



Community Planning & Permitting

Courthouse Annex • 2045 13th Street • Boulder, Colorado 80302 • Tel: 303.441.3930 • Fax: 303.441.4856
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

BOULDER COUNTY PLANNING COMMISSION PUBLIC HEARING

August 17, 2022 at 1:30 p.m.

Hearing to be Held Virtually due to COVID-19

STAFF RECOMMENDATION

STAFF PLANNER: Pete L'Orange, Planner II

Docket SU-22-0003: Dowe Flats Mining and Reclamation Extension

Proposal: Special Use/Site Specific Development Plan review to amend an existing Special Use approval (SU-93-14) for limestone/shale open mining/quarrying located at the Dowe Flats quarry as follows: extend approved mining activities for an additional 15 years; reduce permit area from 1,911 acres to 709 acres; conclude cement plant operations at the facility located south of Highway 66 within the same 15-year timeframe; conduct concurrent reclamation of wildlife habitat.

Location: 13301 55th Street, Parcel #120316000050, located approximately 0.5 mile north of the intersection of N. 53rd Street and state Highway 66, in Sections 9, 10, 15, and 16, Township 3N, Range 70W.

Zoning: Agricultural (A) Zoning District

Owner: CEMEX Inc.

Applicants: Pamela Franch Hora (Primary); Tetra Tech
John Heffernan; CEMEX, Inc.
Therese Glowacki; Boulder County Parks & Open Space

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SUMMARY

The applicants request Special Review and Site-Specific Development Plan review to amend an existing Special Use approval (SU-93-14) to permit an existing limestone/shale open mining and quarrying operation located at the Dowe Flats quarry. The original SU/SSDP approval allowed for the open mining activities to occur for a period of 25 years, starting once mining activities had commenced (which was defined as the movement of at least 100,000 tons of mined material). That 25-year period is scheduled to end in 2022. The original approval also included a number of conditions on, and commitments from, the applicant to mitigate and offset the impacts of the mining activities. The applicant has now requested that the SU/SSDP approval be extended for an additional 15 years. The applicant has proposed additional commitments of record in order to mitigate the land use impacts of the proposal as part of this application.

With the recommended conditions, staff finds the request can meet the Special Review Criteria in Article 4-601 of the Boulder County Land Use Code (the Code) and recommends the Planning Commission recommend conditional approval to the Board of County Commissioners.

HISTORY

Dowe Flats Quarry

The applicants have requested an extension of the mining activities at the Dowe Flats quarry, located north of State Highway 66, for an additional 15 years (see Figure 1 below).

In 1994, the Board of County Commissioners approved a Special Use/Site-Specific Development Plan application for an open mining proposal at the Dowe Flats quarry (SU-93-14). This approval allowed the applicant to conduct mining activities on site to extract approximately 760,000 tons of material a year, with a maximum 25-year mining period. The mining activities at Dowe Flats are also approved through a Colorado State mining permit (M1993-041).

SU-93-14 approved mining activities to progress from the southern portion of the project area to the north, with reclamation occurring as mining activities were completed in each section. Mined materials were approved to be transported from the Dowe Flats quarry across Highway 66 to the cement plant at the Lyons Quarry site via an enclosed conveyer system; transportation of materials was temporarily allowed by truck until the conveyer system was built.

As part of the SU/SSDP approval, the applicants were required to comply with 16 conditions (see Attachment D for the full list of conditions). As one of those, the applicants were required to submit, for review and approval by County Staff, plans for the management and restoration of the land impacted by the mining activities. This was also a requirement of the State of Colorado Division of Reclamation, Mining and Safety permit.

Additionally, the applicants were subject to periodic reviews of the mining operations to ensure that the conditions of approval were being met. These reviews found the operations generally in compliance with the terms and conditions of the approval (See full results in Attachment E). Other conditions of approval included the establishment of non-development covenants on the project area, the donation by the applicant of several conservation easements, the construction of the enclosed conveyor system over Highway 66, and the relocation of some utilities and public rights-of-way.

Currently, the Dowe Flats quarry continues to operate under the existing Boulder County SU approval and State of Colorado permits. To date, approximately 158 acres of the project area have been reclaimed.

Lyons Quarry and Cement Plant

Separate from the mining activities at the Dowe Flats quarry, CEMEX also conducts mining and cement processing activities south of Highway 66. This southern quarry is known as the Lyons

Quarry (see Figure 1 below). The following information on the Lyons Quarry and the associated cement plant is to provide context on the cement processing activities. The operations at the Lyons Quarry and cement plant were not approved under SU-93-14 and are **not** part of the current application to extend mining activities at the Dowe Flats quarry site. The plant and activities on the southern parcels operate under the Land Use Code and state law as nonconforming uses. As nonconforming uses, the owners or any subsequent owners have a right to continue operating the plant at this time.

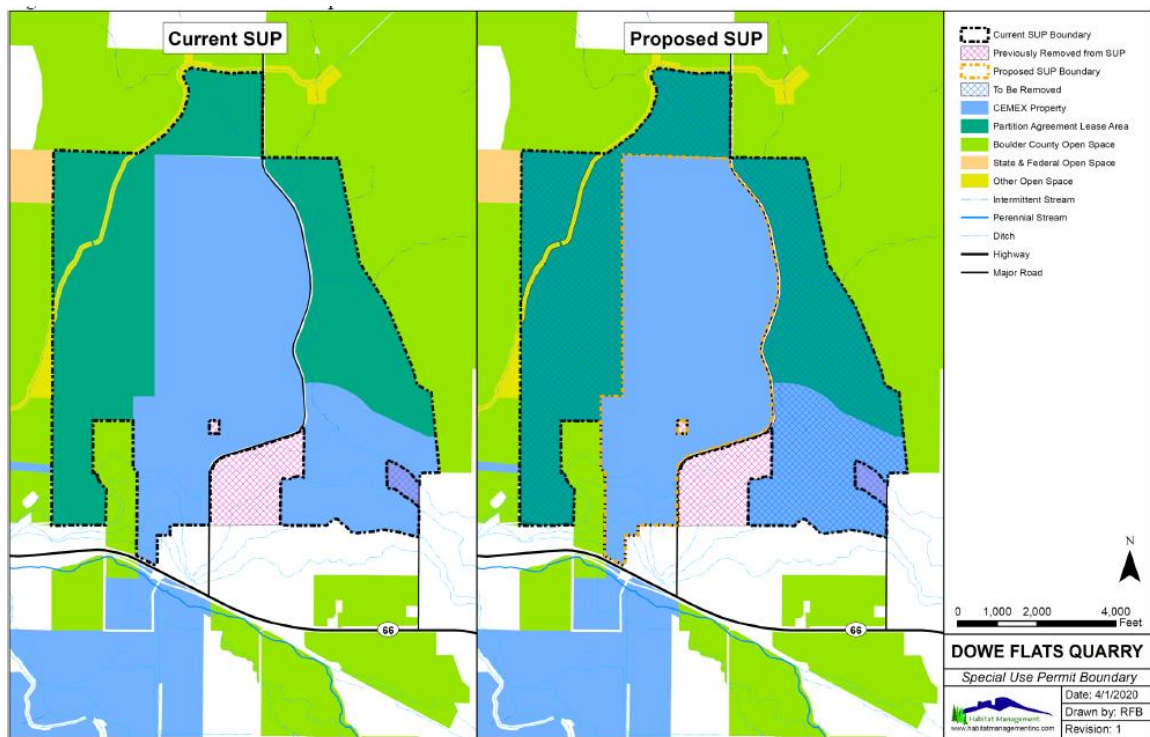


Figure 1: Dowe Flats quarry shown in red; Lyons Quarry shown in blue.

DISCUSSION

The subject property, the Dowe Flats quarry, is located north of State Highway 66, between the City of Longmont and the Town of Lyons. The property is in the Agricultural zoning district. The Dowe Flats quarry open mining use area includes a total of 15 parcels (Parcels 120316000050, 120316000046, 120316001001, 120316001002, 120316001003, 120316001004, 120316001005, 120316001006, 120316001007, 120316001008, 120316001009, 120316001010, 120316001011, 120316001012, and 120316001013). The open mining pits are located on northern-most parcel, 120316000050, while the other parcels are primarily used for the on-site processing of materials and transporting the materials via the conveyor system. The total area encompassed by the proposed extension request is 709 acres.

The subject property has the following designations as determined by the Boulder County Comprehensive Plan: Adjacent to County Open Space on the west, north, and east; Environmental Conservation Area – Rabbit Mountain; High Biodiversity Area – Rabbit Mountain (ranked “B1,” of outstanding significance; limited on parcel); Natural Area – Rabbit Mountain (limited on parcel); View Protection Corridor; Nearby Agricultural Ditches – Supply, Highland, Rough & Ready, Palmerton; Nearby Critical Wildlife and Preble’s Meadow Jumping Mouse habitats – on St. Vrain Creek, and ditches.



The originally approved SU/SSDP boundary encompassed an area of 1,911 acres. Approximately 101 acres have been removed from the boundary over the years due to property sales. The current SU/SSDP area is approximately 1,810 acres. The applicant is proposing, as part of the requested extension to further reduce the boundary to an area of 709 acres. The areas west, north, and east of the proposed new boundary were included in the original approval as buffer areas, much of which is no longer necessary for the current mining activities or the proposed extension of those activities. In addition, much of that land has been transferred to the County. The applicant submitted a map

showing the current SU/SSDP boundary and the proposed boundary (see Figure 2 above).

The current Boulder County approval for mining at Dowe Flats (SU-93-14) included a specific timeframe for the mining activities, which is to end in 2022. The applicant has now applied for Special Use/Site Specific Development Plan review to amend the existing Special Use approval (SU-93-14) to permit the Open Mining use to continue at the Dowe Flats quarry for an additional 15 years.

During this time, the applicant would continue to extract resources from the existing mining pits on the property. The footprint of the mining pits on the subject property would not increase. Rather, the applicant would simply mine deeper in the same location. The applicant has offered the following commitments of record as part of the proposal, as stated in the submitted application materials (see Attachment A):

- A reduction of the purchase prices for Boulder County's existing options to acquire real property north of Hwy. 66 to zero dollars;
- An additional option to Boulder County to purchase (when mining at Dowe Flats is completed) four additional parcels totaling approximately 200 acres around the perimeter of the Dowe Flats mine, at a purchase price of zero dollars;
- An increase in the required rental payments by CEMEX to Boulder County pursuant to the existing buffer lease for properties around the Dowe Flats mine from the current amount of \$1,000/year to an increased amount of \$400,000/year;
- The dedication of a permanent, non-exclusive recreational trail easement to Boulder County for the benefit of Boulder County Parks & Open Space along the south bank of the St. Vrain River or another mutually agreed location;
- A commitment by CEMEX to permanently conclude ongoing cement plant operations at its facility south of Hwy. 66 within the same 15-year timeframe for completion of mining operations (plus reclamation) at Dowe Flats; and
- An additional option to Boulder County to purchase up to approximately 830 acres of CEMEX property surrounding CEMEX's cement plant south of Hwy. 66 at a current price of \$17,000 per acre with a 2.0% annual escalator, upon condition that the Town of Lyons provide consent to Boulder County's acquisition of any lands within the CEMEX Municipal Facilities Area per the 2012 CEMEX Area IGA Map, and provided that CEMEX would reserve an access and utility corridor to/from Hwy. 66 for the benefit of its retained properties.

The applicant would continue to be subject to the conditions of approval as set forth in SU-93-14, as well as all applicable conditions and approvals required through the various required State permits. These include the requirements to carry out the required reclamation on the subject parcel once the mining activities have ceased.

The reclamation plan as approved through SU-93-14, requires the operator to restore the site in a way that is compatible with the surrounding area. Per the application materials (see Attachment A) submitted:

"The currently approved reclamation plan includes two basic vegetation communities: grassland and wetland. The grassland is a somewhat diverse mixture of native range grasses with a small component of wildflowers. The 20-acre wetland, as planned, is to be 98% cattail and 2% rushes. In 1993, when this reclamation plan was approved, at the request of the County, the reclamation plan was geared towards the development of habitat for a single primary species, prairie dogs, which in turn provide food for raptors. While it is important to think about providing some prairie dog habitat, there is already a substantial amount of prairie dog habitat in the area. This site has the potential to provide habitat for many additional species. Because of the location of the property in relation to other open space

land, the site could effectively function as a corridor that expands and connects habitats existing on nearby properties.”

As part of the requested 15-year extension, the applicant has committed to working with Boulder County to revise and improve the reclamation plan to better incorporate the original topographical and vegetative diversity of site in order to provide habitat for a greater variety of local fauna. In addition, sections of the site could be planted with pollinator-friendly vegetation to enhance insect populations. The applicant has also proposed including a diverse wetland habitat with a variety of sedges, rush, forbs, and shrubs interspersed with open water that could be incorporated into the reclamation plan.

As detailed in the criteria review below, staff finds that the proposed extension of the existing Special Use/Site Specific Development Plan (SU-93-14) for a period of 15 years can meet the Special Review Criteria in Article 4-601 of the Code, with the recommended conditions of approval.

REFERRALS

This application was referred to the typical agencies, departments, and adjacent property owners. The original deadline for agencies and departments to respond was June 10, 2022; at the request of the Town of Lyons, that deadline was extended to July 22, 2022.

County Development Review Team – Access & Engineering: This team reviewed the proposal and responded that legal access to the subject property had been demonstrated via State Highway 66 (SH 66), also known as Ute Highway, a Colorado Department of Transportation (CDOT) owned and maintained right-of-way (ROW). They concurred with the trip generation estimates provided in the Pre-Application Methodology Statements (PAMS) dated October 17, 2021 of approximately 20 Average Daily Trips (ADT) being generated by the continued mining and reclamation use on the subject property. Staff does not anticipate the mining and reclamation use will have negative impacts to the surrounding transportation network. Staff has no concerns with the continued use of the subject property for mining and reclamation activities.

County Public Health Department: This department reviewed the proposal and responded that it would be willing to support the mining extension at Dowe Flats for an additional 15 years if the applicant can commit to completing the upgrades and improvements to the plant necessary to address long standing and ongoing fugitive dust and maintenance issues. BPCPH requests Cemex completes the Lyons plant upgrades. Management, along with BCPH staff, has identified the following as necessary future improvements: conveyor belt enclosures, solid closures where there are curtains, Clinker Pit improvement-enclosure with direct conveyance to the A-Frame storage (this is one of the biggest problem areas), broken baghouse detectors, paving the east haul road and improved camera surveillance of the plant.

Boulder County Parks & Open Space: This department reviewed the application materials and determined the proposed mining at Dowe Flats will not extend outside the current disturbance area, rather it will result in mining deeper in the existing footprint. Therefore, the additional disturbance to environmental, cultural, and open space resources is limited. However, because the 15-year extension of mining activity does lengthen the 30-year life of the mine to 45 years, it prolongs the disturbance to the site and impacts to nearby lands. The department also determined that the commitments of record that CEMEX has proposed have important benefits. These are detailed in the May 2, 2022 letter to Dale Case and include the conclusion of plant operations on the same 15-year timeframe of the mine operation, the dedication of a non-exclusive trail easement for the St. Vrain Greenway Trail through the property, the option to purchase additional lands in the future around both the mine and plant sites, and finally monetary savings and income through modification of existing lease and option agreements.

BCPOS included detailed comments about the application as well as recommended conditions of approval in its referral (see the full referral in Attachment B for the specific recommended conditions of approval).

Boulder County Parks & Open Space – Natural Resource Planner: The Natural Resource Planner reviewed the application materials and determined the subject property has the following designations as determined in the Boulder County Comprehensive Plan: Adjacent to County Open Space on the west, north, and east; Environmental Conservation Area – Rabbit Mountain; High Biodiversity Area – Rabbit Mountain (ranked “B1,” of outstanding significance; limited on parcel); Natural Area – Rabbit Mountain (limited on parcel); View Protection Corridor; Nearby Agricultural Ditches – Supply, Highland, Rough & Ready, Palmerton; Nearby Critical Wildlife and Preble’s Meadow Jumping Mouse habitats – on St. Vrain Creek, and ditches.

In general, the Natural Resource Planner agrees with the application’s premise that impacts to natural resources would not significantly change, because: A) the Dowe Flats active mining footprint would not be modified; and B) future impacts can be interpreted as a continuation of existing, previously approved, conditions and impacts.

Additionally, if the proposal is approved with the “mitigating” commitments noted in the CEMEX letter from John Heffernan to Dale Case, dated May 2, 2022, long-term public benefits would significantly increase due to payment changes and the public disposition of many parcels after mining and plant closure. See the full referral comments in Attachment B.

Town of Lyons: The Town of Lyons firmly recommends that the Boulder County Planning Commission advise the Board of County Commissioners to deny the CEMEX mining permit extension application. The Town Board of Trustees, Staff, Boards and Commissions, and community concur.

The Town further asserts that it should have been a part of the discussions between Boulder County Open Space and CEMEX as they negotiated the terms of the real estate agreement, as the Town believes its Primary Planning Area as outlined in the 2012 IGA is directly affected. In addition, the entirety of CEMEX operations, both north and south of SH 66, fall directly within the Town’s state-mandated 3-Mile Planning Area.

The Town requests that the Planning Commission advise the Board of County Commissioners to deny the application and immediately reopen negotiations between CEMEX and the County, with the Town of Lyons as an active participant. The Town would further advise a short-term (six-month) mining extension be put in place.

The Towns states it believes there is a third option to consider, and it is one that every party can benefit from. The Town of Lyons states it would be amenable to a five-year mining and plant operation extension subject to specific conditions:

- Agreement to cease plant operations, decommission the plant and perform reclamation of the plant site and other agreed-to amenities by the end of the term;
- Renegotiation of IGA and ownership boundaries within the property;
- Agreement to annex and rezone the plant property from General Industrial to an agreed-upon zoning classification and discuss annexation and purchase of Lyons Primary Planning Area; and
- Assessment of the two reclamation bonds for Dowe Flats and the plant to ensure amounts are sufficient to cover current costs.

The Town does not believe that CEMEX can continue plant operations indefinitely if the SUP is extended. The current mining permit, M-1977-208, mandates that should mining operations cease

north of SH 66 at the Dowe Flats quarry, the cement plant south of SH 66 in turn must be demolished and the land reclaimed to “irrigated pasture”.

Adjacent Property Owners: Notices were sent to all property owners within a 1-mile radius of the subject property. All responses received as of August 9, 2022 are attached and summarized below. To date, staff received 63 public comments in response: 6 in support; 43 in opposition; and 10 comments classified as “other.”

The comments in support mainly focused on local jobs and the applicant’s commitment to close down the cement plant.

The vast majority of the comments received were in opposition. Most of these comments expressed concern about the environmental impacts of the cement plant and the impacts of the plant on the neighboring communities (mostly the Town of Lyons). The most common comments on the environmental impacts focused on carbon emissions and greenhouse gasses. Several comments mentioned past citations on the plant by environmental regulation agencies. Several questioned whether the cement plant would remain after operations at the Lyon Quarry ceased and expressed concern that the plant could simply be sold to another company who could continue to operate it. Likewise, there were a couple of comments questioning whether it would be economically viable for the cement plant to continue to operate if the Dowe Flats quarry was closed and suggesting that the closure of the Dowe Flats quarry would result in the cement plant closing as well, regardless of the applicants’ statement the plant could continue to operate “indefinitely.” Cited impacts to the neighboring communities included dust from the cement plant, light and noise pollution, traffic impacts, and negative impacts to local property values. Several comments also expressed concern about the impacts of the plant on the health of community members, most specifically respiratory issues.

The majority of the comments in the “other” category were members of the public asking that the Planning Commission hearing on this application for July 20, 2022 be delayed.¹ A few of the “other” comments were members of the public asking for clarification on technical items or for information on how to stay informed on the process.

Staff notes that many of the comments and concerns expressed by members of the public are specific to the cement plant located at the Lyons Quarry site. The Lyons Quarry and the cement plant are not part of the Docket SU-22-0003 application and are not currently under review.

Agencies that responded with no conflict: Larimer County Planning.

Agencies that did not submit a response: Boulder County Long Range Planning; Boulder County Building Official; Boulder County Assessor; Boulder County Attorney; Boulder County Conservation Easement Team; Norther Colorado Water Conservancy District; St. Vrain & Left Hand Water Conservancy District; Longmont Power and Communications; Poudre Valley REA; City of Longmont Planning & Development Services; Boulder Valley & Longmont Conservation District; Colorado Department of Natural Resources Division of Reclamation, Mining, and Safety; Colorado

¹ There was general misunderstanding by some members of the public that a hearing had been scheduled for July 20, 2022; no public hearing for this case was scheduled for that date. There was also a misconception that the original referral response deadline of June 10, 2022 for departments and agencies was also a deadline for comments from the public in general. When staff received comments of this nature, staff responded with a detailed explanation of the review process, how and when cases get scheduled to go before the Planning Commission and the Board of County Commissioners, and emphasized that the public comments would be accepted throughout the review process, including at the hearings by the Planning Commission and the Board of County Commissioners.

Department of Transportation; United States EPA Region 8; and Hygiene Valley Fire Protection District.

SPECIAL REVIEW CRITERIA

The Community Planning & Permitting staff has reviewed the proposal to amend an existing Special Use approval (SU-93-14) to allow limestone/shale open mining/quarrying activities at the Dowe Flats quarry for an additional 15 years pursuant to the Special Use Review standards in Article 4-601 of the Code, and finds the following:

- (1) ***Complies with the minimum zoning requirements of the zoning district in which the use is to be established, and will also comply with all other applicable requirements;***

Open Mining uses are an allowed use through the Special Use Review process in the Agricultural Zoning District, where the subject property is located. The applicant proposes to amend the existing Special Review approval (SU-93-14) to extend the approved mining activities for an additional 15 years.

Article 4-508.C of the Boulder County Land Use Code defines Open Mining as “*The extraction of earth materials by mining directly from the exposed deposits or other materials. Exceptions to this use include those operations which fit the definition of limited impact open mining and excavations below finished grade for basements and footings of a building, retaining wall or other structures authorized by a valid building permit. The term open mining includes, but is not limited to, such processes as open cut mining, open pit mining, strip mining, quarrying and dredging.*” Additional provisions in the Code for Open Mining in 4-508.C.5, including:

- a. *This use is not required to be located on a building lot, or comply with the minimum lot size requirement for the district in which it is located.*
- b. *This use shall also be granted and maintain all applicable local, state, and federal permits.*
- c. *Processing of the mined material (to the extent approved through the special use process) may occur on the parcel where the mining is situated, or on a parcel owned or leased by the mining parcel owner, lessee, or operator provided the parcel is located within 1,000 feet of the mining parcel.*

Staff finds that the current mining activities and the proposed extension of 15 years are consistent with the definition of Open Mining as described in the Code. The existing mining operations are considered to be “open pit mining,” and the proposed 15-year extension would not change that use.

Article 4-508.C.5.a states that Open Mining uses are not required to be located on a building lot or comply with the minimum lot size requirement for the zoning district in which it is located. The existing operations at Dowe Flats are on a site of over 35 acres, which is the minimum required lot size in the Agricultural zoning district. The proposed extension of operations will be located on the same site.

Article 4-508.C.5.b requires that an Open Mining Use be granted and maintain all applicable local, state, and federal permits. The applicants have obtained and maintained all applicable local, state, and federal permits to date. To ensure that the applicant and the mining operations continue to meet the conditions of Article 4-508.C.5.b, staff recommends that the Board include, as a conditional of approval, that the applicant obtain any new, or amend any existing, state, and federal permits as appropriate and necessary, and maintain any and all such permits for the duration of mining activities at the subject site.

Article 4-508.C.5.c allows for the processing of the mined materials to occur either on the same site as the mining activities or on another site, provided that other site is within 1,000 feet of the mining site. The materials currently mined at Dowe Flats are initially processed on the subject site, and then transported via the enclosed conveyor system to the facilities located at the Lyons Quarry site (as discussed above, the Lyons Quarry operations, including the cement plant and the processing of materials at the Lyons Quarry site, which are not part of this application and are not under review). The Lyons Quarry site is located across State Highway 66 from the Dowe Flats, a distance of approximately 150 feet. The extension of mining activities at Dowe Flats as proposed in this application would not result in any change to existing conditions related to the processing location. As such, this provision is met.

Therefore, as conditioned, staff finds this criterion can be met.

- (2) ***Will be compatible with the surrounding area. In determining compatibility, the Board should consider the location of structures and other improvements on the site; the size, height and massing of the structures; the number and arrangement of structures; the design of structures and other site features; the proposed removal or addition of vegetation; the extent of site disturbance, including, but not limited to, any grading and changes to natural topography; and the nature and intensity of the activities that will take place on the site. In determining the surrounding area, the Board should consider the unique location and environment of the proposed use; assess the relevant area that the use is expected to impact; and take note of important features in the area including, but not limited to, scenic vistas, historic townsites and rural communities, mountainous terrain, agricultural lands and activities, sensitive environmental areas, and the characteristics of nearby development and neighborhoods;***

The area surrounding the Dowe Flats quarry is primarily open space. There are a few residential and agricultural properties south of the quarry location clustered on several parcels located northwest of the corner of State Highway 66 and N. 53rd Street. There are also several municipal infrastructure facilities related to the City of Longmont's water treatment plant located on the east side of N. 53rd Street.

The application as submitted does not propose any changes to the existing use and does not propose new structures.

In considering the proposed removal or addition of vegetation, site disturbance, and any grading and changes to the natural topography that would result from this application, as required by this criterion, staff determined the utilization of the existing mining site is a unique situation, which may allow for this criterion to be met, subject to conditions as described below.

The Dowe Flats quarry operations since the original Special Use approval (SU-93-14) have already resulted in site disturbance, which is an expected consequence of the Open Mining use as approved. The continued mining activities which would result from the requested extension would be limited to the area in which site disturbance has already occurred. The application as submitted would not expand this existing "footprint." As such, staff finds that the proposed extension would not result in any significant increased impacts to the compatibility of the area from existing conditions; however, the requested extension would prolong the visual impacts which have already occurred. The original Special Use approval (SU-93-14) permitted the removal of the vegetation as it existed at that time, the site disturbance, and the grading and changes to the natural topography; this approval was conditioned (in part) on the eventual reclamation of the site post-mining.

This criterion also requires that the Board consider the potential impacts to scenic views. The existing mining pit and most of the quarry operations are not visible from most public roads in the area. This is due both to the specific contours of the terrain surrounding the mining pits and the distance of the mining operations from public roads. The mining pit can be seen, however, from Dakota Ridge Road, north of the Dowe Flats quarry location. Likewise, the mining pit can be seen from the hiking trails at the Rabbit Mountain Open Space. Due to depth of the mining pit and distance from the mining pit to these public locations, however, most of the actual mining activities will not be visible to members of the public. The surrounding areas which have not been physically altered to date, would remain unaltered. As the Dowe Flats quarry site has already been impacted through the existing approval and the proposal would only allow for the mining activities to go deeper without expanding the footprint of the operations, continued mining operations at this specific site would not increase those impacts.

As for the impacts which have already occurred as a result of the mining activities as approved through SU-93-14, one of the conditions placed on that approval, and as required by various State Colorado permits, is that the applicant carryout approved reclamation efforts during and after mining operations at Dowe Flats. As addressed in the discussion above, the reclamation plans included in the application materials submitted are conceptual and are in need of refining to mitigate the impacts of the mining operations. Per the application materials (see Attachment A) and the applicant's subsequent reply to Boulder County Parks and Open Space's referral response (see Attachment C), the applicant agrees to work with Boulder County Parks and Open Space and the State of Colorado Division of Reclamation, Mining, and Safety to modify and refine the reclamation plans to ensure that the impacts resulting from the mining activities are appropriately mitigated post-mining operations at Dowe Flats.

In reviewing the application materials, Boulder County Parks and Open Space staff have stated they do not support the creation of wetlands and open water features in the reclamation plan for a variety of reasons. First, Parks and Open Space staff finds that returning the site as much as possible to its pre-mine landscape is the best for long-term ecosystem sustainability. The area was a grassland with associated wildlife, returning the site to that environment is best for the site and adjacent properties. Grassland reclamation of the site fits better into the landscape. Staff does not find that the 'varied' topographical reclamation proposed in the application will benefit wildlife. Grasslands are the most threatened habitat type in our region and are highly diverse overall. Secondly, staff is concerned about water rights associated with the constructed wetland. For example, if the created wetland intercepted groundwater, the subsequent land manager will need water rights adequate for augmenting the evaporative loss.

Staff recommends that the Board condition any approval on the following: that the applicant develop a grassland reclamation plan, consistent with the approved reclamation plan and reflective of the pre-mine vegetative potential of the site; the applicant shall submit a final reclamation plan for review by Boulder County Parks and Open Space staff at least six months prior to December 31, 2037; that the applicant shall make good faith reasonable efforts to incorporate into the final reclamation plan requests for modifications from Parks and Open Space staff.

Therefore, as conditioned, staff finds this criterion can be met.

- (3) *Will be in accordance with the Boulder County Comprehensive Plan;*

There are multiple policies and goals in the Boulder County Comprehensive Plan which have been considered and evaluated in considering this criterion.

Element III: Cultural Resources Element

This Element of the Comprehensive Plan provides guidance on the County's efforts to identify, document, and protect the county's archaeological resources (either historic or prehistoric), historic buildings, sites, districts, and landscapes.

Policy CR 1.01 states: "*Boulder County shall continue researching and documenting the county's cultural resources including maintaining a comprehensive historic sites survey.*"

The original Special Use approval for the Dowe Flats quarry (SU-93-14) included a requirement that the operator produce and implement a cultural resources plan; this requirement was reemphasized and expanded during the site's 1-year compliance review by requiring the operator to catalog and document their cultural resource monitoring activities. As the requested extension for mining activities would occur in areas which have already been disturbed, no new cultural resource surveys are necessary. To ensure that those cultural resources already identified continue to be protected, staff recommend the Board include the following as a condition of approval: the 1994 Cultural Resource Management Plan shall remain active, for all cultural resources located on subject property, for the entirety of mining operations, including the annual monitoring required in the Cultural Resources Management Plan.

As conditioned, staff finds the proposal can be in accordance with this section of the Comprehensive Plan

Element V: Environmental Resources Element

This Element of the Comprehensive Plan provides guidance on the County's efforts to preserve, conserve and restore the unique and distinctive natural features, ecosystems and landscapes of the county using sound resource management principles and practices.

Policy ER 3.02 states: "*Boulder County shall encourage the removal of development rights from [Environmental Conservation Areas] through transfer, donation, acquisition, trade, or other incentives.*"

Policy ER 3.03 states: "*Development within ECAs shall be located and designed to minimize the cumulative impacts on the environmental resource values of ECAs.*"

Policy ER 3.05 states: "*Boulder County shall encourage and participate with the appropriate public entities and private landowners in the development of coordinated management plans to conserve, preserve and restore the environmental resource values of ECAs.*"

The Dowe Flats site is located in an area designated as the Rabbit Mountain Environmental Conservation Area as identified in the Comprehensive Plan. Boulder County currently holds options for the purchase of the land post-mining and post-reclamation, preventing future development on the site. The proposed extension keeps the County's option on the land and reduces the purchase price to zero dollars plus title and closing. The environmental resources of the site have already been impacted due to the mining activities on the site. Limiting mining activities to the area which has already been impacted, the cumulative impacts are minimized by preventing potential impacts to currently unaltered areas, whether in Boulder County or in other counties should the applicants pursue mining activities in surrounding areas. With the recommended conditions of approval under Criterion 2 above, specifically the condition to related to the grassland reclamation plan, the County will be able to help develop

a management plan that will preserve and restore the environmental resources of the Rabbit Mountain ECA more effectively than the restoration which would occur under the existing reclamation plan.

Policy ER 4.02 states: “*Boulder County shall coordinate with local, state, and federal agencies and municipalities, as well as with willing private landowners, to protect natural resource values within Natural Landmarks and Natural Areas. This may include: identification of specific resources of concern including scenic values; recommendations for long-term management; mitigation of existing or foreseen impacts; or protection through acquisition of land interest.*”

The northwest portion of the subject property is located within the Rabbit Mountain Natural Area as identified in the Comprehensive Plan (see Figure 3 below). The majority of the mining activities take place outside of the Natural Area, but some do occur at the very northern end of the property. The proposed extension of mining-activities will occur in these already impacted areas, minimizing the impact to the Natural Area as a whole. Additionally, the required reclamation of the subject property post-mining will significantly mitigate these impacts and will provide for the long-term management of the area.



Figure 3: The subject property with the Rabbit Mountain Natural Area shows in green.

With the County’s post-mining and post-reclamation purchase options on the subject property, and with the conditions of approval as recommended in Criterion 2 above, staff finds the proposal is in accordance with this section of the Comprehensive Plan.

Element VII: Geology Element

This Element of the Comprehensive Plan is intended to provide clear direction in the formulation and implementation of county land use decisions so far as geological factors are concerned. The goals and policies in this Element are also intended to: 1) move toward the attainment of the adopted goals for the Boulder County Comprehensive Plan as directed in

Goal Statements B.1 and B.2, and 2) fulfill the county's obligation to implement a Master Plan for Extraction of Commercial Mineral Deposits pursuant to 30-28-106(c), CRS.

Policy GE 2.05 states: "... *the county shall prohibit or regulate, including by Special Use Review and the like, the open mining of any mineral or earthen material ...*" Additionally, Policy GE 2.10 states: "*In cooperation with the Colorado Mined Land Reclamation Board and its staff, the county shall require that all 'affected land' as defined by Colorado Statute, be reclaimed...*"

The request by the applicant to amend the current approval for Open Mining at the Dowe Flats quarry site is being reviewed through the Special Use Review process. Both the existing approval and the requested extension amendment include post-mining reclamation of the affected land. As such, staff finds the proposal is in accordance with this section of the Comprehensive Plan.

Element X: Open Space Element

This Element of the Comprehensive Plan lays out the County's vision for understanding, preserving, and enjoying the county's natural heritage, and guidance on how to achieve these goals.

Policy OS 2.01 states: "*Boulder County acquires real property rights to protect open space values and functions....*" And Policy OS 2.02 states: "*Boulder County acquires real estate interests in land, water, and minerals through appropriate real estate methods such as fee title, conservation easements, and trail easements.*"

As discussed previously, the County holds post-mining and post-reclamation purchase options on the subject property. As part of the 15-year extension request, the applicant has committed to reducing the purchase price on these existing options, and to include new options on land owned by the applicant south of Highway 66 (see the submitted cover letter in Attachment A). Staff recommends that the following be included as a condition of any approval: the applicant shall sign a real estate option or other agreement ("New Agreement") that comprehensively documents the applicant's commitments in the application to grant Boulder County options to acquire land and easements from the applicant. The New Agreement shall include all water rights appurtenant to the option properties and reclamation requirements arising from this application, must be acceptable to the county in its sole discretion, and shall supersede and replace that certain Purchase Agreement, Lease and Option to Purchase dated July 11, 2002, recorded July 17, 2002, at Reception #2308598 in the office of the Clerk & Recorder of Boulder County. Additionally, the applicant shall work with Parks and Open Space staff to determine the appropriate seed mixture(s) for the required reclamation post-mining.

As conditioned, staff finds the proposal is in accordance with this section of the Comprehensive Plan.

Element XI: Public Health Element

The goals and policies in this Public Health element bolster and complement health-related content in other elements, and address additional topics related to public and environmental health.

Policy PH 1.01 states: "*Boulder County recognizes the direct and secondary health impacts of outdoor air pollution produced by industrial, vehicular and other sources. The county collaborates with industry, state and neighboring governments to respond to and mitigate the*

health impacts of poor air quality due to particulate matter, ground-level ozone, smoke from wildfires, greenhouse gases and other air pollutants.”

Many of the comments received from the public related to this docket express concerns about the health impacts of air pollution from the cement plant operations at the Lyons Quarry site. As discussed above, however, the Lyons Quarry and the cement plant operations are not part of this application or this review. As stated by the applicant, the plant would continue to be operated if the requested extension for the Dowe Flats quarry were to be rejected. While the operations of the cement plant are not the subject of this review, the applicant has committed to the closure of the plant at the end of the requested 15-year extension for Dowe Flats. Having a defined and agreed upon timeframe for the closure of the plant, supports Policy PF 1.01. As such, staff finds the proposal is in accordance with this section of the Comprehensive Plan.

The extension as proposed and with recommended conditions is generally in accordance with the Boulder County Comprehensive plan. As discussed above, staff recommends several conditions of approval to ensure that the requested 15-year extension for the mining activities at Dowe Flats continue to be in accordance with specific polies of the Comprehensive Plan.

Therefore, as conditioned, staff finds this criterion can be met.

- (4) ***Will not result in an over-intensive use of land or excessive depletion of natural resources. In evaluating the intensity of the use, the Board should consider the extent of the proposed development in relation to parcel size and the natural landscape/topography; the area of impermeable surface; the amount of blasting, grading or other alteration of the natural topography; the elimination or disruption of agricultural lands; the effect on significant natural areas and environmental resources; the disturbance of plant and animal habitat, and wildlife migration corridors; the relationship of the proposed development to natural hazards; and available mitigation measures such as the preservation of open lands, the addition or restoration of natural features and screening, the reduction or arrangement of structures and land disturbance, and the use of sustainable construction techniques, resource use, and transportation management.***

The location of the proposed extension of mining activities at the Dowe Flats quarry is a location which has already been impacted by past and current open mining activities as previously reviewed and approved. Many of the impacts addressed in the criterion have already occurred; these impacts include alterations to the natural landscape and topography, the effects on Rabbit Mountain Natural Area, and the disturbance of the plant and animal habitats. The proposed extension of these mining activities would not result in any increase in the size of the mining pit; rather, the mining activities would go deeper in the same location. While the proposed extension would not result in any expansion of the area of disturbance, it would, extend the period of the already existing impacts for an additional 15 years.

In considering these impacts and evaluating the proposed extension under this criterion, staff considered available mitigation measures, such as the preservation of open lands and the restoration of natural features. The County’s existing purchase options on the project area post-reclamation will help mitigate the impacts of the existing mining operations by ensuring that the land will be preserved as open space going forward. The applicants’ commitment of record related to new options for County acquisition of lands south of Highway 66, after the closure of the Lyons Quarry and the cement plan and the required reclamation, will help mitigate the requested extension, as it will result in more open land being preserved.

A mitigation measure for the SU-93-14 approval and the Colorado State mining permit (M1993-041) require the mine operator to carry out reclamation of the land once mining activities have ceased. As addressed in the discussion of Criterion 2 above, the reclamation plans included in the application materials submitted are conceptual and are in need of refining to mitigate the impacts of the mining operations. Per the application materials (see Attachment A) and the applicant's subsequent reply to Boulder County Parks and Open Space's referral response (see Attachment C), the applicant agrees to work with Boulder County Parks and Open Space and the State of Colorado Division of Reclamation, Mining, and Safety to modify and refine the reclamation plans to ensure that the impacts resulting from the mining activities are appropriately mitigated post-mining operations at Dowe Flats.

Therefore, as conditioned in this Criterion and Criterion 2 above, staff finds this criterion can be met.

(5) *Will not have a material adverse effect on community capital improvement programs;*

There is no indication the proposal will have an adverse effect on community capital improvement programs, and no referral agency has responded with such a concern.

Therefore, staff finds this criterion is met.

(6) *Will not require a level of community facilities and services greater than that which is available;*

Staff does not anticipate the proposal will have an adverse effect on community facilities and services, and no agencies submitted a response voicing any concerns about community facilities or services.

Therefore, staff finds this criterion is met.

(7) *Will support a multimodal transportation system and not result in significant negative impacts to the transportation system or traffic hazards;*

There are two points of access to the subject property. The first is via State Highway 66 (SH 66), also known as Ute Highway, a Colorado Department of Transportation (CDOT) owned and maintained right-of-way (ROW). The second is via N. 53rd Street, a Boulder County owned and maintained ROW with the Functional Classification of Local. Legal access is demonstrated via adjacency to these public ROWs.

Boulder County Community Planning and Permitting staff with the Access and Engineering team reviewed the application material and concurs with the trip generation estimates provided in the Pre-Application Methodology Statements (PAMS) dated October 17, 2021 (see Attachment A) of approximately 20 Average Daily Trips (ADT) being generated by the continued mining and reclamation use on the subject property. Based on this information, staff does not anticipate the mining and reclamation use will have negative impacts to the surrounding transportation network.

Therefore, staff finds this criterion is met.

(8) *Will not cause significant air, odor, water, or noise pollution;*

The requested 15-year extension of the open mining activities are regulated, as noted below, to control and mitigate impacts on air, odor, water, and noise pollution. With the required

regulatory mitigation measures, the proposal extension will not have significant impacts. The existing mining activities operate under an Air Pollution Emissions Notice (APEN) and Storm Water Permit and associated stormwater management plan as issued by the State of Colorado Department of Public Health and Environment (CDPHE). There are no records of violations of these plans and permits at the Dowe Flats quarry site. To ensure that these potential impacts are tracked and monitored, staff recommends that the Board include the following as conditions of approval: the permit shall continue to be subject to the period review and assessment every five (5) years as required in the original approval of docket SU-93-14; the applicant shall ensure all site monitoring reports (air, water, wildlife, noise, et cetera) required by Boulder County and the State of Colorado Division of Mining, Reclamation and Safety are submitted to Boulder County Parks and Open Space.

The cement plant at the Lyons Quarry site has a significant impact on air quality and noise levels in the area. As discussed above, the current operations at the Lyons Quarry and the cement plant are not part of this application or this review. As part of the proposal, however, the applicant has committed to close the cement plant at the end of the requested 15-year extension. Although staff does not have the ability to unilaterally stop the cement plant as part of this application, the applicant has agreed to do so as a commitment of record. If the requested extension is not approved, the applicant has stated that it intends to continue to operate the cement plant indefinitely, with no identified timeframe for its closure. While members of the public have questioned whether it would be financially feasible for the applicant to continue to operate the plant without access to raw materials from Dowe Flats, that analysis is beyond the purview of this application and the financial feasibility of importing materials is a decision that applicant would have to make. An increase in imported materials would certainly result in an increase in air, odor, and noise pollution due to an increase in truck traffic needed to bring those raw materials in from one or more alternate source locations.

Staff finds the continuation of the existing mining operations at Dowe Flats, and the closure and deconstruction of the cement plant at the end of the 15-year extension, would result in significantly less air, odor, water, and/or noise pollution than the indefinite operation of the cement plant at the Lyons Quarry site with the importation of raw materials. Staff recommends the Board include the following as a condition of approval: upon the expiration of the requested 15-year extension, as proposed by the applicant, the operator shall cease all operations at the Lyons Quarry site and carry out all required reclamation. This shall include the permanent closure and construction of the Lyons Quarry cement plant and the reclamation of the plant site.

Staff also finds that the air, odor, water, or noise pollutions impacts of the 15-years of continued mining at Dowe Flats are sufficiently mitigated by the state and federal environmental impact permitting requirements as discussed above. The noise impacts of the mining activities at Dowe Flats are mitigated by the earthen berms constructed around the site; the fact that mining activities occur deep within the existing mining pits and that the processing equipment on-site is enclosed.

Therefore, as conditioned, staff finds this criterion can be met.

(9) *Will be adequately buffered or screened to mitigate any undue visual impacts of the use;*

As noted above, the existing mining pit and most of the quarry operations are not visible from most public roads in the area due to the contours of the terrain and the distance of the mining operations from public roads. The quarry can be seen from Dakota Ridge Road, north of the Dowe Flats quarry location and from the hiking trails at the Rabbit Mountain Open Space.

Due to depth of the mining pit and distance from the mining pit to these public locations, however, most of the actual mining activities will not be visible to members of the public. Additionally, the area of site disturbance will not be increasing; instead, the excavation will be going deeper into the current pit.

Therefore, staff finds this criterion is met.

(10) *Will not otherwise be detrimental to the health, safety, or welfare of the present or future inhabitants of Boulder County;*

The requested 15-year extension of mining activities at the Dowe Flats quarry site would result in impacts to the health, safety, or welfare of the present or future inhabitants of Boulder County due to the inherent risks and environmental impacts of open mining. These impacts to health, safety, and welfare can be sufficiently mitigated, however, by the recommended conditions of approval. Specifically, the closure of the cement plant at the end of the 15-year extension would remove a significant source of pollution, carbon-dioxide emissions, and heavy mining-related truck traffic on Highway 66.

In addition, the opportunity for the County to acquire a significant amount of land (post-reclamation), both north and south of Highway 66, as included in the applicants' commitment of record, would be a significant mitigation measure. It will provide the inhabitants of Boulder County with access to a significant amount of new open space for recreation.

Therefore, as conditioned, staff finds this criterion can be met.

(11) *Will establish an appropriate balance between current and future economic, environmental, and societal needs by minimizing the consumption and inefficient use of energy, materials, minerals, water, land, and other finite resources;*

With the recommended conditions of approval, allowing the continued Open Mining use at the Dowe Flats quarry will establish an appropriate balance between accommodating societal and economic needs for cement and concrete by providing for efficient extraction and transportation of raw materials, while mitigating the environmental impacts. The environmental impacts are mitigated by the commitments of record and conditions of approval, specifically, options to purchase approximately 1,030 additional acres at or near the property, dedication of a permanent non-exclusive recreational trail easement along the south bank of the St. Vrain river, and the permanent closure of all operations at the Lyons quarry and cement plant at the end of the 15-year period.

Therefore, as conditioned, staff finds this criterion can be met.

(12) *Will not result in unreasonable risk of harm to people or property – both onsite and in the surrounding area – from natural hazards. Development or activity associated with the use must avoid natural hazards, including those on the subject property and those originating off-site with a reasonable likelihood of affecting the subject property. Natural hazards include, without limitation, expansive soils or claystone, subsiding soils, soil creep areas, or questionable soils where the safe-sustaining power of the soils is in doubt; landslides, mudslides, mudfalls, debris fans, unstable slopes, and rockfalls; flash flooding corridors, alluvial fans, floodways, floodplains, and flood-prone areas; and avalanche corridors; all as identified in the Comprehensive Plan Geologic Hazard and Constraint Areas Map or through the Special Review or Limited Impact Special Review process using the best available information. Best available information includes, without limitation, updated*

topographic or geologic data, Colorado Geologic Survey landslide or earth/debris flow data, interim floodplain mapping data, and creek planning studies.

The Boulder County Comprehensive Plan identifies a number of geologic hazards on the subject parcel including steeply dipping and heaving bedrock, debris flow susceptibility areas, rockfall susceptibility areas, landslide high susceptibility areas, and high swelling soil potential areas. However, all of these are directly associated with, or the result of, the Open Mining activities on the site. The area is not open to the public and access to the subject property is restricted. The extension of the mining activities would not result in any increased risk over existing conditions.

Additionally, the reclamation required under the Colorado State mining permit, SU-93-14, and the recommended conditions of approval regarding reclamation will significantly reduce these geological hazards once those reclamation requirements are completed.

Therefore, as conditioned, staff finds this criterion is met.

- (13) *The proposed use shall not alter historic drainage patterns and/or flow rates unless the associated development includes acceptable mitigation measures to compensate for anticipated drainage impacts. The best available information should be used to evaluate these impacts, including without limitation the Boulder County Storm Drainage Criteria Manual, hydrologic evaluations to determine peak flows, floodplain mapping studies, updated topographic data, Colorado Geologic Survey landslide, earth/debris flow data, and creek planning studies, all as applicable given the context of the subject property and the application.*

The original, historic drainage patterns on the subject property have already been significantly impacted. The requested extension of mining activities will not result in any additional changes to drainage patterns in the long-run.

The required reclamation of the area post-mining will significantly mitigate these impacts once mining activities have ceased. Boulder County Parks and Open Space staff have reviewed the proposed reclamation plan and have determined that they do not support the creation of wetlands and open water features in the reclamation plan. Specifically, staff finds that returning the site as much as possible to its pre-mine landscape as grassland is the best for long-term ecosystem sustainability. With the recommended conditions included under criteria 2, 3, and 12 above, the impacts to historic drainage patterns will be acceptably mitigated.

Therefore, as conditioned, staff finds this criterion is met.

RECOMMENDATION

Staff has determined that the proposal can meet all the applicable criteria of the Boulder County Land Use Code for Special Review. Therefore, staff recommends that the Planning Commission recommend that the Board of County Commissioners *conditionally approve docket SU-22-0003 Dowe Flats Mining and Reclamation Extension* with the following conditions:

1. The applicants shall provide a Development Agreement, for review and approval by County staff, prior to the issuance of a license or permits by the Boulder County Community Planning & Permitting Department and prior to the recordation of said agreement within one year of approval.

2. The 1994 Cultural Resource Management Plan shall remain active, for all cultural resources located on the subject property, for the entirety of mining operations, including the annual monitoring required in the Cultural Resources Management Plan.
3. The applicant shall obtain any new, or amend any existing, state, and federal permits as appropriate and necessary, and maintain any and all such permits for the duration of mining activities at the subject property.
4. The applicant shall develop a grassland reclamation plan, consistent with the approved reclamation plan and reflective of the pre-mine vegetative potential of the site.
5. The applicant shall submit a final reclamation plan for review by Boulder County Parks and Open Space staff at least six months prior to December 31, 2037.
6. The applicant shall make good faith reasonable efforts to incorporate into the final reclamation plan requests for modifications from Boulder County Parks and Open Space staff.
7. The applicant shall sign a real estate option or other agreement (“New Agreement”) that comprehensively documents the applicant’s commitments in the application to grant Boulder County options to acquire land and easements from the applicant. The New Agreement shall be acceptable to the county in its sole discretion.
8. The applicant shall work with Boulder County Parks and Open Space staff to determine the appropriate seed mixture(s) for the required post-mining reclamation.
9. The permit shall continue to be subject to the periodic review and assessment every five (5) years as required in the original approval of docket SU-93-14.
10. The applicant shall ensure all site monitoring reports (air, water, wildlife, noise, et cetera) required by Boulder County and the State of Colorado Division of Mining, Reclamation and Safety are submitted to Boulder County Parks and Open Space.
11. At the expiration of the 15-year extension, as dated from the date of approval by the Board of County Commissioners, the operator shall cease all operations at the Lyons Quarry site and carry out all required reclamation. This shall include the permanent closure and deconstruction of the Lyons Quarry cement plant and the reclamation of the plant site.
12. The applicants shall be subject to the terms, conditions, and commitments of record and in the file for docket **SU-22-0003: Dowe Flats Mining and Reclamation Extension**.



May 2, 2022

Dale Case, AICP
Director
Boulder County Community Planning & Permitting
2045 13th Street
Boulder, CO 80302

Re: Application to Extend Special Use Permit for the Dowe Flats Mine

Dear Mr. Case:

Enclosed for filing with Boulder County Community Planning & Permitting is a complete land use application by CEMEX, Inc. ("CEMEX"), for a Special Use Permit to extend operations at the Dowe Flats limestone and shale mine for an additional fifteen years. In anticipation of the submission of this application, CEMEX has been working with Boulder County Parks & Open Space regarding potential additional open space preservation and trails commitments by CEMEX if an extended mining term is approved as requested. These potential additional commitments of CEMEX include the following items:

- A reduction of the purchase prices for Boulder County's existing options to acquire real property north of Hwy. 66 to zero dollars plus title and closing costs, resulting in savings to the County of approximately \$6.6M;
- The grant of an additional option to Boulder County for the benefit of Boulder County Parks & Open Space for its potential future purchase (when mining at Dowe Flats is completed) of four additional parcels totaling approximately 200 acres around the perimeter of the Dowe Flats mine, at a purchase price of zero dollars plus title and closing costs;
- An increase in the required rental payments by CEMEX to Boulder County pursuant to the existing buffer lease for properties around the Dowe Flats mine from the current amount of \$1,000/year to an increased amount of \$400,000/year, equating to a total value of \$6.0M for 15 years;
- The dedication of a permanent, non-exclusive recreational trail easement to Boulder County for the benefit of Boulder County Parks & Open Space along the south bank of the St. Vrain River or another mutually agreed location;
- A commitment by CEMEX to permanently conclude ongoing cement plant operations at its facility south of Hwy. 66 within the same 15-year timeframe for completion of mining

CEMEX, Inc.
10100 Katy Freeway, Suite 300, Houston, TX 77043

Dale Case
May 2, 2022
Page 2

operations (plus reclamation) at Dowe Flats instead of continuing to operate the cement plant indefinitely as has been contemplated; and

- The grant of an additional option to Boulder County for the benefit of Boulder County Parks & Open Space for the potential future purchase of up to approximately 830 acres of CEMEX property surrounding CEMEX's cement plant south of Hwy. 66 at a current price of \$17,000 per acre with a 2.0% annual escalator, upon condition that the Town of Lyons provide consent to Boulder County's acquisition of any lands within the CEMEX Municipal Facilities Area per the 2012 CEMEX Area IGA Map, and provided that CEMEX would reserve an access and utility corridor to/from Hwy. 66 for the benefit of its retained properties.

These terms would be set forth in additional future agreements between the County and CEMEX, and all such terms are and will remain subject to final approval of the enclosed land use application with conditions consistent with the above terms and otherwise acceptable to CEMEX in its discretion.

Thank you in advance for your consideration. CEMEX looks forward to continuing to work with the County on these matters.

Sincerely,

CEMEX, Inc.

By: 

John V. Heffernan, Authorized Agent

enc.

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DOWE FLATS SPECIAL USE REVIEW APPLICATION

TABLE OF CONTENTS

The following documents are included in the application package. The number on each document refers to the number of the document on the Submittal Requirements Form.

1. 1: Special Use Review Submittal Requirements Form
2. 2: Application Form signed by CEMEX, Inc. and Boulder County Parks and Open Space
\$1,450 application fee to be paid via credit card
- 7: Water Information – noted on application form, as directed
- 8: Sanitary Sewer Service Information – noted on application form, as directed
3. 3: Fee Agreement signed by CEMEX, Inc. and Boulder County Parks and Open Space
4. 4: Vicinity Map and Other Maps
5. 5: Development Report or Narrative
 - a. Development Report
 - b. Review Criteria
 - c. Site Description and Mining Impact Report
 - d. Soils and Geology Report
 - e. NRCS Web Soil Survey
 - f. Cultural Resource Plan from 1994
 - g. Dowe Flats Drainage Report
6. 6: Traffic Report – deemed not necessary, but PAMS and County Approval Communication provided in lieu of a report
7. Special Use Permit Figures:
 - 9: Site Plan
 - 12: Grading Plan (in the form of Mining Plan Maps)
 - 13: Reclamation Plan
8. 14: Title Information
9. 15: Referral Agency List
10. 17: Mineral Interest Certification
11. 20: Recorded Statement of Authority for CEMEX, Inc. signatory

Note: Item on Special Use Review Submittal Requirements Form is the \$25 Public Notice Sign Deposit to be paid via credit card, so there is no document to attach.



Boulder County Land Use Department
 Courthouse Annex Building
 2045 13th Street • PO Box 471 • Boulder, Colorado 80302
 Phone: 303-441-3930
 Email: planner@bouldercounty.org
 Web: www.bouldercounty.org/lu
 Office Hours: Mon., Wed., Thurs., Fri. 8 a.m. to 4:30 p.m.
 Tuesday 10 a.m. to 4:30 p.m.

<i>Shaded Areas for Staff Use Only</i>
Intake Stamp

Planning Application Form

The Land Use Department maintains a submittal schedule for accepting applications. Planning applications are accepted on Mondays, by appointment only. Please call 303-441-3930 to schedule a submittal appointment.

Project Number		Project Name					
<input type="checkbox"/> Appeal <input type="checkbox"/> Correction Plat <input type="checkbox"/> Exemption Plat <input type="checkbox"/> Final Plat <input type="checkbox"/> Limited Impact Special Use <input type="checkbox"/> Limited Impact Special Use Waiver <input type="checkbox"/> Location and Extent		<input type="checkbox"/> Modification of Site Plan Review <input type="checkbox"/> Modification of Special Use <input type="checkbox"/> Preliminary Plan <input type="checkbox"/> Resubdivision (Replat) <input type="checkbox"/> Rezoning		<input type="checkbox"/> Road Name Change <input type="checkbox"/> Road/Easement Vacation <input type="checkbox"/> Site Plan Review <input type="checkbox"/> Site Plan Review Waiver <input type="checkbox"/> Sketch Plan <input checked="" type="checkbox"/> Special Use/SSDP		<input type="checkbox"/> Special Use (Oil & Gas development) <input type="checkbox"/> State Interest Review (1041) <input type="checkbox"/> Subdivision Exemption <input type="checkbox"/> Variance <input type="checkbox"/> Other:	
Location(s)/Street Address(es) 55th Street, Longmont, CO							
Subdivision Name							
Lot(s)	Block(s)	Section(s) 9, 10, 15, 16, 21 and 22	Township(s) T3N	Range(s) R70W			
Area in Acres 709	Existing Zoning Agricultural	Existing Use of Property limestone/shale mining, processing & transport		Number of Proposed Lots 0			
Proposed Water Supply well			Proposed Sewage Disposal Method septic				

Applicants:

Applicant/Property Owner CEMEX, Inc.			Email johnv.heffernan@cemex.com		
Mailing Address 5134 Ute Highway					
City Longmont	State CO	Zip Code 80503	Phone 713-722-6078		
Applicant/Property Owner/Agent/Consultant Boulder County Parks and Open Space (Therese Glowacki)			Email tglowacki@bouldercounty.org		
Mailing Address 5201 St. Vrain Road					
City Longmont	State CO	Zip Code 80503	Phone 303-678-6206		
Agent/Consultant Tetra Tech (Pam Hora)			Email pam.hora@tetratech.com		
Mailing Address 351 Coffman Street, Suite 200					
City Longmont	State CO	Zip Code 80501	Phone 720-864-4507		

Certification (Please refer to the Regulations and Application Submittal Package for complete application requirements.)

I certify that I am signing this Application Form as an owner of record of the property included in the Application. I certify that the information and exhibits I have submitted are true and correct to the best of my knowledge. I understand that all materials required by Boulder County must be submitted prior to having this matter processed. I understand that public hearings or meetings may be required. I understand that I must sign an Agreement of Payment for Application processing fees, and that additional fees or materials may be required as a result of considerations which may arise in the processing of this docket. I understand that the road, school, and park dedications may be required as a condition of approval.

I understand that I am consenting to allow the County Staff involved in this application or their designees to enter onto and inspect the subject property at any reasonable time, without obtaining any prior consent.

All landowners are required to sign application. If additional space is needed, attach additional sheet signed and dated.

Signature of Property Owner 	Printed Name John Heffernan	Date 5/2/22
Signature of Property Owner 	Printed Name Therese Glowacki	Date May 3, 2022

The Land Use Director may waive the landowner signature requirement for good cause, under the applicable provisions of the Land Use Code.



Boulder County

**Boulder County
Land Use Department
Publications**

**Fee
Agreement**

Land Use Department
Courthouse Annex Building
2045 13th Street
PO Box 471
Boulder, CO 80302

Planning Division:
Phone: 303-441-3930
Fax: 303-441-4856
Email: planner@bouldercounty.org
<http://www.bouldercounty.org/lu/>

Office Hours:
Monday — Friday 8:00 AM to 4:30 PM

Fee Agreement

Agreement for payment of Land Use Department Application Fees and for processing of Application in accordance with the Boulder County Land Use Code.

I/We (applicant), **CEMEX, Inc. and Boulder County Parks and Open Space**

as Property Owner of Record/Applicant ("APPLICANT"), AGREE AS FOLLOWS with the County of Boulder and its Land Use Department (collectively "COUNTY"), in consideration of the County's acceptance of Applicant's application for the land use approval as further described below:

1. Applicant has submitted to County an application for approval of:

Application Type: **Special Use Permit**

2. Applicant acknowledges and understands that Board of County Commissioners has established and amends from time to time a fee structure for County Land Use Department applications for most applications, this includes a non-refundable deposit which must be paid prior to the Department's acceptance of any application for processing, and provision for billing the Applicant for any costs of processing applications which may accrue above the non-refundable deposit amount. The Applicant acknowledges and agrees that this Agreement shall govern the payment of fees for the processing of the Application.
3. The Application shall not be accepted for processing unless the property owner of record of the property included in the Application signs this Agreement. In the case of multiple property owners, the Director of the County Land Use Department ("Director") shall have the discretion to determine which owner(s) shall sign. A person other than the property owner of record may sign the Application and this Agreement only if the Land Use Director, for good cause shown, waives the requirement for landowner signature under the applicable provisions of the Land Use Code.
4. The Applicant shall be billed by the County Land Use Department ("the Department") for all direct and indirect costs (including but not limited to staff time of the Department, the County Attorney's Office, and the County Transportation, Public Health, and Parks Departments); mailing, copying, recording, and publication fees and costs; and authorized consultants' fees incurred by the County), which the Department has accrued to date in processing the Application. The Department will continue to bill the Applicant until all costs have accrued and are paid.
5. The Applicant agrees to pay all such bills in full, and by whatever manner of payment is specified as acceptable by the Director, by delivery made to the Department no later than one month after the billing date. The Director shall have the discretion to suspend processing of the Application if any payments under this Agreement are not made on time. This suspension may involve the postponement of scheduled Planning Commission or Board of County Commissioner hearings or meetings, and the incurrence of additional costs such as for remodification or republication. Similarly, the Director shall have the discretion to terminate the processing of any Application for which any billed payment is more than three months overdue.
6. The person/address whom the Applicant designates to receive all billings for fees under this Agreement are as follows:


John Heffernan, CEMEX, Inc.		
Mailing Address 10100 Katy Freeway, Suite 300		
City: Houston	State: TX	ZIP Code: 77043

Any billing mailed to this person/address and not returned to the Department shall be deemed received. The Applicant may change the billing address under this Paragraph by providing written notification of such change to the Department.

7. In the event of nonpayment of fees, the County shall have the right to file a fee collection action against any or all of the persons signing this Agreement or the Application as Applicant. Any resulting judgment for fees may be enforced in any legal manner whatsoever and may be filed as a judgment lien against the real property which is the subject of the Application, as well as against any real property owned in whole or in part by any judgement debtor hereunder.
8. Any agreement by the Director or County to forego any of the judicial or administrative remedies available to them under this Agreement in response to the late payment or nonpayment of fees, shall not in any way constitute a waiver of the Director's or County's rights to collect fees or appropriately adjust the processing of the Application as provided herein.
9. In submitting the Application and signing this Agreement, the Applicant acknowledges and agrees that the Application is subject to the applicable processing and public hearing requirements set forth in the Boulder County Land Use Code. The Applicant acknowledges that the Applicant has obtained or has access to the Boulder County Land Use Code, and that, prior to filing the Application, the Applicant has had the opportunity to consult the relevant provisions governing the processing of and decision on the Application.
10. In submitting the Application and signing this Agreement, the Applicant acknowledges and agrees that the Applicant is authorized to make available to the County, for purposes of copying and distributing for public review, all of the documents and information which the Applicant submits with or in support of the Application. Upon demand from the County, the Applicant agrees to indemnify and defend the County and its officials, agents and employees, and to hold them harmless from, any action, claim, suit, loss, cost, damage, or expense which may be brought or assessed against the County or any of its officials, agents or employees on account of any allegation by the Applicant or any person that the County may have violated federal copyright law, or violated any law, agreement, or provision allegedly protecting the confidentiality of or restricting public review of the Application materials which the Applicant submits to the County for review as part of the Application.
11. In submitting the Application and signing this Agreement, the Applicant acknowledges and agrees that the County Land Use Department and any other County staff involved in processing the Application or their duly authorized representatives will need to enter upon the property which is the subject of the Application and conduct inspections thereof to evaluate the Application pursuant to the applicable criteria of the Land Use Code, and perform related tasks. The Applicant hereby consents to allow the County staff or their designees to enter upon and inspect the subject property at any time for this purpose without obtaining the Applicant's separate consent at the time of inspection. This consent extends to inspections while the Application is in process, as well as after it has been approved to assure that any imposed conditions of approval are met.
12. The Applicant agrees to waive any requirements for the Applicant's written consent to extend voluntarily any public hearing or other deadline associated with processing the Application, if the Applicant or its representative agrees orally to any such extension.
13. The Applicant acknowledges that the Applicant executes this Agreement freely, voluntarily, and without threat of compulsion. The Applicant understands that the Applicant may consult an attorney or any other person concerning the Application or this Agreement prior to executing this Agreement, if the Applicant so chooses.
14. Acceptance of the Application for filing and receipt of the Application fee deposit do not necessarily mean that the Application is complete under the applicable requirements of the Land Use Code.
15. This Agreement shall become effective once signed by the Applicant and the County. It shall remain in effect throughout the processing of the Application Form, and until all obligations of the Applicant under this Agreement and under any County approval of the Application Form are met.
16. This Agreement shall be construed and enforced in accordance with the law of the State of Colorado.

Applicant Signature:

Property Owner must sign this document per Paragraph 3.

Property Owners Signature: 	Date: 5/2/22
Property Owners Signature:	Date:
Property Owners Signature:	Date:
Property Owners Signature:	Date:

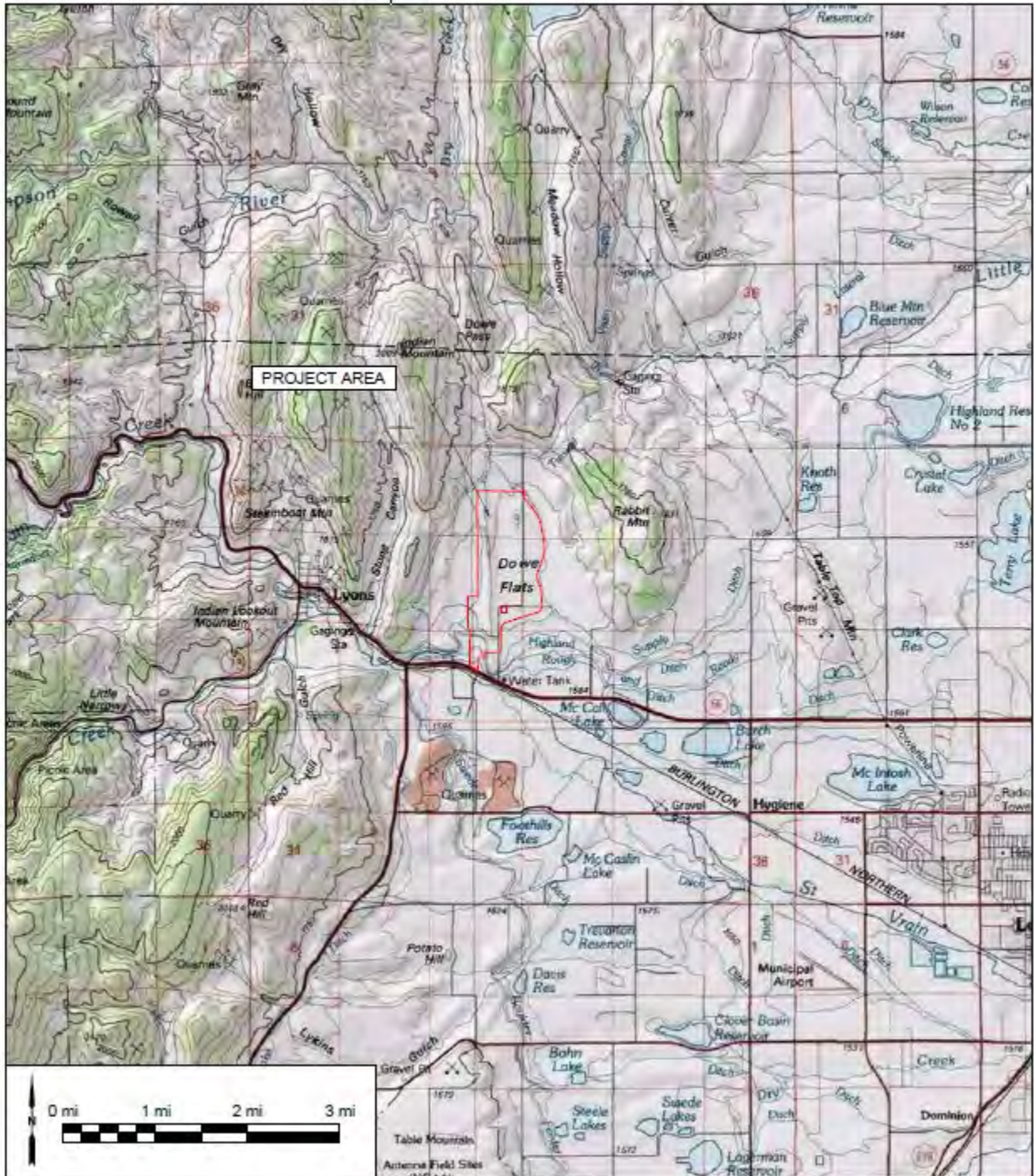
Boulder County:

Land Use Director or Designee:	Date:
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For Land Use Department Use

Docket Name:	Docket Number:	Deposit Amount: \$	Date Received:
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DOWE FLATS QUARRY SPECIAL USE PERMIT VICINITY MAP








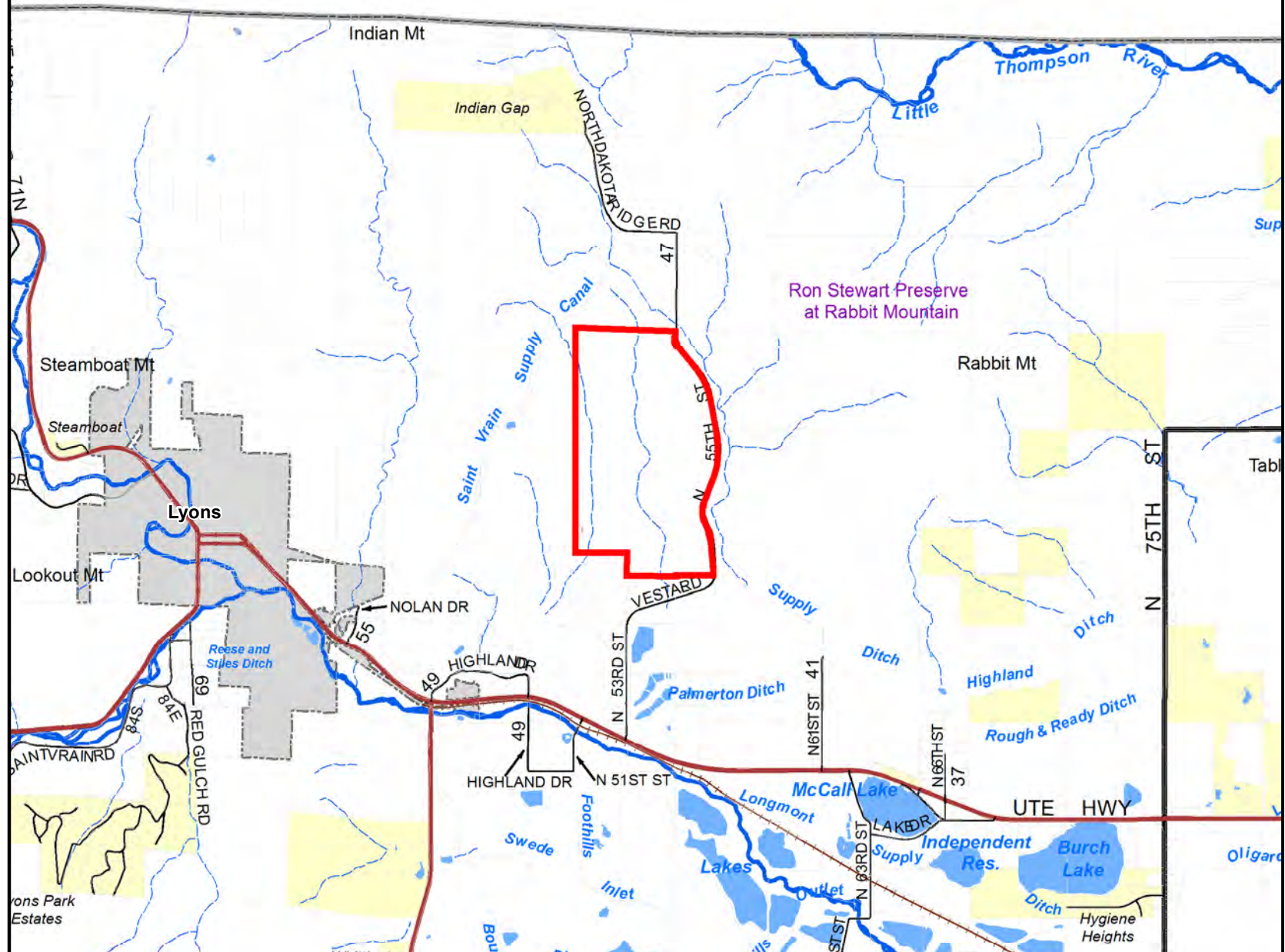
Community Planning & Permitting


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Vicinity

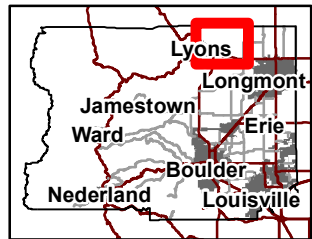
13301 55TH ST

-  Subject Parcel
-  Municipalities
- Subdivisions**
-  Subdivisions



0 0.35 0.7 Miles 

Area of Detail Date: 4/9/2020



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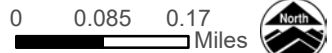
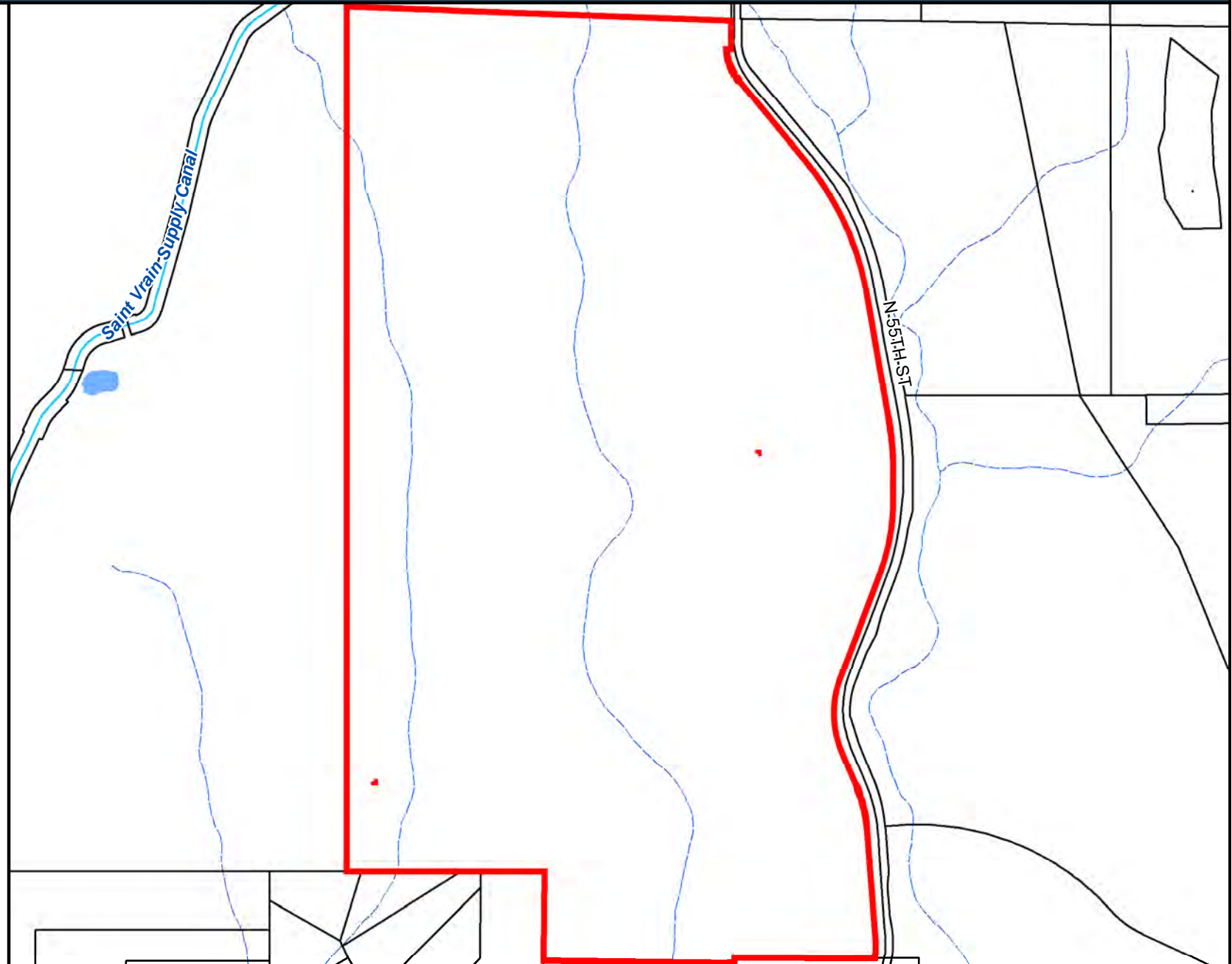
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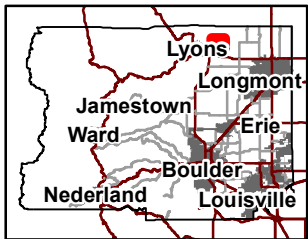
Location

13301 55TH ST

 Subject Parcel



Area of Detail Date: 4/9/2020




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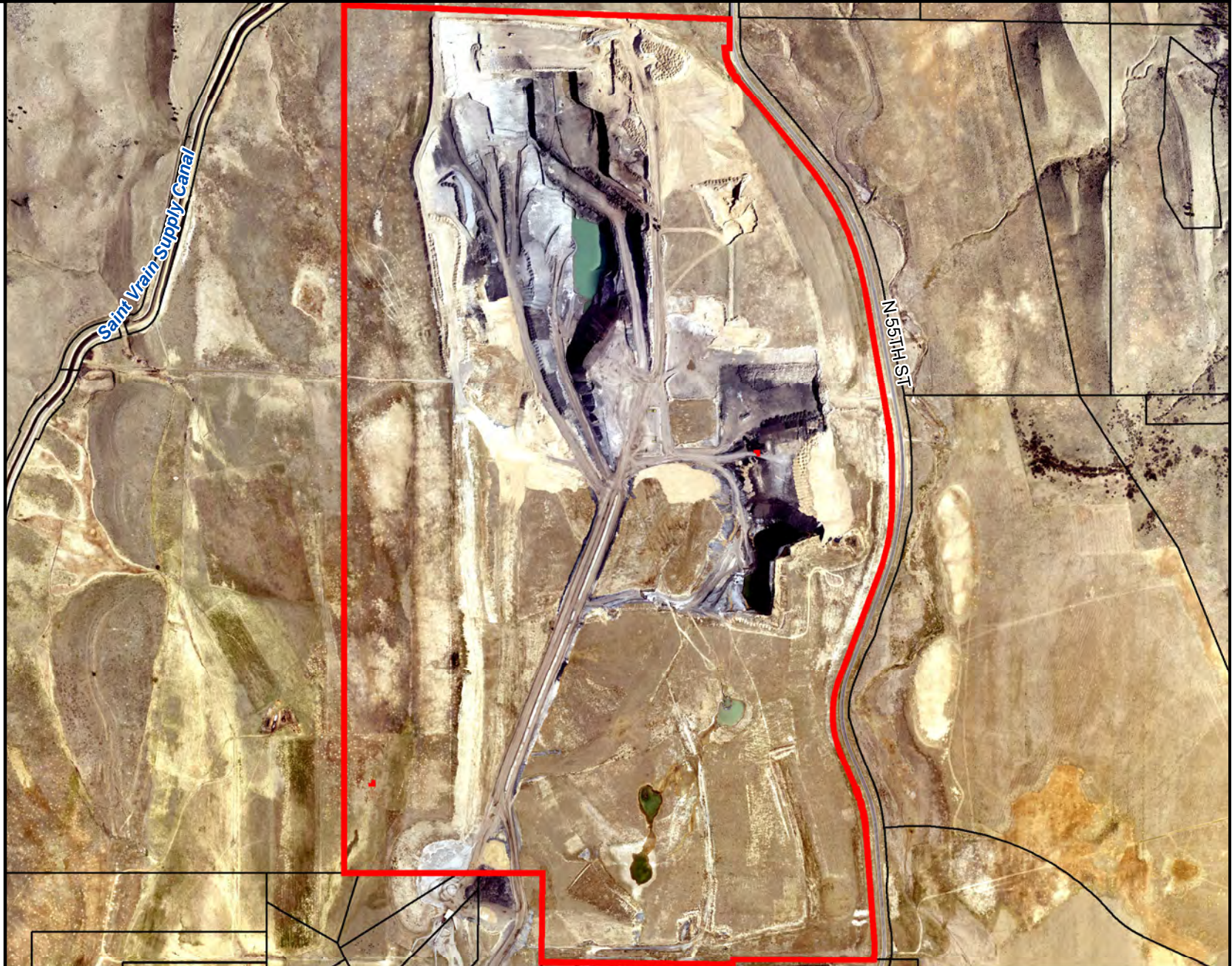



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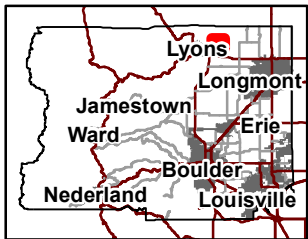
Aerial
13301 55TH ST

 Subject Parcel



0 0.085 0.17 Miles 

Area of Detail Date: 4/9/2020



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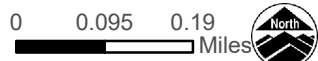
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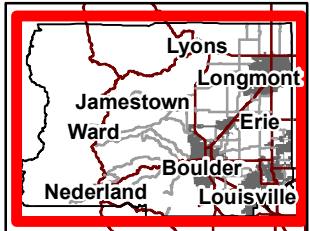
Comprehensive Plan

13301 55TH ST

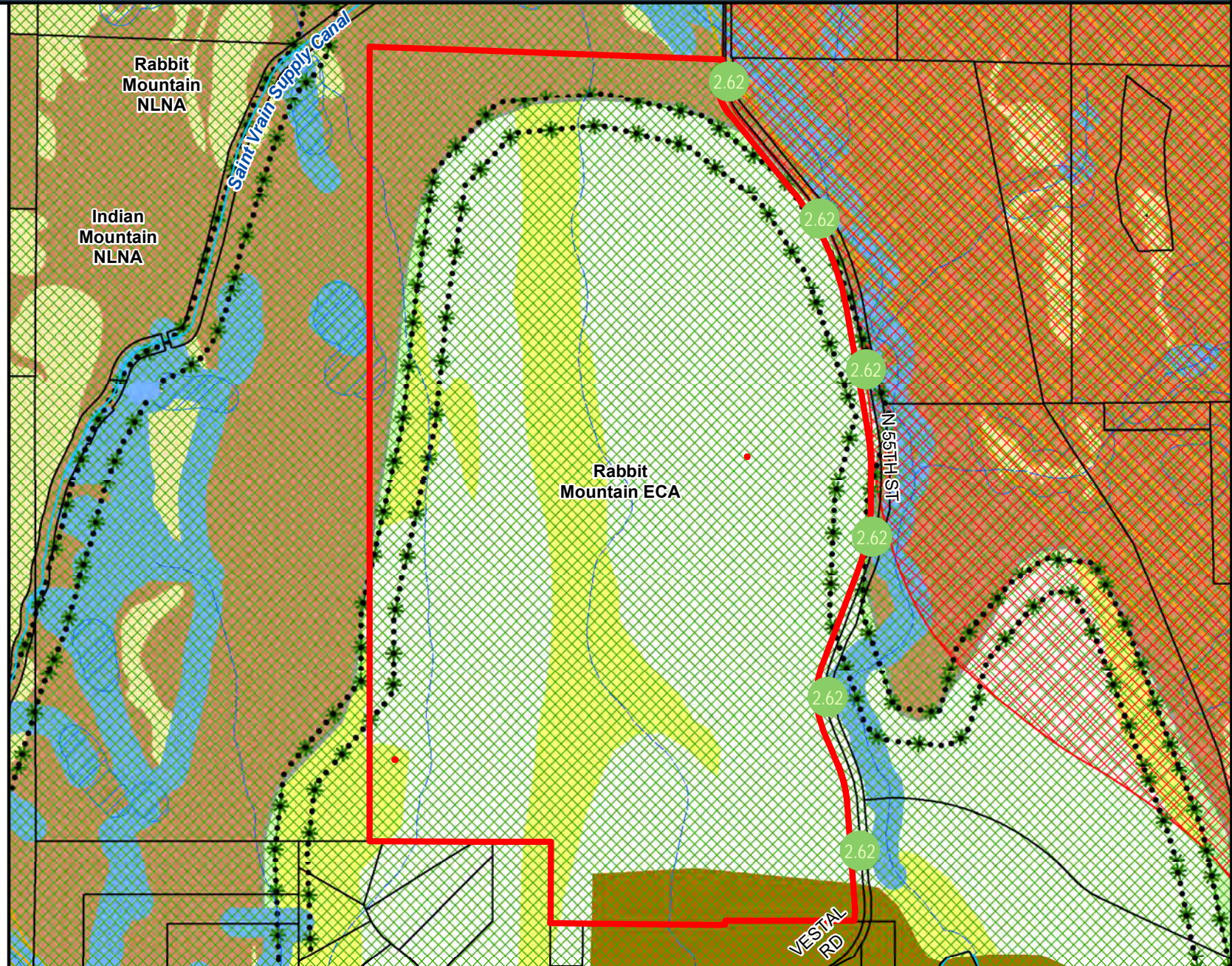
-  Subject Parcel
-  NLNA Buffer
-  Critical Wildlife Habitats
-  Environmental Conservation Areas
-  Riparian Areas
-  View Protection Corridor Score (Higher is More Scenic)
-  Archeologically Sensitive Areas
-  Wetlands
-  Significant Natural Communities
-  B1: Outstanding Biodiversity Significance
-  Natural Landmarks Natural Areas
-  Statewide Importance
-  Local Importance



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Public Lands & CEs

13301 55TH ST

Subject Parcel

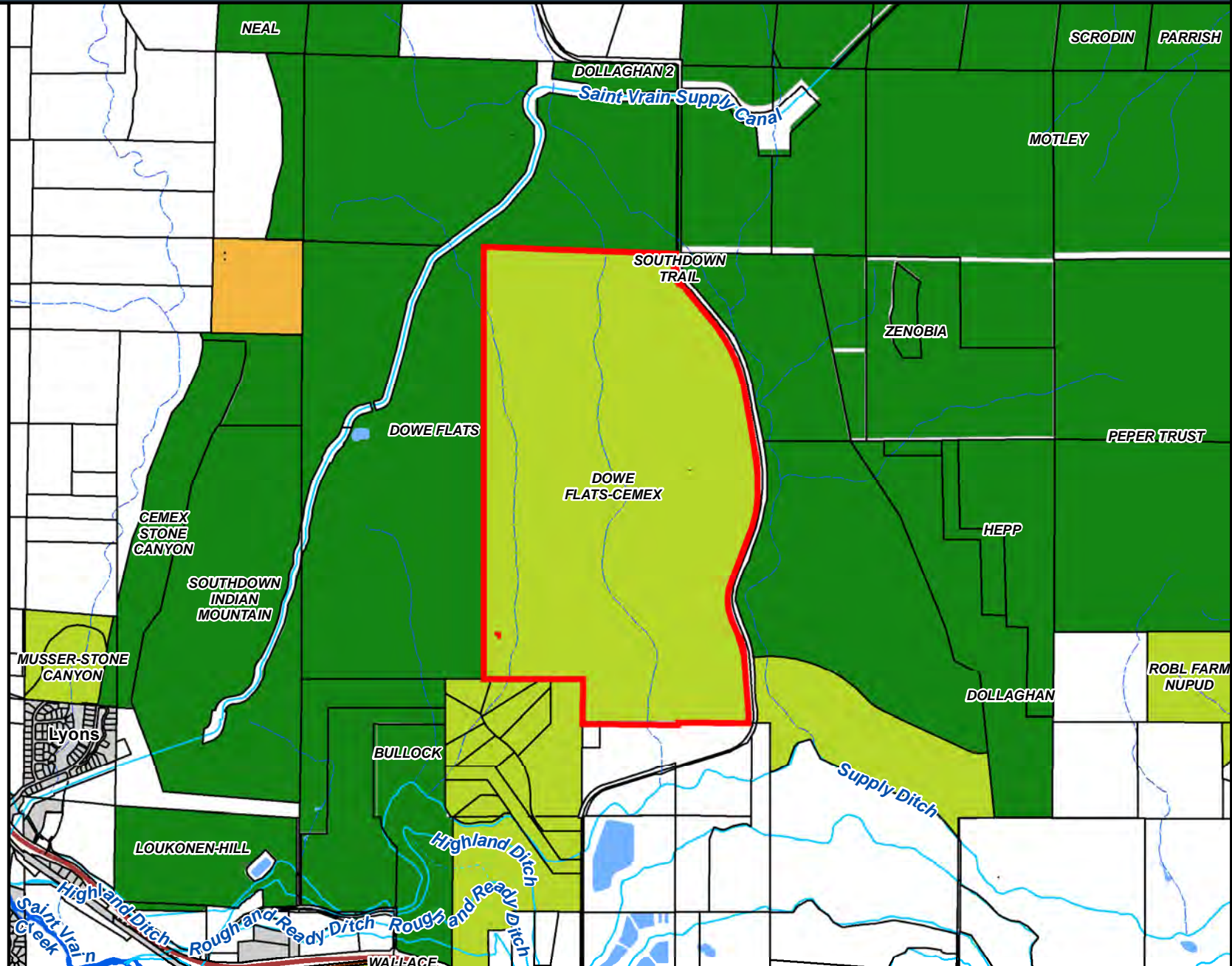
Boulder County Open Space

County Open Space

County Conservation Easement

Federal Lands

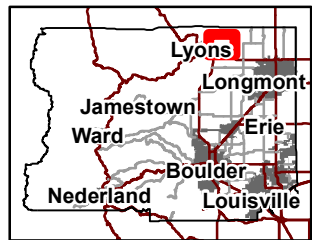
BLM Land



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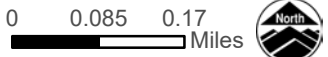
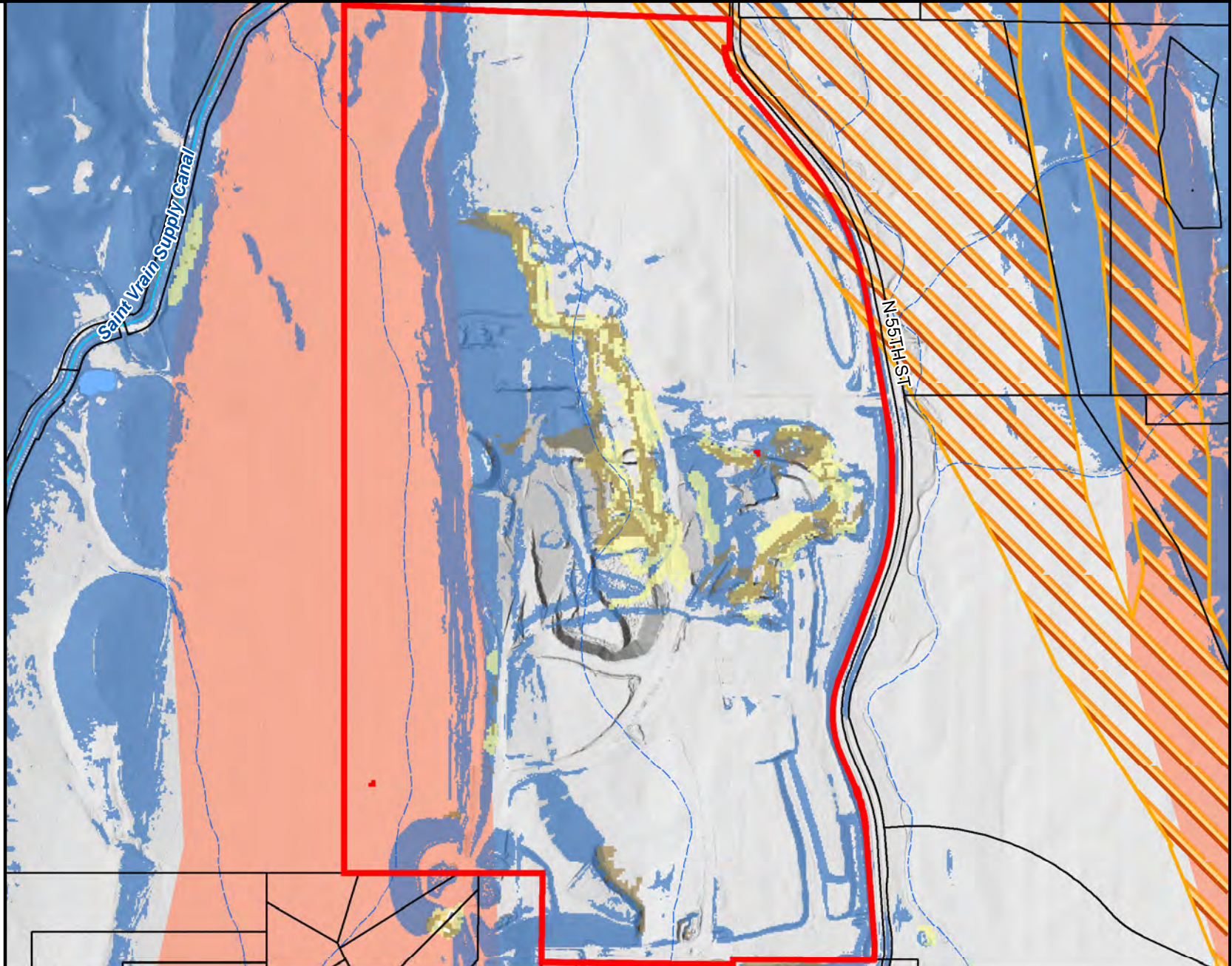
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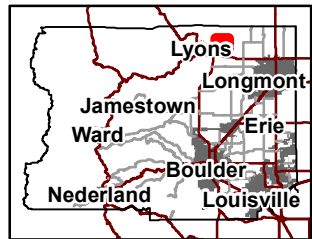
Geologic Hazards

13301 55TH ST

-  Subject Parcel
-  Steeply Dipping, Heaving Bedrock
-  Debris flow susceptibility area
-  Rockfall susceptibility area
-  Landslide high susceptibility area
-  High Swelling Soil Potential



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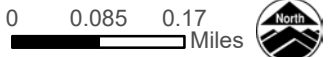
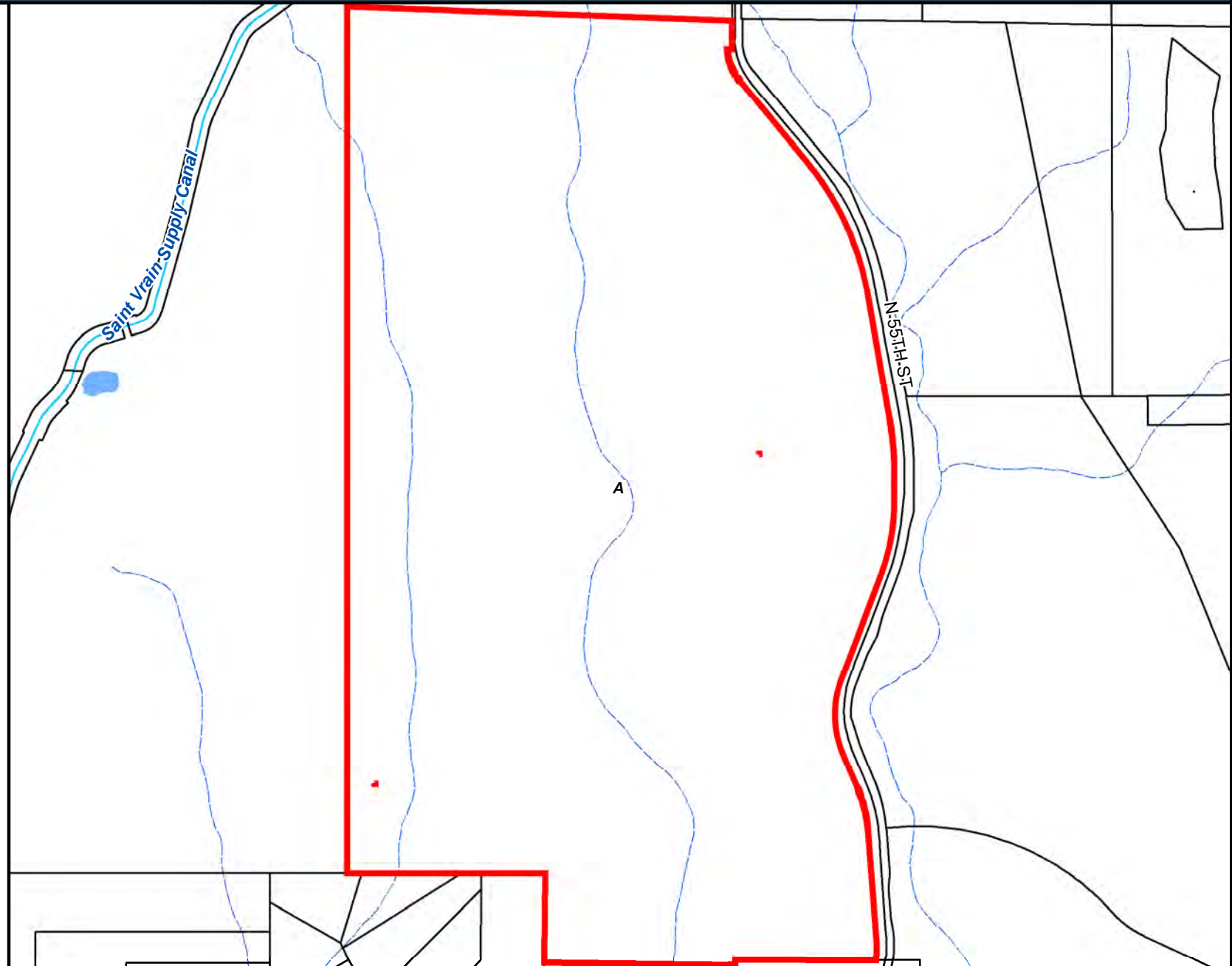
Zoning

13301 55TH ST

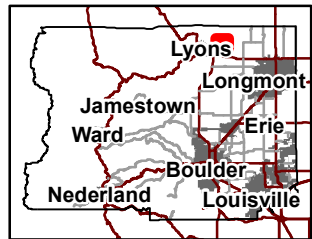
Subject Parcel

Zoning Districts

Agricultural



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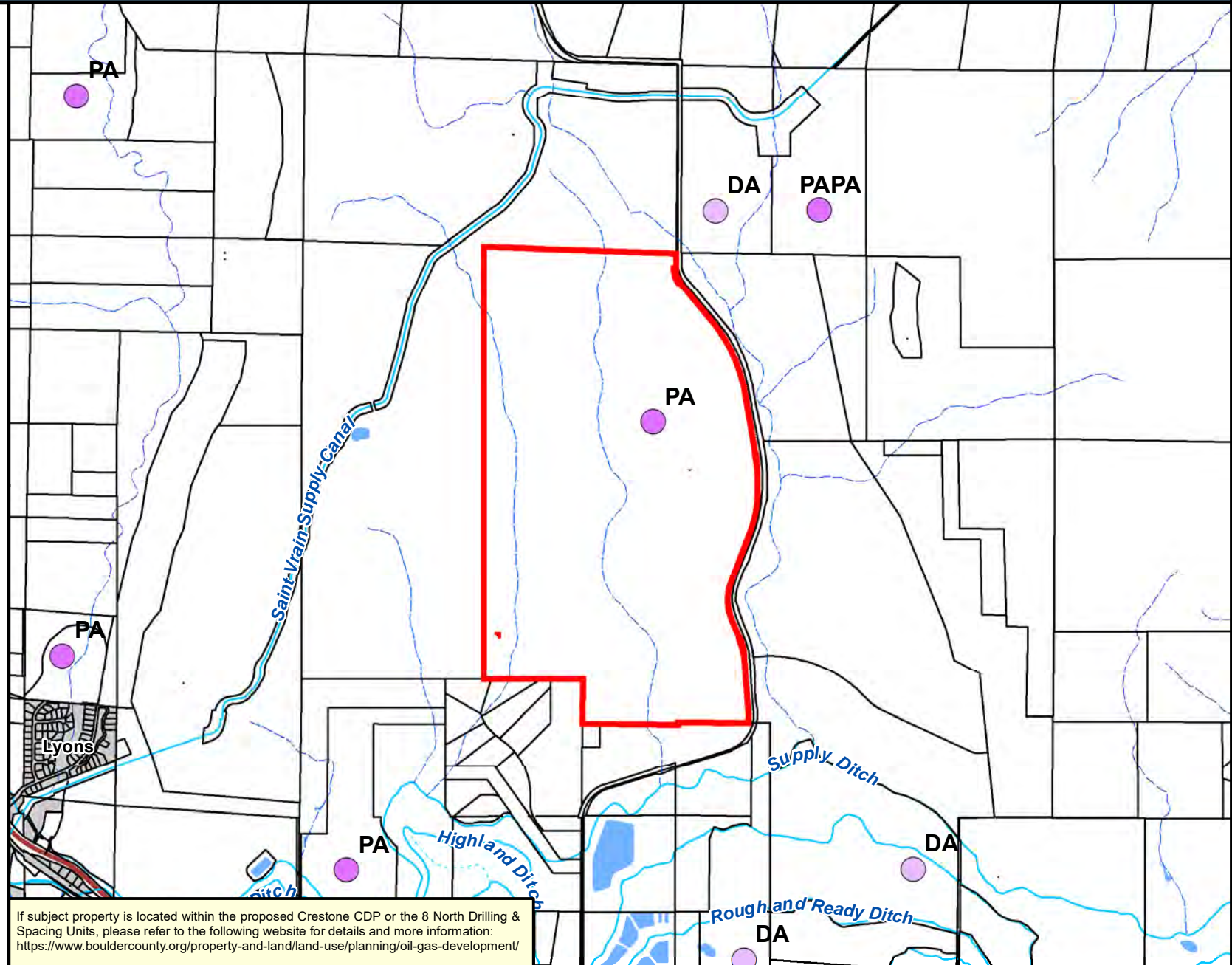
Oil & Gas Facilities

13301 55TH ST

Subject Parcel

Oil & Gas Well

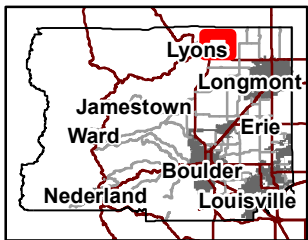
- Plugged & Abandoned (PA)
- Dry & Abandoned (DA)



0 0.15 0.3 Miles



Area of Detail Date: 4/9/2020



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If subject property is located within the proposed Crestone CDP or the 8 North Drilling & Spacing Units, please refer to the following website for details and more information: <https://www.bouldercounty.org/property-and-land/land-use/planning/oil-gas-development/>




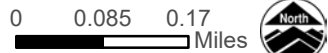
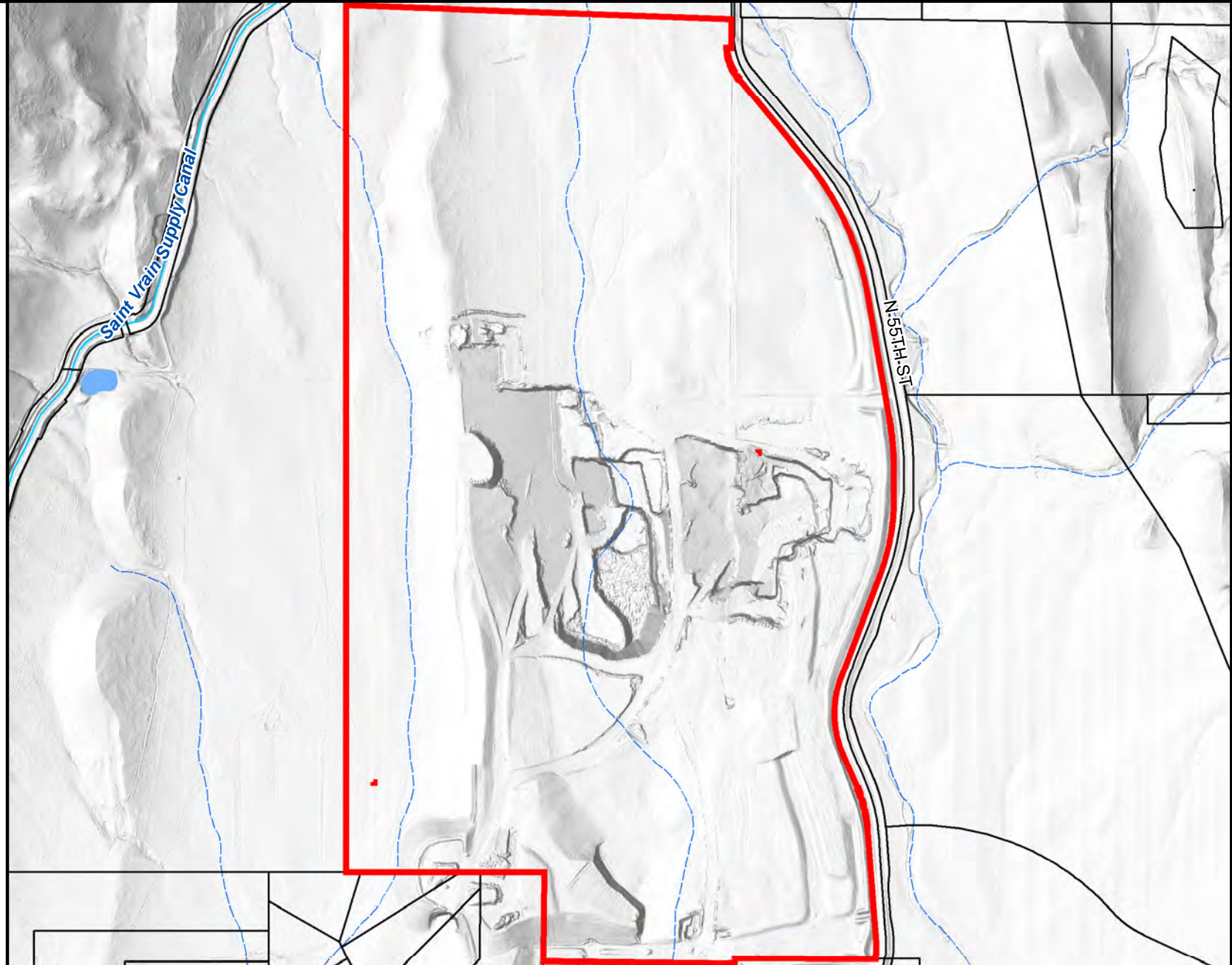
Community Planning & Permitting

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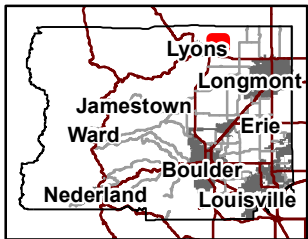
Elevation Contours

13301 55TH ST

 Subject Parcel



Area of Detail Date: 4/9/2020



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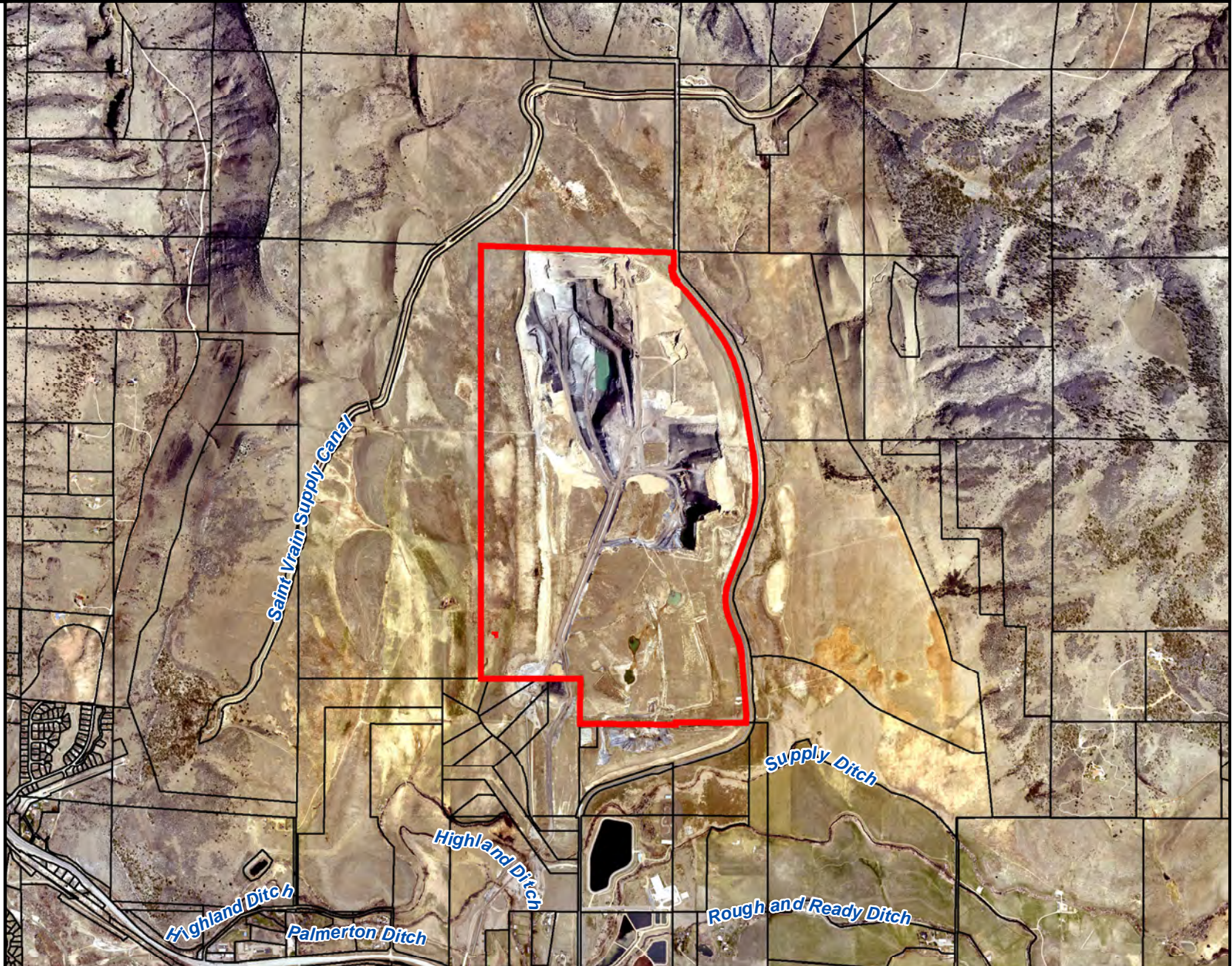
Community Planning & Permitting

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Aerial

13301 55TH ST

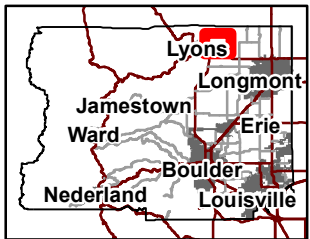
Subject Parcel



0 0.15 0.3 Miles



Area of Detail Date: 4/9/2020



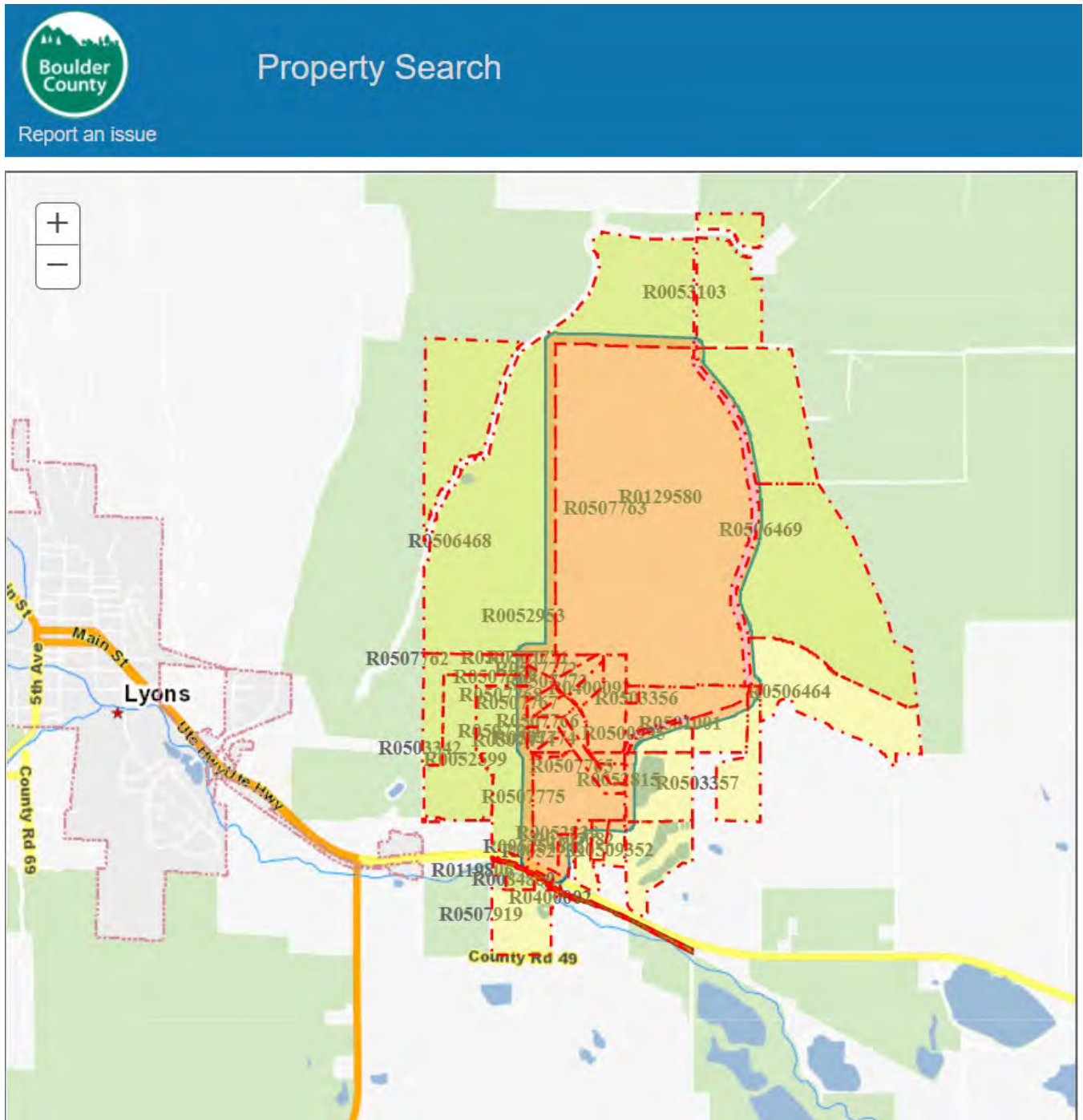
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DEVELOPMENT REPORT

Address List

A. An address list of all owners and their addresses of real property adjacent to subject property.

A list of the names and mailing addresses of all adjacent property owners is attached. This list was directly pulled from the Boulder County Assessors Property Search Map on April 8, 2022. Below is a map of the parcels included on the list.



Site Features

- B. A description of site features such as streams, areas subject to flooding, lakes, high ground water areas, topography, vegetative cover, climatology, and other features that may aid in the evaluation of the proposed development.**

Please see Site Description and Mining Impact Report for this information.

Soil Characteristics

- C. A description of soil characteristics of the site which have a significant influence on the proposed use of the land.**

Information on soil characteristics of the site which will have a significant influence on the proposed use of the land is provided in the Soils and Geology Report. In addition, a copy of the Natural Resources Conservation Service Web Soil Survey map and NRCS soil descriptions is provided in the application package.

Flora and Fauna

- D. The long- and short-term effect on flora and fauna shall be determined through field surveys, and/or expert opinions. The applicant shall address any material adverse impacts of the development on these biological systems, including plans for the mitigation of these impacts. Wildlife impact reports shall be required in accordance with Section 7-1700.**

Please see Site Description and Mining Impact Report for this information.

Cultural Resources

- E. The effect on significant cultural (archaeological and historic) resources and on other designated environmental resources.**

Continued mining at Dowe Flats will have no effect on any significant cultural resource or other designated environmental resources. In 1994, when the site was originally permitted, a Cultural Resources Management Plan was prepared for this site. A copy of that plan is included in the application package for reference. The operator was required to monitor for and mitigate against any possible impacts to any archaeological or historic features found while the site was being mined. In addition, the report documented a process for the operator to follow to address buried archeological resources if found while mining, the treatment of prehistoric or historic cultural resources if found while mining, and the treatment of Native American resources or remains if found while mining. To date, no significant features have been found within the limits of mining.

In addition, with this Special Use Permit Amendment request, 1,349± acres of land are being removed from the original permit area, about 840 acres of which is land now owned by Boulder County. According to the Boulder County Comprehensive Plan (BCCP) Archeologically Sensitive Areas Map, by removing the Boulder County owned land, the new permit boundary will now exclude all land categorized as an Archeologically Sensitive Area.

Potential Radiation Hazard

- F. An evaluation of any potential radiation hazard that may have been identified by the State or County Public Health Departments.**

There are no known radiation hazards at this site.

Ability to Serve and Maintain Adequate Levels of Service

- G. An evaluation of the expected demands and effects of the development on the ability of local governments and quasi-governmental agencies to provide water, sanitation, natural gas, electricity, access, fire, schools, hospitals, police, flood protection, solid waste disposal, and other services to this development while maintaining adequate levels of service to other areas.**

Continued mining at Dowe Flats will not negatively affect the ability of any local government or quasi-governmental agency to provide water, sanitation, natural gas, electricity, access, fire, schools, hospitals, police, flood protection, solid waste disposal, or other services to this development because for all intents and purposes these services are not currently required or being provided to this site. In addition, continued mining operations at Dowe Flats for another 15 years will have no impact on the ability of agencies to provide an adequate level of services to other areas.

Financial Guarantees

- H. Provision of financial guarantees for public or communal improvements.**

There are no requirements for public or communal improvements associated with this project and the requested permit application approval.

O:\Projects\Longmont\8591\117-8591001 and 002\Deliverables\Special Use Review Application\Development Report.docx

REVIEW CRITERIA STATEMENT

A. A use will be permitted by Special Review...only if the Board finds that the proposed use meets the following criteria as applicable:

1. **Except as otherwise noted, the use will comply with the minimum zoning requirements of the zoning district in which the use is to be established and will also comply with all other applicable requirements.**

The Dowe Flats property is currently zoned (A) Agricultural. Open mining, the existing use at the Dowe Flats site, complies with the minimum zoning standards as outlined in the Boulder County Land Use Code requirements for the Agricultural (A) zone district. According to Section 4-508 of the Code, open mining is allowed in the Agricultural zone district as a use permitted by Special Review. Dowe Flats is currently operating under permit SU-93-14. This application is to amend the existing Special Use Permit (SUP) to allow CEMEX, Inc. to continue its present mining operations for an additional 15 years. This extension will allow CEMEX, Inc. additional time to remove remaining limestone and shale deposits (“mineral resources”) that are still available within the currently permitted disturbance boundary. No expansion of the permitted disturbance boundary is proposed as part of this request.

In addition, as part of this proposed amendment to the SUP, CEMEX, Inc. is proposing to remove 1,349± acres of land from the current SUP permit boundary. When Dowe Flats was first permitted through Boulder County, CEMEX, Inc. included more land within its permit area than it planned to mine. This was to provide a generous open land buffer between the mining activity and any land owned and occupied by private citizens. While all the land in the buffer was owned by CEMEX, Inc. when Dowe Flats was originally permitted, the ownership of several of the parcels has since changed hands. Ownership of approximately 840 acres of land to the west, north, and east of the mining area was transferred to Boulder County Open Space through a Partition Agreement. Another 91± acres of land to the south of the site was sold to the City of Longmont. CEMEX, Inc. owns the 330± acres of land southeast of the Dowe Flats mining area and, of that, about 88 acres is preserved within a conservation easement. Although these areas will not be actively mined, while CEMEX does not propose to include them in the new SUP, these parcels will continue to physically function as a buffer between the mining operation and any residential land uses without being included in the permit boundary.

2. **The use will be compatible with the surrounding area. In determining compatibility, the Board should consider the location of structures and other improvements on the site; the size, height and massing of the structures; the number and arrangement of structures; the design of structures and other site features; the proposed removal or addition of vegetation; the extent of site disturbance, including, but not limited to, any grading and changes to natural topography; and the nature and intensity of the activities that will take place on the site. In determining the surrounding area, the Board should consider the unique location and environment of the proposed use; assess the relevant area that the use is expected to impact; and take note of important features in the area including, but not limited to, scenic vistas, historic townsites and rural communities, mountainous terrain, agricultural lands and activities, sensitive environmental areas, and the characteristics of nearby development and neighborhoods.**

With this application to amend the existing special use permit to allow Dowe Flats to continue mining operations for another 15 years, compatibility is a topic that needs to be considered in two phases: first, as it relates to the continued operation of the mine, and then relating to the land to be reclaimed after mining. Below is an explanation of how the site will be compatible at both times.

Compatibility During Mining

The only approval being requested by CEMEX, Inc., is to extend the duration of ongoing mining for an additional 15 years. Because the location and scope of the mining activity and structures associated with that activity will not physically change, no additional impacts are contemplated.

Dowe Flats has operated and will continue to operate in a manner that is compatible with the surrounding area. Because the mining operations occur in an area below the surrounding land surface and behind vegetated visual berms, the activity cannot be seen from the adjacent public roads. These berms also effectively mitigate noise impacts. The mine only operates during the week, most weeks only Monday through Thursday. On weekends, when the Rabbit Mountain Open Space is most used by the public, there is no activity at Dowe Flats that could impact the experience of open space users. The operation does not generate traffic impacts in the area because all the material mined at Dowe Flats is processed on-site and transported over State Highway 66 to CEMEX, Inc.'s Lyons Cement Plant via conveyors. In addition, historically there has been a very large buffer of land around the Dowe Flats mining operation. While all this land is now being proposed to be removed from the permit boundary, the land will continue to act as an effective buffer around the mine. There is no threat of this buffer land being developed because it is owned by the County, the City of Longmont, or CEMEX, Inc. CEMEX, Inc. is unaware of any complaints filed by neighbors or the public about past operations at Dowe Flats, which is indicative of the compatibility of the ongoing operations within its environs.

Continuing to mine this site is in the best interests of the surrounding area. Dowe Flats is conveniently located across the street from CEMEX, Inc.'s Lyons Cement Plant where the limestone and shale mined from Dowe Flats is ultimately used to make cement. Because Dowe Flats utilizes a covered electric conveyor to transport the materials directly over State Highway 66, CEMEX, Inc. does not need to use trucks to transport the materials, which is beneficial to road safety as well as air quality. Having the resource transported by conveyor also results in significant cost savings (no trucking costs) that is passed on to consumers (local governments, businesses, and residents) through lower cement prices. If CEMEX, Inc. loses access to the existing resource at Dowe Flats, another source of mineral resources would need to be utilized, and the new source or sources would require trucks to transport the material from farther away.

For all these reasons, continuing to mine at Dowe Flats would result in the continuation of a compatible use within the area.

Compatibility Following Reclamation

CEMEX, Inc. intends to reclaim the site per the existing reclamation plan approved under SU-93-14. This would return the site to close to its pre-mining condition, which would be compatible within the area. However, because agreements are in place for certain additional property to likely be acquired and maintained by Boulder County Parks and Open Space (BCPOS) as part of the open space system following completion of mining activities and subsequent reclamation, an extended mining term would afford the opportunity to refine the reclamation plan before mining is completed in order to create a more topographically and ecologically diverse area to benefit BCPOS's open space system in the longer term.

The currently approved reclamation plan includes two basic vegetation communities: grassland and wetland. The grassland is a somewhat diverse mixture of native range grasses with a small component of wildflowers. The 20-acre wetland, as planned, is to be 98% cattail and 2% rushes. In 1993, when this reclamation plan was approved, at the request of the County, the reclamation plan was geared towards the development of habitat for a single primary species, prairie dogs, which in turn provide food for raptors. While it is important to think about providing some prairie dog habitat, there is already a substantial amount of prairie dog habitat in the area. This site has the potential to provide habitat for many additional species. Because of the location of the

property in relation to other open space land, the site could effectively function as a corridor that expands and connects habitats existing on nearby properties.

If an extended mining term is approved, CEMEX, Inc. is willing to commit to work with the County to enhance the existing approved reclamation plan. When mining is completed, the land could be reclaimed in a manner that better incorporates diversity of topography and vegetative structure with rock outcrops, depressions, shrub/forb islands, and wooded areas along with the open grassland areas in order to provide habitat for a greater variety of raptor prey, including lagomorphs, rodents, reptiles, and other birds. Predators, such as bobcats and foxes, could find food and shelter, and the deer and elk that already inhabit land around this site, would benefit from an enhanced habitat with expanded shelter opportunities. In addition, shrub/forb islands could also be planted with pollinator-friendly vegetation to enhance insect populations. A more diverse wetland habitat with a variety of sedges, rush, forbs, and shrubs interspersed with open water could also be incorporated into the design to provide habitat for all the species mentioned as well as a variety of waterfowl and amphibians. The more diverse wetland would also provide additional pollinator habitat. These enhancements would also result in the site being reclaimed with established, healthy vegetation much sooner because existing landforms on the site that have already been reseeded and contain very well-established, healthy vegetation could be preserved. This would allow this vegetation to continue to mature and thrive.

Additionally, the Wildlife Habitat Council (WHC) and Greenwood Wildlife Rehabilitation Center have expressed interest in partnering with the County to use the Dowe Flats site to help wildlife and educate the public, especially if the site is reclaimed in a manner that fosters habitat for a broader range of wildlife. The WHC has Wildlife at Work programs for local schools that integrate wildlife habitat and ecosystem improvements, and the Greenwood Wildlife Rehabilitation Center works to provide homes for displaced and injured wildlife.

The Dowe Flats property is centrally located between several other BCPOS properties, making it well suited to incorporate public trails that could connect the open space land. Reclaiming the Dowe Flats property to incorporate more topographic and vegetative diversity would also potentially create a much more interesting environment for the County to build hiking and biking trails that would tie the Rabbit Mountain trail system to other trails in Boulder County.

3. The use will be in accordance with the Comprehensive Plan.

The request to amend the SUP to allow Dowe Flats to continue to mine for another 15 years would be in accordance with several of the Goals and Policies found in the Boulder County Comprehensive Plan. Below is a listing of each applicable Goal and Policy followed by an explanation, in italics, of how continued mining at Dowe Flats will help the County achieve each one of them.

Economics

Goal 2. Steward. Boulder County stewards its economy through sound regulations and collaboration.

EC 2.05 Public/Private Cooperation. Boulder County encourages public/private cooperation in addressing the county's economic goals and objectives.

EC 2.06 Support for Local Assets. Boulder County encourages and supports programs, economic activity, and appropriately scaled development that enhances the county's local assets, including its rural and natural landscapes and resources, agricultural economy, open space, arts, cultural and historic resources, and its tourism and recreation industries. The county supports this activity in a manner consistent with the Guiding Principles of the Comprehensive Plan.

EC. 2.07 Data Informed Decision Making. Boulder County considers available data in its economic-related decision making.

CEMEX, Inc. intends to continue to work with Boulder County to promote the County's economy and cash reserves by continuing to mine the local resources from the Dowe Flats mine while ensuring that the County has the opportunity to acquire and preserve additional open space. This is an appropriate balancing of interests between CEMEX's goal of accessing the valuable mineral resource at Dowe Flats and the County's long-term goal of preserving open space.

Goal 3. Preserve & Enhance Local Assets. Boulder County purposefully preserves and enhances its major assets in promoting a vital regional economy.

EC. 3.01 Local Partnerships and Linkages. Boulder County encourages local economic partnerships and linkages in which products are sustainably sourced or produced within unincorporated Boulder County in a manner compatible with the rural character and are sold in local rural and urban markets.

EC. 3.01.01 Boulder County recognizes the importance of buying local and encourages local purchasing to reduce environmental impacts and support the county's economic vitality.

The mineral resources at Dowe Flats are valuable, naturally occurring assets available on the Dowe Flats property. These valuable assets are extracted from Dowe Flats and then transported via covered conveyor across Highway 66 to CEMEX, Inc.'s cement plant, where they are used to make cement. The cement made by CEMEX, Inc. is sold and used on projects in local rural and urban markets. If the material does not come from Dowe Flats, CEMEX, Inc. would need to source the material from a more distant location. Allowing Dowe Flats to continue to operate is an excellent example of supporting a project that is sustainably sourcing and producing local product and as described previously in response to Criterion 2 of this document, accomplished in a manner that is compatible with the rural character of the area.

Environmental Resources

Goal 5. Enhance Environmental Health. Boulder County shall continue to protect air, water and soil resources and quality, as well as restore resources in a degraded condition to enhance overall environmental health. Pollution of air, water, and soil, and pollution caused by noise or light, shall be eliminated or minimized to the greatest extent possible in order to prevent potential harm to life, health and property, and to reduce incremental degradation of the environment.

ER 2.02 Impacts no Public & Environmental Health. Boulder County shall evaluate land use proposals and other planned activities considering their cumulative impacts on public and environmental health. Sufficient mitigation and minimization of any impacts shall be required for the proposal or activity to be approved. These proposals and activities shall at a minimum comply with air, soil, and water quality standards, as well as noise level and lighting standards, established by county and state agencies or the Boulder County Land Use Code.

Continued mining at Dowe Flats would be beneficial to the environmental health of the County. Dowe Flats already operates in a manner that protects air, soil, and water quality, does not generate off-site noise impacts, and avoids creating light pollution. The site's operating procedures will not change. In addition, the material mined from Dowe Flats is and will continue to be transported to its final destination (the CEMEX, Inc. cement plant south of Highway 66) via covered conveyor for use in making cement. Conveying and not trucking the material to the cement plant is a highly effective, efficient, and environmentally friendly transport method.

Goal 8. Protect Environmental Resources. Boulder County shall protect environmental resources both at the site-specific scale and landscape scale through a variety of means such as partnerships with private landowners, nongovernmental organizations, and other

governmental agencies; education and outreach; advocacy at the state and federal level; and other programs consistent with the goals and policies of the Comprehensive Plan.

ER 1.06 Land Owners and Nongovernmental Organizations. Boulder County shall work in partnership with private land owners and nongovernmental organizations to protect, conserve, and restore designated environmental resources using a variety of tools.

ER 1.08 Assistance. Boulder County shall encourage all private landowners to seek assistance from appropriate governmental and non-governmental entities to protect Boulder County's environmental resources.

As a private landowner, CEMEX, Inc. is requesting approval from Boulder County to continue ongoing mining operations at Dowe Flats for an additional 15 years. Dowe Flats is an existing mining site that still contains a valuable mineral resource that requires additional time to extract. While the Comprehensive Plan does not specifically define what an environmental resource is, according to Encyclopdia.com, "An environmental resource is any material, service, or information from the environment that is valuable to society."¹ The limestone and shale existing at the site are an environmental resource available within the County, requiring extraction to utilize their benefits for the locality. Moreover, no additional land will need to be permitted if mining continues at Dowe Flats. All the material that is planned to be extracted from Dowe Flats will be removed from areas previously permitted. Because Dowe Flats is directly across Highway 66 from the cement plant in which it is used, and all the material mined from Dowe Flats is transferred via covered conveyor and not trucked to the cement plant, the environment is further protected.

Public Health

Goal 1. Foster Healthy Families & Communities. Boulder County values and creates environments that foster healthy families and communities.

PH 1.01 Air Quality. Boulder County recognizes the direct and secondary health impacts of outdoor air pollution produced by industrial, vehicular and other sources. The county collaborates with industry, state and neighboring governments to respond to and mitigate the health impacts of poor air quality due to particulate matter, ground-level ozone, smoke from wildfires, greenhouse gases and other air pollutants.

Continuing to mine Dowe Flats for another 15 years will minimize air quality impacts. CEMEX, Inc.'s cement plant will continue to be supplied with material from Dowe Flats, thus avoiding the need for trucking the material from another location to the cement plant.

Sustainable Materials Management (SMM)

According to the Boulder County Comprehensive Plan, "The EPA describes Sustainable Materials Management (SMM) as a 'systematic approach to using and reusing materials more productively over their entire life cycles. It represents a change in how our society things about the use of natural resources and environmental protection. By looking at a product's entire life cycle – from materials extraction to end-of-life management – we can find new opportunities to reduce environmental impacts, conserve resources, and reduce costs.'²"

¹ "Environmental Resources ." Environmental Encyclopedia. Encyclopedia.com. 25 Oct. 2021 <<https://www.encyclopedia.com>>.

² US EPA, Sustainable Materials Management, www.epa.gov/smm/sustainable-materials-management-basics, accessed October 7, 2016.

The following are some SMM goals and policies from the Comprehensive Plan that are applicable to the Dowe Flats application.

Goal 1. Promote & Uphold the County's SMM Values. Boulder County promotes SMM in its actions, policies, and decision-making countywide. The county values SMM for its environmental protection, including greenhouse gas emission mitigation, its economic soundness, and its contribution to community vitality and quality of life. SMM prioritizes diversion practices that best preserve the inherent value of the resources used.

SMM 1.01 Support for SMM Efforts. Boulder County supports efforts that promote SMM best practices (consistent with adopted plans and agreements) in the following areas: environmental stewardship, product stewardship, resource conservation, pollution prevention, mitigation of adverse climate impacts, and protection of public health. The county will strive to support initiatives that align with SMM including those related to facilities, programs, granting mechanisms, policy mechanisms, local markets, education and outreach.

SMM 1.01.01 To the extent possible, the county shall support land use decisions that align with SMM while balancing other regulatory and policy priorities, e.g., zoning amendments, and/or property acquisitions for facilities in suitable locations. SMM values, functions and impacts to county lands shall be considered in the review of development proposals submitted through the Community Planning & Permitting Department.

As a society, we depend on cement to make concrete, which is used to construct infrastructure and improvements throughout Boulder County. Sourcing natural resources locally from Dowe Flats for use at CEMEX, Inc.'s cement plant optimizes environmental stewardship. The product is mined locally and transported via covered conveyor directly to the cement plant avoiding the need for trucking the material. Closing Dowe Flats before most of the mineral resource has been extracted would be contrary to SMM best practices as it would not enhance and would potentially degrade environmental stewardship, product stewardship, resource conservation, pollution prevention, mitigation of adverse climate impacts, and protection of public health. Therefore, this permit extension aligns with Boulder County's Sustainable Materials Management goals.

Sustainability

Goal 1. Promote Outcomes Consistent with Principles of Sustainability. The county recognizes and accepts that weighing individual wants and needs with those of the larger public and society is a complex but essential responsibility of government. Implementing the Comprehensive Plan involves the need to balance competing goals and policies in cases where they cannot be harmonized. With that understanding in mind, Boulder County's land use management tools and practices should be designed to promote decisions and actions supporting outcomes that are consistent with the principles of sustainability.

Dowe Flats is an existing mine site that has been operating in the County with very minimal impact on the County and its residents. From a sustainability perspective, it would be prudent to allow the resource still available within the mine to be removed rather than abandoned. Continuing to mine at Dowe Flats helps minimize the need to disturb new sites to access mineral resources. As an added benefit, Dowe Flats transports the material mined on-site via covered conveyor to the cement plant, avoiding the need for trucking the material, which is in the best interests of the community and the larger public.

Goal 3. Address Wasteful Resource Practices & Identify Constituencies & Partners in Sustainability Efforts. Sustainability actions or programs undertaken by the county should address the following factors:

- The origins or causes of wasteful resource practices as well as the harmful effects of such practices;

- The interrelationship of systems and forces that dictate how resources are used, and;
- The social constituencies and partners that should be involved in and served by sustainability efforts.

The mineral resources mined from Dowe Flats are a finite and valuable natural resource within Boulder County. Continuing to mine at Dowe Flats and allowing CEMEX, Inc. to remove the resource is in the best interests of sustainability. Leaving the resource behind, necessitating new locations to replace it, whether within Boulder County or elsewhere in the State, would be a wasteful resource practice that should be avoided.

Goal 4. Identify & Implement Actions to Diminish Greenhouse Gas Emissions. The county considers global climate changes to be a matter of paramount concern and a potential threat to any sustainability efforts that may be undertaken. In recognition of this concern and to implement the Board of County Commissioners' Resolution 2005-137 regarding a Sustainability Energy Path for Boulder County, the county should take a leadership role in identifying and implementing actions that will lead to a diminishment in the county's contribution to total greenhouse gas emissions from both stationary and mobile activities or sources through an increase in energy efficiency, a reduction in vehicle miles traveled, a reduction in waste generation, and other measures.

As explained previously, all material mined from Dowe Flats is processed on-site and then transported via covered conveyor to CEMEX, Inc.'s cement plant south of Highway 66. This practice allows CEMEX, Inc. to avoid using trucks, which generate greenhouse gas emissions, to supply the cement plant with resources needed to make cement.

Goal 10. Protect Natural Assets. The county's rich and varied natural features, scenic vistas, ecosystems, and biodiversity should be protected from further intrusion, disruption, consumption and fragmentation.

Continued mining at Dowe Flats will have no negative impact on the County's varied natural features, scenic vistas, ecosystems, and biodiversity because the existing permitted area of the mine will not change. This amendment will further the goals of the BCPOS program. If an extended mining term is approved, CEMEX, Inc. is willing to commit to work with the County to enhance the existing approved reclamation plan to incorporate more topographic interest and varied vegetation communities to create improved habitats and biodiversity on the site when it is reclaimed and transferred to the County after completion of mining and reclamation. Please see the response to Criterion 2 for more details.

In addition, CEMEX, Inc. is committed to developing and preserving wildlife habitat. Since at 2010, CEMEX, Inc. has maintained a current wildlife certification from the Wildlife Habitat Council (WHC) for its wildlife-friendly programs on the Dowe Flats property. The WHC certification attests that CEMEX, Inc. has wildlife habitat programs that concentrate on native restoration and land management practices beneficial to wildlife. CEMEX, Inc. (parent company of the Lyons operation owner) received the 2020 Corporate Conservation Leadership Award, the most prestigious recognition presented annually by WHC. It signifies an exemplary corporate commitment to biodiversity and conservation education and meaningful alignments with global conservation objectives. CEMEX, Inc. received Conservation Certification status for 12 programs within this past certification cycle, with a combined total of 15 qualifying projects. Projects within these programs are aligned with a corporate commitment to biodiversity conservation themes such as awareness and engagement, formal learning, landscaping, wetlands, and large-scale initiatives. This corporate commitment of CEMEX, Inc. has been long-standing, with WHC awards dating back to the 2010 William W. Howard C.E.O. Award.

Goal 13. Support Locally Available Resources. The county should promote and support the use of local products, technologies, expertise, and other locally available resources that contribute to the advancement of these goals.

Allowing CEMEX, Inc. to continue to mine the mineral resources found on the site rather than abandon it, promotes and supports the use of a local product and available resources.

- 4. The use will not result in an over-intensive use of land or excessive depletion of natural resources. In evaluating the intensity of the use, the Board should consider the extent of the proposed development in relation to parcel size and the natural landscape/topography; the area of impermeable surface; the amount of blasting, grading, or other alternation of the natural topography; the elimination or disruption of agricultural lands; the effect on significant natural areas and environmental resources; the disturbance of plant and animal habitat, and wildlife migration corridors; the relationship of the proposed development to natural hazards; and available mitigation measures such as the preservation of open lands, the addition or restoration of natural features and screening, the reduction or rearrangement of structures and land disturbance, and the use of sustainable construction techniques, resource use, and transportation management.**

This SUP application is being made to allow CEMEX, Inc. to continue mining Dowe Flats for an additional 15 years. The original permit, approved in 1993, estimated that the resource at the quarry would be fully mined out by the end of 2021, but there is more resource than anticipated. If CEMEX, Inc. continues to mine the mineral resources that are all within the currently permitted disturbance boundary, no additional land will be disturbed. In addition, the mine would continue to operate in the way it has historically where the product is mined and processed on-site and then sent via covered conveyor to CEMEX, Inc.'s cement plant for use. There is no history of compatibility complaints associated with the Dowe Flats mine, confirming that it is a low-impact operation. There are also no natural hazards associated with continuing to mine the resource from this site. Once the remaining resource is removed in accordance with this permit amendment, CEMEX, Inc. will reclaim the land and then facilitate its transfer to Boulder County where it will be preserved as open space and integrated into the County's parks, open space, and trails network. Therefore, the request being made will not result in an over-intensive use of land or excessive depletion of a natural resource, and the intensity of the use is appropriate for this site.

- 5. The use will not have a material adverse effect on community capital improvement programs.**

Continuing to mine Dowe Flats will have no adverse effect on community capital improvement programs. Rather, continued mining of this site will more likely have a positive effect on community capital improvement programs because of the cost savings associated with having a nearby source of mineral resources for the CEMEX, Inc. cement plant. Having local resources available that are necessary to make the cement helps to keep the cost of cement down. CEMEX, Inc.'s cement plant likely provides the cement used to make concrete for projects constructed throughout Boulder County as the next closest cement plant is in Pueblo.

- 6. The use will not require a level of community facilities and services greater than that which is available.**

Continued mining operations at Dowe Flats through this SUP amendment will not increase the need for any community facilities or services beyond what is currently being provided. At this time, only emergency response services are provided to the site and Dowe Flats has not generated any significant demand on those services because the quarry has historically operated in a safe manner.

7. The use will support a multimodal transportation system and not result in significant negative impacts to the transportation system or traffic hazards.

Continued mining operations at Dowe Flats through this SUP application will not generate new traffic. The traffic generated by the operation of the site is so insignificant that County staff determined that a new traffic impact study was not needed for this application. Copies of the PAMS report prepared by Felsburg, Holt & Ullevig traffic consultants and email correspondence from County staff approving the PAMS report are included in this application package.

8. The use will not cause significant air, odor, water or noise pollution.

Continued mining at Dowe Flats will not result in any significant air, odor, water, or noise pollution. The site successfully operates in accordance with its existing Air Pollution Emissions Notice (APEN) and Storm Water Permit and associated stormwater management plan, all of which were issued by the State of Colorado Department of Public Health and Environment (CDPHE). The site does not generate odors. Noise is effectively controlled because the activity is contained within the mining cell where the walls of the cell and earthen berms constructed around the site absorb noise that is generated. In addition, the processing equipment on the site is enclosed to further minimize the creation of noise impacts. There is no history of violations or compatibility-related complaints associated with Dowe Flats.

9. The use will be adequately buffered or screened to mitigate any undue visual impacts of the use.

The existing vegetated berm successfully screens views into Dowe Flats from adjacent public roads (Highway 66 and North 53rd Street). There have been no complaints about visual impacts and because the site will continue to operate as it has historically, no new visual impacts will be created.

10. The use will not otherwise be detrimental to the health, safety, or welfare of the present or future inhabitants of Boulder County.

The use proposed in this SUP will not be detrimental to the health, safety, or welfare of the present or future inhabitants of Boulder County. The Dowe Flats facility has operated since 1993, and the plan is for the facility to continue to operate as it has historically: in a manner that is protective of the health, safety, and welfare of the inhabitants of the County, including:

- *Transporting all material from Dowe Flats to the CEMEX, Inc. cement plant via covered, electric conveyor rather than haul truck.*
- *Operating under an APEN permit issued by the CDPHE.*
- *Operating in accordance with Mine Safety and Health Administration (MSHA) requirements.*
- *Hiring a blasting contractor, Buckley Powder, a Colorado company with a good safety record that is properly permitted through the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF).*
- *Maintaining a stringent health and safety program and protocols for all CEMEX, Inc. employees and contractors.*

11. The use will establish an appropriate balance between current and future economic, environmental, and societal needs by minimizing the consumption and inefficient use of energy, materials, minerals, water, land, and other finite resources.

Continued mining at Dowe Flats will create a balance between current and future economic, environmental, and societal needs of Boulder County by minimizing the consumption and inefficient use of energy, materials, minerals, and land.

The extension would allow for the extraction of limestone and shale (sedimentary rocks that are composed of minerals), a finite resource that is necessary to meet a societal need (the need for cement to make concrete). Because continued extraction of this finite resource would occur within the confines of the currently permitted disturbance boundary, no additional land will be disturbed. Reclaiming the site before all mineral resources have been extracted would mean leaving behind a valuable resource, which would diminish its efficient use.

In addition, the Dowe Flats operation is very energy efficient because all material from the site is processed and then sent straight to CEMEX, Inc.'s cement plant via a covered, electric conveyor. No haul trucks are used to transport the material from Dowe Flats to the cement plant. However, if Dowe Flats is no longer able to supply CEMEX, Inc. with its mineral resources, the material will need to come from another source which likely would require the use of trucks to haul it to the cement plant.

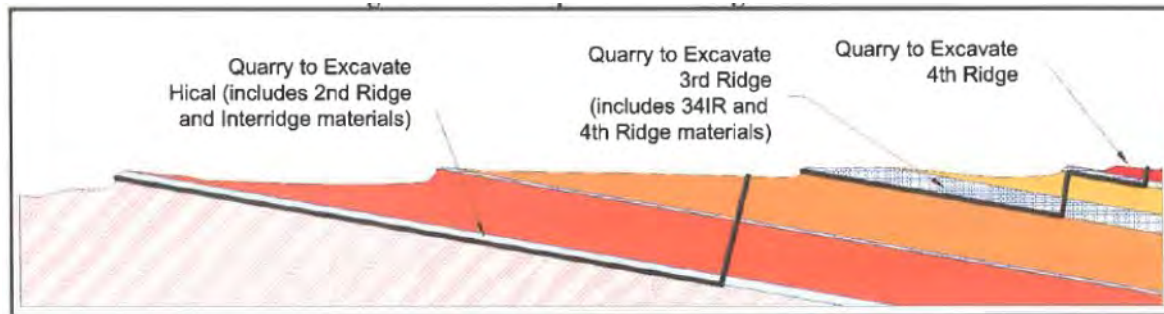
Finally, continued mining at Dowe Flats is economically responsible and in the best interests of the County and its residents. Allowing for the extraction of the material from Dowe Flats, an existing facility that is essentially adjacent to the cement plant where it is utilized minimizes raw material and transportation costs. The costs associated with mining and transporting the material from Dowe Flats to make cement figures into the cost of the cement used to make concrete and impacts consumers in both the private and public sectors.

- 12. The use will not result in unreasonable risk of harm to people or property – both onsite and in the surrounding area – from natural hazards. Development or activity associated with the use must avoid natural hazards, including those on the subject property and those originating off-site with a reasonable likelihood of affecting the subject property. Natural hazards include, without limitation, expansive soils or claystone, subsiding soils, soil creep areas, or questionable soils where the safe-sustaining power of the soils is in doubt; landslides, mudslides, mudfalls, debris fans, unstable slopes, and rockfalls; flash flooding corridors, alluvial fans, floodways, floodplains, and flood-prone areas; and avalanche corridors; all as identified in the Comprehensive Plan Geologic Hazard and Constraint Areas Map or through the Special Review process using the best available information. Best available information includes, without limitation, updated topographic or geologic data, Colorado Geologic Survey landslide, earth/debris flow data, interim floodplain mapping data, and creek planning studies.**

The Dowe Flats quarry has been in operation for over 20 years and there have been no unreasonable risks to people or property on or around Dowe Flats due to quarry activities. The Colorado Division of Reclamation Mining and Safety (DRMS) ensures that mining activities will not impact the structural integrity of any existing structures within 200 feet of the high wall of a mine. The closest neighboring structure to the high wall at Dowe Flats is a building associated with the City of Longmont's water management facility, and it is over 4,500 feet away. Mining at Dowe Flats has never posed a risk to any neighboring structure and continuing to mine the site will not change that analysis because the location of the mining cell will remain within the permitted disturbance boundary.

In addition, the design of the Dowe Flats quarry considered the geology of the site from the very beginning to ensure that no safety hazards would be created inside the mine. The DRMS reviewed the design when the mine was originally permitted, and they concurred. Since CEMEX, Inc. first began operating, there is no record of any natural hazards creating problems at Dowe Flats. The rock in the quarry dips an average of about 15 to 20 degrees to the east and all highwalls are developed on the up-slope side of these rock beds so that the dip is always sloping away. The competent nature of the mineral resources and the beds dipping away, and the highwall being constructed perpendicularly to the dipping of the material, assure safe

highwall stability. The figure below shows the “L”-shaped benches’ up dip of the mined limestone (HiCal) and shale beds (2nd, 3rd, and 4th ridges).



To increase safety and stability, when mining, CEMEX, Inc. creates 12- to 22-foot-wide catch benches near the mining limit. This creates a 2:1 (horizontal: vertical) slope so if rocks fall, they land on the bench and cannot reach the pit floor. As material is mined and the rocks are piled up, CEMEX, Inc.’s operating procedures ensure that rock dumps do not exceed 35-degree slopes. CEMEX, Inc.’s proper mine planning and best management practices further assure no rockslides occur within the quarry.

As noted in the figure above, limestone and shale outcrop near the surface, covered by a thin veneer of sandy-clay, rock fragments and topsoil. Both the limestone and shale units are competent and not subject to expansion, subsidence, or soil creep, and do not diminish the ground’s integrity. Since commencement of the mine, there have been no signs of karst features or subsidence, landslides, mudslides, mudfalls, debris fans, unstable slopes, or rockfalls. The quarry is outside of mapped floodplains and flood-prone areas and was not impacted by the 2013 flood. The quarry is also not situated on an alluvial fan or in an avalanche corridor.

CEMEX, Inc. owns its own drone and regularly flies the property to obtain up-to-date topographic mapping of the mine. This data aids CEMEX, Inc. with mine planning to keep the operation safe and in compliance with their permits and best management practices.

- 13. The proposed use shall not alter historic drainage patterns and/or flow rates unless the associated development includes acceptable mitigation measures to compensate for anticipated drainage impacts. The best available information should be used to evaluate these impacts, including without limitation the Boulder County Storm Drainage Criteria Manual, hydrologic evaluations to determine peak flows, floodplain mapping studies, updated topographic data, Colorado Geologic Survey landslide, earth/debris flow data, and creek planning studies, all as applicable given the context of the subject property and the application.**

A Drainage Report has been prepared for Dowe Flats, which shows drainage patterns and flow rates for the pre-mining versus reclamation plan conditions at the site. The entire Dowe Flats mining/quarry site is within one drainage basin that is not intersected by exterior drainage basins. Furthermore, all stormwater drainage after final reclamation will flow in the same direction (from north to south) as before mining; any minor amounts of runoff not infiltrating within the permit area will exit the site at the south end in the same manner as before mining. No increase in peak runoff rates is expected when comparing pre-mining to reclaimed conditions.



Dowe Flats Quarry Site Description and Future Mining Impact Report

May 2, 2022

Submitted to:

*CEMEX, Inc.
5134 Ute Rd
Longmont, CO 80503*

Prepared by:



*14 Inverness Dr East, Ste A100
Englewood, CO 80112
www.habitatmanagementinc.com*

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Dowe Flats Quarry Site Description and Future Mining Impact Analysis

1 Introduction

The CEMEX, Inc. Dowe Flats Quarry (Dowe Flats) is a limestone quarry located near the Town of Lyons in Boulder County, Colorado. Dowe Flats currently operates under Boulder County Special Use Permit (SUP) number SU-93-14 which is set to expire in the near future. CEMEX, Inc. is seeking to amend their SUP to extend mining within the current footprint for an additional 15 years. Habitat Management, Inc. (Habitat Management) was contracted to prepare the following report to describe existing site conditions and evaluate the ecological impacts of continued mining.

Habitat Management scientists, natural resources consultants, and field crews have provided services to CEMEX, Inc. at this location since 2010. Our personnel are intimately familiar with the site conditions, site history, reclamation, and permitting details.

This report includes descriptions of streams, irrigation ditches, areas subject to flooding, lakes, high ground water areas, topography, current land use, vegetation communities, wetlands, climatology, and wildlife habitats. Additionally, each of these site features was evaluated to consider the ecological impacts that would result from continued mining.

2 Site Features

The area that is currently permitted under SU-93-14 includes the Dowe Flats property itself and a Partition Agreement Lease area around the Dowe Flats property owned by Boulder County Open Space and leased to CEMEX, Inc. as a buffer. The original permit application included 1,911 acres; however, approximately 101 acres were removed over the years due to property sales resulting in a current permit boundary of 1,810 acres. With the proposed amendment to the SUP, CEMEX, Inc. is planning to reduce the permit area to only include the Dowe Flats property itself, which is 709 acres, a 61% reduction in area. (Figure 1). This report focuses on the Dowe Flats Property only.

2.1 Streams

Saint Vrain Creek is the only perennial waterway near the permit area, and it does not intersect the Dowe Flats boundary. The conveyor corridor crosses Saint Vrain Creek in an elevated and fully enclosed location. No activities proposed in the permit amendment application will impact Saint Vrain Creek.

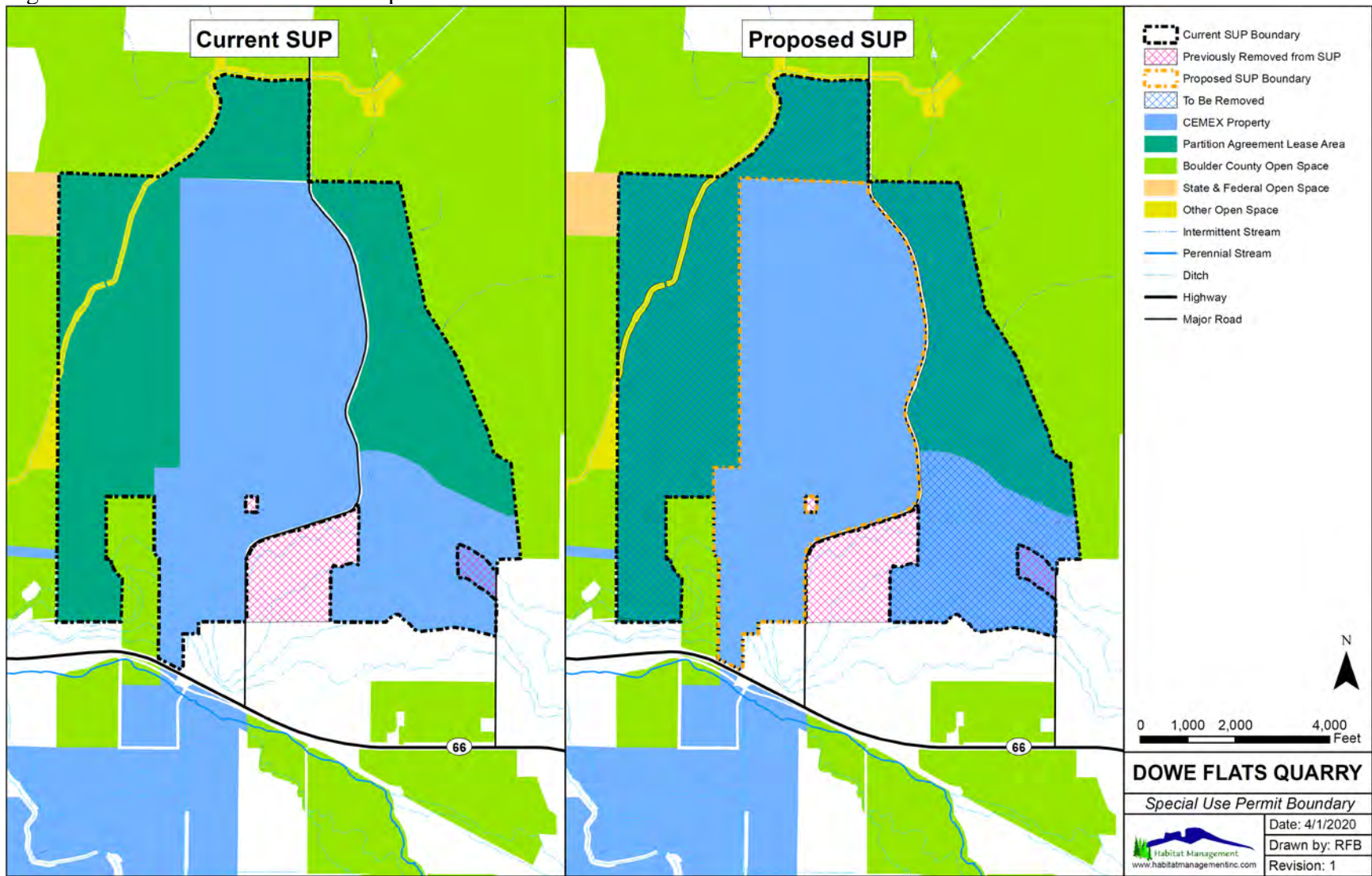
There are several intermittent streams shown crossing Dowe Flats on the Boulder County GIS database (Boulder County 2020a). These drainages are primarily fed by seepage from the St. Vrain Supply Canal and agricultural irrigation. No activities proposed in the permit amendment application will have new impacts on these drainages.

2.2 Irrigation Ditches

There are several active irrigation ditches that flow across the permit area. The Supply Ditch, the Highland Ditch, the Rough and Ready Ditch, and the Palmerton Ditch all cross the Dowe Flats property south of the active mining area. Several of these ditches cross under mine access roads in culverts. Berms and other stormwater management strategies are in place to prevent runoff from these roads from entering the irrigation ditches. No activities proposed in the permit amendment application will have new impacts on these waterways.

Dowe Flats Quarry Site Description and Future Mining Impact Analysis

Figure 1: Dowe Flats Current and Proposed SUP Boundaries



*Dowe Flats Quarry Site Description and Future Mining Impact Analysis***2.3 Areas Subject to Flooding**

After the 2013 flood, The Colorado Water Conservation Board re-mapped the 100-year flood zone. This boundary has been adopted by the Boulder County Commissioners for use in regulatory decisions and is available online from the Boulder County website (Boulder County 2020b). The Dowe Flats property is not within the 100-year flood zone. No activities proposed in the permit amendment application will occur within the 100-year flood zone.

2.4 Lakes

There are no lakes within the Dowe Flats permit area. No activities proposed in the permit amendment application will impact any lakes.

2.5 High Ground Water Areas

The primary source of ground water in the Dowe Flats permit area is an unconsolidated shallow alluvial aquifer of Quaternary age that ranges between 12 and 30 feet thick. The well yields in this aquifer are classified by the Colorado Geological Survey (CGS) as being small to inadequate (less than 15 gallons per minute) (Hall et al. 1980). The Niobrara Formation and Pierre Shale, both Cretaceous-age sediment formations, underlie the unconsolidated alluvium. These formations are both classified by the CGS as aquifers with inadequate well yields of less than one gallon per minute. Previous mining through these aquifers has yielded little to no production of groundwater into the mine pit. No activities proposed in the permit amendment application will have new impacts on groundwater quantity or quality.

2.6 Topography

Dowe Flats is in a triangular-shaped valley that resulted from erosion of less-resistant geologic strata in the interior of a plunging syncline. Ridges of more resistant beds surround the valley on three sides. The Hi-Cal Ridge that runs down the western edge of the current mine area transects the western half of the larger valley. In general, the valley floor has low topographic relief and slopes toward the south at an average 2% gradient. The highest point on the Dowe Flats property at the north end of the Hi-Cal Ridge is approximately 5,470 in elevation and the lowest elevation at the south end of the property near Highway 66 is 5,240 feet.

The Dowe Flats property currently has more topographic relief than it did before mining or than it will when mining is complete. At the south end of the Hi-Cal Ridge, there is a large overburden stockpile where the crusher facilities currently sit. There is another large overburden stockpile to the southeast of the Hi-Cal Ridge, referred to as Mt. George on the site plan map. There are also three pits in the current mining area and several growth media stockpiles around the outer edges of the property. Based on the current reclamation plan, the overburden and growth media stockpiles will be redistributed to fill in the mining pits and entire property will be graded to tie into the existing undisturbed topography and gently slope toward the south except for a 20-acre depression on the northeast side that will be developed into a wetland.

2.7 Current Land Use

The property included in the permit area of this application currently operates as a permitted mine site. The types of activities occurring within the Dowe Flats property include:

- Stripping

Dowe Flats Quarry Site Description and Future Mining Impact Analysis

- Active mining
- Haul roads and access roads
- Equipment staging, fueling, and maintenance
- Crushing and stockpiling
- Office facilities
- Conveyor system
- Overburden stockpiles (temporarily reclaimed)
- Growth media stockpiles (temporarily reclaimed)
- Reclamation in progress (backfilling)
- Reclaimed vegetation communities
- Undisturbed vegetation communities
- Irrigation ditches

2.8 *Vegetation Communities*

The vegetation communities present in the permit area include reclaimed vegetation communities in previously mined areas, undisturbed native communities, and pastures improved for grazing and/or hay production. No activities proposed in the permit amendment application will have new impacts on these communities.

2.8.1 Reclaimed Grassland

Over 158 acres on the Dowe Flats property have been reclaimed over the past 23 years using approved native seed mixtures. For the past 10 years, CEMEX, Inc. has conducted annual vegetation monitoring of these areas including quantitative evaluations of vegetation cover and species diversity. These data have been compared to a reference vegetation community in the Partition Agreement Lease buffer area just west of the Dowe Flats property boundary. In 2021, total vegetation cover on the reclaimed areas averaged 55.6% compared in 50% on the reference area. Desirable species cover (native species as well as cultivated species commonly used in improved pasture plantings) on the reclaimed areas was 50.3% compared to only 36% on the reference. A total of 46 species (33 desirable and 13 undesirable) were observed along the transects in the reclaimed areas. This compared well to 44 species (32 desirable and 12 undesirable) on the reference area.

The most common species, present on more than half of the transects included eight desirable perennial grasses, one native annual forb, one undesirable annual grass, three undesirable annual forbs, and one undesirable perennial forb (Table 1). Several patches within the reclaimed areas have been planted with shrubs to improve the stand structure and habitat diversity. These patches are dominated by fourwing saltbush (*Atriplex canescens*) and rubber rabbitbrush (*Ericameria nauseosa*).

2.8.2 Temporary Reclamation

Temporary reclamation is another major vegetation community within the Dowe Flats property that includes overburden stockpiles, growth media stockpiles, and the area around the conveyor system. These areas typically exhibit similar vegetation cover to the reclaimed grassland vegetation described above but were sometimes seeded with a less diverse seed mixture in anticipation of being re-disturbed.

Dowe Flats Quarry Site Description and Future Mining Impact Analysis

Table 1: Common Species in Grassland/Pasture Communities

Scientific Name	Common Name	Reclaimed Grassland	Lowland Grassland	Improved Pasture
Native Perennial Grasses				
<i>Bouteloua curtipendula</i>	sideoats grama	X		
<i>Bouteloua dactyloides</i>	buffalograss	X		
<i>Bouteloua gracilis</i>	blue grama	X		
<i>Elymus lanceolatus</i>	streambank wheatgrass		X	X
<i>Nassella viridula</i>	green needlegrass	X		
<i>Pascopyrum smithii</i>	western wheatgrass	X	X	X
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	X		
<i>Schizachyrium scoparium</i>	little bluestem	X		
Desirable Perennial Grasses				
<i>Bromus inermis</i>	smooth brome	X		X
<i>Dactylis glomerata</i>	orchard grass			X
<i>Festuca arundinacea</i>	tall fescue			X
<i>Phleum pratense</i>	common timothy			X
<i>Poa pratensis</i>	Kentucky bluegrass			X
<i>Thinopyrum intermedium</i>	intermediate wheatgrass			X
Undesirable Annual Grasses				
<i>Bromus arvensis</i>	field brome	X	X	X
<i>Bromus tectorum</i>	cheatgrass		X	X
Native Perennial Forbs				
<i>Artemisia frigida</i>	prairie sagewort	X	X	
<i>Artemisia ludoviciana</i>	white sagebrush		X	
<i>Heterotheca villosa</i>	hairy false goldenaster	X		
<i>Phyla cuneifolia</i>	wedgeleaf		X	
<i>Sphaeralcea coccinea</i>	scarlet globemallow		X	
<i>Symphotrichum falcatum</i>	white prairie aster	X	X	
Native Annual Forbs				
<i>Helianthus annuus</i>	common sunflower	X	X	
Undesirable Perennial Forbs				
<i>Cirsium arvense</i>	Canada thistle		X	X
<i>Convolvulus arvensis</i>	field bindweed	X	X	X
<i>Linaria dalmatica</i>	Dalmatian toadflax		X	
Undesirable Annual/Biennial Forbs				
<i>Carduus nutans</i>	musk thistle	X		X
<i>Melilotus officinalis</i>	sweetclover	X		
<i>Salsola tragus</i>	prickly Russian thistle	X	X	
<i>Verbascum blattaria</i>	moth mullein		X	
<i>Verbascum thapsus</i>	common mullein	X	X	
Native Woody Species				
<i>Atriplex canescens</i>	fourwing saltbush	X		
<i>Ericameria nauseosa</i>	rubber rabbitbrush		X	
<i>Gutierrezia sarothrae</i>	broom snakeweed	X	X	X

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2.8.3 Lowland Grassland

Lowland grassland communities are in low-lying areas with deeper and heavier soils west of the HiCal Ridge and extending out into the buffer areas. Dominant grass species include western wheatgrass (*Pascopyrum smithii*) and streambank wheatgrass (*Elymus lanceolatus*) along with a variety of native forbs (Table 1).

Many of these lowland areas are occupied by large populations of black-tailed prairie dogs. These populations along with historically high grazing pressure have resulted in some areas within this community having diminished grass cover and a substantial weed cover. One of the reference locations within the buffer area that is monitored each year for comparison to the reclaimed areas is in such a prairie dog town.

2.8.4 Improved Pasture

The irrigated pasture lands on the west side of Dowe Flats are dominated by a mixture of native and cultivated perennial grass species (Table 1). The European cultivars are considered by some to improve the grazing and/or hay production of these pastures. Some of these “improved pastures” have been heavily grazed in some years and some have also been colonized by prairie dogs. The cumulative effect of foraging by these animals has resulted in an invasion of weedy plants in some areas.

2.8.5 Riparian

Riparian communities are isolated to narrow strips along the irrigation ditches within the permit area. The riparian zone along the St. Vrain is wider and much more diverse than that along the irrigation ditches. The irrigation ditches primarily have only riparian tree and shrub species.

Dominant trees in riparian communities include plains cottonwood (*Populus deltoides*), narrowleaf cottonwood (*Populus angustifolia*), peachleaf willow (*Salix amygdaloides*), boxelder (*Acer negundo*), and Russian olive (*Elaeagnus angustifolia*). Dominant shrubs include sandbar willow (*Salix exigua*), chokecherry (*Prunus virginiana*), American plum (*Prunus americana*), and hawthorn (*Crataegus* sp.).

2.8.6 Other Communities Outside Dowe Flats

Several other communities provide important habitat in the areas immediately adjacent to Dowe Flats. Upland grassland communities dominate areas with shallower soils such as along the undisturbed portions of the HiCal Ridge north of Dowe Flats and rockier areas within the buffer area east and west of Dowe Flats. The upland grassland community is dominated by a mixture of warm and cool season grasses with a high diversity of native forbs; however, as the lowland grasslands, many areas have been heavily grazed by cattle and prairie dogs and have developed patches of weed. On the east side of the buffer areas, some of the upland grassland communities also have patches of dense shrubs such as mountain mahogany (*Cercocarpus montanus*) and skunkbrush sumac (*Rhus trilobata*) with the occasional American plum, chokecherry, or wax currant (*Ribes cereum*). Additionally, the riparian zone along the St. Vrain is wider and much more diverse than that along the irrigation ditches providing wide variety of grasses, sedges, rushes, and forbs in the understory and habitat for a more diverse wildlife community.

*Dowe Flats Quarry Site Description and Future Mining Impact Analysis***2.9 Wetlands**

No jurisdictional wetlands are located within the Dowe Flats permit area. Three wetland areas that were once thought to be present within the permit area were associated with the Saint Vrain Supply Canal liner leakage and are primarily within the Partition Lease Agreement buffer area. The canal was relined in 1994 and in 1997, CEMEX, Inc. hired a wetland consultant to conduct an additional study of these three areas. The study results were sent to the U.S. Army Corps of Engineers (ACOE). On July 22, 1997, the ACOE replied verifying that the three subject wetlands were no longer considered to be wetlands or waters of the United States (Corps File # 199580789). No activities proposed in the permit amendment application will have an impact on wetland areas.

Field inspections conducted in summer 2021 found no potential wetland areas within Dowe Flats. However, there is a wet area of just north of the mining boundary on the buffer land owned by Boulder County. This wet area was first identified in 2010 and was reported in both the 10-Year Review and the 15-Year Review of the Boulder County Special Use Permit for Dowe Flats. The wet area has expanded over the past 21 years. CEMEX, Inc. requested more than once since the 15-Year Review that the ditch be relined to prevent potential for future artificial wetland development.

2.10 Climatology

The climate at Dowe Flats is typical of the Front Range foothills of Colorado. While no climatological data are collected onsite at Dowe Flats, precipitation data have been collected at the Flatiron Reservoir located approximately 9 miles north of Dowe Flats at an elevation of 5,470 feet since 1997 (Western Regional Climate Center 2021a). Average annual precipitation is 16.6 inches the majority of which falls as rain in May through September. Average annual snowfall is approximately 44 inches with the greatest snowfall experienced in December through March.

No temperature data are recorded at Flatiron Reservoir. The closest weather station with temperature data is the Loveland 2N station located 13 miles northeast of Dowe Flats at an elevation of 5040 feet (Western Regional Climate Center 2021b). The average high and low temperatures in July are 88°F and 56°F, respectively, while the average high and low temperatures in December are 43°F and 14°F, respectively. The average frost-free period lasts from mid-May through September (Plant Maps 2021).

3 Wildlife

The Colorado Parks and Wildlife Department (CPW) has an extensive habitat and range data for over 200 species of mammals, birds, amphibians, reptiles, and fish throughout Colorado. GIS range data from CPW (CPW 2021) suggest that 57 of these species have ranges that overlap with the Dowe Flats permit boundary including 21 bird species, 20 mammals, and 16 reptiles (Table 1). The wildlife species and habitats of the Dowe Flats area were extensively studied and evaluated in the 1980s and 1990s as a part of the original Dowe Flats SUP application and several species were monitored for the first few years of mining. The relatively undisturbed habitats surrounding Dowe Flats support rich wildlife communities. Daily and seasonal wildlife movements across Dowe Flats connecting Rabbit Mountain, Indian Mountain, and the St. Vrain Creek Corridor are common and will not be further hindered by continued mining. No activities proposed in the permit amendment application will have new impacts on wildlife.

Dowe Flats Quarry Site Description and Future Mining Impact Analysis

Two primary wildlife issues were identified during the pre-mining studies at Dowe Flats: prairie dogs as raptor prey base and big game movement. These issues are discussed in this section along with threatened and endangered species, other species of concern, and wildlife habitat.

3.1.1 *Prairie Dogs and Raptors*

The original Dowe Flats SUP was developed to ensure that reclamation activities would preserve winter raptor habitat. CEMEX, Inc. conducted winter raptor studies and monitored black-tailed prairie dog (*Cynomys ludovicianus*) populations on the Dowe Flats property for five years after approval of the SUP. Several prairie dog management actions and policies were included in the original Dowe Flats Management and Monitoring Plans, and they continue to be followed.

While some prairie dog habitat was destroyed over the years while mining progressed northward, new prairie dog habitat was created in reclaimed areas. A large population currently resides on the east side of the mine in the reclaimed grassland and most of the reclaimed grassland was reclaimed in a manner to support prairie dog establishment. Additionally, several other prairie dog populations are thriving immediately adjacent to the mine in the Partition Lease Agreement buffer area.

Table 2: Wildlife Species with Dowe Flats in Their Known Range

Birds	Mammals	Reptiles
American Bittern	Black Bear	Bullsnake
Bald Eagle	Mountain Lion	Common Gartersnake
Band-tailed Pigeon	Elk	Milksnake
Bobolink	Mule Deer	North American Racer
Brewer Sparrow	White-tailed Deer	Northern Watersnake
Brown-capped Rosy Finch	White-tailed Jackrabbit	Plains Black-headed Snake
Burrowing Owl	Black-tailed Prairie Dog	Plains Gartersnake
Canada Geese	Olive-backed Pocket Mouse	Plains Hog-nosed Snake
Cassin Sparrow	Preble's Meadow Jumping Mouse	Prairie Rattlesnake
Golden Eagle	Big Brown Bat	Six-lined Racerunner
Grasshopper Sparrow	Hoary Bat	Terrestrial Gartersnake
Great Blue Heron	Eastern Red Bat	Hernandez's Short-horned Lizard
Lark Bunting	Silver-haired Bat	Prairie Lizard
Lazuli Bunting	Townsend's Big-eared Bat	Ornate Box Turtle
Lewis Woodpecker	Tri-colored Bat	Painted Turtle
Northern Harrier	Fringed Myotis	Snapping Turtle
Prairie Falcon	Little Brown Bat	
Rufous Hummingbird	Long-eared Myotis	
Swainson Hawk	Long-legged Myotis	
Virginia Warbler	Western Small-footed Bat	
Wild Turkey		

3.1.2 *Big Game*

Mule deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*) are seasonally present in and around Dowe Flats. Before mining, concerns about impacts to mule deer due to interruption of their movement were raised. However, mule deer and elk are both regularly observed using the reclaimed grassland communities south of the active mining area. White-tailed deer (*Odocoileus*

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virginianus) are occasionally observed on the Dowe Flats property, but more often in the riparian corridor associated with St. Vrain Creek.

3.1.3 Threatened and Endangered Species and Species of Concern

Among the 57 species identified in the CPW database as having ranges that include the Dowe Flats permit area are several listed in the US Fish and Wildlife Service's (USFWS) Environmental Conservation Online System (USFWS 2021). However, there is no evidence to suggest that any of these species nor any other state or federal threatened, endangered, or candidate species would be adversely affected by the activities proposed in the permit amendment application.

The Preble's meadow jumping mouse (*Zapus hudsonius preblei*) is a federally threatened species known to occur in the St. Vrain Creek riparian corridor. Populations and habitat of this species are monitored by Boulder County and the activities included in the permit amendment application are far removed from their critical habitat.

The western burrowing owl (*Athene cunicularia ssp. hypugaea*) is considered a species of concern by the USFWS. Burrowing owl surveys were completed per the Dowe Flats Management and Monitoring Plans that were submitted after the original Special Use Permit approval in 1994. No burrowing owls were found during those surveys. Mining has been continuous since those surveys were completed, so there would be no anticipated new impacts to this species as a result of the activities proposed in the permit amendment application. If future reclamation activities involve disturbances during the burrowing owl nesting season to prairie dog communities that have developed in the previously reclaimed areas, then burrowing owl surveys may be required at that time.

No bat species in the range of Dowe Flats permit area are federal or state listed; however, the USFWS is currently conducting a discretionary status review of the little brown bat (*Myotis lucifugus*) and tri-colored bat (*Perimyotis subflavus*; USFWS 2020). The USFWS expected to release the findings of the status review in the spring of 2021 and planned to publish the regulatory guidance pertaining to the review in the fall of 2022 (USFWS 2020); but neither have been released. Additionally, long-legged myotis (*Myotis volans*), fringed myotis (*Myotis thysanodes*), and long-eared myotis (*Myotis evotis*) are considered species of concern by the USFWS (USFWS 2021) and the Townsend's big-eared bat is considered a state special concern species (CPW 2022). Continued mining activities within the permit area are not expected to have adverse effects on bat species.

Seven bat species (big brown bat [*Eptesicus fuscus*], Townsend's big-eared bat, fringed myotis, little brown bat, long-eared myotis, long-legged myotis, and western small-footed bat [*Myotis ciliolabrum*]) in Boulder County are known to roost in rock crevices. In arid environments such as Colorado, high summer temperatures combined with low relative humidity causes high rates of evaporative water loss, particularly in reproductive females and escalates throughout lactation (Adams and Hayes 2008). Studies have noted the preference of maternity roost sites to be in proximity to permanent water sources (Adams & Thibault 2006). Roosting near a drinking water source facilitates replenishing evaporated water before bats start evening foraging and open water provides important foraging habitat. Several of the crevice roosting species are also highly associated with forested habitat for foraging.

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Mining at the south end of the currently open pit created a unique bat habitat where an exposed rock cliff face abuts a small (~2.7-acre) temporary water storage pond that is used by CEMEX, Inc. for filling their water trucks. The rock face has vertical and horizontal crevices as well as rock flakes that bats can use as day and night roosts and the pond can serve as a drinking water source. Although nearby forested habitat is lacking, there may be an opportunity to preserve potential bat habitat if the reclamation plan was revised to not fill in this area of the site and the rock face and pond became permanent features.

While bald eagles (*Haliaeetus leucocephalus*) are no longer protected under the Endangered Species Act, they are still protected by several other federal laws. Several known bald eagle nesting and roosting sites are near to the permit boundary along the St. Vrain Creek corridor and bald eagles are commonly seen hunting on CEMEX, Inc. properties in the area. No new impacts to bald eagles are anticipated with continued mining activities at Dowe Flats.

4 Long- and Short-Term Ecological Impacts

No land disturbance outside the currently permitted disturbance boundary is anticipated with the permit amendment application. The continued mining at Dowe Flats will occur in the already excavated pits that will be expanded as needed to mine additional reserves. Further, some of the areas currently impacted by mine-related activities will be reclaimed concurrent with continued mining. The primary impact to both vegetation and wildlife will be the short-term postponement of the development of a reclaimed habitat.

If the permit amendment application is accepted, the Dowe Flats property will continue to be mined for an additional 15 years. During the first five years, some of the areas currently disturbed by mine-related activities will be reclaimed. After mining is complete, the entire area will be reclaimed to create a reclaimed grassland community with a small wetland area. In the long-term, the vegetation communities and wildlife habitats created at the end of mining will be no different than currently planned.

While there are no new impacts to vegetation communities or wildlife habitat anticipated with the implementation of the permit amendment application, there may be some benefits to modifying the existing reclamation plan to avoid impacts that will occur under the currently approved reclamation plan.

Several landforms containing established grassland vegetation will be disturbed during the final reclamation process because the material used to build the landforms would need to be used to re-create the pre-mining topography. Some of the disturbance will be unavoidable, such as distributing growth media stockpiles; however, some of these landforms could be left intact to create a more topographically diverse reclaimed surface which would in turn support a more ecologically diverse reclaimed habitat.

Current temporary reclamation areas are supporting populations of prairie dogs and mule deer which were the two species of most concern during the original permitting process in 1994. Leaving even some of these areas intact would mitigate currently unavoidable impacts to these species. A reclamation plan with greater topographic and vegetative diversity would provide habitat for a greater diversity of raptor prey including lagomorphs, rodents, reptiles, bats, and other birds. Additionally, deer and elk would benefit from an enhanced habitat with expanded shelter opportunities.

*Dowe Flats Quarry Site Description and Future Mining Impact Analysis***5 References**

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Dowe Flats Quarry Soils and Geology Report

May 2, 2022

Prepared by:



*CEMEX, Inc.
5134 Ute Rd
Longmont, CO 80503*

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Dowe Flats Quarry Soils and Geology Report

1 Introduction

The CEMEX, Inc. Dowe Flats Quarry (Dowe Flats) is a limestone quarry located near the Town of Lyons in Boulder County, Colorado. Dowe Flats currently operates under Boulder County Special Use Permit (SUP) number SU-93-14. CEMEX, Inc. is seeking to amend our SUP to extend mining within the current footprint for an additional 15 years. The soils and geology of the Dowe Flats property were described in detail in the original 1993 SUP Application to Boulder County prepared by SHB AGRA (1993). This document updates and summarizes the information previously submitted. The activities proposed in CEMEX, Inc.'s current permit amendment application do not disturb any new areas.

2 Soils

Soils of the Dowe Flats property were mapped by the U.S. Soil Conservation Service (now the Natural Resources Conservation Service, NRCS) in 1975 as part of the Boulder County Soil Survey (Moreland and Moreland 1975). This survey was updated in 2008 (Moreland and Moreland 2008). There was very little change in the soil classifications at Dowe Flats from 1975 to 2008; however, this document does follow the 2008 survey and the NRCS Web Soil Survey data (Soil Survey Staff 2021).

2.1 Soil Classification & Descriptions

Soil samples were collected at the time of the original permit application to verify soil unit boundaries and determine reclamation suitability. Slight modifications to the boundaries of soil units were made at that time but were not considered critical because all material was verified as suitable for revegetation, and all units were salvageable to similar depths. In further support of this, reclamation activities completed on the site to date have proven the soils are suitable to reestablish healthy vegetation.

2.1.1 Main Soil Types of the Permit Area

The three main soil units mapped in areas that were disturbed by mining are LaPorte very fine sandy loam, Manvel loam, and Gaynor silty clay loam.

2.1.1.1 Manvel Soils

The Manvel soils covered approximately 50% of the property based on the NRCS mapping (Moreland and Moreland 2008). They are deep and well-drained, developing on calcareous, loamy alluvium. These soils were found on the broad central areas of Dowe Flats, away from limestone outcrops. Permeability in this soil is moderate and water holding capacity is low. The upper A-horizon layer was a brown loam about 6 inches thick. The underlying layer was a pale brown loam about 14 inches thick. Below this, was a dark grayish brown to dark brown silty clay loam extending to about 60 inches. The thickness of the surface material likely to be salvaged for reclamation varied from 4 to 6 inches.

2.1.1.2 LaPorte Soils

The LaPorte soils covered approximately 31% of the property based on the NRCS mapping (Moreland and Moreland 2008). They are shallow and well-drained, developing over limestone and limey shale. They have moderate permeability, but because of their shallowness have low water-retention capacity. The upper A-horizon at Dowe Flats was a dark brown sandy loam from

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4 to 7 inches thick, somewhat thinner than described in Moreland and Moreland (1975) where the upper horizon was described as 8 inches thick. Underlying was a layer of pale brown calcareous loam about 4 inches thick. Depth to parent material varied from 11 to 13 inches. These soils were present much as mapped, except where they extended into areas mapped as Gaynor (see Section 2.1.1.3). The thickness of the surface material likely to be salvaged for reclamation varied from 4 to 10 inches.

2.1.1.3 Gaynor Soils

The Gaynor silty clay loam soils covered approximately 13% of the property based on the NRCS mapping (Moreland and Moreland 2008). They are moderately deep soils derived from loamy alluvial and wind-blown materials. They are found in areas of wind deposits which tend to be difficult to accurately predict. Much of the area mapped as Gaynor was described as either LaPorte or Manvel series in the field sampling. The surface A-horizon layer was a grayish brown silty clay loam about 6 inches thick. Below this was a brown silty clay loam about 4 inches thick. The underlying layer of silty clay loam extended approximately 20 inches deeper. The surface material likely to be salvaged for reclamation averaged 8 inches in thickness.

2.1.2 Other Soils of the Permit Area

Several other soil units were mapped within the Dowe Flats property and together represented the remaining 6% of the area. These soil units were either not disturbed or experienced very minor disturbance. These soils included Calkins sandy loam, Nunn clay loam, Nunn sandy clay loam, Playas, and Valmont cobbly clay loam.

Calkins sandy loam soils were mapped as less than one acre on the far northeast edge of the property outside the mining area. These soils are coarse loamy, mixed, mesic Cumulic Haplaquolls. Deep and somewhat poorly drained, they were formed from loamy alluvium on low terraces and bottomlands.

Nunn sandy clay loam and Nunn clay loam soils were mapped along the west edge of the property west of the HiCal ridge outside the mining area. These soils are fine montmorillonitic, mesic Aridic Argiustolls, are deep and well-drained, and are formed on terraces and valley side slopes in loamy alluvium. The Nunn sandy clay loam and Nunn clay loam were mapped separately.

Playas were not included in the original soil description for Dowe Flats but were mapped in the 2008 survey in a single area where the 3rd Ridge Pit now resides. Playas are closed depressions that intermittently hold water from runoff and storm events. The surface soils in playas tend to be of finer texture than the surrounding area and are often more saline and alkaline. Because this area was not described differently from the surrounding area on the pre-mining maps, the surface soils were likely salvaged and stockpiled along with the surrounding topsoil.

Valmont cobbly clay loam soils were mapped by slope class (1-5% and 5-25%) on the northwest edge of the property west of the HiCal ridge outside the mining area. These soils are clayey over loamy-skeletal, montmorillonitic, mesic Aridic Argiustolls. They are deep and well-drained, and are formed on old, high terraces in cobbly and gravelly loamy alluvium.

2.2 Soil Salvage and Suitability

Prior to mining, soil samples were submitted to the Colorado State University Soils Laboratory for verification of reclamation suitability. Based on those soil results and recommendations from

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the NRCS, the reclamation plan was developed for the best use of perennial vegetation cover to be used for livestock grazing and/or wildlife habitat.

During mining, the suitable growth media (A horizon and some of the upper B horizon) have been salvaged and stockpiled and the growth media stockpiles have been temporarily revegetated until used to prevent loss from wind and water erosion. No areas outside of the original mining boundary will be disturbed, as a result of the activities proposed in this permit extension application and growth media stripped in the future will be stockpiled and stabilized, as before. There is sufficient growth media currently stockpiled to reclaim all currently disturbed areas per the currently approved reclamation plan.

2.3 Soil Impacts and Mitigation

The pre-mining land use at Dowe Flats area was largely agricultural, either under cultivation, or having previously been plowed and planted to European or Asian forage species for livestock grazing. The only native grassland was along the HiCal Ridge on the west side of the mining area. According to the NRCS at the time of the original permit application, the historical agricultural land uses were not recommended for these soils due to erosion hazard and slow permeability, rather the highest use of these soils was native perennial vegetation for support of livestock grazing, or wildlife habitat, or both. They further found that the soils on the Dowe Flats property had suffered degradation of surface horizon thickness as a consequence of being cultivated. While the pre-mining soil profiles were lost during salvage, stockpiling, and replacement, the areas that have been reclaimed to date have developed a vegetation cover that should allow soil development to proceed beyond what it was able to reach with the pre-mining agricultural use.

To date, CEMEX, Inc. has reclaimed over 158 acres of previously disturbed areas on the Dowe Flats property. For the past 10 years, CEMEX, Inc. has conducted annual vegetation monitoring of these areas. Quantitative vegetation cover and species diversity data collected on the reclaimed areas have been compared to an undisturbed reference vegetation community just west of the Dowe Flats property boundary. In 2021, total vegetation cover on the reclaimed areas averaged 55.6% compared in 50% on the reference area. Desirable species cover (native species as well as cultivated species commonly used in improved pasture plantings) on the reclaimed areas was 50.3% compared to only 36% on the reference. A total of 46 species (33 desirable and 13 undesirable) were observed along the transects in the reclaimed areas. This compared well to 44 species (32 desirable and 12 undesirable) on the reference area. The reclamation effort has been successful and, as a result, this diverse reclaimed grassland community is already providing wildlife habitat for the deer and elk regularly observed on the property.

3 Geology

In 1985, a study was completed by Fox Consultants that provided a detailed summary of the geologic setting of the Dowe Flats area. This report addressed regional and local bedrock stratigraphy and structural geology and was used for the planning and execution of subsurface explorations and engineering investigations prior to mining. More details of that report can be found in the original Dowe Flats application prepared by SHB AGRA in 1993.

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3.1 Regional Geologic Setting

3.1.1 Regional Stratigraphy

A maximum of approximately 12,700 feet of sediments are found in the vicinity of Dowe Flats, but only those formations beneath the lower Pierre Shale were present at Dowe Flats. In general, the geologic section is composed of alternating sandstone and shale layers with some limestones. Beginning at the bottom of the section and working upward in both depth and time, the individual units display a variety of depositional origins.

Mineral utilization near Dowe Flats has included production of cement from the Fort Hays limestone in a pit south of Dowe Flats and quarrying of Lyons sandstone west of the site for building blocks and silica (from sandstone) used by CEMEX, Inc. in the cement making process. Existing and former gravel pits are present along St. Vrain Creek just south of Dowe Flats from Lyons to Longmont. Farther to the east are several oil fields that produce from sandstones and limestones at depth. Coal mining occurred in the early part of the century from the Laramie Formation but is presently inactive in the area.

3.1.2 Regional Geologic Structure

The Dowe Flats area is in the Foothills Belt, a 5- to 10-mile-wide transition zone between the Front Range physiographic province to the west and the Denver Basin physiographic province to the east. The sedimentary beds adjacent to the Precambrian mountain front are steeply dipping and occasionally overturned. The dip progressively decreases in the younger formations as they outcrop at greater distances from the mountain front. Between Lyons and the northern Colorado border a series of northwest-trending high-angle bedrock faults offset the sedimentary beds. Draping of sediments over these faults produces a series of en-echelon folds and faults. Taken together, these intermediate-scale structural deformations, regional deformations produced by the Front Range and the Denver Basin, and more localized small-scale folding and faulting, result in a generally complex geologic setting throughout the Foothills Belt.

3.2 Dowe Flats Site Geology

3.2.1 Local Stratigraphy

The important formations at Dowe Flats are all Upper Cretaceous in age and are limited to the middle of the regional stratigraphic column. They include, from oldest to youngest, the Dakota Group, the Benton Formation, the Niobrara Formation, and the Pierre Shale. The general stratigraphic descriptions in this section are summarized from three graduate theses that contained detailed lithologic descriptions compiled during field mapping and section measurement activities (Quam 1932, Hunter 1947, and Masters 1957). These documents provide the best available specific lithologic information on Dowe Flats. The most important stratigraphic units in Dowe Flats are, from oldest to youngest: the Dakota Group, containing the Lytle and South Platte formations; the Benton Formation; the Niobrara Formation, containing the Fort Hays and Smoky Hill members; and the Pierre Shale. The uppermost unit at Dowe Flats is the Niobrara Formation, everything above it has been eroded away over geologic time.

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3.2.1.1 Dakota Group

The Dakota Group contains the upper beds on the cuestas surrounding Dowe Flats. It has an average thickness in this area of 330 feet and is subdivided into the lower Lytle and upper South Platte formations.

The Lytle Formation consists of nonmarine fluvial deposits. The lowest part is a fine to coarse-grained massive brown sandstone intercalated with a basal conglomerate containing quarter to half-inch diameter chert pebbles and granite fragments mixed with finer materials in a secondary silica cement. This bed is approximately 40 feet thick. The upper portion of the Lytle Formation consists of a series of variegated red and yellow claystones that, on exposure, weather to a reddish surface soil. This deposit varies in thickness from 30 to 60 feet.

The South Platte Formation deposits are marine and near-marine in origin. The Plainview Member is a platy, fine-grained, hematite-stained quartzose and sandstone. It varies in thickness from 20 to 30 feet through differential incising of the underlying claystones. The middle part of the South Platte Formation is a 125- to 175-foot-thick gray to black carbonaceous shale interbedded with thin, buff-colored siltstones and sandstones. The uppermost part of this formation is the Muddy member, a massive, ridge-forming tan quartzose sandstone 20 to 30 feet thick that is slightly cross-bedded and distinctly jointed.

3.2.1.2 Benton Formation

The Benton Formation is a 500-foot-thick layer of fine-grained marine deposits. The lowest part is composed of dark gray to black fossiliferous sandy shales. The middle portion is a zone of light to dark gray argillaceous limestone and dark gray to black calcareous shales. The upper part is calcareous dark gray sandy shales. Numerous thin but laterally continuous bentonite layers are found throughout the formation. The lower, middle, and upper parts are often referred to as the Graneros Shale, the Greenhorn Limestone, and the Carlile Shale, respectively.

The Codell Sandstone is the uppermost unit in the Benton Formation. In the Dowe Flats area, it has a 15-foot total thickness and can be divided into a 7-foot-thick gray siltstone beneath an 8-foot-thick silty sandstone. This silty sandstone directly underlies the Niobrara Formation.

3.2.1.3 Niobrara Formation

The Niobrara Formation is traditionally separated into two units, the Fort Hays and Smoky Hill members. The Fort Hays Member is an extremely fine-grained, light gray limestone with thin interbedded shales. A section of Fort Hays Member at the south end of Dowe Flats measured 16.5 feet thick (Lowman 1977). Limestone accounted for 13.6 feet or 82% of the outcrop thickness. The limestone is distributed as blocks ranging in thickness from 0.5 to 3.1 feet and vertical joints spaced on 1 to 3-foot centers. The remaining 2.9 feet of material is distributed as 11 thin bentonite layers having an average thickness of 6 inches. Drilling in other areas within the Dowe Flats valley has indicated an average limestone thickness of 20 feet (Malette 1962). The Fort Hays has been the primary ore mined at Dowe Flats to produce cement; it has averaged about 16 feet thick and dips with the area geology about 20 degrees to the east.

The overlying Smoky Hill Member of the Niobrara Formation is generally described as a dark gray, calcareous, fossiliferous marine shale. The three “ridges” mined at Dowe Flats are within the Smoky Hill Member. These units consist of an upper higher alkali/lower lime unit, a middle lower alkali/higher lime unit, and a lower unit that is higher alkali/lower lime. These units along

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with the underlying Fort Hays limestone make up all the ore mined at Dowe Flats to produce cement.

However, characterization of the Smoky Hill Member as shale on a regional scale does not account for several separate limestone beds present in the Dowe Flats vicinity. At Dowe Flats, limestones within the Smoky Hill Member have been described at an outcrop along the Little Thompson River (Quam 1932) and mapped in the Dowe Flats valley (Mallette 1962). An 11-foot-thick limestone unit was mapped 100 feet above the base of the Smoky Hill Member by Mallette in Dowe Flats but was not described by Quam in the Little Thompson River outcrop. All the other materials in the bottom 200 feet of the Smoky Hill Member are dark gray to black, pyritiferous, calcareous, marine shales. A second 20-foot-thick limestone bed was mapped at Dowe Flats and measured in the Little Thompson outcrop at the interval from 200 to approximately 220 feet above the bottom of the Smoky Hill. A final limestone bed, with a base about 256 feet above the Smoky Hill Member, was also located in both field efforts; however, its thickness was measured as 12 feet by Mallette (1962) and 43 feet by Quam (1932). Based upon interpretation of geophysical logs from oil exploration wells drilled 10 to 15 miles south and east of the site (Lowman 1977), the 43-foot value appears to be more realistic.

The fact that the limestones in the Smoky Hill Member are not discussed in regional geologic summary papers indicates that they are local in nature and probably disappear to the north and south.

3.2.1.4 Pierre Shale

The lower Pierre Shale is the uppermost unit considered in this report. Only the lower 500 feet of the Pierre Shale are found in Dowe Flats; the remainder has been eroded away. The lower 2,500 feet of Pierre Shale are homogeneous dark brown to gray-black marine shale that weathers to a buff color. The basal portion of the Pierre Shale, immediately above the Niobrara Formation, is sandy, but the sand content decreases in the main portion of the shale.

3.2.2 *Local Structure*

The area surrounding Dowe Flats is structurally complex with several types of structural features of differing scales overprinted upon each other. Despite detailed studies, interpretations, and reinterpretations, the origin and exact relationship between all the structural features remains unclear.

The regional Dakota hogback that parallels the eastern side of the Front Range through central and northern Colorado forms the ridge that separates Dowe Flats from the town of Lyons. The hogback ridge is normally a monocline formed by the uplift of the Front Range, but in this area, it appears as the eastern limb of a doubly plunging anticline with an axis approximately located on the eastern edge of the Lyons town limits.

On the northern side of Dowe Flats, in the vicinity of Dowe Pass, the regional hogback has been offset approximately 2 miles by a major northwest-trending high-angle fault with a trace along the Little Thompson River. This fault is one of the many large faults that have offset the hogback. The southwest side containing Dowe Flats is the downthrown block, with displacement estimated at 600 feet (Hunter 1947).

Rabbit Mountain is a large, southward-plunging anticline that forms the ridge east of Dowe Flats. It has a steeply dipping eastern limb and a gently dipping western limb, a structural style

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opposite to the general trend of folding along the Front Range. In addition, several smaller faults and canoe folds overprinted on this anticline distort and disrupt the bedding to produce further structural complexity.

Dowe Flats itself is underlain by a southward-plunging syncline. This syncline is nearly symmetrical with no significant folding and faulting at the south end of Dowe Flats. Its northern boundary is the extremely complex Dowe Pass area, an intensely folded area containing numerous anticlines and synclines along with some faulting.

Two faults are shown within the eastern portion of Dowe Flats by Mallette (1962). One high-angle northeast-trending fault is in the northwestern quadrant of Section 15. The other fault is in the eastern half of Section 15 and trends northwest. Both faults are inferred and are shown with very small offsets. However, documentation of evidence for these faults is not provided by Mallette's report, and they were not mapped by the several other major investigators of the Dowe Flats area. In addition, examination of large-scale aerial photography in connection with this study did not reveal any evidence for the northeast-trending fault and only limited evidence for the northwest-trending fault. Therefore, the northeast-trending fault is not believed to be present, and the northwest-trending fault, if present, is only a localized small-scale feature.

All these units are upper Cretaceous in age. The synclinal structure of the central Dowe Flats basin is such that the youngest (Pierre Shale) formation is exposed over much of the eastern portion of the valley bottom with the older strata forming concentric horseshoe-like rings as they outcrop around the valley perimeter on the east and west margins.

Structurally, the region surrounding Dowe Flats is extremely complex with both intense and sometimes superimposed folding as well as post-Cretaceous faulting. In this context, the simplicity of the central interior portion of Dowe Flats is almost anomalous. Interpretation of available information does not indicate the presence of major faulting, shearing, or significant folding in the interior portion of Dowe Flats.

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Appendix A: Map Unit Descriptions

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MANVEL SERIES

The Manvel series consists of very deep, well drained soils that formed in alluvium derived from soft limestone and shale. Manvel soils are on fans, plains, and interfluves. Slopes range from 0 to 15 percent. The mean annual precipitation is about 305 mm (12 inches) and the mean annual temperature is about 11 degrees C. (52 degrees F.).

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Ustic Haplocalcids

TYPICAL PEDON: Manvel silt loam, grassland. (Colors are for dry soil unless otherwise noted).

A--0 to 18 centimeters (0 to 7 inches); brown (10YR 5/3) silt loam, brown (10YR 4/3), moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; common fine and very fine roots; strongly effervescent, 5 percent calcium carbonate equivalent; slightly alkaline (pH 7.6); clear smooth boundary (8 to 18 cm (3 to 7 inches) thick).

Bk1--18 to 64 centimeters (7 to 25 inches); pale brown (10YR 6/3) silt loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; moderately hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; 2 percent medium distinct irregular carbonate masses in matrix; violently effervescent, 20 percent calcium carbonate equivalent; moderately alkaline (pH 8.2); clear smooth boundary. (20 to 51 cm (8 to 20 inches) thick)

Bk2--64 to 124 centimeters 25 to 49 inches; pale brown (10YR 6/3) silt loam, yellowish brown (10YR 5/4), moist; moderate fine prismatic structure; moderately hard, friable, slightly sticky and slightly plastic; few very fine roots; 8 percent medium distinct irregular carbonate masses in matrix; violent effervescence, 13 percent calcium carbonate equivalent; moderately alkaline (pH 8.2); gradual wavy boundary. (48 to 76 cm (19 to 30 inches) thick)

Bk3--124 to 200 centimeters (49 to 79 inches); very pale brown (10YR 7/4) silt loam, brownish yellow (10YR 6/6), moist; weak coarse subangular blocky structure; moderately hard, friable, slightly sticky and slightly plastic; 2 percent fine distinct irregular carbonate masses in matrix; violent effervescence, 35 percent calcium carbonate equivalent; moderately alkaline (pH 8.4).

TYPE LOCATION: Pueblo County, Colorado about 14 miles south of Boone, Colorado; 1,550 feet east and 900 feet north of the SW corner sec. 9, T. 23 S., R. 61 W; Flying A Ranch, CO USGS Quad; UTM zone 13 566930 E, 4212360 N; latitude 38 degrees, 3 minutes, 23.4 seconds N and longitude 104 degrees, 14 minutes, 13.5 seconds W; NAD 83.

RANGE IN CHARACTERISTICS:

Soil moisture: Moist in some part March through May, intermittently moist June through October.

Moisture regime: aridic bordering on ustic.

Mean annual soil temperature ranges from 9 to 13 degrees C. (48 to 56 degrees F.)

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Mean summer soil temperature ranges from 19 to 25 degrees C. (67 to 76 degrees F.)
 Depth to carbonates: calcareous at the surface but may be leached for 5 to 10 centimeters (2 to 4 inches) in some pedons.
 Depth to visible calcium carbonate accumulations: 8 to 38 cm (3 to 15 inches)
 Calcium carbonate equivalent: 15 to 40 percent in at least one horizon above a depth of 100 cm (40 inches).
 Electrical conductivity: 0.5 to 8 dS/m

Particle size control section: (Weighted average)
 Clay content: 18 to 27 percent
 Silt content: 40 to 70 percent
 Sand content: 5 to 35 percent, with less than 15 percent fine or coarser sand
 Rock fragment content: 0 to 5 percent in the control section

A horizon:
 Hue: 10YR to 2.5Y
 Value: 5 or 6 dry, 3 to 5 moist
 Chroma: 2 to 4
 Texture: silt loam or loam
 Clay content: 18 to 27 percent
 Reaction: slightly alkaline to strongly alkaline

Bk horizons: (Bw in some pedons)
 Hue: 7.5YR to 2.5Y
 Value: 5 to 8 dry, 4 to 6 moist
 Chroma: 3 to 6
 Texture: silt loam, loam, clay loam or silty clay loam
 Clay content: 15 to 35 percent but is typically 18 to 27 percent.
 Reaction: moderately alkaline to strongly alkaline
 Calcium carbonate equivalent: 10 to 40 percent
 Rock fragment content: 0 to 5 percent above a depth of 100 cm (40 inches), 0 to 15 percent below 100 cm.

COMPETING SERIES: These are the [Minnequa](#) (CO), and [Willard](#) (NM) series.
[Minnequa](#) soils: have a paralithic contact at depths of 50 to 100 centimeters (20 to 40 inches).
[Willard](#) soils: are in MLRA 70, are dry in March and intermittently moist in April and [May](#), formed in lacustrine deposits, have iron masses in the Bw, and salt crystals in the Bk horizons.

GEOGRAPHIC SETTING:

Landform: fans and plains, interfluves
 Slopes: 0 to 15 percent.
 Parent material: calcareous alluvium derived from chalk, shale and soft limestone.
 Average annual precipitation: 254 to 356 millimeters (10 to 14 inches)
 wettest period: May through August
 Driest period: December through February
 Average annual air temperature: 9 to 14 degrees C. (48 to 57 degrees F.)

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Average summer temperature: 20 to 26 degrees C. (68 to 78 degrees F.)
 Elevation is 1,006 to 1,981 meters (3,300 to 6,500 feet)
 Frost free season: 125 to 170 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the [Penrose](#), [Tyrone](#), and [Wilid](#) series, and the competing [Minnequa](#) series. Penrose soils have a lithic contact at depths of less than 50 centimeters and are on scarps. Tyrone soils have a natric horizon. Wilid soils have an argillic horizon and are on interfluves.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY:

Drainage: Well drained
 Saturated Hydraulic Conductivity: high or moderately high.

USE AND VEGETATION: They are used as rangeland, nonirrigated and irrigated cropland. Native vegetation is mainly blue grama, galleta, western wheatgrass, cactus, and needlegrass.

DISTRIBUTION AND EXTENT: Southern and central Colorado, parts of Kansas, Nebraska and South Dakota, LRR G, MLRA 69, 72, 60A and 64. The series is extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Denver, Colorado

SERIES ESTABLISHED: Arkansas Valley Area, Colorado, 1926.

REMARKS: Diagnostic horizons and features in this pedons are:

Particle size control section: 25 to 100 centimeters (10 to 40 inches). (Bk1, Bk2, and part of the Bk3 horizons)
 Ochric epipedon: the zone from 0 to 18 centimeters (0 to 7 inches). (A horizon)
 Calcic horizon: 18 to 64 centimeters (7 to 25 inches)
 Other features: calcium carbonate equivalent: 15 to 40 percent
 Moisture regime: aridic bordering on ustic.

The assignment of the cation-exchange activity class is inferred from lab data from similar soils in the surrounding area.

LAN 12/2012 The previous classification of calcareous Ustic Torriorthents became obsolete with the Eleventh Edition to Keys to Soil Taxonomy. Based on a field project this update moves the type location from Las Animas County, Colorado to Pueblo County, Colorado and changes the Taxonomic class to Fine-silty, mixed, superactive, mesic Ustic Haplocalcids.

Taxonomic Version: Eleventh Edition, 2010.

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 U.S.A.

*Dowe Flats Quarry Soils and Geology Report***LAPORTE SERIES**

The Laporte series consists of shallow, well drained soils that formed in material that weathered from limestone. Laporte soils are on upland hills and ridges and have slopes of 2 to 60 percent. The mean annual precipitation is about 16 inches and the mean annual temperature is about 48 degrees F.

TAXONOMIC CLASS: Loamy, carbonatic, mesic Lithic Haplustolls

TYPICAL PEDON: Laporte loam, rangeland. (Colors are for dry soil unless otherwise noted.)

A--0 to 9 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine crumb structure; slightly hard, very friable; 5 percent limestone fragments; calcareous; moderately alkaline; clear smooth boundary. (5 to 16 inches thick)

Ck--9 to 16 inches; light brownish gray (10YR 6/2) channery loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; some secondary calcium carbonate occurring mostly as nodules; 30 percent limestone fragments; calcareous; moderately alkaline; gradual smooth boundary. (4 to 15 inches thick)

R--16 inches; weakly fractured limestone.

TYPE LOCATION: Larimer County, Colorado; approximately 1,712 feet north and 321 feet west of SE corner Sec. 1, T. 4 N., R. 70 W.

RANGE IN CHARACTERISTICS:

The average annual soil temperature is 49F. and the average summer soil temperature is 67F. The soils are dry more than .6 of the time that the soil temperature exceeds 5C. The mollic epipedon is 5 to 15 inches thick and the depth to the underlying bedrock is 10 to 20 inches. The mollic epipedon contains from .6 to 2 percent organic carbon which decreases uniformly with increasing depth. These soils are calcareous at or within a few inches of the surface. The control section is typically channery loam but ranges in clay from 15 to 35 percent, in silt from 20 to 55 percent, and sand from 15 to 60 percent, with more than 15 percent but less than 35 percent being fine sand or coarser. Rock fragments range from 5 to 35 percent by volume and are dominantly less than 6 inches in length.

The A horizon has hue of 2.5Y through 7.5YR, value of 4 or 5 dry, 2 or 3 moist, and chroma of 1.5 to 3. Typically, it has granular or crumb structure but has weak subangular blocky structure in some pedons. It is soft or slightly hard and is mildly or moderately alkaline.

The C horizon has hue of 2.5Y through 7.5YR. It is moderately or strongly alkaline. Calcium carbonate equivalent of the strongest part of the Ck horizon is about 16 percent but ranges from 10 to 35 percent. A considerable proportion of the calcium carbonate equivalent results from

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fine limestone pebbles and sand-sized fragments which results in equivalent readings of the whole soil (3/4 inch and smaller) of 40 to 50 percent.

COMPETING SERIES: There are currently no competing series in this family.

GEOGRAPHIC SETTING:

The Laporte soils are on upland hills and ridges.

Slope gradients range from 2 to 60 percent.

The soils formed in material that weathered from or is strongly influenced by the underlying limestone bedrock.

At the type location the average annual precipitation is 15 to 18 inches, most of which falls during the spring and early summer. The frost-free season is about 135 to 150 days. In central New Mexico, the mean annual precipitation is 12 to 15 inches and the mean annual temperature is 48 to 52 degrees F. The frost free period is 110 to 135 days. Elevations are 6,800 to 7,500 feet.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the [Pinon](#), [Penrose](#), and [Kim](#) soils. These soils lack mollic epipedons.

DRAINAGE AND PERMEABILITY: Well drained; medium to rapid runoff; moderate permeability above the bedrock.

USE AND VEGETATION: These soils are used mostly as rangeland, however, they are tilled locally. Principal native vegetation is blue grama, western wheatgrass, needle-and-thread grass, Russian-thistle, yucca, and cactus.

DISTRIBUTION AND EXTENT: Colorado, Montana, New Mexico, and Wyoming. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Bozeman, Montana

SERIES ESTABLISHED: The Fort Collins Area, Colorado, 1927.

REMARKS: This revision changes the classification from mixed to carbonatic minerology.

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*Dowe Flats Quarry Soils and Geology Report***GAYNOR SERIES**

The Gaynor series consists of moderately deep, well drained soils that formed in material weathered from sedimentary rocks. Gaynor soils are on hill sides and ridge crests and have slopes of 0 to 60 percent. The mean annual precipitation is about 18 inches and the mean annual temperature is about 48 degrees F.

TAXONOMIC CLASS: Fine, smectitic, calcareous, mesic Ustic Torriorthents

TYPICAL PEDON: Gaynor silty clay loam - grassland. (Colors are for dry soil unless otherwise noted.)

A--0 to 6 inches; light olive brown (2.5Y 5/3) heavy silty clay loam, olive brown (2.5Y 4/3) moist; strong fine granular structure; soft, very friable; calcareous; moderately alkaline (pH 8.0); clear smooth boundary. (4 to 8 inches thick)

AC--6 to 10 inches; light olive brown (2.5Y 5/3) heavy silty clay loam, olive brown (2.5Y 4/3) moist; weak medium subangular blocky structure; extremely hard, firm; calcareous; moderately alkaline (pH 8.2); gradual smooth boundary. (3 to 5 inches thick)

Ck--10 to 30 inches; light yellowish brown (2.5Y 6/3) heavy silty clay loam, light olive brown (2.5Y 5/3) moist; massive; very hard, firm, plastic; some discontinuous accumulation of secondary calcium carbonate and calcium sulfate as concretions and crystals; calcareous; moderately alkaline (pH 8.2); gradual wavy boundary. (7 to 33 inches thick)

Cr--30 to 60 inches; soft calcareous silty shale.

TYPE LOCATION: Boulder County, Colorado; approximately 1,850 feet south and 1,050 feet east of the NW corner of Sec. 23, T. 2 N., R. 69 W.

RANGE IN CHARACTERISTICS: These soils are usually calcareous at the surface but are leached for a few inches in some pedons. Depth to the underlying paralithic contact is 20 to 40 inches. Organic carbon in the surface horizon is .8 to 1.5 percent and decreases uniformly with increasing depth. Conductivity ranges from less than 1 to about 3 millimhos and exchangeable sodium percentage usually ranges from less than 1 percent throughout the control section. Cation exchange capacity ranges from approximately 60 to 80 milliequivalents per 100 grams of clay. The control section is usually heavy silty clay loam or light silty clay but clay ranges from 35 to 50 percent, silt from 30 to 55 percent, and sand from 5 to 30 percent, with less than 15 percent fine or coarser sand. Coarse fragments range from 0 to 10 percent but are usually less than 2 percent and confined mostly to shale chips. Mean annual soil temperature is 47 to 58 degrees F. Mean summer soil temperature is 59 to 79 degrees F.

The A horizon has hue of 5Y through 7.5YR, value of 5 through 7 dry, 3 through 6 moist, and chroma of 2 through 4. Its primary structure usually is granular or crumb but is weak subangular blocky in some pedons. It is soft or slightly hard and moderately alkaline or mildly alkaline.

Dowe Flats Quarry Soils and Geology Report

The C horizon has hue of 5Y through 10YR. It is moderately alkaline or strongly alkaline and contains about 2 to 8 percent calcium carbonate equivalent. Usually there are a few crystals of calcium sulfate throughout this horizon but amount and placement of visible secondary calcium carbonate and calcium sulfate is erratic from pedon to pedon and horizons are discontinuous.

COMPETING SERIES: These are the [Biedsaw](#), [Bodot](#), [Bone](#), and [Vananda](#) series. Bodot soils are dry in some part of the moisture control section from April to July 15. Bone soils have a thin horizon that qualifies as a natric horizon except for thickness. [Biedsaw](#) and [Vananda](#) soils lack a paralithic contact above a depth of 40 inches.

GEOGRAPHIC SETTING: The Gaynor soils are on hill sides and ridge crests. Slope gradients range from about 2 to 60 percent. These soils formed in thin calcareous sediments weathered residually from sedimentary rock. At the type location the average annual precipitation is 18 inches, with peak periods of precipitation during the spring and summer. Mean annual temperature is 48 degrees F, and the mean summer temperature is 68 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the [Limon](#) and [Samsil](#) soils. In some landscapes they form a topographic sequence with the Samsil and Limon series. Limon soils have no bedrock above a depth of 40 inches. Samsil soils are less than 20 inches deep over shale.

DRAINAGE AND PERMEABILITY: Well drained; medium to rapid runoff; moderate to slow permeability.

USE AND VEGETATION: Used as native pastureland and for dry or irrigated crop land. Principal native vegetation is blue grama, western wheatgrass, and cactus.

DISTRIBUTION AND EXTENT: Eastern and east-central Colorado and Wyoming. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Bozeman, Montana

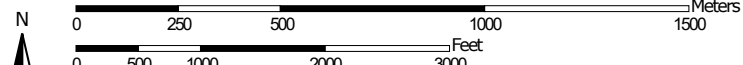
SERIES ESTABLISHED: Johnson County (Southern Johnson Area), Wyoming, 1971.

National Cooperative Soil Survey
U.S.A.

Soil Map—Boulder County Area, Colorado



Map Scale: 1:18,500 if printed on A portrait (8.5" x 11") sheet.




Map projection: Web Mercator Corner coordinates: WGS84 Edge ticks: UTM Zone 13N WGS84

Soil Map—Boulder County Area, Colorado

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils







 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Boulder County Area, Colorado
 Survey Area Data: Version 17, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 20, 2015—Oct 31, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CaB	Calkins sandy loam, 1 to 3 percent slopes	0.7	0.1%
GaD	Gaynor silty clay loam, 3 to 9 percent slopes	96.3	13.2%
LaE	Laporte very fine sandy loam, 5 to 20 percent slopes	220.6	30.3%
Me	Manvel loam	363.2	50.0%
NnB	Nunn sandy clay loam, 1 to 3 percent slopes	13.7	1.9%
NuB	Nunn clay loam, 1 to 3 percent slopes	21.7	3.0%
PLY	Playas	4.4	0.6%
VcC	Valmont cobbly clay loam, 1 to 5 percent slopes	3.2	0.4%
VcE	Valmont cobbly clay loam, 5 to 25 percent slopes	3.3	0.4%
Totals for Area of Interest		727.0	100.0%



DRAFT FINAL

CULTURAL RESOURCES MANAGEMENT PLAN
A Preservation Plan for Management of
Prehistoric, Historic and Geologic
Properties

at

Dowe Flats

Boulder County, Colorado

By:

Carol Drake Mehls
Marcus Grant
Steven F. Mehls
Michael G. Figgs
Michael Burney
Kenneth Carpenter
Paul Rushmore

Prepared for:

Southdown, Inc.
Lyons, Colorado

November, 1994

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1.0 Introduction

Southdown, Inc., a corporation doing business in the State of Colorado as Southwestern Portland Cement Company, owns and operates a cement manufacturing plant and associated quarries two miles east of Lyons, in unincorporated Boulder County. The existing quarries are nearing the end of feedstock production, and Southdown will open new quarries one mile north of the plant at a location known as Dowe Flats. Accordingly, the new quarry is called the Dowe Flats Project (Project). The Dowe Flats quarries are planned to provide feedstock for the plant for 25 years.¹

The mine quarries and associated topsoil and waste rock stockpiles include an impact zone of 385 acres. The 1,955 acre mine permit boundary includes the impact zone and an undeveloped and undisturbed buffer zone.

The area known as the Dowe Flats project site is located east and north of Lyons, Colorado and west of Longmont, Colorado. Rabbit Mountain borders the Study Area on the east, the St. Vrain Creek is the border on the south and Indian Mountain borders the project area to the west. The Dowe Flats topography is flat to rolling with an elevation of approximately 5200 feet at the southeast corner to 5500 feet at the northern border. The Supply Canal, the Highland Ditch, the Rough and Ready Ditch and the Palmerton Ditch provide water and cross the Flats in a generally west to easterly direction. Several springs are located near Rabbit Mountain. (See Figure I).

¹For additional detail the reader is referred to the Dowe Flats Permit Documents including the Boulder County Special Use Permit Application (1993), the Colorado Mined Land Reclamation 112 Permit Application (1993) and Supplemental Technical Appendices (1993).

A north-south oriented limestone ridge crosses Dowe Flats near North 55th Street (County Road 47), which is the major north-south access road. The vegetation is primarily cultivated lands and pasture. Grasslands and shrubs surround the cultivated regions at the margins of the Study Area. South of the major portion of the Study Area is a riparian zone along the irrigation ditches, extending south beyond St. Vrain Creek. The main road construction activities will be the relocation of County Road 47 and the construction of a private haul road.

As displayed in Figure I, the Dowe Flats project includes a 385 acre impact zone (mine quarries, haul roads, conveyer and crusher, and stockpiles). The impact zone is located within a 1,911 acre mine permit boundary which includes more than 1,500 acres of undeveloped buffer and setback for the mine project. Southdown owns an additional 600 acres in the Dowe Flats, Indian Mountain, Rabbit Mountain region that is outside and adjacent to the mine permit boundary. The cultural resource Study Area boundary displayed in Figure I covers more than 2,200 acres including all of the impact zone, all of the mine permit boundary, all of the West Dowe Flats parcel, approximately one-half of the Northwest Dowe Flats property and Southeast Dowe Flats property. Also, at the request of Jerry Orback, a member of the cultural resources project team, portions of the existing Silicate Quarry that will be mined in the future, plus a buffer zone around this quarry, were included in the Study Area.

Beginning in 1989, Southdown contracted with Burney and Associates, Paragon Associates and Western Historical Studies, Inc., to direct and undertake an identification program for significant prehistoric and historic properties at the Dowe Flats site. The surveys for prehistoric and historic resources were undertaken by Michael Burney, Jennifer Germer, Marcus Grant, Jerry Orback, Carol Mehls and Steven Mehls. The scope and purpose of the surveys was to locate, record and evaluate prehistoric archaeological and above ground (non-archaeological) historic architectural/engineering resources in the Study Area.

Southdown submitted these initial surveys to the Colorado Office of Archaeology and Historic Preservation (OAHP) during 1990, 1993 and 1994. The OAHP staff concurred on findings of eligibility relating to the National Register of Historic Places. Further discussions with State Historic Preservation Office (SHPO) staff and Boulder County held on May 14, 1993, led to the following decisions about the cultural resources at Dowe Flats:

1. A Cultural Resources Management Plan (CRMP) would be written establishing the steps and processes to be followed during the life of the mine for historic, archaeological, historic archaeological and paleontological resource's management (this document).
2. Consultation with American Indian tribes/tribal government representatives identified by the Colorado Commission on Indian Affairs would be undertaken. Results of those consultations are incorporated into the CRMP and described in detail in Burney and Lovejoy (1994).
3. Review of ethnographic and ethnohistoric literature to identify, if applicable, any traditional Indian cultural properties in the Dowe Flats area was to be completed Burney and Lovejoy 1994).
4. Develop a monitoring plan for the Montgomery School (Buffington and Mehls, 1994).
5. SHPO and Boulder County policies for dissemination of information about cultural resources would be followed at the Dowe Flats site.
6. The proponent would have additional consultations with the Tri-Lakes Office of the U.S. Army Corps of Engineers.
7. The proponent would use the NHPA 106 process as a model for project review, comment, mitigation and other related activities.

This document establishes the policies and procedures that Southdown will use for the preservation and treatment of significant cultural resources within the Dowe Flats Study Area. Southdown's cultural resource management voluntary and required commitments include:

- a) ongoing American Indian tribal consultations;
- b) monitoring and protection of all NRHP eligible sites in the Study Area, plus the Montgomery School, which is outside the Study Area;
- c) monitoring and protection of other selected sites, not NRHP eligible, that have secondary importance;
- d) training of quarry personnel in cultural resource management;
- e) limited monitoring of ground disturbing activities, including American Indian participation;
- f) avoidance of sites, where ever possible;
- g) mitigation of impacts, if avoidance is not possible;
- h) discovery, notification, data retrieval and curation procedures for subsurface sites;
- h) information management.

This allows Southdown to fulfill its commitments to Boulder County and the State Historic Preservation Officer and comply with necessary regulations.

This document was prepared by Steven F. Mehls and Carol Drake Mehls, Project Historians, Marcus Grant, Project Archaeologist, Michael Burney, Project Ethnohistorian and Director of Tribal Affairs, Kenneth Carpenter, Project Paleontologist, Paul Rushmore, Project Geomorphologist and Michael G. Figgs, Environmental Studies Coordinator. Vibration study data were provided by Darrel L. Buffington, P.E.

1.1 Management Summary

The State of Colorado has regulatory jurisdiction over mine and reclamation operations, and Southdown has received a Regular 112 Permit (No. M-93-041) from the Colorado Mined Land Reclamation Board. This permit is currently under amendment to reflect the reclamation plan and feedstock transportation system approved by Boulder County.

Boulder County is the local governmental land use authority, and Southdown has received a Special Use Permit, Site Specific Development Plan, and Development Agreement from the Board of County Commissioners (Permit Docket No. SU-93-14 and V-93-9).

No federal action or individual permit is required for the Project. An Army Corps of Engineers Nationwide permit has been issued for a bridge pier for the haul road crossing of St. Vrain Creek.

Both the State of Colorado and Boulder County have conditioned the above referenced permits upon a comprehensive plan for management, by preservation and mitigation, for cultural resources in the project area, including paleontological, archaeological, and historic resources (Section 1.2). This Cultural Resource Management Plan (CRMP) is submitted in fulfillment of this requirement.

Steps taken by Southdown to develop this CRMP include:

1. field research for identification of cultural resources
2. evaluation of cultural resources for eligibility for the National and State Registers of Historic places
3. determination of project impacts on eligible cultural resource properties, and whether the impacts are adverse or beneficial.
4. development of general procedures for cultural resource management
5. regulatory agency consultations and public review of Project

Field Research for Identification of Cultural Resources

From 1989 through 1994 Southdown has authorized no less than 21 cultural resource studies for the Project. These studies have

covered the entire mine permit boundary and additional property under Southdown's ownership, with the cultural resource Study Area encompassing more than 2,200 acres (Section 3.0).

Eligibility Evaluations

All cultural resources sites have been inventoried and documents with the appropriate forms and submitted to the Colorado Historical Society, Office of Archaeology and Historic Preservation (SHPO) for determinations of eligibility for inclusion on the National and State Register of Historic Places. Twenty-two prehistoric sites have been identified in the Study Area; 8 are recommended as eligible for the NRHP. Eight historic sites have been identified in the Study Area; seven are recommended as eligible for the NRHP.

Determination of Project Impacts

Based upon evaluations by SHPO and Boulder County on the significance of cultural resources in the Study Area, further analysis was completed by Southdown, the State of Colorado, and Boulder County to determine if the Project has an effect or specific impact upon these significant cultural resources. No known NRHP eligible resources are located within the mine and reclamation impact zone. Four NRHP eligible irrigation ditches must be crossed by the quarry haul road (Section 3.0).

Effects may be adverse in the case of actions that severely alter or necessitate removal of a cultural resource. An adverse effect may not directly impact a resource, but significantly alter the context or setting of that resource. To assist in a determination of adverse effects, this CRMP presents a detailed set of geologic, prehistoric, and historic contexts for the Study Area (Section 2.0).

Effects may be beneficial in the case where a cultural resource is not altered and received documentation, proactive management, and protection. In the instance when a clear determination of

impact could not be made, monitoring plans have been required and are described below.

To address the contingency of inadvertent impacts on unknown (subsurface) cultural resources, a detailed research design for future studies is presented, including an assessment of the potential for subsurface paleontological, archaeological, and historic archaeological resources (Sections 4.0 and 5.0).

Development of General Procedures for Cultural Resource Management

Specific plans for management, monitoring, and mitigation of cultural resources have been developed (Section 6.0). Procedures are established to address the inadvertent discovery and disturbance of subsurface cultural resources, including human remains (Sections 6.4 and 6.5). Curation agreements are proposed in the event that significant cultural resources are discovered during mine operations (Section 8.0).

Regulatory Agency Consultations and Public Review of Project Plans

Southdown has consulted with the SHPO and Boulder County in order to develop appropriate monitoring and mitigation plans (Section 6.4 and 6.5). Southdown will continue to consult with these agencies as necessary during the life of the mine operations in Dowe Flats (Section 9.0).

Southdown also has invited thirteen American Indian nations to participate in the consultation process, and established an American Indian Advisory Council to facilitate ongoing consultations (Section 6.4).

The State and County permits have received extensive public notification and review. Southdown has invited comment by local organizations that have an interest in cultural resources, including the Boulder Chapter of the Colorado Archaeological

Society, Lyons Redstone Museum, and the Boulder Historical Society. The Boulder County Historic Preservation Advisory Board has also reviewed and recommended approval of the Boulder County permits (Section 10.0).

Southdown will continue to provide all cultural resource information generated by the Project to the appropriate regulatory agencies, consulting American Indian nations, and interested members of the public (Sections 7.0 and 9.0). This information will include inventory results, eligibility determinations, general reports, results of management and monitoring activities, and mitigation plans.

Proposed Cultural Resource Management Actions by Southdown

The following list includes actions required by permit terms and conditions by the State of Colorado and Boulder County, commitments of record by Southdown that occurred during the permit review process and public referral periods, and voluntary actions taken by Southdown.

Proposed actions are listed by major topics and cross referenced to the appropriate sections of the following documents:

- Cultural Resource Management Plan (CRMP)
- Management and Monitoring Plans, Dowe Flats Project, Boulder County Docket SU-93-14 and V-93-8, September 12, 1994 (Management and Monitoring Plans)
- Development Agreement between the Board of County Commissioners of Boulder County, Colorado, and Southdown, Inc., July 14, 1994 (Boulder County Development Agreement)
- Dowe Flats Project Summary, March 1994 (Project Summary)

Responsible parties are included in the call down list in Appendix I.

Paleontology

1. Professional collectors will be allowed access to the quarry at appropriate times (Project Summary, Paleontology Section). Responsible Party: Project Paleontologist.
2. In the event of discovery of significant or unusual fossil specimens, the Project Paleontologist will be contacted and formulate recommendations in consultation with SHPO and Boulder County as necessary (CRMP, Sections 6.2 and 8.0). Responsible party: Project Paleontologist.
3. A curation agreement will be executed for placement of significant fossils with the University of Colorado Museum, and/or Denver Museum of Natural History, and/or Lyons Redstone Museum (CRMP Section 6.2, Project Summary, Paleontology Section). Responsible party: Project Paleontologist.

Archaeology

1. Monitoring for cultural materials during topsoil removal will be conducted by approved professionals. This monitoring program will be under the supervision fo SHPO approved professionals. Areas appropriate for monitoring will be based upon predictive modeling by the Project Archaeologist, current and future assessments by the Project Geomorphologist, and concurrence by SHPO and Boulder County (CRMP Section 6.3 Project Summary, Archaeology Section; see also Rushmore 1994b, page 15). Responsible Party: Project Archaeologist.
2. The level and intensity of monitoring will be periodically evaluated by Southdown, SHPO and Boulder County, in consultation with the DFAIAC (CRMP, Sections 6.3 and 6.6). Responsible parties: Plant Manager and Project Archaeologist.
3. Specific procedures will be followed in the event of discovery of previously unknown archaeological sites (CRMP, Section 6.3). Responsible parties: Plant Manager and Project Archaeologist.
4. A curation agreement will be executed for placement of significant artifacts with the University of Colorado

Museum, and/or Lyons Redstone Museum (CRMP, Section 8.0).
Responsible Party: Project Archaeologist.

Geomorphology

1. Additional soil testing will take place during the commencement of topsoil removal at the southern portion of the quarry and waste rock stockpile area (Rushmore, 1994b, page 15). Responsible party: Project Geomorphologist.

American Indian Consultations

1. Consultations will continue by means of the DFAIAC. Responsibilities of the DFAIAC include review of future research, recommendations for selection of American Indian monitors, recommendations on the curation of artifacts and reinterment of human remains (CRMP, Section 6.5; Project Summary, American Indian Consultations Section). Responsible party: Plant Manager.
2. Monitoring for subsurface archaeological sites may include American Indian participation as recommended by the DFAIAC and approved by the Plant Manager. The American Indian monitor will be primarily responsible for representing the cultural interests of Indian people. If this monitor is also SHPO approved, then the monitor may fully participate in the scientifically oriented portion of the program (CRMP, Sections 6.3 and 6.6). Responsible party: Plant Manager.
3. Southdown will make its Indian Mountain property available for tribally approved educational and traditional ceremonial activities. Management will be directed by the DFAIAC. Responsible party: Plant Manager.
4. After conveyance of its Indian Mountain properties, Southdown will encourage Boulder County to consult with the appropriate American Indian tribes regarding the management

of this property (Boulder County Development Agreement, Section 8.4 and 6.6) Responsible party: Plant Manager.

5. To the extent allowed by the State Archaeologist, Southdown will honor the requests of the DFAIAC in the reinterment of American Indian remains (CRMP Section 6.4 and 6.6).
Responsible party: Plant Manager.

Indian Mountain Management

1. Conservation easements covering prehistoric sites on Southdown's West Dowe Flats Donation Parcel on Indian Mountain have been conveyed to Boulder County (Boulder County Development Agreement, Section 6). Responsible party: Plant Manager.
2. Upon commencement of full operations of the mine and reclamation plans, Southdown's Indian Mountain properties will be conveyed in fee title to Boulder County to be maintained in perpetuity as non-developable open space (Boulder County Development Agreement, Section 8).
Responsible party: Plant Manager.
3. The general public is permanently prohibited from access to the West Dowe Flats Donation Parcel, and until 2030 on the Northwest Dowe Flats Donation Parcel (Boulder County Development Agreement, Section 8). Responsible party: Plant Manager.

Human Remains and Process for Reburial

1. A specific protocol will be followed in the event of discovery of human remains (CRMP, Section 6.4). Responsible party: Plant Manager.
2. Colorado law regarding the handling of human remains will be followed (CRMP Section 6.4). Responsible party: Plant Manager.

3. To the extent allowed by the State Archaeologist, Southdown will honor the requests of the DFAIAC in handling American Indian remains (CRMP, Sections 6.4 and 6.6). Responsible party: Plant Manager.

Historic

1. Four NRHP irrigation ditches are impacted by three box culverts and one bridge. Mitigation includes a permanent record of the four ditches in the impact area and archival quality photographs (CRMP Section 6.5). Responsible party: Project Historian.
2. The Montgomery School is an off-site NRHP listed resource. A monitoring plan will be implemented that includes baseline documentation of existing conditions of the structure, adherence to the maximum ground vibration standard, monitoring of ground vibrations at the structure site, annual monitoring program, and consultations with SHPO and Boulder County if mitigation is necessary (CRMP, Section 6.5; Management and monitoring Plans, Historic Section). Responsible party: Project Historian.

General Cultural Resource Management

1. All known sites within the mine permit boundary will be visited within each calendar year, and their condition assessed. Changes in site condition will be documented (CRMP Section 6.3).
2. Quarry employees will be trained in the importance and recognition of cultural resources (CMRP, Section 6.3; Management and monitoring Plans, Archaeology Section). Responsible Party: Project Archaeologist.
3. New quarry employees will be informed of the laws and penalties of collection and vandalism; signs will be posted informing workers of the criminality of unauthorized

destruction of archaeological resources (CRMP, Section 6.3; Management and Monitoring Plans, Archaeology Section).

Responsible party: Plant Manager

4. Quarry personnel will watch for and report on fossils, bones, artifacts or other cultural materials that are discovered during topsoil removal (CRMP Section 6.3).
Responsible party: Quarry Manager.
5. The CRMP will be revised at appropriate times to include new information, changed circumstances, update of the call down list, and the results of management and monitoring programs. Revisions will be reviewed by SHPO, Boulder County, and the DFAIAC (Management and Monitoring Plans, Historic Section).
Responsible party: Project Historian.

General Property Management

1. Property to be fenced and posted for no trespassing (CRMP, Section 6.3). Responsible party: Plant Manager.

Information Management

1. Annual reports will be submitted to the Colorado Department of Natural Resources, Division of Minerals and Geology, and Boulder County, including any significant reports or developments regarding cultural resource management (CRMP Section 6.3: Project Summary, all cultural resource sections). Responsible party: Plant Manager.
2. Copies of all Project cultural resource reports will be filed with SHPO and Boulder County (CRMP, Section 7.1).
Responsible party: Project Historian.
3. Copies of all Project cultural resource reports will be placed with the Lyons Redstone Museum and Boulder Museum of History (CRMP, Section 7.1). Responsible party: Project Historian.

4. Southdown will follow SHPO's policy on the dissemination of sensitive information, including restricted public access to files with site specific information (Project Summary, Archaeology Section). Responsible party: Project Archaeologist and Plant Manager.

Agency Coordination

1. SHPO will be the lead agency directing Southdown's cultural resource management program. Boulder, County will also participate in the Cultural Resource Management Program (CRMP, Section 9.0). Responsible party: Plant Manager.

Public Review

1. Southdown will continue its ongoing communication program with interested members of the public, including the Lyons Redstone Museum, Boulder Chapter of the Colorado Archaeological Society, and the Boulder Historical Society (CRMP, Section 10.0). Responsible party: Plant Manager.

1.2 Regulatory Framework

The federal government, the State of Colorado, and Boulder County recognize that important archaeological and historical properties are valuable, non-renewable representations of our cultural heritage. A number of federal laws, regulations, executive orders and guidelines have been established that deal specifically with consideration of our cultural heritage in the planning process for Federal undertakings. The State also passed legislation pertinent to state and local undertakings as they might affect cultural resources.

1.2.1 Federal Regulations

The mandates for compliance with the following federal statutes, orders, and policy guidance regarding cultural resources include:

- Antiquities Act of 1906
- Historic Sites Act of 1935
- Reservoir Salvage Act of 1960
- National Historic Preservation Act of 1966, as amended
- National Environmental Policy Act of 1969
- General Authorities Act of 1970
- Executive Order 11593 of 1971. This is now in NHPA.
- Archaeological and Historic Preservation Act of 1974
- Archaeological Resources Protection Act of 1979, as amended
- American Indian Graves Protection and Repatriation Act, 1990

Agencies have interpreted these laws and issued regulations and policy statements to assist in compliance with these laws and orders. Among those potentially pertinent to the Dowe Flats project are:

- 36 CFR 60, - National Register of Historic Places (NRHP)
- 36 CFR 63, - Determinations of Eligibility for Inclusion in the National Register of Historic Places
- 36 CFR 800, - Protection of Historic Properties
- 43 CFR 3, - Preservation of American Antiquities

43 CFR 7, - Protection of Archaeological Resources:
Uniform Regulations

Guidelines for Federal Agency Responsibilities, Under
Section 110 of the National Historic Preservation Act
(Federal Register 53.31, February 17, 1988)

Archaeology and Historic Preservation: Secretary of the
Interior's Standards and Guidelines (Federal Register
48:190, September 29, 1983), and

National Register Bulletins: 15, 16, 30, 31 (draft), 38.

Federal agency responsibilities for preservation of historic and archaeological resources began with the passage of the 1906 Antiquities Act (P.L. 59-209; 16 USC 431-433). This act enabled the Federal government to set aside and protect "historic landmarks, historic, and prehistoric structures and other objects of historic or scientific interest."

The 1935 Historic Sites Act (P.L. 74-292; 16 USC 461-471) expanded the role of the Department of the Interior in determination and protection of "historic and archaeological sites, buildings and objects." In addition, a policy to protect nationally significant properties was initiated. Out of this law came the National Historic Landmark (NHL) program. The Reservoir Salvage Act of 1960 (P.L. 86-523; 74 Stat. 2201; 16 USC 469-469c) facilitated the protection of data from resources impacted by reservoir construction. The resources had to be of "exceptional historical or archaeological significance."

The National Historic Preservation Act (NHPA) of 1966 (P.L. 89-665; 16 USC 470, as amended; 80 Stat. 915) mandates that all federal agencies must consider the effects of their projects and programs on cultural resources listed or eligible for inclusion in the NRHP. Later amendments (P.L. 91-243; P.L. 93-54; P.L. 94-422; P.L. 94-458; P.L. 96-199; P.L. 76-244; P.L. 96-515) required that all federal agencies:

- a) Inventory, evaluate, and where appropriate, nominate to the NRHP all significant cultural resources under agency ownership or control (Section 110(a)(2)).
- b) Prior to agency approval of activities, a project's impact on eligible or potentially eligible properties must be considered. The Advisory Council on Historic Preservation (ACHP) must be allowed a reasonable opportunity to comment on the proposed project (Section 106).
- c) A data recovery program on eligible or listed archaeological properties must be completed prior to damage or destruction (Section 110(b)), as reported by the House Committee on Interior and Insular Affairs, 96th Congress, 2nd session, House Report, No. 96-1457, p. 136-37.

In January, 1967, the Secretary of the Interior sent letters to all governors to obtain the mandated participation of the states in the NRHP program. The Secretary requested that each state determine and designate a representative with responsibility for preparing surveys, receiving grants, and working with the Department of the Interior in developing and implementing the programs required by law. The role of the states and the duties and responsibilities of the designated official (SHPO) were first published in the February 1969 Federal Register.

The 1969 National Environmental Policy Act (NEPA) (P.L. 91-190; 83 Stat. 851; 42 USC 4321) required that all environmental aspects, including important historic properties, be considered during the planning of federal action and as part of the process and review of environmental impact statements. In 1971, President Richard Nixon signed Executive Order 11593, "Protection and Enhancement of the Cultural Environment." This Order directed federal agencies, with the advice of the Secretary of Interior in cooperation with SHPO's, to locate, inventory, and nominate to the Secretary of the Interior all sites, buildings, districts, and objects under their jurisdiction or control that appear to qualify for listing on the NRHP. In addition to

requiring the above process, this Presidential Order offered protection to those properties determined eligible for and/or nominated to the NRHP. Subsequent amendments to the NHPA incorporated the programs and requirements of the EO.

Three years later, in 1974, the Archaeological and Historic Preservation Act (P.L. 93-291; 88 Stat. 174; 16 USC 469) required the Secretary of the Interior be notified of any federal project that would adversely affect a significant archaeological or historical property and that a data recovery or mitigation program for cultural resources be implemented if appropriate.

The Archaeological Resources Protection Act (ARPA) of 1979 (P.L. 96-95; 93 Stat. 721, 16 USC 470a) supersedes the 1906 Antiquities Act (P.L. 59-209; 93 Stat. 225, 16 USC 432-32). ARPA provided that prior to excavations on federal lands permits for archaeological investigations must be obtained from the agency with jurisdiction over the lands and resources. ARPA also established stiff fines and extended prison sentences for individuals removing artifacts from public lands without a permit. It has since been amended to clarify the punitive aspects of the law.

To implement these laws, a number of regulations have been promulgated by the Department of the Interior, primarily through the National Park Service, the agency charged with administration of the National Register of Historic Places (NRHP) program. What follows is a brief discussion of those regulations as they apply to the 106 process model for the Dowe Flats Project.

The Department of the Interior has provided regulations for determining site eligibility for the NRHP (36 CFR 60, 36 CFR 63). Additionally, 36 CFR 66 provides standards for data recovery and other guidance for cultural resource surveys. Definitions to implement the Antiquities Act can be found in 43 CFR 3. Procedures for implementing the Archaeological Resources Protection Act are stated in 43 CFR, Part 7.

ACHP regulations, Protection of Historic and Cultural Properties (36 CFR 800) provided the procedures for compliance with Section 106. The ACHP's role is one of advice and consent to review the actions of federal agencies when federal undertakings affect National Register or eligible properties. The Council also reviews plans to mitigate federally caused adverse impacts to eligible properties through the consultation process.

Beyond the regulations offered in the previously discussed manuals and regulations, the Keeper of the NRHP has offered interpretations for implementing the legislation and regulations through a series of Bulletins - NRB. These bulletins cover a wide variety of topics and are organized by single subjects. Of particular interest to the Dowe Flats Project are NRB 15, How to Apply The National Register Criteria for Evaluation; NRB 16A, Guidelines for Completing National Register of Historic Places Forms (with supplement); NRB 30, How to Identify, Evaluate, and Register Rural Historic Landscapes; and Draft NRB 31, Surveying and Evaluating Vernacular Architecture; NRB 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties. The NRHP staff recently completed NRB 36 regarding historic archaeology. Its pertinent concepts have been incorporated into the Dowe Flats project. These NRBs act to flesh out the comparatively vague language of the Code of Federal Regulations and interpret the regulations for certain types of properties through specific examples.

In addition to the resource management oriented legislation and regulations, federal legislation also requires that American Indian sacred and cultural values be considered in the cultural resource planning process. NEPA mandates that American Indian sacred areas be identified for potential adverse impact. NHPA deals with identification of American Indian cultural resources. The American Indian Religious Freedom Act of 1978 (AIRFA) (P.L. 95-341; 92 Stat. 469) provides for legalized status for sacred places, animals, artifacts, and plants of American Indians. In addition, American Indians are guaranteed access to sacred sites on public lands under AIRFA. Additional clarification is

provided by the Council on Environmental Quality which allows for Indian tribal participation in the planning process (40 CFR 1501.7; 40 CFR 1503.1). The Native American Graves Protection and Repatriation Act (NAGPRA) (1990) requires consultation with "appropriate" Tribes prior to intentional excavation or removal of an inadvertent discovery of human remains and associated cultural items.

1.2.2 State Regulations

Concern for cultural resources has been expressed by the Colorado state legislature in the Colorado Register of Historic Places Act (CRS 24-80.1 as amended). This law recognizes the importance of the state's cultural heritage and takes steps to insure that this heritage is considered in the planning process for undertakings. The state law tends to mirror the NEPA provisions for protection of cultural resources at the state, county, and local level. The OAHF (Office of Archaeology and Historic Preservation) is the administering agency for all actions and is therefore responsible for compliance at the state, county and local levels. At present, properties on the Colorado Register of Historic Places are identical to those on the National Register of Historic Places. The State of Colorado passed statutes encouraging counties and local governments to protect cultural resources. House (Colorado) Bills 1034 and 1041 require that cultural resource values be considered when development plans are begun.

1.2.3 County Regulations

Boulder County has an on-going historic sites inventory program. County planning directives specify that consideration be given to all historic sites within the County during the permitting process. The Boulder County Historic Preservation Advisory Board (HPAB) has the duty to "Serve as a referral body to review and comment on proposed land use regulation amendments and amendments to the Boulder County Comprehensive Plan, as well as development proposals which would affect designated historic landmarks." If the HPAB determines that historic properties are endangered by

specific acts and the structure may be eligible for designation as an historic landmark,

. . . the issuance of the permit will be stayed for up to 120 days. A copy of this determination, including the reasons for determining the structure is eligible for designation, shall be provided to the property owner by regular mail within seven days of the determination being made. The 120 day time period during which the permit is stayed shall be used to discuss the nomination of the structure for landmark status, and to look for alternatives to the proposed action which will not have an adverse impact on the historic significance of the structure.

Boulder County completed the Cultural Resource Element of the BOCO Comprehensive Plan. Any alterations to present County policy will be considered when the CRMP is reviewed and up-dated annually.

When reviewing the Dowe Flats project HPAB unanimously approved their referral on the BOCO Special Use Permit for the mine.

2.0 Cultural and Geologic Contexts

2.1 Introduction

These contexts and the CRMP define a cultural resource as the physical remains of past human activity having demonstrable association with prehistoric, historical events, individuals or cultural systems. Cultural resources may include such things as archaeological sites, districts and objects; standing historical structures, objects or groups of resources; locations of important historic events; or places, objects and living or non-living things that are important to the practice and continuity of traditional cultures. Under the broader heading of cultural resources are three more restrictive terms, historic property, traditional use area and sacred or religious site.

Historic Property is a legal term and refers specifically to any cultural resource listed on or considered eligible for inclusion in the National Register of Historic Places. A historic property may be an archaeological site, a historical site, or a traditional use area. Not all such sites meet the specific NRHP criteria for historic property designation.

A *traditional use area* is a place or landscape that is important to a traditional culture. It may include such things as a community, a sacred site or an area from which food and nonfood resources were obtained.

Sacred sites are places important to the practice of traditional religions. Their relationship to traditional religions makes it possible for sacred sites to become historic properties but they are also considered under statutes designed to protect First Amendment guarantees to the free practice of religions.

Cultural resources are the physical remains of past human activity and present a clear tie between the present and the past. These tangible remains are protected under federal, state

and county laws as discussed in Section 1.1, Regulatory Framework.

2.2 Geologic Context

In 1985 a study was completed by Fox consultants that provided a detailed summary of the geologic setting of the Dowe Flats area for the purpose of assisting in the planning and execution of subsurface explorations and engineering investigations in this area. This study addresses regional and local bedrock stratigraphy and structural geology. The scope of the Fox report included compilation of existing geologic data through August 1984 and interpretation of these data aided by aerial photography interpretation and site reconnaissance (Fox 1985).

The Dowe Flats area is in the Foothills Belt, a transition zone between the Front Range physiographic province to the West and the Denver Basin physiographic province to the east. The Front Range, which is the eastern most range of the Southern Rocky Mountains, begins on the northern side of the Arkansas River in southern Colorado and extends northward for approximately 185 miles to the Wyoming border. The range varies from 25 to 45 miles in width (Boos and Boos, 1957), and was formed by vertical uplift and subsequent erosion of the sedimentary strata to expose the Precambrian core. Remnants of the original sedimentary cover, now present as truncated sedimentary rocks along the uplift flank, are tilted by drag along the uplift boundaries. The more resistant tilted rocks, generally sandstones and some carbonates, form linear hogbacks that parallel the mountain front. The less resistant shales have been eroded away to form linear valleys between the hogbacks. This linear system of valleys and ridges is present along most of the eastern Front Range boundary.

The Foothills Belt is a transitional area about five to 10 miles wide between these two major physiographic provinces. The sedimentary beds adjacent to the Precambrian mountain front are steeply dipping and occasionally overturned. The dip

progressively decreases in the younger formations as they outcrop at greater distances from the mountain front. Between Lyons and the northern Colorado border a series of Northwest-tending high-angle bedrock faults offset the sedimentary beds. Draping of sediments over these faults produces a series of en-echelon folds and faults. Taken together, these intermediate-scale structure deformations, regional deformations produced by the Front Range and the Denver Basin, and more localized small-scale folding and faulting, result in a generally complex geologic setting throughout the Foothills Belt.

A maximum of approximately 12,700 feet of sediment is found in the vicinity of Dowe Flats. Only those formations beneath the lower Pierre Shale are present. In general, the geologic section is composed of alternating sandstone and shale layers and some limestones. Beginning at the bottom of the section and working upward in both depth and time, the individual units display a variety of depositional origins.

All of these sedimentary units are Upper Cretaceous in age. The synclinal structure of the central Dowe Flats basin is such that the youngest (Pierre Shale) formation is exposed over much of the eastern portion of the valley bottom with the older strata forming concentric horseshoe like rings as they outcrop around the valley perimeter on the east and west margins.

Structurally the region surrounding Dowe Flats is extremely complex with both intense and sometimes superimposed folding as well as Post-Cretaceous faulting. In this context, the simplicity of the central interior portion of Dowe Flats is almost anomalous. Interpretation of available information does not indicate the presence of major faulting, shearing, or significant folding in the interior portion of Dowe Flats.

The important formations in this area are all upper Cretaceous in age and are limited to the middle of the regional stratigraphic column. They include the Dakota Group, the Ft. Benton Formation, the Niobrara Formation and the Pierre Shale. The general

stratigraphic descriptions in this section are summarized from three graduate theses that contained detailed lithologic descriptions compiled during field mapping and section measurement activities (Hunter; 1947, Masters, 1957). These documents provide the best available specific lithologic information on Dowe Flats. The most important stratigraphic unit in Dowe Flats are, from oldest to youngest, the Dakota Group, containing the Lytle and South Platte formations; the Ft. Benton Formation, the Niobrara Formation, containing the Fort Hays and Smokey Hill members, and the Pierre Shale.

The Dakota Group contains the upper beds on the cuestas surrounding Dowe Flats. It has an average thickness in this area of 330 feet, and is subdivided into the lower Lytle and upper South Platte formations.

The Lytle Formation consists of nonmarine fluvial deposits. The lowest part is a fine to coarse-grained massive brown sandstone intercalated with a basal conglomerate containing quarter to half inch diameter chert pebbles and granite fragments mixed with finer materials in a secondary silica cement. This bed is approximately 40 feet thick. The upper portion of the Lytle Formation consists of a series of variegated red and yellow claystones that, on exposure, weather to a reddish surface soil. This deposit varies in thickness from 30 to 60 feet.

The South Platte Formation constitutes the upper part of the Dakota Group. Deposits in this interval are marine and near-marine in origin. The Plainview Member is a platy, fine-grained, hematite stained quartz and sandstone. It varies in thickness from 20 to 30 feet through differential incising of the underlying claystones. The middle part of the South Platte Formation is a 125 to 175 foot thick gray to black carbonaceous shale interbedded with thin, buff-colored siltstones and sandstones. The uppermost part of this formation is the Muddy member, a massive, ridge-forming tan quartzose sandstone 20 to 30 feet thick that is slightly cross-bedded and distinctly jointed.

The Ft. Benton Formation is a 500 foot thick layer of fine grained marine deposits. The lowest part is composed of dark gray to black fossiliferous sandy shales. The middle portion is a zone of light to dark gray argillaceous limestone and dark gray to black calcareous shales. The upper part is calcareous dark gray sandy shales. Numerous thin but laterally continuous bentonite layers are found throughout the formation. The lower, middle and upper parts are often referred to as the Graneros Shale, the Greenhorn Limestone, and the Carlile Shale, respectively.

The Codell Sandstone is the uppermost unit in the Ft. Benton Formation. In the Dowe Flats area, it has a 15-foot total thickness and can be divided into a 7-foot gray siltstone beneath an 8-foot thick silty sandstone. This silty sandstone directly underlies the Niobrara Formation.

The Niobrara Formation is traditionally separated into two units, the Fort Hays and Smoky Hill members. The Fort Hays Member is an extremely fine-grained, light gray limestone with thin interbedded shales. A section of Fort Hays Member at the south end of Dowe Flats measured 16.5 feet thick (Lowman 1977). Limestone accounted for 13.6 feet or 82% of the outcrop thickness. The limestone is distributed as block ranging in thickness from 0.5 to 3.1 feet and vertical joints spaced on 1 to 3 foot centers. The remaining 2.9 feet of material is distributed as 11 thin bentonite layers having an average thickness of 6 inches. Drilling on other areas within the Dowe Flats valley has indicated an average limestone thickness of 20 feet (Masters 1957).

The overlaying Smokey Hill Member of the Niobrara Formation is generally described as a dark gray, calcareous, fossiliferous marine shale. However, characterization of the Smoky Hill Member as shale on a regional scale does not account for several separate limestone beds present in the Dowe Flats vicinity. At Dowe Flats, limestones within the Smoky Hill Member have been described as an outcrop along the Little Thompson River and

mapped in the Dowe Flats area (Masters 1957). An 11-foot thick limestone unit 100 feet above the base of the Smoky Hill Member was mapped by Mailed in Dowe Flats, but was not described by Quam in the Little Thompson River outcrop. All the other materials in the bottom 200 feet of the Smoky Hill Member are dark gray to black, pyritiferous, cancerous, marine shales. A second 20-foot thick limestone bed was mapped at Dowe Flats and measured in the Little Thompson outcrop at the interval from 200 to approximately 220 feet above the bottom of Smoky Hill. A final limestone bed, with a base about 256 feet above the Smoky Hill Member, was also located in both field efforts; however, its thickness was measured as 12 feet by Mailed (1962) and 43 feet by Quam (1932). Based upon interpretation of geophysical logs from oil exploration wells drilled 10 to 15 miles south and east of the site (Lowman 1977), the 43 foot value appears to be more realistic.

The Niobrara Formation is the only formation mined at Dowe Flats, with the Fort Hays member being the source of limestone.

The lower Pierre Shale is the uppermost unit considered in this report. Only the lower 500 feet of the Pierre Shale are found in Dowe Flats; the remainder has been eroded away. The lower portions of Pierre Shale are homogeneous dark brown to gray-black marine shale that weathers to a buff color. The basal portion of the Pierre Shale, immediately above the Niobrara Formation, is sandy, but the sand content decreases in the main portion of the shale.

2.3 Prehistoric Context

The Colorado Historical Society (CHS) through the Office of Archaeology and Historic Preservation published several prehistoric and historic contexts for the northeastern Colorado region that includes Dowe Flats. The documents are part of the Resource Protection Planning Process (AKA: RP3). Jeffrey Eighmy authored the prehistoric context (1984). The historic Euro-american context was written by Steven Mehls (1984). The

historic archaeology context for all of Colorado was written by William and Nancy Buckles (1984). Joseph King (1984) wrote the engineering context for the state of Colorado. In addition, cultural resource reports specifically for Dowe Flats by Marcus Grant, Jennifer Germer and Michael Burney (prehistoric) and Steven Mehls (historic) provide the background for the following narratives.

Sources useful in reviewing the cultural history of northeastern Colorado are Anderson (1985), Buckles (1968), Burney (1987, 1989, 1994), Butler (1981, 1986, 1988), Caldwell and Henning (1978), Cassells (1983), Chase (1980), Conner (1968), Eddy and Windmiller (1977), Eighmy (1984), Frison (1978), Gunnerson (1987), Guthrie, Gadd, Johnson and Lischka (1984), Haug (1968), Morris and Kainer (1978), Morris and Mayo (1979), Mulloy (1952, 1958a), Nelson (1967), RippetEAU (1979), Stephenson (1965), Wedel (1961), Wendland (1978), Wood (1967) and Wood (1971).

When reviewing the archaeological record it is important to keep in mind the transitional nature of the foothills region, including Dowe Flats. Three zones, the plains, foothills, and front range alpine, are intrinsically intermingled when defining archaeological complexes. The foothills subarea defined by Eighmy (1984) will be used, as will information provided by Guthrie, Gadd, Johnson, and Lischka (1984), regarding what they refer to as the plains/foothills transition zone.

The archaeology of the Colorado Piedmont and foothills region has been researched for over 50 years. Archaeological remains date to pre-Clovis occupations (+10,000 B.C.) with few chronological gaps. The Paleo-Indian stage, for the most part, is represented by kill sites. One major exception to this pattern is Lindenmeier, a Folsom period site in Larimer County. This site represents a lengthy campsite occupation by early big game hunters. In addition, Lindenmeier, with its lack of mammoth remains, appears to document either the extinction or over-kill of mammoth and a shifting of hunting emphasis to Bison Antiquus (Eighmy 1984).

Prehistoric habitation and use of northeastern Colorado and adjacent regions spans approximately 12,000 years from the late Pleistocene epoch through historic contact. Although the preponderance of reliably dated archaeological sites in the region represent the past 5,000 years, evidence of occupation is nearly continuous throughout this 12,000 year span. The first formal regional chronology was devised by Mulloy (1958). Mulloy's scheme was designed specifically for the northwestern plains, but it was generally adopted by archaeologists working within eastern Colorado. Wood (1967) formulated a chronology specifically for the eastern plains region, which relied on Colorado site data and which built on Mulloy's work. Frison (1978) further revised and refined Mulloy's northwestern plains chronology. Since cultural and physiographic boundaries are generally indistinct in the archaeological record, Frison's chronology was considered largely applicable to northeastern Colorado. Detailed chronological outlines for northeastern Colorado were prepared more recently by Morris (1982:22) and Eighmy (1984:12); these two chronologies differ only slightly. Eighmy's chronology is used in this section and throughout this report. Eighmy recognizes seven distinct temporal episodes from Paleo-Indian through Contact, within which additional temporal and/or cultural subdivisions may occur.

2.2.1 Paleo-Indian Stage

Eighmy divides the Paleo-Indian Stage into four periods: Pre-Clovis, Clovis, Folsom, and Plano. Although this chronology includes a Pre-Clovis period, the earliest undisputed date of human occupation in eastern Colorado is a radiocarbon age estimate of 11,200 +/- 500 years Before Present (B.P.) from the Dent Clovis site (Cassells 1983:48). Kalasz et al. (1992:24) note that a large proportion of known Clovis sites in continental North America are concentrated along the eastern flanks of the Rocky Mountains and within the adjacent plains region. Clovis occupations in northeastern Colorado are represented by isolated surface finds and intact deposits. Intact Colorado Clovis sites, such as Dent, Claypool, and Dutton contain the butchered remains

of mammoth and other extinct mammals. Such sites represent components of a hunting oriented lifeway that occurred globally during the late Pleistocene.

By approximately 10,500 years B.P. Clovis projectile points were replaced by a form indicative of the Folsom period. This technological change coincided with a shift away from primary dependence on mammoth to increased exploitation of Pleistocene bison (Bison antiquus). The largest and most thoroughly investigated Folsom occupation in northeastern Colorado is the Lindenmeier site, located north-northeast of the Study Area in Larimer County.

The majority of Paleo-Indian sites or components represent the Plano period, which began by ca. 9000 years B.P. This period includes several technologically related complexes, most notably Agate Basin, Hell Gap, and Cody. Increased exploitation of plant resources is indicated at one Plano period site in eastern Colorado (Wheat 1979). Some researchers feel that a greater level of social organization is indicated at certain Plano period sites than at earlier Paleo-Indian occupations (Kalasz et al. 1992:26).

2.2.2 Archaic Stage

The Archaic Stage is divisible into Early, Middle, and Late periods. By approximately 7,000 years B.P. cultural materials indicative of the Plano period of the Paleo-Indian stage began to be replaced by evidence of markedly different technological adaptations and subsistence strategies. During this time much of North America was affected by an accelerated continental warming trend, the Altithermal episode, which resulted in ecological changes. The lifeway that developed in response to these conditions during the Early Archaic period was characterized by increased dependence on small mammals and wild plants. A decrease in the exploitation of the plains region and increased utilization of foothills and montane environments is characteristic of this period. (Larson et al. 1992; Benedict and

Olson 1978; Benedict 1979; Kehoe 1981).

The general hunting and gathering lifeway that evolved during the Early Archaic period persisted with only minor alterations throughout the Middle and Late Archaic periods. Cultural variation during this stage is indicated by changes in projectile point morphology and by increased exploitation and settlement of plains regions during the milder climatic episodes that followed the Altithermal.

Sites or site components attributed to the Middle Archaic period (5,000-3,000 years B.P.) are well documented in eastern Colorado, particularly along the North and South Platte drainages. A generalized hunting and gathering lifeway continued in eastern Colorado during the Late Archaic Period (3,000-2000 years B.P.). Summarizing the work of several researchers, Eighmy (1984:62-63) notes that Late Archaic camp sites in eastern Colorado tend to cluster on stream terraces, while relatively briefly occupied lithic scatters are found more often on ridge tops.

2.2.3 Ceramic Stage

The termination of the Archaic Stage in Eastern Colorado is indicated by the occurrence of three roughly contemporaneous events in the archaeological record: the introduction of ceramic technology, the replacement of the spear thrower with the bow, and the advent of horticulture. Both ceramic technology and horticultural practices are believed to represent extremely attenuated manifestations of the Eastern Woodlands culture, or at least a diffusion of traits from that region (Cassels 1983:158-160). Cord-impressed vessels with conical bases are typical of early ceramic artifacts in eastern Colorado.

Although the Early Ceramic period is contemporaneous with the rise of a relatively sedentary, horticultural lifeway in some adjacent areas, there is scant evidence of plant domestication during this time in eastern Colorado and none from the project area proper. Although the practice of horticulture in

neighboring areas probably had some impact on lifeways in northeastern Colorado, the overall subsistence strategy in this area appears to have remained generally similar to that of the Archaic Stage.

By approximately 1,000 years B.P., cord-marked ceramics began to be replaced by smooth surfaced forms, indicative of the Middle Ceramic period. This transition coincided with the introduction of small side-notched projectile points. Both traits are generally considered diagnostic of the Upper Republican phase which was centered geographically in Nebraska (Cassels 1983:170-173). The temporal span of the Middle Ceramic period in eastern Colorado corresponds also with the Old Woman's phase or Late Side-Notched Arrow Point tradition of the northwestern plains (Reeves 1978). Although Frison (1978) attributes the appearance of small side-notched projectile points and smooth ceramics on the Wyoming plains to northwestern influences, this region of influence has been traditionally overlooked by Colorado archaeologists.

In Eighmy's chronology the Middle Ceramic period terminates at the beginning of the Protohistoric period, ca. 275 years B.P. Previous chronologies, and some contemporary efforts, include a Late Ceramic period between the Middle Ceramic and Protohistoric periods. While a three-part division of the Ceramic period is justified by morphological changes in artifact assemblages in some regions, eastern Colorado ceramic artifacts exhibit little variability between the onset of the Middle Ceramic period and historic contact.

2.2.4 Protohistoric/Contact Stage

This stage is the period between early contacts of American Indians with European items and the beginning of frequent contact. Eighmy (1983:149) notes that virtually all proto-historic stage sites in northeastern Colorado are attributed to the Dismal River Phase of the Plains Apache. Nonetheless, numerous tribes including Palome and Cuartelejo Apache, Comanche, Shoshone, and

Wichita are known to have used the area during the period of accelerated mobility and conflict following acquisition of firearms and horses. It is difficult to estimate the potential frequency of sites because early protohistoric sites are probably often indistinguishable from prehistoric occupations while very late protohistoric sites may be mistaken for early Euro-american camps.

Table 1 presents a very general outline of major prehistoric cultural episodes and concurrent paleoclimatic events for eastern Colorado. Data used in this table are derived from Cassels (1983), Eighmy (1984), Morris (1982), Benedict (1975, 1979) and Benedict and Olson (1978).

Protohistoric occupations (post - A. D. 1500) are rare in the Colorado Piedmont. This situation appears to result primarily from a lack of research emphasis. Ethnographic data indicate that the foothills region was the western boundary for Plains Indian occupations. Until approximately A. D. 1700, the Apache dominated the entire eastern portion of the state. Following the Apache movement south, the Comanche and Ute claimed this area until about A. D. 1750. Between A. D. 1750 and A. D. 1820, the Comanche and Ute split the state in half, with the Comanche remaining east of the Rocky Mountains. By A. D. 1830 the Arapahoe and Cheyenne were dominant in the northeastern quarter of Colorado. The last major transition occurred with the Cheyenne and Arapahoe dominating the entire eastern half of the state by the mid-1800s (Cassells 1983).

Information regarding the historic Indian tribes is available in Burney and Lovejoy (1994).

Table 1
Prehistoric Chronology Applicable to the Dowe Flats Study Area

Years Before Present	Cultural Period	Environmental Conditions
12,000 - 7,500	Paleo-Indian	Generally cooler, savannah
7,500 - 5,000	Early Archaic	Continental warming trend
5,000 - 3,000	Middle Archaic	Cooler than previous episode
3,000 - 2,000	Late Archaic	Moister; Triple Lakes glaciation on Front Range.
2,000 - 1,000	Early Ceramic	Expansion of sage-grassland vegetation zone.
1,000 - 275	Middle Ceramic	Audubon Cirque glaciations on Front Range
275-150	Protohistoric/ Contact	Predominately modern conditions.

2.4 Historic Context

The historic context for Dowe Flats covers the period of Euro-american interest and occupation from approximately 1700 to the present. The history of the lands that comprise the Dowe Flats Study Area is dominated by the evolution of a high plains, rural agricultural lifestyle. Other factors, particularly mining and quarrying, influenced the area's history, but in one way or another the majority of those factors were associated with the area's general rural development. Mining is often viewed as historic Colorado's basic industry but agriculture constantly has been the state's most profitable and steady source of income. Within Boulder County agriculture has been a predominant enterprise despite the variations of altitude and terrain. "No county . . . has so wide a range in altitude within so small an area." (Yearbook 1918:78) The eastern part of the county is within the Platte River Valley, is basically level and is excellent agricultural land. The western sections of the county have a rapid rise in elevation to mountain peaks and provide good pasture land. Recent studies identified a total of four historic themes for lands near the Study Area (Burney 1989; Meier 1987a; Meier 1987b; Riggs 1987; Weiss 1980, 1981). The use of such a narrowly defined historic framework may lead to oversimplification if extended to too large an area. Equally, the approach taken in those reports tends to diminish any uniqueness the Study Area's history may possess when evaluated within a regional (Front Range or Colorado Plains) context. Review of presently available sources indicates that an enlarged thematic framework is needed to accommodate both the regional context and the uniqueness of the Study Area. For the Dowe Flats area the pertinent historic themes include: 1) Exploration and the Fur Trade, 1700-1845; 2) The Colorado Gold Rush and Early Settlement, 1858-1870; 3) Early Agricultural and Ranching Development, 1870-1895; 4) Quarrying and Urban Growth and Development, 1870-1900; 5) Ranching and Farming After 1900; and 6) The Great Depression and World War II, 1929-1945. All of these themes except Exploration and the Fur Trade are directly

associated with the dominant rural-agricultural lifestyle of the Study Area.

2.4.1 Exploration and the Fur Trade 1700-1845

Spain, the original European claimant of all of Colorado, held tenuous control throughout the sixteenth, seventeenth and eighteenth centuries by virtue of Coronado's wanderings of 1540-41. From that time until 1720 Spanish explorers, military parties and traders ventured north out of Mexico, eventually settled New Mexico, and continued north into Colorado, travelling both east and west of the mountains. The first documented Spanish incursions to reach the area of modern Denver and beyond came in 1719-20. In those years Pedro de Villasur, leading a small military detachment, moved as far north as the Platte River before falling victim to Pawnee Indians (Long 1943:117-118). His expedition had been prompted by reports of French traders moving into the Platte-South Platte Valley and posing a threat to Spanish control of the region.

The historic record is unclear about when the first French traders from the Mississippi Valley may have set foot in modern Colorado. In 1739 the Mallett Brothers' trading expedition crossed Nebraska along the Platte, followed the South Platte to the Front Range and then headed south to the Arkansas before pointing their caravan east along the Arkansas or Cimarron Rivers and returning to the Mississippi Valley. From that time until 1763, when France formally relinquished all claims to the area, the two European powers sought, through either trade or diplomatic means, to control the local American Indian population. After the French threat was removed Spain showed little interest in the lands north of the Arkansas River until 1793. From the late 1790s until 1819 and ratification of the Adams-Onis Treaty, the Spanish army sent a number of patrols into the South Platte area (Mehls 1984a:19-20).

The Adams-Onis Treaty led to official Spanish recognition of the United States claims to the area that dated to 1803 when the

Louisiana Purchase gave the new American government control of the central and northern Great Plains as far west as the Continental Divide. Official exploration of the new lands began with the Lewis and Clark expeditions. During the first decade of American ownership fur trapper Baptiste LaLande reached the Colorado Front Range to hunt, followed by many others including Ezekiel Williams and James Purcell. In 1806 the first government exploration of the area was led by Zebulon Pike. Pike did not reach the Dove Flats area, but his reports spurred further governmental activity (Goetzmann 1959: 36-39).

The next, and most famous, federal exploration of northeastern Colorado came in 1820 when Major Stephen Long led a party of soldiers and scientists along the South Platte River to the Front Range and then south to the Arkansas River before returning to the Mississippi Valley. While it is very doubtful that Long actually crossed the Study Area, his reports had a lasting impact on it and much of the rest of the Great Plains. Long, in his official descriptions, labelled the lands from the central plains to the foothills of the Rockies as the Great American Desert, proclaiming the land to be fit only for grazing and homelands for nomadic Indians. The image of the desert lingered and influenced the ways that later settlers envisioned using the lands (Goetzmann 1966:40-64).

Long's expedition ushered in a new, more intense use of the South Platte Valley region that witnessed an increased presence of Euro-Americans, but not the development of permanent settlement. Between 1820 and approximately 1845 fur traders and trappers frequented the South Platte Valley. During this same period a number of fur forts appeared there as well, including the first Fort Vasquez or Fort Convenience, located at the confluence of the South Platte River and Clear Creek. The post, built in 1832 by Louis Vasquez, remained active only three years, when Vasquez moved his operations north to near modern Platteville, Colorado. At the same time Lancaster Lupton operated a post at Ft. Lupton (Carrillo and Mehls 1992). Also, a number of trappers, including Ceran St. Vrain, who lent his name to the Study Area's primary

watercourse, entered the mountains along the route of modern U.S. 36 West from Lyons. In 1836 A. Pike Vasquez stripped the Vasquez's Clear Creek post of all usable materials, leaving the cottonwood and adobe structure to molder back into the earth. Within a few years of the fort's abandonment the fur trade declined as fashion changed. Silk, not beaver, became "the" material for hats coincidental to exhaustion of the beaver supply from over-trapping. During and after the halcyon days of the mountain man, the U.S. Army continued to show an interest in the South Platte region, sending out patrols to maintain peace among the Indians and further explorers, seeking new routes to and from the Far West. By the 1850s the Army patrols had become more frequent, reflecting increased American presence in the Southwest after the region was ceded to the United States at the end of the Mexican War in 1848 (Mehls 1984a:26,28-9). The era of exploration and the fur trade added much useful information to the body of knowledge about the American West and Colorado by the time early federal exploration ended in the late 1850s. The other, more important, contribution for development of the Dove Flats area came with the government explorers and mountain men, who discovered and mapped travel routes, including the South Platte Trail and routes into the mountains, so that when gold was discovered in 1858 Americans already knew how to get to the Cherry Creek gold fields (Meier 1987b).

2.4.2 The Gold Rush and Early Settlement, 1858-1870

In 1857-1858 residents of the American Middle-west found themselves caught in the midst of an economic depression, with hundreds of young men eager for the chance at a new start. Coinciding with that, William Green Russell and a small party of prospectors announced that they had discovered gold in the area that became modern Denver. News of the finds spread, conjuring up pictures of a new California Gold Rush. The discoveries in Colorado led to the Rush of 1859 and the resultant beginnings of permanent settlement along the Front Range from Colorado City (Colorado Springs) north to Ft. Collins. Many prospectors found they arrived too late and discouraged, they returned to the

Mississippi Valley. Others, who could not or did not go back, turned their attentions to matters besides mining--providing food, lodging, or other goods and services to those more fortunate prospectors who actually found paying claims (Athearn 1976:7-31). By 1860 the roots of permanent settlement north and east of the fledgling town of Boulder began to appear as farmers and stock raisers turned prospectors returned to farming, establishing farms and running cattle herds along the South Platte and St. Vrain. From these early roots the area of modern northern Boulder County, Colorado, began to evolve into one of Denver's agricultural hinterlands, supplying the town and its merchants with food.

Soon some of the farmers found that Long's description of the area as a desert to be at least partially accurate. By the end of 1860 farmers claimed and appropriated for agriculture South Boulder Creek, Boulder Creek and others, each individual or group building a ditch. These efforts proved only the beginning of irrigation along creeks and rivers of Boulder County. Future generations built ever larger and more elaborate systems to bring water to the fields, including the Highland Ditch, Palmerton Ditch, Rough and Ready Ditch, and the St. Vrain Supply Canal (East Denver Municipal Irrigation District map 1920; Classon Map 1904; Burney 1989:3).

2.4.3 Early Agricultural and Ranching Development, 1860-1895

The lands of the Front Range and South Platte Valley north of Denver by 1870 had become one of the leading agricultural areas of Colorado. After 1870 that development intensified for a number of reasons including the rapid population growth of Denver, Boulder, and the eastern two thirds of Colorado between 1870 and 1893. The availability of rail transportation after 1870, and the high food prices being paid by merchants in Colorado's booming mining camps were significant factors in front range population growth. Those conditions led more and more farmers and ranchers to settle in the region. A final factor, liberal federal land disposal laws, encouraged settlement in

Colorado and throughout the West (Athearn 1976:107-119). The Dowe Flats area participated in this agricultural boom of the late nineteenth century with the majority of the land within it passing from federal to private ownership between 1878 and 1900. More specifically, the earliest attempts to homestead land in the area came during the 1860s and 1870s. From the 1860s to the early 1880s a number of claims were entered on lands in the Study Area but all were either revoked or canceled by the General Land Office. Successful settlement did not happen to any large degree until the mid to late 1880s as dozens of cash entry, timber culture, homestead and railroad patents were issued between 1885 and the end of 1900 (GLO records v.d.).

The foregoing brief review of land patenting activity tends to reinforce previously accepted interpretations of settlement in the region. The first users of the lands in the Study Area were stock raisers who took advantage of the public domain for free grazing lands. They used laws such as the Timber Culture act to claim parcels of land and after a period of time, often once the available forage had been depleted, allowed the claim to revert back to the government. The boom days of open range ranching in northeastern Colorado lasted from the late 1860s until approximately 1888 when severe winters, overgrazing and increased pressures from farmers forced an end to the system and establishment of fenced, more closely managed ranches (Peake 1937:8-27, 271). The stockmen, once the range had been depleted, moved elsewhere and in their wake came the farmers. The large number of patents during the period 1885-1900 coincides with the first large dryland farming boom to hit eastern Colorado (GLO Records v.d.). Spurred by railroad, land company, and even government literature that told of the changes being wrought in the climate, the retreat of the Great American Desert under the plowshare, and easy 10-year credit terms from railroads, hundreds of Midwestern farmers moved to the high plains of Colorado, Nebraska and Kansas. Upon arrival in or near the Study Area would-be settlers found booming markets for their produce, open land to be had for minimal prices and enough moisture to grow crops of corn, wheat and other grains much as they had in Iowa or

Illinois. What went unrealized until a few years later was that the Great Plains in general had entered a periodic wet cycle, with above average precipitation, followed by a dry cycle during the mid 1890s (Mehls 1984b:X:1-2).

One rather unique settlement was Longmont, in the northern section of Boulder County. The Colorado-Chicago Colony, known as the Chicago Colony, was founded in Illinois in 1870. The purpose of the colony was to purchase land and establish a communal living arrangement in the West. The group settled in the St. Vrain Valley near Old Burlington. Longmont was founded by those colonists wanting a temperance society. Longmont and the surrounding area grew quickly. The large number of initial settlers made development of a large irrigation system necessary, (Athearn 1976: 116-228; "Old Burlington interview" CWA, CSHS, vol. 253).

The initial success of farmers is partially attributable to irrigation. Individual irrigation efforts began with earliest farmers in southeastern Colorado. The large community irrigation systems began after the Civil War. Until that time short ditches carrying water from streams to low lands were most prevalent. Irrigation on the larger scale was first undertaken near Greeley. Soon, the pattern was successfully duplicated. By 1889 Colorado ranked second, behind California, among states in irrigation development. For the Study Area this meant a series of canals crossing the lands to provide irrigation.

Other projects provided water for agricultural and domestic use. In 1905-1906 plans to build a reservoir near Lyons met with disdain. The project called for flooding the town and moving the inhabitants to the area known as Dow [sic] Flats. Needless to say, nothing came of the plan at the time. A later water diversion project was much more successful. The Colorado-Big Thompson, a trans-montaine water project affected the entire northeastern section of the state and provided a constant source of water supply to the eastern plains. Ideas for the project

date to the late nineteenth century, but the project was undertaken in the 1930s and 1940s.

Much to the chagrin of the farmers, their boom ended by 1900. Not only did the rains fail to come, but irrigation ditches, including those in the Dowe Flats area, ran dry and a national depression that proved to be particularly devastating to Colorado's silver mines all but wiped out the farm markets. Those who could afford to abandoned their farms, did so, while others hung on by scratching out a living from the parched soil (Mehls 1984a:123-134). The Panic of 1893 and ensuing depression marked the end of Colorado's first boom period and local residents spent the closing years of the nineteenth century trying to adjust to the changed conditions and looking for the next boom.

2.4.4 Ranching and Farming After 1900

The drought of the 1890s marked a turning point in agricultural development for all of the Colorado plains including the areas around Boulder and Longmont. For farmers with irrigation systems, the need to build or improve reservoirs became obvious as the ditches ran dry. Those farmers who did not have sources of water other than precipitation found they had to make adjustments in their methods. Soil studies, rainfall studies, improved windmill pumps to bring up groundwater, and new hybrids of plants all became available to farmers after 1900 and this allowed for more productive farming. These developments, followed by abnormally high crop prices during World War I (1914-1919), led to a boom in dryland farming. During this boom period another factor influenced Boulder County agriculture, the introduction of sugar beets.

Sugar beets had been cultivated in central Europe since the Napoleonic Wars. The crop spread slowly to the United States and in the ten years after the Civil War some experimentation began. In 1871 a committee of Colorado businessmen unsuccessfully tried to raise money to purchase sugar beet processing equipment. Despite early failures the crop eventually became widespread.

Sugar factories to process the crop opened in Grand Junction, Windsor, Ft. Lupton and Longmont (Great Western Sugar Co.). The boom brought thousands of acres of land under cultivation.

Another factor that helped revolutionize rural life at the time was the introduction of the gasoline tractor which allowed one person to till more land than had been possible previously. Despite these improvements after 1920, local farmers faced difficulties as crop prices fell when European farms returned to production after World War I. A decade later in 1929, the nation began a slide into the Great Depression. By 1937 and 1938, with the Great Depression and another drought at the same time many Boulder County farmers were just able to survive with massive aid from the federal government. World War II led to a complete reversal of that situation and attempts by the federal government since the war to stabilize the farm economy led to a somewhat easier life for the area's farmers until recently (Mehls 1984b: XVI:1-2; Athearn 1976: 253-278).

2.4.5 Quarrying and Urban Growth and Development, 1870-1900

Denver and northeastern Colorado experienced rapid growth between 1870 and the mid 1890s. During the later part of the period real estate promoters in the city began to turn their attentions to the open farm and ranch lands that surrounded Denver as locales for urban development. In downtown Denver speculators such as Donald Fletcher and Samuel M. Perry began to buy properties and replaced older wood and brick buildings with ones made of stone. Their activity was part of an overall real estate boom in Denver that made many paper millionaires. Near the Study Area, land changed hands from an agriculture use to quarrying for building stone. Stone from the Lyons area quarries found its way into many Denver buildings and was shipped throughout the United States as other cities grew and matured during the late 19th century. Stone quarrying was popular in other areas of the state as well. Ft. Collins was estimated to have over a dozen operational stone quarries in the 1880s to provide building supplies.

In 1880 E. S. Lyons settled in the area that was to be named after him. Recognizing the market for stones, he began quarrying and hauling to Longmont for shipment to Denver. Lyons also engaged in promotional and construction work in the Lyons area. The quarry business proved very successful and by 1900 it was the third largest stone producing region in the United States.

The Romanesque Revival architectural movement of the 1880 and 1890s had a major effect on building materials. These houses often were large, "rambling," structures of brick and sandstone with high pitched gable roofs. Public buildings adopted the Romanesque style with large, intricately laid stone work. Some of the architects designing in this style were H. T. E. Wandell and Frederick Sterns. One of the most popular purveyors of this style was H. A. Richardson whose style "Richardsonian" or "Richardsonian Romanesque" was popular in the Midwest and West. In addition to the characteristics described above, Richardson used heavy walls of stone, arches, French Romanesque and Byzantine motifs. Richardson's popularity in the 1880s was coincidental with the growth of cities and towns and with the stone quarrying operations at Lyons and elsewhere. In addition, the rural Italian style of the University of Colorado at Boulder made extensive use of Lyons quarried stone. Quarrying constituted a major industry near the Study Area.

By the early 1900s, cement, which was strong and reasonably inexpensive, began to replace stone as a major building material. Cement plants developed in the Study Area, notably the Ideal Cement Company (later Ideal Basic) that purchased Dowe Flats in 1957. In 1969 Martin Marietta established a plant southeast of Lyons. (Personal Communication, E. E. Drake, former Corporate Secretary, Ideal Cement/Ideal Basic Industries). In 1984, this became the Southdown plant that will utilize the Dowe Flats quarries.

2.4.6 The Great Depression and World War II, 1929-1945

The period 1929-1945 proved to be one of dramatic change for Boulder County and the entire state. After the euphoric period of the 1910s and trauma of Ku Klux Klan control of Colorado politics during the early 1920s, residents hoped for a period of calm, and as President Harding termed it, "a return to Normalcy." These hopes were shattered in 1929 when, after the New York stock market crashed, Colorado and the rest of the nation began a slide into the Great Depression. By 1933, when President Franklin Roosevelt took office, promising the nation a "New Deal," many Boulder County residents found themselves on the verge of financial collapse (Mehls, et al. 1985:68-69,72). To further exacerbate the already desperate situation, the Colorado plains entered another dry cycle during the early 1930s. Rains did not fall, irrigation ditches and reservoirs began to dry up, and crops wilted in the fields. As the dry cycle continued, wind erosion began to take its toll on the heavily disturbed soil structures, and dust storms, not as severe as those farther south, became commonplace (Mehls 1984a: 155-157).

Franklin Roosevelt's first administration set out immediately to help the nation through federal economic intervention. For Boulder County and the Dove Flats area Roosevelt's farm programs had the greatest impact. Crop price stabilization through the Agricultural Adjustment Administration and later efforts at soil conservation were the foremost of these programs. They allowed farmers who had not already gone out of business to remain on their land, but failed to fully revitalize local agricultural production. Farmers in the region did not totally recover from the Depression until 1940 and the beginning of World War II.

Table 2

Historic Chronology for the Dove Flats Study Area

<u>Tradition</u>	<u>Period/Phase</u>	<u>Date</u>
Euro-american	Exploration & Fur Trade	A.D. 1700 - 1845
	Gold Rush & Early Settlement	A.D. 1858 - 1870

Early Agriculture & Ranching Development	A.D. 1860 - 1895
Transportation & Quarrying Boom	A.D. 1880 - 1900
Urban Growth & Development	A.D. 1870 - 1900
Ranching & Farming After 1900	A.D. 1900 - Present
Great Depression & World War II	A.D. 1929 -1945

3.0 Inventory Results

3.1 Geologic/Paleontological Resources

As a whole, exposures of strata in Dowe Flats are not very good, thus limiting the possibility of discovering fossils. Some strata at the Codell sandstone-Fort Hays Limestone boundary is exposed along the St. Vrain Supply Canal. The strata has been temporarily exposed by maintenance work along the canal. Invertebrate burrows were seen in the Codell and nothing else.

A ridge of Fort Hays Limestone bisects Dowe Flats through the middle of the eastern half of Section 9 south to Section 16. Very few fossils were seen, these being the casts of inoceramid clams and possible invertebrate burrows. These fossils are not scientifically important and were not collected.

The oldest strata in Dowe Flats are the Dakota Group. These strata are steeply dipping and form the east, north and west rims of the Flats. The group consists of about 330 feet of sandstone and shales. It is subdivided into the Lytle and South Platte formations which record the beginnings of the seaway spreading west across Colorado during the Cretaceous.

Fossils in the Dakota Group are known from near Golden and Boulder (Carpenter notes), and includes dinosaur footprints and trace fossils in the basal portion of the South Platte Formation. An undescribed skeleton of a large fish is also known from southeastern Colorado (Denver Museum of Natural History collections).

Conformably overlying the Dakota Group is the Graneros Shale. This dark shale, about 160 feet thick, records deepening of the marine waters during the Late Cretaceous. This shale is poorly exposed in Dowe Flats because it erodes quickly and is soon overgrown by vegetation. Invertebrate fossils have been reported from elsewhere by Kauffman (1977) and include various trace fossils, clams, oysters, and ammonites. Vertebrate fossils

include sharks, salt water crocodiles, ichthyosaurs, and both long and short necked plesiosaurs (Russell 1988).

Overlying the Graneros shale is the Greenhorn Limestone. The Greenhorn consists of bedded limestones separated by thin shales. Elder (1987) reports that various species of ammonites, inoceramid clams, oysters, snails and a shark tooth, were found in Lykins Gulch about 4.5 miles south of Lyons. Similar marine invertebrate fossils are common elsewhere as reported by Kauffman (1977). A few rare vertebrate fossils are also known from the Greenhorn Limestone, including short necked plesiosaurs from Kansas (Craggin 1888; Russell 1988) and a three-dimensional preserved fish specimen from near Pueblo (University of Southern Colorado collections).

Above the Greenhorn Limestone is the Carlile Shale. This shale, about 75 feet thick, erodes quickly and is poorly exposed in Dowe Flats. Marine fossils reported by Kauffman (1977) from elsewhere in Colorado include inoceramid clams, oysters, bryozoans, ammonites, snails, and invertebrate burrows.

The Codell sandstone overlies the Carlile. It is only about 15 feet thick in the Dowe Flats area and was seen along the St. Vrain Supply Canal. Kauffman (1977) has reported marine invertebrate fossils from elsewhere in Colorado, including inoceramid clams, oysters, and invertebrate burrows. Lag deposits of sharks teeth and fish bones are also known in some areas.

The Niobrara Formation overlies the Codell sandstone. This formation is divided into two members, the lower Fort Hays Limestone, about 20 feet thick in Dowe Flats and the upper Smoky Hill Shale, about 360 feet thick. The Niobrara Formation is the only formation mined at Dowe Flats, with the Fort Hays member being the source of limestone. In one of the few studies of the fossils from the Dowe Flats area, Barlow (1985), lists the following fossils from the Southwest Portland Cement Quarry:

invertebrate burrows

Thalassinoides sp.

Planolites sp.

Planolites aucella

Chondrites

clams

Cerminoceras inconstans

Cerminoceras deformis?

Cerminoceras deformis (two forms)

Cerminoceras inconstans transition species Inoceramus rotundatus

Cerminoceras aff. C. schloenbachi

Cerminoceras schloenbachi (two forms)

Cerminoceras schloenbachi woodsi

Cerminoceras wandereri

Inoceramus new transition species Inoceramus wandereri to Inoceramus walterdorfensis hannovrensis

Inoceramus erectes (three forms)

Mytiloides fiegei

Mytiloides stantoni

Pseudopema congesta

Platyceras platinus

ammonites

Clioscapites saxitonianus

Baculites codyensis

In addition, a single specimen of sepioid squid has been found and is presently under study by Kauffman (Robinson, personal communications).

A few rare fossil vertebrates have also been found at the quarry. Young (1992) reports specimens of the fish Apsopelax sp. from the quarry. Several large scales of Xiphactinus in the Fort Hays Limestone along the Front Range was confirmed by the discovery of a skull and partial body near LaPorte, Colorado (Carpenter, notes).

Fossils from the Smoky Hill Shale member of the Niobrara Formation have not been reported from the Dowe Flats area. However, Scott and Cobban (1964) have reported ammonites, clams, and oysters from Pueblo, Colorado.

The Pierre Shale overlies the Niobrara Formation and is present along the eastern portion of Dowe Flats. Exposures are poor because of vegetation. Fossils are very common in the Pierre Shale as reported by Kauffman (1977) and Scott and Cobban (1965). Rare vertebrate fossils are known from the Sharon Springs Member at the base of the formation from elsewhere along the Front Range. These fossils include fish and marine reptiles (Carpenter, notes).

Most of the strata in Dowe Flats are Upper Cretaceous marine sediments covered locally by a veneer of unconsolidated Quaternary sediments. All of the Cretaceous strata in Dowe Flats are known to be fossiliferous. Most of these fossils are the shells of various invertebrates, including ammonite cephalopods, inoceramic clams, oysters, and snails. Such fossils are common in the strata throughout Colorado and minimal impact is predicted on scientifically important specimens from quarry operations.

3.2 American Indian Resources

The Dowe Flats project area, where actual mining will take place, (385 acre mine impact zone), contains no known prehistoric or historic sites. The surrounding Study Area contains 19 prehistoric and 10 historic sites. The archaeological and historic inventory results are summarized below. (See Figure I for the Study Area and the Project Area).

The recordation of prehistoric archaeological resources in the area near Dowe Flats dates to the 1940s when various amateur and professional archaeologists began documenting their findings in the region. William Herbert Dick, Gordon Hewes, and Jack Clifford Moomaw were among those responsible for the earliest site record forms. Although relatively few sites were recorded formally in Boulder County during the 1940s and 1950s, amateur

artifact collection was apparently rampant prior to and during that time. Moomaw, in particular, is known to have collected scores of sites in and near the Dowe Flats area, only a few of which were actually recorded (Burney 1988). Extensive and routine artifact collection by other local residents is documented (Faller 1959). Many of the earliest sites recorded in Boulder County were reevaluated in the 1980s. Site 5BL7, located within the Study Area, and sites 5BL8 and 5BL15, adjacent the Study Area, are among these.

Tables 3 and 4 list all prehistoric sites and isolated finds recorded within and immediately adjacent to the Study Area. Information presented in Tables 3 and 4 was obtained from OAHP files and from field work conducted for this project, from July, 1989-November 1994. Prehistoric cultural resources within the Study Area span the Paleo-Indian through Protohistoric periods. The great majority of datable resources-- both sites and isolated finds-- represent the Early Ceramic through Late Ceramic period occupations.

A total of 19 prehistoric sites are known within the Study Area. Of these, 8 (42%) are recommended as eligible for inclusion in the NRHP. Two of the sites recommended for NRHP inclusion (5BL876, 5BL2431) have been subjected to test excavation. Further work was recommended on two (11%) of the sites in order to make a valid determination of significance. The balance (9 or 47%) were not recommended for NRHP inclusion.

Open lithic scatters comprised the largest category of sites (9 or 47%) within the Study Area. These sites consisted of flaked and/or ground stone artifacts without associated features. These are the most commonly encountered types of prehistoric sites in the Plains region (Eighmy 1984). Of the 9 sites in this category, 4 (44%) were among those recommended for NRHP inclusion.

Stone circles were present on 5 (26%) of the sites within the Study Area. The number of stone circles observed on sites ranged from 1-11, though only one site (5BL876) contained more than three stone circles. Site 5BL876 was the only stone circle site within the Study Area recommended for inclusion in the NRHP. Test excavation of stone circle site 5BL3129 prior to determination of significance was recommended by Burney.

Open Camps accounted for (21%) of the sites within the Study Area. These sites contained hearths and/or cairns in addition to lithic scatters. All of these sites were recommended for NRHP inclusion; one (5BL2431) has been subjected to test excavation.

The remaining site location (5BL4151) was reported by Orback to have contained a protohistoric burial. Although the skeletal material was purportedly removed by the University of Colorado Anthropology Club in the 1970s, and the burial crevice itself subsequently collapsed, grave goods were found by Orback in a catchment area below the purported grave location. The site is recommended for inclusion in the NRHP.

Table 3. Prehistoric Sites on Indian Mountain, Rabbit Mountain, and Dove Flats; Bolded Sites are Located Within the Permit Area.

Site No.	Location	Recorder	Year		Recorded Type	Cultural Affinity	NRHP Rec.
			Recorded	Year			
5BL7	T3N R70W S 20	Various	1949; 1982	OL	Unknown	NE	
5BL8	T3N R70W S 20	Various	1949; 1982	OL	LP	NE	
5BL15	T3N R70W S 21	Various	1949; 1984	SC	Unknown	ND	
5BL350	T3N R70W S 10	Nykamp	1984	SC	Unknown	ND	
5BL351	T3N R70W S 10	Nykamp	1984	SC	Unknown	ND	
5BL793	T3N R70W S 10	Pay	1986	SC	Unknown	ND	
5BL876	T3N R70W S 17	Cassels	1983	SC	LA/LP	E	
5BL1448	T3N R70W S 10	Nykamp	1984	SC	Unknown	ND	
5BL2431	T3N R70W S 15	Burney	1989	OC	LA/LP	E	
5BL3129	T3N R70W S 9	Burney	1990	SC	Unknown	ND	
5BL3843	T3N R70W S 10	Nykamp	1991	SC	Unknown	ND	
5BL3844	T3N R70W S 11	Nykamp	1991	OC	LP	E	
5BL4144	T3N R70W S 17	Grant/Orback	1993	OC	Unknown	E	
5BL4146	T3N R70W S 8, 9	Grant/Orback	1993	OC	Unknown	E	
5BL4147	T3N R70W S 17	Grant/Orback	1993	SC	Unknown	ND	

Site No.	Location	Recorder	Year Recorded	Type	Affinity	NRHP Rec.
5BL4148	T3N R70W S 17	Grant/Orback	1993	OL	Unknown	NE
5BL4149	T3N R70W S 17	Grant/Orback	1993	OC	Unknown	NE
5BL4150	T3N R70W S 8	Grant/Orback	1993	OL	LP	NE
5BL4151	T3N R70W S 17	Grant/Orback	1993	BC	PH	E
5BL4191	T3N R70W S 17	Grant/Orback	1993	SC	Unknown	NE
5BL4192	T3N R70W S 9	Grant/Orback	1993	OL	Unknown	E
5BL4193	T3N R70W S 9	Grant/Orback	1993	OL	Unknown	E
5BL4194	T3N R70W S 9	Grant/Orback	1993	OL	Unknown	NE
5BL4195	T3N R70W S 9	Grant/Orback	1993	OL	Unknown	NE
5BL4196	T3N R70W S 16	Grant/Orback	1993	OL	Unknown	E
5BL4197	T3N R70W S 16	Grant/Orback	1993	OL	Unknown	NE
5BL4199	T3N R70W S 20	Grant/Orback	1993	OL	Unknown	E

LP= Late Prehistoric, LA = Late Archaic, PH = Protohistoric.
 E = Eligible, NE = Not Eligible, ND = Need Data.
 OL = Open Lithic, OC = Open Camp, SC = Stone Circle, BC = Burial Crevice.

Table 4. Prehistoric Isolated Finds (IF) on Rabbit Mountain, Dove Flats, and Indian Mountain.

IF No.	Location	Material	Affinity	Recorder	Date
5BL782	T3N R70W S10	Projectile point	LP	Pipkins	8/12/86
5BL873	T3N R70W S10	Biface fragment	U	Pipkins	8/20/86
5BL1446	T3N R70W S10	Flake, Biface	U	Loria	4/15/84
5BL2432	T3N R70W S15	Quartzite uniface	U	Burney	4/18/89
5BL2433	T3N R70W S15	Sandstone mano	U	Burney	4/18/89
5BL2434	T3N R70W S15	Chert flake	U	Burney	4/18/89
5BL2435	T3N R70W S15	Granite mano	U	Burney	4/18/89
5BL2436	T3N R70W S15	Ground Cobble	U	Burney	4/18/89
5BL2437	T3N R70W S15	Sandstone metate	U	Burney	4/19/89
5BL2438	T3N R70W S15	Sandstone metate	U	Burney	4/19/89
5BL2439	T3N R70W S15	Sandstone metate	U	Burney	4/20/89
5BL2440	T3N R70W S15	Sandstone mano	U	Burney	4/20/89
5BL2441	T3N R70W S15	Quartzite Cobble	U	Burney	5/8/89
5BL2442	T3N R70W S16	Sandstone metate	U	Burney	5/10/89
5BL2443	T3N R70W S16	Sandstone metate	U	Burney	5/10/89
5BL2444	T3N R70W S16	Quartzite Cobble	U	Burney	5/10/89
5BL2445	T3N R70W S16	Sandstone metate	U	Burney	5/10/89
5BL2446	T3N R70W S16	Sandstone metate	U	Burney	5/10/89

IF No.	Location	Material	Affinity	Recorder	Date
5BL2447	T3N R70W S9	Projectile Point	LP	Burney	7/5/89
5BL2448	T3N R70W S9	Sandstone metate	U	Burney	7/5/89
5BL2449	T3N R70W S9	Sandstone metate	U	Burney	7/5/89
5BL2450	T3N R70W S9	Chert flake	U	Burney	7/5/89
5BL2451	T3N R70W S9	Sandstone metate	U	Burney	7/5/89
5BL2452	T3N R70W S15	Sandstone metate	U	Burney	7/6/89
5BL2453	T3N R70W S15	Sandstone metate	U	Burney	7/6/89
5BL2454	T3N R70W S15	Granite mano	U	Burney	7/6/89
5BL2455	T3N R70W S15	Chert flake	U	Burney	7/6/89
5BL2456	T3N R70W S10	Granite mano	U	Burney	7/7/89
5BL3123	T3N R70W S9	Utilized flake	U	Germer	12/9/90
5BL3124	T3N R70W S9	Granite mano	U	Germer	12/10/90
5BL3125	T3N R70W S9	Granite mano	U	Germer	12/10/90
5BL3126	T3N R70W S9	Projectile Point	LP	Germer	12/10/90
5BL3127	T3N R70W S16	Sandstone mano	U	Germer	12/2/90
5BL3847	T3N R70W S10	Chert uniface	U	Tucker	11/10/92
5BL3848	T3N R70W S3	Biface Frag.	U	Gleichman	12/16/92
5BL4201	T3N R70W S17	Ground Cobble	U	Grant	93
5BL4202	T3N R70W S17	Ground Cobble	U	Grant	93
5BL4203	T3N R70W S8	Projectile Point	PI	Grant	93
5BL4204	T3N R70W S8	Uniface	U	Grant	93
5BL4205	T3N R70W S17	Biface	U	Grant	93

IF No.	Location	Material	Affinity	Recorder	Date
5BL4206	T3N R70W S17	Ground Slab	U	Grant	93
5BL4207	T3N R70W S17	Ground Cobble	U	Grant	93
5BL4208	T3N R70W S17	Ground Cobbles	U	Grant	93
5BL4209	T3N R70W S17	Ground Cobble	U	Grant	93
5BL4210	T3N R70W S20	Projectile Point	LA	Grant	93
5BL4211	T3N R70W S20	Projectile Point	PI	Grant	93
5BL4212	T3N R70W S20	Ground Cobbles	U	Grant	93
5BL4213	T3N R70W S9	Ground Cobble	U	Grant	93
5BL4214	T3N R70W S9	Quartzite Flake	U	Grant	93
5BL4215	T3N R70W S16	Ground Slab	U	Grant	93

U= Unknown, LP= Late Prehistoric, PI= Paleo-Indian, LA= Late Archaic.

3.3 Historic Resources

While inventories of the prehistoric resources at the Dowe Flats area are numerous, historic inventories are more limited. Previous Dowe Flats historic surveys found ten historic resources located within the Study Area (see Figure I). There are no historic resources within the mine impact zone. Of the resources of sufficient age (50 years old or older) to be considered as possibly significant historic resources, there were four irrigation ditches, an equipment shed, a thresher or corn sheller and associated jumble of used fencing, stone structures, a stone fence, a foundation and artifacts and a foundation and corrals. Two additional resources were less than 40 years old and were not of exceptional significance. (See Table 5). Current recommendations of not eligible for five buildings connected with a former farmstead is underway. Those recommendations will be sent to SHPO for official determinations and to HPAB for review.

The shed and thresher, stone fence, and foundations and corrals were recorded and determined as not eligible for inclusion in the National Register of Historic Places.

The four ditches, the stone structures and the foundation and artifacts were determined as eligible for nomination to the NRHP.

Outside the Study Area are additional historic resources. Two previously determined eligible buildings, the Montgomery School and the Gerstenkorn Homestead (Centennial Farm) are located on nearby Colorado Highway 66.

Table 5
Previously Recorded Historic Sites
Dowe Flats Study Area

Site Number	Resource Type	Temporal Period	NRHP Evaluation	Recorder
5BL3110	Supply Ditch	1862-Present	Eligible	WHS
5BL3111	Thresher	1900-1945	Not Eligible	WHS
5BL3112	Shed	1900-1980	Not Eligible	WHS
5BL3113	Rough and Ready Ditch	1862-Present	Eligible	WHS
5BL3114	Highland Ditch	1862-Present	Eligible	WHS
5BL3115	Palmerton Ditch	1862-Present	Eligible	WHS
5BL4145	Stone Structures	1870-1900	Eligible	Paragon Consult.
5BL4152	Stone Fence	1862-Present	Not Eligible	Paragon Consult.
5BL4198	Foundations & Artifacts	1880-1920	Eligible	Paragon Consult.
5BL4200	Foundations & Corrals	1930-1950	Eligible	Paragon Consult.

4.0 Research Design

This research design is the intellectual guideline for future prehistoric, historic and historic archaeological work at the Dowe Flats site. The research design is based upon the previous work of Burney (1989), Burney and Germer (1991), Cassells and Farrington (1986), Gleichman (1992), Grant (1990 & 1994), Mehls (1989), Rushmore (1994), and Scott-Cummings (1991), Colorado SHPO documents, historic contexts by Mehls (1984 a & b) and historic archaeology context by Buckles and Buckles (1984), and current Plains Prehistoric Context (Eighmy 1984) guidelines. Major problem domains, or areas of scholarly interest, are identified, and research questions are developed which relate the problem domains specifically to the Dowe Flats Study Area. The following section addresses the assumptions regarding the potential for other prehistoric sites within the Dowe Flats Study Area.

Major problem domains, or areas of scholarly interest are identified. For each problem domain there is one or more research questions that tie the problem domain more specifically to the Dowe Flats area. Data from previous cultural resources investigations at Dowe Flats make it possible to answer the research questions and develop patterns of information about past human behavior at the Dowe Flats site. Several key assumptions shaped the development of this research design. The first is that prehistoric archaeological remains provide evidence reflecting the adaptation of social and cultural systems to environmental variability and change. Secondly, documentary (written) evidence combined with cultural remains provide the basis for answering the research questions. No one element was more critical - the resources provide evidence of occupation and usage. The written record provides assistance in determining the extent and implications of usage of the Dowe Flats area.

In addition to these assumptions, it is understood that a dynamic, responsive research design also will address current needs and concerns of the American Indian community. It is

recognized that the data gathered by archaeologists and the types of analyses performed on those data are often of little relevance to American Indians whose interpretation and use of cultural sites focuses on social and spiritual values. An overriding goal of this research design is to reconcile these apparently divergent needs.

The following research questions are formulated specifically for an area larger than the Study Area and includes southern Rabbit Mountain, southern Indian Mountain, and Dowe Flats. The content of these research questions necessarily reflects the strengths and weaknesses of the recorded cultural resource data base. For instance, very few temporally diagnostic artifacts have been recovered by professional archaeologists within or adjacent the Study Area, largely as a result of previous intensive collection by amateurs. Consequently, research questions that utilize data from artifact assemblages are limited in scope. Furthermore, the research questions are intended to be operationalized within the context of a non-disturbing management program. Therefore, methods such as detailed analysis of artifact use-wear patterns are beyond the range of data collection activities anticipated for this management program.

Moreover, there are a number of logistical and technical constraints on the data base from which these questions were derived. Since many of the sites that comprise the present Study Area sample were recorded previously by a variety of investigators, site specific information is often variable. For this reason, not all sites are included in each of the data summaries below. Changes in site sample sizes across research topics reflect deficits in the current data base. Finally, it should be noted that the region of interest represents only one portion of a broader settlement and subsistence network. A full understanding of the implications of any research findings within the Study Area requires careful integration of data from surrounding regions.

4.1 Prehistoric Problem Domains

Anthropologists address the various issues of human behavior using a scale from specific locale to the entire world. A researcher may use one site or evidence of localized human occupation during a brief time as a microcosm of larger activity. However, the broader scale or picture, an understanding of cultural behavior of an entire group, regardless of location, may be derived from one small site. The archaeological remains at Dowe Flats may contribute knowledge to our understanding at many scales.

4.1.2 Chronology

Previous survey efforts have documented a total of six prehistoric or protohistoric sites and four prehistoric isolated artifacts within or immediately adjacent to the Study Area containing temporally diagnostic artifacts (Tables 2 and 3). All but one of these sites and isolated artifacts are affiliated with the Late Prehistoric (Early to Late Ceramic) period. One site (5BL4151) is associated with protohistoric grave remains; one isolated artifact is a possible fragment of a late Paleo-Indian period projectile point. In addition, absolute (radiocarbon) age estimates are available from two sites within the Study Area (5BL876, 5BL2431).

Sites 5BL876 and 5BL2431 contained two datable components. Radiocarbon age estimates of 2,140 +/- 200 years, 1280 +/- 195 years, and 1,120 +/- 200 years B.P. were obtained from charcoal found in buried fire pits within three different stone circles on site 5BL876 (Cassells and Farrington 1986:131). These or similar dates would normally indicate the presence of a Late Archaic or Late Preceramic period occupation (c. 3,000 - 2,000 years B.P.) and an Early Ceramic period occupation (c. 2,000 - 1,000 years B.P.). However, the charcoal that yielded the earliest date was associated directly with a small piece of pottery, an artifact type that is generally indicative of later cultural episodes in

eastern Colorado. This unexpected association makes the site's temporal placement problematic and significant since this is the earliest recorded date for a ceramic artifact in the foothills region (Cassells and Farrington 1986:136-138).

Mean radiocarbon age estimates of 2,660 +/- 90 years and 990 +/- 60 years B.P. were obtained from buried charcoal excavated from two different stratigraphic levels on site 5BL2431 (Grant 1990). The upper or younger component was associated with pottery and artifact styles indicative of the Early Ceramic period; no pottery was found within the earlier component. These results were consistent with expectations based on previous findings throughout eastern Colorado. However, the radiocarbon age estimate of 2,660 +/- 90 years B.P. was obtained from charcoal that was over 2 meters (5.56 feet) below the ground surface. Archaeological sites in eastern Colorado rarely attain such depth and significantly earlier radiocarbon ages are typically recovered from much shallower cultural strata.

Radiocarbon data from both of these sites raises unique questions about the Study Area. Site 5BL876 provides limited evidence that ceramic technology may have been introduced to groups living on Indian Mountain markedly earlier than is generally believed to have occurred within the foothills region. Site 5BL2431 provides evidence that sites on the valley floor may be subject to depositional processes that are not typical of other sites in the region, and that Late Archaic and earlier components may be deeply buried. The following questions will direct research efforts aimed at establishing a more detailed chronology:

- 1) Is additional evidence of early ceramic technology present within the Study Area?
- 2) Do deeply stratified sites such as 5BL2431 occur throughout the valley floor?
- 3) Is the apparent paucity of preceramic sites and isolated artifacts indicative of changes in settlement patterns through time, the effects of collector activity, depositional factors, or interactions among all of these?

4) Are fluctuations in prehistoric use of the Study Area keyed to identifiable paleoenvironmental events, such as glacial stades or changes in the forest/grassland boundary?

Answers to such questions provide understanding of the issue of time/chronology at Dowe Flats.

Applicable RP3 Contexts:

Applicable RP3 contexts for the chronology of settlement within the Study Area address the Late Archaic and Ceramic Stages in Northeast Colorado as defined by Eighmy (1984). Test excavations at sites 5BL876 and 5BL2431 indicate that sites within the Study Area may address directly Eighmy's research problems 5 and 9 for the Archaic period. These problems are "possible influences from outside the Colorado Plains area," and "Formation processes of Archaic sites, the rate of site destruction, the nature of site transformation," respectively (1984:64). In addition, chronological research within the Dowe Flats area may address Eighmy's Research Needs 1 and 5. These include, "Chronologic dates," and "environmental reconstructions to answer questions about the relationship between the Archaic, Paleo, and Ceramic stages..." respectively (1984:65). With regard to the Ceramic period, investigation of the chronological domains outlined above may address Eighmy's research problems 4 and 10. These problems include the "relationship between the Ceramic stage and Archaic stage," and "formation processes of ceramic sites, the rate of site destruction and nature of site transformation (1984:102)."

4.1.3 Settlement

Investigation of site distributions at and around Dowe Flats addresses the spatial component of archaeological interpretation. Site locations display non-random patterning in relation to environmental variables such as land form, vegetation zones, distance to water, and others. Understanding the nature of these patterns reveals certain aspects of prehistoric cultures'

adaptive strategies, and potentially reveals something of their general world view.

Complete and reliable settlement data is available for a total of twenty two prehistoric sites on Rabbit Mountain and Indian Mountain and two sites on the valley floor. Investigation of this data revealed several trends which appeared to define at least certain aspects of the settlement, subsistence, and land use strategies employed by prehistoric groups within the Study Area.

Data was available for all sites on six environmental variables: slope, elevation, distance to water, aspect, vegetation zone, and land form. Site attributes available for analysis included area, stone circle frequency, ground stone frequency, and flaked stone frequency. Sites occurred exclusively in locations characterized by slopes of 8 degrees or less, with an average site slope of 3.18 degrees, and within 200 meters of surface water. All sites occurred between 1612 meters and 1780 meters above mean sea level; south and east facing exposures were preferred, with an average directional exposure of 150 degrees (south-southeast). There was no substantial difference between Rabbit Mountain and Indian Mountain in terms of predominant exposures of site locations or other environmental factors.

Vegetation could be divided reliably into three general categories: shrub, grassland and pine forest with the majority of sites in the grassland zone on terraces, saddles, ridge crests, and hill tops. Terraces and saddles contained the greatest number of sites; hill tops and hill slopes contained the least.

Sites located on terraces contained significantly greater numbers of ground stone artifacts than did sites located on other land forms. Conversely, sites located on ridge tops contained significantly greater numbers of stone circles than did sites located on other land forms. Chi-square analysis, a statistical procedure that measures the likelihood of dichotomous events

resulting from chance or other factors, indicated there was less than one chance in one thousand that this trend resulted from random biases in the site sample (see Table 6). The data indicates that, on average, the greatest frequencies of ground stone artifacts will occur on terrace sites, while low to moderate frequencies will occur on saddles and hill tops, and low to nil frequencies will occur on ridge tops. For stone circle frequencies this pattern of probabilities is reversed.

Land form appears to be an orienting variable for site type. In other words, land form alone was not necessarily a factor in the presence or absence of sites, but exerted a significant amount of influence on the types of activities that were carried out within sites.

Research Data Requirements

The cultural resource data base for the Front Range area within Boulder County will increase as development continues. Accurate recording of site data and preservation of the cultural resources data record will ensure that the Study Area data is available for this and similar undertakings in the future and will provide the beginning of a larger sample base. Similar trends in land use strategies or divergent trends would imply shifting strategies. Such potential shifts may indicate changes in seasonality of occupation, responses to the exploitation of differing environmental zones or intergroup differences.

The following key research questions provide a beginning point for inventory, evaluation and mitigation of the prehistoric properties at Dowe Flats. They allow for flexibility and gathering of information for any unexpected discoveries made

Table 6
Chi-Square Analysis

	Stone Circles		Ground Stone		Total
	O	E	O	E	
Terrace	11	44	123	90	134
Ridge	59	26	18	51	77
Total	70		141		211

$$\chi^2 = 103.2419 (2), p < .001$$

Regression formulae for ground stone:

Estimated Frequency of Mano Fragments = $1.05 + (.3266 * \text{Observed Frequency of Metate Fragments})$;

Estimated Frequency of Metate Fragments = $-1.69 + (2.50 * \text{Observed Frequency of Mano Fragments})$

$r = .903, p < .001$

during mine operation. At present, the following questions will be used to increase our understanding of site spatial patterning.

- 1) How many environmental factors form the underlying structure of the local settlement pattern and which site attributes correlate significantly with each factor?
- 2) Are there functional and/or temporal differences between those sites which occur within the average ranges of environmental variables, such as slope and distance to water, and those which occur in the extreme ranges (e.g. 1,000 meters from water)?
- 3) Is the observed effect of land form on site type typical of the surrounding region or unique to the Study Area?
- 4) Is the apparent absence of habitation sites (and relative abundance of isolated artifacts) on the valley floor a result of agricultural and other disturbances or an indication of actual avoidance of the valley floor as a habitation area?

Answers to each question provide for increased understanding of the issue of settlement at Dowe Flats.

Applicable RP3 Contexts

Applicable RP3 contexts for the study of settlement patterns within the Study Area address the Late Archaic and Ceramic Stages in Northeast Colorado as defined by Eighmy (1984). Test excavations at sites 5BL876 and 5BL2431 as well as survey results indicate that sites within the Study Area may address directly Eighmy's research problems 7 and 8 for the Archaic period. These problems include "subsistence and seasonality," and "site settlement studies similar to Kvamme's (1979)," respectively (1984:64). With regard to the Ceramic period, investigation of settlement patterns within the Study Area, as outlined above, may address Eighmy's Research Problem 3: "Subsistence/settlement differences between the Early and Middle Ceramic" (1984:102).

4.1.4 Site Function

The investigation and interpretation of site function focuses on intrasite attributes, such as the number and types of artifacts and features present, and their spatial configurations. This information is used to define site functional types and gauge differences across sites, which may indicate functional variability. The same site sample used to define research questions for the settlement domain was used for a preliminary investigation of site function. Reliable information was available on site area and the frequencies of ground stone and flaked stone artifacts, and stone circles.

Sites were highly variable in area and ranged from 25 square meters (5BL7) to 14,000 square meters (5BL15). Average site area was 2,762 square meters, but this figure had little practical validity due to the extreme variability of this value. Sixty-eight stone circles were recorded within or immediately adjacent the Study Area. The features occurred on 10 sites that contained between 1 and 19 stone circles; occurrences of five or fewer features per site were most common.

Stone circle frequency was found to correlate significantly with site area. As the number of stone circles changed, site area changed by a consistent and predictable ratio. Moreover, while the number of stone circles varied considerably from site to site, nearly 50 percent of this variability could be attributed statistically to changes in site area. This suggests that average intrasite distances among stone circles and between stone circles and related activity areas were relatively uniform throughout the Study Area and adjacent lands.

There was no correlation between site area and the frequency of ground stone or flaked stone artifacts. Small sites were about as likely as larger sites to contain high artifact densities. Artifact and stone circle frequencies were unrelated, though a trend toward a negative correlation (a tendency for the number of

artifacts to decrease as the number of stone circles increases) may become significant in a larger site sample.

A sample of 140 ground stone artifacts available for analysis facilitated several lines of investigation concerning intersite and intrasite patterning. For instance, determining whether artifact size remains constant or varies among sites may indicate whether a single use, such as seed grinding, or multiple uses occurred, as discussed in the following section. Variability in ground stone use among sites would suggest that different types of plants were harvested and/or processed at different sites.

The ratio of manos to metates on site surfaces addresses intrasite activity patterns, site formation and preservation processes, and the possible effects of collector activity. A consistent linear relationship across sites (similar to the trend observed for stone circle frequency and site area) would suggest that ground stone artifacts represented similar intrasite activity patterns regardless of other site attributes, and that sites were subjected to similar post-depositional impact agents, artifact breakage patterns, and so on. Absence of a consistent relationship, or presence of a nonlinear correlation, would suggest differing use of intrasite space, divergent site formation processes, or the uneven effects of amateur collector activity.

The relative frequencies of manos or mano fragments and metates or metate fragments within sites exhibited a very strong correlation. As the number of metates changed the number of manos changed in a consistent and predictable manner. While the overall number of ground stone artifacts varied considerably among sites, over 80% of the variability in frequency of either artifact type (manos or metates) could be attributed to changes in the intrasite frequency of the other type. As with the relationship between site area and stone circle frequency, this trend suggested functional consistency across sites. Homogeneity of the site sample was also indicated by the distribution of

ground stone metric attributes, discussed in the following section.

Research Data Requirements

The following key research questions or problems provide a starting point for providing for inventory, evaluation and interpretation of the prehistoric site functions at Dowe Flats. These questions are broad enough to allow flexibility and gathering of information for any unexpected discoveries made during mine operation.

- 1) Is the apparent consistency in the use of intrasite space on stone circle sites in the present sample typical of the surrounding region or unique to the Study Area?
- 2) Is the consistent ratio of manos to metates observed within the present site sample typical of the region in general or unique to the Study Area?
- 3) What additional factors may be identified that contribute to the definition of site types within the Study Area?
- 4) How many functional site categories can be defined within the Study Area and what are those categories?

Answers to these questions provide understanding of the issue of site function at Dowe Flats.

Applicable RP3 Contexts

Applicable RP3 contexts for the study of site function within the Study Area address primarily the Late Archaic and Ceramic Stages in Northeast Colorado as defined by Eighmy (1984). Test excavations at sites 5BL876 and 5BL2431 as well as survey results indicate that the study of site function within the Study Area may contribute to Eighmy's research questions 7 and 9 for the Archaic period. These include issues of "subsistence and seasonality," and "formation processes of Archaic sites...", respectively (1984:64). With regard to the Ceramic period,

investigation of settlement patterns may contribute to Eighmy's research questions 8 and 10. These questions address the "position of stone ring structures in the cultural taxa of the Middle Ceramic," and "formation processes of Ceramic sites," respectively (1984:102).

4.1.5 Technology

This problem domain investigates the range and diversity of material culture in the Study Area. While all of the research domains are interrelated, the formulation and investigation of questions for this domain is strongly dependent on the content of the previous research questions. The scope of potential research within this domain is limited by the types and quantities of artifacts recorded within the Study Area. At present, ground stone artifacts and lithic debitage comprise the only artifact samples large enough to permit meaningful analysis.

Metric data was available for 89 metates or metate fragments and 51 manos or mano fragments. All were manufactured from tabular sandstone; 57 percent of the manos or mano fragments were manufactured from granite river cobbles and the balance were manufactured from sandstone cobbles. Since most of these specimens were incomplete, thickness was the only metric variable to be investigated. Considering the manner in which ground stone artifacts were used, thickness may be the most sensitive discriminator of artifact function.

The thickness of all artifacts identified as metates or metate fragments conformed to a normal (symmetrical) distribution with an average of 2.175 centimeters. The thickness of all artifacts identified as manos or mano fragments conformed to a normal (symmetrical) distribution with an average of 4.04 cm. There was very little overlap between the two distributions, such that just under 40% of the variability in ground stone thickness could be attributed statistically to the mano/metate contrast. Differences among sites, land form, vegetation zone and so forth,

exerted no measurable effect on ground stone thickness. Furthermore, the average thickness of 16 metates excavated from different strata on site 5BL2431 at the base of Rabbit Mountain did not differ from that of the surface sample. The ratio of manos to metates recovered from the test unit on this site was also within the expected range for the surface sample. Again, functional consistency across sites, and possibly through time, is suggested. This finding is also consistent with Scott-Cummings' (1991:10, 13) conclusion that grass seeds were the food items processed on all metates at site 5BL2431 regardless of stratigraphic location or changes in background pollen levels.

Flaked stone artifacts were relatively rare in the present sample. However, test excavations at site 5BL2431 demonstrated that a paucity of surface artifacts did not necessarily indicate a correspondingly sparse subsurface assemblage. Locally dense subsurface concentrations of flaked stone artifacts were found during excavations on portions of site 5BL876, while no surface artifacts were evident. Lithic material types noted among 93 flakes and 8 formal tools recovered from 5 strata on site 5BL2431 included chert, chalcedony, petrified wood, quartzite, rhyolite, and mudstone. Using material from two radiocarbon dated strata, it was found that different relative frequencies of lithic material type were associated strongly with different temporal periods. Chert, petrified wood, and chalcedony occurred most frequently among deposits associated with the Early Ceramic or later periods. Quartzite, mudstone, and rhyolite occurred most frequently among deposits associated with the Late Preceramic or earlier periods.

Average flake size also changed significantly across strata, with larger flakes occurring in the lower strata. However, careful statistical analysis indicated that this trend was due uniquely to the effect of different material types and could not be attributed to temporal variation. In the excavated sample, approximately 35 percent of the variability in lithic material type was attributed to temporal differences and about 16 percent

of the variability in flake size was attributed to differences in material type, with no interaction between temporal variability and flake size (Grant nd). These results are not supported by findings from site 5BL876 where a smaller lithic sample, consisting primarily of cherts, was recovered in association with a radiocarbon date of 2140 +/- 200 year B.P. (Cassels and Farrington 1986).

Research Data Requirements

The following research questions provide a starting point for inventory, evaluation and interpretation of the prehistoric technologies represented at Dowe Flats. These questions are broad enough to allow flexibility and information gathering for any unexpected discoveries made during mine operation.

- 1) Is the observed consistency in ground stone thickness across sites an indication of functional consistency or merely a reflection of the raw material available within the Study Area?
- 2) Is the temporal variability in lithic material types observed on site 5BL2431 a result of sampling error or indicative of technological trends in the Dowe Flats region?
- 3) Can raw lithic materials (both flaked and ground) within the Study Area be traced to specific quarry locations?

Answers to these questions provide an understanding of the issue of technology at Dowe Flats.

Applicable RP3 Contexts

Applicable RP3 contexts for the study of technology within the Study Area address primarily the Late Archaic and Ceramic Stages in Northeast Colorado as defined by Eighmy (1984). Test excavations at sites 5BL876 and 5BL2431 as well as survey results indicate that the study of technology within the Study Area may contribute to Eighmy's research question 6 for the Archaic period in Northeast Colorado. This question addresses "lithic source

identification and distribution" (1984:64). Although not formulated specifically for Northeast Colorado, Eighmy's research question 7 for the Southeast Colorado Archaic is highly applicable. This question addresses the "morphology and function of ground stone" (1984:77). With regard to the Ceramic period, investigation of prehistoric technology within the Study Area may contribute globally to Eighmy's research need 2: "surveys to answer questions concerning cultural/ceramic/projectile point taxonomy, extent of horticulture... cultural boundaries" (1984:103).

4.2 Predictive Model of Prehistoric Site Locations

The management of cultural resources in the Permit Area includes the construction of a predictive model of American Indian site locations to aid in the identification of areas where buried cultural resources could be expected. The process of constructing the model, as well as the model's results, provided a detailed empirical study of the relationship between site locations and environmental variables on Indian Mountain and Rabbit Mountain, as discussed in Grant and Mehls (1994).

Predictive modeling attempts to find the dimension or dimensions along which site and nonsite locations differ and generate a classification equation to predict group membership. Predictor variables usually are identified by analysis of a sample of site and nonsite locations drawn from an intensively surveyed area that is physiographically similar to, and preferably contiguous with, the region of interest.

In addition to building predictive equations, the process of modeling is inherently exploratory and serves to both generate and test specific hypotheses about past human-environment interactions. The modeling process carries a network of meanings beyond the prediction of site locations: it begins to address prehistoric settlement patterns as correlates of cognitive processes.

Technical constraints on predictive models include the following:

- 1) Site and nonsite locations must differ significantly in relation to certain environmental variables.
- 2) There must be sufficient within-groups variability in the site and nonsite samples to allow meaningful comparisons.
- 3) The number of independent variables that can be combined to create a prediction equation is constrained by the number of site and nonsite locations available for analysis and by the statistical methods chosen.
- 4) Because of the exploratory nature of model building, predictive models may capitalize on chance, particularly when samples are small.

Method

Construction of a valid predictive model for the Dowe Flats project area was constrained by several considerations. Foremost among these was the small sample of sites available for analysis. Previous work by Burney, Cassels, Gleichman, Nykamp and others identified 8 prehistoric sites within and immediately adjacent to the study area. Sites included in this sample were located on Indian Mountain and Rabbit Mountain.

Since this site sample represented data accumulated by various researchers over a period of several years, information on specific site characteristics varied considerably. A total of 22 sites, including 14 sites recorded on Indian Mountain during the present inventory (Grant and Mehls, 1994), could be analyzed reliably. Site 5BL4198, located south of St. Vrain Creek in Study Area No. 2, and site 5BL4151, a burial, were not included in the analysis. Among the 22 relevant sites for which adequate data existed, six environmental variables could be measured reliably: slope, aspect, elevation, distance to water, land form, and vegetative cover. Slope and aspect were continuous variables measured in degrees, distance to water was a continuous variable measured in meters, and vegetative cover and land form were discrete variables. Three vegetative zones were identified

within the study area: shrubland, grassland, and pine forest. Land forms comprised five categories: lowland terraces, upland terraces, hill slopes, ridge crests, and hill tops.

A pilot study using the sample and variables described above determined that a valid predictive model could be constructed for the project area. The pilot study compared the 22 sites with a sample of 22 randomly selected nonsite locations within current project area on Indian Mountain and the western margin of Dowe Flats. Sites and nonsites differed significantly in relation to slope, distance to water, vegetative cover, and land form (Grant and Mehls 1994).

The predictive model was generated using logistic regression. This approach parallels predictive modeling methods used by Zier et al. (1987) for the Fort Carson area near Colorado Springs and Kvamme (1992) for the Pinon Canyon maneuvers area in Las Animas County, Colorado. This approach to predictive modeling is based purely on empirical observations and does not attempt to incorporate economic theory into the predictive process. Hence it is distinct from the economy based models discussed by Earle and Christenson (1980) and others.

Results

The logistic regression equation generated for the study area was $3.63 - [(.33 \text{ slope}) - (.01 \text{ water}) - (1.29 \text{ vegetation}) - (.95 \text{ land form})]$ where vegetation and land form were orthogonally coded variables (Grassland = -1, Pine Forest = 0, Shrubland = 1; Upland Terrace = -2, Lowland Terrace = -1, Hill Top or Ridge Crest = 0, Saddle = 1, Hill Slope = 2)². The above equation correctly classified

². The coded variables listed are based on a linear model which was necessary to satisfy the assumptions of Discriminant Analysis. Since logistic regression is nonlinear, any arbitrary coding scheme will yield the same regression coefficients; however, the regression constant will change markedly.

86.36% of both site and non-site locations in the present sample. The probability of a site's occurrence was given by

$$P = \frac{1}{1 + e^{-Z}}$$

where e was the base natural logarithm 2.7183, and $-Z$ was the signed result of the above logistic equation. The co-probability of a non-site occurrence was given by $1-P$.

The decision axis for expecting site presence or absence in a logistic model is usually placed at $P = .50$, though this value may be adjusted in either direction to compensate for inflated false positives or false negatives (Kvamme 1992). Since the present model correctly classified equal proportions of sites and non-sites, the 50% criterion is reasonable.

Discussion

Results of the predictive modeling process suggest that site location strategies used by prehistoric groups within the study area were based at least partly on a hierarchical arrangement of environmental variables from most desirable to least desirable. Slope was apparently of paramount importance regardless of other variables. However, potential site locations that occurred in the shrub vegetation zone were apparently avoided more stringently than other locations regardless of slope or other factors while locations in the grassland zone were favored over those in pine forests regardless of other factors.

As slope and distance to water became less ideal, vegetation and land form apparently increased in importance, with a marked preference for upland and lowland terraces and continued preference for the grassland vegetative zone. (A general avoidance of hill slopes regardless of most other variables may actually capture the effect of slope rather than land form since hill slopes are by definition characterized by greater slopes than other land forms).

All of these conclusions assume that modern vegetational cover and drainage patterns are tolerably close representations of the prehistoric environment. Since the directions and magnitudes of site probabilities under varying environmental conditions are rationally as well as empirically sensible, this is probably the case.

The model predicted high site probabilities throughout the Dowe Flats area where only isolated finds have been recorded. However, an unmodified application of the existing model to the Dowe Flats landscape probably introduced a significant bias due to the differences in slope and land form on Indian Mountain and Rabbit Mountain as opposed to Dowe Flats.

Manipulation of the predictor variables in the existing model was attempted in order to replicate the environmental conditions of prehistoric Dowe Flats and to apply the current regression equation to those conditions. This process did not take into account the considerable alteration and loss of sediments that has occurred on Dowe Flats during the past century as a result of mechanized agriculture. Although results indicated a high potential for site presence throughout Dowe Flats, intensive geomorphological studies within the 350 acre mine impact zone indicated no potential for the preservation of archaeological deposits (Rushmore 1994b). Thus while the present predictive model is a valid and accurate predictor of site locations in environments surrounding Dowe Flats, it was demonstrated to be biased in relation to Dowe Flats proper. There the geomorphological context has been demonstrated to override other potential predictors of site presence.

4.3 Buried Archaeological (Prehistoric and Historic) Resources

The results of geomorphological testing conducted in January and July, 1994 suggest the potential for buried intact archaeological sites within the immediate impact area is low. The nature of secondary deposits themselves and/or post-depositional

alterations have produced a poor environment for preservation of intact archaeological assemblages. The following is a generalized probability scenario for archaeological preservation and sediment types within the proposed impact area.

- 1) Remnant paleosols (ancient soils) rank first in utility value from the standpoint of archaeological and geomorphologic and paleoclimatic interpretations. The presence of paleosols in the impact area is very limited.
- 2) Secondary deposits of mixed colluvium and alluvium in the west sub-basin have a very low potential for archaeological preservation at depth. By definition, cut-and-fill stratigraphy associated with poorly sorted deposits are too dynamic and coupled with post-depositional processes, such as plowing, surface deflation through plowing, and bioturbation of the sediments primarily by prairie dogs and plants, have created an environment nonconductive to archaeological preservation.
- 3) Thin residual sediments associated with the more resistant bedrock (the more elevated areas of the valley floor) are probably too old and too mixed through various biotic activities to have much potential for intact archaeological preservation at depth. Sediments of this type are basically forming in place, oldest at the top and youngest near the bedrock where the sediment is forming. Any archaeological assemblages associated with this type of area would be contained within the plow zone and no longer intact.

The geomorphic analysis indicates minimal possibility for buried intact archaeological assemblages to exist within the immediate impact zone. The same may apply to historic archaeological resources. The natural soil deposition and post-depositional alterations have produced an environment non-conductive to archaeological preservation at depth. The cumulative effect of the generations of plowing accompanied with extensive surface deflation has further reduced the chances that significant resources have survived throughout the Dowe Flats Study Area.

4.4 Historic Problem Domains

Review of previous works about northeastern Boulder County and the general Dowe Flats area indicate that a fundamental concern facing researchers is a previous lack of interdisciplinary research goals. This prohibits effective utilization of the extensive literature in history, historical geography and anthropology on the region and similar areas throughout Colorado. The result is chaotic, making it impossible to evaluate adequately the significance of historic archaeological sites in relation to the other resources present within, and documentary information available about, the area.

The research design which follows adapts the research concerns expressed in Buckles and Buckles (1984) to the Dowe Flats area. Specifically, the study team has refined and, where not applicable, eliminated questions from the larger field available to students of local history. An effort has been made to be as flexible as possible at this time so that the specific needs of any given site or resource can be addressed through further refinement of the problem domains and research questions, property types, significance discussions, and integrity requirements.

This design is built around comparative studies of the Western community in its broadest sense, drawing heavily from mining areas as those have been the most studied to date (See for example Hardesty, 1986, 1987, 1988a, 1988b or Mehls, et al, 1992). Frequently, community is defined in terms of the boundaries of social/economic networks. This scheme could be applied to all time periods from earliest human use and occupation through the permanent Euro-american settlement of the Dowe Flats area. The key elements of this research design are the organization and dynamics of the community and agricultural industry in several problem domains, including household, consumer behavior, ethnicity, gender, and others. What must be remembered is that documentary, ethnographic, and archaeological

data offer somewhat different but complementary images. Combining the three disciplines of history, anthropology and historic archaeology, with input from other fields for the historic period, offers the possibility of a multi-dimensional image of communities in the American West.

Beyond those research oriented concerns, other factors influenced the framing of this research design. Foremost was the need for the research design to remain dynamic and adaptable so that as collective knowledge increases the design can continue to mature as well. Given the potential range of activities, cultural resource managers believe that a research design needs to remain pliable enough to meet whatever contingencies arise through the ensuing years. Secondly, this is not a data recovery plan. Such plans should not be framed until after specific actions have been identified and any needed inventory and evaluation phases have been completed. However, this research design can be used to guide the inventory and evaluation of historical archaeology sites in the Study Area and then adapted to any subsequent data recovery programs.

Evaluating any historical property begins by developing a historic context within which it can be placed. There are already a number of themes in place for the historic period of Dowe Flats that include: 1) Exploration and the Fur Trade, 1700--1845; 2) The Colorado Gold Rush and Early Settlement, 1858-1870; 3) Early Agricultural and Ranching Development, 1870-1895; 4) Quarrying and Urban Growth and Development, 1870-1900; 5) Ranching and Farming After 1900; and 6) The Great Depression and World War II, 1929-1945. Each of these contextual themes can be linked directly to one or more research periods identified by Buckles and Buckles (1984) for the state of Colorado. For example, the Dowe Flats Exploration and Fur Trade theme links to Buckles and Buckles' two research periods: 1) Exploration, and 2) Trading Frontier.

Since the above ground resources of Dowe Flats have already been evaluated under Criteria a, b and c of the National Register and the criteria of the Colorado Historic Register and Boulder County landmarks, this research design will focus on Criterion d as it relates to those contexts. A historic context is "a broad pattern of historical development in a community or its region, that may be represented by historic resources" (NRB 24: 14). The context is defined by time, place, and theme (NRB 16: 7). Identifying the period of significance within this chronological framework, however, will be one of the keys to making judgments about the National Register and other eligibilities of the properties. Place is another dimension of historic context that will be critical. Areas such as Dowe Flats typically were integrated into social and economic networks that operated on several geographical scales, ranging from the locality to the region and outward to the national and international levels. Identifying the geographical scale on which local properties were most significant is another key to making significance judgments. The third dimension of historic context is theme. Several broad themes for judging significance have been identified by the National Register, including factors such as conservation, agriculture, commerce, and government.

Historic context is linked to actual properties through property types which are defined as "a grouping of individual properties based on a set of shared physical or associative characteristics" (NRB 16: 8). The property types developed (i.e.: farmsteads, irrigation system) are intended to be used with the concerns in this research design. This allows the Dowe Flats resources to be evaluated against the "standard" example of that property type. For those resources considered eligible and likely to be adversely impacted by any proposed action, a data recovery or mitigation plan will be developed. As stated before, mitigative action is part of a research design, based on this document, but tailored for the specific resource. As can be seen by this brief introduction, as judicious and unbiased a scheme as possible, has been developed to assist the inventory, evaluation

and treatment of the historic archaeological resources of Dowe Flats.

4.4.1. Structure of Inquiry

The Need For A Historical Ethnography of Dowe Flats

Schuyler's (1988) idea of "historical ethnography" is considered the most viable research strategy for the area. This strategy combines ethnographic, documentary, and archaeological interpretations to distill a consensus interpretation for a specific community or area within its full historical context. The most significant questions are ones that relate to the historical and social geography of the community, the spheres of social interaction, ethnicity and ethnic relations, gender, social structure, variability and change in household organization and consumer behavior. After these initial studies, comparative studies of communities are done using the historical ethnographic material to provide an understanding and interpretation of Dowe Flats history.

Buckles and Buckles in the Colorado Historic Archaeology Context (1984), argue for a similar approach:

Identification of systematic relationships of material culture content with thematic systems. There are many levels of systematic relationships from thematic systems, specific activity sets, relationships of thematic systems, other thematic systems and other units of the statewide framework, such as social-structural and ideologically-related behaviors, ecology and other variable. . . . (Buckles and Buckles 1984: 3).

A number of possible approaches to the historical ethnography of Dowe Flats can be identified. One approach uses documentary reconstructions of the Study Area population. Rutman and Rutman's (1984) analysis of "community" in the Chesapeake Bay region, Middlesex County, Virginia, 1650 to 1750, is an example of the results of such an approach. Vertical and horizontal

networks within the community were reconstructed from patterns of social interaction identified from the biographies of individuals. Katherine Harris's work on farming communities and women on the plains of northeastern Colorado is another example of this approach (Harris 1983).

Historian Robert Darnton's The Great Cat Massacre, (1984) provides an interpretation of a story about a massacre of cats in late 1730s Paris by print shop workers. From the symbolic point of view what is important about the incident is not the act itself but its meaning for labor relations between workers and shop owners. While it is not anticipated that evidence of similar events will be found in Dowe Flats, the philosophy of attempting to understand motivations behind symbolic acts has merit.

Another route to understanding symbolism is material culture. Material culture also can be used to create the context needed to write historical ethnography. For example, early colonial architecture not described in documentary accounts has been found archaeologically. Carson et al (1981) argue that the cheaply constructed earth-fast buildings are associated with temporary tobacco farms established by English colonists. Permanent buildings of brick and sill were constructed only after the decline of tobacco prices, the shift to mixed farming, and the development of domestic markets. In the West, the first shelters built by settlers frequently were hastily thrown together. Permanency resulted from longer term goals and desires and was expressed after the pioneering hardships had been overcome. Thus the research questions that are most important to a historical ethnography of the Dowe Flats community can be identified within the framework of a questioning matrix of chronology, geographical scale and associated problems. The known changes in the character of the local population over time suggest that the relative importance of the research questions will vary over time as well. Within the geographical area, questions can be asked about household, locality, regionalism and the world system. Research

questions are linked to each of the four scales. Several problem domains have been identified, including social geography, household variability and change, ethnicity, class, gender, consumer behavior and subsistence. The research framework indicates that Dowe Flats needs to be investigated as a community changing over time.

4.4.2 Geographical Scale

Many individuals, such as former Colorado Governor Richard Lamm, have bemoaned the "colonial" status of the West. However, that would seem to imply that Western communities may be part of a multi-leveled hierarchy. The social geography of the American West includes localities, or local groups or settlement nodes that are visible in both the documentary and archaeological records. Historical and anthropological studies suggest that the local group (Hine 1980, Godoy 1985; Nash 1979; Hardesty 1988a, Mann 1982) is typically an exceedingly fragile organization, in part because of the potentially rapid population turnover of the pioneer period.

Historical and anthropological studies suggest several general things about the organization of a community. First and foremost, it is a "colony" of a larger system connected to the outside world by economic and demographic networks. Those networks bridge the remoteness typical of the American West. Railroads, wagon roads and telegraph lines linked Denver, Chicago and other major American cities to most of Boulder County by the end of the 1880s. Such a pattern of interaction has been described by Wallerstein(1974) as a "world system." Research questions about variability and changes in world systems, therefore, are needed to help identify the informational value of ranching and farm home related sites. Such questions are aimed at large-scale national and international process including the impact of industrialization and large corporations on American building habits. Also important are the belief systems carried by the stone workers versus farmers including the "popular" myths

of the day and ethnic folk cultures and local demographic patterns (Buckles and Buckles 1984: 3, 5).

4.4.3 Household Variability and Change

The local community was made up of households that were loosely linked together into vertical and horizontal networks organized around space, work, kinship, occupation, religion or ethnicity, class, and gender (Hardesty 1988a, Hine, 1980; Russo 1974). Most definitions of the household include shared domestic activities and location (Godoy, 1958; Laslett 1972; Netting et al 1984; Yanagisako 1979). The members of a household may or may not live under the same roof and may or may not be a family (Netting et al 1984:3). For example, a farm or ranch constitutes a household in which many or only a few of its members may be blood relations. How to best explain the variability in activity of the domestic household has been the subject of much study. It has become clear that the household should not be viewed simply as a snapshot, but rather as a process with underlying rules and strategies for creating variability (Buchler and Selby 1968; Carter 1984; Hammel 1972). The process includes strategies that stipulate the way in which the household works in order to achieve goals, and rules that stipulate how people and things are combined to form the household (Carter 1984:48). Household strategies can be understood as adaptive if the goals are related to solving environmental problems (Buckles and Buckles 1984: 27, 31). The organization of the household reflects the behavior undertaken in pursuit of those goals.

4.4.4 Ethnicity and Ethnic Relations

The identification and ethnographic reconstruction of ethnic groups living in the Dowe Flats area is an important research problem. Documentary accounts of the area suggest that at least some archaeological visibility may be present to suggest ethnic affiliations (Buckles and Buckles 1984: 50-51).

4.4.5 Class

Another important influence upon local social geography may prove to be class. Despite the often cited misconception of Western social egalitarianism, Hine (1980:83) observes that in mining areas at least "no mining camp was ever devoid of class distinctions." How to identify class distinctions for such studies, of course, is a substantial problem. One approach is to use material correlates of class such as documentary and archaeological measures of wealth. House size and luxury artifacts, for example, often can be used to separate some house sites from others in the archaeological record.

4.4.6 Gender

Yet another expected influence upon the social geography of Dowe Flats is gender. Without wishing to sound sexist, the marital status and role of the "typical" female position in local society must be considered, especially in the homesteading periods and areas such as Dowe Flats. Studies will help to illuminate and define the role of gender in the settlement of northern Boulder County and may be applicable to wider areas of northeastern Colorado, thus supporting, refuting or modifying the conclusions of historians such as Harris (1983) or Propst (1982) who found that women homesteaders often exhibited typical settlement patterns while appearing atypical in local society.

4.4.7 Consumer Behavior and Patterns

Another set of questions concerning variability and change among households revolves around consumer behavior and subsistence. Trash dumps and other material correlates of households reflect choices made by consumers from a palette of commodities available to them. It also reflects subsistence patterns. Such choices are not random, but are patterned by market availability and by social and cultural influences (Miller 1980; Spencer-Wood 1987; Weatherill 1988). On the Western American frontier the supply or

availability of consumer goods was controlled by the integration of the local area into the national and international marketplace.

Most consumer goods found in Lyons and Dowe Flats had been shipped from major commercial centers throughout the United States and Europe. Local markets were less important in general, but significant variation is expected from one household to another as might be found from one settlement to another. Equally, how did the presence of Noland and the other quarry-related communities effect local buying and consumption patterns is a topic of concern. In other areas of Colorado there are well documented examples of the impacts of mining (precious metals typically) on local consumption and agricultural production patterns. However, little is known to date about the relationships between stone quarry workers and their neighboring farms and ranches.

4.5 Research Data Requirements

Key research problems identified in the questioning framework outlined above address historic archaeological data requirements needed to guide the inventory and evaluation of the historical properties in Dowe Flats. The data categories that are most needed to answer the key research questions are related to time, household and community demography, the social organization and layout of households, the social geography and layout of communities, changing community boundaries, participation in regional and world system networks, and consumer behavior. As stated earlier, it is felt that flexibility must be maintained to address the wide range of possible Southdown (proponent) actions and any unexpected discoveries made during mine operation.

4.6 Significance Assessment Process

For historic resources being considered as significant under Criterion d, three elements should be used as the filter to

assess significance and integrity. These are significant information content, visibility and focus. The last two ideas are important concepts for evaluating the integrity of individual features as well as sites and can help form the crucial link between the on-the-ground resource and the property type. As originally used by Deetz (1977: 94-95), visibility refers to the total surviving physical remains of a property type, while focus is a measure of how well the remains of a property type actually reflect or mirror the property type. In many ways, focus is the all-important key to an integrity judgement. For example, sites that include a mixture of time periods or property types or do not include clear surviving traces of materials, workmanship, and design of a property type from the period of significance are not likely to retain sufficient integrity to be considered as eligible for inclusion in the National Register of Historic Places. Also, they probably do not have sufficient integrity under the informational requirements proposed here to be considered significant either.

If sites are clearly focussed, visibility becomes the key to making a judgement about integrity. High visibility sites expected to be found in the area, for example, would include a farmstead with standing house(s), refuse dumps, corrals, roads, and a lodge foundation associated with domestic trash dumps. Low visibility sites expected in the same place would include a residential complex with a low house foundation or leveled house terrace, scattered refuse, and a privy depression. If both have been judged to be significant property types, integrity as measured by visibility is the key to eligibility. The high visibility site, for example, could be judged as retaining enough integrity of design to convey significance under criteria a, b, c, and d. The low visibility site most likely would have only enough integrity to qualify under criterion d, and then only if it has a demonstrable potential to offer significant information to address the research concerns which follow.

4.7 Comparative Value

Whatever the information content of a property, its value as an information repository is relative, varying in importance with what is contained in other examples of the property type in the area. The comparative approach should be used in assessing other elements of integrity and other property types. The basic elements of this approach will be to examine comparative data on the condition of similar resources in the Dowe Flats area and elsewhere in Boulder County to arrive at baseline estimates of the population size of the resource type, attempting to define a quantified value as to how "representative" a specific resource is. This representative test should be applied to all resources under all National Register criteria to fulfill the system envisioned here.

4.8 Time and Social Mobility

Developing a good chronological context for the historical properties is a typical data requirement. Questions about change in household and community organization, for example, cannot be answered effectively without time control. The documentary model of local chronology discussed earlier provides a starting point for asking questions about the time context of specific properties; however, there is a possibility that the archaeological record of the property may provide more detailed chronological information (Buckles and Buckles 1984:3).

Associated with the time area of concern and offering an avenue to give a continuity to the time periods in the study mentioned above is the question of social mobility within the Dowe Flats community. For example, did residents who stayed in the area from the early years (ca. 1865) and were present when the land boom of the early 1900s started, experience a rapid climb up the socio-economic ladder or were the positions at the top taken by new arrivals during the boom? Along with that concern, assuming these people did move up, did they relocate within Dowe Flats and

the Lyons-Longmont area as well? Can long-term residents be traced as they moved from lesser to more desirable housing, and possibly back to lesser housing? Is there any correlation between the local population and changes over time to the comparative desirability of the area as a place to live. For example, did people move up and then out of Dowe Flats or was a move to the area dictated more by job success? Answers to such questions can help further the understandings gained from the archaeological record. The research done to assemble the bibliography indicates that the documentary data exists to answer these questions. Sources such as the manuscript census records, some records of Boulder County, General Land Office files, newspaper accounts and directories of Colorado and the County can be consulted to retrieve the archival data needed to complement that gleaned from the archaeological record. Beyond that, the study of social mobility within the area might support the research concerns enunciated below about household and community demography.

Applicable Contexts

1) The Colorado Gold Rush and Early Settlement, 1858-1870; 2) Early Agricultural and Ranching Development, 1870-1895; 3) Quarrying and Urban Growth and Development, 1870-1900; 4) Ranching and Farming After 1900; and 5) The Great Depression and World War II, 1929-1945.

4.9 Household and Community Demography

Without question, writing a historical ethnography of Dowe Flats requires information about population dynamics at different time periods. The study of chronological changes in household size or the geographical boundaries of the community, for example, require demographic data. Here again, general models of demography can be constructed from such documentary sources as population census schedules for the area. The demography of specific historical properties, however, is more likely to come from the

homestead and tax records. In many cases information is augmented by the archaeological record. In general three categories of demographic information are needed: population size, population structure or composition, and population geography (Hardesty 1977; Willigan and Lynch 1982). The first two of these are discussed below; data on the spatial distribution of population are discussed in another section on social geography.

Applicable Contexts

1) Exploration and the Fur Trade, 1700-1845; 2) The Colorado Gold Rush and Early Settlement, 1858-1870; 3) Early Agricultural and Ranching Development, 1870-1895; 4) Ranching and Farming After 1900; and 5) The Great Depression and World War II, 1929-1945.

Population Size

Estimates of the size of households and the community as a whole at different time periods are required to answer some of the research questions. Archaeological data that may be related to household size include the floor area of house sites and room additions (Hardesty 1981, 1988; Reno and McLane 1987). For this reason, house sites, especially those with well-defined foundations or evidence of rebuilding, can be important. House sites with good time information thus become especially significant if they can be clearly identified.

Applicable Contexts

1) The Colorado Gold Rush and Early Settlement, 1858-1870; 2) Early Agricultural and Ranching Development, 1870-1895; 3) Quarrying and Urban Growth and Development, 1870-1900; 4) Ranching and Farming After 1900; and 5) The Great Depression and World War II, 1929-1945.

Population Structure

Several research questions require information about the age and gender composition of the local population, especially those related to the social organization of households. A model of the structure of the population can be developed from population census schedules and other documentary sources. Reconstructing the age and gender structure of specific households in the community, however, is expected to require data from both the documentary and archaeological record. Such data include the presence or absence of age-specific and gender-specific artifacts in association with house sites or archaeological features. In the Dowe Flats area understanding of the population structure of the community will come from understanding the household. On that basis the following expectations may be made.

Family Households may be characterized as having a comparatively large to medium floor area with a wide variety of gender and age related artifacts including decorated ceramics, toys, and slate boards. Social stratification may be indicated by medium floor size and a predominance of plain or undecorated ceramics, such as ironstone. Furthermore, a relatively high percentage of manganese oxide bleached glass, which was used for wide mouth jars that contained fruit and/or vegetables, medicine, and other items for family consumption may be present. In contrast, a relatively low amount of colored glass is expected since these containers may be indicative of beer, whiskey, or wine.

All Male Domestic Households may differ from the above pattern in that they will have a medium floor size in conjunction with a small percentage of undecorated ironstone and purple glass. In contrast, there will be a high percentage of bottle glass present. Furthermore, male personal items, such as clay pipes, pocket tobacco cans and snuff cans along with pocket knives, watches, and other items may be expected (Buckles and Buckles 1984: 27).

Boarding facilities or ranches/farms with bunk houses may actually consist of two or more related structures. One or more may represent sleeping quarters and the others activity areas such as dining halls. As a result, these complexes should have a less diverse artifact assemblage in association with the large total floor size. A relatively large percentage of undecorated ceramics, such as ironstone, in conjunction with a few tin food cans will be expected in the dining hall. The sleeping quarters may have a relatively high percentage of bottle glass. Other useful indicators might include bed springs and male oriented personal items.

Applicable Contexts

1) Exploration and the Fur Trade, 1700-1845; 2) The Colorado Gold Rush and Early Settlement, 1858-1870; 3) Early Agricultural and Ranching Development, 1870-1895; 4) Quarrying and Urban Growth and Development, 1870-1900; 5) Ranching and Farming After 1900; and 6) The Great Depression and World War II, 1929-1945.

4.9 Social Geography in Dowe Flats

Research questions about the "social geography" of Dowe Flats requires information on the spatial distribution and social context of households, including those related to gender, ethnic relations, class, and workplace. The efforts outlined earlier to define the social mobility of the Study Area over time will go a long way in answering questions regarding social geography and layout of the community.

Applicable Contexts

1) Exploration and the Fur Trade, 1700-1845; 2) The Colorado Gold Rush and Early Settlement, 1858-1870; 3) Early Agricultural and Ranching Development, 1870-1895; 4) Quarrying and Urban Growth and Development, 1870-1900; 5) Ranching and Farming After 1900; and 6) The Great Depression and World War II, 1929-1945.

4.10 Sexual Segregation

Based on the historic record it is known that women were present in Dowe Flats since at least the late nineteenth century. Sexual segregation within the region may have been a characteristic of the local social system and it might be reflected in the archaeological record. A hypothesis generated from this assumption may be stated as follows:

- a) Women may have been spatially separated from other components of the local population.

Implications: The majority of women living in homesteading areas or during the fur trapping period will be married or attached to a specific male. However, in some situations, such as at ranches, they may have been separated. With these possibilities it is likely that women fulfilled a variety of roles such as reproduction, childbearing, or related activities. Following from this, the identification of households bearing such responsibilities should be relatively clear cut. Even childless couples, however, should have a distinct artifact inventory from the all male households. As a result, the documentary information should be adequate to recover the social and spatial dimensions required by these hypotheses. However, very specific instances may arise in which the archaeological record also needs to be examined.

Expectations: Differential distributions of certain artifact types will indicate the presence/absence of women within a household. Items such as decorated ceramics, cold cream jars, and corset stays can provide evidence for female residence in some of the buildings. The spatial segregation hypothesis may be rejected if such artifacts are uniformly or randomly distributed throughout all households.

Applicable Contexts

1) Exploration and the Fur Trade, 1700-1845; 2) The Colorado Gold Rush and Early Settlement, 1858-1870; 3) Early Agricultural and Ranching Development, 1870-1895; 4) Quarrying and Urban Growth and Development, 1870-1900; 5) Ranching and Farming After 1900; and 6) The Great Depression and World War II, 1929-1945.

4.11 Ethnic Segregation

Ethnic and/or racial segregation is frequently associated with the concept of social distance between groups. Historic documents indicate that at least one ethnic/religious group interacted with the majority population of the area.

The way in which ethnicity is reflected in the archaeological record, and what social and or economic factors can be inferred from the archaeological deposits, may become the research topic of interest if enough documentary evidence first can be assembled to direct any archaeological field work. The following hypotheses can then be tested:

- a) The Euro-american population was composed of several distinct ethnic groups who participated in a common culture based on occupational endeavors.
- b) The minority populations in Dowe Flats were segregated from the Euro-american population.

Implications: Artifacts associated with ethnicity will be confined to certain areas, and those areas will include different types of households with related features and/or artifacts. Spanish style artifacts, for example, will be restricted in distribution. Specific ethnic food items, especially different types of spices will occur in discrete locales, and will not occur in coresidential structures such as hotels. If discrimination was economic as well as social, the artifact assemblage of certain ethnic groups is likely to show more evidence of later reuse (Schiffer 1987).

Expectations: If there were strong ethnic identities and occupational differences it is expected that evidence for ethnic or racial segregation will be found in Dowe Flats. This evidence will occur in the form of differential distributions of artifacts and perhaps macrofloral remains. Both of these hypotheses will be rejected if ethnically associated artifacts are not recovered or are found in a random or uniform spatial pattern.

Applicable Contexts

1) Exploration and the Fur Trade, 1700-1845; 2) The Colorado Gold Rush and Early Settlement, 1858-1870; 3) Early Agricultural and Ranching Development, 1870-1895; 4) Quarrying and Urban Growth and Development, 1870-1900; 5) Ranching and Farming After 1900; and 6) The Great Depression and World War II, 1929-1945.

4.12 Class Segregation

Class segregation refers to the hierarchical structuring of a social system or community with unequal access to resources. This suggests that merchants and proprietors of various business establishments or employees of the more prosperous ranches, would have a more reliable source of income and thereby enjoy a higher living standard than cowboys, hunters or small farmers. Furthermore, there are likely to be some differentials in the standard of living between a successful farmer or rancher, and the less successful ones. Should variability in living standards be observable in the archaeological record, it may be possible to establish the relative importance of various industries or trades in the local economy based on the standard of living of the owner or operator. Should sufficient chronological control be obtainable, fluctuations in the national economy may be observable by trends in standard of living for the quarrying or agricultural industries. This trend is less likely to be observed in farming related sites. Given that sufficient variability exists in the types and quantities of artifacts and floral and faunal remains

so that relative levels of social stratification can be defined, the following hypotheses could be examined:

- a) The merchant/farmer/ranch owner or foreman class experienced a higher standard of living than the other classes present in Dowe Flats.
- b) Only this upper/upper middle class could afford to bring their wives and families to a rural, isolated area as represented by Dowe Flats. Hence, women were segregated socially. Further, some of the local livelihoods were not followed by women, such as ranch hands, and as a result another element of segregation was present.

Implications: Artifacts associated with upper/upper middle class assemblages will show more evidence of single use and disposal. Artifact assemblages from these households will contain more manufactured goods, manufactured goods with a higher status (e.g., china cups rather than tin cups), and the artifacts will show less evidence of wear. Coins will be of higher average value than from other assemblages. "Upper" class privies will contain more evidence of processed and imported foods, and less evidence of locally obtainable foods such as elk bone.

Expectations: Differences in the standard of living are expected to be observed in the total number and variety of artifacts, and perhaps in structural floor size.

The hypotheses that these classes experienced a higher standard of living should be tested based on the comparison of artifact assemblages from stores/habitations to the assemblages from all male households. The hypothesis should be rejected if: 1) habitations of these classes are associated with artifact assemblages that indicate relatively more secondary use; if 2) the assemblages contain relatively fewer manufactured goods, fewer high status manufactured goods, and more wear; if 3) coins are of lower average value; and if 4) there is relatively less evidence of processed and imported foods and more evidence of local foods.

Because there are four criteria of rejection, three or more of these must be satisfied to accept the hypothesis.

The second hypothesis referring to the social isolation of women should also be examined. This hypothesis should be rejected if there no correlation can be found between female associated artifacts and a typical upper/upper middle class assemblage, as outlined above.

Applicable Contexts

1) The Colorado Gold Rush and Early Settlement, 1858-1870; 2) Early Agricultural and Ranching Development, 1870-1895; 3) Quarrying and Urban Growth and Development, 1870-1900; 4) Ranching and Farming After 1900; and 5) The Great Depression and World War II, 1929-1945.

4.13 Consumer Behavior

Another set of research questions relates to variability and change in the consumer behavior of households in Dowe Flats. Answers to these questions require data on the geography of the marketplace and on the social and cultural correlates of consumer choice, including the influence of ethnicity, class, and gender. Trash dumps and privies are expected to be the most valuable sources of information about consumer behavior. The geography of consumer markets can be reconstructed from the names and locations of manufacturers or maker's marks sometimes found on bottles, cans, ceramics, and other artifacts. Of particular importance is information about different degrees of economic participation in local, regional, and world system markets by ethnic or class-structured groups. Information about what commodities have been consumed by particular households also can be identified from maker's marks. Within the framework of this research design, the most valuable source of archaeological information about the consumer behavior of households is the house site associated with trash deposits or privies that contain

artifacts sensitive to time, use, gender, ethnicity, and class. However, records of local stores, outfitters, traders and freight companies should be examined carefully for clues on trade patterns (Buckles and Buckles 1984: 36-37).

Applicable Contexts

1) Exploration and the Fur Trade, 1700-1845; 2) The Colorado Gold Rush and Early Settlement, 1858-1870; 3) Early Agricultural and Ranching Development, 1870-1895; 4) Quarrying and Urban Growth and Development, 1870-1900; 5) Ranching and Farming After 1900; and 6) The Great Depression and World War II, 1929-1945.

4.14 Regional and World System Integration

Several research questions require information about the geographical scale of the social and economic networks in which the community participated. One important source of information about such "spheres of interaction" is the household, especially if documentary and archaeological images of specific households can be combined. Comparative data on occupational and class differences in the degree of participation in local, regional, and world system networks can be important. For example, are upper class ranch households more fully integrated in to world system markets and social networks than under class/farmer households? The material correlates of "Mass Culture" may be one way of testing such a hypothesis, since this phenomenon is transmitted through world system networks and is expected to be more often associated with upper class households. Can shifts in mass culture apparent in the documentary and archaeological records available for other locales be found in Dowe Flats from one time period to another?

Models of social and economic interaction networks can be developed from documentary data on the local population. More specific models of interaction spheres may require archaeological data, especially household data related to consumer behavior,

time, and social contexts such as class and ethnicity. One test of the hypothesis that Dowe Flats residents were not engaged in the world system until after 1880, for example, requires data on the degree of household "self sufficiency" before and after that time.

Because the area was part of a larger community there will be routes of communication in the Study Area that connect it to the larger region and nation. The hypothesis to be tested is:

Dowe Flats was part of a larger Colorado/Western community and as such was connected to that community by a system of roads and paths. Over time as farm product demands fluctuated and decreased and as internal combustion vehicles became prevalent the system of connection between Dowe Flats and other parts of Colorado and Boulder County underwent significant, observable change.

Expectations: It is expected that archival descriptions and maps of the area, when combined with the archaeological record will reveal that the network included connections to even the remote corners of Dowe Flats and that within the immediate and greater Dowe Flats area a system of secondary routes might be discovered that held the fabric of the community together. This fabric can give meaning to variables including the structure of the various households within Dowe Flats. Finally, the documentable changes in the system over the years may shed light on the contraction and expansion of the area's population over the years vis a vis spatial arrangements of farming or ranching activity.

Implications: The hypothesis will be rejected or modified if any or all of the following conditions can be met. First, that no distinguishable changes in the road system can be found; 2) evidence of change in the system over the years can not be found or accurately controlled chronologically; 3) no meaningful correlation between the road system and the centers of activity or settlement can be found; or 4) the only road system identifiable can not be dated to before the post-World War II period.

Applicable Contexts

1) Exploration and the Fur Trade, 1700-1845; 2) The Colorado Gold Rush and Early Settlement, 1858-1870; 3) Early Agricultural and Ranching Development, 1870-1895; 4) Quarrying and Urban Growth and Development, 1870-1900; 5) Ranching and Farming After 1900; and 6) The Great Depression and World War II, 1929-1945.

5.0 Potential for Resources

5.1 Introduction

This section describes the types of resources that may still be extant, their condition and thus their ability to offer significant data on the research questions. Potential subsurface Paleontological, archaeological and historic archaeological resources were assessed for their probability of occurrence.

5.2 Potential for Geologic/Paleontological Resources

Vertebrate fossils are present in the Niobrara Formation in the active Southwest Portland Cement quarry immediately south of Dowe Flats. It is inevitable that quarry operations will have an impact upon these fossils, but quarry operations will also expose the fossils for collecting. To prevent the total loss of scientifically important specimens, it is recommended that the Company grant qualified fossil collectors access to the quarry at such time that their presence will not interfere with quarry operations. Southdown should also encourage the collector to deposit any scientifically important specimens at a recognized public institution, such as the University of Colorado Museum, where the fossils will be accessible to scientific study.

Paleontological properties not associated with archaeological deposits are minimally protected under federal law and not usually considered for nomination to the National Register of Historic Places. They may, however, be placed on the Register of

National Monuments. At the Dowe Flats site this sort of designation would only be considered if a site or area contained an extraordinary density and diversity of fossil material.

5.3 Potential for Sub-surface Prehistoric and Historic Archaeological Resources

Archaeological archival data and the compilation of field data derived from various archaeological surveys and excavations at Dowe Flats (including Indian Mountain and Rabbit Mountain) have shown that archaeological sites are preserved or destroyed depending on their geomorphic location and degree of post-depositional alteration. Adjacent to the project area archaeological remains representing several thousand years of generally contemporaneous occupations are preserved in a stratified context within sediments ranging from 50cm to over 4 meters in depth, depending on their topographic position (Burney 1989; Cassells and Farrington 1986; Grant 1990). Excavations at 5BL2431 (Grant 1991) suggest that 2600 years ago the landscape along the western toeslope of Rabbit Mountain was 10 to 15 feet lower than it is today. In comparison, archaeological site sediments situated in upland positions around the valley are similar in age, yet they are only 50cm in depth and have changed very little since site deposition occurred.

Alterations to the local landscape as well as to archaeological sites within the project area have been extensive. Since the beginning of historic development around Dowe Flats a large amount of prehistory has been collected and removed from the surface (Meier 1987). Dry land and irrigated farming of the project area has caused extensive surface deflation and destroyed whatever archaeological assemblages may have been present at the surface of this valley. Also one of the most destructive processes to impact archaeological preservation at depth is faunalurbation, regardless of topographic position or sediment type, especially in the proposed impact area. The mixing of sediment across much of the project area by prairie dogs has

disrupted much of the stratigraphy resulting in the disarticulation of whatever archaeological deposits may have existed at depth.

Archaeological sites associated with Dowe Flats tend to be preserved in low-energy, fairly well sorted, fine-grained deposits, away from areas of active erosion. In contrast, the majority of project area sediments are medium to high-energy deposits, with evidence of cut-and-fill deposition and massive horizontalization. Most of the stratigraphic profiles viewed during the field visit were discontinuous secondary deposits of previously weathered materials eroded from older colluvial/alluvial deposits and redeposited further downslope.

The result of this analysis suggests there is a minimal possibility for buried intact archaeological assemblages to exist within the immediate impact zone. The nature of the deposits themselves and/or post-depositional alterations have produced an environment nonconducive to archaeological preservation at depth.

6.0 General Procedures

6.1 Introduction

Preservation of cultural resources is mandated by Boulder County and the State of Colorado for the Dowe Flats project. The steps in that process include identification of properties, evaluation of their eligibility for the National and State Registers, determination of the effect of the project on eligible properties, determination of whether that effect is adverse, and consultations to be undertaken if the effect is potentially adverse. Sites discovered during mining activity will follow the procedures outlined below. The known historic, prehistoric and American Indian sites are outside of the impact zone and are considered significant and avoidance, mitigation, and in situ preservation efforts are proposed by Southdown.

6.2 Treatment of Geologic or Paleontological Resources

Geologic and Paleontological resources will be treated as important scientific finds. Geologic and Paleontological sites may only be discovered once mining activity begins, after top soil is removed. In the event of the discovery of unusual fossil bearing rock or geologic formations not anticipated as the result of work completed for writing of the Geologic Context, the Project Paleontologist will be called to the site to review the find and formulate recommendations. Appropriate BOCO and SHPO staff will be notified and consulted. Curation procedures will be followed (refer to Section 8.0).

6.3 Treatment of Prehistoric or Historic Cultural Resources

The philosophy governing the treatment for historic, prehistoric and American Indian sites is pro-active on the part of Southdown and exhibits a sense of stewardship and concern for the cultural heritage of the area by guaranteeing protection and mitigative activities. All Southdown employees involved in mine construction and operation will be cognizant of the importance of cultural resources and will be reminded periodically of the need for due diligence. All mine quarry personnel and supervisory staff will receive training and will watch for fossils, bones, artifacts and other cultural materials. Worker education will be accomplished by Southdown managerial staff who will inform all new quarry employees of the laws and penalties of collection, vandalism, etc. In addition, signs will be posted at mine headquarters informing workers of the criminality of unauthorized destruction, alteration or collection of archaeological materials. A public education effort has been conducted emphasizing the unique cultural resources at Dowe Flats and the need for their preservation.

Further protection of the significant resources in the Study Area will be accomplished through fencing and posted warning signs regarding the dangers of trespassing. All known cultural sites

will be visited within each calendar year and their condition assessed. Changes will be documented by making marginal notes on copies of the original description and by taking additional photographs. Annual reports will be submitted to Boulder County and DMG.

If a property is discovered and determined eligible for nomination to the National Register of Historic Places, any alteration of a historic property that changes the characteristics that qualify the property for inclusion to the National Register of Historic Places is considered an effect (36CRF800.9). Effects may be beneficial to historic properties, i.e., renovation which may prolong the life of structures and security measures which may protect archaeological sites from vandalism. Other effects, however, may alter the integrity, feeling and association of a property and are therefore considered adverse.

Adverse effects comprise seven categories: natural erosion, increased erosion, unauthorized collection and vandalism, direct damage or alteration, audible and visual effects and habitat destruction.

Natural Erosion is a process that proceeds in the absence of human activity. Most surface archaeological and paleontological deposits have been damaged by erosion and many no longer exist as a result. Attempts will be made to minimize the effects of erosion on properties. A management policy that recognizes the impact of erosion and attempts to minimize it will be in place at Dowe Flats.

Removing ground cover, scarring the landscape with wheeled vehicles and introducing domestic stock may accelerate erosion of archaeological and paleontological resources. The Dowe Flats Reclamation Plan has been designed to minimize activities that increase erosion.

Unauthorized collection and vandalism occurs because fossils, prehistoric and historic artifacts and human remains are considered collectibles by a segment of the public. Any area where public access is allowed and law enforcement patrols are infrequent is subject to unauthorized collection. Vandalism is the wanton destruction of natural or manmade objects and includes such acts as spray painting petroglyphs, driving up mountainsides to create tracks, or burning or defacing old buildings. Southdown will attempt to impede these activities, particularly vandalism. All violators will be prosecuted to the fullest extent of the law. Signage detailing that policy will be posted around the mine area.

Construction, renovation, and land leveling can affect cultural resources through direct damage or alteration. Subsurface and surface artifact deposits may be disrupted or obliterated, buildings destroyed or the unique characteristics of a building altered or removed. Buildings may lose their context if similar structures and sacred monuments obliterated. Audible and visual effects through the introduction of noise and visual destruction can alter the association, feeling and context of historic properties.

Habitat destruction, specifically the destruction of certain species of native plants and animals important to the cultural practices of the area's Indian people, is another example of a potentially adverse effect. When habitats of sacred species are destroyed, it is difficult or impossible to find the plants or animals important in the continuity of traditions.

In the unlikely event that an eligible resource is effected by Southdown's mining related activities, all efforts will be made to protect or avoid the resource. If that is not possible, mitigation will be completed after consultation with SHPO and BOCO.

Nondisturbing data recovery is the preferred course of action. However, such treatments may or may not be adequate depending on the character of the site and the types of impacts. Recovery may include, but not necessarily be limited to, completion of Colorado State Historic Preservation Office/Office of Archaeology and Historic Preservation site forms, HABS/HAER record forms, comprehensive in situ retrieval of artifact attribute data and extensive mapping.

Geomorphic analyses to assess the potential for buried archaeological sites within Dowe Flats determined that minimal possibility for buried intact archaeological assemblages exists within the immediate impact zone. The nature of the deposits themselves of post-depositional alterations produced an environment nonconducive to archaeological preservation at depth. However, Southdown may conduct monitoring of top soil removing earth-disturbing activities by approved professionals and may include representatives of the 13 American Indian tribes participating in the DFAIAC. Monitoring activities may range from cultural resource specialists being present throughout the earth disturbing phases of construction to daily visits by a cultural resource specialist. The level of monitoring will be determined by Southdown and the SHPO in consultation with the Project Archaeologist and Historian and will be based on the rate of the earth-disturbing activities and the cultural sensitivity of the locality. Even where the archaeological potential of an area is considered low, the construction crews are required to watch for bones and artifacts and report any such finds to the Project Manager.

If previously unknown prehistoric sites are discovered during mine construction and operation, the following procedures will be followed:

- 1) discovery of any cultural materials will be reported to the Southdown Plant Manager and procedures outlined in the CMRP will be followed.

- 2) work within 100 feet of the find will be discontinued until evaluated by an archaeologist. If the find is an isolated find, the monitor or project archaeologist will complete a Colorado OAHP IF form with appropriate photography and work will resume.
- 3) if a site is located, the project archaeologist, the Colorado SHPO and Boulder County will be notified. The project archaeologist will conduct an intensive survey of the site discovery area and complete Colorado State Site Forms. The project archaeologist will determine an adequate buffer zone for the site, beyond which mine work will continue. Photographs documenting the site's condition will be taken. Reporting of the survey will follow the guidelines established by the Colorado SHPO. No artifacts will be collected from the site during the survey process.
- 4) Southdown, Boulder County and SHPO will consult to determine the significance of the discovery, the need for any additional mitigation measures and the need to confer with additional parties such as DFAIAC.
- 5) if the site is considered significant and is to be disturbed by mining, data retrieval will take place as agreed upon by Southdown and SHPO and evidenced by a signed letter.
- 6) when any mitigation measures are completed, work will resume in the area.
- 7) if suspected human remains are discovered legal procedures and mandates will be followed as described in Section 6.4.
- 8) provision will be made for recommending curation of all significant artifacts recovered from ground disturbance at a facility that meets professional standards. Southdown will favor curation efforts that provides educational opportunities.

6.4 American Indian Consultation

Southdown assumed from the beginning of the cultural resource studies that the lands of Dowe Flats and north-central Boulder county were important to Indian peoples, and this assumption guided archaeological research and consultation efforts. The consultation discussion began on May 14, 1993 when representatives of Southdown, Susan Collins (State Archeologist) and Rich Koopman (Boulder County Parks and Open Space Department) agreed that Southdown would engage in formal consultations with American Indian tribes. The Colorado Commission of Indian Affairs (CCIA) identified appropriate tribes to participate in the process.

The CCIA recommended an initial list of tribes with which Southdown should consult. The Wyoming Indian Affairs Council later recommended the Eastern Shoshone. Francis Brown (Northern Arapaho and President of the Medicine Wheel Coalition for Sacred Sites in North America) recommended the Rosebud and Pine Ridge Sioux. Alden Naranjo (Southern Ute) recommended the Pawnee of Oklahoma. Mark Wauahdooah (Comanche) recommended the Apache of Oklahoma. Southdown also solicited the assistance and participation of Indian Affairs Commission in Oklahoma, Wyoming, South Dakota, Montana and Utah.

A total of thirteen American Indian nations have participated in the consultations as follows:

Northern Ute	Ft. Deschene, Utah
Ute Mountain Ute	Towaoc, Colorado
Southern Ute	Ignacio, Colorado
Eastern Shoshone	Ft. Washakie, Wyoming
Apache of Oklahoma	Anadarko, Oklahoma
Comanche of Oklahoma	Lawton, Oklahoma
Kiowa Nation of Oklahoma	Carnegie, Oklahoma
Northern Arapaho	Ethete, Wyoming
Northern Cheyenne	Lame Deer, Montana
Cheyenne-Arapaho of Oklahoma	Watonga, Oklahoma

Rosebud Sioux	Rosebud, South Dakota
Pine Ridge Sioux	Pine Ridge, South Dakota
Pawnee of Oklahoma	Pawnee, Oklahoma

6.4.1 Initial Consultations

Initial consultations included introductory meetings at all of the tribe's locations with the exception of the Northern Ute, the Ute Mountain Ute, and the Pine Ridge Sioux. (The Northern Ute and Ute Mountain Ute were able to send representatives to Dowe Flats to individually review the project prior to the formal on-site meeting in October of 1993). In a typical consultation visit to tribal locations, Southdown representatives met with tribal staff, usually the Business Council and/or Cultural Committee and other designated individuals in order to:

- 1) provide an overview of the proposed mining project
- 2) disclose what is known about the Indian cultural resources in the Study Area
- 3) request suggestions for the preservation of these Indian resources;
- 4) solicit tribal recommendations on how the consultation process should be conducted

After these initial introductory meetings, Southdown hosted an inter-tribe on-site visit to Dowe Flats on October 1-2, 1993. More than 45 tribal representatives attended from nine tribes including:

Southern Ute
 Eastern Shoshone
 Comanche of Oklahoma
 Cheyenne-Arapaho of Oklahoma
 Northern Arapaho
 Northern Cheyenne
 Rosebud Sioux
 Pine Ridge Sioux
 Pawnee of Oklahoma

Directors from five state Indian Affairs Commission also attended including Colorado, Oklahoma, Wyoming, Montana, and South Dakota. Representatives from the Colorado SHPO and Boulder County Parks and Open Space and Land Use Departments were also in attendance. The on-site attempted to bring together the consulting nations as an inter-tribe group. The meeting also intended to:

- 1) provide first-hand inspection of Dowe Flats and known Indian resources;
- 2) to solicit comments and recommendations on the mining project;
- 3) discuss the relevance of academic archaeological research to Indian people;
- 4) discuss the feasibility of setting aside land adjacent to Dowe Flats for use by contemporary Indian people for cultural, education, and ceremonial and spiritual activities.

During the initial consultations, Southdown submitted copies of all Dowe Flats project reports pertaining to American Indian cultural resources to all of the participating tribes for review and comment. Since that time, all new reports have been referred to the tribes, as well as BOCO, SHPO and CCPA. Since this time, all new reports have been referred to the tribes as well.

6.4.2 Dowe Flats American Indian Advisory Council

Based on recommendations made at the 1993 on-site meeting, Southdown has formed the Dowe Flats American Indian Advisory Council (DFAIAC), consisting of one representative from each of the thirteen consulting tribes. The responsibilities of the DFAIAC includes:

- 1) representation of the tribes in the continuing consultations;
- 2) review of proposals for future research;

- 3) recommendations on the selection of American Indian monitors;
- 4) recommendations on the reinterment or curation of artifacts;
- 5) recommendations on the reinterment of human remains;
- 6) management of tribally approved educational, cultural, and ceremonial activities on Southdown's Indian Mountain properties.

The first convening of the DFAIAC occurred on October 7-8, 1994. Twenty-four individuals representing 11 tribes, SHPO, BOCO, CCIA and the Indian Peaks Chapter of the Colorado Archaeological Society were in attendance. The agenda included:

- 1) review of the Dowe Flats Permit Process;
- 2) role of the DFAIAC;
- 3) summary of archaeological investigations and conclusions;
- 4) Dowe Flats and Indian Mountain tour;
- 5) discussion of the Monitoring Program, Cultural Resource Management Plan, and Indian Mountain management.

6.4.3 Primary Issues and Proposed Actions

Over the course of the past 18 months, the consultation process has revealed several primary issues of concern expressed by the tribal representatives:

- 1) protection and preservation of the known prehistoric sites; many representatives requested that the sites not be disturbed, even for further academic research;
- 2) assessment for the potential of subsurface prehistoric sites;
- 3) request for monitoring during removal of topsoil for mining operations, with participation by qualified American Indians;
- 4) request for Southdown to follow the requests of the tribal representatives in the handling of human re-

- mains, if inadvertently disturbed during topsoil removal by mining operations;
- 5) the need for educational and traditional ceremonial sites in the Front Range of Colorado.

Southdown is addressing these concerns with the following actions.

- 1) An active protection plan for all significant prehistoric sites within the Study Area including:
 - conservation easements conveyed to Boulder County on sites on the West Dowe Flats donation parcel (refer to Figure 1)
 - annual inspection of all prehistoric sites on the Study Area by qualified cultural resource personnel
 - fencing and posting for no trespassing on Southdown's property
 - conveyance, in fee title, upon the establishment of full mining operations in Dowe Flats, of the West Dowe Flats donation parcel and the Northwest Dowe Flats Property to Boulder County. These properties contain most of the significant prehistoric sites found in the Study Area. Public access will be limited or prohibited.
- 2) Completion of two geomorphic studies to assess the potential of subsurface sites within the mine impact zone.
- 3) Notwithstanding that the geomorphological studies have determined a low potential for subsurface sites, Southdown has committed to a limited monitoring program during the first three years of the mining project, after which Southdown intends to review the program with SHPO, Boulder County, and the DFAIAC. Southdown has also submitted a proposal to the DFAIAC for American Indian participation in this monitoring program. The project archaeologist will also instruct the quarry crew in applicable cultural resource laws and the recognition of artifacts.

- 4) Southdown will follow Colorado law regarding the discovery of human remains, but will also follow, to the extent possible, the direction of the DFAIAC. (See also Section 6.4).
- 5) Southdown submitted to the DFAIAC a proposal for management of Indian Mountain (the ridge west of Dowe Flats that includes the West Dowe Flats donation parcel and the Northwest Dowe Flats Property) that includes the opportunity for tribally approved and sponsored educational and traditional ceremonial activities.

Southdown submitted copies of all reports pertaining to American Indian cultural resources to all of the participating tribes. Southdown will continue to consult with the tribes by means of the annual meetings of the DFAIAC.

6.5 Human Remains and Process for Reburial

During consultation between representatives of Southdown and the 13 American Indian nations (discussed in Section 6.6) it became clear that Indian people have different ways of handling their ancestors remains, as compared to Euro-american peoples and our government agencies. Indian people have expressed their desires in this regard by means of federal legislation, most importantly, the Native American Graves Protection and Repatriation Act (NAGPRA). Colorado state law governing the handling of inadvertently discovered human remains and NAGPRA are not perfect matches, and involve sovereignty issues between tribes, the federal government, and state government.

Southdown's mining operation in Dowe Flats is subject to State of Colorado regulation, and at this time does not require a federal action. Colorado law invests authority of the handling of prehistoric human remains in the position of the State Archaeologist. Accordingly, Southdown will follow state regulations in the handling of American Indian remains. To the extent that the State Archaeologist will accommodate the requests

of the DFAIAC, Southdown will support and execute those requests. The proposed protocol for the discovery of human remains is:

- 1) the finder will not disturb the bones and will immediately contact the Southdown plant manager or the county sheriff.
- 2) the county coroner and the Project Archaeologist will be called by the Plant Manager.
- 3) the coroner will conduct an on-site inquiry within forty-eight hours. If it is confirmed that the remains are human remains but of no forensic value, the coroner shall notify the state archaeologist of the discovery. The state archaeologist shall recommend security measures for the site.
- 4) Prior to further disturbance, the state archaeologist shall have the human remains examined by a qualified archaeologist to determine whether the remains are more than 100 years old and to evaluate the integrity of their archaeological context.
- 5) If the human remains are Native American, the Colorado State Archaeologist will notify the Colorado Commission of Indian Affairs and the Dowe Flats American Indian Advisory Council.
- 6) If the skeleton is not Native American, and is unclaimed, it will be delivered to the county coroner for further conveyance to the Colorado State Anatomical Board.

6.6 Historic Resources

Construction and use of the Mine Haul Road will have minor impacts on the four significant, NRHP eligible, irrigation ditches. Impacts include placement of new bridges and culverts. There are no significant resources in the area to be disturbed by mining and reclamation. Because the four ditches are similar in function and character, a mitigation plan has been developed for all. A permanent record of the four ditches in the impact areas

will be made including archivally stable photographs (35 mm.), architectural cross-sections and brief histories with narratives of the ditches.

The Montgomery School and other presently unrecorded resources along Highway 66 are located in areas that are not expected to be subject to secondary impacts from construction and mining activity. Blasting vibrations from the Hi-Cal pit on Limestone Ridge are not expected to have significant impact on the Montgomery School. The monitoring plan for Montgomery School was submitted to Boulder County and SHPO (Buffington and Mehls, 1994). The evaluation in that document includes:

- 1) Baseline documentation of existing ground vibrations at the site
- 2) Literature review to identify applicable ground vibration standards
- 3) Development of recommended compliance standards
- 4) Projection of ground vibrations from the Dowe Flats quarry operation.
- 5) Development of a monitoring program, if the owner allows access, that has four components:
 - (a) Pre-blasting structural assessment to establish baseline building condition
 - (b) Consultation with Boulder County and SHPO to establish a mitigation program that preserves the architectural fabric and character of the building
 - (c) Annual monitoring program
 - (d) Mitigation, if necessary.

Southdown proposed and BOCO accepted a ground vibration compliance value 0.25 inches/second for the Montgomery School. This compliance value is based upon review of existing vibrations near the school, analysis of the historical structure, and literature review of acceptable standards of ground vibration for historical structures. After approximately five years, as mining at Dowe Flats moves from south to north, ground vibrations at the Montgomery School will be at or below levels associated with the

existing Lyons Quarry. For the life of the mine operation, a monitoring and conservation program is proposed to assure that the compliance level provides adequate protection for the Montgomery School building. Further policies for any mitigation, should it become necessary, will be included in future revisions of the CRMP.

The blasting limits and monitoring as outlined above will sufficiently protect the Montgomery School and other presently unrecorded resources along Highway 66 from project related impacts. If, however, evidence of impact becomes apparent, consultation with the SHPO and Boulder County will result.

7.0 Information Management and Coordination

The sharing of information gathered from these and future resources investigations at Dowe Flats rests with Southdown. The "Call Down List" (see Appendix I) provides a listing of persons concerned with various aspects of resource management at Dowe Flats and serves as a guide for future managers.

7.1 Deposition and Dissemination of Information

The data collected during cultural resource investigations including geomorphological and paleontological studies, will be disseminated by Southdown. All cultural resource studies at Dowe Flats will be filed with the Colorado SHPO and the County of Boulder, Colorado. Additional copies of the cultural reports, without site forms, will be placed with the Lyons Redstone Museum and the Boulder Museum of History.

8.0 Curation of Paleontological, Archaeological and Historic Archaeological Resources

In Colorado, under state law 24.80.401, the Historical, Prehistorical and Archaeological Resources Act, "The state of Colorado reserves to itself title to all historical, prehistorical and

archaeological resources in all lands, rivers, lakes, reservoirs and other areas owned by the state or any of its political subdivisions." This act can be interpreted to mean that the State of Colorado claims ownership of the cultural resources identified within Dowe Flats because the County of Boulder is a subdivision of the State of Colorado. Therefore, officials of Dowe Flats must deal with the State Archaeologist and SHPO as representatives of the State of Colorado.

A curation agreement with the Lyons Redstone Museum or the University of Colorado-Boulder Museum for curation of collected paleontological, archaeological and historic artifacts recovered and collected during survey or excavation at Dowe Flats will be executed. In addition, paleontological specimens may be curated at the Denver Museum of Natural History.

9.0 Agency Coordination

As of October, 1994, Southdown conferred with the Colorado SHPO and Boulder County and together worked on the issues delineated in the May 14, 1993 memorandum from the SHPO. In addition, the Colorado Mined Land Reclamation Board has stated that a permit will not be issued to Southdown until the Colorado SHPO approves the Cultural Resource Management Plan. Boulder County has also incorporated this requirement into the Special Use Permit for mining and reclamation.

The comments of the State of Colorado and the County of Boulder were considered for the development of this CRMP. The SHPO is the agency directing Southdown's future actions in the treatment of identified cultural and paleontological resources, with additional participation by Boulder County.

10.0 Public Review

Public comment was solicited and encouraged through the Boulder County public referral period, June 13 - August 13, 1993. Addi-

tional public comment was provided throughout the County and CMLRB permit process, still underway. In addition, Southdown maintains an on-going communication program with interested members of the public. Southdown specifically met with members of the Lyons Redstone Museum, the Colorado Archaeological Society - Boulder Chapter, the Boulder Historical Society and the representatives of the 13 American Indian tribes involved in the consultation process. All of these parties were provided copies of the draft CRMP and will receive copies of the final CRMP.

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APPENDIX I
CALL DOWN LIST

Call Down List

<u>Name</u>	<u>Telephone No.</u>
John Lohr, Plant Manager	(303) 823-6685
Susan Collins, State Archaeologist	(303) 866-3392
Rich Koopman, BOCO Parks & Open Space Dept.	(303) 441-4558
Camela Laughline, Boulder County Land Use Dept.	(303) 441-3930
Marcus Grant, Project Archaeologist	(303) 964-9916
Steven Mehls, Project Historian	(303) 666-6208
Kenneth Carpenter, Project Paleontologist	(303) 388-3595
Michael Figgs, Environmental Stud. Coor. Boulder County Sheriff	(303) 447-1899 911 or (303) 441-4444
Boulder County Coroner	(303) 441-3535
Mary Jo Dennis, CCIA	(303) 866-3027
DFAIAC Representatives	
1) Betsy Chapoose Northern Ute	(801) 722-4992
2) Terry Knight Ute Mountain Ute	(303) 565-6412
3) Alden Naranjo Southern Ute	(303) 563-0235
4) Francis Brown Northern Arapahoe	(307) 856-8664
5) Darwin St. Clain Shoshone Tribe	(307) 332-3055
6) Marie Not Help Him Pine Ridge Sioux	(605) 867-5488
7) Terry Gray Rosebud Sioux	(607) 747-2263
8) Gilbert Brady, Sr. Cheyenne	(406) 477-6327
9) Archie Hoffman Cheyenne-Arapahoe of Oklahoma	(405) 262-0345, ext. 62
10) Lawrence Edge	(405) 654-2300

11) Dick J. Mowatt
Kiowa of Oklahoma
Apache of Oklahoma (405) 247-5342

<u>Name</u>	<u>Telephone No.</u>
12) Edward Tahhahwah, Jr. Comanche Nation of Oklahoma	(405) 492-4982
13) William Howell Pawnee of Oklahoma	(918) 762-3624

APPENDIX II
CORRESPONDENCE RE: CORPS OF ENGINEERS



Dowe Flats Drainage Report

Pre-Mining vs. Final Reclamation

Tetra Tech Job #117-8591002
March 15, 2022

PRESENTED TO

CEMEX
5134 Ute Highway
Longmont, CO 80503

PRESENTED BY

Tetra Tech
351 Coffman Street
Suite 200
Longmont, CO 80501

(303) 772-5282
tetrattech.com

PREPARED BY:



Fred Charles, PhD, PE
Senior Engineering Manager

March 15, 2022

DRAINAGE REPORT – PRE-MINING VS FINAL RECLAMATION

This document describes pre-mining and final reclamation drainage differences and similarities at the Dowe Flats property of CEMEX Construction Materials South, LLC (CEMEX). This description intends to address the Boulder County requirement for a Drainage Report and to demonstrate that the drainage differences between pre-mining and final reclamation land surfaces would not result in an increase in runoff to off-site areas.

Site Description

Two maps present information for the Special Use Permit (SUP) application area: Figure 1 presents the pre-mining topography and drainage direction; Figure 2 presents the reclamation topography and drainage direction.

Land Area (acres)

The area currently permitted under SU-93-14 includes the Dowe Flats property itself and a Partition Agreement Lease area around the Dowe Flats property owned by Boulder County Open Space and leased to CEMEX as a buffer. The original permit application included 1,911 acres; however, approximately 101 acres were removed over the years due to property sales resulting in a current permit boundary of 1,810 acres. With the proposed amendment to the SUP, CEMEX proposes to reduce the permit area to only include the Dowe Flats property itself, which is 709 acres, a 61% reduction in area. This report focuses on the Dowe Flats property only.

Ground Cover and Vegetation

The vegetation communities present in the permit area include reclaimed vegetation communities in previously mined areas, undisturbed native communities, and pastures improved for grazing and/or hay production. No activities proposed in the permit amendment application will have new impacts on these communities. No Army Corps of Engineers jurisdictional waters or wetlands are located within the Dowe Flats permit area. Further information on ground cover and vegetation is in the Site Description and Future Mining Impact Report, prepared by Habitat Management, Inc. for this application. That report explains that the pre-mining land use at Dowe Flats area was largely agricultural, either under cultivation, or having previously been plowed and planted with European or Asian forage species for livestock grazing. The only native grassland was along the ridge on the west side of the permit area. According to the NRCS at the time of the original permit application, the historical agricultural land uses were not recommended for these soils due to erosion hazard and slow permeability. Instead, the highest use of these soils was native perennial vegetation to support livestock grazing or wildlife habitat or both. They further found that the soils on the Dowe Flats property had suffered degradation of surface horizon thickness as a consequence of being cultivated.

Site Topography and Slopes

Dowe Flats is in a triangular-shaped valley that resulted from erosion of less-resistant geologic strata in the interior of a plunging syncline. Ridges of more resistant beds surround the valley on three sides. The ridge that runs down the western edge of the current mine area transects the western half of the larger valley. In general, the valley floor has low topographic relief and slopes toward the south at an average 2% gradient. The highest point on the Dowe Flats property at the north end of the ridge is approximately 5,470 feet in elevation and the lowest elevation at the south end of the property near Highway 66 is 5,240 feet.

The Dowe Flats property pre-mining topography is similar to the topography under the reclamation plan with an overall lowering of the surface elevation by six feet. Based on the reclamation plan, the existing overburden and growth media stockpiles will be redistributed to fill in the mining pits and the entire property will be graded to tie into the existing undisturbed topography and gently slope toward the south except for a 20-acre depression on the northeast side that will be developed into a wetland.

NRCS Soil Classification

The Soils and Geology Report prepared by CEMEX for this application states that the U.S. Soil Conservation Service (now the Natural Resources Conservation Service or NRCS) mapped soils of the Dowe Flats property in 1975, with an update in 2008, as part of the Boulder County Soil Survey. Information is currently accessible via the NRCS Web Soil Survey. The three main soil units mapped in areas disturbed by previous mining are LaPorte very fine sandy loam, Manvel loam, and Gaynor silty clay loam. The Soils and Geology Report Further supplies further information.

Drainageways/Channels

Saint Vrain Creek is the only perennial waterway near the permit area, and it does not intersect the Dowe Flats boundary. No activities proposed in the permit amendment application will impact Saint Vrain Creek.

As discussed in the Site Description and Future Mining Impact Report, there are several intermittent streams shown crossing Dowe Flats on the Boulder County GIS database. These drainages are primarily fed by seepage from the St. Vrain Supply Canal and agricultural irrigation, with a minor component from local runoff from the land surface. No activities proposed in the permit amendment application will have new impacts on these drainages other than localized drainage within the permit area resulting from mining.

Regulatory Floodplains

The Dowe Flats property is not within a FEMA-mapped 100-year flood zone. The Dowe Flats property is located on Flood Insurance Rate Map (FIRM) Panel No. 08013C0255J, dated December 18, 2012. No activities proposed in the permit amendment application will occur within the 100-year flood zone.

Existing Irrigation Facilities

Several active irrigation ditches flow across the south end of the permit area. The Supply Ditch, the Highland Ditch, the Rough and Ready Ditch, and the Palmerton Ditch all cross the Dowe Flats property south of the active mining area. Several of these ditches cross underneath mine access roads in culverts. Berms and other stormwater management strategies are in place to prevent runoff from these roads from entering the irrigation ditches. No activities proposed in the permit amendment application will have new impacts on these waterways.

Significant Geologic Features

The Soils and Geology Report discusses the regional geologic setting and Dowe Flats site stratigraphy and structure.

Drainage Basins, Flow Patterns/Paths

Figures 1 and 2 show runoff flow directions for the pre-mining and reclamation conditions, respectively. The drainage basin when reclaimed generally follows the boundary of the reclamation plan (Figure 2) and is assumed to be similar to the pre-mining drainage basin, based on the unmined ridge on the west side and road on the east side. As shown in Figures 1 and 2, the general flow direction will not change from the pre-mining condition to the post-reclamation plan condition. There are no lakes within the Dowe Flats permit area.

Outfall Location

There is no specific outfall location for the site, although any excess flows would exit the south end of the site; this is unchanged from pre-mining to final reclamation.

Pre-mining Condition

As discussed above, prior to mining at the site, the drainage pattern was from the north to south based on the gently sloped land surface – all within one drainage basin that is not intersected by exterior drainage basins as shown in Figure 2. There are two dry channels just outside of the permit boundary – one immediately to the east and the other to the west. These two channels are unchanged before, during, and after mining.

Existing Condition

The existing condition during mining includes runoff draining to on-site pits, but the overall flow direction from north to south and drainage basin boundary is generally the same as for pre-mining and reclamation conditions. The only location where flow can leave the site is in the southern end, and this is limited to a small area for access to the permit area which will continue to be the case when reclaimed.

Final Reclamation Condition

Based on the currently approved reclamation plan, there will be similar land use and land slope for final reclamation compared with pre-mining. The final reclamation drainage pattern is similar to the pre-mining condition, with drainage from the north to south on the gently sloped land surface that is not intersected by exterior drainage basins. The dry channels to the east and west of the reclamation area are unchanged from existing or pre-mining conditions.

The reclamation plan includes grading of the surface to blend into the surrounding topography outside the permit area, thus maintaining the same elevations along all edges of the permit area. The reclamation plan was laid out to accommodate concerns from prairie dog interests and states the following regarding the final reclamation versus pre-mining topography:

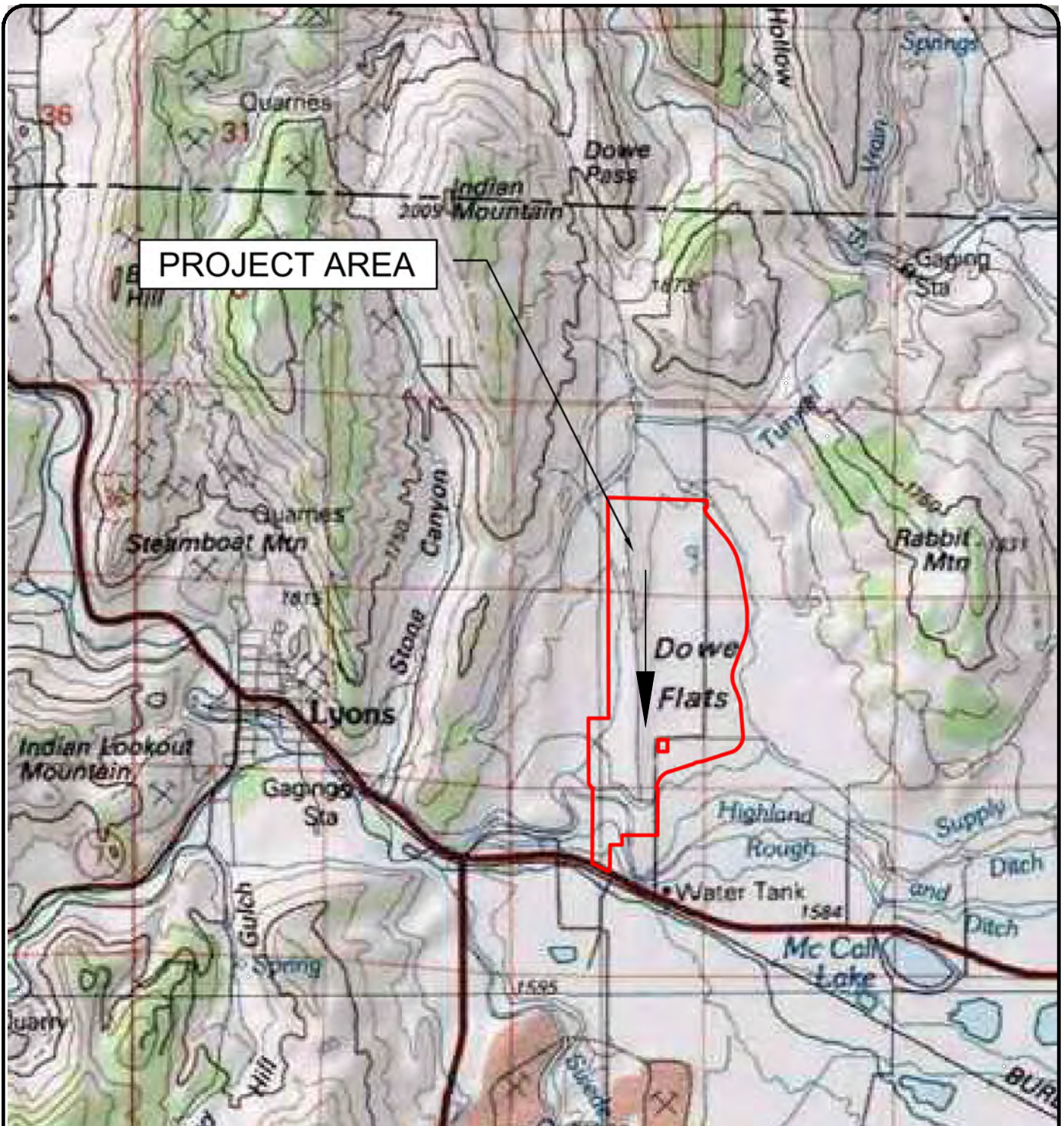
“The valley will appear much the same as it does today, except that the overall ground surface will be lowered about six feet (because the volume of reclamation material is slightly less than the volume of the mined-out area). The six feet deficit will be spread out uniformly over the valley and will be barely noticeable.”

As noted, the final reclamation plan is designed to be six feet lower than the pre-mining condition. This will result in lower elevations throughout the permit area with a decreased slope gradient in the southern end, thus reducing the peak runoff rate and erosion potential due to less topographic change within this reclaimed area. There are no stormwater structures or controls as part of the plan. However, the 20-acre wetland/pond to be created in the northern portion of the permit area will intercept some of the stormwater runoff, which will decrease the volume that may travel farther south toward the outlet and also reduce any contribution the area draining into the wetland would have had on the peak runoff rate.

Comparison of Runoff Potential for Pre-Mining vs. Reclamation Plan Conditions

The entire Dowe Flats mining/quarry site is within one drainage basin that is not intersected by exterior drainage basins (Figure 2). Furthermore, all stormwater drainage after final reclamation will flow in the same direction (from north to south) as before mining; any minor amounts of runoff not infiltrating within the permit area will exit the site at the south end in the same manner as before mining. No increase in peak runoff rates is expected when comparing pre-mining to reclaimed conditions.

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INFORMATION PROVIDED BY:

WATER & EARTH TECHNOLOGIES, INC.
 40504 WELD COUNTY RD 17
 SEVERANCE, COLORADO 80524
 970-225-6080



LEGEND:

—▶ DRAINAGE DIRECTION



0 2000' 4000'
 SCALE: 1" = 4000'



www.tetrattech.com
 351 Coffman St., Suite 200
 Longmont, CO 80501
 Phone: (303) 772-5282

CEMEX CONSTRUCTION MATERIALS SOUTH, INC
 DOWE FLATS QUARRY

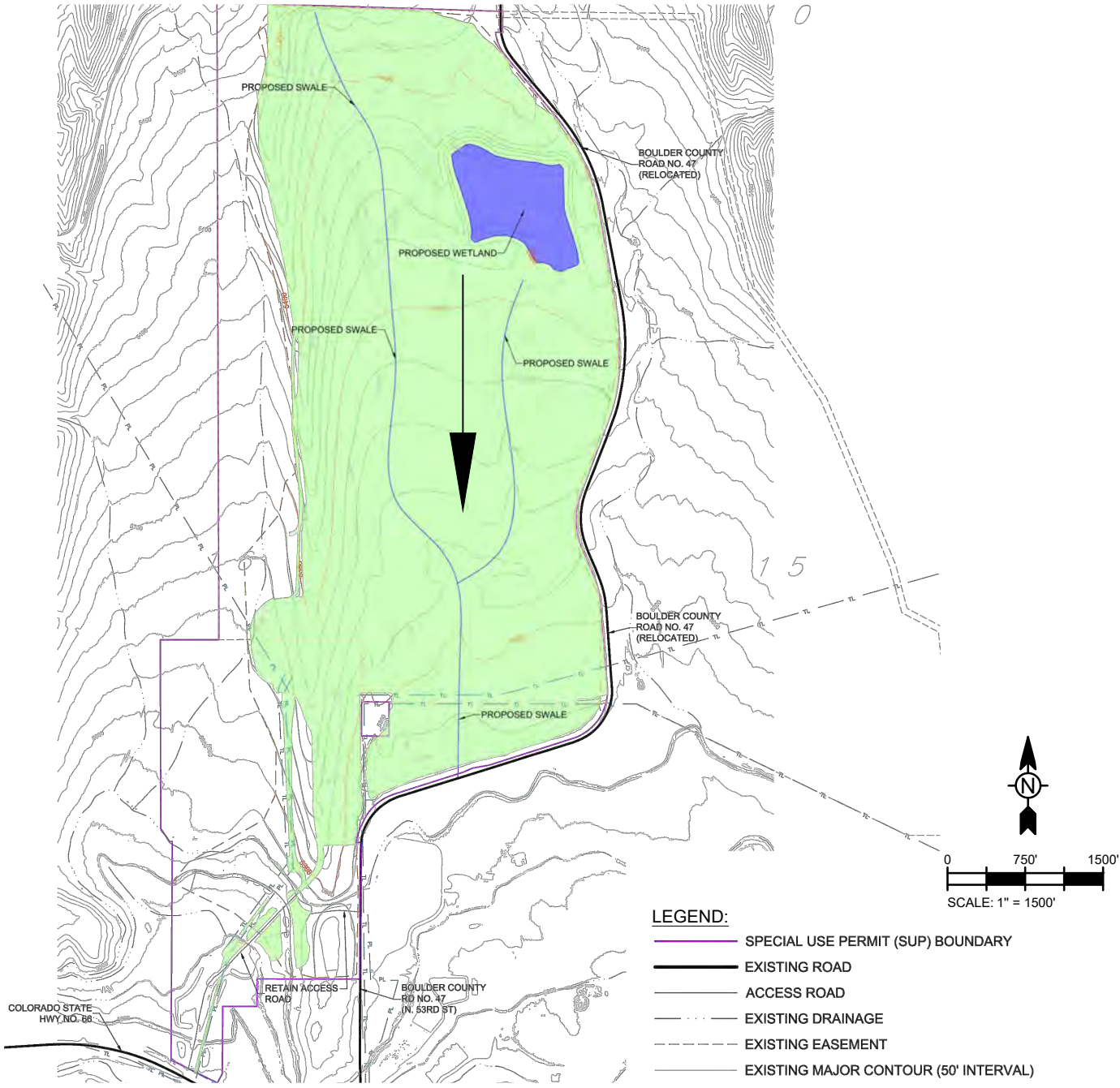
**PRE-MINING TOPOGRAPHY
 AND DRAINAGE DIRECTION**

PROJ: 117-8591001
 DATE: March 14, 2022
 DESN: FC
 Figure
1

Bar Measures 1 inch

Copyright: Tetra Tech

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LEGEND:

- SPECIAL USE PERMIT (SUP) BOUNDARY
- EXISTING ROAD
- ACCESS ROAD
- EXISTING DRAINAGE
- EXISTING EASEMENT
- EXISTING MAJOR CONTOUR (50' INTERVAL)
- EXISTING MINOR CONTOUR (10' INTERVAL)
- PL EXISTING PIPELINE
- TL EXISTING TRANSMISSION LINE (OVERHEAD)
- PROPOSED MAJOR CONTOUR (50' INTERVAL)
- PROPOSED MINOR CONTOUR (10' INTERVAL)
- PROPOSED SWALE OR DRAINAGE
- FINAL RECLAIMED GRASSLAND AREAS
- FINAL RECLAIMED WETLAND AREAS
- ▶ DRAINAGE DIRECTION

INFORMATION PROVIDED BY:

WATER & EARTH TECHNOLOGIES, INC.
 40504 WELD COUNTY RD 17
 SEVERANCE, COLORADO 80524
 970-225-6080



TETRA TECH

www.tetrattech.com
 351 Coffman St., Suite 200
 Longmont, CO 80501
 Phone: (303) 772-5282

CEMEX CONSTRUCTION MATERIALS SOUTH, INC
 DOWE FLATS QUARRY

**RECLAMATION TOPOGRAPHY
 AND DRAINAGE DIRECTION**

PROJ: 117-8591001
 DATE: March 14, 2022
 DESN: FC

Figure
2

Bar Measures 1 inch

Copyright: Tetra Tech



MEMORANDUM

DATE: October 17, 2021
TO: Jennifer Severson c/o transdevreview@bouldercounty.org
CC: Pam Hora, Tetra Tech
 Patrick Chalupsky, CEMEX
FROM: Charles Buck, Felsburg Holt & Ullevig
SUBJECT: Preapplication Methodology Statement (Revised)
PROJECT: Dowe Flats (FHU Reference No. 121329-01)

Background

Aggregate mining operations at Dowe Flats have been conducted for several decades under a Special Use Permit through Boulder County. The site is located north of State Highway 66 (SH 66) about 2 miles east of the Town of Lyons. Mined materials are transported to the nearby CEMEX cement plant on the south side of SH 66 via an existing overhead conveyor system.

Since CEMEX wishes to continue the existing mining operations for at least another 10 years at the current levels, an amendment application is being prepared for submittal to the County. However, the Special Use Permit is due to expire in the near future. Although site operations (including traffic levels) would remain the same, it is anticipated that the County may require a *Transportation System Impact Letter*, *Transportation System Impact Review*, or *Transportation System Impact Study* as part of the application to extend the Special Use Permit. Therefore, the purpose of this memorandum is to outline the current operations at Dowe Flats based on recent discussions with the applicant team. A preliminary trip generation evaluation and proposed methods and assumptions are provided to assist the County in determining the appropriate level of analysis needed to support the application.

I. Impact Area

The analysis will focus on the intersections impacted by mining traffic and traffic related to silica haulage from CEMEX's Lyons Quarry, which has occurred historically over an approximate two-month period each spring and will take place one last time in 2022, as the Lyons Quarry is almost fully mined out. The proposed study area intersections (see attached **Figure 1**) include:

- a. **SH 66/CEMEX/Dowe Flats mine access.** The south leg of this intersection is aligned with CEMEX's Lyons Cement Plant (CEMEX). The north leg of this intersection provides limited ingress to the Dowe Flats mine but only for vehicles crossing SH 66 between CEMEX and Dowe Flats. Employees working at Dowe Flats may leave the site via this access. Vehicles driving east or west on SH 66 may not enter Dowe Flats at this intersection.
- b. **SH 66/US 36.** This intersection, located about 3/4 mile west of the SH 66/CEMEX/Dowe Flats mine access, is on the silica haul route.
- c. **SH 66/N 53rd Street.** This intersection, located about 1/3 mile east of the SH 66/CEMEX/Dowe Flats mine access, serves most of the mine's employee, service, and vendor traffic and is also part of the silica haul route.

October 17, 2021
Jennifer Severson
Dowe Flats Preapplication Methodology Statement
Page 2

2. Project Components

- a. **Total Mine Production.** Dowe Flats produces an average of 24,000 tons per month and generally operates 4 days per week (about 16 days per month working) for an average rate of about 1,500 tons per day. On occasion, extra production is needed to meet demand, in which case the quarry may operate 5 days per week. The production rate is not expected to increase under the new permit.
- b. **Material Transport.** All mined aggregate material from Dowe Flats is transported via the existing conveyor system over SH 66 to CEMEX.
- c. **Vehicle Types.** Typical mine operations involve the following vehicles:
 - i. One to two quarry trucks (pickup trucks) cross SH 66 between Dowe Flats and CEMEX per day (Monday through Thursday, and on rare occasions, Friday). These crossing movements are two-way: quarry trucks enter and exit north-south between the two sites.
 - ii. One preventative maintenance vehicle (pickup truck) crosses SH 66 about one time per week. This crossing movement is two-way, north-south between the two sites.
 - iii. Heavy mobile mining equipment is transferred across SH 66 between CEMEX and Dowe Flats an average of 2 times per month. The equipment crosses over in the morning, does the work that day, and then crosses back at the end of the day. When this occurs, flaggers are deployed to direct traffic each time the equipment crosses.
 - iv. Mine employees use their personal vehicles (passenger cars or pickup trucks). Six employees work a single shift 6:00 AM to 4:00 PM, Monday through Thursday. All of these employees in their personal vehicles use only the SH 66/N 53rd Street intersection.
 - v. One mobile repairman is on-site most days to maintain equipment (utility truck). The repairman uses only the SH 66/N 53rd Street intersection. The repairman is not one of the six regular mine employees.

Silica Haul. Historically, up to 35,000 tons of silica per year has been hauled from CEMEX's Lyons Quarry to Dowe Flats using a belly dump or side dump vehicles (35-ton trucks) over a two-month period every year. The silica is stockpiled at the Dowe Flats, processed, and then conveyed to CEMEX. However, the resource at the Lyons Quarry is nearly depleted and so the Spring of 2022 will be the final time silica is hauled to Dowe Flats. Because the silica haul operation will be completed prior to when the proposed amendment to the Special Use Permit for Dowe Flats would be approved, the information pertaining to this trucking operation will not be applicable to Dowe Flats and will not need to be accounted for in a *Transportation System Impact Letter, Review, or Study*.

October 17, 2021
 Jennifer Severson
 Dowe Flats Preapplication Methodology Statement
 Page 3

Trip Generation

The trip generation analysis will be based on the operational characteristics as detailed by the applicant. **Table I** provides preliminary trip generation calculations for the day-to-day Dowe Flats operations.

Table I. Day-to-Day Dowe Flats Mine Operations

Trip Type	Average Number	Average Number of Daily Trips	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Employees	6	12	6	0	6	0	6	6
Quarry Truck	2	4	1	0	1	0	1	1
Preventive Maintenance	1	2	0	0	0	0	0	0
Mobile Repairman	1	2	1	0	1	0	1	1
Total Trips		20	8	0	8	0	8	8

As shown in **Table I**, it is estimated that, on a day-to-day basis, the mine generates on average about 20 trips over the course of the day, with about 8 trips during either peak hour. Note that these are conservative estimates, as the hours of operation would tend to impact off-peak, rather than the typical commute hours.

3. Mode Share

The mine generates only motorized vehicular traffic. No transit, bicycle, or pedestrian traffic currently occurs or is envisioned.

4. Background Traffic

We propose to use CDOT growth factors on SH 66 and US 36 to estimate future background traffic:

- a. CDOT 20-year factor for US 36 = 1.17 (annual growth rate of 0.8 percent)
- b. CDOT 20-year factor for SH 66 = 1.26 (annual growth rate of 1.2 percent)

CDOT vehicle classification data will also be applied:

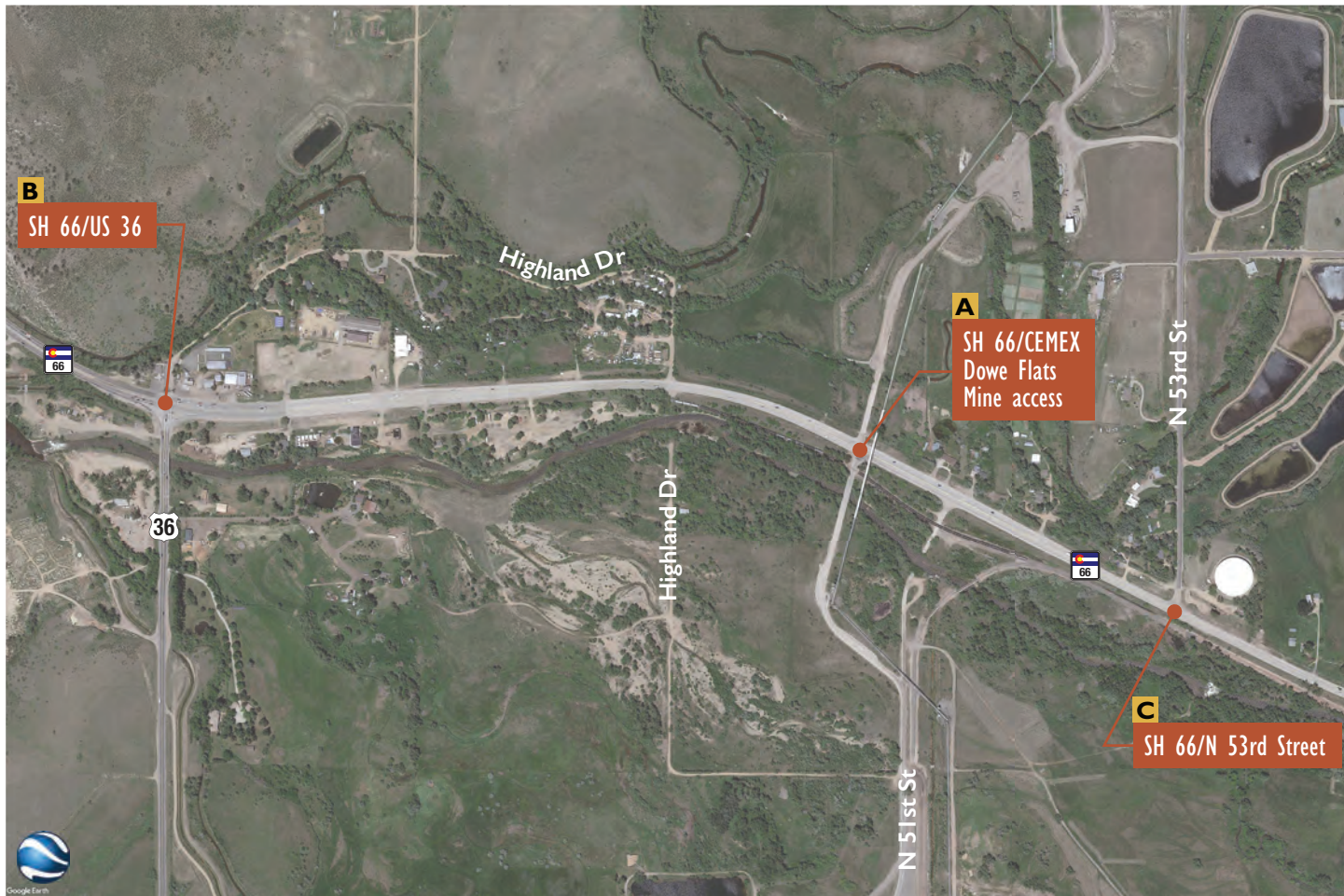
- c. US 36 = 2.7 percent heavy vehicles
- d. SH 66 = 4.4 percent heavy vehicles.

5. Trip Distribution

The directional distribution of mine traffic will be based on estimates provided by the applicant, as follows:

- a. **Employees.** Approximately 75 percent oriented to/from the east via SH 66 and 25 percent to/from the west via SH 66.
- b. **Vendors.** 100 percent to/from the east via SH 66.

The above methods and assumptions are preliminary and are intended for review and discussion with Boulder County staff to determine if a *Transportation System Impact Letter, Review, or Study* will need to be prepared. Adjustments or refinements to accommodate staff concerns are anticipated.



From: [Charles.Buck](#)
To: [Hora, Pam](#)
Subject: FW: Dowe Flats PAMS
Date: Wednesday, November 3, 2021 6:34:27 AM

CAUTION: This email originated from an external sender. Verify the source before opening links or attachments.

Pam:

See Jennifer Severson's email below – looks like you are good to go!

Charles

CHARLES M. BUCK, PE, PTOE

Senior Transportation Engineer

303.721.1440 x 8927

6400 S Fiddlers Green Circle, Suite 1500, Greenwood Village, CO 80111

charles.buck@fhueng.com

www.fhueng.com

From: Severson, Jennifer <jseverson@bouldercounty.org>

Sent: Tuesday, November 2, 2021 10:30 PM

To: Charles.Buck <Charles.Buck@FHUENG.COM>

Subject: RE: Dowe Flats PAMS

Good Evening Charles- I apologize for the delayed response- I'm trying to get things wrapped up before I leave on vacation tomorrow (thus the 10:30 pm email!). I reviewed the revised PAMS and it adequately demonstrates to me that the use will not generate more than 20 trips/ daily once the Silica Hauling ends after Spring 2022. Therefore, no additional traffic analysis is required. Please make sure the PAMS is attached to the land use application materials- and you're welcome to also attach a copy of this email that confirms no additional info is needed.

Best,
Jennifer

Jennifer Severson, AICP - *Principal Planner – Development Review Team – Access & Engineering*

Boulder County Community Planning & Permitting

Direct Phone: 720-564-2663

Main Phone: 303-441-3930

jseverson@bouldercounty.org

TransDevReview@bouldercounty.org

From: Charles.Buck <Charles.Buck@FHUENG.COM>

Sent: Friday, October 22, 2021 12:22 PM
To: Severson, Jennifer <jseverson@bouldercounty.org>
Subject: [EXTERNAL] RE: Dowe Flats PAMS

Thanks Jennifer – you too!

Charles

CHARLES M. BUCK, PE, PTOE

Senior Transportation Engineer
303.721.1440 x 8927

6400 S Fiddlers Green Circle, Suite 1500, Greenwood Village, CO 80111

charles.buck@fhueng.com

www.fhueng.com

From: Severson, Jennifer <jseverson@bouldercounty.org>
Sent: Friday, October 22, 2021 12:10 PM
To: Charles.Buck <Charles.Buck@FHUENG.COM>
Cc: Transportation Development Review <TransDevReview@bouldercounty.org>
Subject: RE: Dowe Flats PAMS

Thanks Charles, I'll try to review this early next week and will let you know if I have any questions.
Have a great weekend!

Jennifer Severson, AICP - *Principal Planner – Development Review Team – Access & Engineering*

Boulder County Community Planning & Permitting

Direct Phone: 720-564-2663

Main Phone: 303-441-3930

jseverson@bouldercounty.org

TransDevReview@bouldercounty.org

From: Charles.Buck <Charles.Buck@FHUENG.COM>
Sent: Monday, October 18, 2021 7:57 AM
To: Transportation Development Review <TransDevReview@bouldercounty.org>
Cc: Hora, Pam <Pam.Hora@tetrattech.com>
Subject: [EXTERNAL] RE: Dowe Flats PAMS

Jennifer:

Attached is a revised PAMS for Dowe Flats. I believe this provides the clarifications you requested.
Please let me know if you have questions or need any additional information.

Thanks,

CHARLES M. BUCK, PE, PTOE

Senior Transportation Engineer

303.721.1440 x 8927

6400 S Fiddlers Green Circle, Suite 1500, Greenwood Village, CO 80111

charles.buck@fhueng.com

www.fhueng.com

From: Transportation Development Review <TransDevReview@bouldercounty.org>

Sent: Thursday, October 14, 2021 2:12 PM

To: Charles.Buck <Charles.Buck@FHUENG.COM>; Transportation Development Review <TransDevReview@bouldercounty.org>

Cc: Hora, Pam <Pam.Hora@tetrattech.com>

Subject: RE: Dowe Flats PAMS

Hi Charles- I agree with your line of thinking to not include the Silica hauling in the projected ADT for the use on the Dowe Flats property. If you can please clarify that in the PAMS, that would be ideal – still mention it but make it clear that those trips will not be made after (date). So does that mean the ADT for Dowe Flats after Spring 2022 will be ~20?

Jennifer

Jennifer Severson, AICP - Principal Planner – Development Review Team – Access & Engineering

Boulder County Community Planning & Permitting

Direct Phone: 720-564-2663

Main Phone: 303-441-3930

jseverson@bouldercounty.org

TransDevReview@bouldercounty.org

From: Charles.Buck <Charles.Buck@FHUENG.COM>

Sent: Thursday, October 14, 2021 1:53 PM

To: Transportation Development Review <TransDevReview@bouldercounty.org>

Cc: Hora, Pam <Pam.Hora@tetrattech.com>

Subject: [EXTERNAL] RE: Dowe Flats PAMS

Jennifer:

Thanks so much for getting back to us. We will coordinate with the applicant on the operational clarifications you have asked for. I have attached a map of the silica haul route as requested. However, before we go in-depth on the details of the Silica Haul and how it impacts the average daily trips, we have learned that the last time the Silica Haul will happen is in the spring of 2022, as the Lyons quarry will run out of the material. After this, the Dowe Flats mine will no longer be

processing silica.

As the Special Use application will not be submitted until March 2022, it seems that the Silica Haul should not be a consideration in the calculation of the average daily trips. If you could let us know your thought on this it would be much appreciated. Meanwhile, we will work on addressing your comments.

Thanks again,

CHARLES M. BUCK, PE, PTOE

Senior Transportation Engineer

303.721.1440 x 8927

6400 S Fiddlers Green Circle, Suite 1500, Greenwood Village, CO 80111

charles.buck@fhueng.com

www.fhueng.com

From: Transportation Development Review <TransDevReview@bouldercounty.org>

Sent: Wednesday, October 13, 2021 4:03 PM

To: Charles.Buck <Charles.Buck@FHUENG.COM>; Transportation Development Review <TransDevReview@bouldercounty.org>

Cc: Hora, Pam <Pam.Hora@tetrattech.com>

Subject: RE: Dowe Flats PAMS

Good Afternoon Charles,

Please see my comments on page 2 of the attached PAMS – most of my questions are addressed in the tables on page 3, but it would be helpful if these details were also clarified in the text.

A few additional comments are below:

1. Can you please provide a haul map that identifies beginning and end points for hauling and the haul routes used (with arrows or other notation to show haul directions)?
2. The 100 trips sounds like that will be the maximum trips per day but that number of trips will only occur during the 2 months/ ~ 60 days during the haul ops, correct? Is it possible for you to provide the daily trips as an average over 365 days? I.e. using 100 trips for 60 days and 20 trips for the other 305 days, then average that number. I think that will be a better representation of the average daily trips vs. just the max trips for a 2-month period. Please still show the max 100 trips during haul ops, but I'd also like to see the trips averaged over the full year.

Please let me know if you have any questions.

Jennifer

Jennifer Severson, AICP - *Principal Planner – Development Review Team – Access & Engineering*

Boulder County Community Planning & Permitting
Direct Phone: 720-564-2663
Main Phone: 303-441-3930
jseverson@bouldercounty.org
TransDevReview@bouldercounty.org

From: Charles.Buck <Charles.Buck@FHUENG.COM>
Sent: Monday, October 11, 2021 2:54 PM
To: Transportation Development Review <TransDevReview@bouldercounty.org>
Cc: Hora, Pam <Pam.Hora@tetrattech.com>
Subject: [EXTERNAL] Dowe Flats PAMS

To: Jennifer Severance
c/o transdevreview@Bouldercounty.org

Jennifer:

Attached is a Preapplication Methodology Statement for Dowe Flats, for your review and comment. CEMEX is looking to update their Special Use Permit for this site. Once you have had a chance to look this over, please get back to me with your thought on next steps and any comments or concerns you may have.

Thank you,



CHARLES M. BUCK, PE, PTOE

Senior Transportation Engineer

303.721.1440 x 8927

6400 S Fiddlers Green Circle, Suite 1500, Greenwood Village, CO 80111

charles.buck@fhueng.com

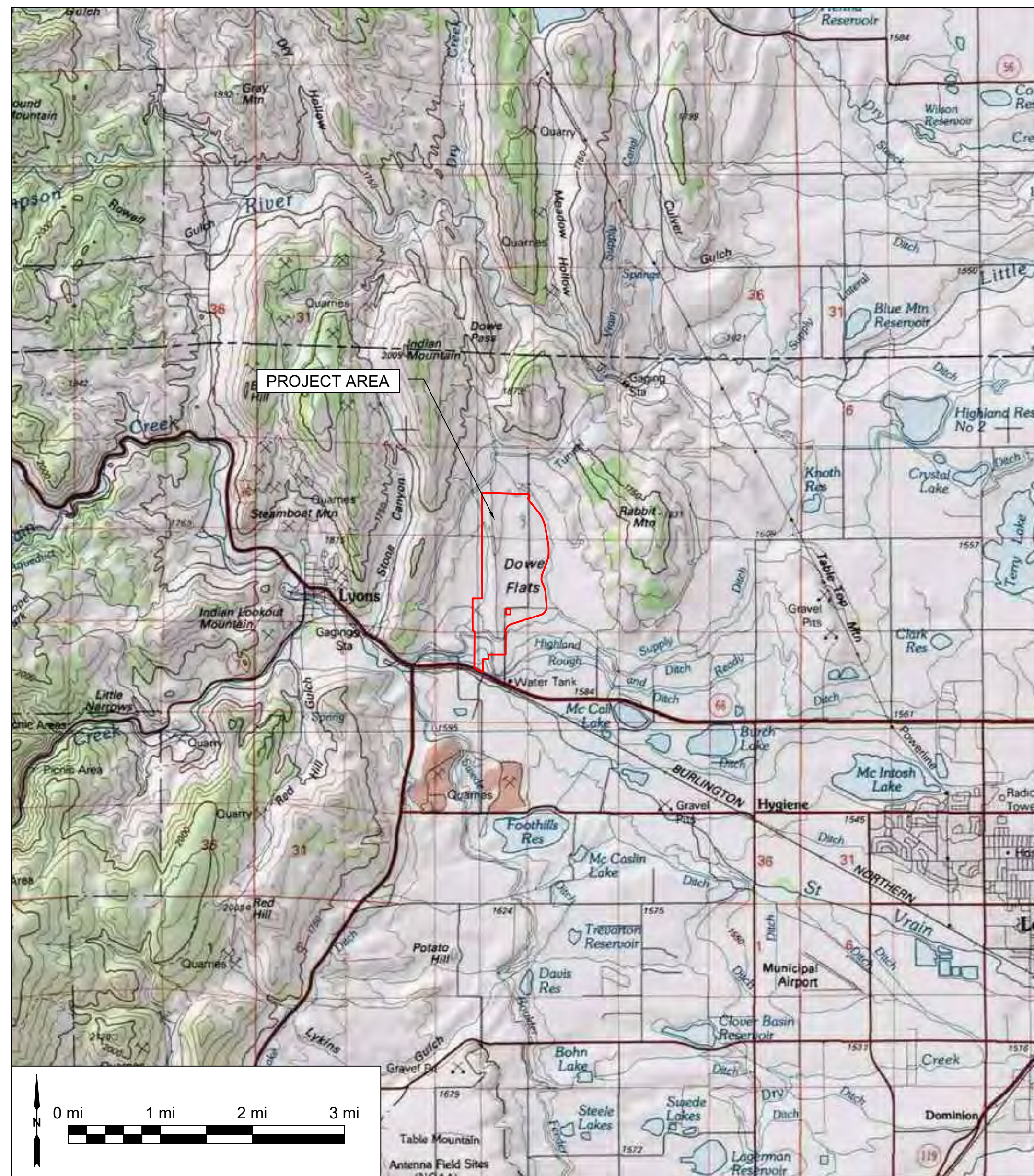
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SPECIAL USE PERMIT APPLICATION FIGURES

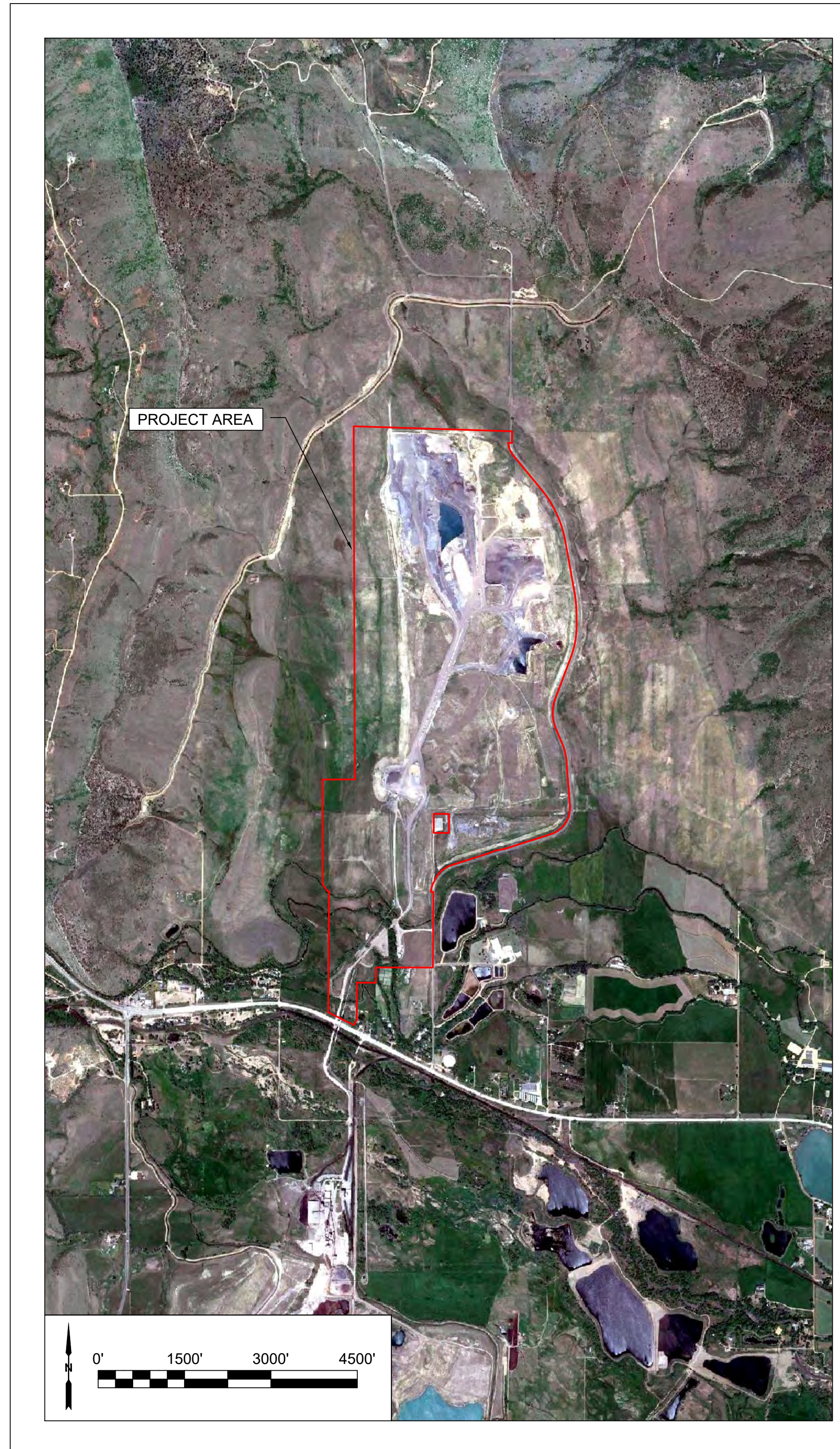
DOWE FLATS QUARRY

APRIL 18, 2022

VICINITY MAP



PROJECT LOCATION



CLIENT:

CEMEX, INC.
5134 UTE HIGHWAY
LONGMONT, CO, 80503
713-722-6078



SET PRODUCED BY:

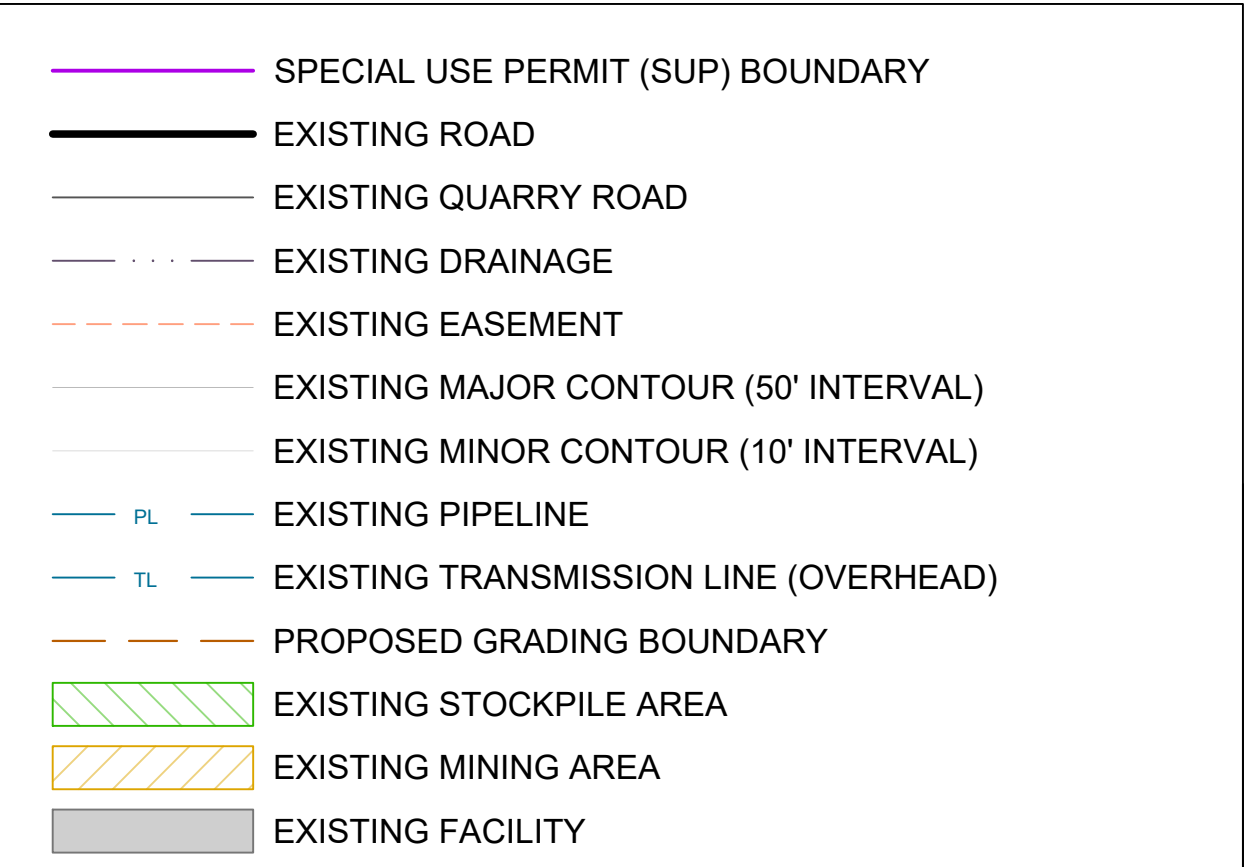
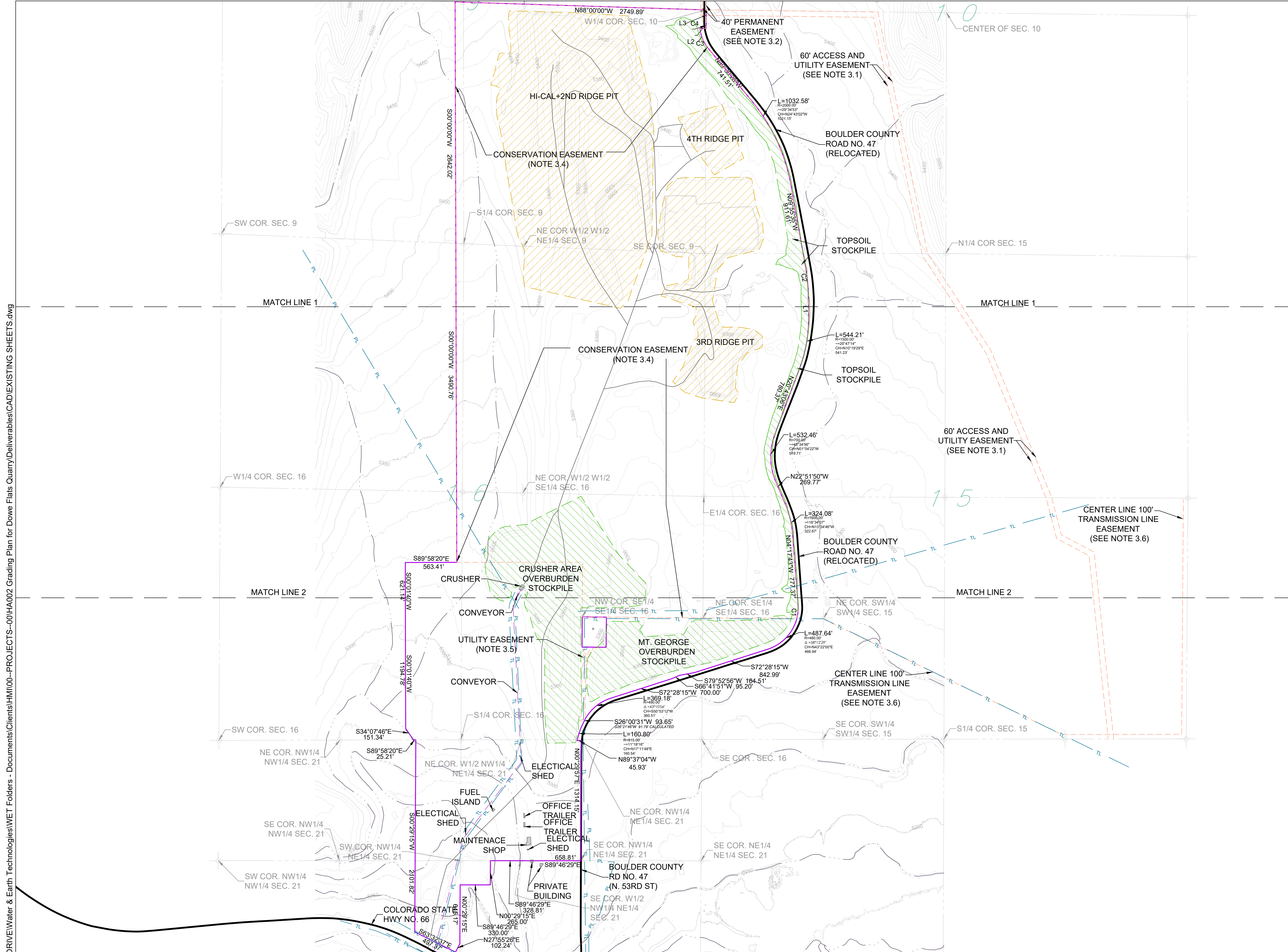
WATER & EARTH TECHNOLOGIES, INC.
40504 WELD COUNTY RD 17
SEVERANCE, COLORADO 80524
970-225-6080



DRAWING INDEX:

SHEET	SHEET TITLE
1 OF 15	COVER SHEET
2 OF 15	DOWE FLATS QUARRY EXISTING CONDITIONS OVERVIEW MAP
3 OF 15	DOWE FLATS QUARRY EXISTING CONDITIONS NORTH SECTION
4 OF 15	DOWE FLATS QUARRY EXISTING CONDITIONS CENTER SECTION
5 OF 15	DOWE FLATS QUARRY EXISTING CONDITIONS SOUTH SECTION
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15 OF 15	DOWE FLATS QUARRY FINAL RECLAIMED AREAS

FOR PERMITTING ONLY



NOTES

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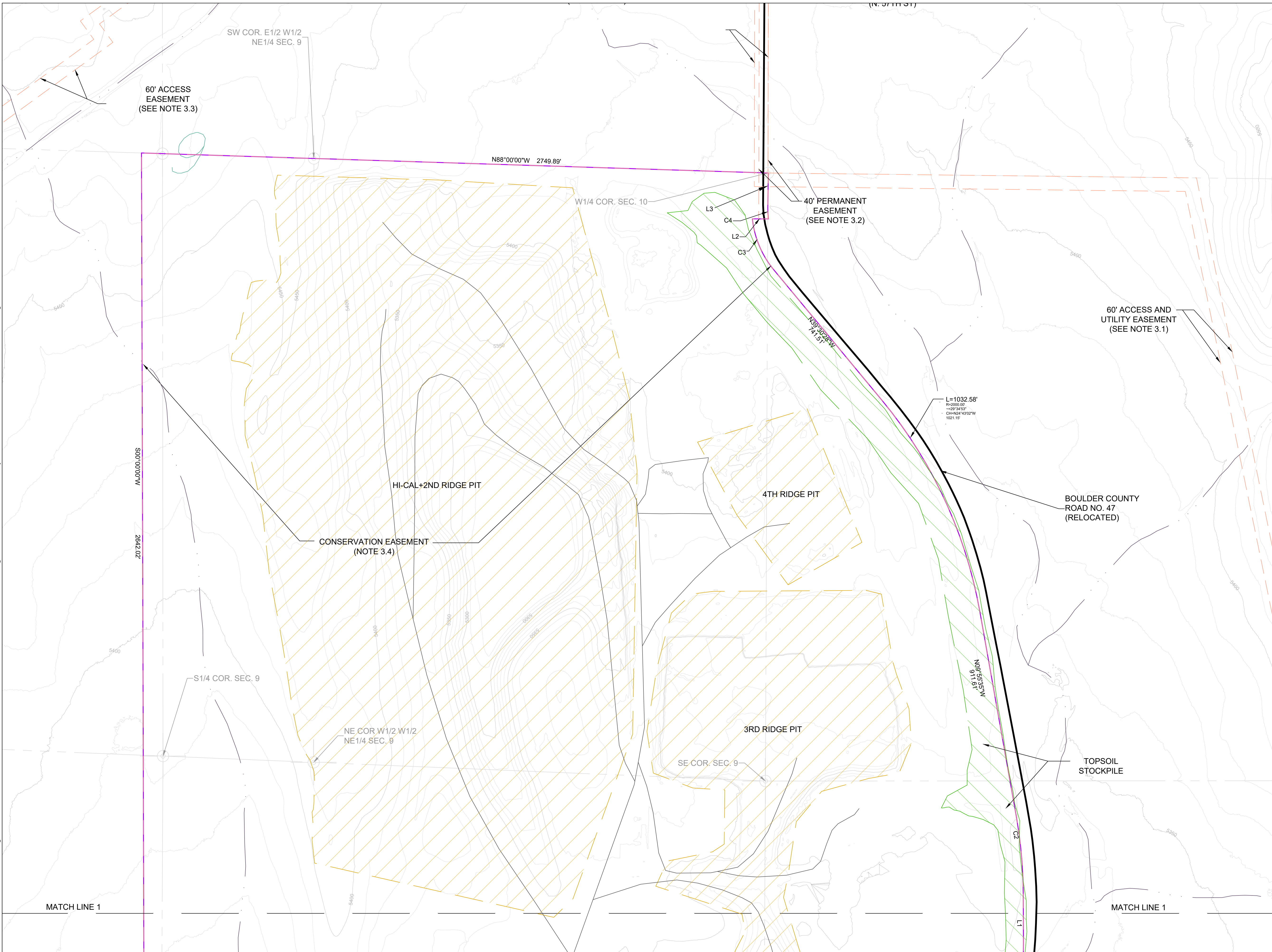
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CONSTRUCTION**

DOWE FLATS QUARRY

**DOWE FLATS QUARRY
EXISTING CONDITIONS
OVERVIEW MAP**

CONTRACTOR SHEET NO.		2 OF 15	
DWG. NO.			
REVISION	DATE		
0	04/18/2022		

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- SPECIAL USE PERMIT (SUP) BOUNDARY
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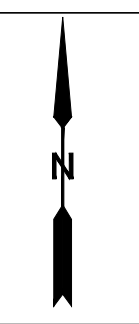
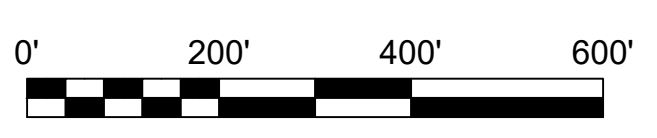
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DOWE FLATS QUARRY

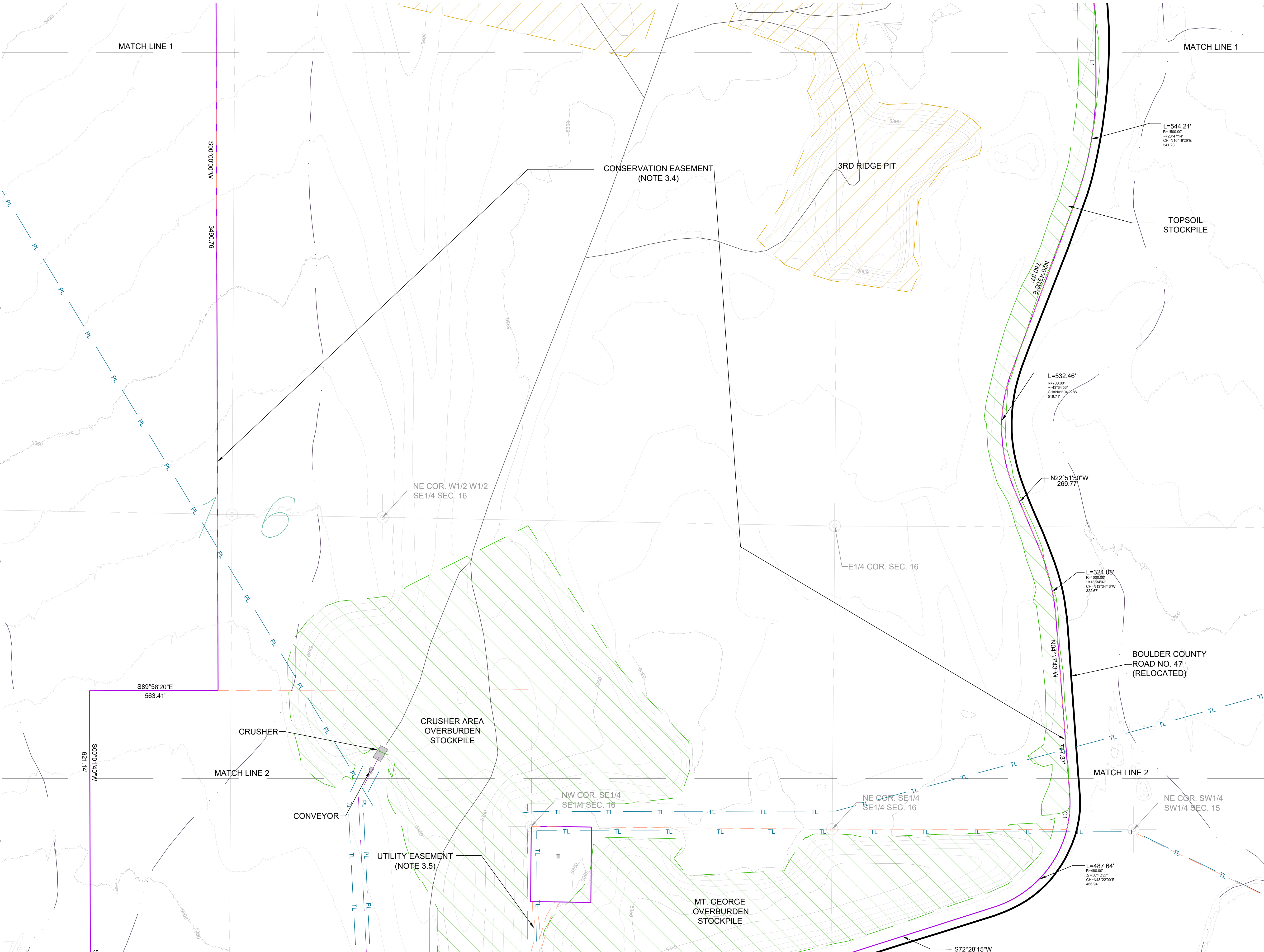
**DOWE FLATS QUARRY
EXISTING CONDITIONS
NORTH SECTION**

CONTRACTOR SHEET NO.	
3 OF 15	
DWG. NO.	
REVISION	DATE
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REFERENCES						REVISIONS						REVISIONS					
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- SPECIAL USE PERMIT (SUP) BOUNDARY
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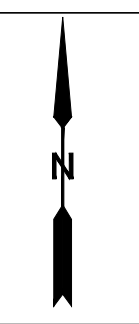
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DOWE FLATS QUARRY

**DOWE FLATS QUARRY
EXISTING CONDITIONS
CENTER SECTION**

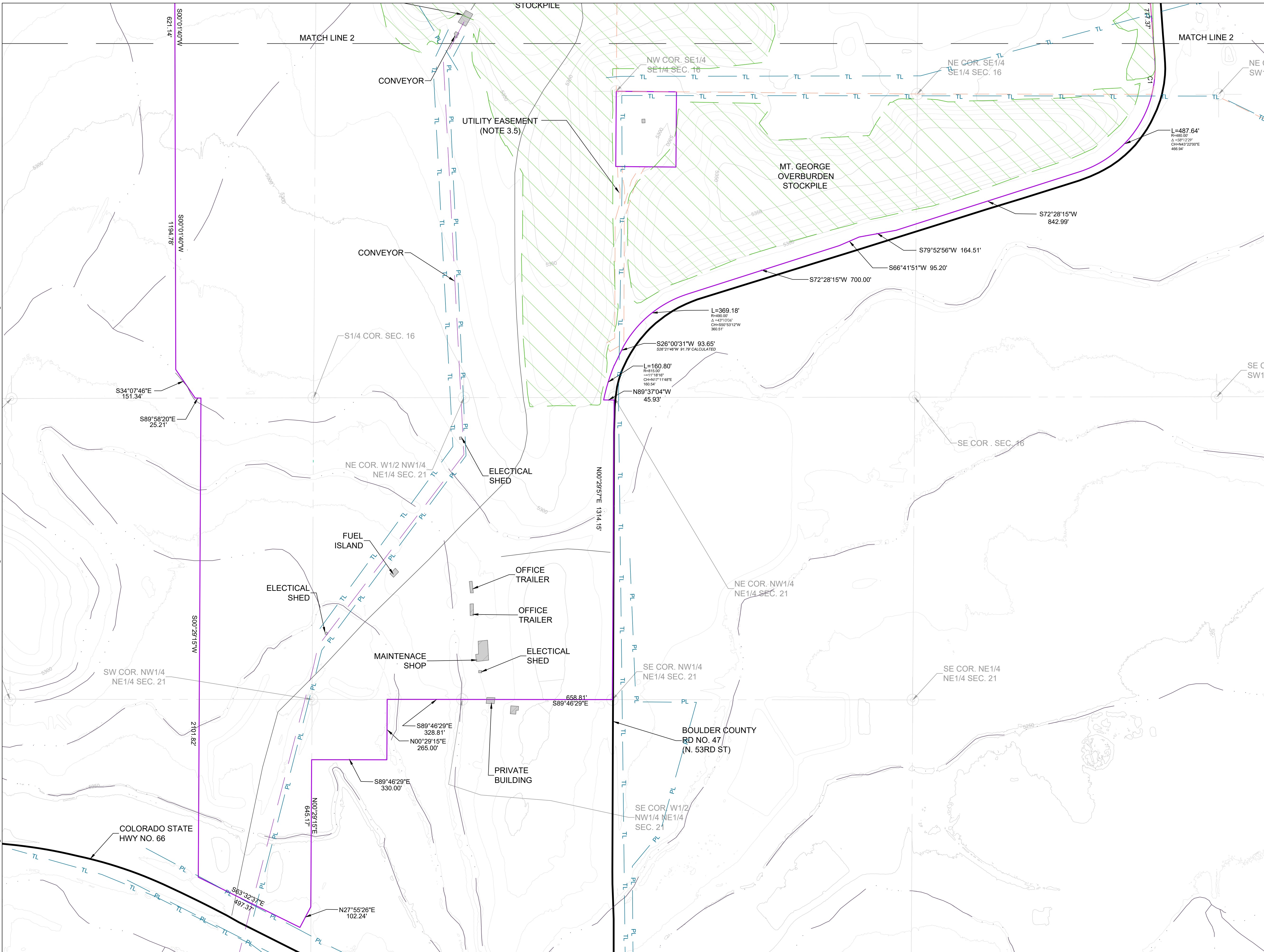
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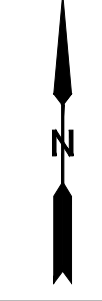
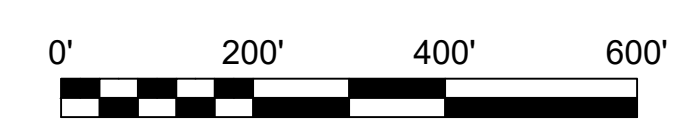
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DOWE FLATS QUARRY

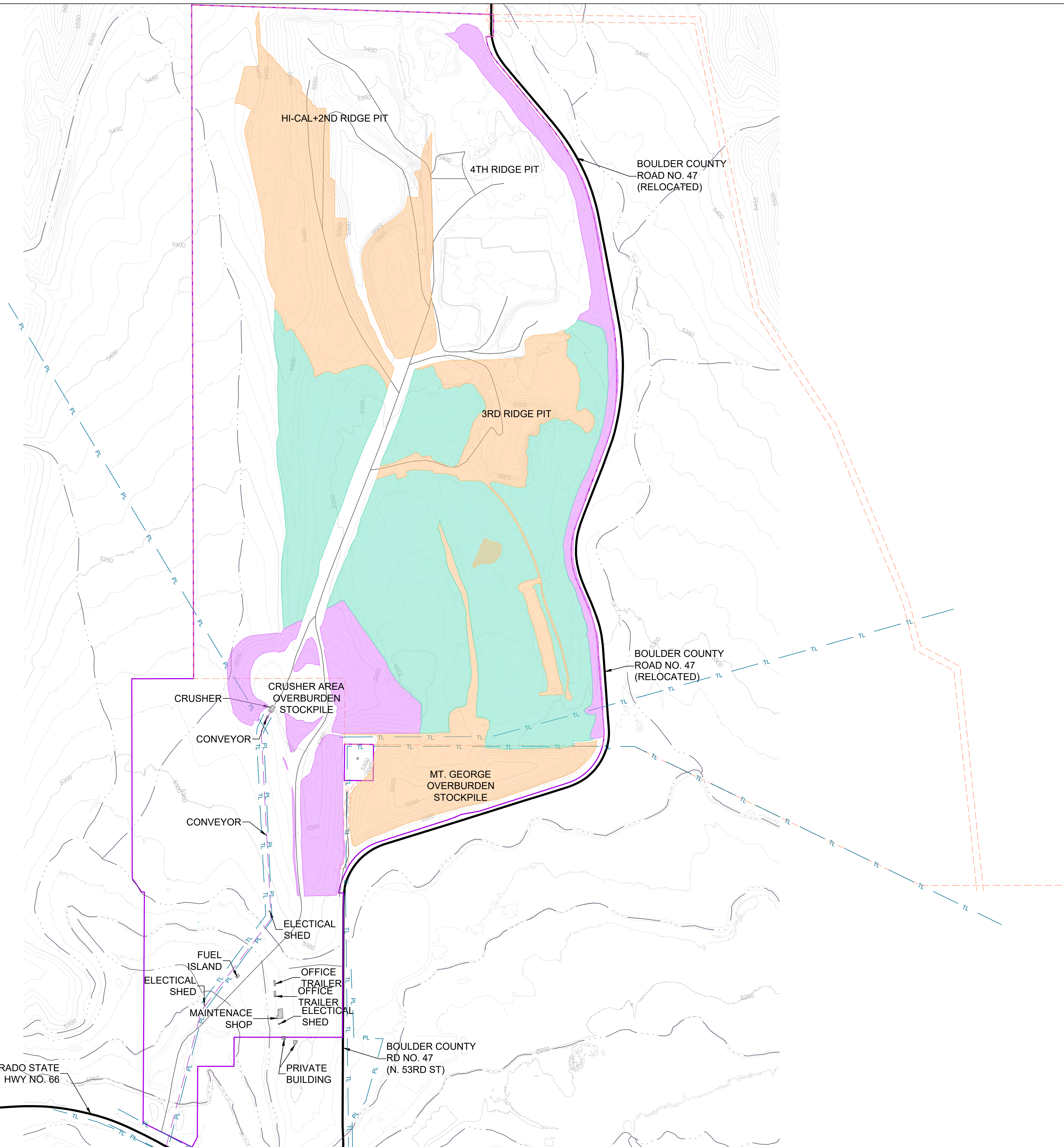
**DOWE FLATS QUARRY
EXISTING CONDITIONS
SOUTH SECTION**

CONTRACTOR SHEET NO.	
5 OF 15	
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5134 UTE HIGHWAY
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- EXISTING TEMPORARY RECLAIMED AREA
- RECLAMATION IN PROGRESS
- EXISTING FACILITY

NOTES

1. TEMPORARY RECLAIM AREAS CONSIST OF MOSTLY OVERBURDEN AND STOCKPILE MATERIALS. THESE MATERIALS WILL BE USED AS BACKFILL TO CONSTRUCT THE FINAL RECLAIMED SURFACE (SHEETS 12-15)
2. EXISTING RECLAIMED AREAS HAVE BEEN RECLAIMED UTILIZING THE GRASSLAND SEED MIXTURE DESCRIBED BELOW.

Table E-1. Plant Material Mixes - Grassland

Scientific Name	Common Name - Variety	Seeding Rate (PLS b/ac)	
		Drill	Broadcast
GRASSES			
<i>Elymus lanceolatus</i>	thickspike wheatgrass - Critana	0.4	1
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass - Whitmar	2.2	5.5
<i>Elymus lanceolatus</i>	streambank wheatgrass - Sodar	0.6	1.5
<i>Pascopyrum smithii</i>	western wheatgrass - Arriba	1.5	3.8
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass - Secar	1.9	4.8
<i>Bouteloua curtipendula</i>	sidecoats grama - Vaughn	0.9	2.3
<i>Bouteloua gracilis</i>	blue grama - Native, Alma	0.2	0.5
<i>Bouteloua dactyloides</i>	buffalograss	2.9	7.3
<i>Festuca arizonica</i>	Arizona fescue - Redondo	0.6	1.5
<i>Koeleria macrantha</i>	prairie Junegrass	0.03	0.08
<i>Achnatherum hymenoides</i>	Indian ricegrass - Nezapar, Paloma	1.9	4.8
<i>Poa secunda</i>	Sandberg bluegrass	0.2	0.5
<i>Schizachyrium scoparium</i>	little bluestem - Blaze, Pastura	1.0	2.5
<i>Hesperostipa comata</i>	needle and thread	1.4	3.5
<i>Nassella viridula</i>	green needlegrass - Lodorm	0.9	2.3
FORBS			
<i>Achillea lanulosa</i>	common yarrow	0.01	0.03
<i>Eurybia glauca</i>	glaucous aster	0.06	0.15
<i>Coreopsis tinctoria</i>	golden tickseed	0.03	0.08
<i>Heliomeris multiflora</i>	showy goldeneye	0.03	0.08
<i>Linum lewisii</i>	Lewis flax	0.11	0.28
<i>Medicago sativa</i>	alfalfa - Ladak	0.16	0.4
<i>Penstemon palmeri</i>	Palmer's penstemon - Cedar	0.05	0.13
<i>Dalea purpurea</i>	purple prairie clover - Kanab	0.11	0.28
<i>Ratibida columnifera</i>	upright prairie coneflower	0.03	0.08
<i>Sphaeralcea coccinea</i>	scarlet globemallow	0.06	0.15
TOTAL		17.28	43.54

Table E-2. Plant Material Mixes - Herbaceous Wetland

Scientific Name	Common Name - Variety	Seeding Rate (PLS b/ac)	
		Drill	Broadcast
GRASSES			
<i>Asclepias incarnata</i>	swamp milkweed	N/A	0.25
<i>Schoenoplectus maritimus</i>	alkali bulrush	N/A	2
<i>Typha latifolia</i>	broadleaf cattail	N/A	2
TOTAL			4.25

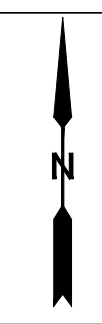
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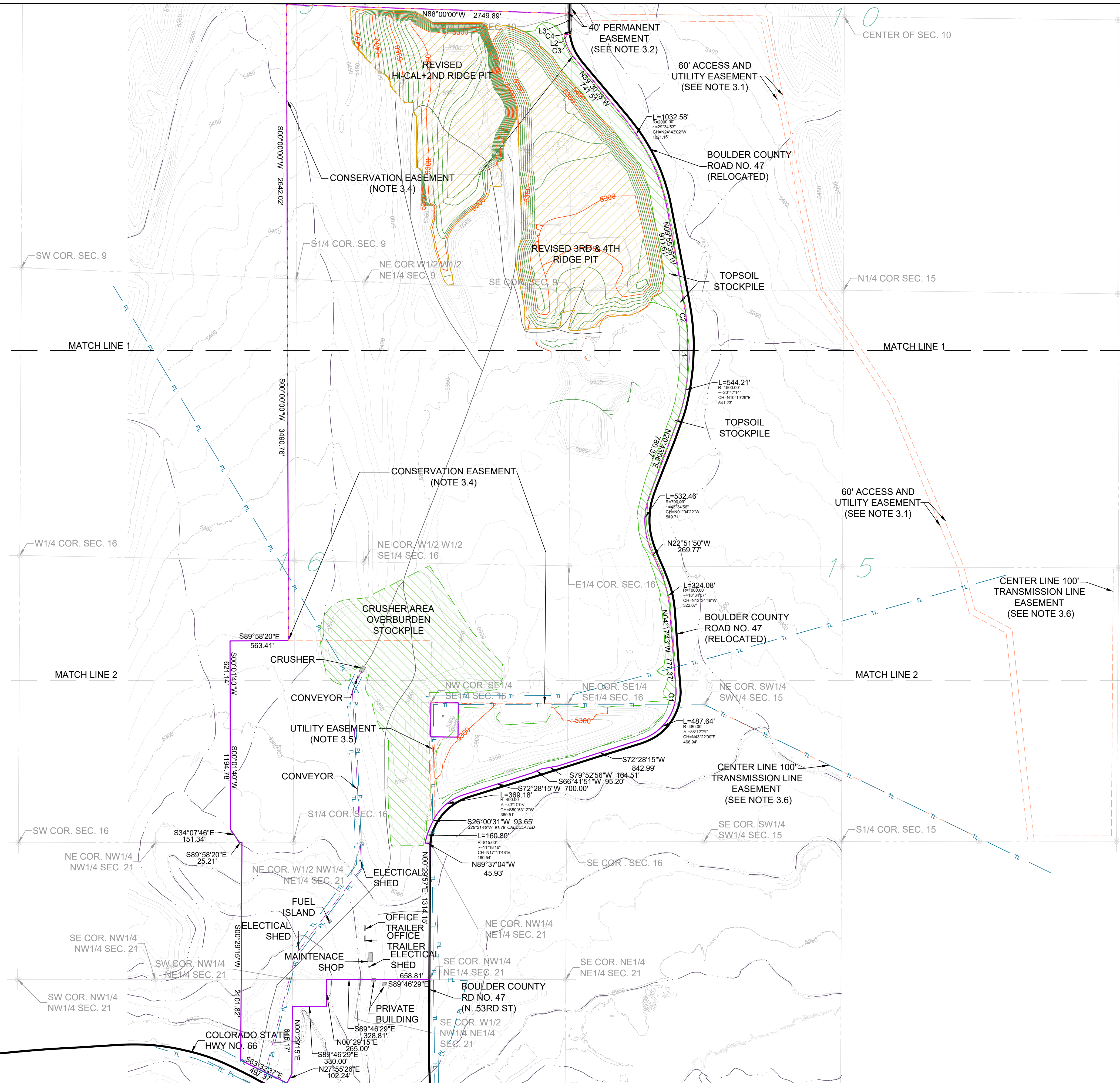
**DOWE FLATS QUARRY
 EXISTING RECLAIMED AREAS**

CONTRACTOR SHEET NO. 6 OF 15	
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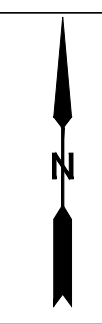
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 40504 WELD COUNTY RD 17
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 (970) 225-6080
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DOWE FLATS QUARRY

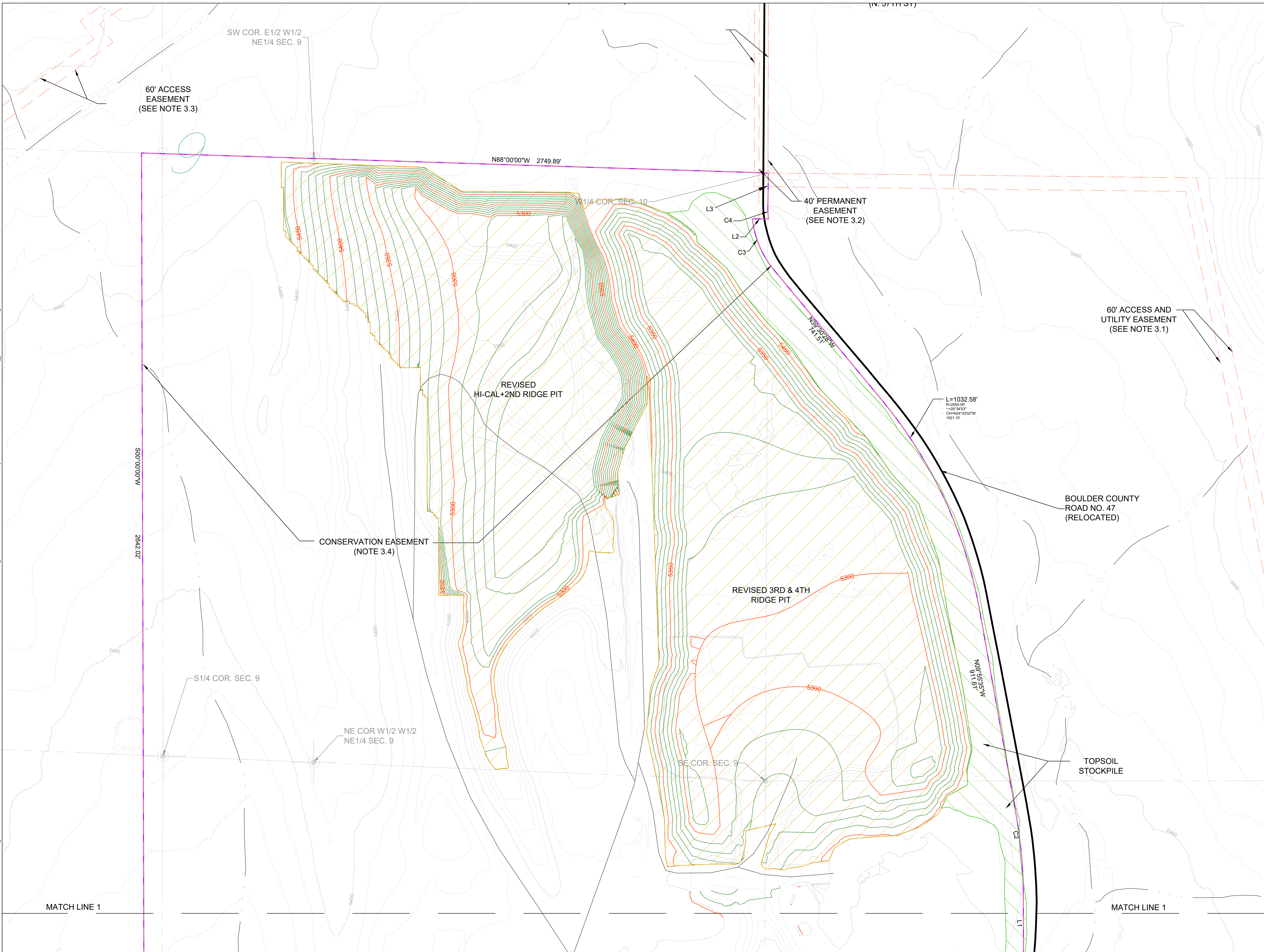
**DOWE FLATS QUARRY
MINING PLAN
OVERVIEW MAP**

CONTRACTOR SHEET NO.	
7 OF 15	
DWG. NO.	
REVISION	DATE
0	04/18/2022



REFERENCES					REVISIONS					REVISIONS					
DWG. NO.	TITLE	NO.	BY	CHKD.	APP.	CLIENT	DATE	DESCRIPTION	NO.	BY	CHKD.	APP.	CLIENT	DATE	DESCRIPTION

CEMEX
 CEMEX, INC.
 5134 UTE HIGHWAY
 LONGMONT, CO, 80503
 713-722-6078



	SPECIAL USE PERMIT (SUP) BOUNDARY
	EXISTING ROAD
	EXISTING QUARRY ROAD
	EXISTING DRAINAGE
	EXISTING EASEMENT
	EXISTING MAJOR CONTOUR (50' INTERVAL)
	EXISTING MINOR CONTOUR (10' INTERVAL)
	PL EXISTING PIPELINE
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	PROPOSED GRADING BOUNDARY
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	MINING AREA
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NOTES

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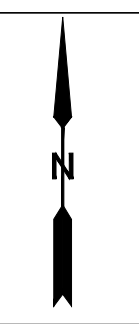
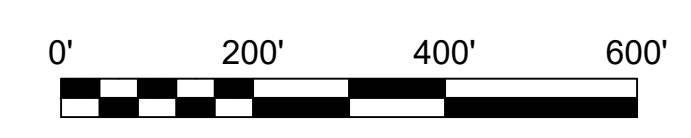
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DOWE FLATS QUARRY

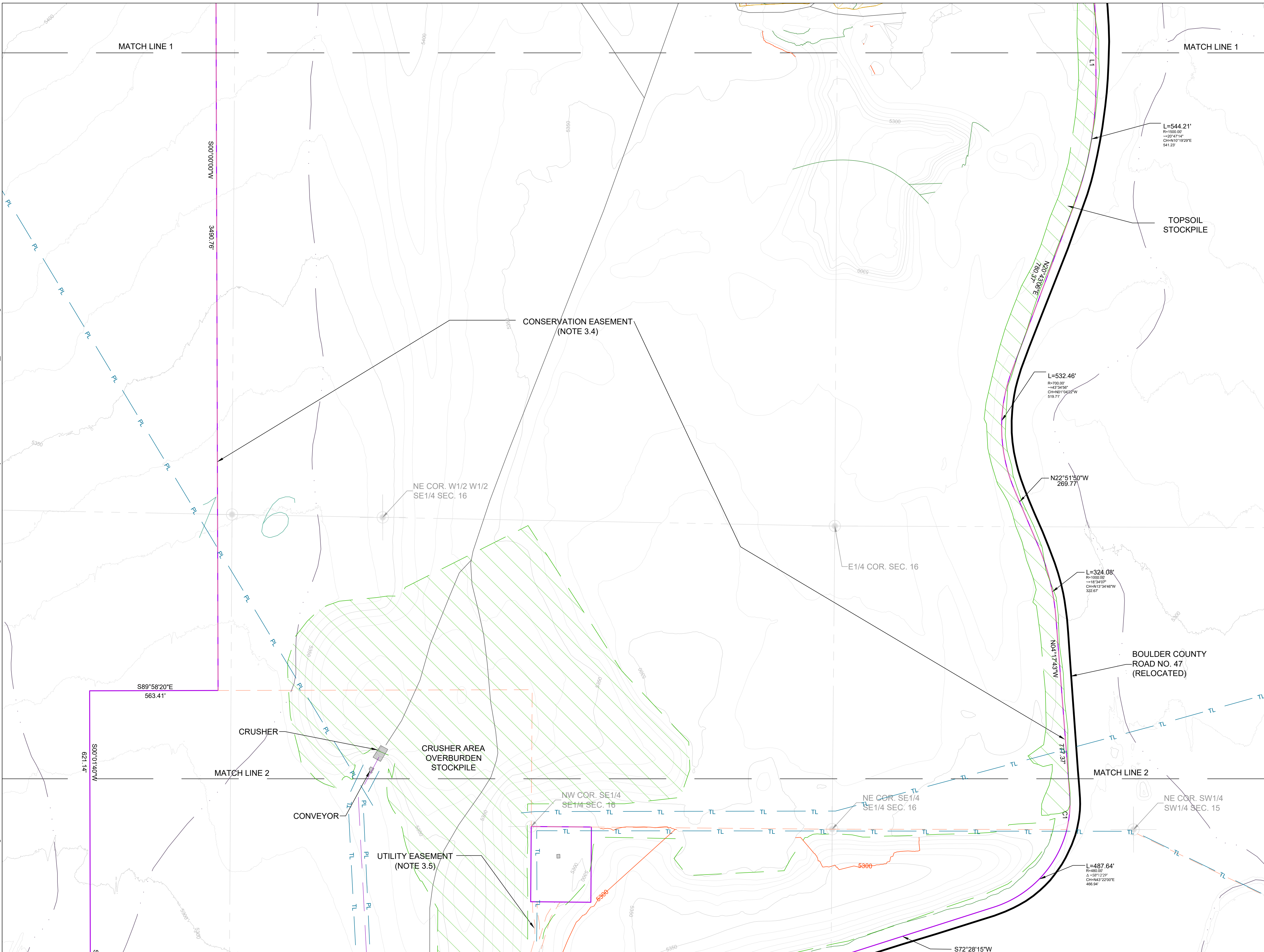
**DOWE FLATS QUARRY
MINING PLAN
NORTH SECTION**

CONTRACTOR SHEET NO.	
8 OF 15	
DWG. NO.	
REVISION	DATE
0	04/18/2022



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CEMEX
 CEMEX, INC.
 5134 UTE HIGHWAY
 LONGMONT, CO, 80503
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LEGEND

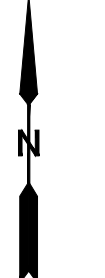
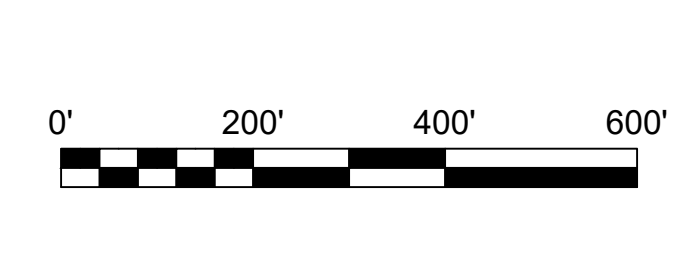
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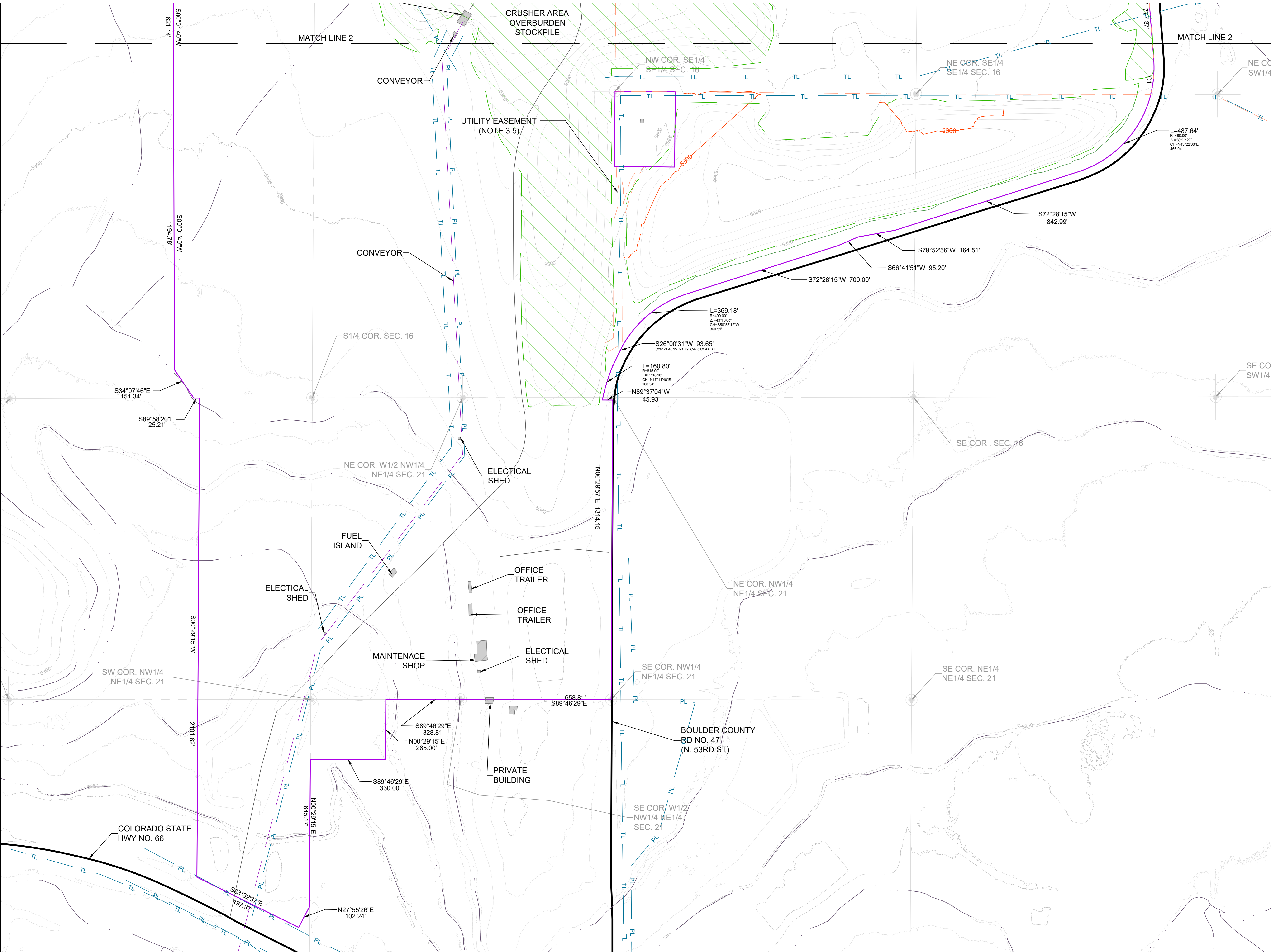
DOWE FLATS QUARRY

**DOWE FLATS QUARRY
MINING PLAN
CENTER SECTION**

CONTRACTOR SHEET NO.
9 OF 15

REVISION DATE
0 04/18/2022

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- SPECIAL USE PERMIT (SUP) BOUNDARY
- EXISTING ROAD
- EXISTING QUARRY ROAD
- EXISTING DRAINAGE
- - - EXISTING EASEMENT
- EXISTING MAJOR CONTOUR (50' INTERVAL)
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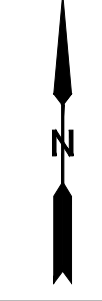
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DOWE FLATS QUARRY

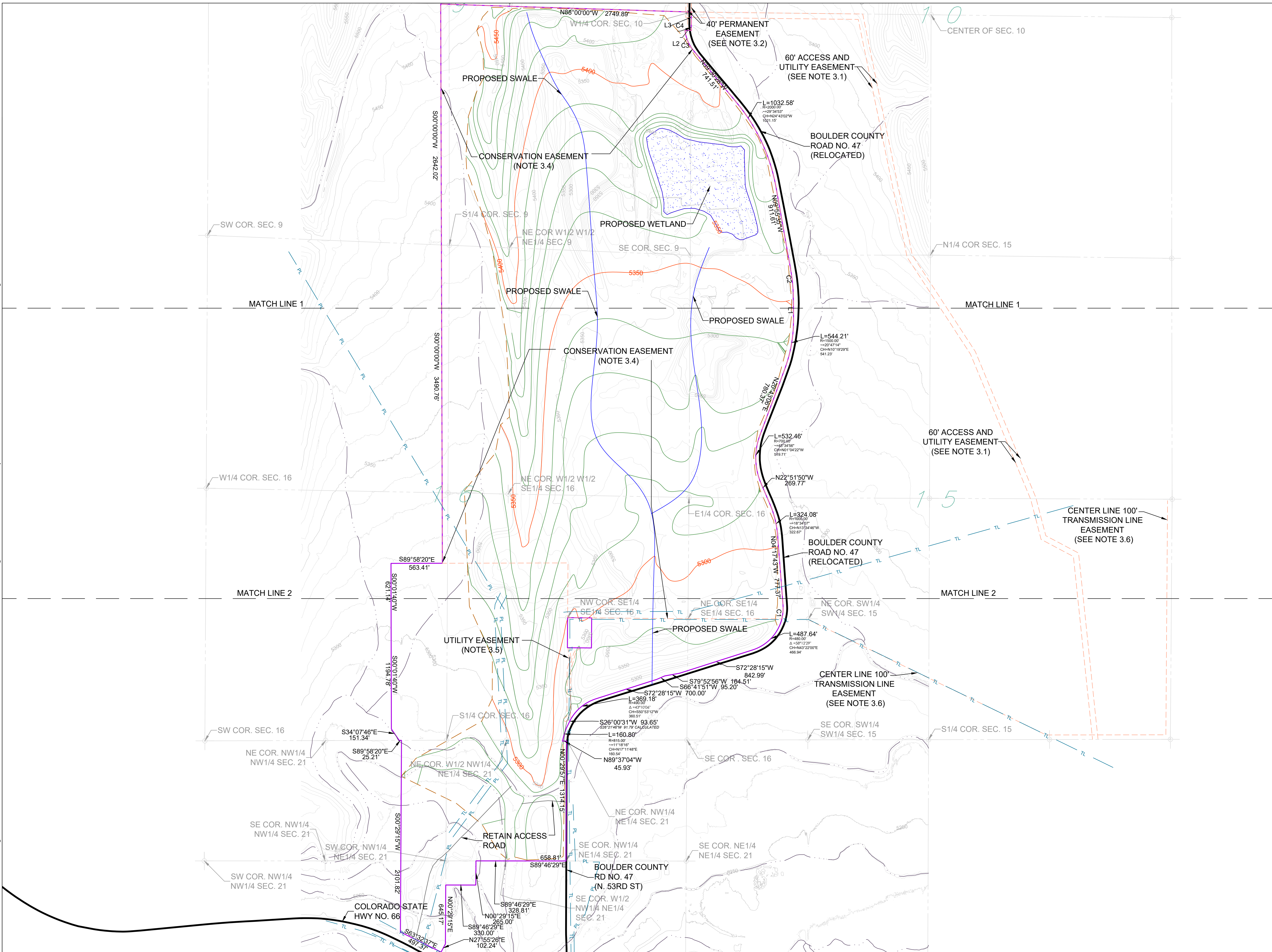
**DOWE FLATS QUARRY
MINING PLAN
SOUTH SECTION**

CONTRACTOR SHEET NO.	
10 OF 15	
DWG. NO.	
REVISION	DATE
0	04/18/2022



REFERENCES		REVISIONS					REVISIONS								
DWG. NO.	TITLE	NO.	BY	CHKD.	APP.	CLIENT	DATE	DESCRIPTION	NO.	BY	CHKD.	APP.	CLIENT	DATE	DESCRIPTION

CEMEX
 CEMEX, INC.
 5134 UTE HIGHWAY
 LONGMONT, CO, 80503
 713-722-6078



- SPECIAL USE PERMIT (SUP) BOUNDARY
- EXISTING ROAD
- ACCESS ROAD
- EXISTING DRAINAGE
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- PROPOSED SWALE OR DRAINAGE
- PROPOSED WETLAND

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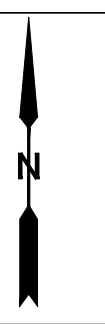
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DOWE FLATS QUARRY

**DOWE FLATS QUARRY
FINAL RECLAIMED CONDITION
OVERVIEW MAP**

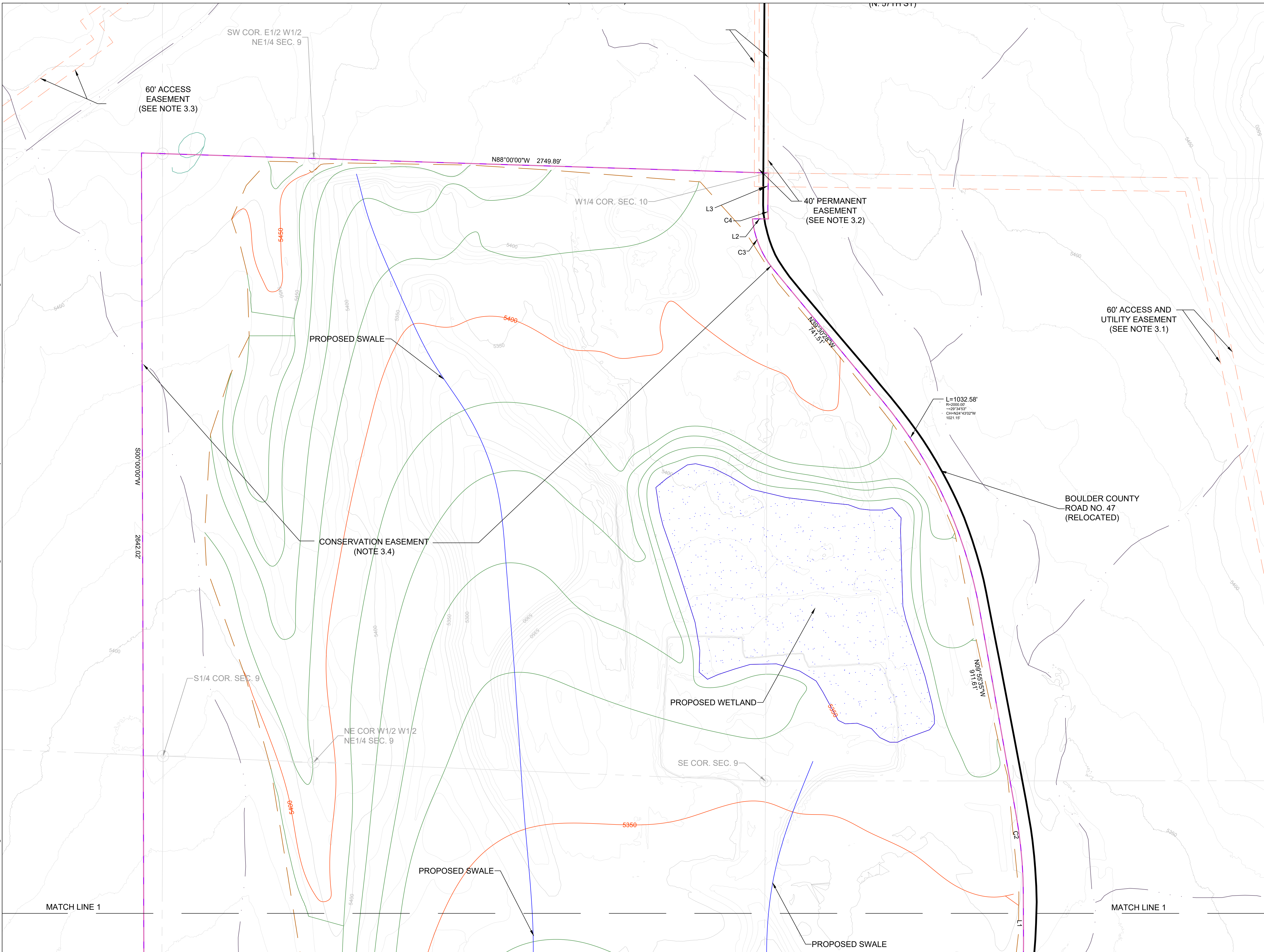
CONTRACTOR SHEET NO. 11 OF 15	
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REFERENCES						REVISIONS						REVISIONS					
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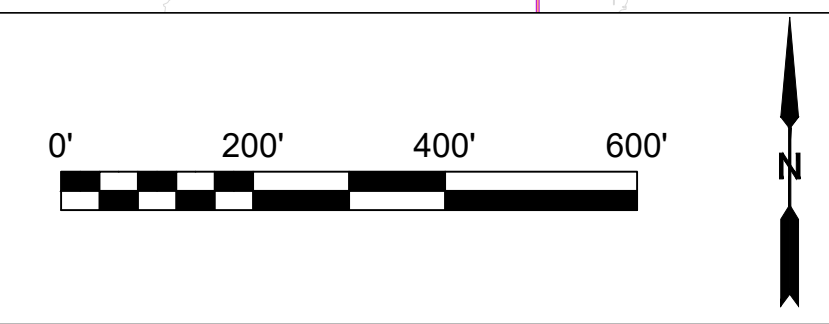
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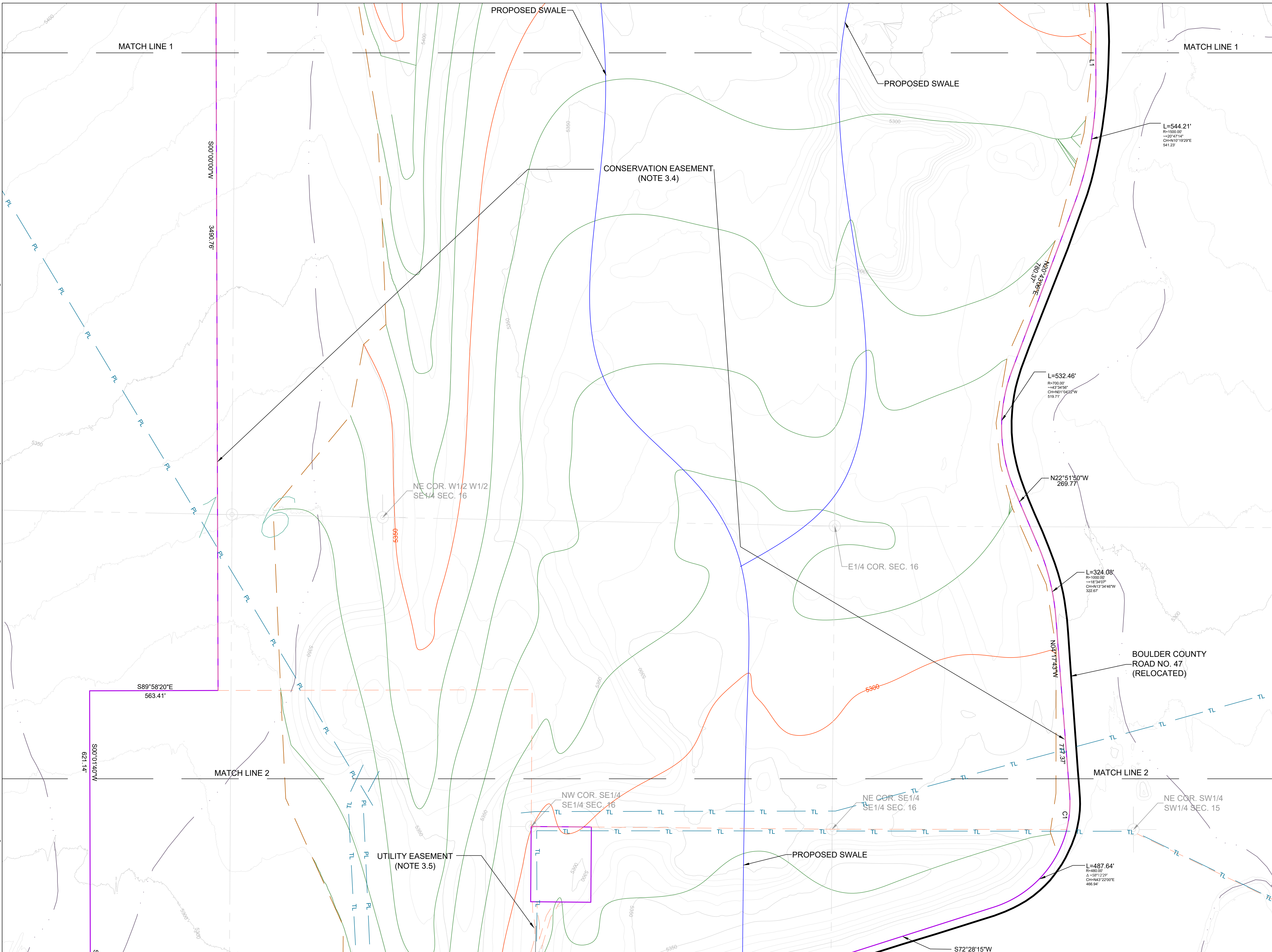
DOWE FLATS QUARRY

**DOWE FLATS QUARRY
FINAL RECLAIMED CONDITION
NORTH SECTION**

CONTRACTOR SHEET NO.
12 OF 15

DWG. NO.

REVISION DATE
0 04/18/2022



	SPECIAL USE PERMIT (SUP) BOUNDARY
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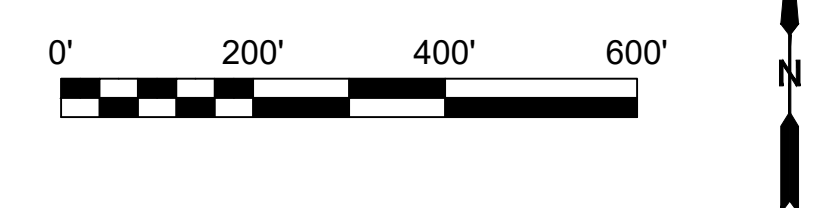
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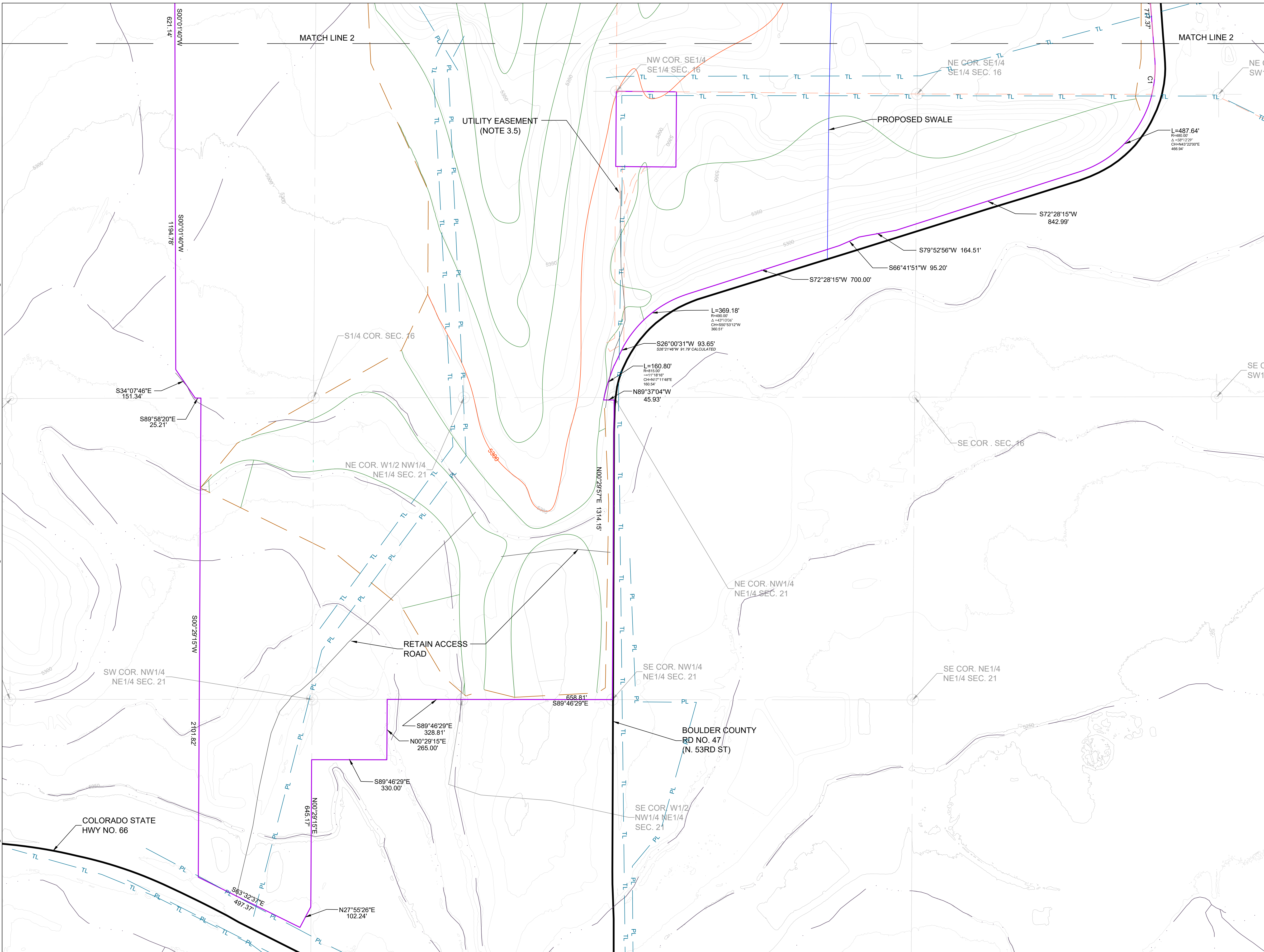
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DOWE FLATS QUARRY		CONTRACTOR SHEET NO. 13 OF 15
DOWE FLATS QUARRY FINAL RECLAIMED CONDITION CENTER SECTION		DWG. NO.
REVISION	DATE	
0	04/18/2022	

REFERENCES					REVISIONS					REVISIONS					
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LINE	LENGTH	BEARING	
L1	218.20	N00°04'00"W	
L2	70.50	S89°37'09"E	
L3	152.30	N00°59'12"E	

CURVE TABLE					
CURVE	LENGTH	RADIUS	DELTA	BEARING	CHORD LENGTH
C1	155.73	480.00	18°35'21"	N04°59'58"E	155.05
C2	344.09	2000.00	9°51'28"	N04°59'52"W	343.66
C3	246.83	420.00	33°40'21"	N22°40'17"W	243.29
C4	49.31	350.00	8°04'19"	N03°02'57"W	49.27

3. EASEMENT INFORMATION: RECORD NUMBERS ASSOCIATED HAVE BEEN PULLED FROM TITLE COMMITMENT DOCUMENTATION.
 - 3.1. 60' ACCESS AND UTILITY EASEMENT REC. NO. 1028294 AND 01605054. OWNER: DOLLAGHAN
 - 3.2. 40' PERMANENT EASEMENT REC. NO. 2101052. OWNER: COUNTY OF BOULDER
 - 3.3. 60' WIDE EASEMENT FOR INGRESS & EGRESS FOR ACCESS FROM BOUNTY ROAD NUMBER 47.
 - 3.4. CONSERVATION EASEMENT REC. NO. 2308605 & 2577192. OWNER: COUNTY OF BOULDER
 - 3.5. UTILITY EASEMENT REC. NO. 2186003. OWNER: POUFRE VALLEY RURAL ELECTRIC ASSOCIATES, INC.
 - 3.6. TRANSMISSION LINE EASEMENT REC. NO. 965876. OWNER: POUFRE VALLEY RURAL ELECTRIC ASSOCIATES, INC.
4. UTILITY LOCATIONS NOT VERIFIED.
5. FACILITY LOCATIONS DIGITIZED FROM AERIAL PHOTOGRAPHY.

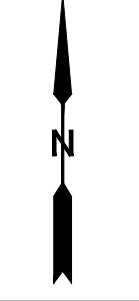
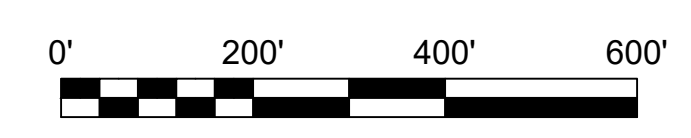
WATER & EARTH TECHNOLOGIES
 40504 WELD COUNTY RD 17
 SEVERANCE, CO, 80524
 (970) 225-6080
 WWW.WETEC.US

**PRELIMINARY
NOT FOR
CONSTRUCTION**

DOWE FLATS QUARRY

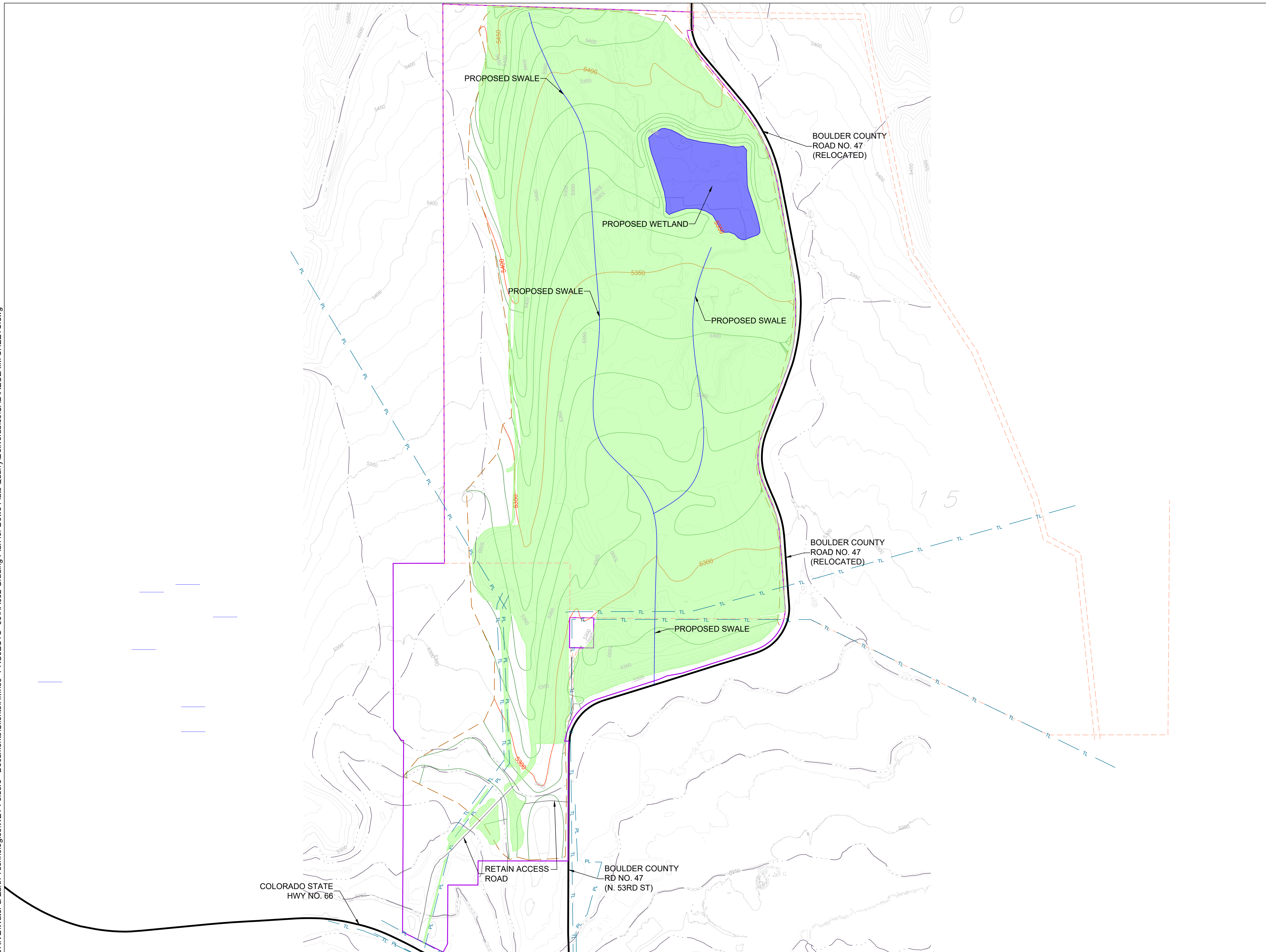
**DOWE FLATS QUARRY
FINAL RECLAIMED CONDITION
SOUTH SECTION**

CONTRACTOR SHEET NO. 14 OF 15	
DWG. NO.	
REVISION	DATE
0	04/18/2022



REFERENCES		REVISIONS						REVISIONS							
DWG. NO.	TITLE	NO.	BY	CHKD.	APP.	CLIENT	DATE	DESCRIPTION	NO.	BY	CHKD.	APP.	CLIENT	DATE	DESCRIPTION

CEMEX
 CEMEX, INC.
 5134 UTE HIGHWAY
 LONGMONT, CO, 80503
 713-722-6078



- SPECIAL USE PERMIT (SUP) BOUNDARY
- EXISTING ROAD
- ACCESS ROAD
- - - EXISTING DRAINAGE
- - - EXISTING EASEMENT
- EXISTING MAJOR CONTOUR (50' INTERVAL)
- EXISTING MINOR CONTOUR (10' INTERVAL)
- PL EXISTING PIPELINE
- TL EXISTING TRANSMISSION LINE (OVERHEAD)
- PROPOSED MAJOR CONTOUR (50' INTERVAL)
- PROPOSED MINOR CONTOUR (10' INTERVAL)
- PROPOSED SWALE OR DRAINAGE
- FINAL RECLAIMED GRASSLAND AREAS
- FINAL RECLAIMED WETLAND AREAS

NOTES

1. FINAL RECLAIMED GRASS LAND AREAS WILL BE SEEDED WITH THE GRASSLAND MIXTURE DESCRIBED BELOW
2. FINAL WETLAND AREAS WILL BE SEEDED WITH THE HERBACEOUS WETLAND MIXTURE DESCRIBED BELOW.

Table E-1. Plant Material Mixes - Grassland

Scientific Name	Common Name - Variety	Seeding Rate (PLS b/ac)	
		Drill	Broadcast
GRASSES			
Elymus lanceolatus	thickspike wheatgrass - Critana	0.4	1
Pseudoroegneria spicata	bluebunch wheatgrass - Whitmar	2.2	5.5
Elymus lanceolatus	streambank wheatgrass - Sodar	0.6	1.5
Pascopyrum smithii	western wheatgrass - Arriba	1.5	3.8
Pseudoroegneria spicata	bluebunch wheatgrass - Secar	1.9	4.8
Bouteloua curtipendula	sidecoats grama - Vaughn	0.9	2.3
Bouteloua gracilis	blue grama - Native, Alma	0.2	0.5
Bouteloua dactyloides	buffalograss	2.9	7.3
Festuca arizonica	Arizona fescue - Redondo	0.6	1.5
Koeleria macrantha	prairie Junegrass	0.03	0.08
Achnatherum hymenoides	Indian ricegrass - Nezap, Paloma	1.9	4.8
Poa secunda	Sandberg bluegrass	0.2	0.5
Schizachyrium scoparium	little bluestem - Blaze, Pastura	1.0	2.5
Hesperostipa comata	needle and thread	1.4	3.5
Nassella viridula	green needlegrass - Lodorn	0.9	2.3
FORBS			
Achillea lanulosa	common yarrow	0.01	0.03
Eurybia glauca	glaucous aster	0.06	0.15
Coreopsis tinctoria	golden tickseed	0.03	0.08
Heliomeris multiflora	showy goldeneye	0.03	0.08
Linum lewisii	Lewis flax	0.11	0.28
Medicago sativa	alfalfa - Ladak	0.16	0.4
Penstemon palmeri	Palmer's penstemon - Cedar	0.05	0.13
Dalea purpurea	purple prairie clover - Kanab	0.11	0.28
Ratibida columnifera	upright prairie coneflower	0.03	0.08
Sphaeralcea coccinea	scarlet globemallow	0.06	0.15
TOTAL		17.28	43.54

Table E-2. Plant Material Mixes - Herbaceous Wetland

Scientific Name	Common Name - Variety	Seeding Rate (PLS b/ac)	
		Drill	Broadcast
GRASSES			
Asclepias incarnata	swamp milkweed	N/A	0.25
Schoenoplectus maritimus	alkali bulrush	N/A	2
Typha latifolia	broadleaf cattail	N/A	2
TOTAL			4.25

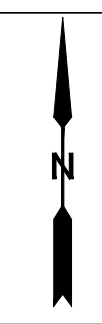
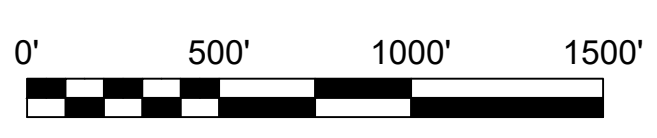
WATER & EARTH TECHNOLOGIES
 40504 WELD COUNTY RD 17
 SEVERANCE, CO, 80524
 (970) 225-6080
 WWW.WETEC.US

**PRELIMINARY
 NOT FOR
 CONSTRUCTION**

DOWE FLATS QUARRY

**DOWE FLATS QUARRY
 FINAL RECLAIMED AREA**

CONTRACTOR SHEET NO. 15 OF 15	
DWG. NO.	
REVISION	DATE
0	04/18/2022



REFERENCES						REVISIONS						REVISIONS					
DWG. NO.	TITLE	NO.	BY	CHKD.	APP.	CLIENT	DATE	DESCRIPTION	NO.	BY	CHKD.	APP.	CLIENT	DATE	DESCRIPTION		





LAND SERVICES
OIL AND GAS TITLE

P.O. Box 336337
Greeley, CO 80633

Phone (970) 351-0733
Fax (970) 351-0867

LIST OF MINERAL OWNERS AND MINERAL LESSEES for NOTIFICATION
(CEMEX Inc. Property)

Subject Property:

Township 3 North, Range 70 West, 6th P.M., Boulder County, CO
Sections 9, 10, 15, 16 and 21: Those tracts of lands being more particularly
described on Exhibit A

Zeren Land Services, an oil and gas title research company, states that to the best of its knowledge the following is a true and accurate list of the names and addresses of the mineral owners and mineral leasehold owners entitled to notice under the Surface Development Notification Act, Colorado Revised Statutes §24-65.5-101, *et seq.* in the Subject Property based upon the records of the Boulder County Assessor and Clerk Recorder as of September 7, 2021 at 7:45 a.m.:

Mineral Owners:

Mineral Leasehold Owners:

First Int of Denver NA Hill Found
c/o ICG
P.O. Box 659
Wichita Falls, TX 76307

None (entitled to notice)

Estate of Paul J. Zenobia and
Frances E. Zenobia
3644 Meadow Park Loop NE
Salem OR, 97305

Dated this 20th day of September, 2021

ZEREN LAND SERVICES

By: Cynthia A. E. Zeren, CPL
Certified Professional Landman #4044

At the request of **Tetra Tech** ("Client"), Zeren Land Services, an independent land consulting firm, has prepared the foregoing list of mineral estate owners entitled to notice under the Surface Development Notification Act, Colorado Revised Statutes §24-65.5-101, *et seq.*

Zeren Land Services, searched (i) the records of the Boulder County Assessor relating to the Subject Property for persons identified therein as mineral estate owners, and (ii) the records of the Boulder County Clerk and Recorder relating to the Subject Property for recorded requests for notification in the form specified in the Surface Development Notification Act. The results of these searches are set forth above in this List of Mineral Owners Entitled to Notice. At the date of the search, the records of the Assessor and the Clerk and Recorder were posted through September 7, 2021 at 7:45 A.M.

Zeren Land Services, agreed to prepare this listing for the Client only if the Client agreed that the liability of Zeren Land Services, would be strictly limited to the amount paid by the Client for such services. Zeren Land Services, makes no warranty, express, implied or statutory, in connection with the accuracy, completeness or sufficiency of such listing of mineral estate owners. In the event the listing proves to be inaccurate, incomplete, insufficient or otherwise defective in any way whatsoever or for any reason whatsoever, **the liability of Zeren Land Services, shall never exceed the actual amount paid by Client to Zeren Land Services**, for the listing.

In order to induce Zeren Land Services, to provide such services, **Client further agreed to indemnify and hold Zeren Land Services, its managers, members and employees, harmless from and against all claims by all persons (including, but not limited to Client) of whatever kind or character arising out of the preparation and use of each such listing of mineral estate owners, to the extent that such claims exceed the actual amount paid to Client by Zeren Land Services, for such listing.** Client specifically intends that both the foregoing limitation on liability and foregoing indemnification shall be binding and effective without regard to the cause of the claim, inaccuracy or defect, including, but not limited to, breach of representation, warranty or duty, any theory of tort or of breach of contract, or the fault or negligence of any party (including Zeren Land Services) of any kind or character (regardless of whether the fault or negligence is sole, joint, concurrent, simple or gross). **Client's use of this listing evidences Client's acceptance of, and agreement with, this limitation on liability and the indemnification.**

Date: September 20, 2021

ZEREN LAND SERVICES

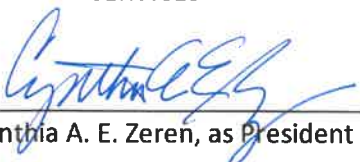
By: 
Cynthia A. E. Zeren, as President

EXHIBIT A

Township 3 North, Range 70 West, 6th P.M.

Sections 16 & 21: Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and Outlots A and B, Dowe Flats Estates, according to the Subdivision Exemption Plat thereof recorded April 16, 2004 at Reception No. 2577189, being a part of the S½ of Section 16 and the N½ of Section 21

AND;

Township 3 North, Range 70 West, 6th P.M.

Sections 15 & 16: A parcel of land located in Sections 15 and 16, being more particularly described as follows:

Commencing at the Southeast corner of Section 16 whence the South Quarter corner of Section 16 bears North 89°53'89" West 2636.34 feet, said line forming the basis of bearings for this description; thence along the East line of the c of Section 16, North 00°39'56" East 1329.84 feet to the Northwest corner of the SW¼SW¼ of Section 15 and the True Point of Beginning;

Thence along the North line of the SW¼SW¼ of Section 15, South 89°46'36" East 1029.62 feet to the westerly line of a parcel of land described by Deed recorded at Reception No. 1607221 of Boulder County Records; thence along said westerly line the following seven (7) courses ;

- 1) Along the arc of a curve to the right (said curve having a radius of 480.00 feet, a central angle of 58°12'29", chord of said arc bears South 43°21'02" West 466.94 feet) a distance of 487.64 feet;
- 2) South 72°27'17" West 842.99 feet;
- 3) South 79°51'58" West 164.51 feet;
- 4) South 66°40'53" West 95.20 feet;
- 5) South 72°27'17" West 700.00 feet;

thence along the arc of a curve to the left (said curve having a radius of 490.00 feet, a central angle of 43°10'06", chord of said arc bears South 50°52'14" East 360.51 feet) a distance of 369.18 feet;

thence along the arc of a curve to the left (said curve having a radius of 815.00 feet, a central angle of 6°35'15", chord of said arc bears South 25°59'33" West 93.65 feet) a distance of 93.70 feet to the West line of the SE¼SE¼ of Section 16;

thence along the East line of the SE¼SE¼ of Section 16, North 00°34'36" East 872.57 feet to the Southwest corner of that tract of land described by Deed recorded under Reception No. 1668922; thence along South and East line of said tract the following two courses:

- 1) South 89°19'41" East 264.08 feet;
- 2) North 00°33'47" East 330.00 feet to the North line of the Southeast Quarter of the Southeast Quarter of Section 16; thence South 89°19'41" East 1056.19 feet to the True Point of Beginning.

AND ;

Township 3 North, Range 70 West, 6th P.M.

Sections 9, 10, 15 & 16: A tract of land located in Sections 9, 10, 15 and 16, described as follows:

Commencing at the South Quarter Corner of said Section 9 from which the Southeast Corner of said Section 9 bears S87°27'25"E, 2644.89 feet, thence North 87°28'55" West, 86.80 feet along the South line of SW¼ of said Section 9 to the True Point of Beginning;

Thence South 00°00'00" West, 3490.76 feet;

Thence South 89°58'20" East, 1377.93 feet to the West line extended Northerly of the SE¼SE¼ of said Section 16;

Thence South 00°34'45" West, 600.00 feet along the West line extended Northerly of the SE¼SE¼ of said Section 16 to the Northwest Corner of the SE¼SE¼ of said Section 16;

Thence South 89°18'43" East, 1320.20 feet along the North line of the SE¼SE¼ of said Section 16 to the Northeast Corner thereof;

Thence South 89°45'38" East, 1028.99 feet along the North line of the SW¼SW¼ of said Section 15 to the Westerly right-of-way line of Boulder County Road No. 47 as described in Exhibit A in Special Warranty Deed recorded on Film 2126 under Reception No. 1607221 of the records of Boulder County, Colorado;

The following courses and distances are along the Westerly and Northerly right-of-way line of said Boulder County Road No. 47;

Thence Northerly, 155.73 feet along the arc of a curve concave to the West to a point of tangent, said arc having a radius of 480.00 feet, a central angle of 18°35'21" and being subtended by a chord that bears North 04°59'58" East, 155.05 feet;

Thence North 04°17'43" West, 777.37 feet to a point of curve to the left;

Thence Northwesterly, 324.08 feet along the arc of said curve to a point tangent, said arc having a radius of 1000.00 feet, a central angle of 18°34'07" and being subtended by a chord that bears North 13°34'46" West, 322.67 feet;

Thence North 22°51'50" West, 269.77 feet to a point of curve to the right;

Thence Northerly, 532.46 feet along the arc of said curve to a point tangent, said arc having a radius of 700.00 feet, a central angle of 43°34'56" and being subtended by a chord that bears North 01°04'22" West, 519.71 feet;

Thence North 20°43'06" East, 780.37 feet to a point of curve to the left;

Thence Northeasterly, 544.21 feet along the arc of said curve to a point tangent, said arc having a radius of 1500.00 feet, a central angle of 20°47'14" and being subtended by a chord that bears North 10°19'29" East, 541.23 feet;

Thence North 00°04'09" West, 218.20 feet to a point of curve to the left;

Thence Northerly, 344.09 feet along the arc of said curve to a point tangent, said arc having a radius of 2000.00 feet, a central angle of 09°51'26" and being subtended by a chord that bears North 04°59'52" West, 343.66 feet;

Thence North 09°55'35" West, 911.61 feet to a point of curve to the left;

Thence Northwesterly, 1032.58 feet along the arc of said curve to a point tangent, said arc having a radius of 2000.00 feet, a central angle of 29°34'53" and being subtended by a chord that bears North 24°43'02" West, 1021.15 feet;

Thence North 39°30'28" West, 741.51 feet to a point of curve to the right;

Thence Northwesterly, 246.83 feet along the arc of said curve, said arc having a radius of 420.00 feet, a central angle of 33°40'21" and being subtended by a chord that bears North 22°40'17" West, 243.29 feet;

Thence South 89°37'09" East, 70.50 feet to the Westerly line of that strip of land as described in Exhibit A in Special Warranty Deed recorded on Film 2126 under Reception No. 1607222;

Thence leaving the Northerly right-of-way line of said Boulder County Road No. 47, Northerly, 49.31 feet along the Westerly line of that strip of land as described in Exhibit A on said Film 2126 under Reception No. 1607222 and along the arc of a curve concave to the East to a point tangent, said arc having a radius of 350.00 feet, a central angle of 8°04'19" and being subtended by a chord that bears North 03°02'57" West, 49.27 feet;

Thence North 00°59'12" East, 152.30 feet along the West line of that strip of land as described in Exhibit A on said Film 2126 under Reception No. 1607222 to the East-West Centerline of said Section 10;

Thence North 89°10'22"W, 1.43 feet along the East-West Centerline of said Section 10 to the West Quarter Corner of said Section 10;

Thence North 88°00'00" West, 2749.89 feet along the East-West Centerline of said Section 9 to a point from which the True Point of Beginning bears South 00°00'00" West;

Thence South 00°00'00" West, 2642.02 feet to the True Point of Beginning.


**CEMEX, INC.
SECRETARY'S CERTIFICATE**

The undersigned, Mike F. Egan, Secretary of CEMEX, Inc. (the "Company"), hereby certifies as follows:

1. That he is the Secretary of the Company and that, as such officer, has knowledge of the corporate records of the Company.

2. That John V. Heffernan is the Assistant Secretary of the Company as of the date hereof, and, as such, is authorized to execute and deliver documents, agreements and deeds on behalf of the Company.

IN WITNESS WHEREOF, I have hereunto set my hand as of April 18, 2022.

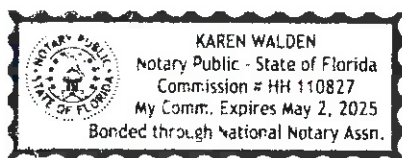


Mike F. Egan
Secretary

STATE OF Florida

COUNTY OF Palm Beach

The foregoing instrument was acknowledged before me this 18th day of April, 2022, by Mike F. Egan. He is personally known to me.





Notary Public, State of _____
My Commission Expires: _____



Public Health

Environmental Health Division

June 8, 2022

TO: Staff Planner, Land Use Department
FROM: Jessica Epstein, Environmental Health Specialist
SUBJECT: SU-22-0003: CEMEX Dowe Flats Mining and Reclamation Extension project

OWNER: CEMEX

PROPERTY ADDRESS: 13301 55th Street

SEC-TOWN-RANGE: 30 -1N -69

The Boulder County Public Health (BCPH) – Environmental Health division has reviewed the submittals for the above referenced docket and has the following comments.

AIR Quality:

1. Boulder County Public Health would be willing to support the mining extension at Dowe Flats for an additional 15 years if Cemex can commit to completing the upgrades and improvements to the plant necessary to address long standing and ongoing fugitive dust and maintenance issues. BCPH requests Cemex completes the Lyons plant upgrades. Management along with BCPH staff has identified as necessary future improvements.
 - Specifically; conveyor belt enclosures, solid closures where there are curtains, Clinker Pit improvement-enclosure with direct conveyance to the A-Frame storage (this is one of the biggest problem areas), broken baghouse detectors, paving the east haul road and improved camera surveillance of the plant.

This concludes comments from the Public Health – Environmental Health division at this time.

Cc: owner, Community Planning & Permitting

TO: Pete L'Orange
FROM: Jeff Moline, Senior Planner
RE: Referral Comments on SU-22-0003 CEMEX Dowe Flats Mining Extension
DATE: June 10, 2022

Summary

Boulder County Parks & Open Space (POS) appreciates the opportunity to provide comments on this proposal as it impacts and intersects the open space properties that we manage. According to the application, the proposed mining at Dowe Flats will not extend outside the current disturbance area, rather it will result in mining deeper in the existing footprint. Therefore, the additional disturbance to environmental, cultural, and open space resources is limited. However, because the 15-year extension of mining activity does lengthen the 30-year life of the mine to 45 years, it does prolong the disturbance to the site along with some impacts to nearby lands. For example, instead of getting the site reclaimed and returned to a more natural area in the next few years, those opportunities would be put off to the future and the impacts to wildlife species such as ungulates will remain for a longer duration. Additionally, the mine does create impacts to scenic views from Rabbit Mountain, this proposal would prolong those impacts.

At the same time, the post-approval commitments that CEMEX has proposed have important benefits as well. These are detailed in their May 2, 2022 letter to Dale Case. These include the conclusion of plant operations on the same 15-year timeframe of the mine operation, the dedication of a non-exclusive trail easement for the St. Vrain Greenway Trail through the property, the option to purchase additional lands in the future around both the mine and plant sites, and finally monetary savings and income through modification of existing lease and option agreements.

POS does have the following significant comments about the application as well as recommended conditions of approval, numbered below.

Cultural Resources

Since the mining expansion is occurring in an area already disturbed, no new cultural surveys are necessary at this time.

1. The 1994 Cultural Resource Management Plan shall remain active for the entirety of mining operations. This includes the annual monitoring required in the Cultural Resources Management Plan (pp.12).
2. The applicant shall provide a written narrative statement of how the 1994 Cultural Resources Management Plan was followed and will continued to be followed.
3. The applicant shall supply POS with copies of all cultural monitoring plans and reports generated during mine operation.

Real Estate:

4. The applicant shall sign a real estate option or other agreement (“New Agreement”) that comprehensively documents the applicant’s commitments in the application to grant Boulder County options to acquire land and easements from the applicant. The New Agreement shall include all water rights appurtenant to all water rights appurtenant to the option properties and reclamation requirements arising from this application, must be acceptable to the county in its

sole discretion, and shall supersede and replace that certain Purchase Agreement, Lease and Option to Purchase dated July 11, 2002, recorded July 17, 2002, at Reception #2308598 in the office of the Clerk & Recorder of Boulder County.

Site Plans:

5. The applicant shall ensure all site monitoring reports (air, water, wildlife, noise, etc.) required by Boulder County and the State of Colorado Division of Mining, Reclamation and Safety are submitted to POS.
6. POS may like to see utility lines that have been extended to the site, remain for potential future use by landowners and managers. POS requests that the applicant leave utility lines stubbed and located after land transfer but ensure that all buildings are removed.

Plant and Wildlife Resources:

Staff reviewed the mining and reclamation plans. They are very conceptual at this stage of review, but include wetlands creation. Staff does not support the creation of wetlands and open water features in the reclamation plan for a variety of reasons. First, staff finds that returning the site as much as possible to its pre-mine landscape is the best for long-term ecosystem sustainability. The area was a grassland with associated wildlife, returning the site to that environment is best for the site and adjacent properties. Grassland reclamation of the site fits better into the landscape. Staff does not find that the ‘varied’ topographical reclamation proposed in the application will benefit wildlife. Grasslands are the most threatened habitat type in our region and are highly diverse overall. POS does support small enhancements in the reclamation plan, including some small shale outcrop ridges and rocky sites that may support a diverse suite of native plant species, including the endemic *Physaria bellii*. However, slopes should be less than 3:1 for ensuring adequate reclamation and minimizing erosion. Staff is not aware of any evidence that bats are utilizing open water on or immediately adjacent to the site currently. Secondly, staff is concerned about water rights associated with the constructed wetland. For example, if the created wetland intercepted groundwater, the subsequent land manager will need water rights adequate for augmenting the evaporative loss. The applicant should explain in more detail its proposed relationship with Greenwood Wildlife Rehabilitation Center, it is unclear how this partnership would utilize the mine site, reclaimed areas, and/or county open space in the future.

7. POS recommends the development of grassland reclamation plan, consistent with the approved reclamation plan and reflective of the pre-mine vegetative potential of the site.
8. The applicant shall submit a final reclamation plan for review by POS at least six months prior to December 31, 2037. POS may request modifications to the plan and the applicant shall make good faith reasonable efforts to incorporate POS’ requests into the final reclamation plan.
9. Comments specific to the reclamation seed mix.
 - A. Remove alfalfa from Grassland Seed Mix, unless required by CO DRMS for a nitrogen fixing forb. Could be replaced with *Hedysarum boreale* if necessary.
 - B. Remove *Festuca arizonica* from mix. Not native to area. Either adjust other rates or substitute with another spp. like Squirreltail, *Elymus elymoides*, var. Pueblo if possible.
 - C. Remove *Penstemon palmeri* from mix, not native to area. Substitute with *Penstemon secundiflorus* or *Penstemon virgatus*, or *Penstemon strictus* as last resort.

- D. Herbaceous wetland mix – remove broadleaf cattail and substitute with hardstem bulrush (*Schoenoplectus tabermontanei*), and/or other *Carex* and *Juncus* spp. to be determined by CEMEX and BCPOS depending on final hydrology if this is approved.

10. The applicant should provide POS the document titled Dowe Flats Management and Monitoring Plan.



Parks & Open Space

5201 St. Vrain Road • Longmont, CO 80503
 303-678-6200 • POSinfo@bouldercounty.org
 www.BoulderCountyOpenSpace.org

TO: Pete L'Orange, Community Planning & Permitting Department
FROM: Ron West, Natural Resource Planner
DATE: June 14, 2022
SUBJECT: Docket SU-22-0003, CEMEX Dowe Flats Mining and Reclamation Extension

Staff has reviewed the submitted materials, and has visited both the mine and the plant site several times in the past.

County Comprehensive Plan Designations

The parcel has the following designations in the Boulder County Comprehensive Plan.

- Adjacent to County Open Space – Dowe Flats property, on west, north, and east
- Environmental Conservation Area – Rabbit Mountain
- High Biodiversity Area – Rabbit Mountain; ranked “B1,” of outstanding significance; limited on parcel
- Natural Area – Rabbit Mountain; limited on parcel
- View Protection Corridor
- Nearby Agricultural Ditches – Supply, Highland, Rough & Ready, Palmerton
- Nearby Critical Wildlife and Preble’s Meadow Jumping Mouse habitats – on St. Vrain Creek, and ditches

Discussion

In general, staff agrees with the application’s premise that impacts to natural resources would not significantly *change*, because: A) the Dowe Flats active mining footprint would not be modified; and B) future impacts can be interpreted as a continuation of existing, previously-approved, conditions and impacts.

Additionally, if the proposal is approved with the “mitigating” commitments noted in the CEMEX letter from John Heffernan to Dale Case, dated May 2, 2022, *long-term* public benefits would significantly increase due to payment changes and the public disposition of many parcels after mining and plant closure.

However, staff does have concern with some of the application’s discussions on the special use review criteria – the “Review Criteria Statement.”

Page 1. The application divides the compatibility question into two arenas – the existing mine, and its future reclaimed condition. Staff questions whether the newly-proposed reclamation concept would be compatible with the surrounding area. Pre-mining, the site was

mixed grass prairie with minimal topographical features. The newly-proposed reclamation concept would introduce a headwall and a pond/wetland, among other features. These do not seem compatible with the pre-mine environment, and are thus likely not compatible with the surrounding area.

If the mine extension proposal is not approved, the details of final reclamation would be of immediate concern. However, if the mine life is extended, there would be abundant time to reach agreements between the applicant, the state, and the county for what the final reclamation plan would include.

The application states that the newly-proposed reclamation plan would, "...result in the site being reclaimed with established, healthy vegetation *much sooner* because existing landforms on the site that have already been reseeded and contain very well-established, healthy vegetation could be preserved" (emphasis added).

While ostensibly true, whatever final reclamation conditions are eventually agreed upon, they would result in *permanent* conditions -- what the site will look like for the indefinite future. It is important that whatever these conditions are to be, that they are determined to be the most appropriate conditions, with agreement by the county and state. That such conditions may take additional years to be reached – by re-working temporarily established vegetation – is not relevant.

Indeed, on the south side of the highway is a huge, artificial landform – a ridge-like feature of overburden deposition about a half-mile long and 130-feet tall. This is the result of earlier, 1970's mining on the south side of the highway. In the 1970's, such a landform was deemed appropriate as a final condition of reclamation. It is almost certain that such a large artificial landform would not be approved today, but this feature is now a permanent and unchangeable part of the county.

In other words, we need to get the reclamation of Dowe Flats "right."

Page 3. In this section, the application lists about 20 goals and policy statements, discussing whether the proposal would be in accordance with the Comprehensive Plan. Staff could question several of the application's responses to these goals and policy statements, though most are outside of staff's purview. Just one environmental topic is included here. Page 5 defines an environmental resource as "...any material, service, or information from the environment that is valuable to society," and that therefore, "The limestone and shale existing at the site are an environmental resource...requiring extraction to utilize their benefits...." Standard ecological understanding is that mined material is a non-renewable, natural *resource*, yes, but to argue that mining the commodity is therefore beneficial to the environment is inappropriate to a reasonable discussion of the issue.

Page 2 of the Development Report, Cultural Resources – The fact that some lands, designated as Archeologically Sensitive Areas, would be removed from the permit boundary is moot since all mining activities need to comply with the Cultural Resource Management Plan, regardless.

Recommendations

- The above discussion should be considered during review.
- It is unclear if the 15-year timeframe – for both the mine and the plant sites – includes structure removal and revegetation. In other words, would revegetation of the sites be finalized in the year 2037, or would the process of final revegetation *begin* in 2037?
- There is a plugged/abandoned oil & gas well near the center of the subject parcel. Based on aerial photography, this area has been disturbed. Given the regular blasting from on-going mining, and the potential for more blasting, the condition and efficacy of the plugged well should be investigated. This should occur after mining operations cease and before the land's final disposition.
- Since the mine would excavate additional deposits, staff assumes that additional overburden would need to be temporarily stockpiled on the surface. Where would this be placed? Should such details be addressed under the state's mining permit?
- Staff defers to the POS-specific referral for detailed natural resource comments such as reclamation recommendations.



Community Planning & Permitting

Courthouse Annex • 2045 13th Street • Boulder, Colorado 80302 • Tel: 303-441-3930
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.BoulderCounty.org

June 13, 2022

TO: Pete L'Orange, Planner II; Community Planning & Permitting, Development Review Team - Zoning

FROM: Jennifer Severson, Principal Planner; Community Planning & Permitting, Development Review Team – Access & Engineering

SUBJECT: Docket # SU-22-0003: CEMEX Dowe Flats Mining & Reclamation Extension
13301 55th Street

The Development Review Team – Access & Engineering staff has reviewed the above referenced docket and has the following comments:

1. The subject property is accessed via State Highway 66 (SH 66), also known as Ute Highway, a Colorado Department of Transportation (CDOT) owned and maintained right-of-way (ROW). Legal access has been demonstrated via adjacency to this public ROW.
2. Staff concurs with the trip generation estimates provided in the Pre-Application Methodology Statements (PAMS) dated October 17, 2021 (attached) of approximately 20 Average Daily Trips (ADT) being generated by the continued mining and reclamation use on the subject property. Staff does not anticipate the mining and reclamation use will have negative impacts to the surrounding transportation network.
3. Staff has no concerns with the continued use of the subject property for mining and reclamation activities.

This concludes our comments at this time.



Community Planning & Permitting

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 Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

MEMO TO: Referral Agencies
 FROM: Pete L'Orange, Planner II
 DATE: May 6, 2022
 RE: Docket SU-22-0003

Docket SU-22-0003: CEMEX Dowe Flats Mining and Reclamation Extension

Request: Special Use/Site Specific Development Plan review to amend an existing Special Use approval (SU-93-14) for limestone/shale open mining/quarrying located at the Dowe Flats Quarry, extending approved mining activities for an additional 15 years; the original permit area of 1,911 acres to be reduced to 709 acres; the concluding of cement plant operations at the facility located south of Highway 66 within the same 15-year timeframe; with concurrent reclamation of wildlife habitat.

Location: 13301 55th Street, Parcel #120316000050, located approximately 0.5 mile north of the intersection of N. 53rd Street and state Highway 66, in Sections 9, 10, 15, and 16, Township 3N, Range 70W.

Zoning: Agricultural (A)

Applicant/Owner: Cemex Inc., c/o John Heffernan

Agent: Pam Hora, Tetra Tech Inc.

Special Use Review / Site Specific Development Plan is required of uses which may have greater impacts on services, neighborhoods, or environment than those allowed with only Building Permit Review. This process will review compatibility, services, environmental impacts, and proposed site plan.

This process includes public hearings before the Boulder County Planning Commission and the Board of County Commissioners. Adjacent property owners and holders of liens, mortgages, easements or other rights in the subject property are notified of these hearings.

The Community Planning & Permitting staff, Planning Commission, and County Commissioners value comments from individuals and referral agencies. Please check the appropriate response below or send a letter to the Community Planning & Permitting Department at P.O. Box 471, Boulder, Colorado 80306 or via email to planner@bouldercounty.org. All comments will be made part of the public record and given to the applicant. Only a portion of the submitted documents may have been enclosed; you are welcome to call the Community Planning & Permitting Department at 303-441-3930 or email planner@bouldercounty.org to request more information. If you have any questions regarding this application, please contact me at 303-441-1418 or plorange@bouldercounty.org.

Please return responses by **June 10, 2022**.

(Please note that due to circumstances surrounding COVID-19, application timelines and deadlines may need to be modified as explained in the CPP Notice of Emergency Actions issued March 23, 2020 (see <https://boco.org/covid-19-cpp-notice-20200323>).

We have reviewed the proposal and have no conflicts.
 Letter is enclosed.

Matt Jones County Commissioner Claire Levy County Commissioner Marta Loachamin County Commissioner

Signed UJ PRINTED

Name Michael Whitley

Agency or Address Larimer County Planning - 200 W. Oak Street, Suite

Please note that all Community Planning & Permitting Department property owner's mailing lists and parcel maps are generated from records maintained by the County Assessor and Treasurer Office. We are required to use this list to send notices to the "property owner" of land in Boulder County. If you feel you should not be considered a "property owner," or if the mailing address is incorrect, contact the County Assessor's Office at (303) 441-3530.

3100
FC
80522

June 10, 2022

Pete L'Orange, Community Planning & Permitting
Boulder County Commissioners
Boulder County, Colorado

Re: SU-22-0003

Dear Commissioners and Mr. L'Orange:

On behalf of the Town of Lyons Board of Trustees, we are writing to formally request an extension of our response regarding SU-22-0003 until October 31, 2022.

Boulder County is fully aware that the town is updating its Comprehensive Plan and our timeline is to complete that process by the end of the year. As such, we have not yet heard from our community members regarding our planning and potential growth area, including the CEMEX properties involved in this application. Until we know the sentiment of our interest area, we are unable to respond to this referral comprehensively.

The town received the special use application on May 3, 2022. The Board of Trustees did not meet until May 16th and instructed that all pertinent Boards and Commissions also receive the referral packet and give feedback on the application. Most of our boards meet monthly and are just now posting and scheduling this review. A June 10th deadline was simply not enough time to get solid input for such a critical decision.

In discussions with Attorney Pearlman, we understand the county did not feel that the Town of Lyons should be involved with the negotiations as the primary discussions involved Dowe Flats. However, the town disagrees. What happens on Dowe Flats has a direct impact on what happens on the plant side, in which the town does have a formal, written agreement and interest. The decision to extend mining on the north side will/does conflict with our current Intergovernmental Agreement.

In addition to an extension for our response, we would like to request to meet with planning staff and the county commissioners to discuss the application, its impacts, further options, and future land use of this area.

We understand that an extension will create additional impacts for the county as the current mining permit expires on September 30, 2022. This, however, should not hinder the county from giving agencies who will be significantly impacted by this decision, a sufficient amount of time to respond. We have experienced a collaborative partnership with the county over the past decade and would like to continue open, honest communication with each other. We look forward to your response.

Sincerely,

Victoria Simonsen

Victoria Simonsen,
Town Administrator

DOUBLE GATEWAY
TO THE ROCKIES

TELEPHONE

303.823.6622

FACSIMILE

303.823.8257

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July 22, 2022

Pete L'Orange, Planner II
Boulder County Planning & Permitting
2045 13th Street
Boulder, CO 80302



Re: Docket SU-22-0003, CEMEX Dowe Flats Mining and Reclamation Extension

Dear Planner L'Orange,

The Town of Lyons firmly recommends that the Boulder County Planning Commission advise the Board of County Commissioners to **deny** the CEMEX mining permit extension application. Our Board of Trustees, Staff, Boards and Commissions, and community concur.

The Town further asserts that it should have been a part of the discussions between Boulder County Open Space and CEMEX as they negotiated the terms of this application, as either option contained in the application directly affects the Town's Primary Planning Area as outlined in the 2012 IGA. In addition, the entirety of CEMEX operations, both north and south of SH 66, fall directly within the Town's state-mandated 3-Mile Planning Area (*please refer to Appendix Items 3, 4, and 5*).

The Town requests that the Planning Commission advise the Board of County Commissioners to deny the application and immediately reopen negotiations between CEMEX and the County, with the Town of Lyons as an active participant. We would further advise a short-term (six-month) mining extension be put in place.

We believe there is a third option to consider, and it is one that every party can benefit from.

The Town of Lyons would be amenable to a five-year mining and plant operation extension with conditions including:

- Agreement to cease plant operations, decommission the plant and perform reclamation of the plant site and other agreed-to amenities by the end of the term;
- Renegotiation of IGA and ownership boundaries within the property; and
- Agreement to annex and rezone the plant property from General Industrial to an agreed-upon zoning classification and discuss annexation and purchase of Lyons' Primary Planning Area;
- Assessment of the two reclamation bonds for Dowe flats and the plant to ensure amounts are sufficient to cover current costs.

The Town of Lyons recommends against granting the 15-year Special Use Permit extension to the applicant for the following reasons:

- The Town does not believe that CEMEX can continue plant operations indefinitely if the SUP is extended. The current mining permit, M-1977-208, mandates that should mining operations cease north of SH 66 at the Dowe Flats quarry, the cement plant south of SH 66 in turn must be demolished and the land reclaimed to "irrigated pasture" (*please refer to Appendix Item 8 for the 2004 map filed with the*

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State of Colorado, as well as the 2002 letter from the Colorado Division of Minerals & Geology)

- Permitting and oversight is unclear.
 - If mining at Dowe Flats ceases, will the Colorado Department of Mining and Reclamation permit pertaining to both the north and south sides of the property expire?
 - What is the status of the Title V Clean Air Act expired permit? EPA Region 8 has thus far been unable to determine an answer.
 - If CEMEX will, as they say, truck in materials to process at the plant, do they require CDOT approval? What are the estimated vehicular and safety impacts? Where will the materials come from? Will this jeopardize DRCOG TIP funding?
 - The Greenhouse Gas Emissions and Energy Management for Manufacturers in Colorado¹ (GEMM) rule requires CEMEX specifically to undergo an emissions audit in 2022. The GEMM rule requires facilities that show through an audit process they are using GHG Best Available Control Technologies and Energy Best Management Practices to achieve an additional 5% reduction in their GHG emissions. Has CEMEX undertaken this audit process?
- The application does not support the 2020 Boulder County Comprehensive Plan's listed primary philosophies of
 - *Growth should be channeled to municipalities*
 - *Agricultural land should be protected*
 - *Preservation of our environmental and natural resources should be a high priority in making land use decisions*
- For Boulder County to reach its 2030 climate goals, both mining and plant operations should either cease or be held to current standards. The Lyons CEMEX facility violates Federal clean air regulations² and emitted more than 357,000 tons of CO₂ in 2020 alone³. Fugitive silica dust storms are common and well-documented. There is an urgent need to redouble our efforts to combat climate change.
- There are environmental justice concerns given the location of the facility in relation to the County and Town's limited stock of affordable housing.
- The Special Use Permit is set to expire in September of 2022. Both the Town and the surrounding community took CEMEX at their word on the matter; if granted, there is no prohibition against CEMEX applying for an additional SUP prior to 2037.
- There is also no prohibition against CEMEX selling the plant to another General Industrial operator, such as an asphalt producer.
- In addition, there are several other considerations currently at play:
 - The Town of Lyons is in the process of revising its 2010 Comprehensive Plan, which provisionally envisions scenarios within both the Eastern Corridor and its Primary Planning Area.
 - The approved Colorado Department of Transportation SH 66 Planning & Environmental Linkages Study Report (*please refer to Appendix Item 9*)

¹ <https://cdphe.colorado.gov/greenhouse-gas-emissions-and-energy-management-for-manufacturing-in-colorado>

² See <https://www.epa.gov/enforcement/cemex-lyons-plant-settlement> for the 2013 \$1,000,000 levied on CEMEX Lyons for Clean Air Act violations

³ <https://ghgdata.epa.gov/ghgp/service/facilityDetail/2020?ds=E&et=&id=1007877&popup=true>

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- The soon to be revised 2012 IGA between the Town and County (*please refer to Appendix Item 10 for both the general IGA and the CEMEX-specific IGA*)
- Our opportunities to shepherd the direction of land use in our Primary Planning area is being hampered. The current proposal does not provide a sufficient framework for the Town of Lyons to affect annexation or zoning of our PPA at the plant site. Remediation, reclamation, and rezoning the main plant site will directly and positively impact Lyons, the surrounding community, and Boulder County as a whole.

The opportunities for transforming this high-polluting mine and plant include creating a state-of-the-art eco village that can be a centerpiece for the County, have a net zero impact on the environment, and offer a solar generation facility to power the entire Town of Lyons; we are our own electric utility as it stands.

The Town of Lyons appreciates our long history of collaboration with Boulder County and hopes to work in tandem to find another path forward that will serve the best interests of all parties.

Sincerely,



Victoria Simonsen
Town Administrator

ATTACHMENTS



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303.823.6622

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July 22, 2022

Pete L'Orange, Planner II
Boulder County Planning & Permitting
2045 13th Street
Boulder, CO 80302



Docket SU-22-0003 – Town of Lyons Referral Response List of Appendices

Appendix Item 1. “000 Cover Letter from CEMEX to Boulder County – May 2, 2022”

Appendix Item 2. “09-15 Referral Agency List”

Appendix Item 3. Lyons – CEMEX Area Comprehensive Development Plan Intergovernmental Agreement

Appendix Item 4. Lyons – CEMEX Area Comprehensive Development Plan Intergovernmental Agreement – Map

Appendix Item 5. Town of Lyons 3-Mile Planning Area – Map

Appendix Item 6. CEMEX: Town of Lyons Boards & Commissions Statements

Appendix Item 7. CEMEX: Public Comments Submitted to Town of Lyons

Appendix Item 8. State of Colorado Division of Minerals & Geology Letter and Map

Appendix Item 9. Colorado Department of Transportation State Highway 66 Planning & Environmental Linkages and Access Control Plan

Appendix Item 10. Lyons Planning Area Intergovernmental Agreements

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TELEPHONE

303.823.6622

FACSIMILE

303.823.8257

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**LYONS CEMEX AREA
COMPREHENSIVE DEVELOPMENT PLAN
INTERGOVERNMENTAL AGREEMENT**

This Intergovernmental Agreement ("IGA") by and between the Town of Lyons, a Colorado statutory municipal corporation ("Lyons" or the "Town"), and the County of Boulder, a body politic and corporate of the State of Colorado ("Boulder County" or the "County") (collectively, the "Parties") is made to be effective on the Effective Date as defined on the signature page of this IGA.

RECITALS

WHEREAS, the Parties are authorized by § 29-20-101 et seq., C.R.S. as amended, to enter into intergovernmental agreements to plan for and regulate land uses in order to minimize the negative impacts on the surrounding areas and to protect the environment, and specifically to cooperate and contract with each other for the purposes of planning and regulating the development of land by means of a "comprehensive development plan;" and

WHEREAS, § 29-1-201, et seq., C.R.S., as amended, authorizes the Parties to cooperate and contract with one another with respect to functions lawfully authorized to each of the Parties and the people of the State of Colorado have encouraged such cooperation and contracting through the adoption of Colorado Constitution, Article XIV, § 18(2); and

WHEREAS, the functions described in this IGA are lawfully authorized to each of the Parties which perform such functions hereunder, as provided in Article 20 of Title 29; Part 1 of Article 28 of Title 30; Part 1 of Article 12 of Title 31; and Parts 2 and 3 of Article 23 of Title 31, C.R.S., as amended; and

WHEREAS, in December 2002, the Parties entered into a Comprehensive Development Plan Intergovernmental Agreement (the "Original IGA") for a period of ten years, which was amended to add certain additional properties to the LPA in 2005 and again in 2011; and

WHEREAS, the term of the Original IGA as amended ends in December 2012, and the Parties believe it is in the best interests of the citizens of the Town and the County to enter into new Intergovernmental Agreements with the goal of continuing the spirit of collaboration that was established by the Original IGA and demonstrated through the Parties' course of dealing throughout the term of the Original IGA; and

WHEREAS, the Parties have contemporaneously with this IGA entered into the Lyons Planning Area Comprehensive Development Plan Intergovernmental Agreement ("Lyons Planning Area IGA"), a complementary IGA that addresses development and preservation issues for all areas surrounding the Town not addressed by this IGA. This IGA and the Lyons Planning Area IGA together represent a shared vision of appropriate development for the areas covered by the IGAs for their respective durations; and.

WHEREAS, the Parties believe that, in order to preserve Lyons' unique and individual character through the orderly development of land and to preserve the rural quality of other lands in the area, it is in the best interest of the residents of both communities to enter into an IGA that delineates the areas of the CEMEX Property that are appropriate for certain kinds of development and the areas of the CEMEX property that the Parties desire to preserve in a rural state; and

WHEREAS, the disturbed area of the CEMEX property where the current cement plan is located is important to the Town both as a current employment center and in the future as a redevelopment area focusing on such as green technology uses and low impact development; and

WHEREAS, the Parties have each held hearings after proper public notice for the consideration of entering into this IGA and the adoption of a comprehensive development plan for the subject lands as shown on the map attached as Exhibit A; and

NOW THEREFORE, in consideration of the above and the mutual covenants and commitments made herein, the Parties agree as follows:

1.0 LYONS CEMEX AREA COMPREHENSIVE DEVELOPMENT PLAN (CEMEX AREA IGA PLAN).

1.1 CEMEX Area IGA Plan Defined. This IGA, including the Map attached hereto as Exhibit A, is hereby adopted by the Parties as the Lyons CEMEX Area Comprehensive Development Plan, and shall be known herein as the CEMEX Area IGA Plan. The CEMEX Area IGA Plan shall govern and control the CEMEX Area. This IGA complements the Lyons Planning Area Comprehensive Development Plan IGA, but is independent from and not a part of it or any other Comprehensive Development Area IGAs between the Parties, except the Boulder County Countywide Coordinated Comprehensive Development Plan Intergovernmental Agreement (“Super IGA”).

1.2 CEMEX Area IGA Map. The Map identifies, designates and defines the land to be known as the “CEMEX Area,” which consists of the CEMEX Primary Planning Area (the “CEMEX PPA”), the CEMEX Municipal Facility Area (the “CEMEX Municipal Facility Area”), the CEMEX Lyons Interest Area/Rural Preservation Area (the “CEMEX LIA/RPA”), and the CEMEX LIA/RPA GI Property.

1.2.1 The CEMEX PPA is the land that is planned for the next phase of expansion of the Town limits and which the Parties recognize is appropriate and intended for urban development.

1.2.2 The CEMEX Municipal Facility Area represents areas which Lyons may annex in order to develop municipal services facilities such as water and sewer plants and solar/electric facilities.

1.2.3 The CEMEX LIA/RPA represents areas that are expected to remain rural for the duration of this IGA.

1.2.4 The CEMEX LIA/RPA GI Property is the portion of the Lyons Interest Area/Rural Preservation Area that (a) currently has a County general industrial zoning designation; and (b) is the subject of negotiations toward a future land use plan, as addressed in Section 2.4 of this IGA.

2.0 ANNEXATION AND DEVELOPMENT OF PROPERTY.

2.1. CEMEX PPA. The Town may annex into its corporate boundaries any and all property located within the CEMEX PPA in accordance with state and local laws governing annexation. By executing this IGA, the County finds and declares that a community of interest exists between the Town and all property located within the CEMEX PPA. The County will cooperate with Town efforts to annex land in the CEMEX PPA. The County

will also cooperate and consult with Town and lend its expertise, if requested, on potential development proposals for the CEMEX PPA. The Town and the County recognize the importance of remediation of the CEMEX PPA property and will work together to encourage CEMEX and state regulators to ensure remediation efforts are complete.

- 2.2 CEMEX Municipal Facilities Area. The Town may annex into its corporate boundaries any and all property located within the CEMEX Municipal Facility Area in accordance with state and local laws governing annexation for the sole purpose of allowing the Town to develop municipal services of the following specific kinds: water or wastewater facility; renewable energy or electric distribution facility; emergency alert system; recycling collection facility; municipal service facility, if developed in conjunction with a water or wastewater facility; and such other municipal facilities as may be mutually agreed upon by the Parties. If the Town opts to develop water treatment or sewer facilities in the CEMEX Municipal Facility Area while the property is still in unincorporated Boulder County, the County agrees that this IGA shall serve in lieu of review, as to any wastewater treatment infrastructure projects, of any permit applications that would otherwise be required under Section 8 of the Boulder County Land Use Code concerning Areas and Activities of State Interest (“1041 Regulations”).
- 2.3 CEMEX LIA/RPA. The Town and the County acknowledge and agree that the property within the CEMEX LIA/RPA is intended to remain in the County’s regulatory jurisdiction and shall not be annexed or developed by the Town during the duration of this IGA unless mutually agreed upon by both parties.
- 2.4 CEMEX LIA/RPA GI. The Parties further agree that within ten (10) years after execution of this IGA they will engage in good faith negotiations toward the adoption of a land use plan for the CEMEX LIA/RPA GI Property, taking into consideration input from the property owner (currently CEMEX), and to make such amendments to this IGA as are necessary to implement the land use plan if adopted..
- 2.5 Annexation of County ROW.
The Town agrees that if it annexes any part of a County road it will annex the entirety of that road.

3.0 OPEN SPACE AND RURAL PRESERVATION

- 3.1 Open space acquisitions within the CEMEX Area. The County agrees that for the term of this IGA it will not purchase or otherwise acquire any land within the CEMEX PPA or the CEMEX Municipal Facilities Area for open space purposes, including conservation easements. The Town agrees that land within the CEMEX Rural Preservation Area may be acquired by the County for open space purposes, including conservation easements.
- 3.2 Zoning and subdivision of land in the CEMEX LIA/RPA. The zoning classification of land within CEMEX LIA/RPA should remain agricultural and subdivision should be restricted to that which exists under the County's Land Use Code, including the creation of lots of a minimum of thirty-five (35) acres, a Non-Urban Planned Unit Development which may contain up to two units per 35 acres if approved and clustered so that at least 75% of the land is protected by a conservation easement, or other cluster development permissible under the County’s Land Use Code where gross density would not exceed one unit per 35 acres.

4.0 REFERRALS

- 4.1 Lyons Referrals to Boulder County. The Town shall promptly refer in writing to the County any application for annexation in the CEMEX Area.
- 4.2 Boulder County Referrals to Lyons. The County agrees that the Town shall be a formal referral agency for any application to the County for zoning, rezoning, subdivision, PUD, replat, special use, limited impact special use, vacation, transfer of development rights, conservation easement or development (including site plan reviews) for any lot, tract, easement, right-of-way or parcel within the CEMEX Area as well as any proposed map amendment to the Boulder County Comprehensive Plan affecting any lot, tract, or parcel within the CEMEX Area.

5.0 AMENDMENTS

- 5.1 Entire Agreement. With the exception of the Super IGA, this IGA contains the entire agreement between the Parties as to the CEMEX Area, and supersedes and replaces any other or prior IGAs as to the same geographic area.
- 5.2 Changes to IGA. Amendment of this IGA shall take place only upon approval by resolution or ordinance adopted by the governing body of both of the Parties, after notice and hearing as may be required by law.
- 5.3 Timely Decisions on Amendments to IGA. The Parties agree and acknowledge that time is of the essence when either Party seeks an amendment to this IGA. The Parties further agree and acknowledge that the length of time necessary to process and act upon any proposed amendment may vary depending on the complexity of the particular request and on other factors and other responsibilities facing the Parties at any given time. Nevertheless, the Parties each agree to give high priority to any proposal by the other Party to amend this IGA and to act on any such proposal without delay. In addition, the Parties agree that within thirty (30) days after receipt by one Party of an amendment proposed by the other Party, the Parties will agree on and establish a firm schedule for processing and taking final action upon the amendment proposal.

6.0 NON-SEVERABILITY.

If any portion of this IGA is held by a court of competent jurisdiction in a final, non-appealable decision to be *per se* invalid or unenforceable as to any Party, the entire IGA shall be terminated, it being the understanding and intent of the Parties that every portion of the IGA is essential to and not severable from the remainder.

7.0 BENEFICIARIES.

The Parties, in their corporate and representative governmental capacities, are the only entities intended to be the beneficiaries of the IGA, and no other person or entity is so intended.

8.0 ENFORCEMENT.

Either or both of the Parties may enforce this IGA by any legal or equitable means including specific performance, declaratory relief, and injunctive relief. No other person or entity shall have any right to enforce the provisions of this IGA. The Parties agree to

discuss and attempt to resolve any dispute in the interpretation or application of this IGA, but if they are unable to do so, either Party may request that the matter be presented to a mediator selected and paid for jointly by the Parties.

9.0 DEFENSE OF CLAIMS/INDEMNIFICATION

If, notwithstanding the provisions of Sections 7.0 and 8.0 of this IGA, any person allegedly aggrieved by a provision of this IGA who is not a party to the IGA asserts or attempts to assert any claim against any Party concerning such IGA provision, the County shall, and the Town may, defend such claim upon receiving timely and appropriate notice of the pendency of such claim. Defense costs shall be paid by the Party providing such defense. In the event that any person not a party to the IGA should obtain a final money judgment against the Town for the diminution in value of any regulated parcel resulting from regulations in the IGA or regulations adopted by the Town implementing the IGA, the County shall, to the extent permitted by law, indemnify the Town for the amount of said judgment.

10.0 GOVERNING LAW AND VENUE

This IGA shall be governed by the laws of the State of Colorado and venue shall lie in the appropriate court(s) for Boulder County, Colorado.

11.0 TERM AND TERMINATION

This IGA shall remain in effect through December 31, 2034, unless otherwise terminated earlier by mutual agreement of the Parties.

12.0 PARTY REPRESENTATIVES

Referrals made under the terms of this IGA shall be sent to the Parties' representatives as follows:

County of Boulder
Director, Land Use Department
P.O. Box 471
Boulder, Colorado 80306

Town of Lyons
Town Administrator
P.O. Box 49
432 Fifth Avenue
Lyons, Colorado 80540

Name and address changes for representatives shall be made in writing and mailed to the other representatives at the then current address.

13.0 COUNTERPART.

This IGA may be executed in any number of counterparts which together shall constitute the agreement of the Parties.

14.0 EFFECTIVE DATE.

The effective date of this IGA shall be the date on which both Parties have approved and executed the IGA by signing where indicated below.

TOWN OF LYONS:

Board of Trustees

By: _____

Date: _____, 2012

Mayor or Mayor Pro Tem

ATTEST:

APPROVED AS TO FORM:

Town Clerk

Town Attorney

COUNTY OF BOULDER:

BOARD OF COUNTY COMMISSIONERS

By: _____

Date: _____, 2012

Chair

ATTEST:

APPROVED AS TO FORM:

Clerk to Board

County Attorney

**LYONS PLANNING AREA
COMPREHENSIVE DEVELOPMENT PLAN
INTERGOVERNMENTAL AGREEMENT**

This Intergovernmental Agreement ("IGA") by and between the Town of Lyons, a Colorado statutory municipal corporation ("Lyons" or the "Town"), and the County of Boulder, a body politic and corporate of the State of Colorado ("Boulder County" or the "County") (collectively, the "Parties") is made to be effective on the Effective Date as defined on the signature page of this IGA.

RECITALS

WHEREAS, the Parties are authorized by § 29-20-101 et seq., C.R.S. as amended, to enter into intergovernmental agreements to plan for and regulate land uses in order to minimize the negative impacts on the surrounding areas and to protect the environment, and specifically to cooperate and contract with each other for the purposes of planning and regulating the development of land by means of a "comprehensive development plan;" and

WHEREAS, § 29-1-201, et seq., C.R.S., as amended, authorizes the Parties to cooperate and contract with one another with respect to functions lawfully authorized to each of the Parties and the people of the State of Colorado have encouraged such cooperation and contracting through the adoption of Colorado Constitution, Article XIV, § 18(2); and

WHEREAS, the functions described in this IGA are lawfully authorized to each of the Parties which perform such functions hereunder, as provided in Article 20 of Title 29; Part 1 of Article 28 of Title 30; Part 1 of Article 12 of Title 31; and Parts 2 and 3 of Article 23 of Title 31, C.R.S., as amended; and

WHEREAS, in December 2002, the Parties entered into a Comprehensive Development Plan Intergovernmental Agreement (the "Original IGA") for a period of ten years which, among other things, defined the Lyons Planning Area as the area the Town may annex and develop. The Original IGA was amended to add certain additional properties to the LPA in 2005 and again in 2011; and

WHEREAS, the term of the Original IGA as amended ends in December 2012, and the Parties believe it is in the best interests of the citizens of the Town and the County to enter into a new Intergovernmental Agreement with the goal of continuing the spirit of collaboration that was established by the Original IGA and demonstrated through the Parties' course of dealing throughout the term of the Original IGA; and

WHEREAS, in October 2003, the Parties entered into the Boulder County Countywide Coordinated Comprehensive Development Plan Intergovernmental Agreement (the "Super IGA") which is designed to coordinate all of Boulder County's comprehensive development plan IGAs, to recognize and protect each municipality's planning area, and to preserve the rural character of the land outside of each community's respective planning areas; and

WHEREAS, the Parties believe that it is in the best interest of the residents of both communities to enter into a new IGA in order to preserve Lyons' unique and individual character through the orderly development within a newly defined Lyons Planning Area (the "LPA"). The LPA contains a Primary Planning Area ("PPA") where annexation and development may occur in accordance with the provisions of this IGA. It also includes areas designated as Lyons Interest Area/Rural

Preservation Area (LIA/RPA”) where the Parties’ intent is to preserve the rural quality of the land; and

WHEREAS, the Parties have contemporaneously with this agreement entered into the CEMEX Area Comprehensive Development Plan Intergovernmental Agreement (“CEMEX Area IGA”), a complementary IGA that addresses development and preservation issues for the portions of the Lyons Comprehensive Plan as adopted in 2010 (“LCP”) area not contained within this IGA. For the purposes of this IGA, LPA refers to all portions of the overall Lyons Planning Area that are not separately addressed in the CEMEX Area IGA. This IGA and the CEMEX Area IGA together represent a shared vision of appropriate development for the areas covered by the IGAs for their respective durations; and

WHEREAS, the Parties have each held hearings after proper public notice for the consideration of entering into this IGA and the adoption of a comprehensive development plan for the subject lands; and

NOW THEREFORE, in consideration of the above and the mutual covenants and commitments made herein, the Parties agree as follows:

1.0 PURPOSE AND INTENT

This IGA is intended to protect and enhance the Town's ability to coordinate its future growth into the PPA, and specifically for the following purposes:

- 1.1 Implementing Comprehensive Plans. This IGA is designed to implement the goals and policies set forth in the Parties’ respective comprehensive plans.
 - 1.1.1. The LCP emphasizes that in order for Lyons to become economically sustainable, it must transition from a residential development-based economy to a commercial-based, localized economy. To this end, Lyons will strive to preserve and expand employment opportunities, reduce retail leakage, attract visitors and encourage new commercial, light-industrial and mixed-use development in the PPA while concentrating any significant additional housing within its current Town limits or within mixed-use areas with commercial being the predominant land use in these areas.
 - 1.1.2. The LCP adopts as one of its guiding principles articulating the Town’s interests in expanding the development potential in the area by proactively engaging with private and government stakeholders to make collaborative land use decisions.
 - 1.1.3. The LCP emphasizes proactively planning for the future and balancing the demands of environmental and economic sustainability with community character, historical preservation and property owners’ rights.
 - 1.1.4. The Boulder County Comprehensive Plan, as amended from time to time, (the “BCCP”) seeks to protect agricultural lands, channel growth to municipal planning areas and consider environmental and natural resources in land use decisions.
- 1.2 Recognizing Future Urban Development is Appropriate in the LPA. This IGA intends to direct future urban development within the PPA to: avoid sprawl, ensure the provision of adequate urban services, maximize the utility of funds invested in public facilities and services, distribute fairly and equitably the costs of government services among those persons who benefit therefrom, extend government services and facilities in an efficient, logical fashion, simplify the governmental structure of the affected areas, and reduce and avoid, where possible, conflict between the Parties.

- 1.3 Maintaining Community Buffer. This IGA is intended to keep the LIA/RPA and the land outside the LPA rural in character to preserve a community buffer.
- 1.4 Protecting View Corridors and Allowing Only Compatible Development in the LPA. This IGA acknowledges the importance to both Parties of protecting sensitive natural areas, maintaining view corridors, enforcing nuisance ordinances and ensuring that new development is compatible with the character of both Lyons and adjoining County properties.
- 1.5 Fostering Intergovernmental Cooperation. This IGA encourages the Parties to collaborate to achieve common goals, including becoming more socially, economically and environmentally sustainable and supporting the public and private provision of cultural, educational, social and healthcare services in the LPA.
- 1.6 Encouraging Transparent and Timely Decisions. This IGA is intended to encourage transparent, open communication between the Parties and to ensure that decisions pertaining to this IGA are made in a timely and efficient manner.

2.0 LYONS COMPREHENSIVE DEVELOPMENT PLAN (IGA Plan).

- 2.1 IGA Plan Defined. This IGA, including the Map attached hereto as Exhibit A, is hereby adopted by the Parties as the Lyons Comprehensive Development Plan, and shall be known herein as the IGA Plan (as distinguished from the Lyons Comprehensive Plan, referred to herein as the LCP). The IGA Plan shall govern and control the LPA, which is defined as the unincorporated area of Boulder County as shown on Exhibit A, or as subsequently amended in accordance with this IGA. With the exception of the Super IGA and the CEMEX Area IGA, this IGA Plan replaces and supersedes any and all previous agreements between the Parties concerning the LPA.
- 2.2 Lyons Planning Area Designations. The Map identifies, designates and defines the land to be known as the LPA, which consists of the Primary Planning Area (the “PPA”) and the Lyons Interest Area/Rural Preservation Area (the LIA/RPA). The Map indicates four portions of the PPA that are designated as “No Development Areas.”
- 2.2.1 The PPA is the land that is planned for the next phase of expansion of the Town limits and which the Parties recognize is appropriate and intended for urban development.
- 2.2.2 The No Development Areas are a subset of the PPA, but are too steep or otherwise inappropriate for development.
- 2.2.3 The LIA/RPA represents areas that are expected to remain rural for the duration of this IGA, unless otherwise agreed to by the Parties.

3.0 ANNEXATION AND DEVELOPMENT OF PROPERTY.

- 3.1 Land Within the Primary Planning Area.
- 3.1.1 The Town may annex into its corporate boundaries any and all property located within the PPA, including the No Development Areas, in accordance with state and local laws governing annexation. The Town agrees that it will only annex parcels in their entirety, not portions of a parcel, into the Town, unless mutually agreed to by the Parties. By executing this IGA, the County finds and declares that a community of interest exists between the Town and all property located

within the PPA. The County will cooperate with Town efforts to annex land in the PPA.

- 3.1.2 When parcels are annexed which contain No Development Areas, the Town, prior to final plat recordation or other final approval for any development on those parcels, will ensure that the owner of the properties grant to the County and to the Town of Lyons a Conservation Easement pursuant to Article 30.5 of Title 38 of the Colorado Revised Statutes, in a form acceptable to both the County and the Town, which prohibits structures or development in the preserved area of the properties.
- 3.1.3 Any property that is disconnected from the Town after the Effective Date of this IGA (whether currently located within the municipal limits of the Town or later annexed into the Town after the Effective Date of this IGA) shall continue to be within the PPA for purposes of this IGA unless it is specifically excluded by a duly executed amendment to this IGA.
- 3.1.4 The Parties agree that two parcels in the PPA (County Assessor Parcel Number 120320000007, currently owned by the Loukonen family and County Assessor Parcel Number 120320000006, currently owned by CEMEX) may not be zoned (currently zones E-1, EC, R-1, R-2, R2A and R-3) or developed by the Town for residential uses.
- 3.1.5 The Town and the County acknowledge and agree that the property within the LIARPA is intended to remain in the County's regulatory jurisdiction and shall not be annexed or developed by the Town during the duration of this IGA, unless mutually agreed to by the Parties.
- 3.1.6 The Town agrees that if it annexes any part of a County road it will annex the entirety of that road.
- 3.3 Land Outside of the LPA.
- 3.3.1 Excepting the area covered by the CEMEX Area IGA, which is addressed in a separate IGA, the area outside the LPA is intended to remain in the County's regulatory jurisdiction for the term of this IGA, unless otherwise provided herein or by a duly executed amendment to this IGA.
- 3.3.2 The Town may annex lands outside of the PPA and expand the LPA only in accordance with Section 4 of this IGA.
- 3.4 Developing Areas with Constraints. When evaluating development applications within their respective areas of responsibility, both Parties will consider the impact of proposed development on the floodway, natural areas, wildlife habitat, steep slopes, and historically- and archaeologically-significant areas, and will require impacts to be reasonably mitigated.
- 3.5 Promote Quality Design and Development. The Town is pursuing adoption of design standards to promote quality architecture and landscaping that is done in an environmentally sensitive manner within 12 months of the Effective Date of this IGA.

4.0 EXPANSION OF THE LPA

- 4.1 Mutual Agreement. During the term of this IGA, the Town may expand the LPA within Boulder County only with the mutual agreement of the Parties and the corresponding amendment of Exhibit A in accordance with this IGA.
- 4.2 Lyons Comprehensive Plan Amendment. Any request for expansion of the LPA must be a reflection of community consensus, as documented in a duly-adopted amendment to the LCP and its Land Use Map.

5.0 OPEN SPACE.

- 5.1 Acquisitions within the LPA. The County agrees that for the term of this IGA it will not purchase or otherwise acquire any land within the LPA for open space purposes, including conservation easements and transfer of density right sending sites without the approval of the Town, excepting only an L-shaped parcel of land currently owned by CEMEX (County Assessor Parcel Number 120317000046) located between the Loukonen-Hill Open Space Property and the Southdown Indian Mountain Open Space Property.

6.0 COMMUNITY BUFFER.

The County agrees not to allow more intensive zoning classifications for lands remaining in the County's regulatory jurisdiction within the PPA and LIA/RPA, unless mutually agreed to by the Parties.

7.0 TOWN OF LYONS UTILITIES.

- 7.1 Lyons Service Area. It may be necessary for the Town to seek additional water supplies, water storage, and water and wastewater treatment and delivery facilities, both within and outside the LPA. The areas designated in the Map portion of Exhibit A as the LPA shall constitute the Town's "Service Area" for all purposes, including but not limited to the County's Regulations of Areas and Activities of State Interest in Article 8 of the Boulder County Land Use Code.
- 7.2 1041 Permits. To the extent such supplies and facilities are necessary to serve development within the LPA that is consistent with the provisions of this IGA, the County agrees to use its best efforts and to act in good faith on Town permit applications and imposing permitting requirements without undue delay, recognizing applications for such permits as being in conformance with this IGA. Specifically, the County agrees that the Town, in applying for such permits under the provisions of the Regulation of Areas and Activities of State Interest in Article 8 of the Boulder County Land Use Code, shall not be required to demonstrate compliance with the following provisions of said Regulation, where the proposed utility development will serve only lands within the LPA:
- Section 8-511B.3, 10, 11, 12, 13 and 14, C.1 and C.2.a, D and E.
 - Sections 8-511 B.5 c and d shall only be applicable to sanitary sewage facilities.
 - Sections 8-511 B.5.b, e, f and g, B.6, 7 and 8 shall apply to site location, construction and operations of facilities within areas designated on Maps 2, 3 and 4 of the Boulder County Comprehensive Plan, and with respect to other areas shall be limited in its application to construction and operation of such facilities.
 - The application of Section 8-511 B.7 concerning archaeological resources shall be limited to a determination whether archaeologically significant resources will be

negatively impacted by the proposed project, and if so, provide for mitigation of those impacts.

- The application of Section 8-511 B.5.h concerning geologic hazards shall be limited to resolution of floodplain issues.
- The remaining portions of Section 8-511 shall only be applicable to the direct, site-specific impacts of the proposal.
- Section 8-407 shall exempt all upgrades to existing facilities that are required maintenance or otherwise required by federal, state or County regulations, including repairing and/or replacing old or outdated equipment, or installing new equipment, provided the improvements do not expand levels of service beyond the design capacity, and provided further that the upgrade does not alter the location of the existing facility.

8.0 IMPLEMENTATION PROCEDURES.

- 8.1 Plan Amendment Required. A Plan amendment, agreed to by both the Town and the County, must occur in order to annex, allow any use or development, or acquire for open space any parcel within the LPA where such annexation, use or development, or acquisition does not comply with the IGA Plan. The provisions of Section 11.0 of this IGA shall apply to any such Plan amendment.
- 8.2 Notice Required. The Parties each agree to undertake all steps necessary to adopt procedures, plans, policies, and ordinances or other regulations as may be necessary to implement and enforce the provisions of this Plan. The Parties agree that in adopting such procedures, plans, policies, ordinances or regulations, each will give the other Party sufficient notice of such action as will enable such Party, if it so desires, to comment upon the planned actions of that Party. Sufficient notice shall generally mean notice delivered to the other Party at least fifteen (15) days before the date of any public hearing or, where no public hearing will be conducted, before any deadline for the submission of public comment.
- 8.3 County Zoning Changes within the LPA. Where the County seeks to approve zoning changes within the LPA after referral as provided herein, the Board of Trustees shall respond by resolution, approving or disapproving such change or suggesting conditions of approval.

9.0 REFERRALS

- 9.1 Lyons Referrals to Boulder County. The Town shall refer in writing to the County:
- 9.1.1 Any application for annexation;
 - 9.1.2 Any proposed amendment to the LCP affecting any lot, tract, or parcel within the LPA; and
- 9.2 Boulder County Referrals to Lyons. The County shall treat the Town as a formal referral agency and shall refer in writing to the Town:
- 9.2.1 Any application for zoning, rezoning, subdivision, PUD, replat, special use, limited impact special use, vacation, transfer of development rights, conservation easement or development (including site plan reviews) for any lot, tract, easement, rights-of-way or parcel within the LPA;
 - 9.2.2 Any proposed map amendment to the BCCP affecting any lot, tract, or parcel within the LPA; and

- 9.2.3 In addition to referring the foregoing applications and proposals to the Town, the County agrees to advise any applicant owning land in the PPA during the pre-application process (i.e., prior to formal application submittal) for any of the categories of development listed in Section 9.2.1 of the possibility of annexation into the Town, to encourage any such applicant to contact the Town concerning possible annexation, and to provide such applicants with the Town's appropriate contact information.
- 9.3 Waiver of period for response to referrals. Either Party may, for any given referral, elect to waive or reduce the period of time it requires to submit a response, and such election shall be made by written letter or electronic mail.
- 9.4 Failure to respond to referrals. Failure by either Party to respond to a referral shall entitle the referring Party to assume that the receiving Party has no comment concerning the application or proposal.
- 9.5 Communication with referral party. For any application or proposal required to be referred by Section 9.1 or 9.2, the referring Party shall use its best efforts to keep the other Party apprised of the status of each application or proposal, including but not limited to, mailing to the other Party notices of public hearings and meetings, staff reports, non-confidential memoranda concerning the status of the application or proposal, and notification of other activities and events associated with the processing of the application or proposal. Upon any final decision concerning the application or proposal, the referring Party shall notify the other Party in writing of the final decision including a general summary of any terms, conditions, or other details of the decision.

10.0 PARTNERSHIPS

- 10.1 Intergovernmental Cooperation. The Parties recognize and acknowledge the need for intergovernmental cooperation on important local and regional land use matters and to achieve common goals. In accordance with the LCP, the Town and the County agree to cooperate in good faith in:
- 10.1.1 Forming a St. Vrain River Task Force to improve the health of the riparian corridor, achieve sustainability goals, improve recreational opportunities, enhance fish and wildlife habitat, create economic benefits and construct the St Vrain Greenway trail system;
- 10.1.2 Collaborating to design, fund and construct regional trails that connect Lyons to Boulder County open space and other municipalities including the Boulder County River Corridor Legacy Project;
- 10.1.3 Working with the Colorado Department of Transportation, the Regional Transportation District and the Denver Regional Council of Governments to improve Lyons' multimodal transportation system, including continuing to explore ways to improve bus service between the Town, its neighboring communities, and Boulder County destinations and to reduce emissions;
- 10.1.4 Continuing to freely share geographic information system data, maps and expertise;
- 10.1.5 Identifying and implementing programs to enhance opportunities for senior housing and affordable housing within the Town and the LPA; and

- 10.1.6 Cooperating in the identification of sites to provide more efficient governmental services, including but not limited to a recycle and composting facility, and solar or other forms renewable energy generation facilities.
- 10.1.7 Cooperating in determining efficient, effective and equitable options for providing library services to citizens in both incorporated and unincorporated areas of Boulder County, including residents of Lyons and surrounding areas.
- 10.1.8 Enforcing nuisance ordinances to improve the appearance of properties in the LPA.
- 10.1.9 Implementing the Boulder County Sustainable Energy Plan, which Lyons has formally adopted.
- 10.1.10 Cooperating on joint ventures to finance and provide for cultural and recreational opportunities for Town residents and people living in the LPA and surrounding neighborhoods.
- 10.1.11 Collaborating to construct a cost effective, highly diverse, and resilient wastewater treatment system to serve that LPA that is both environmentally beneficial and aesthetically pleasing and that protects the St. Vrain watershed.
- 10.1.12 Facilitating the transfer of ownership of the 10-acre Olson property to the Town of Lyons to expand the recreational opportunities offered in the LPA.
- 10.1.13 Cooperating on the provision of water and sewer services to properties in the LIA/RPA by the Town.

11.0 AMENDMENTS.

- 11.1 Entire Agreement. This IGA contains the entire agreement between the Parties and, with the exception of the Super IGA and the CEMEX Area IGA, supersedes and replaces any other or prior agreements concerning the same subject matter.
- 11.2 Changes to IGA. Any proposed amendment to the IGA affecting the jurisdiction over lands or the development regulation of lands must be referred to the other Party by the Regulatory Party. The "Regulatory Party" shall mean the Party having final land use or annexation approval jurisdiction, as the context requires. Amendment of the IGA shall take place only upon approval by resolution or ordinance adopted by the governing body of both of the Parties, after notice and hearing as may be required by law. The Regulatory Party shall not approve nor permit any development or change of use of any parcel within the LPA by any means in a manner inconsistent with this IGA until and unless the IGA has been amended so that the proposed development or use of such parcel is consistent with the IGA.
- 11.3 Timely Decisions on Amendments to IGA. The Parties agree and acknowledge that time is of the essence when either Party seeks an amendment to this IGA. The Parties further agree and acknowledge that the length of time necessary to process and act upon any proposed amendment may vary depending on the complexity of the particular request and on other factors and other responsibilities facing the Parties at any given time. Nevertheless, the Parties each agree to give high priority to any proposal by the other Party to amend this IGA and to act on any such proposal without due delay. In addition, the Parties agree that within thirty (30) days after receipt by one Party of an amendment proposed by the other Party, the Parties will agree on and establish a firm schedule for processing and taking final action upon the amendment proposal.

12.0 NON-SEVERABILITY.

If any portion of this IGA is held by a court of competent jurisdiction in a final, non-appealable decision to be *per se* invalid or unenforceable as to any Party, the entire IGA shall be terminated, it being the understanding and intent of the Parties that every portion of the IGA is essential to and not severable from the remainder.

13.0 BENEFICIARIES.

The Parties, in their corporate and representative governmental capacities, are the only entities intended to be the beneficiaries of the IGA, and no other person or entity is so intended.

14.0 ENFORCEMENT.

Either or both of the Parties may enforce this IGA by any legal or equitable means including specific performance, declaratory relief, and injunctive relief. No other person or entity shall have any right to enforce the provisions of this IGA. The Parties agree to discuss and attempt to resolve any dispute in the interpretation or application of this IGA, including but not limited to any dispute regarding a request to terminate this IGA, but if they are unable to do so, either Party may request that the matter be presented to a mediator selected and paid for jointly by the Parties.

15.0 DEFENSE OF CLAIMS/INDEMNIFICATION

If any person allegedly aggrieved by a provision of this IGA who is not a party to the IGA asserts or attempts to assert any claim against any Party concerning such IGA provision, the County shall, and the Town may, defend such claim upon receiving timely and appropriate notice of the pendency of such claim. Defense costs shall be paid by the Party providing such defense. In the event that any person not a party to the IGA should obtain a final money judgment against the Town for the diminution in value of any regulated parcel resulting from regulations in the IGA or regulations adopted by the Town implementing the IGA, the County shall, to the extent permitted by law, indemnify the Town for the amount of said judgment.

16.0 GOVERNING LAW AND VENUE

This IGA shall be governed by the laws of the State of Colorado and venue shall lie in the appropriate court(s) for Boulder County, Colorado.

17.0 TERM AND TERMINATION

17.1 This IGA shall remain in effect for a period of ten (10) years from the effective date, unless otherwise terminated earlier by mutual agreement of the Parties. With the execution of this IGA, the Town agrees that it has waived its right to opt out of the SuperIGA, as that right is set forth in the SuperIGA.

18.0 PARTY REPRESENTATIVES

Referrals made under the terms of this IGA shall be sent to the Parties' representatives as follows:

County of Boulder
Director, Land Use Department
P.O. Box 471
Boulder, Colorado 80306

Town of Lyons
Town Administrator
P.O. Box 49
432 Fifth Avenue
Lyons, Colorado 80540

Name and address changes for representatives shall be made in writing and mailed to the other representatives at the then current address.

19.0 COUNTERPART.

This IGA may be executed in any number of counterparts which together shall constitute the agreement of the Parties.

20.0 EFFECTIVE DATE.

The effective date of this IGA shall be the date on which both Parties have approved and executed the IGA by signing where indicated below.

TOWN OF LYONS:

Board of Trustees

By: _____
Mayor or Mayor Pro Tem

Date: _____, 2012

ATTEST:

APPROVED AS TO FORM:

Town Clerk

Town Attorney

COUNTY OF BOULDER:

BOARD OF COUNTY COMMISSIONERS

By: _____
Chair

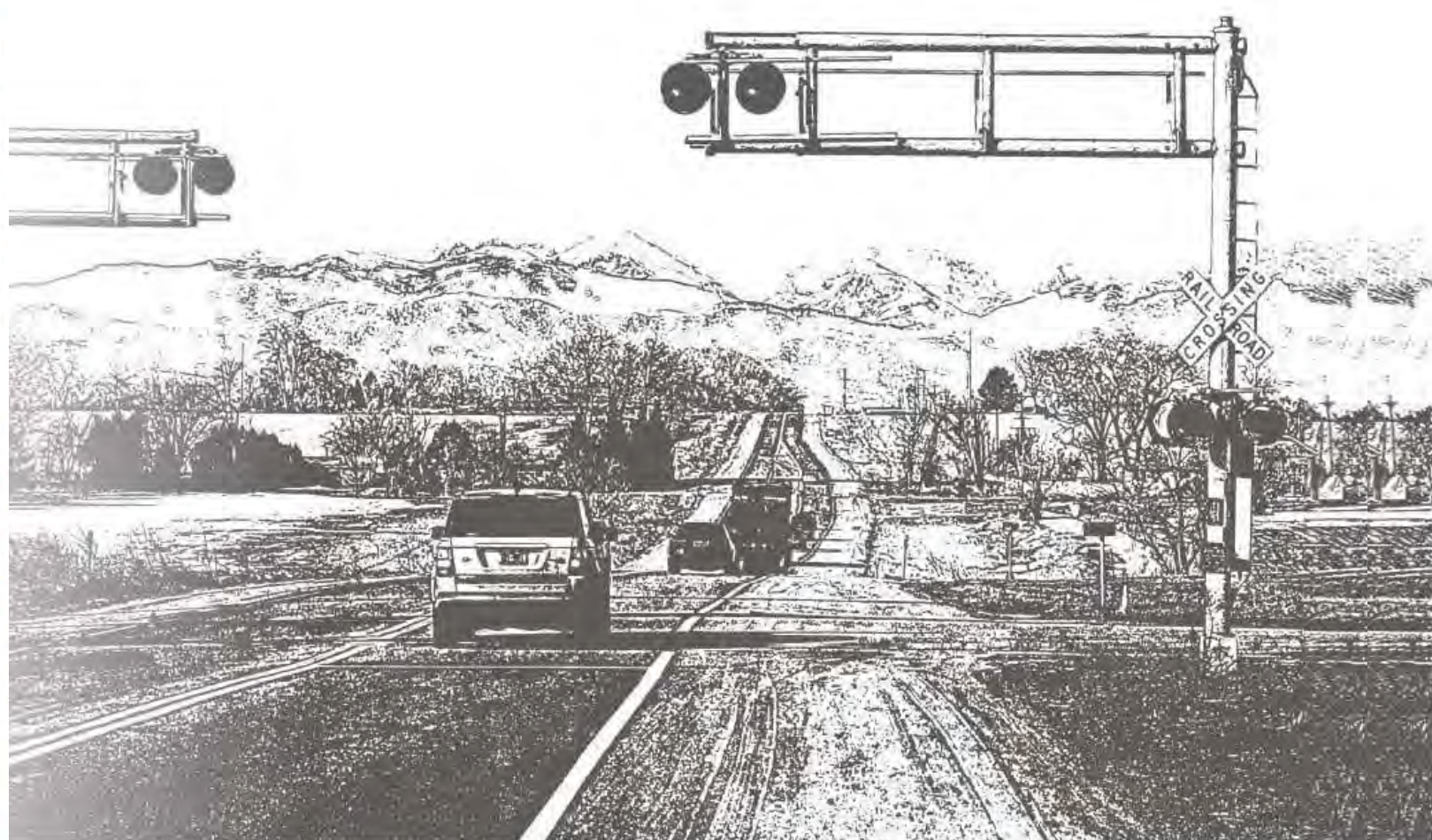
Date: _____, 2012

ATTEST:

APPROVED AS TO FORM:

Clerk to Board

County Attorney



SH 66 PEL and ACP Update

Heather Paddock, PE
 CDOT Region 4 Transportation Director



January 16, 2020



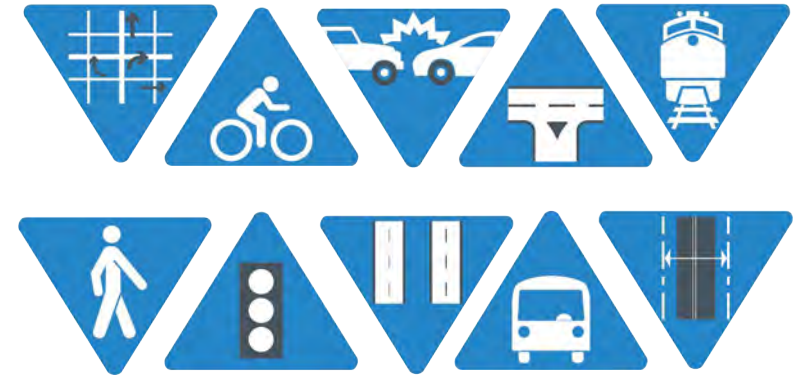
Background on SH 66 PEL and ACP

What is a PEL study? - planning document

- Planning document -- *vision for 2045 transportation*
- Goals framework; *environment, community, & economy*
- Reduces project implementation delays & duplication
- Promotes cost-effective transportation solutions
- Encourages environmental stewardship

What is an ACP?

- Access plan for location/type/features of future access
- Developed in parallel with PEL
- Legally binding through IGA



Safety

*Vehicular
Bicycle
Pedestrian*

Mobility

*Vehicular
Bicycle
Pedestrian
Transit*

Access

*Consolidated
Strategic*



SH 66 PEL and ACP Governance

SH 66 Coalition:

- Six (6) communities and CDOT
- Facilitated by local agency leadership or staff with CDOT

Technical Advisory Committee (TAC):

- Assisted in PEL study process
- Includes planners/engineers from each community in PEL
- Reviewed project materials before public review
- Point-of-contact for updates to elected officials

Executive Committee (EC):

- Includes one or two elected officials or executive leaders from each community in PEL
- Provided policy-level guidance on the study
- Met at key milestones and decision points in the project





Purpose of the SH 66 PEL

Purpose Statement

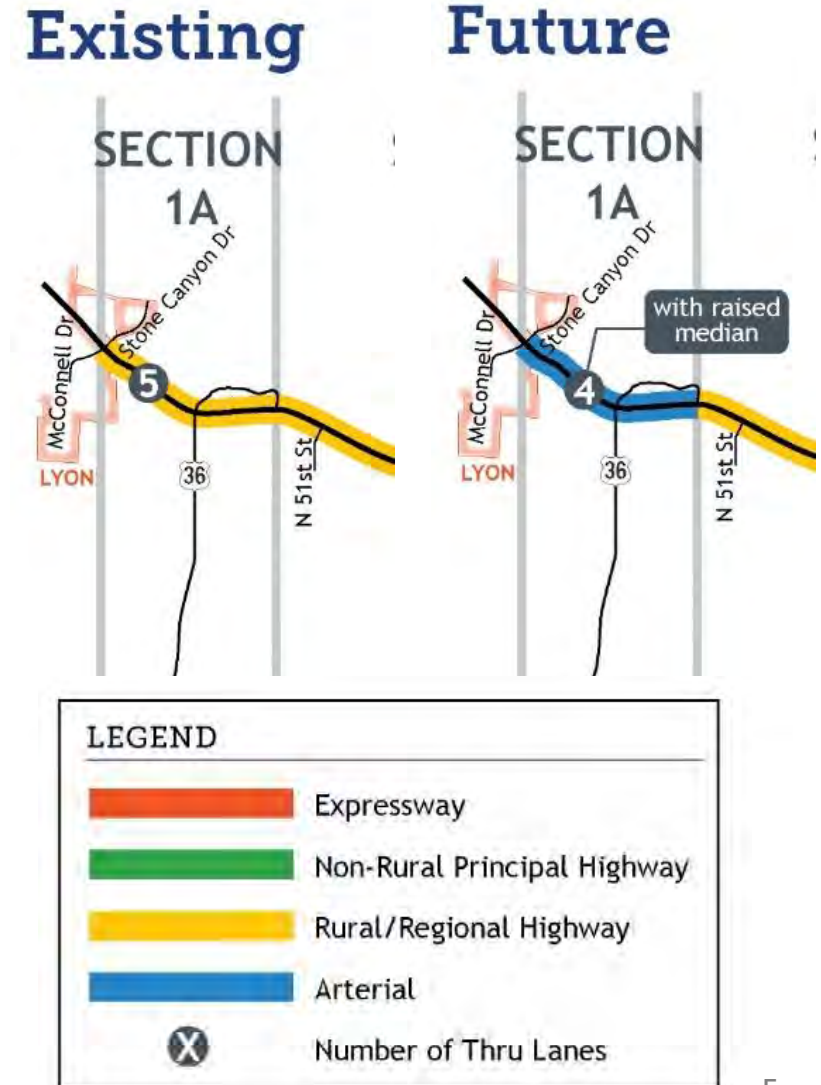
“SH 66 transportation improvements are to increase safety; reduce traffic congestion; provide managed access for existing and future development; and improve multi-modal mobility of people, goods, and services. The improvements should be resilient, accommodate developing technologies, and strive to complement adjacent community context.”



Community Impacts of SH 66 PEL and ACP

Town of Lyons Needs

- Mobility solutions commensurate with existing infrastructure west of US 36
- Economically viable transportation plans consistent with current traffic patterns
- Flexible and innovative access on the primary corridor between Denver and Estes Park
- Collaboration opportunities with neighboring communities (*Boulder County & Longmont*)
- Cohesive mobility planning consistent with community vision for future development along the corridor





Lyons Economic Planning Considerations

Eastern Corridor Development, 1-2 years

LYONS VILLAGE EAST

LYONS, CO
MAY 3, 2018



IN A YEAR OR TWO

0' 100' 200'
SCALE: 1" = 200'



Lyons Economic Planning Considerations

Eastern Corridor Development, 2-3 years

LYONS VILLAGE EAST

LYONS, CO
MAY 3, 2018



IN TWO TO THREE YEARS

0' 100' 200'
SCALE: 1" = 200'



Lyons Economic Planning Considerations

Eastern Corridor Development, 5-10 years

LYONS VILLAGE EAST

LYONS, CO
MAY 3, 2018



IN FIVE TO TEN YEARS

0' 100' 200'

SCALE: 1" = 200'

PEL • O N A
ARCHITECTS AND URBANISTS

RONNIE PELLUSIO, AIA, LEED AP • KORKUT ONARAN, PH.D., CNU AP

4676 BROADWAY, BOULDER, CO 80304 / 303.443.7876 / WWW.PEL-ONA.COM



SH 66 PEL and ACP History

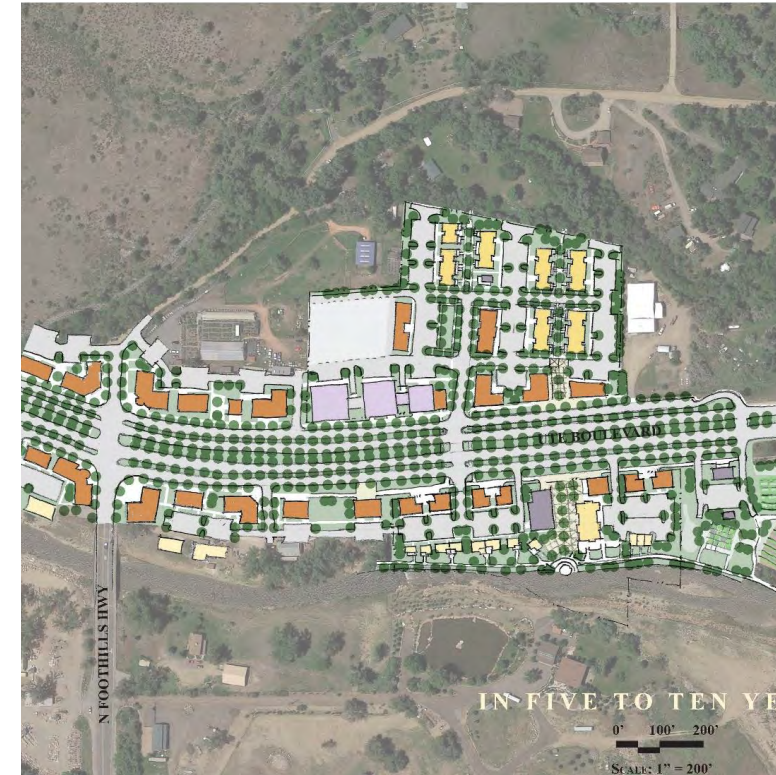
- **Oct. 2016** - Begin Study
- **Jan. 2017 through Sept. 2017** - Purpose and Need
- **Apr. 2017** - Public Open House Series #1
- **Sept. 2017** - Final Corridor Conditions Report
- **Aug. 2017 through July 2018** - Risk and Resiliency (R&R) PEL Process
- **Apr. 2019** - Public Open House Series #2
- **July 2019** - Draft Access Control Plan (ACP) Public Open House
- **Sept. 2019** - Public Open House Series #3
- **Sept. 2019** - Alternatives Development and Screening complete
- **Oct. 2019** - Draft PEL and ACP Reports available



SH 66 ACP Opportunities

ACP Modification Opportunity:

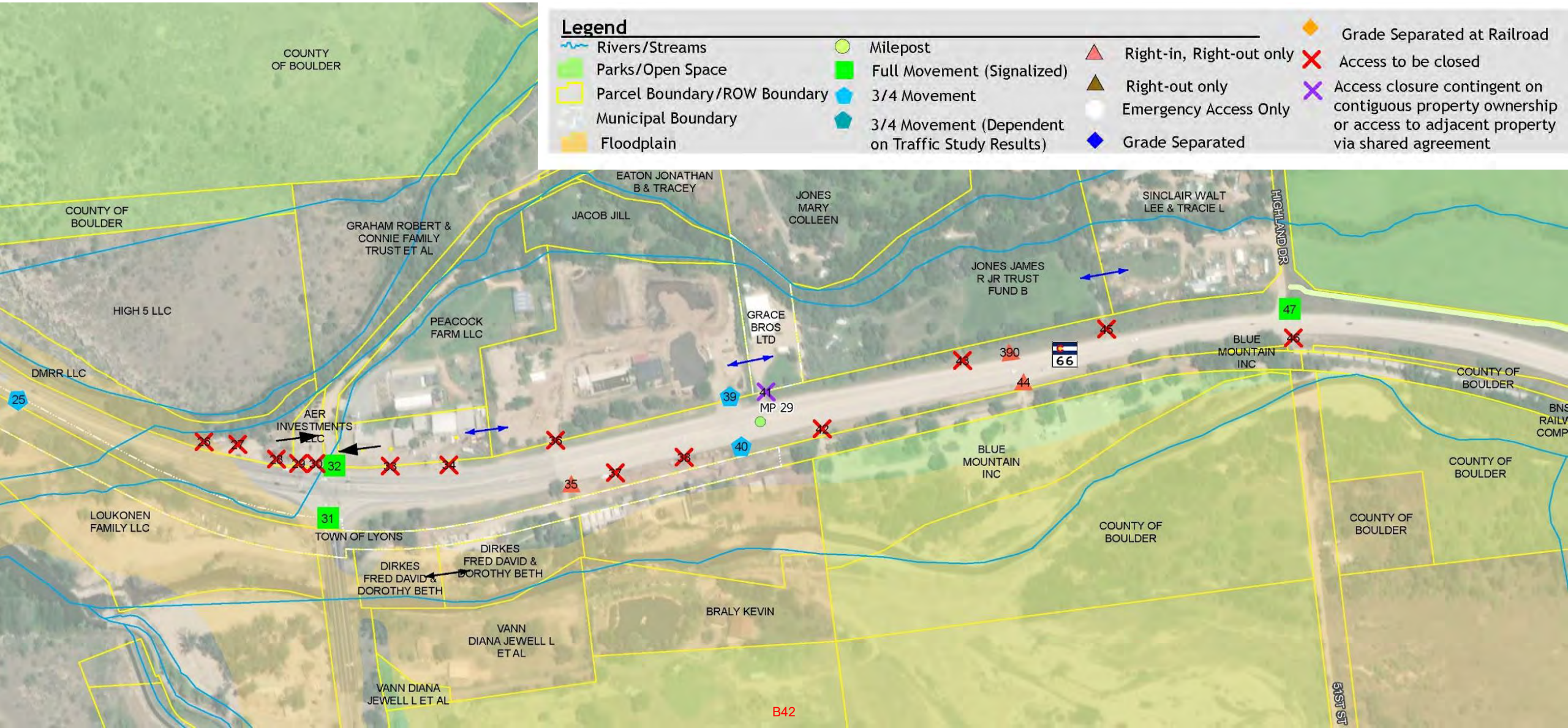
- 1 ACP, 1 IGA, and 2 Voting Blocks
 - West = Lyons, Boulder Co., Longmont & CDOT
 - East = Mead, Firestone, Weld Co., Longmont & CDOT
- Lyons prepares a roadway reclassification application
 - Includes a development plan and traffic analysis study
 - To be supported by CDOT and formalized in an MOU
 - To be reviewed and approved by Transportation Commission
- CDOT agrees to support Lyons' bid to reclassify SH 66
 - Affects E. Corridor Development east of SH 66 & US 36
 - Support framework drafted in MOU between Lyons & CDOT
- PEL remains unchanged





Current Access near Lyons

Draft Oct. 2019

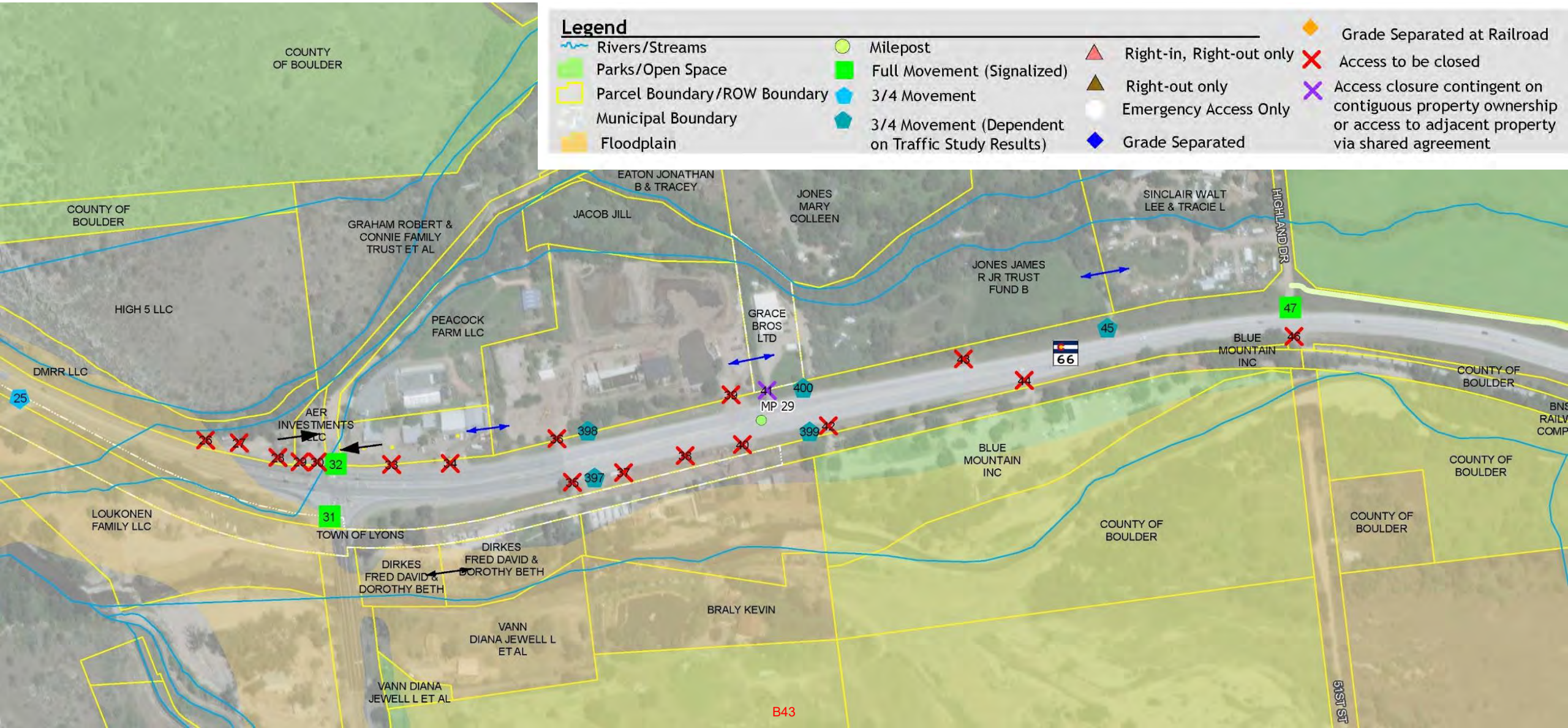


Legend

- | | | | |
|------------------------------|---|--------------------------|--|
| Rivers/Streams | Milepost | Right-in, Right-out only | Grade Separated at Railroad |
| Parks/Open Space | Full Movement (Signalized) | Right-out only | Access to be closed |
| Parcel Boundary/ROW Boundary | 3/4 Movement | Emergency Access Only | Access closure contingent on contiguous property ownership or access to adjacent property via shared agreement |
| Municipal Boundary | 3/4 Movement (Dependent on Traffic Study Results) | Grade Separated | |
| Floodplain | | | |



Potential Modified Access near Lyons Reclassified to NR-B with Assumed 35 mph Speed



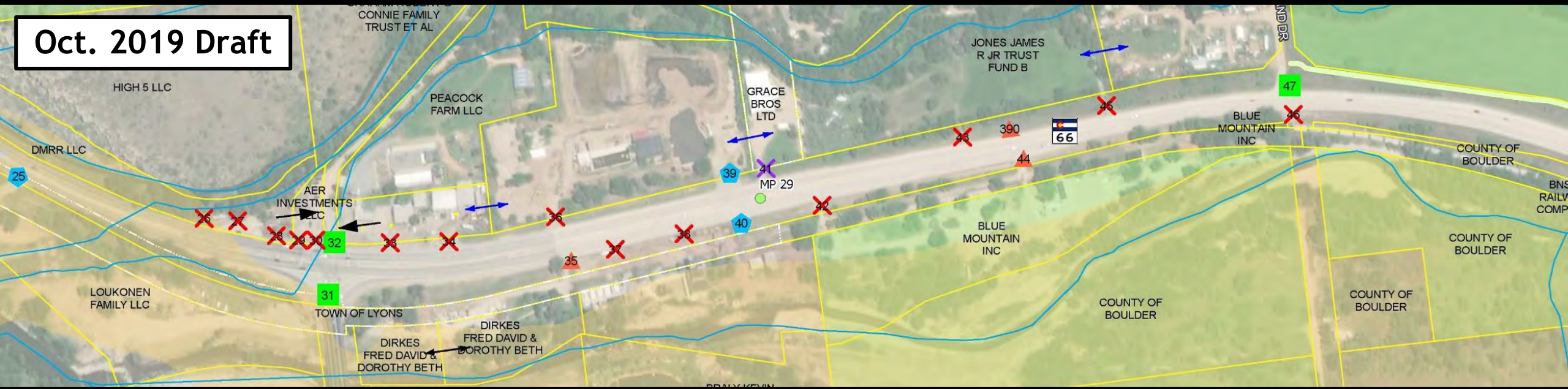
Legend

- | | | | |
|------------------------------|---|--------------------------|--|
| Rivers/Streams | Milepost | Right-in, Right-out only | Grade Separated at Railroad |
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| Parcel Boundary/ROW Boundary | 3/4 Movement | Emergency Access Only | Access closure contingent on contiguous property ownership or access to adjacent property via shared agreement |
| Municipal Boundary | 3/4 Movement (Dependent on Traffic Study Results) | Grade Separated | |
| Floodplain | | | |



Potential Modified Access near Lyons Reclassified to NR-B with Assumed 35 mph Speed

Oct. 2019 Draft



Jan. 2020 Proposed



Legend

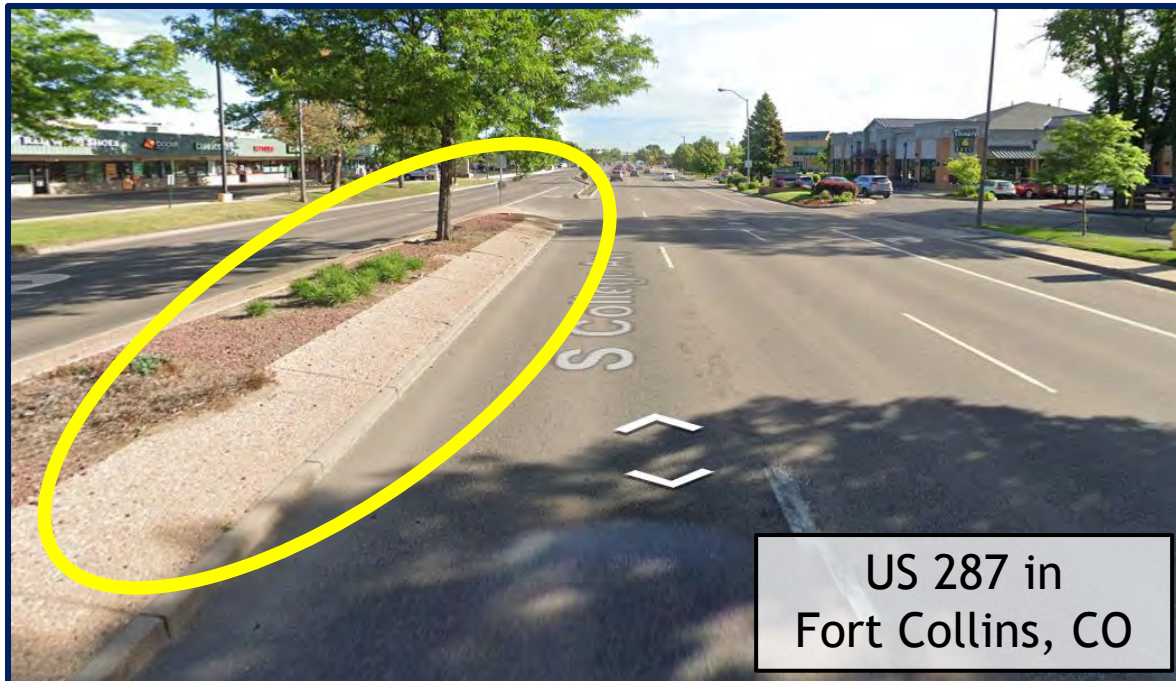
Rivers/Streams	Milepost	Right-in, Right-out only	Grade Separated at Railroad
Parks/Open Space	Full Movement (Signalized)	Right-out only	Access to be closed
Parcel Boundary/ROW Boundary	3/4 Movement	Emergency Access Only	Access closure contingent on contiguous property ownership or access to adjacent property via shared agreement
Municipal Boundary	3/4 Movement (Dependent on Traffic Study Results)	Grade Separated	
Floodplain			



SH 66 ACP Opportunities

Reclassification Process near E. Corridor Development:

- Developer/Lyons creates roadway template plan (from professional engineer)
 - Includes new roadway geometry with median barriers
 - Suggested design speed outlined





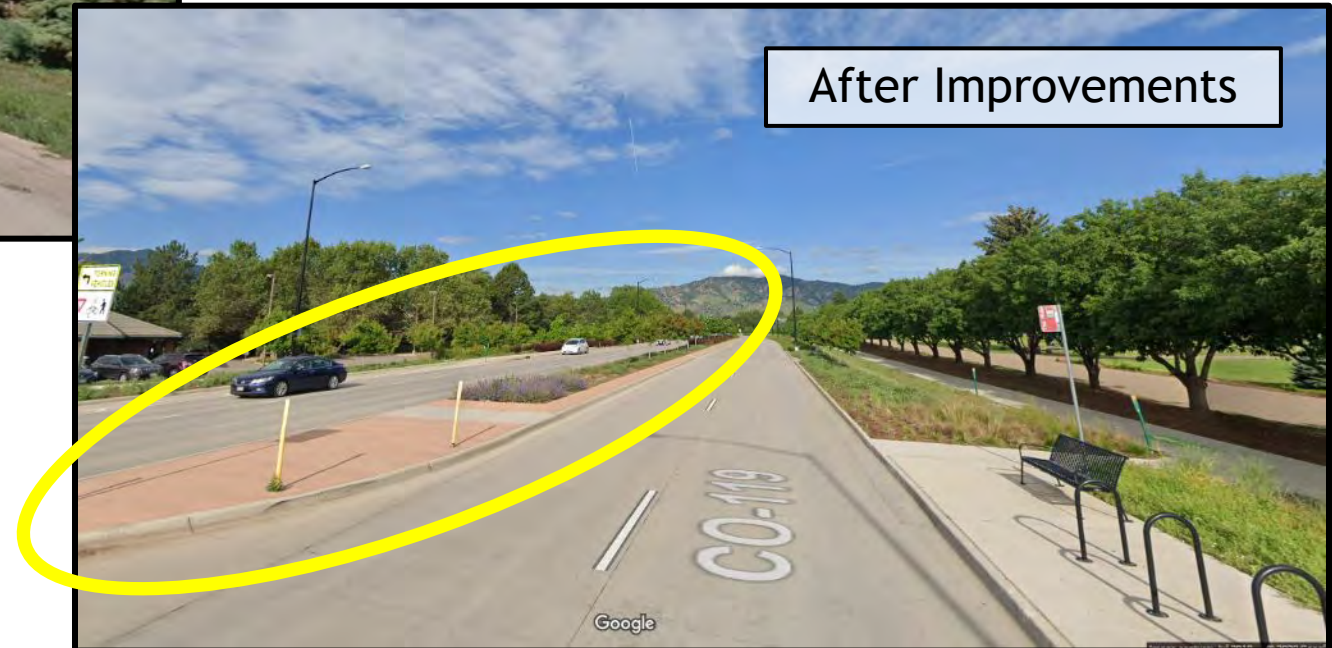
SH 66 ACP Opportunities

Example of Geometric Improvements to SH 119 in Boulder Co.:

Before Improvements



After Improvements





Next Steps for the SH 66 PEL and ACP

Next Steps in the SH 66 PEL & ACP:

- **Jan. 16, 2020** - work session with CDOT and Lyons Board of Trustees (Board)
- **Jan. 17, 2020** - CDOT provides information for Lyons Board packet
 - Also date of next SH 66 Coalition meeting
- **Jan. 22, 2020** - Lyons Board meeting
- **Feb. 2020** - sign the IGA (2 voting blocks) at the SH 66 Coalition meeting
- ~ **Early-2020** - complete all predecessors for the MOU
 - CDOT committed to helping the E. Corridor Development Team through process
 - Prepare a packet for Transportation Commission (TC) review and hearing
- ~ **Mid-2021** - following TC approval & engineering of medians & traffic studies, modify SH 66 ACP by West Voting Block action
 - Then change speed limits on SH 66 along E. Corridor Development



SH 66 PEL and ACP Update

**THANK
YOU**

Heather Paddock, PE

Region Transportation Director
CDOT Region 4

Heather.Paddock@state.co.us
(970) 290-8723

Keith G. Sheaffer, P.E.

South Program Manager
Keith.Sheaffer@state.co.us
(970) 350-2162

Brian Varrella, PE, CFM

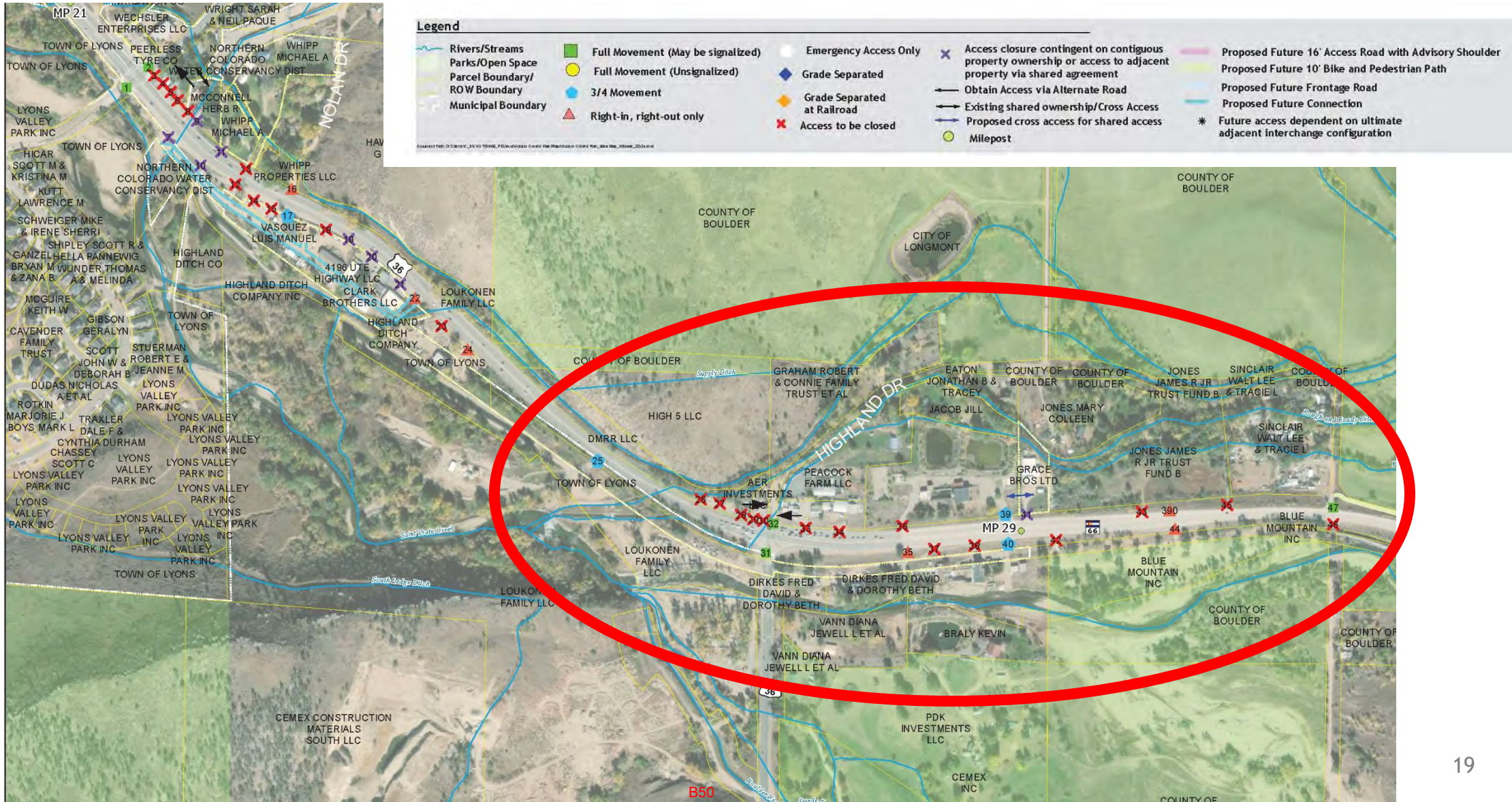
Boulder Resident Engineer
Brian.Varrella@state.co.us
(970) 373-6121





Current Access Plan near Lyons

Draft Oct. 2019

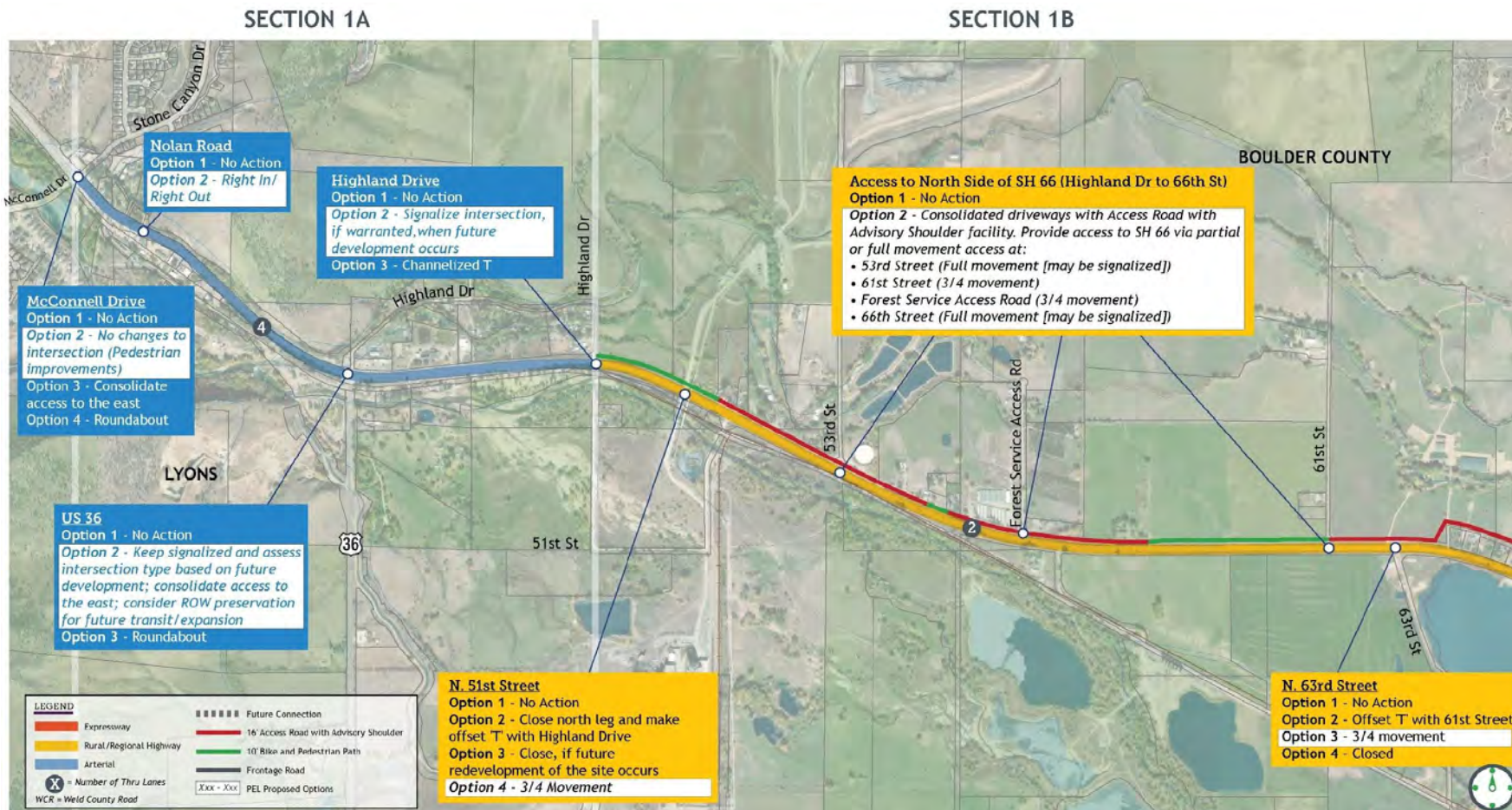




Level 3 Roadway Recommendations

Section 1A - McConnell Dr. to Highland Dr.

Section 1B - Highland Dr. to 75th St.





Existing & Proposed Visualizations (facing west)



Improvements



TRANSPORTATION CONSIDERATIONS:
The access road with advisory shoulders option is not an approved treatment in the Manual on Uniform Traffic Control Devices and would require a request for experiment to implement. The proposed bicycle and pedestrian path and access road with advisory shoulders must be accommodated with safety in mind within the highway clear zone and at all intersection crossings along the corridor.

ENVIRONMENTAL CONSIDERATIONS:
Resources include floodplains and floodway, potential wetlands, Preble's Meadow Jumping Mouse habitat, potential bald eagle nest sites, parks and open space, proposed trails, utilities, noise sensitive areas, hazardous materials sites, visual resources, and potential historic sites.

SH 66 PEL Study Recommendations, Section 1

Near-Term 0-10 years	LOCATION ON SH 66 (Intersection or section)			IDENTIFIED PROBLEM	RECOMMENDED IMPROVEMENT
	1A	McConnell Drive to Highland Drive East		High rate of access-related crashes; high-use bike corridor with limited shoulders	Install raised median and restrict and/or consolidate accesses. Install rumble strips or bike lanes
1A	US 36		Lacks safe facility/crossing for bicycles and pedestrians	Construct grade-separated underpass for bicycle and pedestrians	
1B	Section-wide		High rate of run-off-road crashes	Install rumble strips	
1B	Section-wide		Lacks consolidated access and regional bicycle and pedestrian mobility options	Install access road with advisory shoulders, add right and left turn lanes at those accesses; and install sidepath	
1B	75th Street		High rate of intersection-related crashes	Re-assess signal timing. Install bicycle and pedestrian grade-separated crossing	
1C	Section-wide		High rate of run-off-road crashes; lacks consolidated access and regional bicycle and pedestrian mobility options	Install rumble strips. Install access road with advisory shoulders, add right and left turn lanes at those accesses; and install sidepath	

Mid-Term 5-15 years	LOCATION ON SH 66 (Intersection or section)			IDENTIFIED PROBLEM	RECOMMENDED IMPROVEMENT
	1B	Section-wide		High delays for vehicles entering SH 66 from accesses	Construct missing Sections of access road with advisory shoulders, and/or bike/ped only connections. Include shoulder widening. Work with local agencies to construct trail along BNSF
1C	Section-wide		High delays for vehicles entering SH 66 from accesses	Construct missing Sections of access road with advisory shoulders, and/or bike/ped only connections. Include shoulder widening	

Long-Term 10-20 years	LOCATION ON SH 66 (Intersection or section)			IDENTIFIED PROBLEM	RECOMMENDED IMPROVEMENT
	1B	Section-wide		Lacks regional bicycle and pedestrian mobility options	Work with local agencies to install trail along SH 66
1C	53rd Street		Lacks safe facility/crossing for bicycles and pedestrians	Install bicycle and pedestrian grade-separated crossing	

Beyond Horizon Year +20 years	LOCATION ON SH 66 (Intersection or section)			IDENTIFIED PROBLEM	RECOMMENDED IMPROVEMENT
	1B	Section-wide		Multi-modal and vehicular transportation concerns	Multi-modal and safety transportation improvements
1C	Section-wide		Multi-modal and vehicular transportation concerns	Multi-modal and safety transportation improvements	

Local Agency Planning Efforts



Lyons vision for:

- Business district along SH 66
- US 36/SH 66 roundabout
- Gateway features at US 36/SH 66 and east of US 36 along SH 66



Boulder County vision for:

- Improve bus service and stops, park and ride capacity, and local transit connections; add queue jump lanes
- Incorporate bikeable shoulders and key grade separated crossings
- Enhance intersections to improve safety and convenience for all modes and to reduce congestion



For more information, please view the SH 66 PEL Corridor Conditions Report (Appendix C).



SH 66 PEL Study Recommendations, Section 1

Overview & Recommendations

- ❑ **Local agencies:** Town of Lyons and Unincorporated Boulder County
- ❑ **Known transportation problems:** Vehicular access, mobility, and safety; bicycle and pedestrian connections and safety, bicycle crossings
- ❑ **Existing roadway classification and laneage:** Rural/Regional Highway with two to five lanes
- ❑ **Recommended roadway classification:**
 - Arterial roadway from McConnell Drive to Highland Drive (Section 1A)
 - Rural/Regional Highway from Highland Drive through 75th Street (Section 1B) and 75th Street through 87th Street (Section 1C)
- ❑ **Total recommended cross section width:** 101 feet to 138 feet
- ❑ **Total right of way preservation acreage:** 99.6 acres

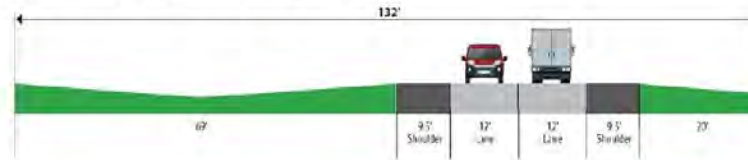
- ❑ **Recommended cross sections include:**
 - Four 12-foot travel lanes with a raised 16-foot median and curb and gutter (Section 1A)
 - Two 12-foot travel lanes with turn lanes at intersections and right-of-way preservation for potential multimodal and safety transportation improvements (Sections 1B and 1C)
 - Curb and gutter and bike lanes along SH 66 (Section 1A)
 - Either a 10-foot bike and pedestrian path or a 16-foot access road with advisory shoulders along SH 66 (Section 1B and 1C)
 - A five-foot offset to clear zone (a clear zone is an unobstructed, traversable roadside area that allows a driver to stop safely or regain control of a vehicle that has left the roadway) in areas that are not curb & gutter

Recommended Right-of-Way Preservation Footprint



Expansion of intersections throughout Section 1 should consider the potential for any future expansion of the roadway and should fit appropriately in the right-of-way. Additionally, the construction of the Access Road with Advisory Shoulders and Bike Only Path should be placed in the right-of-way such that if future roadway expansion occurs, the bicycle and pedestrian facilities would not require replacement.

Section 1B & Section 1C Existing Conditions
(exact dimensions vary slightly throughout the section)

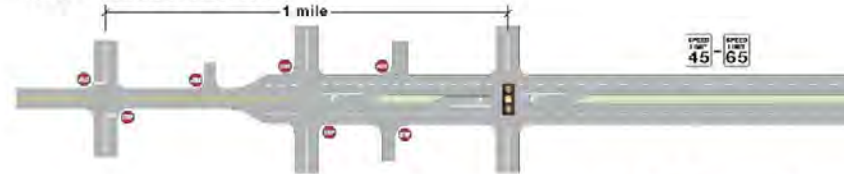


Recommended Roadway Classification

ARTERIAL



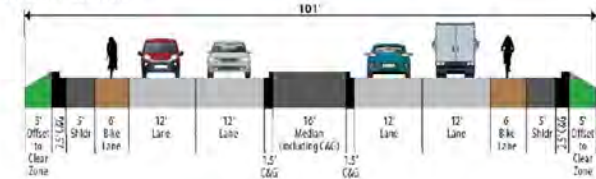
RURAL/REGIONAL HIGHWAY



DESCRIPTION	ACCESS SPACING
Moderate to low travel speeds and traffic volumes with moderate access	1/2 mile for full movement intersections, with possible 3/4 movement at quarter miles, and RIRO access for each parcel (should share access if possible)
Moderate to high speeds with moderate to low traffic volumes	1/2 mile + for full movement intersections with public roadways, maximum of one access per parcel (depending on other roadways that could preclude access) with shared access preferable

Recommended Cross Sections (facing east)

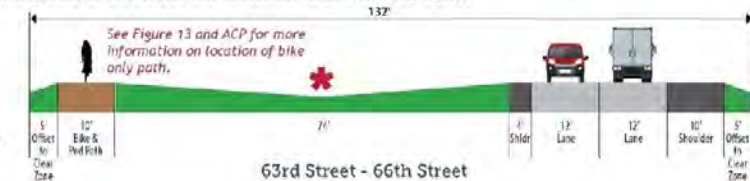
Section 1A with Curb & Gutter



Section 1B & Section 1C with 16' Access Road with Advisory Shoulders with Potential Dedicated Bus Lanes



Section 1B & Section 1C with 10' Bike & Ped Path



* Right-of-way preservation for operational resiliency

STATE OF COLORADO

DIVISION OF MINERALS AND GEOLOGY

Department of Natural Resources

1313 Sherman St., Room 215

Denver, Colorado 80203

Phone: (303) 866-3567

FAX: (303) 832-8106

Bill Owens
GovernorGreg E. Walcher
Executive DirectorRonald W. Cattany
Acting Division Director

October 28, 2002

Mr. Steve Mossberg
CEMEX
P.O. Box 529
Lyons, CO 80540RE: CEMEX, Inc., Lyons Mine, Permit No. M-1977-208
Nonconforming Use Status

Dear Mr. Mossberg,

The Division of Minerals & Geology received your letter on October 16, 2002 regarding the nonconforming use status of the cement kiln plant located at the Lyons Mine, Permit No. M-1977-208. This information was submitted as a result of the Division's inspection of September 5, 2002 requesting this information in order to determine if a reclamation cost estimate needs to be included for the cement kiln facility.

As noted in the Division's September 5, 2002 inspection report,

"Because the CKD is regulated as a waste generated by the mining operation under the DMG Permit, it would require that a bond be posted as part of the facilities which would need to be demolished and decommissioned following the closure of plant operations. The 1999 inspection reports states that at that time, the company believes that this area of Boulder County is grandfathered as non-conforming use and that the complex and kiln are allowed to remain in place after closure as part of its industrial/commercial final end land use. DMG stated that it would like either written confirmation that the cement kiln is allowed under the current zoning and has the approval of Boulder County to remain in place after reclamation is completed, or a Certificate of Designation regarding the disposal of Cement Kiln Dust. The Division further stated that if neither of these measures are taken in the near future, DMG will recalculate the financial warranty for the site based on the cost of decommissioning the kiln, unless such confirmation is received, in which case the financial warranty will be based on the County requirements for leaving the kiln in place."

The letter written by Boulder County Land Use Department dated October 8, 2002 recognizes the cement kiln and attendant equipment as a nonconforming use. However based on Boulder County Land Use Code, it appears that the nonconforming use will terminate once the facility is either altered or abandoned. It appears that once the facility is no longer in operation, the nonconforming use will terminate and be subject to reclamation under DMG permit M-1977-208.

The letter supplied by Boulder County Land Use Department does not satisfy the Division's requirement that the cement kiln facility can remain in place as part of the post mining land use. Please be aware that the reclamation plan includes the cement kiln facility in the permit area of the Lyons Mine, and the area is slated to be reclaimed as "irrigated pasture" (see attached copy of 1977 Reclamation Plan Map). The Division was unable to locate any designation of a postmining land use of "industrial/commercial" as stated by the operator in the DMG 1999 inspection report.

Based on the information noted in the reclamation plan and letter from the Boulder County Land Use Department, the Division believes that the reclamation cost estimate for the Lyons Mine will need to be updated to include demolition and decommission of the cement kiln facility, and return the site to a postmining land use of "irrigated pasture."

If CEMEX wishes to retain this facility as part of the postmining land use, and have it not be subject to bonding, then the following must be submitted by November 29, 2002;

1. The plant site is slated to be reclaimed to a postmining land use of "irrigated pasture." In order to retain the structures CEMEX will need to submit a Permit Amendment Application changing this part of the postmining land use to "industrial/commercial."
2. CEMEX will need to provide a letter from Boulder County Land Use Department stating that the cement kiln facility can remain as a part of the postmining land use once the operation is no longer in use.

If the above mentioned items are not submitted, the Division will make arrangements to conduct an inspection of the site for purposes of revising the reclamation cost estimate. If you have any questions, please do not hesitate to contact me at 303-866-4943.

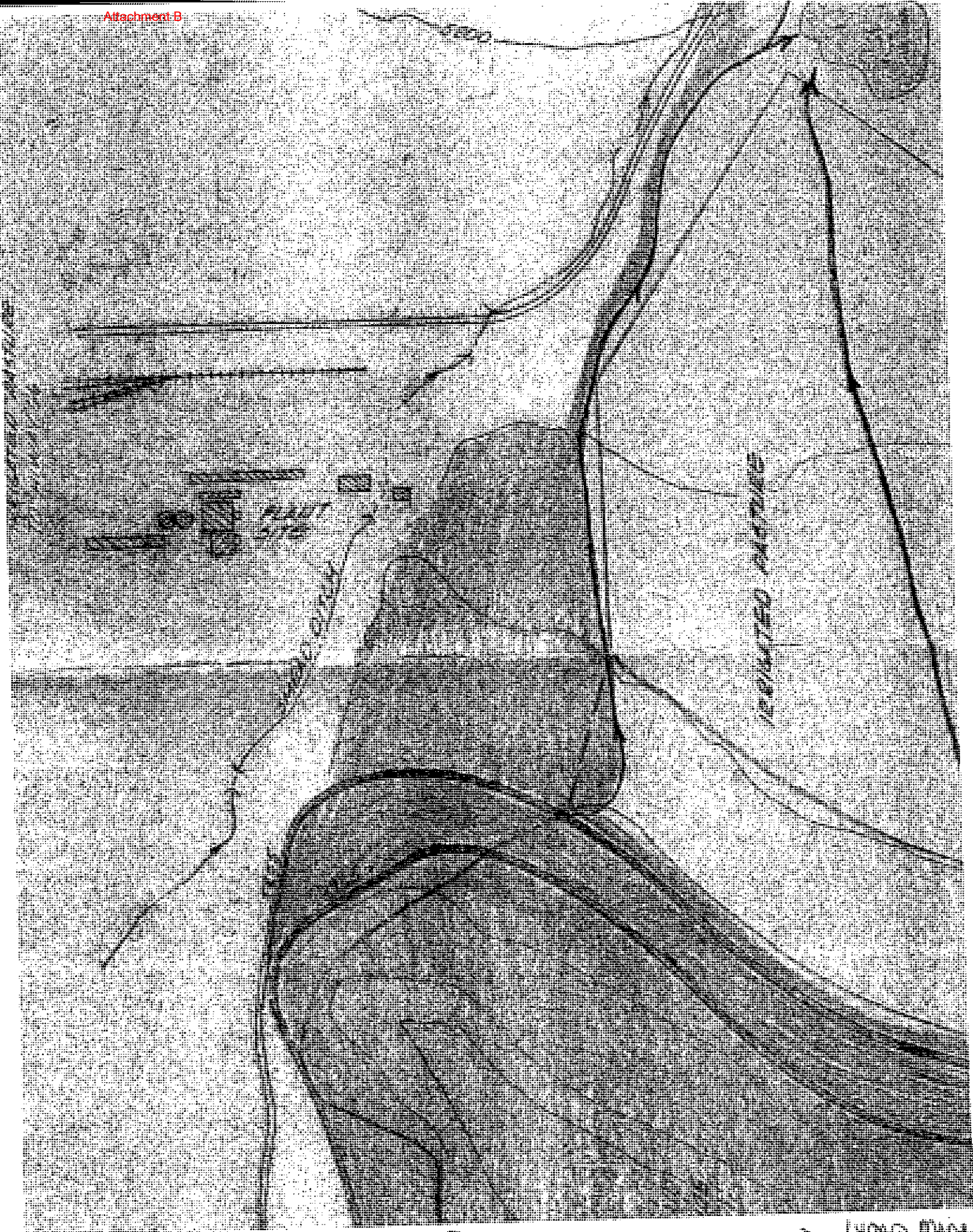
Sincerely,



Erica S. Crosby
Environmental Protection Specialist

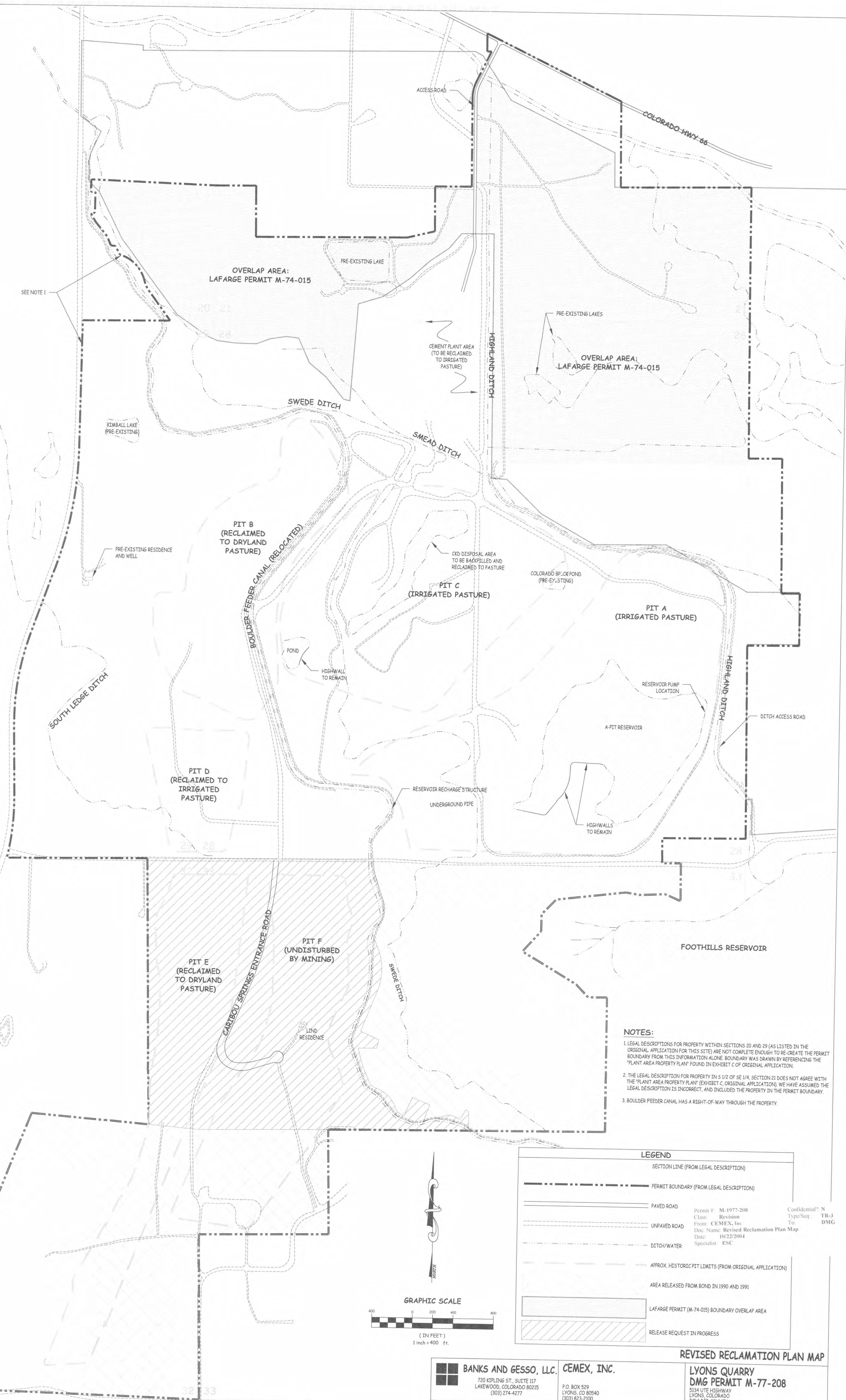
Enclosure (copy of portion of 1977 Reclamation Plan Map)

cc: Carl Mount; DMG
John Lohr; CEMEX (w/enclosure)



Copy of Portion of Reclamation Plan Map (Received 9-14-77)

LYONS MINE
M-1977-208



NOTES:

- LEGAL DESCRIPTIONS FOR PROPERTY WITHIN SECTIONS 20 AND 29 (AS LISTED IN THE ORIGINAL APPLICATION FOR THIS SITE) ARE NOT COMPLETE ENOUGH TO RE-CREATE THE BOUNDARY FROM THIS INFORMATION ALONE. BOUNDARY WAS DRAWN BY REFERENCING THE "PLANT AREA PROPERTY PLAN" FOUND IN EXHIBIT C OF ORIGINAL APPLICATION.
- THE LEGAL DESCRIPTION FOR PROPERTY IN S 1/2 OF SE 1/4, SECTION 21 DOES NOT AGREE WITH THE "PLANT AREA PROPERTY PLAN" (EXHIBIT C, ORIGINAL APPLICATION). WE HAVE ASSUMED THE LEGAL DESCRIPTION IS INCORRECT, AND INCLUDED THE PROPERTY IN THE PERMIT BOUNDARY.
- BOULDER FEEDER CANAL HAS A RIGHT-OF-WAY THROUGH THE PROPERTY.

LEGEND	
	SECTION LINE (FROM LEGAL DESCRIPTION)
	PERMIT BOUNDARY (FROM LEGAL DESCRIPTION)
	PAVED ROAD
	UNPAVED ROAD
	DITCH/WATER
	APPROX. HISTORIC PIT LIMITS (FROM ORIGINAL APPLICATION)
	AREA RELEASED FROM BOND IN 1990 AND 1991
	LAFARGE PERMIT (M-74-015) BOUNDARY OVERLAP AREA
	RELEASE REQUEST IN PROGRESS

Permit #: M-1977-208
 Class: Revision
 From: CEMEX, Inc.
 Doc. Name: Revised Reclamation Plan Map
 Date: 10/22/2004
 Specialist: ESC

Confidential? N
 Type/Seq.: TR-3
 To: DMG

BANKS AND GESSO, LLC. 720 KIPLING ST., SUITE 117 LAKEWOOD, COLORADO 80215 (303) 274-4277		CEMEX, INC. P.O. BOX 529 LYONS, CO 80540 (303) 823-2100		LYONS QUARRY DMG PERMIT M-77-208 5134 UTE HIGHWAY LYONS, COLORADO BOULDER COUNTY	
JOB NO	DATE	SCALE	DRAWN BY	DESIGNED BY	APPROVAL
04033	10/21/04	1"=400'	DRF		
					REV SHEET

CEMEX Lyons Dowe Flats Mining Extension Discussion

June 9, 2022



Agenda

- About Good Neighbors of Lyons
- About CEMEX Lyons
- The Current Situation
- The Proposal
- Questions Raised
- What Can You Do?
- Q&A

About Good Neighbors of Lyons

About CEMEX Lyons

Who is CEMEX?



Mexican multinational materials company.

Manufactures and distributes cement, ready-mix concrete and aggregates in 50 countries

Global 2000 (#1,178)

\$13 Billion in Annual Revenues

\$27 Billion in Assets

What does CEMEX Lyons do?



Produces **cement**, the main basic ingredient of ready-mix concrete

Cement is produced largely from combining **limestone** and **silica** from local mines & quarries.

To combine the ingredients, **the plant burns coal**, and heats a kiln to **>2300 deg F**

Where is CEMEX Lyons?



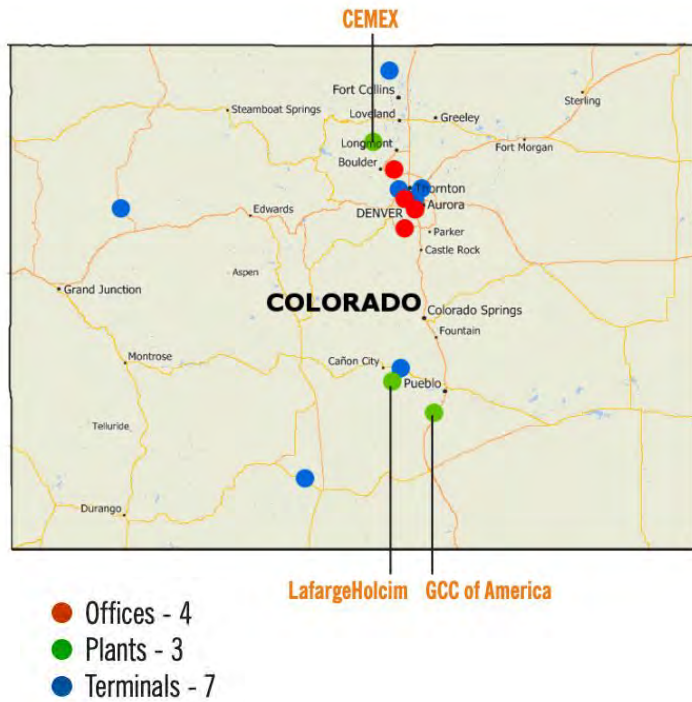
Dowe Flats Mine
(1594 acres)

Pipe & Conveyor
From Mine to Plant

CEMEX Lyons Plant
(930 acres)



What does the Colorado cement market look like?



- **3 cement plants**
- **7 cement delivery terminals**
- **2.6 million tons** of cement produced
- **2.1 million tons** of cement consumed
- Net exporter of **500,000 tons** of cement
- **327 employees** (2015)

Source: [Cement.org report on Colorado Cement Industry \(2016\)](#)

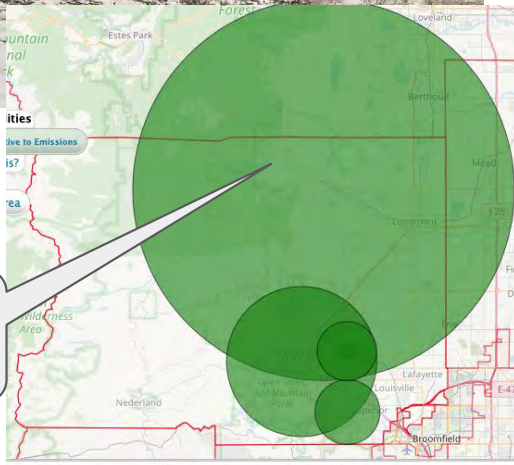
When did CEMEX Lyons begin operations?



CEMEX Lyons Plant constructed in **1969** by Martin Marietta and permit granted by State of Colorado. Adjacent quarries were mined for **decades** until exhausted.

Dowe Flats Mine began mining operations **September 30, 1997** with a **25 year permit** granted by Boulder County, ending **September 30, 2022**.

What is the CEMEX Lyons carbon footprint?



CEMEX Lyons Plant

EPA: #1 Greenhouse Gas Emitter in Boulder County

- Equivalent to **~30,000** Boulder County residents
- **~7.3%** of Boulder County Greenhouse Gas Emissions (GHG)
- Emits **357,101 tons of CO₂ annually**; the #2 polluter in Boulder County emits only 55,000 tons of CO₂ annually
- Over next 30 years, will emit **10 million tons of CO₂**

Image Source: Boulder County - EPA Facility Level Emissions
<https://ghgdata.epa.gov/ghgp/main.do>

What regulatory actions have been taken?



The screenshot shows the EPA website's 'Enforcement' section. The main heading is 'CEMEX Lyons Plant Settlement'. Below the heading, a paragraph states: '(Washington, DC - April 19, 2013) The U.S. Department of Justice (DOJ) and the U.S. Environmental Protection Agency (EPA) announced today that CEMEX, Inc., the owner and operator of a Portland cement manufacturing facility in Lyons, Colo., has agreed to operate advanced pollution controls on its kiln and pay a \$1 million civil penalty to resolve alleged violations of the Clean Air Act (CAA)'. To the right of the text is a green box titled 'Cemex Lyons Company Settlement Resources' containing links for 'Press Release' and 'Consent Decree'. A sidebar on the left lists various enforcement categories, and a search bar is visible at the top right.

Enforcement CONTACT US

CEMEX Lyons Plant Settlement

(Washington, DC - April 19, 2013) The U.S. Department of Justice (DOJ) and the U.S. Environmental Protection Agency (EPA) announced today that CEMEX, Inc., the owner and operator of a Portland cement manufacturing facility in Lyons, Colo., has agreed to operate advanced pollution controls on its kiln and pay a \$1 million civil penalty to resolve alleged violations of the Clean Air Act (CAA).

On this page:

- [Overview of Company](#)
- [Violations](#)
- [Injunctive Relief](#)
- [Pollutant Reductions](#)
- [Health Effects and Environmental Benefits](#)
- [Civil Penalty](#)
- [Comment Period](#)
- [Contact](#)

Cemex Lyons Company Settlement Resources

- [Press Release](#)
- [Consent Decree](#)

Overview of Company

\$1M settlement with DOJ and EPA for Nitrogen Oxide (NOx) emissions.

Source: <https://www.epa.gov/enforcement/cemex-lyons-plant-settlement>

The Current Situation

Dowe Flats Permit Expiring



Mining Permit Expiring **September 30, 2022** and reclamation expected to be completed in **2024**.

CEMEX Plant Won't Have Local Raw Materials



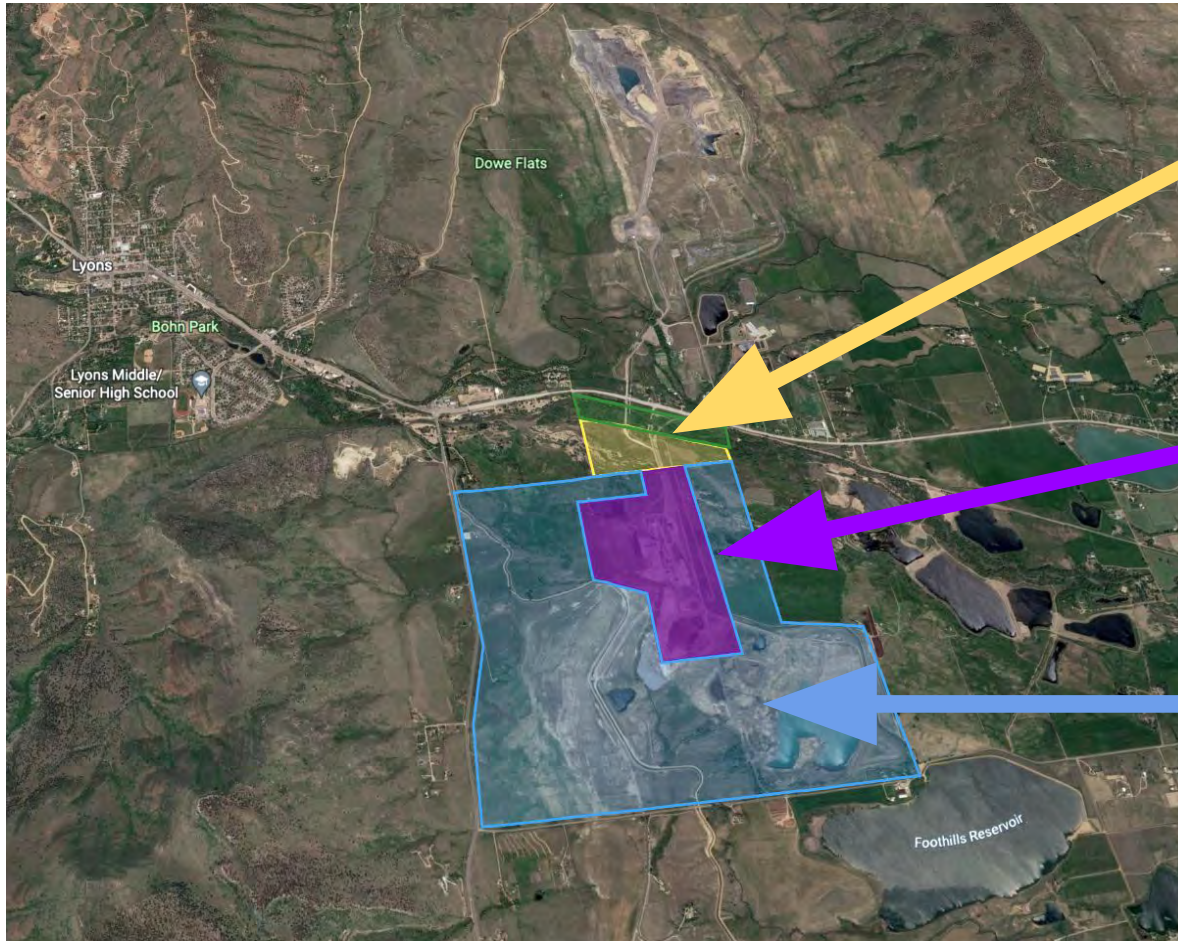
Boulder County Open Space Purchase Rights



Boulder County Open Space has rights to buy 100% of Dowe Flats on **Dec 31, 2024**

Boulder County Open Space **does not have any purchase rights** to the CEMEX Plant parcel

Land Use Agreement between Lyons & Boulder County (IGA)



Municipal Facilities Area (~73 ac)

- Lyons Planning Area; Annexable
- **No** Boulder County Purchases/Easements w/o Lyons consent
- Intended for Green Tech; Solar/Electric, Etc

Primary Planning Area - e.g. CEMEX Plant (~40 ac)

- Lyons Planning Area; Annexable
- Intended for Urban Development & Town Expansion
- Some of it intended to be negotiated in 2022

Rural Preservation Area (~830 ac)

- Boulder County Jurisdiction
- **Can be acquired** by County for Open Space & Conservation Easements
- Zoned Agricultural: 35 acre, 1-unit residential

CEMEX indicates possible “Indefinite Operation”



In face of Dowe Flats closing, CEMEX has indicated they have contemplated “**continuing to operate the cement plant indefinitely**”

To accomplish this, it would require shipping in **hundreds of thousands of tons** of limestone and silica from distant mines and quarries each year.

The Proposal

CEMEX Proposes to Extend Dowe Flats Mining Another 15 Years



Mining Permit Extended to **2037** and reclamation expected to be completed in **2040**.

Conclude "Ongoing Cement Plant Operations" by **2037** plus reclamation

In Exchange >\$15 Million to Boulder County Open Space



Boulder County Open Space receives Dowe Flats for **free** and **saves \$6.6M**

Boulder County Open Space receives **\$6.0M** of rent payments for land it owns

Boulder County Open Space receives **200 acres** adjacent to Dowe Flats for **free** (est **\$3.4M** value)

Plus...Additional Purchase Rights for Boulder County



Boulder County Open Space receives rights to buy **830 acres** of Plant parcel for **\$17,000+ per acre (~\$15M)**

Permission to build a trail along St. Vrain River



Questions this Raises...

Can CEMEX **really operate indefinitely**
without a nearby mine?

Why would CEMEX pay the equivalent of **\$15 million** to operate for the next **15 years** if they can **really operate indefinitely** without a nearby mine?

We seem to be presented with a **binary choice** between **15 more years** and “**indefinite**”

...but is there **another** option?

How does this impact the **current land use agreement (IGA)** between the Town of Lyons and Boulder County regarding the CEMEX property?

In lieu of agreeing to the 15-year proposal, could the Town of Lyons negotiate with Boulder County and CEMEX a **different exit timeline** and immediately move to negotiate a new land use agreement outlining the future of Lyons on the former CEMEX site?

In the current proposal the language states that CEMEX will “conclude ongoing cement plant operations,” but what does that **actually mean**?

- Could they **repurpose the plant** for a different industrial use?
- What’s going to happen to the plant? Is there an **actual plan**?
- Does CEMEX have to sell the plant once operations end?

If the cement plant goes away, could we still get cement?

How do we reconcile this proposal with Boulder County's 2030 Paris Climate Goal and Greenhouse Gas Reduction Commitments?

What are the impacts on public health and safety?

What are the impacts on air quality in the local communities?

What are the impacts on wildlife?

What are the impacts to Lyons as the “Gateway to the Rockies” and first impressions for travelers on the way to Estes & Rocky Mountain National Park?

What are the impacts to Eastern Corridor and its residents?

What is the impact to the beauty of the St Vrain Valley?

What are the impacts to Town of Lyons
tax revenue and economic
development?

How do we know there won't be yet another extension in 15 years?

What are the environmental impacts of continuing to operate a 60 year old plant?

Why is the timeline for public comment
so fast?

....Lots of Questions
... Few Answers....

**We Need More Time to Get
Answers to these Questions!**

What Can You Do?

Before Friday at 5PM

- Email Boulder County: planner@bouldercounty.org
Subject Line: SU-22-0003
CC: commissioners@bouldercounty.org
- Email Town of Lyons: dvasquez@townoflyons.com
- Call Boulder County Planning: 303-441-3930

“Delay Boulder County Planning Commission review scheduled for **July 20th**, we need more time to answer the questions posed today.”

Add any personal details/experiences that are important to you

...then continue to spread the word (email, social)

If you're inclined...

Visit Save our St. Vrain Valley and make
a Donation

<https://sosvv.wordpress.com/>

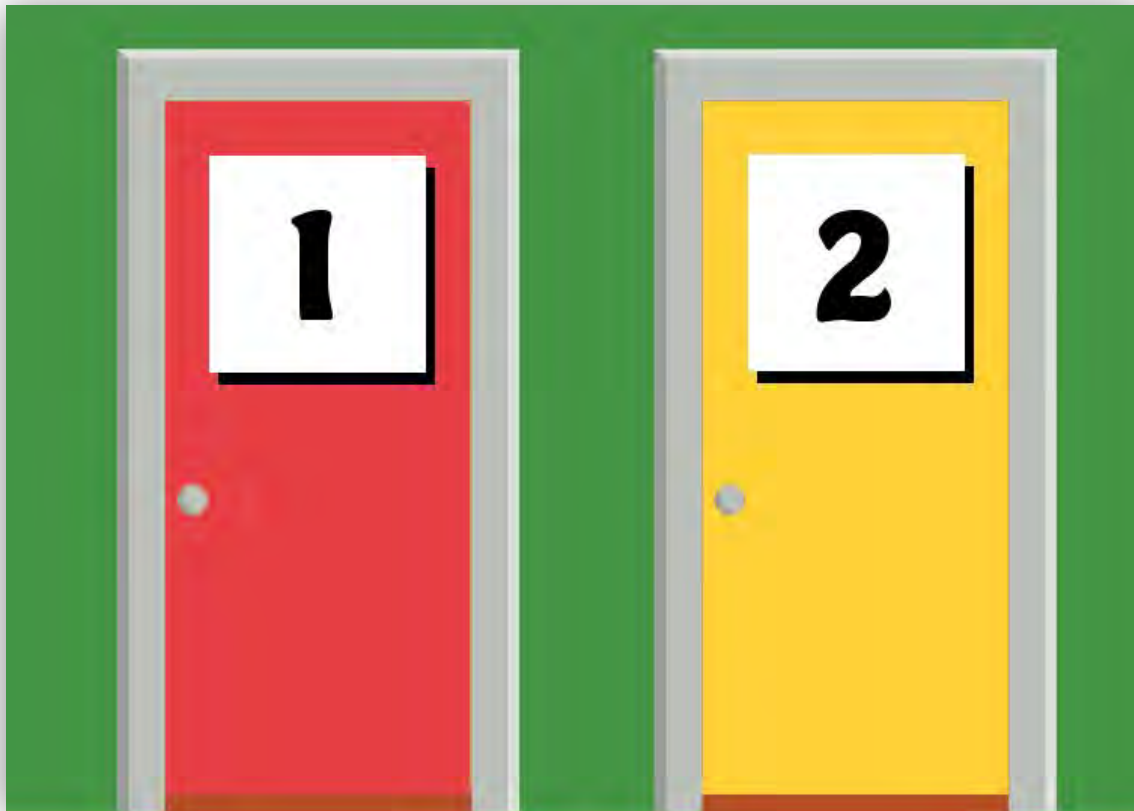
Q&A

Thank You

CEMEX Lyons: An Alternative Proposal

07.07.2022

Two Options: 15 Years or “Indefinite”



Negotiation Technique: False Dilemma Fallacy

“A false dilemma presents a choice between two mutually exclusive options, **implying that there are no other options**. One option is clearly worse than the other, making the **choice seem obvious**. Also known as the either/or fallacy, false dilemmas are a type of informal logical fallacy in which a faulty argument is used to **persuade an audience to agree**. False dilemmas are everywhere. They can be deliberate or accidental, but their goal is to **make their argument convincing**.”

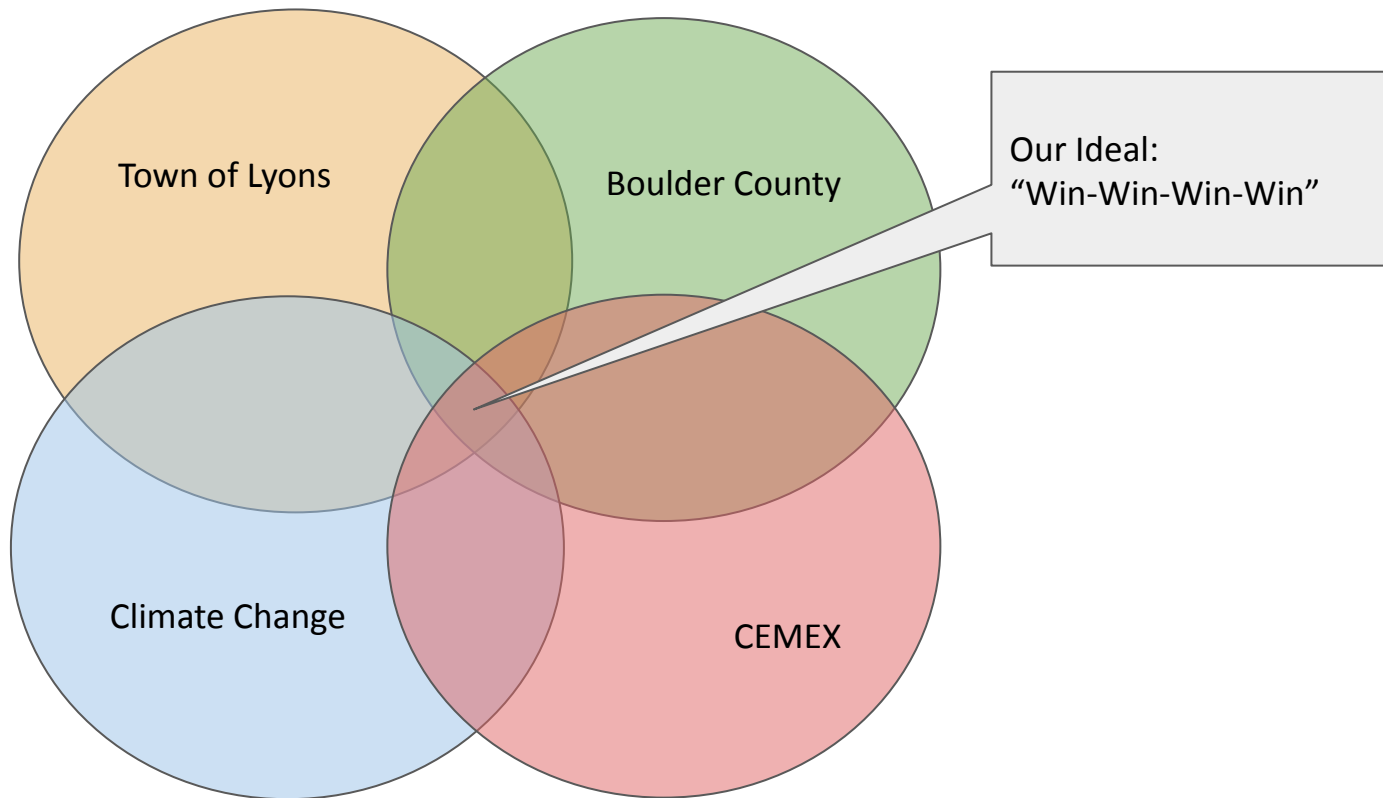


Source: <https://examples.yourdictionary.com/false-dilemma-fallacy-examples.html>

What about a Third Option?



Third Option Objective



Imagine a Third Option that was...

Faster

- 5 Years of Mining & Plant Operations Instead of 15 Years or Indefinite.
- Reduces CO2 Emissions *ahead* of 2030 Goals.
- 5 Years for Dowe Flats Open Space instead of 15 Years.
- Accelerant for Eastern Corridor Development.



Better

- Plant Demolition and Industrial Operations Gone. Permanently.
- Land Conservation, Wildlife, and plentiful multimodal St Vrain Greenway Trails
- Renewable Energy, powering 100% of the Town of Lyons.
- Lyons Economic Development and much needed Tax Revenue Base.
- Sustainable Multi-Use that's Beautiful, Unique and inline with Boulder County and Lyons ethos.



Cheaper

- \$3.8MM option for Boulder County instead of \$8.0MM net outlay.
- Increase Town of Lyons Revenue and Tax Base
- ~\$40MM more value for CEMEX shareholders than an "Indefinite" option
- Leverages the sustainable investment community for public/private partnership (capital/creativity)



“The Town of Lyons Proposal” - Summary Terms

- 5 Years instead of 15 Years; Both Dowe Flats Mine & Plant
- CEMEX Performs demolition of plant and reclamation by 2030
- CEMEX Area (930 acres) is Protected/Conserved via Updated IGA & Land Use Agreements
 - Boulder County Open Space ~ 510 Acres
 - Town of Lyons ~ 420 Acres
 - 310 Acres for Low Density Mixed-Use under Covenant/Conservation Easement
 - Ithaca 10/90 model - <https://ecovillageithaca.org>
 - 70 Acres for Open Space / Wetlands
 - 40 Acres for Solar Agri Voltaics for 100% Lyons Renewable Energy
- CEMEX Area (930 Acres) - purchase options for entirety
 - \$17,000 per acre + 2% Annual Increase
 - For Boulder County 510 acres - 2022 onwards
 - For Lyons 420 acres - 5 year window (beginning in 2030) to annex & commence, otherwise assigned to Boulder
- Lyons has 5 years (beginning 2030) to annex & proceed with its portion
 - Multiple sustainable investment groups envisioned to participate, bid and present concepts
 - Boulder County can participate as well and present its own concepts
- Boulder County and Lyons receive right-of-first refusal for CEMEX Water Rights sales
- All of Dowe Flats still provided to Boulder County Open Space for \$0

Next Steps

- Town to assert rights and/or leverage
 - Additional legal resources
- Town to engage in IGA Negotiation
 - Boundaries to allocate CEMEX Area
 - Density parameters - inline with Lyons Comprehensive Plan
- Upcoming meetings to put forth Town of Lyons proposal
 - Town of Lyons (Special Sessions and/or Workshops) ahead of July 22nd response
 - Boulder County Community Planning (August 17th)
 - Boulder County Commissioners (Sep/Oct)
- Good Neighbors of Lyons is here to help...
 - Help craft narrative and presentation so Lyons position/proposal is clear and compelling
 - Compile community feedback and gather community support/endorsements for proposal

Key Deal Terms & Benefits	Option A Status Quo "Possibly Indefinite"	Option B CEMEX Proposal "15 Years More Mining"	Option C Town of Lyons Proposal "5 Years More Mining"
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CEMEX Gets:

- Dowe Flats Mining Extension
- Continued Plant Operation
- Estimated Net Present Value for CEMEX (e.g. Value for Shareholders)
- Profitable & Sustainable Ongoing Operation
- **NEW:** Graceful Exit and Wind Down from Boulder County

	0 Years	15 Years	5 Years
Permitted Indefinitely	15 Years	15 Years	5 Years
	-\$9,693,447	\$48,257,787	\$29,890,976
	No	Yes	Yes
	No	No	Yes

CEMEX Gives:

- Purchase Options @ \$17,000/acre on Land Surrounding Plant (830 Acres)
- **NEW:** Purchase Options @ \$17,000/acre on remaining CEMEX Area incl Plant (~100 Acres)
- **NEW:** Updated IGA for Land Use (Covenant / Conservation Easement) on CEMEX Area (930 Acres)
- **NEW:** Commitment to Close Plant
- **NEW:** Demolish Plant and Perform Cleanup/Reclamation
- Reclaim Dowe Flats
- Reclaim Land surrounding Plant
- Provide Trail Easement for St Vrain Greenway
- **NEW:** Commitment best attempts to sequester CO2 Emissions
- **NEW:** Commitment best attempts to mitigate ongoing Noise, Light & Dust pollution
- **NEW:** Lyons and/or Boulder County Right of First Refusal on Any Water Rights Sales

	No	Yes - to Boulder County	Yes - to Boulder (~60%), Lyons (~40%)
	No	No	Yes - to Lyons
	No	No	Yes - w/ Boulder County & Lyons
	No	Yes - by 2037	Yes - by 2027
	Indeterminate	Indeterminate	by 2030
	by 2025	by 2041	by 2030
	Indeterminate	by 2041	by 2030
	No	Yes	Yes
	No	No	Yes
	No	No	Yes
	No	No	Yes

Boulder County Gets:

- **NEW:** Climate Goals: Annual Reduction of CO2 by 2030
- Addtl Acres of Protected Open Space and/or Conserved Land
 - Addtl Acres of Open Space
 - **NEW:** Addtl Acres governed by Covenant / Conservation Easement (75% minimum CE)
- Total Amount Spent
- **NEW:** Updated IGA for Land Use (Covenant / Conservation Easement) on entire CEMEX Area (930 Acres)
- Purchase Options to acquire ~510 Acres Open Space @ \$17,000 / acre
- **NEW:** Purchase Options to acquire ~420 Acres CEMEX Area after 2035 if not Exercised/Annexed by Lyons
- Cement Plant Closes (*)
- **NEW:** Cessation of General Industrial Activity at CEMEX Plant Site
- **NEW:** Plant Demolished and Plant Site Cleaned Up
- **NEW:** Improved Beauty of St. Vrain Valley / "Gateway to the Rockies"
- Trail Easement for St Vrain Greenway
- Access Easement to Boulder County property

	0	0	357,000 Tons/Yr (12.5% of 2030 Goal)
	766	1804	1904
	766	1804	1484
	0	0	420
	\$7,150,000	\$8,000,000	\$3,840,400
	No	No - 830 Acres	Yes - 930 Acres
	No	Yes - 830 Acres	Yes - 510 Acres
	No	No	Yes
	No	Yes (2037)	Yes (2027)
	No	No	Yes (2030)
	No	No	Yes (2030)
	No	No	Yes
	No	Yes	Yes
	No	Yes	Yes

Town of Lyons Gets

- **NEW:** Updated IGA for Land Use (Covenant / Conservation Easement) on entire CEMEX Area (930 Acres)
- Options to Develop portion of CEMEX Area for Low-Density Sustainable Mixed-Use (spirit of 2012 IGA)
- Options to Develop Municipal Facility for 100% Renewable Energy (spirit of 2012 IGA)
- **NEW:** Purchase Options & 5yr window to Annex/Solicit Plans for ~420 Acres CEMEX Area (2030 to 2035) @ \$17,000 per acre
- **NEW:** Ability to engage/solicit Sustainable Investment Community for Bids/Proposals
- Boulder County assistance/cooperation with Sustainable Development Proposals for CEMEX Area (from 2012 IGA)
- **NEW:** Potential Increase in Town Tax Revenue Base
- **NEW:** Viable & Sustainable Eastern Corridor
- **NEW:** Cessation of General Industrial Activity at CEMEX Plant Site
- Ongoing \$40K/year donations/gifts from CEMEX

	No	No - 830 Acres	Yes - 930 Acres
	No	No	Yes
	No	No	Yes
	No	No	Yes
	No	No	Yes
	No	No	Yes
	Yes	Yes	Yes
	No	No	Yes
	No	No	Yes
	No	No	Yes
	Yes	Yes	No

For Community:

- **NEW:** Plant Goes Away, Forever.
- **NEW:** Climate Goals: Annual Reduction of CO2 by 2030
- **NEW:** Reduced Noise, Light & Dust Pollution
- Beautiful Walking/Biking Trails through the St. Vrain Greenway
- Dowe Flats 1600 Acres as Open Space
- **NEW:** Entirety of CEMEX Plant Land (930 Acres) becomes Protected/Conserved
- **NEW:** Pedestrian Bridge connecting Dowe Flats to CEMEX Plant Land

	No	No	Yes
	0	0	357,000 Tons/Yr (12.5% of 2030 Goal)
	No	No	Yes
	No	Yes	Yes
	Yes - 2025	Yes - 2040	Yes - 2030
	No	No	Yes
	No	No	Yes

Marissa Davis

From: Jim Becker <jimbecker24@hotmail.com>
Sent: Thursday, July 14, 2022 4:49 PM
To: Marissa Davis
Subject: Feedback on Cemex mining permit extension

Hi,

Thank you for the opportunity to comment on the Cemex mining permit extension application. I am opposed to an extension for the following reasons:

An industrial complex involving both mining and processing doesn't fit with the current environment surrounding the Plant and mining operation. The Plant is a major pollution contributor to the bad air quality in Boulder county and the immediate area around the facilities, as well as a extremely loud and noise polluting facility.

The days of mining / extraction in Boulder County and the Lyons area in Boulder County are on the downside. We need to focus on housing, environment, transportation, and other issues. And not encourage the continuation of mining / extraction in Boulder County.

The approach (tone) of the extension from Cemex seems more like a threat or blackmail, than a company willing to work with the local governments / population. Seems like they are desperate to make a deal and may be in bad shape financially.

Having lived in Boulder County for the last 50 years, I seem to remember that the cement plant was bankrupted or was threatened to be shutdown before Cemex bought it out. I don't think it has a long term financial viability.

Boulder County should be the only voice in this process. Boulder County appears to be getting greedy with the idea of obtaining more open space and not looking at the impacts to Lyons and other local entities. Having dealt with Boulder County over the years, I find them overly optimistic with future planning but not very realistic / practical on issues and impacts involved with the actual situation here and now.

Therefore, I do not support the mining extension for Cemex.

Sincerely,
Jim Becker
419 Park St
Lyons

Marissa Davis

From: juliedonn <juliedonn19@outlook.com>
Sent: Thursday, July 14, 2022 5:01 PM
To: Marissa Davis
Subject: Fw: Cemex application for permit extension

Hello Marissa,

Regarding my comments below, I forgot to ask that they be entered into the official record of the BOT meetings whenever this issue is discussed, so I'm requesting that with this email. Thank you!

Julie Boyle

----- Forwarded Message -----

From "juliedonn" <juliedonn19@outlook.com>

To mdavis@townoflyons.com

Date 7/14/2022 4:42:07 PM

Subject Cemex application for permit extension

Dear Ms. Davis,

Please convey to the Lyons Board of Trustees that I hope they will unanimously and vigorously oppose the Cemex permit extension for the Dow Flats Quarry, and all the incentives the company is offering to Boulder County.

It will render the ambitious climate change goals the county and our town have established impossible to achieve. I am not convinced the company can afford to continue to operate the cement plant by trucking and railroading in the necessary materials. Continued plant operation will continue to massively pollute our town's and county's air with silica dust. And I do not believe the company has been a good neighbor: they have repeatedly refused to upgrade the plant operations to limit carbon and silica dust emissions to counter the massive contributions to climate change and poor air quality.

Thank you for passing on this comment to the BOT.

Julie Boyle

970-397-6041

Marissa Davis

From: juliedonn <juliedonn19@outlook.com>
Sent: Thursday, July 14, 2022 4:42 PM
To: Marissa Davis
Subject: Cemex application for permit extension

Dear Ms. Davis,

Please convey to the Lyons Board of Trustees that I hope they will unanimously and vigorously oppose the Cemex permit extension for the Dow Flats Quarry, and all the incentives the company is offering to Boulder County.

It will render the ambitious climate change goals the county and our town have established impossible to achieve. I am not convinced the company can afford to continue to operate the cement plant by trucking and railroading in the necessary materials. Continued plant operation will continue to massively pollute our town's and county's air with silica dust. And I do not believe the company has been a good neighbor: they have repeatedly refused to upgrade the plant operations to limit carbon and silica dust emissions to counter the massive contributions to climate change and poor air quality.

Thank you for passing on this comment to the BOT.

Julie Boyle
970-397-6041

Should the CEMEX Mining Permit be approved?

Although I serve on a Lyons advisory board, the following are only my personal thoughts. Correction of any errors and any needed updates would be much appreciated.

Also, some of the below makes use of information posted by a local advocacy group three years ago. This includes a verbatim copy of 2019 Boulder County-CEMEX correspondence, and it is at: <https://sosvv.wordpress.com/2019/06/20/breaking-news-land-use-director-holds-cemex-to-25-year-permit/>

Context: our neighbor CEMEX (large multinational company, headquartered in Mexico, second quarter 2021 net profit of \$270 million) seeks a 15 year extension on its Dowe Flat mining permit, which is integral to cement production south of highway 66.

Property Taxes: The company pays \$5872/year in property tax to Boulder County, on the 525 acre mining property. None at all on another 88 acres deemed “commercial land of no value” and which connects the mined area to the road.

For comparison, a small house in the close vicinity, also north side of the road, pays \$4934 on six acres.

In its Permit Application, the company is promising this same land in 2037 to Boulder County after reclamation at “0” cost, and claims this to be a savings of \$6.6 million. But the County-assessed actual value is only a little over \$400,000.

About 200 acres of other land would also be conveyed to the County (for example, there is an 88 acre parcel it owns to the east of the mining area). At present, that parcel pays \$311/year in property tax and has an actual value assessed of \$11,300.

In contrast, the area the kiln is on does pay significant property tax: this year \$130,081, on 866 total acres (\$14.3 million assessed actual value). This is, however, only ~35% of what was paid just last year (\$367,114 in 2021, similar amounts in years prior). If the same reduction applies for next 15 years, this is a decrease in County property tax revenue of, very roughly without inflation, \$3.6 million. Those are real dollars, real savings to CEMEX.

Why such a large decrease? According to County tax records, what happened this tax billing year is that part of the land was moved from the “single family residence-improvements” property code to the “manufacturing processing-improvements” (much lower rate). The assessed property values appear to have been left as they were. Whatever the rationale, CEMEX is paying much less in taxes on the property this year and will also in the years to come.

As part of its permit application, the company promises to sell just some of this land to the County, in 2037, for \$22,431/acre. This is being portrayed as a reason to approve the agreement.

Permit Application: Boulder County promises an end to both mining and production (in the kiln area, south of the highway): in 15 years (some CEMEX ownership will remain, and industrial zoning as well). If mining instead ends this year, as per the existing permit, then a reasonable supposition is that the added expense of mining elsewhere and transporting the raw materials would greatly increase costs and cause CEMEX to shut down and divest the property, probably rather quickly.

It has already tried to do so. In 2016, CEMEX was planning to sell the Lyons plant and it was reported sold (to GCC, also in Mexico). Then, just before closing, this Plant and a cement terminal in Florence, CO, were removed from the larger deal (other CEMEX assets were sold).

Proximity to the raw materials is a major economic criterion for locating these plants. Will CEMEX operations extend after mining comes to an end? It seems misleading for Boulder County and CEMEX to imply in press releases that unless the County agrees to the extension requested by CEMEX, the kiln will continue operating “indefinitely”.

Local environmental costs: Some are well-established already for this Plant. Others are less certain but are legitimate concerns. Consider: in 2008, in California, the Unified Air Pollution Control District in Monterey Bay reported high levels of hexavalent chromium (the cancer-causing chemical in the Erin Brockovich movie) at an elementary school and fire department in Davenport, CA. It originated from dust emitted by the Cemex Cement plant in Davenport: the levels of Chromium VI measured eight times the air district's acceptable level at Pacific Elementary School and 10 times at the (somewhat closer) Davenport Fire Department. At the time, the District's executive director stated that it's "highly possible that Chromium VI continues to be produced across the country as an accidental, previously unknown byproduct of the cement-making process". The Davenport plant has since been closed by CEMEX, and the local government is exploring plans for reuse.

Hexavalent chromium is present in the cement and clinker produced by many cement plants. It is a potential occupational hazard for production (there are techniques to minimize the hazard). Just as for silica dust. But the chromium is toxic in exceptionally trace amounts and could also find its way into storage areas, buildings, and ponds on the property. The ponds are hydrologically connected to the shallow aquifer along the St Vrain rivers and well water supplies. Bottom line: Cement production plants come with environmental costs. Is the possible contamination being adequately monitored? Is it a factor in the present decision-process? The longer this Plant continues to operate (it has already been 25 years), the greater the risk of buildup of this and other contaminants in our local soils and water.

Plant Site in the Floodplain and in the Floodway: Much of the Plant is in the regulatory floodplain and also the floodway. Why do the regulations that apply to everyone else, residential or commercial or industrial, not seem to apply to CEMEX? The 2013 flood caused damage to the plant and to the elevators for the homogenizing silo. Storage of petrochemicals in the floodplain are just one of many hazards posed by continued operation of the plant and the mining and covered in floodplain management. Is Boulder County adequately enforcing its

flood damage ordinance and thereby reducing the risk, not just on-site but downstream? At what location in the decision-making process will this issue be addressed? Some types of municipality-owned or company-owned facilities are appropriate for floodplain locations (municipal waste treatment plants need to be near the river; solar arrays can be elevated and pass “no-rise” floodwater requirements). Cement kilns do not need to be. These other possible uses will not occur as long as the County goes back on prior agreements (see below) and instead works to make continued operation of the Plant economic.

Workplace environment and safety: Every industrial work place has its hazards. But recent worker and ex-worker comments on indeed.com are instructive as to some of the specific issues at Lyons CEMEX, and since the quarry/mining operations and the kiln are one industrial operation: “Dirtiest plant I’ve worked at in 39 years in Refining and Coal Fired Power Plants. Out-dated equipment and Control System was several revisions behind.” “The safety manager for my plant has a home base at the KY plant and visiting my plant 4 times a year so the mentoring process was very lacking”. “...hard work with the presence of chemical dust in the air at all times of the day”. “..manual labor sometimes involved in very hot areas, very small areas and very dusty environment.” The history of (unnecessary) silicosis in the industry as a whole, and the possible presence in the dusts of very toxic trace chemicals is troubling. Shouldn’t these concerns be part of any County decision to facilitate continued mining and cement production?

Local Use of cement: CEMEX is not just a local industry. It trades its cement, coke and coal internationally (it has its own trading company). When the Front Range market wanes, it can ship excess product to other states, or overseas. How much Portland cement, produced at some environmental cost here, will be used in our region in the next 15 years? Only the company knows.

Greenhouse gas emission: This is the elephant in the closet. The media coverage states that the operation of this Plant emits 350,000 tons of CO₂/year. That is the equivalent of about 70,000 cars/year, or 33,800 homes. As a (fact-checking) comparison, an industry estimate is that there are 92 cement plants in the country and the total emitted is about 6.7 million tons, for an average of about 728,000 tons each. It could be that the estimate for Lyons is unrealistically low, unless the Plant is unusually small. In any case, this single operating plant’s production of CO₂ is roughly comparable to that produced by all of the housing units in Longmont. It is an amazingly high number. Boulder County is right to be concerned about this.

What Changed? Why the recent about-face on this matter from the County? Two items:

1) Less than 3 months from now, the CEMEX cement plant reaches the end of 25 years of mining cement raw material under a County permit (“Boulder County Landuse Resolution #94-81”, May, 26,1994). The County could simply decline the application and reclamation and the rehabilitation and (already-promised) handover of some of the land to the County could begin.

2) A Covenant “running with the land” was recorded on July 17, 2002 in County records (Reception No. 2308595): between the County and relevant landowners. It provided Boulder

County with an interest to “various real properties associated with the mining of this area”. This Covenant establishes “*a commitment by Boulder County to prevent, to the extent possible, use of the property for mining after December 31, 2021*”.

Pretty plain language, right? So, how exactly did the County move from this legally enforceable commitment to prevent further mining, to the present situation? The Covenant, signed by the three county commissioners, prevents Boulder County from extending the deadline further or amending the option agreement and lease. This was communicated to CEMEX in a June 14, 2019 letter from the Boulder County Land Use Director. The present permit application includes a cover document prepared by Boulder County Park and Open Space that briefly refers to this matter: but then simply evades the issue. The public deserves a clear explanation. So do the County Commissioners.

Objective Technical Input is Still Needed: Finally, there is one thing on which we ought to all be able to agree. Impartial information indicating the pros and cons needs to be provided to the public and the referring entities in advance of the County Commissioner hearing. So far, the permit application and associated news releases instead disclose a newly made and un-approved draft agreement to the public. It was reached by County Parks and Open Space on the public’s behalf, but their publicity portrays the agreement only in the most positively-biased manner possible. And there are other relevant issues not considered at all. What is critical now is for the balanced pros and cons of this major decision to be presented and further evaluated. This work must be done for the benefit and protection of the public at large, the neighbors such as Town of Lyons, and to accurately inform the County Commissioners who make the final decision.

Robert Brakenridge, Resident, Town of Lyons, CO

Marissa Davis

From: Dan Burke <dburke.col65@gmail.com>
Sent: Friday, July 15, 2022 2:40 PM
To: Marissa Davis
Subject: Cemex

I am a Lyons resident at 206 Cobblestone Ct. Extending the life of an outdated polluting cement factory is bad enough but now importing materials by truck with all of the additional climate gas emissions this will add makes the whole plan nearly insensible given what we know we must do as citizens and decision makers facing the climate crises before us. And this is not considering the Added noise and traffic for another 15 years.

I trust the Town of Lyons will work within its power to try to produce as good an outcome as possible given the circumstances.

Thank you.

Dan Burke.

Sent from my iPhone

Marissa Davis

From: Stephen Dalton <stephen.g.dalton@gmail.com>
Sent: Friday, July 15, 2022 11:06 AM
To: Marissa Davis
Subject: Cemex comments from a Lyons Resident

To Whom It May Concern,

I am writing today to voice my concerns about the proposed plan to allow the CEMEX plant in Lyons, Colorado to operate for an additional 15 years. I am very much against this measure and would like to see the plant uphold its promise of closing the Down Flats Mining Pit this fall in 2022. The CEMEX plant is the largest greenhouse gas emitter in Boulder County. It has been disciplined in the recent past for environmental issues and pollution. The plant is not a major employer in town and has only a few local Lyons residents on its staff. There are concerns about air quality and impacts on local wildlife from the plant, including light pollution. I also have major concerns about a 60-year-old plant of this size continuing to operate in this capacity. This is not a clean, efficient business doing its best for the environment and the local community. For these reasons, I would like to see Boulder County decline the 15-year extension proposal. I would also like further research to be done into the environmental impact of the plant, and have the Town of Lyons more involved in the future of this plant.

Thank you,
Stephen Dalton
PO Box 2612
Lyons, CO 80540
(645 3rd Ave)

Marissa Davis

From: Cathleen Chrystal DeCoster <chrystaldecoster@gmail.com>
Sent: Friday, July 15, 2022 8:41 AM
To: Marissa Davis
Subject: Fwd: CEMEX thoughts from non-voting / former LAHC commissioner

Marissa ~

Hope all is well!!

I realized after the fact that I perhaps should have copied you on this communication re: CEMEX below?

Sorry for the oversight!
Holler if any questions?

Chrystal DeCoster
401-301-1212

Sent from my iPhone

Begin forwarded message:

From: Cathleen Chrystal DeCoster <chrystaldecoster@gmail.com>
Date: July 13, 2022 at 8:54:34 AM MDT
To: Hollie Rogin <hrogin@townoflyons.com>
Cc: Gil Sparks <gsparks@nwi.net>, Lauren Click <laurenmclick@gmail.com>
Subject: CEMEX thoughts from non-voting / former LAHC commissioner

Hi all ~

Just looping you all in ~ in case anything here might offer any value...

I'd been asked to serve on CEMEX's "community board" awhile ago as an arts community & business owner representative & have had the opportunity to tour the plant and grounds, glean 5k in funding for the LAHC, and begin exploration of a couple (now obviously postponed) arts-related / alternative energy projects (potentially involving local artists) at the Lyons facility.

I've enjoyed many conversations with Michael Clausen (who oversees the "community board") and have found him to be an authentic environmentally-concerned compass point for this plant and passionate about building community relationships & helping CEMEX to navigate the right solutions for the right reasons.

I sent this flow of ideas input (pasted below) as a private citizen to Michael on Sunday July 10th:

*"Hey Michael ~
Just putting down some thoughts that keep floating through...*

Sounds as if CEMEX is being nudged to come up w/ another option proposal.

Here one of the smallest plants in CEMEX's system sits in a renown creativity corridor at a critical junction in time.

Around us sits farrow hemp fields ~ farmers who jumped on the bandwagon ~ poised as the Farm Bill passed only to face a glut / saturation point in that industry...

And hops / brewing industry's bounty of agri-castoffs are seemingly plentiful & rife w/ possibilities...

And stalks from surrounding sunflower, field corn farms...

And byproducts from, say, Celestial Seasonings... and other Boulder County fibrous / agrarian-related mfgs...

And blue jean castoffs from Goodwill & other donation sources...

Wool from herds of sheep grazing on unused acreage on the property...

And the fire-hazardous heaps of beetle kill pine free for the taking in a win win attempt to utilize a napping endangerment to the front range...

Oh, and the shredding of tires ~ can't there be a way to responsibly deploy them into a transportive ingredient for a new type of construction material?

With all these experimental materials & more ~ couldn't the Lyons plant ~ w/ it's aging facility ~ be modified into a globally recognized research & development center ~ w/ pilot plants ~ for seeking advancements in the formulation of improved cement / cement-like products to supply the never-ending global need for responsibly-created products for enduring construction?

Like relying substantially on a solar powering shift...

And somewhere in this new proposal ~ and future land-use agreement ~ can't a significant & intentional nod be given to Lyons specifically ~ to placate this neighboring municipality that CEMEX has been incubating relationships with?

Like a pocket of Habitat for Humanity homes and/or artist live/work spaces (like partnering w/ Artspace ~ <https://www.artspace.org>) ~ with CEMEX literally also paving the way w/ a network of connectivity trails to Lyons... perhaps a trolley transport circuit that loops people into a high traffic density town from a remote parking area (all made from experimental testing-ground sections of new-age concrete / concrete-like materials) in an expanding eastern corridor...

Working alongside the ground-breaking efforts of nearby soil improving farming efforts such as those at Elk Run (<https://www.dar.eco>) & Hugo (<https://www.farmingsecrets.com/mentor/hugo-and-helen-disler/>)... perhaps helping to create a center of collaborative core research for such efforts in the corner of the property?

Ok.

This was the tossed salad of thoughts that awakened me tonight.

Hopefully there's something possibly fruitful here!! A springboard or piggyback into a potentially positive outcome for CEMEX, a new template for the industry, Lyons, global environmental impact concerns, Boulder County, and beyond... a sustainable repurposing of locally sourced waste model..."

He enthusiastically responded to this the next day with:

“So I read through your thoughts and ideas and I must say there is some really great stuff in there. I love most of them actually. It is fortuitous because we will be hosting the senior management for CEMEX USA next week and I would like to present some of these to them. Of course we need community and county support to invest and implement but it is so important to show decision makers here that we have a progressive vision. Thank you! Your energy gives me energy!”

Aside ~ I’d resigned from the LAHC on June 14th to open a seat up for newcomers interested in applying & bringing in fresh ideas.

I wanted to fully disclose this conversation and transparently offer this content up merely as food for thought...

My best,
Chrystal DeCoster
401-301-1212 (cell)
303-747-3818 (gallery)

Sent from my iPhone

Marissa Davis

From: Roger Flynn <Roger@wmaplaw.org>
Sent: Friday, July 15, 2022 11:06 AM
To: Marissa Davis; Hollie Rogin; Victoria Simonsen
Cc: Ted Elson; Jocelyn Farrell; Paula Williams; Tanya Daty; Gregg Oetting; Glen Delman
Subject: CEMEX options and questions

Dear Mayor Rogin, members of the Lyons Board of Trustees, Administrator Simonsen, and Deputy Clerk Davis,

Thank you for the opportunity to comment on the issues surrounding CEMEX's proposal to continue mining at Dowe Flats in exchange for some future commitments on open space, among other issues.

I am the Director and Managing Attorney with the Western Mining Action Project, a non-profit public interest law firm, based here in Lyons since 2005, which specializes in mining issues in the West. I am also an Adjunct Professor at the University of Colorado School of Law, teaching Mining and Mineral Development Law since 2002.

I served on the Lyons PCDC for 8 years (2011-2019).

A major concern I have is the lack of information coming from CEMEX, and to some extent Boulder County, regarding the current permitted operations at the site (both north and south of Rt. 66), and CEMEX's proposed operations in the future.

For example, CEMEX is claiming that if its mining at Dowe Flats ends this year (as it originally committed to Boulder County), it will continue its cement plant operations indefinitely. But this would require a drastic change in the source of the materials/minerals for plant operations. Right now, the materials come from Dowe Flats, via the overhead conveyor. If mining at Dowe Flats ends, CEMEX must obtain a constant source of minerals from other mines across the Front Range. This will obviously result in major truck traffic, pollution, safety and other concerns that currently do not exist.

It is imperative for the Town, and Boulder County, to have this information before any decisions can be made. The Town, and County, should ask of CEMEX, who, where, what, how much, and how they will get their materials to continue running the cement plant if Dowe Flats mining stops at the end of this year.

I would be very concerned if CEMEX says it does not have this information, as it should have thought this through, especially with the impending deadline for closure of Dowe Flats. I can't imagine that CEMEX does not have those contingency plans in place, especially with the impending deadline.

How can the County make an informed decision on CEMEX's proposed "deal" if it does not know how many trucks, routes, sources, etc., for all this new material, and the resulting impacts from these major changes?

Also, and due to the lack of information so far provided to the public by CEMEX, other questions remain about whether CEMEX's current state mining permit allows them to operate the plant as what is known as a "batch plant," "custom mill," or "dedicated plant" – which means that the source material for the plant comes from other locations, as compared to an on-site source, such as the old quarry on the south side or the connected (via the conveyor) source in Dowe Flats, which has been the case for decades.

This is also a question regarding the County permit for plant operations. Does the current County permit allow CEMEX to take source material from an unknown number of mines in the region, or does the County permit limit the source of plant materials to just Dowe Flats? If that is the case, then CEMEX would have to go through the County permitting process, with hopefully robust public comment opportunities, and no guarantees that CEMEX would be allowed to undertake such a major change in operations.

Again, without this critical information, it is very hard for the public to properly ascertain the pros and cons of the "deal," especially regarding whether CEMEX can operate the plant indefinitely using totally new material sources, when the company may not be permitted to do so.

I would hope that the Town would request this information from the County, and CEMEX, so that we can all be better informed.

Please note: if the Town already has this information, it would greatly assist public review if these documents could be posted online for review as the process continues.

There are other critical issues and questions that CEMEX has not been forthcoming on, such as what industrial operations could occur at the plant site in 15+ years (that will not be transferred/sold to the County), etc. I would hope that the Town and County receives details from CEMEX on these issues, instead of what appear to be vague generalities.

Overall, without this information regarding what is currently allowed, and what may not be allowed without major modifications to the various permits, I would urge the Town to recommend that the County does not agree to the deal as proposed by CEMEX.

Thank you for the opportunity to provide these comments, and again, I appreciate the Town's leadership in reaching out to the public for our input.

Please do not hesitate to contact me if you have any questions.

Roger Flynn
1010 Steamboat Valley Rd.
Lyons

7/15/2022

Re: Cemex Dowe Flats permit extension.

Dear Town of Lyons Board of Trustees

As a resident of Lyons I urge you to advise Boulder County to deny the Dowe Flats permit extension request being sought by Cemex. Beyond the threats being levied by Cemex that the kiln will continue operations indefinitely regardless of whether Dowe Flats is closed, by transporting by truck the materials that will no longer be supplied by the mine, and the inducements to the county in terms of future acquisition of Cemex properties, the bottom line is that the mining of limestone and other minerals at Dowe Flats is not conducive to the health of town residents. Exacerbating this health issue is the fact that the only purpose of the Dowe Flats operation is to supply the adjacent kiln which is county's and one of the state's largest sources of greenhouse gas emissions and SO₂, NO₂ and particulates.

While there are many who point to the obvious fact that Lyons, the state, the country, and the world depend on concrete, they disregard that there are cleaner, less polluting and lower-carbon methods of producing cement that even Cemex at other locales have adopted:

<https://www.cemex.com/sustainability/future-in-action/sustainable-products-and-solutions> There is also emerging cement producing technologies that actually captured and then sequester back into the cement carbon emissions [Carbon capture in cement - NRDC](#) . There are better and less impactful ways to produce this critical building material and it is incumbent on our climate, society and the economy to embrace those practices. Encouraging on-going production at the Lyons kiln by reducing the cost of the cement sold by that facility in the long-run only benefits this multi-national corporation. For this reason, I urge the Board of Trustees to recommend the denial of the Dowe Flats permit extension.

Sincerely,

Dave Hatchimonji
200 Welch Ct., Lyons

Marissa Davis

From: Julie Jacobs <Julie.Jacobs@colorado.edu>
Sent: Friday, July 15, 2022 2:05 PM
To: Marissa Davis
Subject: Cemex comments

Hi Marissa-

I wanted to submit my personal comments regarding the Cemex extension situation.

I believe Cemex is abusing its perceived power in this situation and am appalled that Boulder County has been willing to extend this pollution factory for another 15 years. I object to this extension and think that BoCo should call their bluff. Let them try to operate the factory without materials. Let them pay to have the materials driven in from other places. Let's see how profitable this is for them.

They are corporate extortionists, trying to scare the County into the extension by threatening to bring even more pollution than they already create with a convoy of big rigs full of rocks. They are already the biggest polluter in our county, what message does it send to allow them to continue to spew garbage into our air for 15 more years (15 years!!!!)?

I say no. I say call the bluff. I say let the state develop some standards for forcing them to reduce their CO2 output. Stop playing nice with the corporate overlords. Let's take some steps to protect our children, to protect the vulnerable, lower income folks (including my own nephew) who live under the cloud of the Cemex plant, to protect our beautiful land and sky and planet.

Enough already.

Thank you for your consideration.

Julie

--

Julie A. Jacobs, Psy.D., J.D.

Owner, Julie A. Jacobs, PC

Risk Management Consultant, The Trust

Chair, Legislative Committee, Colorado Psychological Association

Marissa Davis

From: jmikoni@aol.com
Sent: Friday, July 15, 2022 4:40 PM
To: Marissa Davis
Subject: Re:Cemex

Follow Up Flag: Follow up
Flag Status: Completed

Hi Marissa,

As a 30 year resident of Lyons here is my input:

First of all a decision made under threat by Cemex is a poor place to be. I had always expected them to do what we had been informed of which was shutdown and reclaim the land. This would be my preference but apparently that's not on the table. So the choice given in the Redstone are 15 years of more pollution, trucks who already don't respect the drivers and bikers, more dangerous traffic and congestion or the same thing indefinitely? Not much of a choice. How can we even trust that they will shutdown after 15 years?! Is there a back entrance that keeps them off the main roads at least? Still not much of an option and probably bad for other locals. How is it we even got here and how is Boulder County representing out interests? Are there any financial offsets we could ask for so at least we get something? Could we limit the hours that the trucks could operate? 10am-3pm, no weekends? If we can't beat them can we at least negotiate for concessions and who's doing that and cares about Lyons?

Thanks,
Joe

[Sent from the all new AOL app for iOS](#)

Marissa Davis

From: Julie Smith <rockymtnacupt@gmail.com>
Sent: Monday, July 18, 2022 6:49 PM
To: Marissa Davis
Subject: Cemex

Follow Up Flag: Follow up
Flag Status: Flagged

Thank you for providing this opportunity to hear from the public. I have lived in Lyons for 25 years. I have looked forward to the expiration of Cemex' s permit. The cement plant has been and continues to be a major polluter of the Front Range. The plants equipment is far out dated. I see no reason to extend their permit when they have such an extensive history of infractions. Furthermore, the details of this extension remain vague to the public. I don't trust Cemex or the county to hold them accountable. Enough is enough.

Sincerely,
Julie R Smith

Sent from my iPhone

Marissa Davis

From: Hollie Rogin
Sent: Saturday, July 16, 2022 3:13 PM
To: Marissa Davis
Subject: Fw: Cemex!

From: Sally King <sallywhiteking@live.com>
Sent: Friday, July 15, 2022 4:06 PM
To: Board of Trustees <TOL_BOT@townoflyons.com>
Subject: Cemex!

Dear Lyons Board of Trustees and Mayor,

Please say no to an extension for Cemex's deal . They are not going to want to run the business at half mast, they will lose money.

And let's not fall for "the more open space trade" they are making, it confuses the issue. This is big business toying with a town's people and a county. It makes me mad!

We have been counting the years until Cemex would leave. It's up to us to care of our local piece of earth and sky.

Dear Lyons Officials, Say NO!

In gratitude, Sally King

(artist of the bears)

PS,

For years we had a group called The Watch Dogs who documented the infractions of Cemex, releasing extra pollution at night, etc. Many people donated their time to get the word out that Cemex was not good neighbor. Let's make that work count!

Marissa Davis

From: Greg Lowell <lowellgregory@gmail.com>
Sent: Tuesday, July 12, 2022 7:11 AM
To: Marissa Davis
Subject: Comment on Cemex permit

Hi, Marissa:

Per Mayor Rogin's suggestion, here's my thoughts on the Cemex permit:

I am in favor of the County granting the 15-year Cemex permit extension for quarrying at Dowe Flats. The 15-year limit provides a certain date for the closing of the Cemex operation; without this extension, Cemex will continue to operate indefinitely with materials transported in from other sites. It is far better environmentally to allow mining of materials onsite rather than truck or transport by rail materials from elsewhere and the use of carbon-based fuels for such transportation. Further, the potential additional commitments from Cemex include considerable new open space for the County and some \$12.6M in additional savings for land acquisition and rental payments. Without the guarantee of open space, Dowe Flats could be the site of hundreds of homes and commercial development (as has been proposed in the past) - the last thing the Lyons PPA needs.

One final thought; the statement that operation of the plant "will preclude the county from meeting its carbon reduction goals" is, to me, a red herring. Boulder County has allowed tremendous growth (see City of Longmont expansion and Boulder's 30th St. development as examples) which also precludes their meeting its carbon reduction goals by adding thousands of residents, their vehicles and the construction and extensive heating and cooling of thousands of buildings.

Thanks for allowing the opportunity to comment.

Greg Lowell
411 Raymond Court
Lyons, CO

Marissa Davis

From: Tess McDonald <dandylyonsbrigade@gmail.com>
Sent: Friday, July 15, 2022 10:13 PM
To: Marissa Davis
Subject: Cemex Inform CDOT

Hi Marissa,

I know that CDOT was intricate in slowing Cemex before when there was the Martin Marietta permit renewal attempt. CDOT will not allow that many more trucks on Ute Hwy without a plan in place. Very organized, communicative and powerful committee, they can help stall/stop/inform Cemex on this permit expansion.

Thank you,
Tess McDonald

Marissa Davis

From: Vanessa Paswaters <vjp6100@yahoo.com>
Sent: Friday, July 8, 2022 8:17 PM
To: Marissa Davis
Subject: Cemex Deal

Hello!

I live in Lyons and wish to give my input about Cemex.

I feel that the mining extension for Cemex is fine. It will employ a lot of people. And, with the current state of our economy, the people currently mining and those who will mine, will need the jobs.

Sincerely,

Vanessa Paswaters
438 Silver Sage Lane
Lyons, CO 80540

Marissa Davis

From: Patty7 <Patty7@protonmail.com>
Sent: Friday, July 15, 2022 8:42 AM
To: Marissa Davis
Subject: cemex

Hello,

The public officially knows that Eric Estrada admitted that Cemex knowingly violated state and federal regulations on July 12, 2022 at 3:57 PM. Cemex should be shut down without any options TODAY because they have been doing illegal exhaust activities for years! If the EPA doesn't care than the citizens need to. This plant needs to be shut down immediately!

[Marshall McClung](#)

Shared with Members of Lyons Happenings

"Where's the plant? I can't see it through the fugitive carcinogenic dust. Cemex has a hotline for their comonplace fugitive dust emissions that violate state and federal environmental regulations. These events are due to intentionally negligent decisions made at the plant, be it untimely maintenance or worn out equipment that is not renewed. We all need concrete and I don't mind responsibly produced cement products, but if the plant can't and won't comply with clean air standards, it has become a public nuisance and is a health risk to Lyonsers and everyone in St Vrain Valley. The plant manager, Eric Estrada, admitted to me this week that their dust release on Tuesday, July 12, 2022 at 3:57 pm was facilitated by knowingly violating state and federal regulations. Report all fugitive dust events to the Cemex Hotline at (301)747-3730. Take photos of the event and note the time of the occurrence. Those photos need to be sent to the state EPA with a statement. All kiln dusts are required to be wetted and pug-milled before leaving the building, but this is not happening. It's cheaper to have the wind dispose of toxic waste than to operate responsibly."



Sent with [Proton Mail](#) secure email.

Marissa Davis

From: Amber Revoir <arevoir@gmail.com>
Sent: Friday, July 15, 2022 11:17 AM
To: Marissa Davis
Subject: CEMEX Comments from a Lyons, CO Resident

To Whom It May Concern,

I am writing to share my concerns about the proposed plan allowing the CEMEX plant in Lyons, Colorado to operate for an additional 15 years. I am very much *against* this measure and request the plant be held to its commitment of closing the Down Flats Mining Pit in Fall 2022.

The CEMEX plant is the largest greenhouse gas emitter in Boulder County, with environmental issues and pollution leading to disciplinary measures in the recent past. The plant provides little value to the community as it is not a major employer in town and has only a few local Lyons residents on staff. Additionally, there are negative consequences to the plant's operation, including diminished air quality, detrimental impacts on local wildlife from the plant, and light pollution. I also have major concerns about a 60-year-old plant of this size continuing to operate in this capacity. This is not a clean, efficient business doing its best for the environment and the local community.

For these reasons, I would like to see Boulder County *decline* the 15-year extension proposal. I would also like further research to be done into the environmental impact of the plant. Further, as its closest residents and stakeholders, the Town of Lyons must be centrally involved in the future of this plant.

Thank you,

AMBER REVOIR

arevoir@gmail.com

645 3rd Ave.

PO Box 2612

Lyons, CO 80540

Marissa Davis

From: Van Rollo <vanrollomsp@gmail.com>
Sent: Monday, July 18, 2022 5:10 PM
To: Marissa Davis
Cc: rcargill@aol.com; Lisa Rollo
Subject: CEMEX LYONS

Follow Up Flag: Follow up
Flag Status: Flagged

Hello We live at 12995 N 66th Street and have owned property in Boulder county since 1984. My wife and I get frustrated with this process of county rope a dope. We are NOW frustrated with all the large trucks in and out of CEMEX and the massive increase of trains bringing materials in. As has happened, not too long ago at 75th Street intersection with HIWY 66, there will be more major TRUCK oriented accidents. We do not want to witness any more degradation of our close by living area. In the early 90's when the plant began, it may have been unpopulated out here, that is no longer the case. We care VERY much and would love to see Boulder County take the correct action and close the Cement plant down. NO more extensions, to polluters, and to people that can not follow local or Federal law!

Here are just some of the distractions and pollution issues that have happened as a result of CEMEX, and Boulder Counties extensions to operate:

Rocks/Gravel on Hiwy

Pollution both noise and dust/Silica

Dust storms, that blow directly onto our farm less than 1.5 miles away.

Too many large 18 wheel trucks entering and departing on a daily basis Too Many trains bringing in material for Cement creation Potential for upstream water pollution and degradation...yes, it has happened...we live right on the Hylander Ditch and can smell it at times Air pollution from all of these vehicles on a Daily basis Noise and Ashlike deposits found after the constant blasts that are allowed to clean out their giant stack!!!

Boulder county claims to be a green county. Truly the only green I see in this instance is the craving for the all mighty \$\$\$\$!

Boulder land use vision reads as follows:

“We are committed to preservation of integrity of our landscape, conservation of natural resources for a sustainable future, and provision of safety and well being for the citizens of Boulder County through the best in service, public policy, and process.”

Thank you

Van & Lisa Rollo

Sent from Van Rollo

Marissa Davis

From: Liz Callahan Schnabolk <elc204@gmail.com>
Sent: Friday, July 15, 2022 5:41 PM
To: Marissa Davis
Subject: Cemex plant

Hello,

My name is Liz Schnabolk and I live at 355 McConnell Drive. I'm writing to say that I am dismayed at the plans for Cemex to continue mining for 15 more years. I'm concerned that they will continue to pollute our air and I would like the town to do whatever it can to stop the company from operating right over the ridge from where so many of our children live, play, and go to school. In addition, if a deal is eventually reached to turn it into open space I would like part of the deal to be that the factory/building is take down so that we don't have to look at it crumbling for 30+ years.

Thank you for taking on this difficult topic, I truly appreciate your service to our town!

Thanks,
Liz Schnabolk

Marissa Davis

From: Kayann Short <kshort@greenspeedisp.net>
Sent: Monday, July 18, 2022 5:13 PM
To: Marissa Davis
Subject: Cemex comments

Follow Up Flag: Follow up
Flag Status: Flagged

As property owners living across Highway 66 from Cemex, we would like to see operations cease sooner than fifteen years. We don't believe this type of extractive industry is consistent with Boulder County's environmentally sustainable future.

However, should the permit be extended for any amount of time, we ask that additional regulations be put in place to meet environmental concerns regarding dust and emissions from all mining and production operations. We are particularly concerned with fugitive dust events from uncovered mining pits.

Additionally, we ask that additional measures be taken to lessen the high amount of truck traffic coming and going from Cemex. These trucks are traffic hazards for everyone living near the plant and they increase noise, dust, and other emissions along highway 66. We also ask that all trucks leaving the Cemex property be required to wash before exiting. That would mean creating a second wash station for the transport trucks that bring in materials to the plant.

We are glad Cemex is negotiating to leave Boulder County. Now it's up to local government to ensure that in the time Cemex remains, their practices are consistent with high environmental and community standards.

Thank you,
Kayann Short and John Martin
Stonebridge Farm

Marissa Davis

From: dave.stine@gmail.com
Sent: Friday, July 8, 2022 3:58 PM
To: Marissa Davis
Subject: Cemex

I've lived in Lyons for 30 years and I'm a little tired of reading about the county's largest polluter getting another lease on life. Especially if it means trucking the calcium from other sources to process here. We can buy our own fireworks from now on. Don't renew their lease.

D Stine

Marissa Davis

From: ANDREA BIRKBY <ANDREA-BIRKBY@outlook.com>
Sent: Tuesday, July 19, 2022 1:42 PM
To: Marissa Davis; ghoeffler@bouldercounty.org; david.huber@state.co.us
Subject: Comments about Cemex

Dear Mayor Rogin and Trustees,

Please let me introduce myself. My name is Andrea Birkby and I am a 3rd generation, Colorado local. I grew up in Golden, a town not far from here. Last year, I purchased a house in this area, off of Hygiene Road. And in so many ways, this is like a little bit heaven. The visual and audio beauty is nearly unprecedented. I now find Lyons, a town that has always been considered a secret little gem by other locals, is now my closest township. What stands between me, my property, and your incredible town, the Cemex plant, an environmental disaster, an eyesore, and which as far as I can tell, has no regard whatsoever for any of the life surrounding it.

And the life surrounding the plant is plentiful. As you are probably aware, many people show up on this stretch of Hygiene Road to watch amazing bald and golden eagles nest and hunt, and even the less attractive but not less valuable members in the animal kingdom, aka the waste collectors, otherwise known as turkey vultures.. I have never experienced bird life quite like this. There are barn swallows, bats, owls and pigeons, robins and sparrows, meadowlarks and jays, all kinds of hawks and these are the ones I know the names of.. I am quite certain there are many more bird species. As you probably know there are horses and cows that graze on that very land surrounding the Cemex plant. Someone, somewhere likely consumes the beef that comes from these cows, grazing here. I shudder to think about the insides of these animals living so close to Cemex pollution with no way to escape it.. Make no mistake about this, as this is someone somewhere's food source. Even if this is not our food, we would be kidding ourselves to not realize that this most certainly has a cumulative effect on all of us. Besides the winged and mammal species, there are countless toads and likely frogs living here. I know this because there is a chorus each night to remind me of who my neighbors are. There are also all kinds of plants and trees, and waterways, and my guess is, if someone went looking, they might even find something endangered here as well.

I'm bringing this up because everything I have just spoken about has a voice, yet it seems they do not have voices most humans can hear. For if we could hear, we might be forced to reflect even deeper about the very gifts of nature dropped at our doorstep reminding us what it means to be alive and to be human. This reflection might cause us to want to take action and try to undo some of the past infractions against one of our greatest natural resources, nature. As humans we do have some choice and some say in these matters. We can write letters and protest with our dollars and use what we have learned in the past to help us not repeat past mistakes, but trees and frogs cant move somewhere else because of pollution. They cant relocate their nests because human-caused environmental conditions have worsened lately or write letters to their mayors. They rely on us to be their stewards and protect that precious something that I believe we all want to call home, forever.

So I am asking of you to please consider **the quality for all life in this surrounding area** and to take action showing us that quality of life including clean air and dirt, is more valuable than profit.

With kind regards,

Andrea Birkby

Marissa Davis

From: R. Breese <stone.minerals@gmail.com>
Sent: Tuesday, July 19, 2022 11:12 AM
To: Marissa Davis; Hollie Rogin; Victoria Simonsen; Ted Elson; Jocelyn Farrell; Paula Williams; Tanya Daty; Gregg Oetting; Glen Delman
Subject: re Cemex - Dowe Flats Mining - Boulder County Permit Request

Lyons Town Board and staff,

For the past 42 years I've been a specialist in non-metallic minerals, mining, and mineral manufacturing, serving both as an independent consultant or as a corporate staff specialist. I've been a resident of Lyons for these same years.

For your consideration, some of my initial thoughts regarding the Cemex matter are as follows:

- I've only had time to briefly review the information provided by Lyons on its website.
- To my knowledge, Lyons town staff and residents have been presented with only 2 highly-generalized alternative plans to comment upon -- 1) close the Dowe Flats quarry, and, 2) extend the Dowe Flats mining permit for 15 additional years. If other possible courses of action have/are being considered I am not aware of them.
- I've not yet seen any detailed review of impacts that could possibly arise from continued operation of the plant should Cemex be denied an extension of their mining activities and consequently their supply of raw materials shifted to importation of mineral resources by haul truck via Hwy 66 and by rail (to whatever extent that means is possible).
- As we all know, Hwy 66 is already greatly congested, and is ever increasingly so.
- To be thorough, both Lyons and the County should consider added Safety Risk, added Noise, added truck Exhaust and Dust, and added highway Congestion on Hwy 66 if Cemex pursues the direction of importing raw materials by truck.
- When the Cemex plant (south of Hwy 66) eventually closes, how will the property be protected from undesirable development by **any** developer, Lyons and Boulder County included?

Without such considerations I simply don't have sufficient information to judge what choice of directions would have the least and the best impact on the north Boulder County Community as a whole -- 1) closure of the mine with consequent importation of all mineral resources by highway truck and maybe by rail to some extent (if this is the direction Cemex chooses to pursue), or, 2) continued extraction from Dowe Flats and ancillary plant activities.

- This matter is not just a question of Cemex land being up for grabs to Lyons and to the County.
- Eventual use of the Cemex property following eventual closure of the plant can have immense impact on the entire region .

- Increased highway congestion and its consequences should be of great concern to Boulder County as well as to Lyons.

- Is Lyons confident that the County has **thoroughly** considered the potential impacts of whatever directions are taken?

- Has Lyons had the time to sufficiently consider potential impacts and has Lyons been provided sufficient information to wisely choose a position and provide meaningful comment? Should Lyons ask for additional time and whatever additional information is needed from the County and from Cemex?

- As the rail line into the Cemex plant runs through Longmont, has Longmont been given the opportunity to comment?

- By the way and looking at the big picture of possible impacts, in the past, Cemex management has stated that they want to reach an annual production target of roughly 500,000 tons per year. Assuming this figure was correct and is still their target, and that this target will be achieved, it means that Cemex will need more than 500,000 tons of raw materials transported to their plant each year. This would add a significant traffic burden to Hwy 66 if raw materials are imported by truck.

Has Lyons or the County asked Cemex for their projections regarding cement production and use of road and rail?

Keep in mind that for each truck bringing a full lode of raw material into any plant, that truck must also leave that plant empty to return to its home base. A single lode of raw material by truck thus means 2 trips on a highway. Obviously and whatever the actual number of haul trucks is needed and used, this could be a lot of truck trips on Hwy 66.

And keep in mind that the number of annual truck trips needed to distribute the finished product (empty going in and full going out) must be added to the traffic needed to import raw materials.

Whatever actions are taken should be well thought out and not hastily decided as we'll all have to live with the consequences of our actions,

Ric Breese
402 Reese St.
Lyons, CO 80540



Virus-free. www.avq.com

Marissa Davis

From: RCargill@aol.com
Sent: Tuesday, July 19, 2022 11:21 AM
To: Marissa Davis
Subject: Cemex - public comment

Dear Mayor Rogin and Trustees,

My wife and I live in unincorporated Boulder County. Our daughter, son-in-law, and grandson live in Lyons. So, we visit Lyons frequently and have been enjoying Lyons' hospitality for more than 20 years. We have fostered many loving and caring friendships with folks in this community. It alarms me that Cemex's proposed activities are imposing yet another public safety issue for your community. I thank you for seeking input from the community, and for addressing this issue now before it gets bigger.

I was the Director of the St. Vrain Valley Community Watchdogs for 10 years, and the Watchdogs had many residents from Lyons in our ranks. The environmental issues we faced with Cemex in 1999 were staggering. After years of attending meetings, writing letters, etc with Boulder County Land Use, County Commissioners, Cemex officials, State and County Health Department inspectors, the Air Quality Control Commission, the Division of Minerals and Geology, the EPA, and many others, Cemex was finally pressured & able to pass inspections and able to come into compliance with the provisions of the Clean Air Act and its Federal Title V Operating Permit. The Watchdogs dispersed shortly after Cemex had achieve "compliance," but not before we walked from the Stone Cup in Lyons to Cemex with a dynamic group of Lyons' moms called "Mothers Against Tire Burning." I was so proud of being able to support the moms on this walk, and so proud of them when they reached the entrance to Cemex and presented the plant manager with a "Citizens Notice of Violation of Trust."

The air was much cleaner for a few years, but with each change in management at Cemex, the history of Cemex's violations and maintenance issues faded away, until we find ourselves today facing a resurgence of air pollution incidents, public safety issues, environmental issues, and health issues. Breathing isn't optional!

I am currently serving on the Board of Directors with Save Our St. Vrain Valley (SOSVV). SOSVV has a sub-committee that is focused on finding solutions to air pollutions issues at Cemex. Because Barbara and I live 2 miles east of the plant, we have a good view of dust incidents at the plant. Along with others in the community, we photograph these incidents regularly and then file complaint reports with the Boulder County Health Department and Air Pollution Control Division (CDPHE). Below is a copy of a fugitive dust complaint that I submitted to State Inspector David Huber and Boulder County Inspector Gabi Hoefler. Fugitive dust incidents at Cemex have been increasing over the last several years, and it is disconcerting to me to think that Cemex could continue polluting the air we breathe for the next 15 years.

I recommend that Lyons review the contract between Cemex and the County and make sure that public safety and health issues are addressed in this contract. Will Cemex be forthcoming on its industrial operations and plans? Will the County provide for the welfare of the public first as Cemex dangles a carrot with promises of abundant open spaces in the future?

Ruth Ginsberg once said, "One lives not just for oneself but for one's community." Thank you Mayor Robin for serving the people of Lyons & beyond to that end. We so appreciate the opportunity to contribute to your decision making process. Why not the BEST for the community?!

Sincerely,

Richard and Barbara Cargill

"Protect what is closest to you heart: Your family, your friends, and your lungs."

Dear Inspectors,

In 2003 the Colorado Air Pollution Control Division fined Cemex-Lyons \$280,000 for its failure to control dust emissions. Three years later in 2006, the U.S. Environmental Protection Agency fined Cemex-Lyons \$1,500,000 for air quality

violations. In a press release on this state of affairs, Chuck Stout, Director of the Boulder County Health Department, wrote: "The penalties levied against Cemex are appropriate. The magnitude of the penalty accurately reflect the significance of the negative impact to the community."

This disgraceful history of non-compliance with air pollution controls must not be allowed to return and negatively impact this community again. Unfortunately, dust events from Cemex-Lyons are on the increase. Emissions are intense, occur frequently, and emissions drift beyond the company's boundary. Community members are filing this **complaint** with you regarding the May 20th incident at Cemex-Lyons and requesting an immediate investigation. Please assure the community through your due diligence that you will take appropriate measures to put an end to these dust events promptly.

The emissions from a cement plant have long been known to pose a negative impact on human health. The emissions also ripples out to negatively impact our soil, our lifestyles, and real estate. In 2020, Wendy Kahn-Robson, a real estate agent, wrote: "In 2012 I had a client who was interested in a property on Hygiene Road near 59th Street and after doing research on the area decided to pass on the property due to lawsuits regarding pollution and noxious chemicals released by the nearby Cemex plant. At the time, the suit had been settled, however, it was this buyers opinion that history could repeat itself there and possibly there was some remaining pollution to the soil and potentially the house itself. When asked if there was a lower price that might convince him to buy the property, the buyer's answer was 'To the possible detriment of my health? No.'. The possibility of future mishaps from the same company was a deal breaker for that buyer."

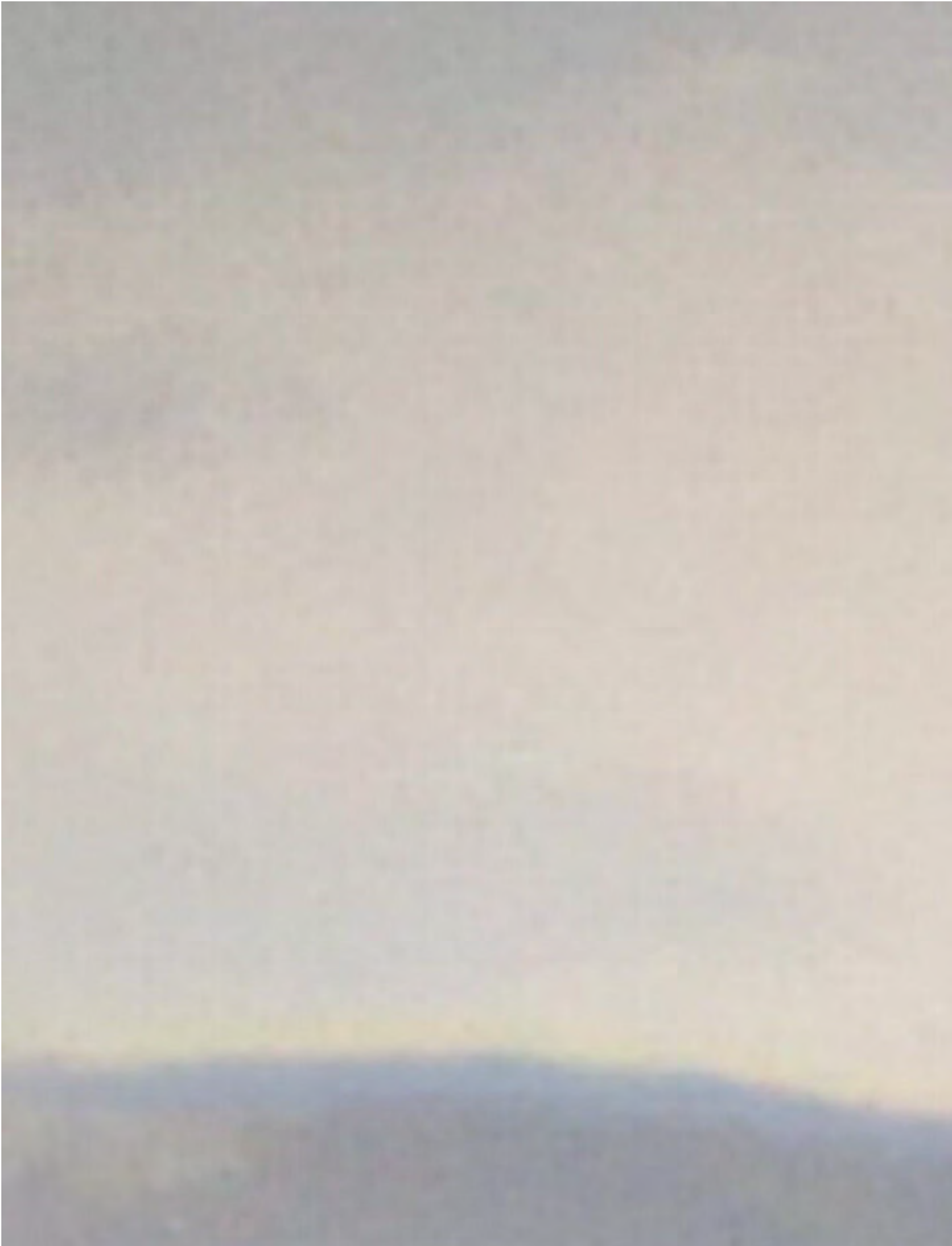
Please let us know the results of your investigation & actions taken to remedy issues.

Sincerely,

Richard Cargill

bcc: community members

1 Attached Images



Marissa Davis

From: Linda Dunlap <honudream@gmail.com>
Sent: Tuesday, July 19, 2022 4:21 PM
To: Marissa Davis
Subject: Cemex - Public Comment

Dear Mayor Rogin and Trustees,

My husband and I live in unincorporated Boulder County, less than a mile to the east as the crow flies from the CEMEX plant. We struggled for 4 long years with a health condition my husband developed that we were told by doctors was related to toxic exposure of some sort. Our journey culminated in him having a bone marrow transplant in Seattle the summer of 2020. Since that time he has completely regained his health, but we have been warned to be very cautious about toxins in general.

We have been active members of the Save Our Saint Vrain Valley (SOSVV) organization and have learned a considerable amount during the last several years. We have been counting down the years, months, and days until the CEMEX contract expires and are deeply concerned about the possibility of them renewing it. Research my husband delved into several years ago indicated that the predominant winds around the CEMEX plant blow from east to west. With this in mind, I would like to bring to the Board's attention the fact that the Lyons Middle and High School campuses are located within 1.5 miles from the CEMEX plant and are likely highly impacted by the air quality resulting from the CEMEX activity. In fact, the entire town of Lyons is impacted by this compromised air quality.

I urge you to stand up for the city of Lyons and all of us in the surrounding area. We love our home and this precious land so much. We need leaders like all of you to work to keep both the land and all of us healthy and thriving.

Sincerely,
Linda Dunlap

Marissa Davis

From: Liz E. <liz.erley@gmail.com>
Sent: Monday, July 18, 2022 3:24 PM
To: Marissa Davis
Subject: Cemex

Follow Up Flag: Follow up
Flag Status: Flagged

Hello,

I don't like either option that Cemex and BCOS have presented. If this discussion were happening in the city of Boulder none of this would be an option to Cemex.

Allowing Cemex to continue for another 15 years without any plan to lower emissions is harmful to our community and is not taking Colorado's climate change initiatives into consideration.

Thinking that our other acceptable option is to allow Cemex to operate indefinitely is beyond unacceptable for reasons such as increased traffic and pollution from these vehicles along with continued coal burning and pollution created from this process. Over time there will be more health issues in our community such as asthma and COPD that have not been addressed.

If we consider and are concerned about climate change reports that we have read from scientists over the years, we should not allow either of these options to move forward.

It's time for all of us to pay attention to our future.

Sincerely,

Liz

Liz Erley
liz.erley@gmail.com



Marissa Davis

From: Mr Selwyn Goldstein <selgold@yahoo.com>
Sent: Tuesday, July 19, 2022 10:36 AM
To: Marissa Davis; Richard Cargill; Kate Young; Ben Goldstein
Subject: Cemex mining extension.

Mr Davis, The Cemex Plant operation permit will expire in September 2022, Why would that permit be extended when 10% of the world pollution is caused by manufacturing of Cement . Cemex is Polluting Boulder county air and you may continue to let it happen . I live next to the RR tracks that supply the Cemex plant. Each week carloads of coal are burned at the Cemex plant. You can stop this pollution now. Please do it. I am a Boulder county resident since 1971, In Boulder we close mines not extend or open new mines.

Selwyn Goldstein
649 Wade Rd., Longmont. Co. 80503
720-218-1024.

Marissa Davis

From: Michele Leonard <michele.leonard@colorado.edu>
Sent: Tuesday, July 19, 2022 12:11 PM
To: Marissa Davis
Cc: Hollie Rogin
Subject: NO to CEMEX Dowe Flates Mining Extension

Please include my comments with tonight's agenda.

To the Town Board,

The CEMEX Dowe Flates Mining Extension must be adamantly opposed by the Town Board, the Boulder County Commissioner's and the State of Colorado. CEMEX is a bad actor and has been allowed to violate and skirt county, state and federal regulations for decades. It is unconscionable to provide a coal burning cement plant from the 1960s cart blanc to operate for 12 more years regardless of threats or promises. Do not allow yourselves to be bullied into accepting this absolute farce of a deal. Say no to the extension. No extension no profits.

Sincerely,
Michele Leonard

Marissa Davis

From: Kristin Powell <pioneerfamilyllc@gmail.com>
Sent: Tuesday, July 19, 2022 3:16 PM
To: planner@bouldercounty.org; Marissa Davis
Cc: commissioners@bouldercounty.org; Dolores Vasquez
Subject: SU-22-003

Dear Town of Lyons and Boulder Co Planners,

My name is Kristin Powell. My husband Jerry Powell and I have been residents of Lyons since 1997. We oppose extending a mining permit to CEMEX at Dowe Flats.

Thank you for taking the time to seek public input into CEMEX's proposal to continue mining at Dowe Flats. I have been involved in tracking CEMEX's air quality compliance for the past 15+ years. I have reported many instances of CEMEX's poor housekeeping in terms of silica dust events and unwashed trucks leaving the plant to Gabi Hoeffler and State Inspector David Huber over the years. In 2003, the Colorado Air Pollution Control Division fined CEMEX in Lyons, Colorado an amount of \$280,000 for its failure to control silica dust from being released into the atmosphere. In 2006, The U.S. E.P.A. fined CEMEX in Lyons, Colorado \$1,500,000 for air quality violations. CEMEX is still at it. The most recent dust event I recorded on my iPhone was on June 22, 2022 at 8:32 pm on N. 61st St. It was a completely wind-free evening and no excuses for CEMEX to be releasing silica dust into the environment. My husband Jerry was also a witness to this dust event.

We are lacking critical information needed to consider any extension of the existing permit. From my understanding, CEMEX is stating that if mining at Dowe Flats ceases without an extension of their permit period, the company will continue to run its plant indefinitely. Where would CEMEX get the materials they will need to continue to run the plant indefinitely? They will have to be sourced and brought into the area by truck, creating new issues such as additional truck traffic, pollution and safety concerns to an already congested Front Range corridor. I am concerned that CEMEX (not a good neighbor) will be holding us hostage; we are in fear that CEMEX will run the plant indefinitely, but is that any worse than what's happening today? Please consider CEMEX's track record and lack of compliance before you trust this company.

I encourage you to seek further information before granting an extension to the Dowe Flats permit to CEMEX.

Thank you for your consideration.

Kristin and Jerry Powell
107 Longs Peak Drive, Lyons CO

July 14, 2022

To: Victoria Simonsen, Town Administrator
From: Steve Simms, Chair, Lyons Ecology Advisory Board
Subject: CEMEX application to extend

Lyons Ecology Advisory Board met July 13. It was asked to provide input to the Lyons Board of Trustees regarding the CEMEX application to extend its mining permit from its present 25-year term to an additional 15 years. Six of our seven members and the Board liaison were in attendance.

This is our consensus input (all six in the meeting support these recommendations, concerns, and conditions):

- 1) EAB does not support approving the mining permit application in its present form.
- 2) EAB instead recommends that the Town of Lyons be provided more effective input into these major decisions that affect its Planning Area and properties covered by the Lyons/Boulder County Intergovernmental Agreement (IGA). The County must not negotiate with CEMEX and commit to an extension of the mining permit and the disposition of the properties in this area without a process for formal input from the Town per the IGA.
- 3) The economic, public health, and environmental issues around renewal of this permit are not restricted to Parks and Open Space. EAB urges Boulder County to involve all of its relevant agencies in the permit decision. An objective and balanced review of the pros and cons of the company's application for permit renewal is needed.
- 4) The dollar values provided in the application appear to be inflated given that the present tax assessments are very much smaller (Dowe Flat is assessed at ~\$400,000 actual value but is shown in the application as worth \$6 million; and so forth). The Assessor's Office, Community Planning and Permitting, Air Quality, Water Quality, Environmental Health Program, and Floodplain Information programs are examples of County staff resources whose input would be relevant and valuable for the benefit of decision-making by the County Commissioners.
- 5) EAB urges that the complete rehabilitation of the mining area and the anticipated transfer to Boulder County Open Space be accomplished as soon as possible pursuant to the present agreement, which stipulates they both be completed by 2024. There is potentially significant economic and environmental risk to the County of expanding the mining area and timeline and delaying any rehabilitation to 2037.

Respectfully submitted by Lyons Ecology Advisory Board, July 14, 2022

TO: Lyons Board of Trustees (BOT)
FROM: Economic Vitality Commission (EVC)
DATE: July 15, 2022
RE: Cemex permit renewal/extension request of Dowe Flats

Thank you for reaching out to all of the Town's Boards and Commissions. We are grateful to provide our opinions and feedback. We realize that the turnaround time for this feedback was quicker than anticipated (or desired). As such, some of the thoughts here might lack full detail. Please let us know if you want us to clarify any of our thoughts or if you have any questions.

Top Three Concerns from Board and Commission Perspective:

- We are concerned about an abrupt loss of financial support for various local non-profit organizations, events and art initiatives. This is a short-term issue/worry, and we know that it is one that can be solved. However, it is a concern. We do not know how big of a concern it is, because we do not know the specific level of support that is coming from Cemex now. Our educated guess is that it is \$15-20K. We recognize that whatever the financial support is currently, it likely does not seem like a huge amount of funding, but for the local organizations and initiatives, it is significant financial support.
- We are concerned that an absolute denial of Cemex's permit request would result in the realization of their threat to operate the plant "indefinitely." We believe that that is too large a risk to take - because of the possible financial and economic vitality opportunities that could exist in a post-Cemex Lyons reality. We believe that there is a middle path (see below).
- In the briefings that we received from Town staff, we heard about the indirect (and possibly avoidant) communications from Cemex. We heard that "Cemex requested that Lyons not be notified" about the permit extension request. This sort of back channel communication is a concern and a worry.

Suggestions or Conditions that Board and Commission would like to offer:

- Most importantly, we suggest a "middle path" - neither a 15-year renewal nor "indefinite" operation. We believe that in order to truly assess possible future economic vitality for this area and to best align this area and its usage with our upcoming new Lyons Comprehensive Plan, Boulder County should extend the Dowe Flats permit, but only for an initial period of 3-5 years.
- Further, we suggest that over those 3-5 years, there should be additional action and assessment which should include:
 - An immediate process to update the IGA.
 - An assessment and financial analysis of possible future alternative uses for the Cemex plant site. Specifically, we would be interested to see at least 3 different

possible future realistic scenarios for the land that included estimated duration to realize the new land use and the estimated tax revenue generation (for Boulder County and for Lyons).

- Further, we suggest that a condition for the permit extension (to be written into the iGA) is that part or all of the Cemex property be annexed into the Town of Lyons so that the Town realizes a portion of the tax revenue created by Cemex operations.
- Although we are suggesting a shorter permit extension period, we do recognize that it is important for Cemex to plan for longer term stability. We would be open to supporting a longer (yet still temporary) operational period if Cemex were to agree to:
 - A commitment to fully ceasing all operations and closure of the site after the next permitted period of Dowe Flats.
 - A commitment to reduce their carbon footprint and improve the sustainability of their plant's energy source. (Specific goals to be outlined and decided on - not in our EVC purview).
 - A commitment to working closely with Boulder County, the Town of Lyons, and likely external consultants to model and assess the costs and future uses of the site once the plant has closed - to include analysis of the reclamation process of the site.

Board or Commission: HPC No Comment

Top Three Concerns from Board and Commission Perspective:

- 1.
- 2.
- 3.

Suggestions or Conditions that Board and Commission would like to offer:

- History Colorado and state future development growth for town. Can Colorado State be asked to intervene?
- We are creating our history now and the sooner this environmental mess is cleaned up the better.
- Goes against all of Boulder County's core values to support the use and development of a multinational polluter. The conversation needs to be weighed more heavily towards how and when the plant will cease operation and how to clean up the site and less towards how to support continued operation.
- Adding 1800 acres of open space to Boulder County's already 100,000 acres is not enough of an incentive for at least 15 more years of carbon emissions with an uncertain end date.
- Especially while the Federal Supreme Court scrambles to roll back EPA restrictions it becomes a community priority to make our environment safe.



Comment Form

Please return to mdavis@townoflyons.com no later than the morning of July 15th.

Board or Commission: Housing and Human Services Commission

No Comment

Top Three Concerns from Board and Commission Perspective:

#1. Pollution - Unfettered CO2 emissions at high levels for 15 more years

#2. Environmental injustice/disparate impact - unsafe and unhealthy housing for low income persons in the Eastern corridor

#3. _____

Suggestions or Conditions that Board and Commission would like to offer:

#1. Allow the plant to operate for 5 more years with concrete, identified reductions in emissions annually and with a guarantee that it will be dismantled at the end of the term (not just decommissioned). This will address both of the concerns noted above.

#2. _____

#3. _____

Please feel free to use additional space for your comments. Thank you for your input!

LAHC response to Cemex extension request

Submitted by Lauren Click, Chair

Prepared by Gil Sparks, member

7/15/2022

The Lyons Arts and Humanities Commission (LAHC) held its regularly monthly meeting on Tuesday July 12, 2022. While the CEMEX application extension was on the agenda, the LAHC did not recognize the need for Commission input until late in the meeting. There was insufficient time to have an in-depth orientation or discussion about the issues or to solicit a consensus position by the Commission.

Instead, the members were requested to submit written comments to the chair by July 14 for submission to the Town of Lyons by Friday July 15.

Three members submitted written comments, which are set out below.

As chair, my thoughts are aligned with the comments submitted by Melinda Wunder and Gil Sparks.

The LAHC has not had any formal discussion, nor has any vote been taken by our Commission. We recognize the Town of Lyons intends to have a public forum on the Cemex application on July 19th and will encourage all our members to attend and participate in those discussions.

Please let me know if you have any questions or need additional information.

Respectfully,

Lauren Click, Chair

Comments of LAHC commission members

Gil Sparks

I am a retired attorney and live at 2169 Apple Valley Road in Lyons. I serve on the Lyons Parks and Recreation Commission, the Lyons Arts and Humanities Commission, the Lyons Community Foundation Board and the Lyons Regional Library District Board.

I have reviewed the Cemex extension request for Dowe Flats. As currently proposed, I oppose the extension request.

While Cemex is dangling some enticing financial incentives to obtain Boulder County's support for the requested extension, the extension request is contrary to Boulder County's stated climate goals. The Boulder County climate goals are far more important for our health and the health of our children and grandchildren than any financial incentives Cemex can offer. Creating or protecting more open space is not the solution.

I am unaware of anything in Cemex's proposal that remotely attempts to meaningfully mitigate the harm caused by allowing Cemex's high levels of pollution to continue unabated. Additionally, based on

the information I have received, Cemex's proposal does not mean the physical plant will actually cease operations at the end of the extension period. There is no commitment to either decommission the plant or not sell it to another operator. Any negotiation to allow even a brief extension, must be coupled with the requirement to decommission the cement plant permanently.

Also, the Town of Lyons has not been part of the ongoing negotiations with Cemex, contrary the spirit of the 2012 IGA. Without prior involvement or input in the negotiation process, the request for comments from the Town is too short. I can support a possible short extension of the Dowe flats application, as long as the Town of Lyons can meaningfully participate in all future discussions or negotiations regarding the Cemex extension request.

Melinda Wunder

I understand Cemex has supported LAHC with some donations this past year but I see these as purely a function of public relations and not genuine. I have no faith in Cemex as they have proven over the years to be unreliable and untrustworthy. They continue to be a major contributor of polluted air emissions which impact the entire surrounding area.

Barring closing the plant, I would like see Cemex make significant changes to their structure and processes to reduce emissions. In other words, I want to see them operate on a much cleaner facility.

This is my major issue with Cemex.

Claudia Paterno

I apologize for getting my response to you so late. I have actually read more about the decision that has been laid in front of us. After letting all of it simmer, this is what I think we should do.

I think we should allow for the extension of their mining operations for another 15 years. Gulp. And, going forward we ask them for every contribution they can give to Lyons as a penance for polluting our air so badly!

Also, can we negotiate with them that if we extend this permit they MUST make some steps to lower their emissions.

CMEX Comment Form

Board or Commission: Parks and Recreation Commission

Top Three Concerns from Board and Commission Perspective:

#1. Meeting Boulder County's emissions goals and keeping environmental standards high, for example grant monies may be at risk.

#2. Lack of confidence that Cemex will honor its long term or short term commitments to the community or environment

#3. Potential impact on regional trail and open space opportunities for the future. Promises may not be kept.

Suggestions or Conditions that Board and Commission would like to offer:

#1. Meaningfully involve the town of Lyons in future permit extension discussions/negotiations.

#2. Update existing environmental standards to include a higher percentage of renewable energy and ensure strict compliance with Boulder County climate goals and timetables.

#3. If any extension is granted, short or long term, CEMEX will provide full and complete funding for trail and park improvements desired or planned by the town of Lyons within our state mandated planning area.

Board or Commission: PCDC No Comment

Top Three Concerns from Board and Commission Perspective:

1. The Dowe Flats renewal does not support the values conveyed in the Lyons 2012 Comprehensive Plan, the 2020 Boulder County Comprehensive Plan and the Guiding Principles & Goals developed in the Lyon's 2022 Comprehensive Plan.
2. Approval of the Mining permit could seriously affect future development in Lyons, especially along the Eastern Corridor, which is where the most significant new future land use opportunities are. The carbon emissions from continued operations at the CEMEX plant will likely put Boulder County in violation of stated Greenhouse Gas (GHG) reduction aspirations and thereby jeopardize the ability to obtain DRCOG TIP funding critical for future transportation-related projects, e.g. improving the futures of Shady Lane Mobile Home Park residents.
3. According to the attached Colorado Revised Statute 31-12-105 (1) (e) (I) municipalities are required to have a plan for areas within 3 miles of its borders. Lyons is in the process of establishing a new Comprehensive Plan which will address the full range of this requirement. Since the term of the proposed Dowe flats mining permit mining extension will include years in which this 3-mile plan is in effect, Lyons should be included in any discussion or commitments involving land use within the 3-mile range of its outer borders. Dowe Flats and the entire CEMEX properties are within this 3-mile range. Further, Boulder County is required to meet the requirements of CRS 34-1-304 related to a master plan for mineral extraction which includes:
 - a. The potential for effective multiple sequential use which would result in the optimum benefit to the landowner, neighboring residents, and the community as a whole;
 - b. The development or preservation of land to enhance development of physically attractive surroundings compatible with the surrounding area;

Suggestions or Conditions that Board and Commission would like to offer:

- 1) Boulder County needs to negotiate a shorter-term (5-years?) to extend the mining permit to allow CEMEX to wind down operations at the plant.
- 2) If in the unlikely chance the mining permit is extended, CEMEX must take significant efforts to reduce their carbon footprint and greenhouse gas emissions.
- 3) If the mining permit is not renewed and the plant shuts down, strong consideration should be given to the development of a solar farm, a model Eco Village, affordable housing and/or a mixed-use development.
- 4) Regardless of the final negotiated outcome, the terms and conditions should preclude CEMEX from reselling the property for future industrial use and provide Boulder County/Lyon's the right of first refusal.

Attachments

- **C.R.S. – 31-23-106 Planning Commission/Master Plan/Mineral Rights**
(<https://leg.colorado.gov/sites/default/files/images/olls/crs2016-title-31.pdf>)
- **Carbon negative cement** - <https://www.dailycamera.com/2022/07/04/cu-boulder-research-scientists-use-algae-to-make-carbon-negative-cement/>
- **EPA violations – CEMEX** - <https://echo.epa.gov/detailed-facility-report?fid=110000467450>
- **EPA downgrades Colorado** - <https://coloradosun.com/2022/04/12/colorado-ozone-air-pollution-downgraded-severe/>

7/14/2022

Dear Lyons Board of Trustees,

The Lyons Sustainable Futures Commission (SFC) respectfully submits to the Board the following concerns and suggestion regarding town input to Boulder County pertaining to the Dowe Flats permit extension requested by Cemex.

The SFC would like to preface our comments and have formatted our response based on the assertion that mining operations at Dowe Flats is directly tied to the operation of the cement kiln to the south of the mine by both a physical connection (the conveyor system transporting materials from the mine to the kiln), as well as by purpose (the mine exists solely to feed the kiln). Because of this dependent link and because the kiln is within the Lyons Planning Area, any recommendation to Boulder County regarding an approval or denial of the Dowe Flats permit extension must give due consideration to the kiln operations.

Sincerely, The Sustainable Futures Commission

3 top concerns from the Sustainable Futures Commission:

1. Environmental concern – Continued operation of the Cemex plant is not consistent with either the Town of Lyons September 2021 Resolution Declaring a Climate Crisis, nor county greenhouse gas emission reduction goals, the latter of which as a statutory municipality of Boulder County, is also circuitously, a town goal.
2. Environmental concern – Any decision by Boulder County must take into full consideration the yet uncompiled with requirement of the Cemex Lyon’s kiln plant to conduct a Greenhouse Gas and Energy Management for Manufacturing audit as required by SB21-1266 [GEMM 1](#). The findings of this audit is intended to reveal the environmental, economic and social impacts of the plant’s energy and carbon emission expenditures. Since the company is required by law to complete this audit by December 31, 2022 and then report to the state Air Pollution Control Division no more than 60 days after, the county in full accountability needs to delay the permit extension decision until this substantial set of data is made available. The importance of having a more complete picture of the impact that the kiln and through direct association, the mine, has on the residents of Lyons and surrounding community cannot be emphasized enough.
3. Procedural concern – The SFC agrees with the town’s position that the time and manner dictated by Boulder County for the town to provide a binary approve or deny recommendation on the Dowe Flats permit extension by July 19 is inappropriate and unrealistic. Given the approve or deny choice, the commission recommends that the town advise the county that it is not in favor of the permit extension. Should Boulder County concurs with Lyons and deny the 15-year extension being sought by Cemex, the company later submit a new request for consideration that offers other more climate favorable concessions and during that process, the county could rectify it’s mistake of not including Lyons in meaningful discussions on the merits of that new application.

3 top suggestions or recommendations from the SFC to the Board (by order of rank)

1. Most favored recommendation - The SFC recommends that the Board of Trustees advise Boulder County to deny the Dowe Flats permit extension request for the reason stated in Concerns #'s 1 and 3.
2. Second most favored recommendation- The SFC asks that the Board of Trustees recommend to the county that they neither approve or deny the permit extension until it has received the Greenhouse Gas and Energy Management for Manufacturing (GEMM 1) report, and public comment regarding the findings of that report have occurred. In lieu of an immediate decision, the SFC supports a temporary extension of the permit to allow for continued operations at Dowe Flats until the GEMM 1 audit review and public hearing process has been completed.

Once again, the SFC firmly believes that the GEMM 1 report covering activities at the kiln is directly related to the Dowe Flats mining activities and therefore must be part of the decision process for the permit extension.
3. Least favored recommendation - Should the Board of Trustees recommend an approval of the Dowe Flats mining permit extension, SFC encourages the board to make that approval contingent on a binding commitment by Cemex to develop an enforceable plan for achieving Colorado GHG Pollution Reduction Roadmap without exception or special exemption [GHG reduction roadmap](#) . Lyons and all of Colorado together must meet these state goals for the sake of current and future generations of residents.

Thank you for considering these recommendation by your Sustainable Future Commission.

Approved by the members of the Sustainable Futures Commission on 7/14/22.



Comment Form

Please return to mdavis@townoflyons.com no later than the morning of July 15th.

Board or Commission: Utilities and Engineering Board

No Comment

Please feel free to use additional space for your comments. Thank you for your input!

The UEB at a special meeting on July 13, 2022 unanimously passed the following motion:

The UEB has no comment on the proposals because there is no impact on Lyons existing utilities and the CEMEX municipal area is highly impacted by floodplain and floodway issues.



TO: Town Boards and Commissions
FROM: Alexander Painter, Planner II and David Kimmett, Planner II
DATE: July 7, 2022

The Board of Trustees is seeking your input regarding an application submitted by Cemex to Boulder County to extend their mining permit on Dowe Flats (north side of Hwy 66). The town has an Intergovernmental Agreement with Boulder County regarding the Cemex parcel on the south side of Hwy 66 that the trustees feel has a direct correlation to the north side. The application and the IGA are both attached as well as a staff memo outlining the issues.

The Board is requesting that you review the application and its potential implications for the Lyons area from the perspective of your Board/Commission. They will combine the comments into a comprehensive Referral Response and submit it to the county by the July 22, 2022, deadline.

Docket SU-22-0003: CEMEX Dowe Flats Mining and Reclamation Extension

Request: Special Use/Site Specific Development Plan review to amend an existing Special Use approval (SU-93-14) for limestone/shale open mining/quarrying located at the Dowe Flats Quarry, extending approved mining activities for an additional 15 years; the original permit area of 1,911 acres to be reduced to 709 acres; the concluding of cement plant operations at the facility located south of Highway 66 within the same 15-year timeframe; with concurrent reclamation of wildlife habitat.

Location: 13301 55th Street, Parcel #120316000050, located approximately 0.5 mile north of the intersection of N. 53rd Street and state Highway 66, in Sections 9, 10, 15, and 16, Township 3N, Range 70W.

Zoning: Agricultural (A)

Applicant/Owner: Cemex Inc., c/o John Heffernan

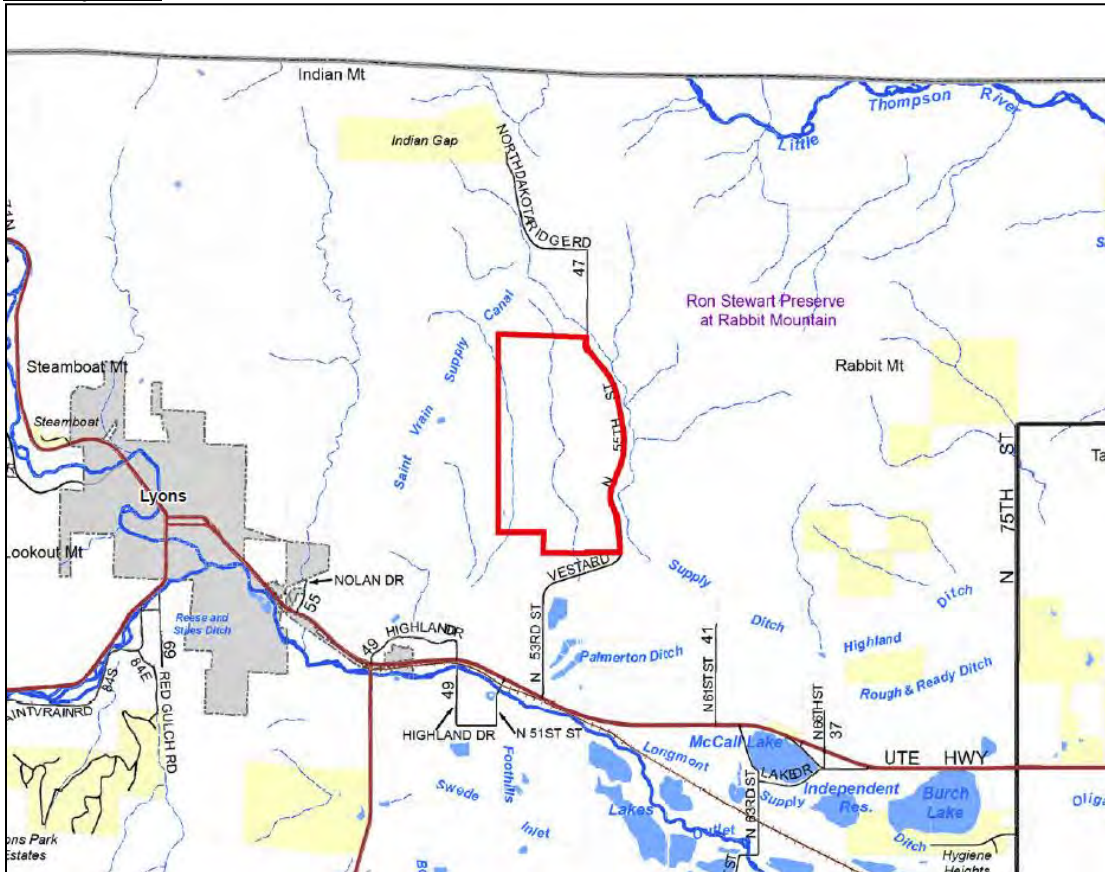
Agent: Pam Hora, Tetra Tech Inc.

Special Use Review / Site Specific Development Plan is required for uses that may have greater impacts on services, neighborhoods, or the environment than those allowed with only Building Permit Review. This process will review compatibility, services, environmental impacts, and the proposed site plan.

This process includes public hearings before the Boulder County Planning Commission and the Board of County Commissioners. Adjacent property owners and holders of liens, mortgages, easements, or other rights in the subject property are notified of these hearings.



Vicinity Map



Without an understanding of the negotiation details between Boulder County and Cemex, it appears two options were discussed for CEMEX's future operations: Not extending the permit for mining operations and an indefinite operation of the cement plant OR extending the mining operations permit 15 years along with a commitment from CEMEX to permanently conclude the cement plant operations at the same time.

While Dowe Flats is not within the Lyons Planning Area, this permit extension could impact the Town of Lyons in the following ways:

- The cement plant operation facility to the south is in the Lyons Planning Area, so any timeline changes and operations on the property will impact Lyons' IGA and our potential plans for the site.
- With the proximity of the Eastern Corridor, timeline and uses may impact the development of the area.



- The dedication of a permanent, non-exclusive recreational trail easement to Boulder County along the south bank of the St. Vrain River is proposed, which is in the Lyons Planning Area.
- the operation of the plant for 15 years (or indefinitely) will preclude the county from meeting its carbon reduction goals.
- An option for Boulder County to purchase CEMEX property surrounding the cement plant, including property in the CEMEX Municipal Facilities Area per the 2012 CEMEX Area IGA Map, which is included in the Lyons Planning Area.

The PCDC reviewed the referral at a workshop on June 23, 2022 and felt there was not adequate time to develop a response for the Board of Trustees and discussed the potential modification of the Town Planning Area, and any changes should be driven by the current Comprehensive Plan Update process. The Board of Trustees requested an extension until October 31, 2022, to get this community input; however, the deadline was extended only until July 22, 2022.

The Board of Trustees will hold a special meeting on July 19th, 2022, at 5:00 pm for public input, and at 7:00 pm the Board meeting. If there are any questions or concerns, please reach out to our Planning staff: apainter@townoflyons.com or dkimmett@townoflyons.com.

The Town of Lyons and the Planning staff value comments from individuals and referral agencies. We have added a comment sheet at the bottom of this memo and would appreciate it if you could delineate three primary concerns of your board or commission in regard to the extension of the CEMEX Dowe Flats Mining and Reclamation Extension. Please have your comments sent back by 8:00 am on Friday, July 15, 2022, to mdavis@townoflyons.com

We realize this is an abridged period of comment time under which we have all been placed by Boulder County. We would like boards/commissions to share not only your concerns with the CEMEX application but what are some alternatives to it? For example, a 5-year lease option instead of 15 years (merely an example).

Potential additional commitments of CEMEX include the following items:

- A reduction of the purchase prices for Boulder County's existing options to acquire real property north of Hwy. 66 to zero dollars plus title and closing costs, resulting in savings to the County of approximately \$6.6M;
- The grant of an additional option to Boulder County for the benefit of Boulder County Parks & Open Space for its potential future purchase (when mining at Dowe Flats is completed) of four additional parcels totaling approximately 200 acres around the perimeter of the Dowe Flats mine, at a purchase price of zero dollars plus title and closing costs;



- An increase in the required rental payments by CEMEX to Boulder County pursuant to the existing buffer lease for properties around the Dowe Flats mine from the current amount of \$1,000/year to an increased amount of \$400,000/year, equating to a total value of \$6.0M for 15 years;
- The dedication of a permanent, non-exclusive recreational trail easement to Boulder County for the benefit of Boulder County Parks & Open Space along the south bank of the St. Vrain River or another mutually agreed to location;
- A commitment by CEMEX to permanently conclude ongoing cement plant operations at its facility south of Hwy. 66 within the same 15-year timeframe for completion of mining operations (plus reclamation) at Dowe Flats instead of continuing to operate the cement plant indefinitely as has been contemplated; and
- The grant of an additional option to Boulder County for the benefit of Boulder County Parks & Open Space for the potential future purchase of up to approximately 830 acres of CEMEX property surrounding CEMEX's cement plant south of Hwy. 66 at a current price of \$17,000 per acre with a 2.0% annual escalator, upon condition that the Town of Lyons provide consent to Boulder County's acquisition of any lands within the CEMEX Municipal Facilities Area per the 2012 CEMEX Area IGA Map, and provided that CEMEX would reserve an access and utility corridor to/from Hwy. 66 for the benefit of its retained properties.

These terms would be set forth in additional future agreements between the County and CEMEX and all such terms are and will remain subject to final approval of the enclosed land use application with conditions consistent with the above terms and otherwise acceptable to CEMEX at its discretion.



Comment Form

Please return to mdavis@townoflyons.com no later than the morning of July 15th.

Board or Commission: Student Advisory Committee

No Comment

Top Three Concerns from Board and Commission Perspective:

#1. _____

#2. _____

#3. _____

Suggestions or Conditions that Board and Commission would like to offer:

#1. _____

#2. _____

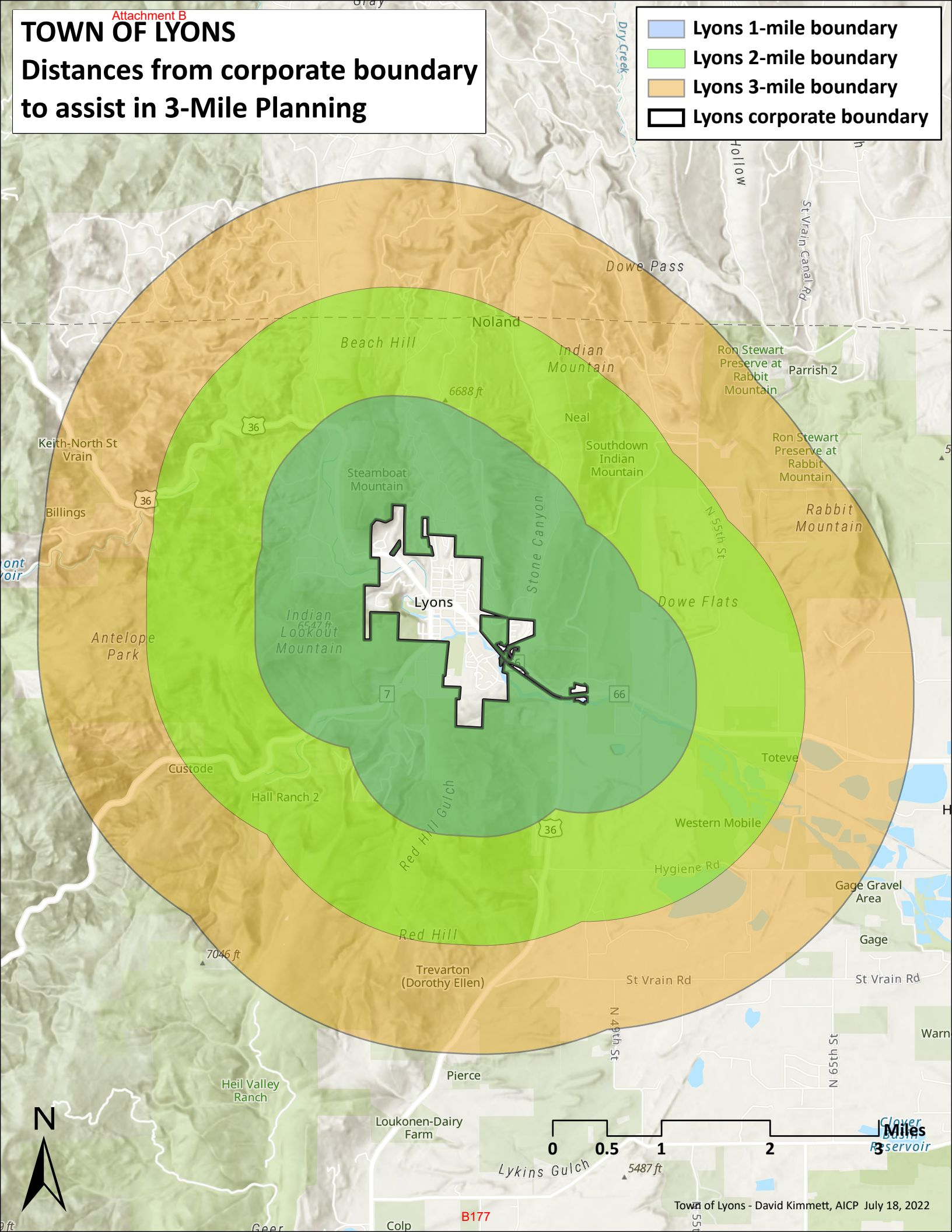
#3. _____

Please feel free to use additional space for your comments. Thank you for your input!

TOWN OF LYONS

Distances from corporate boundary to assist in 3-Mile Planning

- Lyons 1-mile boundary
- Lyons 2-mile boundary
- Lyons 3-mile boundary
- Lyons corporate boundary



CEMEX AREA IGA MAP

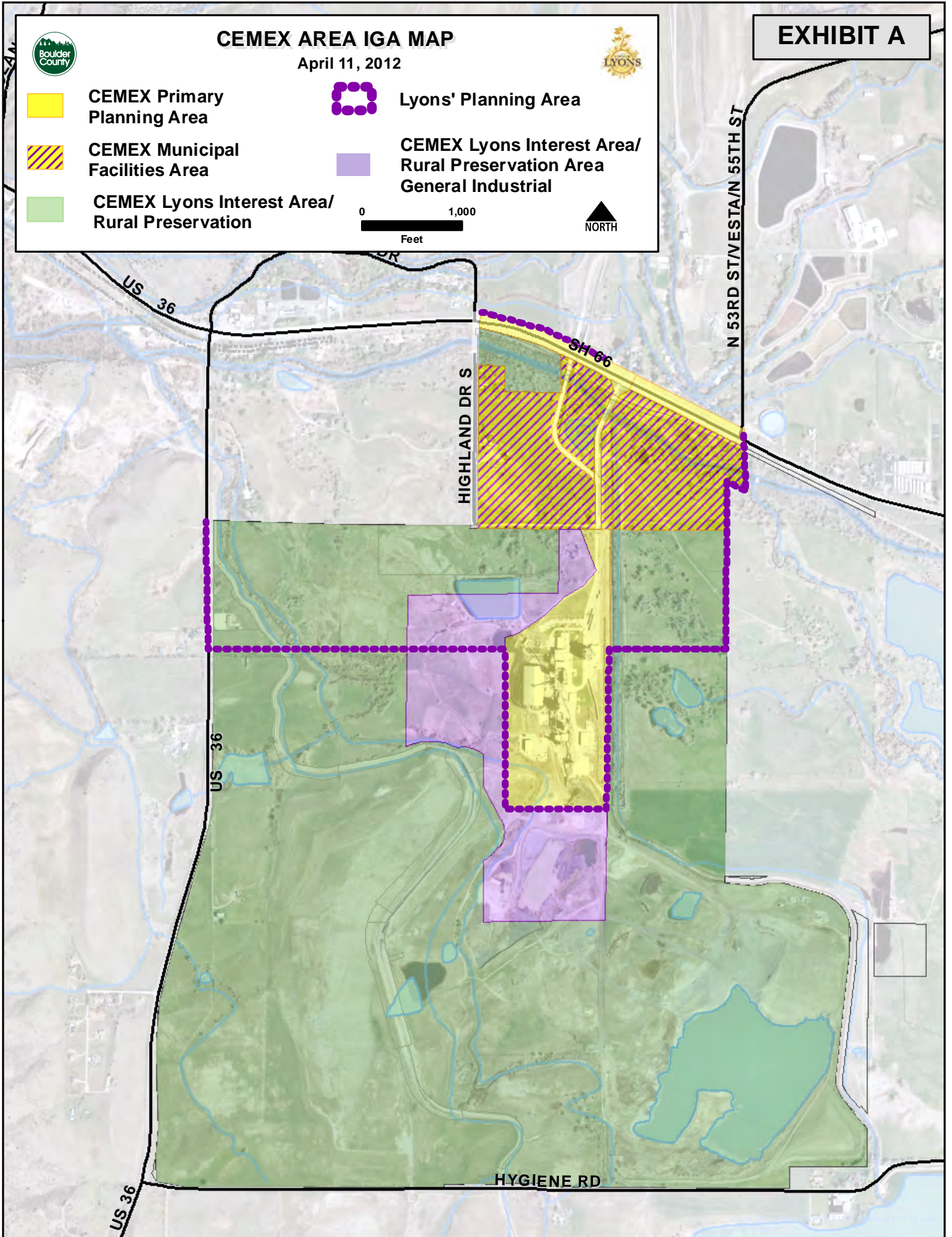
April 11, 2012



EXHIBIT A



-  CEMEX Primary Planning Area
-  Lyons' Planning Area
-  CEMEX Municipal Facilities Area
-  CEMEX Lyons Interest Area/
Rural Preservation Area
General Industrial
-  CEMEX Lyons Interest Area/
Rural Preservation



**LYONS CEMEX AREA
COMPREHENSIVE DEVELOPMENT PLAN
INTERGOVERNMENTAL AGREEMENT**

This Intergovernmental Agreement ("IGA") by and between the Town of Lyons, a Colorado statutory municipal corporation ("Lyons" or the "Town"), and the County of Boulder, a body politic and corporate of the State of Colorado ("Boulder County" or the "County") (collectively, the "Parties") is made to be effective on the Effective Date as defined on the signature page of this IGA.

RECITALS

WHEREAS, the Parties are authorized by § 29-20-101 et seq., C.R.S. as amended, to enter into intergovernmental agreements to plan for and regulate land uses in order to minimize the negative impacts on the surrounding areas and to protect the environment, and specifically to cooperate and contract with each other for the purposes of planning and regulating the development of land by means of a "comprehensive development plan;" and

WHEREAS, § 29-1-201, et seq., C.R.S., as amended, authorizes the Parties to cooperate and contract with one another with respect to functions lawfully authorized to each of the Parties and the people of the State of Colorado have encouraged such cooperation and contracting through the adoption of Colorado Constitution, Article XIV, § 18(2); and

WHEREAS, the functions described in this IGA are lawfully authorized to each of the Parties which perform such functions hereunder, as provided in Article 20 of Title 29; Part 1 of Article 28 of Title 30; Part 1 of Article 12 of Title 31; and Parts 2 and 3 of Article 23 of Title 31, C.R.S., as amended; and

WHEREAS, in December 2002, the Parties entered into a Comprehensive Development Plan Intergovernmental Agreement (the "Original IGA") for a period of ten years, which was amended to add certain additional properties to the LPA in 2005 and again in 2011; and

WHEREAS, the term of the Original IGA as amended ends in December 2012, and the Parties believe it is in the best interests of the citizens of the Town and the County to enter into new Intergovernmental Agreements with the goal of continuing the spirit of collaboration that was established by the Original IGA and demonstrated through the Parties' course of dealing throughout the term of the Original IGA; and

WHEREAS, the Parties have contemporaneously with this IGA entered into the Lyons Planning Area Comprehensive Development Plan Intergovernmental Agreement ("Lyons Planning Area IGA"), a complementary IGA that addresses development and preservation issues for all areas surrounding the Town not addressed by this IGA. This IGA and the Lyons Planning Area IGA together represent a shared vision of appropriate development for the areas covered by the IGAs for their respective durations; and.

WHEREAS, the Parties believe that, in order to preserve Lyons' unique and individual character through the orderly development of land and to preserve the rural quality of other lands in the area, it is in the best interest of the residents of both communities to enter into an IGA that delineates the areas of the CEMEX Property that are appropriate for certain kinds of development and the areas of the CEMEX property that the Parties desire to preserve in a rural state; and

WHEREAS, the disturbed area of the CEMEX property where the current cement plan is located is important to the Town both as a current employment center and in the future as a redevelopment area focusing on such as green technology uses and low impact development; and

WHEREAS, the Parties have each held hearings after proper public notice for the consideration of entering into this IGA and the adoption of a comprehensive development plan for the subject lands as shown on the map attached as Exhibit A; and

NOW THEREFORE, in consideration of the above and the mutual covenants and commitments made herein, the Parties agree as follows:

1.0 LYONS CEMEX AREA COMPREHENSIVE DEVELOPMENT PLAN (CEMEX AREA IGA PLAN).

1.1 CEMEX Area IGA Plan Defined. This IGA, including the Map attached hereto as Exhibit A, is hereby adopted by the Parties as the Lyons CEMEX Area Comprehensive Development Plan, and shall be known herein as the CEMEX Area IGA Plan. The CEMEX Area IGA Plan shall govern and control the CEMEX Area. This IGA complements the Lyons Planning Area Comprehensive Development Plan IGA, but is independent from and not a part of it or any other Comprehensive Development Area IGAs between the Parties, except the Boulder County Countywide Coordinated Comprehensive Development Plan Intergovernmental Agreement (“Super IGA”).

1.2 CEMEX Area IGA Map. The Map identifies, designates and defines the land to be known as the “CEMEX Area,” which consists of the CEMEX Primary Planning Area (the “CEMEX PPA”), the CEMEX Municipal Facility Area (the “CEMEX Municipal Facility Area”), the CEMEX Lyons Interest Area/Rural Preservation Area (the “CEMEX LIA/RPA”), and the CEMEX LIA/RPA GI Property.

1.2.1 The CEMEX PPA is the land that is planned for the next phase of expansion of the Town limits and which the Parties recognize is appropriate and intended for urban development.

1.2.2 The CEMEX Municipal Facility Area represents areas which Lyons may annex in order to develop municipal services facilities such as water and sewer plants and solar/electric facilities.

1.2.3 The CEMEX LIA/RPA represents areas that are expected to remain rural for the duration of this IGA.

1.2.4 The CEMEX LIA/RPA GI Property is the portion of the Lyons Interest Area/Rural Preservation Area that (a) currently has a County general industrial zoning designation; and (b) is the subject of negotiations toward a future land use plan, as addressed in Section 2.4 of this IGA.

2.0 ANNEXATION AND DEVELOPMENT OF PROPERTY.

2.1. CEMEX PPA. The Town may annex into its corporate boundaries any and all property located within the CEMEX PPA in accordance with state and local laws governing annexation. By executing this IGA, the County finds and declares that a community of interest exists between the Town and all property located within the CEMEX PPA. The County will cooperate with Town efforts to annex land in the CEMEX PPA. The County

will also cooperate and consult with Town and lend its expertise, if requested, on potential development proposals for the CEMEX PPA. The Town and the County recognize the importance of remediation of the CEMEX PPA property and will work together to encourage CEMEX and state regulators to ensure remediation efforts are complete.

- 2.2 CEMEX Municipal Facilities Area. The Town may annex into its corporate boundaries any and all property located within the CEMEX Municipal Facility Area in accordance with state and local laws governing annexation for the sole purpose of allowing the Town to develop municipal services of the following specific kinds: water or wastewater facility; renewable energy or electric distribution facility; emergency alert system; recycling collection facility; municipal service facility, if developed in conjunction with a water or wastewater facility; and such other municipal facilities as may be mutually agreed upon by the Parties. If the Town opts to develop water treatment or sewer facilities in the CEMEX Municipal Facility Area while the property is still in unincorporated Boulder County, the County agrees that this IGA shall serve in lieu of review, as to any wastewater treatment infrastructure projects, of any permit applications that would otherwise be required under Section 8 of the Boulder County Land Use Code concerning Areas and Activities of State Interest (“1041 Regulations”).
- 2.3 CEMEX LIA/RPA. The Town and the County acknowledge and agree that the property within the CEMEX LIA/RPA is intended to remain in the County’s regulatory jurisdiction and shall not be annexed or developed by the Town during the duration of this IGA unless mutually agreed upon by both parties.
- 2.4 CEMEX LIA/RPA GI. The Parties further agree that within ten (10) years after execution of this IGA they will engage in good faith negotiations toward the adoption of a land use plan for the CEMEX LIA/RPA GI Property, taking into consideration input from the property owner (currently CEMEX), and to make such amendments to this IGA as are necessary to implement the land use plan if adopted..
- 2.5 Annexation of County ROW.
The Town agrees that if it annexes any part of a County road it will annex the entirety of that road.

3.0 OPEN SPACE AND RURAL PRESERVATION

- 3.1 Open space acquisitions within the CEMEX Area. The County agrees that for the term of this IGA it will not purchase or otherwise acquire any land within the CEMEX PPA or the CEMEX Municipal Facilities Area for open space purposes, including conservation easements. The Town agrees that land within the CEMEX Rural Preservation Area may be acquired by the County for open space purposes, including conservation easements.
- 3.2 Zoning and subdivision of land in the CEMEX LIA/RPA. The zoning classification of land within CEMEX LIA/RPA should remain agricultural and subdivision should be restricted to that which exists under the County's Land Use Code, including the creation of lots of a minimum of thirty-five (35) acres, a Non-Urban Planned Unit Development which may contain up to two units per 35 acres if approved and clustered so that at least 75% of the land is protected by a conservation easement, or other cluster development permissible under the County’s Land Use Code where gross density would not exceed one unit per 35 acres.

4.0 REFERRALS

- 4.1 Lyons Referrals to Boulder County. The Town shall promptly refer in writing to the County any application for annexation in the CEMEX Area.
- 4.2 Boulder County Referrals to Lyons. The County agrees that the Town shall be a formal referral agency for any application to the County for zoning, rezoning, subdivision, PUD, replat, special use, limited impact special use, vacation, transfer of development rights, conservation easement or development (including site plan reviews) for any lot, tract, easement, right-of-way or parcel within the CEMEX Area as well as any proposed map amendment to the Boulder County Comprehensive Plan affecting any lot, tract, or parcel within the CEMEX Area.

5.0 AMENDMENTS

- 5.1 Entire Agreement. With the exception of the Super IGA, this IGA contains the entire agreement between the Parties as to the CEMEX Area, and supersedes and replaces any other or prior IGAs as to the same geographic area.
- 5.2 Changes to IGA. Amendment of this IGA shall take place only upon approval by resolution or ordinance adopted by the governing body of both of the Parties, after notice and hearing as may be required by law.
- 5.3 Timely Decisions on Amendments to IGA. The Parties agree and acknowledge that time is of the essence when either Party seeks an amendment to this IGA. The Parties further agree and acknowledge that the length of time necessary to process and act upon any proposed amendment may vary depending on the complexity of the particular request and on other factors and other responsibilities facing the Parties at any given time. Nevertheless, the Parties each agree to give high priority to any proposal by the other Party to amend this IGA and to act on any such proposal without delay. In addition, the Parties agree that within thirty (30) days after receipt by one Party of an amendment proposed by the other Party, the Parties will agree on and establish a firm schedule for processing and taking final action upon the amendment proposal.

6.0 NON-SEVERABILITY.

If any portion of this IGA is held by a court of competent jurisdiction in a final, non-appealable decision to be *per se* invalid or unenforceable as to any Party, the entire IGA shall be terminated, it being the understanding and intent of the Parties that every portion of the IGA is essential to and not severable from the remainder.

7.0 BENEFICIARIES.

The Parties, in their corporate and representative governmental capacities, are the only entities intended to be the beneficiaries of the IGA, and no other person or entity is so intended.

8.0 ENFORCEMENT.

Either or both of the Parties may enforce this IGA by any legal or equitable means including specific performance, declaratory relief, and injunctive relief. No other person or entity shall have any right to enforce the provisions of this IGA. The Parties agree to

discuss and attempt to resolve any dispute in the interpretation or application of this IGA, but if they are unable to do so, either Party may request that the matter be presented to a mediator selected and paid for jointly by the Parties.

9.0 DEFENSE OF CLAIMS/INDEMNIFICATION

If, notwithstanding the provisions of Sections 7.0 and 8.0 of this IGA, any person allegedly aggrieved by a provision of this IGA who is not a party to the IGA asserts or attempts to assert any claim against any Party concerning such IGA provision, the County shall, and the Town may, defend such claim upon receiving timely and appropriate notice of the pendency of such claim. Defense costs shall be paid by the Party providing such defense. In the event that any person not a party to the IGA should obtain a final money judgment against the Town for the diminution in value of any regulated parcel resulting from regulations in the IGA or regulations adopted by the Town implementing the IGA, the County shall, to the extent permitted by law, indemnify the Town for the amount of said judgment.

10.0 GOVERNING LAW AND VENUE

This IGA shall be governed by the laws of the State of Colorado and venue shall lie in the appropriate court(s) for Boulder County, Colorado.

11.0 TERM AND TERMINATION

This IGA shall remain in effect through December 31, 2034, unless otherwise terminated earlier by mutual agreement of the Parties.

12.0 PARTY REPRESENTATIVES

Referrals made under the terms of this IGA shall be sent to the Parties' representatives as follows:

County of Boulder
Director, Land Use Department
P.O. Box 471
Boulder, Colorado 80306

Town of Lyons
Town Administrator
P.O. Box 49
432 Fifth Avenue
Lyons, Colorado 80540

Name and address changes for representatives shall be made in writing and mailed to the other representatives at the then current address.

13.0 COUNTERPART.

This IGA may be executed in any number of counterparts which together shall constitute the agreement of the Parties.

14.0 EFFECTIVE DATE.

The effective date of this IGA shall be the date on which both Parties have approved and executed the IGA by signing where indicated below.

TOWN OF LYONS:

Board of Trustees

By: _____

Date: _____, 2012

Mayor or Mayor Pro Tem

ATTEST:

APPROVED AS TO FORM:

Town Clerk

Town Attorney

COUNTY OF BOULDER:

BOARD OF COUNTY COMMISSIONERS

By: _____

Date: _____, 2012

Chair

ATTEST:

APPROVED AS TO FORM:

Clerk to Board

County Attorney



**Boulder County
Land Use Department
Publications**

**Referral
Agencies**

Land Use Department
Courthouse Annex Building
2045 13th Street
PO Box 471
Boulder, CO 80302

Planning Division:
Phone: 303-441-3930
Fax: 303-441-4856
Email: planner@bouldercounty.org
Website: www.bouldercounty.org/lu

Office Hours:
Monday — Friday 8 a.m. to 4:30 p.m.
Closed Tuesdays 8-10 a.m.

Referral Agencies

The planner at your pre-application conference will go through this list and identify which entities will be sent a referral request. If the line in front of the entity is marked "**Email**," then that entity will be sent an email referral request and a hard copy packet is not required to be submitted; otherwise a hard copy referral packet for that agency is required to be submitted to the Land Use Department as part of the application. See the publication titled [Referral Packet Guidelines](#) for directions on creating referral packets.

Internal Referral Agencies Requesting Email Referrals

Land Use Department

- Abby Shannon, *Long Range Planning*
 Ron Flax, *Chief Building Official*
 Jessica Fasick, *Historic Review*, [#Historic](#)
 Wildfire Mitigation, [#WildfireMitigation](#)
 Code Compliance, [#CodeCompliance](#)
 Varda Blum, *Floodplain Administrator*, floodplainadmin@bouldercounty.org

Administrative

- Mark Ruzzin, *Eldorado Springs LID*
 Jenny Griffiths, *Marijuana Licensing*, marijuanalicensing@bouldercounty.org

Assessor

- Adam Hoppe, [#AssessorReferral](#)

Attorney

- County Attorney*, [#CReferral](#)

Parks & Open Space (refer applications, even if co-signed by BCPOS)

- Melissa Arnold, *Conservation Easements*, [#CReferral](#)
 Leah Rothbaum, *all applications on or adjacent to county open space*

Public Health

- Environmental Health / Water Quality,
HealthWQ-EnvironBPLU@bouldercounty.org
 Child Health Promotion (CHP), Sarah Scully (Camps, Childcare, etc.)
 Consumer Protection Program, Lane Drager (Food Service, Comm. Kitchens)

Sheriff

- Mike Wagner, *Operations Commander*

Treasurer

- Alycia Allshouse

Internal Referral Agencies Requesting Hardcopy Referrals

(Applicant to provide packets)

Parks and Open Space

- Ron West, *Natural Resource Planner*

Transportation

- Development Review*, transdevreview@bouldercounty.org
 Ted Plank, *Road Maintenance*

Surveyor

- Lee Stadele, leestadele@bouldercounty.org
 Flagstaff Surveying, Inc., 637 South Broadway, Suite C,
 Boulder, Colorado 80305 | T: 303-499-9737

Additional: _____

Community Interest Groups

____ Allenspark Area Landowners
Attn: Jeff Kolen/Becky Brandli
PO Box 511
Allenspark, CO 80510
T: 303-747-2340
E: bbptjfire@wildblue.net

____ Allenspark Concerned Citizens
Attn: Bob Donovan
PO Box 336
Allenspark, CO 80510
Note: Send referral for projects along Peak to Peak from Peaceful Valley to the County limit.

____ Audubon Society
Board of Review
P.O. Box 2081
Boulder, CO 80306

____ Coal Creek Canyon
Improvement Association
P.O. Box 7331
Golden, CO 80403
Note: Send referrals for all projects in Coal Creek Canyon Area.

Email Eldora Civic Association
PO Box 988
Nederland, CO 80466
eldoracivicasociation@gmail.com
Note: Also receives referrals for projects within the Eldora Environmental Preservation Planning area (EEP).

Email Eldorado Springs Community
Assoc. (ESCA)
eldocommunity@gmail.com

Both Gold Hill Town Meeting
Attn: Tony Vrba
1011 Main Street
Boulder, CO 80302
tonyvrba@gmail.com

____ Gold Hill Zoning & Historic
District
1011 Main Street (Gold Hill)
Boulder, CO 80302
Note: Send Referrals for all projects in Gold Hill area.

Email Fourmile Watershed Coalition
Maya MacHamer
fourmilewatershed@gmail.com

____ Greater Allenspark
Alliance/MOST
Attn: Phil Stern
PO Box 56
Allenspark, CO 80510
Note: Send Referral for projects along Peak to Peak from Peaceful Valley to County limit and along Big Owl Rd. & Cabin Creek.

Email James Creek Watershed Initiative
Attn: Colleen Williams, Director
P.O. Box 110
Jamestown, CO 80455
E: colleen@jimtown.org AND
mark@jimtown.org

____ Lake Eldora Corporation
Attn: Brent Tregaskis
PO Box 1697
Nederland, CO 80466
T: 303-440-8700 x295
E: btregaskis@eldora.com

____ Nature Conservancy of CO
Colorado Field Office
2424 Spruce Street
Boulder CO 80302
T: 303- 444-2950

____ Niwot Business Association
Attn: Tony Santelli
PO Box 92
Niwot, CO 80544
E: info@niwot.com

Email Niwot Cultural Arts Association
Attn: Bruce Warren
E: bwarren@niwotlaw.com

Email Niwot Community Association
Attn: David Limbach, NCA VP & Dir.
Of Communications
PO Box 72
Niwot, CO 80544
E: info@niwot.org;
landuse@niwot.org;
board@niwot.org

Email Old Town Niwot Design Review
Subcommittee
Attn: Pat Murphy
pmurphy@niwotrealty.com
Note: Send Referrals for all projects within the original NRCD boundary (commercial are on 2nd Ave) and also in the NRCDII (the Old Town residential blocks).

Email Niwot Historical Society
Attn: Kathy Koehler
kathyboco@gmail.com AND
info@niwothistoricalsociety.org
Note: Send Referrals for all projects for Land Use builds and/or changes in Niwot.

Email PUMA (Preserve Unique Magnolia
Association)
puma@magnoliaroad.net
Note: Send Referrals for ALL projects off of Magnolia Road.

Utilities

Water and Sanitation Districts

_____ Allenspark Water & Sanitation Dist.
Attn: Andrew Griffiths
PO Box 91
Allenspark, CO 80510

_____ City of Boulder Utilities
1777 Broadway
Boulder, CO 80302

Email District 5 Water Commissioner
shera.sumerford@state.co.us

_____ District 6 Water Users Assn.
See St. Vrain & Left Hand Water

Email East Boulder County Water District
P.O. Box 18461
Boulder, CO 80308
president@eastboulderwater.com

_____ Eldorado Artesian Springs, Inc.
P.O. Box 445
Eldorado Springs, CO 80025

Email Fairways Metropolitan District
c/o Special District
Management Services
Attn: David Solin
141 Union Boulevard, Suite 150
Lakewood CO 80228-1898
dsolin@sdmsi.com
Tel: 303-987-0835

*Note: For all applications in the Fairways /
Lake Valley Estates / North Rim subdivisions.*

_____ Hoover Hill Water & Sanitation District
P.O. Box 16532
Golden, CO 80402
T: 720-432-6322
info@hhwsd.org AND
cade@metro-district.com

Email Lake Eldora Water & Sanitation
PO Box 1697
Nederland, CO 80466
hwright@eldora.com

_____ Left Hand Water District
Attn: Christopher Smith
PO Box 210
Niwot, CO 80544

Email Little Thompson Water District
Attn: Brad Eaton,
District Engineer
835 East Hwy. 56
Berthoud, CO 80513
T: 970-344-6318
F: 970-532-3734
BEaton@lthwd.org

Email Longs Peak Water District
Attn: Brian Morse
9875 Vermillion Road
Longmont, CO 80504
brian@lpwd.org

Email Niwot Sanitation District
Attn: Karen Behne
7395 N. 95th Street
Longmont, CO 80504
T: 303-652-2525
kbehne@niwotsanitation.com

Email Northern Colorado Water
Conservancy District
Attn: Jim Struble &
Brian Flockhart
220 Water Avenue
Berthoud, CO 80513
jstruble@northernwater.org AND
Bflockhart@northernwater.org

Email Pine Brook Water District
Attn: Bob de Haas
1903 Linden Drive
Boulder, CO 80304
T: 303-817-8153
bob@pinebrookwater.com

Email St. Vrain & Left Hand Water
Conservancy District
9595 Nelson Road
Box C, Suite 203
Longmont, CO 80501
office@svlhwcd.org

Power and Gas Providers

Email Estes Park Power & Light
Attn: Steve Rusch, Utilities
Coordinator
PO Box 1200
Estes Park, CO 80517
srusch@estes.org

*Note: Any project with a solar component goes
to both srusch@estes.org and
solarpower@estes.org. All projects go to
srusch@estes.org.*

_____ Longmont Power and
Communications
Attn: Jess Aills
1100 South Sherman Street
Longmont, CO 80501

Email Noble Energy, Inc.
Attn: Mike Rodine, Land Supervisor
Noble Field Office
2115 117th Ave.
Greeley, CO 80634
T: 970-304-5000
Michael.Rodine@noblenergy.com

Email Poudre Valley REA
Attn: Matt Organ
PO Box 272550
Fort Collins, CO 80527-2550
morgan@pvrea.com

Email United Power, Inc.
500 Cooperative Way
Brighton, CO 80603
platreferral@unitedpower.com

Email Western Area Power Administration
Attn: Tracy Rogers
Rocky Mountain Region
PO Box 3700
Loveland, CO 80539
T: 970.461.7284
Rogers@wapa.gov

_____ Western Gas Supply Co.
4200 S. County Road 15H
Loveland, CO 80537

Email Xcel Energy
Attn: Donna George, ROW & Permits
1123 West 3rd Avenue
Denver, CO 80223
T: 303-571-3306
Donna.L.George@xcelenergy.com
BDRCO@xcelenergy.com

(Email link to PDF if file is over 10 MB)

Communications

Email CenturyLink Communications
Attn: Christopher Janoski
1855 S. Flatiron Ct. #B-01
Boulder, CO 80301
Christopher.Janoski@centurylink.com

Ditch Companies

Cities and Counties

Email Adams County Community & Economic Development Dept.

Attn: Jen Rutter

4430 South Adams County Pkwy.,
Ste. 3000
Brighton, CO 80601
T: 720-523-6990
F: 720-523-6150
jrutter@adcogov.org

Email City of Boulder Planning & Development Services

Attn: Phil Kleisler
PO Box 791
Boulder, CO 80306-0791
T: 303-441-4497
KleislerP@bouldercolorado.gov

Email City of Boulder Open Space & Mountain Parks
Attn: Bethany Collins, Matt Ashley, and Juliet Bonnell

PO Box 791
Boulder, CO 80306
bonnellj@bouldercolorado.gov
ashleym@bouldercolorado.gov
CollinsB@bouldercolorado.gov

City and County of Broomfield
Planning Division
1 Des Combes Drive
Broomfield, CO 80020
T: 303-438-6284
F: 303-438-6297

Email Town of Erie Community Development Department
Planning Division
Attn: Melinda Helmer and Deborah Bachelder
PO Box 750
Erie, CO 80516
mhelmer@erieco.gov AND
dbach@erieco.gov
T: 303-926-2771
F: 303-926-2706

Email Gilpin County
Community Development Dept.
Attn: Dan Horn
P.O. Box 661
Central City, CO 80427
T: 303-582-5831 ext. 3
F: 303-582-5440,
dhorn@co.gilpin.co.us

Email Grand County Planning and Zoning Department
Attn: Robert Davis & Alex Taft
PO Box 238
Hot Sulphur Springs, CO 80451
T: 970-725-3062
rdavis@co.grand.co.us AND
ataft@co.grand.co.us

Email Jamestown Planning Department
Attn: Kristi Rutledge

PO Box 298
Jamestown, CO 80455
T: 303-449-1806
E: townclerk@jamestownco.org

Email Jefferson County Planning and Zoning Department

Attn: Mike Schuster, Assistant Director
100 Jefferson Pkwy., Suite 3550
Golden, CO 80419-3500
mschuste@jeffco.us
T: 303-271-8756
F: 303-271-8744

Email City of Lafayette
Community Development Dept.
Planning Division

Attn: Paul Rayl & Jana Easley
1290 S. Public Road
Lafayette, CO 80026
T: 303-665-5588 ext. 3332
F: 303-665-2153
jana.easley@cityoflafayette.com
AND paulr@cityoflafayette.com

Email Larimer County Planning
Department
P.O. Box 1190
200 West Oak Street, Ste. 3100
Ft. Collins, CO 80522
T: 970-498-7683
F: 970-498-7711
E: poc@co.larimer.co.us
AND ellislk@larimer.org

Email Longmont Planning & Development
Services Division
Attn: Erin Fosdick and Jade Krueger
350 Kimbark St.
Longmont, CO 80501
erin.fosdick@longmontcolorado.gov
AND
jade.krueger@longmontcolorado.gov

Email Louisville Planning Department
Attn: Kristin W. Dean

749 Main St.
Louisville, CO 80027
T: 303-335-4592
planning@louisvilleco.gov AND
kdean@louisvilleco.gov

Email Town of Lyons
Attn: Victoria Simonsen Town
Administrator

PO Box 49
Lyons, CO 80540
vsimonsen@townoflyons.com

Both Town of Nederland
Attn: Cynthia Bakke, Planning & Building Tech.

P.O. Box 396
Nederland, CO 80466
T: 303-258-3266 ext. 22
cynthiab@nederlandco.org

Email Town of Superior
Planning Department
124 E. Coal Creek Drive
Superior, CO 80027

T: 303-499-3675
F: 303-499-3677
stevenw@superiorcolorado.gov

Ward Planning Department
PO Box 99
Ward, CO 80481-0099

Email Weld County Planning
Department

Attn: Jim Flesher
1555 N. 17th Avenue
Greeley, CO 80631
T: 970-353-6100
F: 970-304-6498
jflesher@weldgov.com

School Districts

Email Boulder Valley School District

Attn: Glen Segrue
PO Box 9011
Boulder, CO 80306
T: 720-561-5062
Glen.segrue@bvdsd.org

St. Vrain Valley Schools
Planning Educational Services
Center
395 South Pratt Pkwy.
Longmont, CO 80501
T: 303-682-7229

Regional Agencies

Email Boulder Valley & Longmont Conservation Districts
Attn: Liz Northrup
9595 Nelson Road, Box D
Longmont, CO 80501
bldrvalleyandlongmontcds@gmail.com

Send Liz a referral for ALL applications within Agricultural and Forestry Zoning Districts.

Email DRCOG
Brad Calvert, Director
Regional Planning & Development
1290 Broadway, Suite 700
Denver, CO 80203-5606
T: 303-480-6839
bcalvert@drcog.org

Email Urban Drainage & Flood Control District
2480 W. 26th Ave., Ste. 156-B
Denver, CO 80211
submittals@udfcd.org

State Agencies

Email CO Dept. of Agriculture -ICS- PACFA
2331 W. 31st Avenue
Denver, CO 80211T: 303-869-9146
Cda_pacfa@state.co.us

Email CO Geological Survey
1801 19th St.
Golden, CO 80401
T: 303-384-2655
cgs_pubs@mines.edu

Email CO Dept of Public Health & Environment (CDPHE)
Attn: Sean Hackett
4300 Cherry Creek S Dr
Denver, CO 80246
sean.hackett@state.co.us

Email CO Office of Early Childhood (CDHS)
Attn: Colleen Rosa
1575 Sherman St
Denver, CO 80203
colleen.rosa@state.co.us

Email CO Dept. of Local Affairs
Division of Local Government
Attn: Don Sandoval
150 E. 29th St., Ste. 215
Loveland, CO 80538
don.sandoval@state.co.us

CO Dept. Natural Resources
Div. of Reclamation
Mining & Safety (DRMS)
1313 Sherman Street, Rm 215
Denver, CO 80203
T: 303-866-3567

Email CO Dept. Natural Resources
Division of Water Resources
State Engineer's Office
Attn: Sarah Brucker
1313 Sherman St., Room 818
Denver, CO 80203
T: 303-866-3581 x8249
sarah.brucker@state.co.us

Email Colorado Parks and Wildlife
Attn: Sam Peterson
4207 W. County Line Rd., 16E
Loveland, CO 80537
T: 970-776-6939
samuel.peterson@state.co.us

Note: Sam's area is the southern part of the county, south of 4th of July Rd/ Eldora/ Hwy119 (Boulder Canyon)/ Arapahoe Rd/ 287/Hwy 7.

Email Colorado Parks and Wildlife
Attn: Tyler Asnicar
4207 W. County Line Rd., 16E
Loveland, CO 80537
T: 720-357-4464
tyler.asticar@state.co.us

Note: Tyler's area is north of Peter to Brainard Lake Rd/ Left Hand Canyon/N. Foothills Hwy/Neva Rd/Hwy 52.

Email Colorado Parks and Wildlife
Attn: Joe Padia
4207 W. County Line Rd., 16E
Loveland, CO 80537
T: 303-906-3643
joe.padia@state.co.us
Note: Joe's area is north of Tyler, to Boulder County Line/Hwy 7/Hwy 66/Hover/9th Ave/US 287/3rd Ave./Hwy 119.

Email Colorado Parks and Wildlife
Attn: John Koehler
4207 W. County Line Rd., 16E
Loveland, CO 80537
T: 303-906-7870
john.koehler@state.co.us
Note: John's area is everything north of Joe.

CO Dept. Natural Resources
Oil & Gas Conservation Commission
Attn: Rob Young
1120 Lincoln Street, Ste. 801
Denver, CO 80203-2136
T: 303-894-2100

CO Dept. Natural Resources
Soil Conservation Board For
Watershed & Soil Protection
700 Kipling Street, Ste. 4000
Lakewood, CO 80215-8000

CO Dept. Natural Resources
Water Conservation Board
1313 Sherman St., Room 721
Denver, CO 80203-2236
T: 303-866-3441
F: 303-866-4474

CO Dept. of Regulatory
Agencies (DORA)
Public Utilities Commission
1560 Broadway, Suite 250
Denver, CO 80202
T: 303-894-2000

Email Colorado Dept. of Revenue
Marijuana Enforcement Div.
Attn: Keith Kuretich
275 S. Main St., Ste 101
Longmont, CO 80501
E: keith.kuretich@state.co.us

& Email Attn: Richard Hollar
1709 Cole Blvd., Suite 300
Lakewood, CO 80401
T: 303-866-4664
E: Richard.hollar@state.co.us

Email CO Dept. of Transportation R4
Attn: Timothy Bilobran
10601 W. 10th Street
Greeley, CO 80634
T: 970-350-2148
timothy.bilobran@state.co.us

Email CO Dept. of Transportation R1
Attn: Rick Solomon
2829 W. Howard Place #255f
Denver, CO 80204
T: 303-757-9356
richard.solomon@state.co.us

Note: Only for segment of SH 72 between SH 93 and SH 119, and SH 119 south of SH 72.

Email CO Natural Areas Program
Attn: Raquel Wertsbaugh
6060 Broadway
Denver, CO 80216
T: 303-291-7267
Raquel.wertsbaugh@state.co.us
OR dnr_cnap@state.co.us

Email CO State Forest Service
Boulder Field Office
5625 Ute Highway
Longmont, CO 80503
T: 303-823-5774
CSFS_Boulder@mail.colostate.edu

Email CO State Land Board
1127 Sherman Street, Suite 300
Denver, CO 80203
julie.majors@state.co.us;
christopher.smith@state.co.us

Email CSU Extension, Boulder County
Attn: Laura Larson, Director
9595 Nelson Road, Box B
Longmont, CO 80501
T: 303-678-6280
llarson@bouldercounty.org

State Agencies (continued)

Email History Colorado - Office of
Archaeology and Historic Preservation
1200 Broadway
Denver, CO 80203
T: 303-866-5216
hc_filesearch@state.co.us

____ Eldorado Canyon State Park
P.O. Box B
Eldorado Springs, CO 80025
T: 303-494-3943
john.carson@state.co.us

Federal Agencies

Email Arapaho and Roosevelt
National Forests
Boulder Ranger District
Attn: Mike Johnson
2140 Yarmouth Ave.
Boulder, CO 80301
T: 303-541-2534
mjohnson10@fs.fed.us

____ Bureau of Land Management
Royal Gorge Field Office
Attn: Keith Berger
3028 E. Main Street
Canon City, CO 81212

____ Burlington Northern &
Santa Fe Railway Co.
Property & Facilities Management
Director of Field Operations
2500 Lou Menk Dr., AOB 3
Ft. Worth, TX 76131-2830

Email US Department of Commerce
Nat'l Telecommunications & Info
Admin Inst. of Telecommunication
Sciences (NTIA/ITS)
(formerly ESSA)
Attn: Brian Lane, Exec. Officer
325 Broadway, MS NTIA/ITS.D
Boulder, CO 80305
303-497-3484
blane@ntia.doc.gov

Email Rocky Mtn. National Park
Attn: Darla Sidles,
Superintendent
1000 US Hwy 36
Estes Park, CO 80517
T: 970-586-1200
Darla_sidles@nps.gov

____ U.S. Bureau of Reclamation
Eastern Colorado Area Office
Attn: Signe Snortland
11056 West County Rd. 18E
Loveland, CO 80537
T: 970-962-4300

____ US Army Corps of Engineers
Denver Regulatory Office
Attn: Kiel Downing
9307 S. Wadsworth Blvd.
Littleton, CO 80128-6901
T: 303-979-4120
F: 303-979-0602

Email US EPA Region 8
Office of Water Protection
Underground Injection Control
Unit
Attn: Omar Sierra-Lopez,
Physical Scientist
(Environmental)
1595 Wynkoop Street
Denver, CO 80202-1129
T: 303-312-7045
F: 303-312-7084
Sierra-Lopez.Omar@epa.gov

Email US Fish & Wildlife Service
PO Box 25486
DFC (MS 65412)
Denver, CO 80225-0486
T: 303-236-4773
coloradoes@fws.gov

Email U.S. Forest Service
Attn: Mike Johnson
2140 Yarmouth
Boulder, CO 80301
mjohnson10@fs.fed.us

____ U.S. Post Offices in Boulder
County

- Allenspark 80510
- Berthoud 80513
- Boulder 80302
- Broomfield 80020
- Eldorado Springs 80025
- Erie 80516
- Hygiene 80533
- Jamestown 80455
- Lafayette 80026
- Longmont 80501
- Louisville 80027
- Lyons 80540
- Nederland 80466
- Niwot 80544
- Ward 80481

For Navigable Airspace Safety and Operation Of Air Navigation Facilities

Email FAA Air Traffic Airspace Branch,
ASW-520
Attn: Brian Barnes and Jay Garver
10101 Hillwood Parkway
Ft. Worth, TX 76136
E: brian.a.barnes@faa.gov
AND j.garver@faa.gov

Email FAA
Northwest Mountain Region
Attn: Marsha Hofer, Program
Specialist
26805 E. 68th Ave., Ste. 224
Denver, CO 80249
T: 303-342-1251
E: marsha.hofer@faa.gov

Local Airports

Email Boulder Municipal Airport
Attn: Tim Head, Manager
3327 Airport Road
Boulder, CO 80301
T: 303-441-3108
BMA@bouldercolorado.gov

____ Erie Municipal Airport
395 Airport Drive
Erie, CO 80516

Email Rocky Mountain
Metropolitan Airport
Attn: Ben Miller
11755 Airport Way
Broomfield, CO 80021
T: 303-271-4850
bmiller@flyRMMA.com

Email Vance Brand Airport
City of Longmont
Attn: David Slayter, Manager
229 Airport Road
Longmont, CO 80503
T: 303-651-8431
David.slayter@longmontcolorado.gov

Fire Protection Agencies

Email Allenspark FPD
Leo Touzjian, Fire Chief
PO Box 153, Allenspark, CO 80510
T: 303-747-2586
info@allensparkfire.com

Email Berthoud FPD
Attn: Joe Jaramillo
PO Box 570, Berthoud, CO 80513
T: 970-619-0299
J@berthoudfire.org

Email Big Elk Meadows VFD
42 Willow Drive
Lyons, CO 80540
Chief@vfdofbigelk.org

____ Boulder Mountain FPD
John Benson; Chief
Mike Palamara; WFM
1905 Linden Drive
Boulder, CO 80304
T: 303-440-0235

____ Boulder Rural FPD
Dean Rogers
6230 Lookout Road
Boulder, CO 80301
T: 303-530-9575 ext. 105
E: dean.rogers@BRFD.org

____ Cherryvale FPD
7700 Baseline Road
Boulder, CO 80303-4708

____ City of Boulder Fire Dept.
Michael Calderazzo; Chief
David Lowrey; Marshal
3065 Center Green Dr.
Boulder, CO 80301
T: 303-441-4178

Email Coal Creek Canyon FPD
Garret Ball; Chief
PO Box 7187, Golden, CO 80403
T: 303-642-3121
admin@coalcreekcanyonfd.org

Email Four Mile FPD
Bret Gibson; Chief
Regina Daly; Fire Marshal
1740 Four Mile Canyon Drive
Boulder, CO 80302
303-449-3333
chiefbret@gmail.com AND
reginadaly01@gmail.com

Email Gold Hill FPD
Chris Finn; Chief
1011 Main Gold Hill
Boulder, CO 80302
T: 303-444-5549
cfinn@goldhillinn.com

Email Hygiene VFD
Attn: Hygiene Fire Chief
PO Box 83
Hygiene, CO 80533
T: 303-776-2950
cody.trevithick@hygienefire.org
AND
travis.homyak@hygienefire.org

____ Indian Peaks FPD
PO Box 205
Ward, CO 80481
T: 303-459-3452

Email Jamestown VFD
Attn: Kristi Rutledge, Town Clerk
PO Box 298
Jamestown, CO 80455
T: 303-447-1568
townclerk@jamestownco.org

____ City of Lafayette Fire Dept.
Attn: Dave Friedel, Chief and
Norm Kellett, Fire Marshal
401 N. 111th Street
Lafayette, CO 80026
T: 303-665-9661

____ Lefthand FPD
Russell Leadingham
900 Lefthand Canyon Dr.
Boulder, CO 80302
T: 720-214-0560
rleadingham@lefthandfire.org

Email City of Longmont, Fire Services Div.
Capt. Michele Goldman, Marshal
225 Kimbark St.
Longmont, CO 80501
T: 303-651-8426
Michele.goldman@longmontcolorado.gov

Email Louisville FPD
Attn: John Willson, Chief
Chris Mestas, Fire Marshal
895 West Via Appia
Louisville, CO 80027
T: 303-666-6595
jwillson@louisvillefire.com AND
cmestas@louisvillefire.com

Email Lyons FPD
J.J. Hoffman; Chief
PO Box 695
Lyons, CO 80540
T: 303-823-6611
plans@lyonsfire.org

Email Mountain View FPD
Attn: Doug Saba and LuAnn Penfold
3561 N. Stagecoach Rd., Unit 200
Longmont, CO 80504
T: 303-772-0710
LPenfold@mvpfd.org AND
dsaba@mvpfd.org AND
jwebb@mvpfd.org

Email Nederland FPD
Attn: Rik Henrikson
P.O. Box 155
Nederland, CO 80466
T: 303-258-9161
Inspections@NFPD.org

____ Pinewood Springs FPD
61 Kiowa Road
Lyons, CO 80540-8202
T: 303-823-5086

Email North Metro Fire Rescue
Attn: David Ramos
101 Spader Way
Broomfield, CO 80020
fireprevention@northmetrofire.org

____ Poorman VFD
390 Leonards Road
Boulder, CO 80302

Email Rocky Mountain Fire Dist.
Michelle Kelly
4390 Eldorado Springs Dr.
Boulder, CO 80303
T: 303-494-3735
mkelly@rockymountainfire.org

Sugar Loaf FPD - For Site Plan Review Referrals, Mail and Email To:

Both Sugar Loaf FPD
Miles La Hue; Site Review Officer
1360 Sugar Loaf Road
Boulder, CO 80302
cmlahue@yahoo.com

For All Other Referrals Mail & Email to:

Both Sugar Loaf FPD
Andrew Goldman; Chief
1360 Sugar Loaf Road
Boulder CO 80302
T: 303-442-1050/303-810-2815
chief@slfpd.org

Email Sunshine FPD
Michael Schmitt; Chief
Bruce D. Honeyman; Fire Marshal
Regina Daly; Fire Marshal
311 County Road 83
Boulder, CO 80302
T: 303-246-4519
chief@sunshine-fpd.org
AND reginadaly01@gmail.com
AND bdhoneyman@gmail.com

Email Timberline Fire Protection District
660 Hwy 46
Blackhawk, CO 80422
T: 303-582-5768
jhinderman@timberlinefire.com

Homeowner and Road Associations and Review Committees

Bar K Ranch HOA
1180 Rock Lake Rd
Ward, CO 80481

Benchmark HOA
#12 Benchmark Drive
Boulder, CO 80301

Email Boulder Hills HOA
Attn: Anne L. Larson
8498 Stirrup Ct.
Longmont, CO 80503
E: annelarson@juno.com

Boulder Tech Center Owners Assoc.
Attn: Gary Reed
2729 S. Lakeridge Trail
Boulder, CO 80302-9312
T: 303-442-0750

Email Brittany Place HOA
Attn: Dina Kenkel, President
8427 Brittany Place
Niwot, CO 80503
dkenkel@comcast.net

Email Burgundy Park HOA
a.k.a. Johnson Farm Replat G
Attn: Steve Ekman, Vice President
7100 Burgundy Drive
Niwot, CO 80503
E: steve@ekmandesign.com **AND**
president.bphoa@gmail.com, **AND**
treasurer.bphoa@gmail.com

Canyonside HOA
PO Box 1698,
Boulder, CO 80306

Circle "C" Ranch HOA
Attn: Jon Larson
6325 Trevarton Drive
Longmont CO 80503

Email Clover View North NUPUD
Attn: Bruce Johnson
bask@skybeam.com
T: 303-775-1350

Email Cottonwood Park West HOA
Attn: Dean Carpenter, Assoc. Mgr.
PO Box 421
Niwot, CO 80544
M: 303-652-2537
E: cpwhoaoffice@gmail.com

Email Country Creek HOA
Attn: Karin Antoni
P.O. Box 85
Niwot, CO 80544-0085
T: 720-384-7843
E: pghsmanley@comcast.net

Cove (The) HOA
PO Box 1052
Niwot, CO 80544-1052

Crescent Lake Estates HOA
PO Box 7114
Golden, CO 80403

Email Crestmoor Architectural Review
Attn: Richard Boscardin
993 Crestmoor Drive
Boulder, CO 80303
E: raboscardin@comcast.net
AND Email Michael J. Waggoner
930 Crestmoor Drive
Boulder, CO 80303
E: waggonem42@yahoo.com

Email Crestview Estates Architectural
Control Committee (ACC)
Richard E. Blanchette
E: reb@green-mtn.com
T: 303-818-7996

Crystal Views HOA
Nan Stuart
11732 Crystal Views Lane
Longmont, CO 80501

Darvey's Farm NUPUD Architectural
Committee
Bruce M. Davis & Mary Davis Burkhart
10142 Oxford Road
Longmont, CO 80501

East Meadowdale HOA
P.O. Box 270368
Louisville, CO 80027

ERTL Farm HOA
Ned Flannigan
9499 W Phillips Rd.
Boulder, CO 80301
T: 303-664-5994

Farm in Boulder Valley HOA
P.O. Box 208
Niwot, CO 80544

Flintlock HOA
c/o Sentry Management
1375 Ken Pratt Blvd Suite 100
Longmont, CO 80501

Email Fountaintree HOA
470 Fountaintree Lane
Boulder, CO 80304
E: kit@sancheztennis.com

Email Gaynor Lake HOA
Attn: James Williams
7905 Anchor Drive
Longmont, CO 80504
jamie@jamiewilliams.com
303-482-7715

Githens Acres Neighborhood Assn.
Jim Snow
2305 Topaz Drive
Boulder, CO 80304

Goose Haven HOA
Douglas W. Porrey, Secretary/Treasurer
10425 Goose Haven Drive
Lafayette, CO 80026

Email Granja Este Road
Maintenance Association
Attn: Shawn F. Roberts
9980 Phillips Road
Lafayette, CO 80026
E: sf.roberts@yahoo.com

Both Gunbarrel Green HOA
PO Box 11217
Boulder, CO 80301
E: gunbarrelgreen@gmail.com
T: 720-443-3471

Hardt Estates Subdivision
Emily Bray
4138 Nelson Road
Longmont, CO 80503
T: 303-447-1187

Heatherwood HOA
P.O. Box 11102
Boulder, CO 80302

Email Hidden Lake HOA
Attn: Richard Sands, HOA President
2425 Balsam Drive
Boulder, CO 80304
E: rjsands303@gmail.com
T: 303-402-9626

Hillcrest Heights Replat B
See Wildview HOA

Hygiene HOA
Sam Clark
P.O. Box 171
Hygiene, CO 80533

Johnson Farm Replat G
See Burgundy Park HOA

Email Knollwood HOA
Alan A. Teran
2126 Knollwood Drive
Boulder, CO 80302-4706
T: 303-444-6877
E: aatbigsteaks@aol.com

Lagerman Farm HOA
3281 61st Street
Boulder, CO 80301

Email Lake of the Pines HOA
Attn: Arch. Control Committee and
HOA Board Presidents
2849 S. Lakeridge Trail
Boulder, CO 80302
E: acc@lophoa.com;
board_president@lophoa.com
T: 303-786-7833

Lakeshore Estates ARC
Julianne M. Anderson
6397 Glenmoor Rd.
Boulder, CO 80303
T: 303-499-7150

Lake Valley Estates HOA
3950 Bogey Ct.
Longmont, CO 80503
T: 303-545-6651

Homeowner and Road Associations and Review Committees (continued)

Lazy Z Estates HOA
Box 374
Pinecliffe, CO 80471-0374

Legend Ridge HOA
5440 Ward Rd. #230
Arvada, CO 80002

Longs Peak Estates HOA
PO Box 1141
Lyons, CO 80540-1141

Longview Ranchettes (a.k.a. Fox
Pointe at Niwot) Design Review
David & Jane Chaknova
8631 Monte Vista Avenue
Niwot CO 80503
T: 303-702-9455

Lykins Gulch HOA
3743 Nelson Road
Longmont, CO 80503

Meadow Green Farm HOA
Carol & Harvey Yoakum
14707 N. 95th Street
Longmont, CO 80504
T: 303-775-1408

Monarch Park HOA
Jennifer Sleek
7376 Monarch Road
Longmont, CO 80503-8630

Monarch Ponds HOA
7739 Monarch Road
Niwot, CO 80503

Mountain Ridge HOA
Levin Hemming
2289 Park Lake Dr.
Boulder, CO 80301-5124

Niwot Hills HOA (Arch. Committee)
Attn: Cindy Henry, Markel Homes
5723 Arapahoe Ave #2B
Boulder, CO 80303
T: 303-339-6120
E: cindy@markelhomes.com

Niwot Meadow Farm HOA
8510 Niwot Meadow Farm Road
Niwot, CO 80503

North Rim HOA
4400 Hogan Ct.
Niwot, CO 80503

Email Orange Orchard
Attn: President of Board
PO Box 17241
Boulder, CO 80308
E: board@oohaboulder.org

Oxford Farm HOA
7600 Rodeo Drive
Longmont, CO 80501

Panorama Park Subdivision
Architectural Review
Attn: Frank Hawke
7331 Spring Drive
Boulder, CO 80303
T: 303-499-6704

Email Park Lake HOA
PO Box 682
Louisville, CO 80027
E: parklakehoa@gmail.com

Email Pine Brook Hills Architectural
Committee
Eric Erickson
E: ARC@PineBrookHills.org

Pine Valley Estates HOA
PO Box 643
Pinecliffe, CO 80471

Powderhorn Condominium
Association, Inc.
Hudson Real Estate
1200 28th St., Suite 100
Boulder, CO 80303
303-442-6380

Quiet Retreat HOA
2807 Jay Road
Boulder, CO 80301-1605

Email Ranch at Clover Basin
Replat B TDR/PUD 2nd Filing (a.k.a.
Portico)
c/o Flagstaff Management, Inc.
900 Coffman St., STE D
Longmont, CO 80501
T: 303-682-0098
E: fmc900@flagstaffmanagement.com

The Reserve Homeowners and
Recreational Association (Sombrero
Ranch)
6298 Reserve Drive
Boulder CO 80303

Silver Springs HOA
11 Nightshade Drive
Boulder, CO 80302

Smith Meadow Lane HOA
7376 Elm St.
Longmont, CO 80503

Email Springhill HOA
c/o Trio Property Management
PO Box 208
Niwot, CO 80544
T: 303-415-2054
E: TrioProperty@comcast.net

Email Somerset HOA
c/o Trio Property Management
PO Box 208
Niwot, CO 80544
T: 303-415-2054
E: somersethoa@comcast.net
AND TrioProperty@comcast.net

South Meadow Gunbarrel Green Acres
PO Box 1718
Longmont, CO 80502

Spanish Hills HOA (Deanna Blomquist)
84 Caballo Ct.,
Boulder, CO 80303
E: deannablomquist@yahoo.com
AND Email
Spanish Hills Architectural

Design Committee
William Hickey
156 Barcelona Drive
Boulder, CO 80303
303-494-0384
E: wa3h@hotmail.com

Email Summerlin HOA
Attn: Dave Boschert, Mike Exner, Will
Coleman
3223 Arapahoe Ave., #325
Boulder, CO 80303
T: 303-442-1277 x21
E: dboschert@boschland.com **AND**
mlexner@comcast.net **AND**
will@ascend-mg.com

Email St. Anton Highlands First Addition
HOA
SAHFAHOA
PO Box 810
Nederland, CO 80466
T: 303-442-1277 x21
E: sahfahoa@gmail.com

Sunrise Ranch NUPUD HOA
6106 Sunrise Ranch Drive
Longmont, CO 80501

Valle Del Rio Subdivision Only
(Not for Valle Del Rio Subdivision 1)
Lori Dempsey
4567 Prado Drive, Boulder, CO 80303
T: 303-499-7777 M: 303-472-0811
E: dempsey4567@yahoo.com

Waterford HOA
PO Box 6632
Longmont, CO 80501

Email Waterstone HOA
c/o Trio Property Management
PO Box 208
Niwot, CO 80544
T: 303-415-2054
E: TrioProperty@comcast.net

West Meadowdale HOA
P.O. Box 831
Niwot, CO 80544

White Hawk Ranch HOA
c/o Homestead Management
1499 W. 121st Ave, Suite 100
Westminster, CO 80234
T: 303-457-1444 F: 303-457-0670

**Homeowner and Road
Associations and Review
Committees (cont'd):**

Both Wildview HOA
a.k.a. Hillcrest Heights Replat
PO Box 2459
Longmont, CO 80502
E: hoa2@wildview.net

Email Willow Glen HOA
c/o David Corson
7973 Sagebrush Court
Boulder, CO 80301
T: 303-888-5450
E: davidjcorson@yahoo.com



May 2, 2022

Dale Case, AICP
Director
Boulder County Community Planning & Permitting
2045 13th Street
Boulder, CO 80302

Re: Application to Extend Special Use Permit for the Dowe Flats Mine

Dear Mr. Case:

Enclosed for filing with Boulder County Community Planning & Permitting is a complete land use application by CEMEX, Inc. ("CEMEX"), for a Special Use Permit to extend operations at the Dowe Flats limestone and shale mine for an additional fifteen years. In anticipation of the submission of this application, CEMEX has been working with Boulder County Parks & Open Space regarding potential additional open space preservation and trails commitments by CEMEX if an extended mining term is approved as requested. These potential additional commitments of CEMEX include the following items:

- A reduction of the purchase prices for Boulder County's existing options to acquire real property north of Hwy. 66 to zero dollars plus title and closing costs, resulting in savings to the County of approximately \$6.6M;
- The grant of an additional option to Boulder County for the benefit of Boulder County Parks & Open Space for its potential future purchase (when mining at Dowe Flats is completed) of four additional parcels totaling approximately 200 acres around the perimeter of the Dowe Flats mine, at a purchase price of zero dollars plus title and closing costs;
- An increase in the required rental payments by CEMEX to Boulder County pursuant to the existing buffer lease for properties around the Dowe Flats mine from the current amount of \$1,000/year to an increased amount of \$400,000/year, equating to a total value of \$6.0M for 15 years;
- The dedication of a permanent, non-exclusive recreational trail easement to Boulder County for the benefit of Boulder County Parks & Open Space along the south bank of the St. Vrain River or another mutually agreed location;
- A commitment by CEMEX to permanently conclude ongoing cement plant operations at its facility south of Hwy. 66 within the same 15-year timeframe for completion of mining

CEMEX, Inc.
10100 Katy Freeway, Suite 300, Houston, TX 77043

Dale Case
May 2, 2022
Page 2

operations (plus reclamation) at Dowe Flats instead of continuing to operate the cement plant indefinitely as has been contemplated; and

- The grant of an additional option to Boulder County for the benefit of Boulder County Parks & Open Space for the potential future purchase of up to approximately 830 acres of CEMEX property surrounding CEMEX's cement plant south of Hwy. 66 at a current price of \$17,000 per acre with a 2.0% annual escalator, upon condition that the Town of Lyons provide consent to Boulder County's acquisition of any lands within the CEMEX Municipal Facilities Area per the 2012 CEMEX Area IGA Map, and provided that CEMEX would reserve an access and utility corridor to/from Hwy. 66 for the benefit of its retained properties.

These terms would be set forth in additional future agreements between the County and CEMEX, and all such terms are and will remain subject to final approval of the enclosed land use application with conditions consistent with the above terms and otherwise acceptable to CEMEX in its discretion.

Thank you in advance for your consideration. CEMEX looks forward to continuing to work with the County on these matters.

Sincerely,

CEMEX, Inc.

By:



John V. Heffernan, Authorized Agent

enc.

18798793_v2



July 21, 2022

Pete L'Orange
Planner II
Boulder County Community Planning & Permitting
2045 13th Street
Boulder, CO 80302

RE: Responses to Referral Comments and Other Items for SU-22-0003 CEMEX Dowe Flats Mining & Reclamation Extension

Dear Pete:

CEMEX has reviewed and responded to the referral agencies' comments on the Dowe Flats Mining Extension SUP. Copies of our responses are attached to this letter.

We did not respond to the June 10, 2022, letter from the Town of Lyons, which was directed solely to the County, requesting an extension of the referral period that was subsequently granted. Nonetheless, we note for the County that it is important to CEMEX that there not be any significant delays in the consideration of our application and that the process function as contemplated by the applicable County regulations.

In addition, as you and Parks and Open Space Staff requested at the Tuesday, June 28, 2022, Dowe Flats site visit, the following points respond to your query as to why all of the material at Dowe Flats has not been mined within the timeframe of the existing permit:

- The construction industry is subject to fluctuations both on localized and macroeconomic levels, contributing to rises and falls in demand.
- CEMEX is limited at Dowe Flats in the amount of materials that it can mine and store by permit and by production rate.
- Like any other natural material, the seams of limestone and shale at Dowe Flats vary in width, depth, quality and composition, which impact availability, usability and rate of extraction. As with most quarrying operations, only after the commencement of mining was CEMEX able to learn more about the available materials and their characteristics, more of which were usable than previously anticipated, extending the life of the quarry.

Finally, we have notified the mineral interest owners of the Planning Commission Public Hearing on August 17, 2022. We have attached a copy of the notice sent and the receipt showing when it was sent, as well as a copy of the signed certification statement confirming that it was sent. As with the submission of the application, we would appreciate your assistance in obtaining the signature of an authorized representative from Parks and Open Space on the certification statement as co-signer of the application.

Thank you for your consideration. If you have any questions or need any additional information, please let me know.

Sincerely,

CEMEX, Inc.


John V. Heffernan, Authorized Agent

Enclosures:

- Response to Boulder County Community Planning & Permitting, Access & Engineering Development Review Team

- Response to Boulder County Community Planning & Permitting, Building Safety Development Review Team
- Response to Boulder County Parks and Open Space, Jeff Moline
- Response to Boulder County Parks and Open Space, Ron West
- Response to Boulder County Public Health
- Notice of Public Hearing to Mineral Rights Owners, Proof of Mailing, and Signed Certification Statement

O:\Projects\Longmont 8591\117-8591001 and 002\Deliverables\Special Use Review Application\Response to Referral Comments 2022 07\Cover Letter to BOCO Planning.docx



July 21, 2022

Jennifer Severson
Principal Planner
Community Planning & Permitting
Development Review Team — Access & Engineering
P.O. Box 471
Boulder, CO 80302

RE: Response to Referral Comments on SU-22-0003 CEMEX Dowe Flats Mining & Reclamation Extension

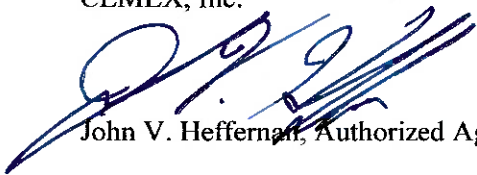
Dear Jennifer:

We have reviewed the referral comments about CEMEX's request to update the Dowe Flats Special Use Permit to extend the life of the quarry. Below is a listing of each of your comments followed by a response to each comment. *The responses are provided in italics.*

1. The subject property is accessed via State Highway 66 (SH 66), also known as Ute Highway, a Colorado Department of Transportation (CDOT) owned and maintained right-of-way (ROW). Legal access has been demonstrated via adjacency to this public ROW.
Acknowledged
2. Staff concurs with the trip generation estimates provided in the Pre-Application Methodology Statements (PAMS) dated October 17, 2021 (attached) of approximately 20 Average Daily Trips (ADT) being generated by the continued mining and reclamation use on the subject property. Staff does not anticipate the mining and reclamation use will have negative impacts to the surrounding transportation network.
Acknowledged
3. Staff has no concerns with the continued use of the subject property for mining and reclamation activities.
Acknowledged

Sincerely,

CEMEX, Inc.



John V. Heffernan, Authorized Agent

cc: Pete L'Orange, Boulder County Community Planning & Permitting

O: Projects Longmont-8591-117-8591001 and 002-Deliverables-Special Use Review Application Response to Referral Comments 2022 07 Response to BOCCO Access Engineering.docx



July 21, 2022

Michelle Huebner
Plans Examiner Supervisor
Boulder County Community Planning & Permitting
2045 13th Street
Boulder, CO 80302

RE: Response to Referral Comments on SU-22-0003 CEMEX Dowe Flats Mining & Reclamation Extension

Dear Michelle:

We have reviewed your referral letter in response to CEMEX's request to update the Special Use Permit for the Dowe Flats project to extend the life of the quarry. As you indicated in your letter, our request does not propose any development, or change of use. In addition, CEMEX understands that if in the future we need to propose or replace any existing structures or change the use of any existing structure or utilities that a building permit will be required.

Sincerely,
CEMEX, Inc.

A handwritten signature in blue ink, appearing to read "John V. Heffernan".

John V. Heffernan, Authorized Agent

cc: Pete L'Orange, Boulder County Community Planning & Permitting

10/10/2019 10:10:10 AM
10/10/2019 10:10:10 AM
10/10/2019 10:10:10 AM



July 21, 2022

Jeff Moline
Senior Planner
Boulder County Parks and Open Space
5201 St. Vrain Rd.
Longmont, CO 80503

RE: Response to Referral Comments on SU-22-0003 CEMEX Dowe Flats Mining Extension

Dear Jeff:

We have reviewed your comments about CEMEX's request to update the Special Use Permit for the Dowe Flats project to extend the life of the quarry. Below is a listing of each of your comments followed by a response to each comment. *The responses are provided in italics.*

Cultural Resources:

Since the mining expansion is occurring in an area already disturbed, no new cultural surveys are necessary at this time.

Acknowledged

1. The 1994 Cultural Resource Management Plan shall remain active for the entirety of mining operations. This includes the annual monitoring required in the Cultural Resources Management Plan (pp.12).

CEMEX will continue to follow the Cultural Resources Management Plan. However, the prehistoric sites identified as a part of the original Dowe Flats Cultural Resource Management Plan that are subject to annual monitoring (p.12) are now in Boulder County ownership, and the responsibility of monitoring these sites has transferred to Boulder County.

2. The applicant shall provide a written narrative statement of how the 1994 Cultural Resources Management Plan was followed and will continue to be followed.

Monitoring for buried cultural resources by a qualified archaeological consultant during topsoil salvage took place from 1995-2008, with no reports of any findings. Formal cultural resource monitoring by an archaeologist ceased after 2008. From 2009 until now, as allowed by the Cultural Resources Management Plan, the Quarry Manager and equipment operators have been trained to watch for and report on fossils, bones, artifacts, or other cultural materials when conducting topsoil removal. This procedure is being followed and will continue to be followed through the end of mining. No cultural materials have ever been discovered, so nothing has been reported.

A pre-blast survey was completed in 1995 for the Montgomery School (Michael Weston residence). Annual monitoring of the school by a qualified historic resources consultant took place from 1995-2000, with no reports of adverse impacts on the structure. Monitoring has not continued because since 2000, mining activities have moved north, away from the Montgomery School.

3. The applicant shall supply POS with copies of all cultural monitoring plans and reports generated during mine operation.

All the required cultural resource reports were submitted to Boulder County Land Use as part of the required Interim County Compliance Reviews that were conducted by CEMEX. Those reports were reviewed by Parks and Open Space. There is no additional information to share beyond what has already been submitted to the County.

Real Estate:

4. The applicant shall sign a real estate option or other agreement (“New Agreement”) that comprehensively documents the applicant’s commitments in the application to grant Boulder County options to acquire land and easements from the applicant. The New Agreement shall include all water rights appurtenant to all water rights appurtenant to the option properties and reclamation requirements arising from this application, must be acceptable to the county in its sole discretion, and shall supersede and replace that certain Purchase Agreement, Lease and Option to Purchase dated July 11, 2002, recorded July 17, 2002, at Reception #2308598 in the office of the Clerk & Recorder of Boulder County.

A New Agreement is underway between CEMEX and the County. The New Agreement will recognize prior agreements, as appropriate.

Site Plans:

5. The applicant shall ensure all site monitoring reports (air, water, wildlife, noise, etc.) required by Boulder County and the State of Colorado Division of Mining, Reclamation and Safety are submitted to POS.

The site monitoring reports required by Boulder County and the State of Colorado Division of Reclamation, Mining, and Safety were all submitted to the Boulder County Land Use Department, as required by Condition #16 of SU-93-14. Condition #16 required CEMEX to submit Interim County Compliance Reviews at the end of years 1, 3, 5, 10, 15, and 20. The 20-year report was submitted in 2014 and a copy is attached for your convenience. Unfortunately, CEMEX lost many records in the 2013 flood and no longer has older records and documentation to submit.

Since the 20-year Interim County Compliance Review, CEMEX has continued to submit annual reports to the DRMS. The DRMS annual reports for the years 2014 – 2021 are attached. Copies of the DRMS annual reports from the start of mining through 2013 were included in each of the Interim County Compliance Reviews submitted to the Boulder County Land Use Department through 2014.

A noise report completed by Engineering Dynamics, Inc. in July 1997 found that measured noise at the mine was well below the required standards. This report was submitted to Boulder County Land Use after it was completed, but CEMEX no longer has a copy of the report because it was destroyed in the 2013 flood. We contacted Engineering Dynamics, but they no longer have a copy of the report.

A final raptor study was completed in 1998 by wildlife biologist David Buckner to address the impacts on raptor populations from mining. The study found increasing prairie dog and rabbit populations and large raptor use that tracked with the prey base. This report was submitted to Boulder County Land Use after it was prepared. CEMEX no longer has a copy due to the 2013 flood; we understand that David Buckner’s records were destroyed in the Marshall Fire.

Boulder County and the State of Colorado Division of Mining, Reclamation and Safety do not regulate air and water; they are regulated by the Colorado Department of Public Health and Environment (CDPHE). CEMEX maintains all required air and water permits and monitoring as required by CDPHE.

6. POS may like to see utility lines that have been extended to the site, remain for potential future use by landowners and managers. POS requests that the applicant leave utility lines stubbed and located after land transfer but ensure that all buildings are removed.

After the land transfer, CEMEX will remove all buildings, structures and equipment as required in the Dowe Flats reclamation plan, and is willing to leave behind utility lines stubbed and located for potential future use by the County.

Plant and Wildlife Resources:

Staff reviewed the mining and reclamation plans. They are very conceptual at this stage of review, but include wetlands creation. Staff does not support the creation of wetlands and open water features in the reclamation plan for a variety of reasons. First, staff finds that returning the site as much as possible to its pre-mine landscape is the best for long-term ecosystem sustainability. The area was a grassland with associated wildlife, returning the site to that environment is best for the site and adjacent properties. Grassland reclamation of the site fits better into the landscape. Staff does not find that the 'varied' topographical reclamation proposed in the application will benefit wildlife. Grasslands are the most threatened habitat type in our region and are highly diverse overall. POS does support small enhancements in the reclamation plan, including some small shale outcrop ridges and rocky sites that may support a diverse suite of native plant species, including the endemic *Physaria bellii*. However, slopes should be less than 3:1 for ensuring adequate reclamation and minimizing erosion. Staff is not aware of any evidence that bats are utilizing open water on or immediately adjacent to the site currently. Secondly, staff is concerned about water rights associated with the constructed wetland. For example, if the created wetland intercepted groundwater, the subsequent land manager will need water rights adequate for augmenting the evaporative loss.

The reclamation plan currently proposed is the plan approved by the DRMS and Boulder County. CEMEX is willing to work with the County and DRMS to amend the final reclamation plan to eliminate the wetland requirement and return the entire site to grassland with slopes no greater than 3:1.

The applicant should explain in more detail its proposed relationship with Greenwood Wildlife Rehabilitation Center, it is unclear how this partnership would utilize the mine site, reclaimed areas, and/or county open space in the future.

No specific relationship between Greenwood Wildlife Rehabilitation Center and Boulder County is being proposed or recommended by CEMEX. CEMEX simply wanted to suggest that the two entities may want to discuss a partnership.

7. POS recommends the development of grassland reclamation plan, consistent with the approved reclamation plan and reflective of the pre-mine vegetative potential of the site.

CEMEX is open to working collaboratively with Boulder County and the DRMS to modify the final reclamation plan to eliminate the wetland and only reclaim the site to contain grasslands.

8. The applicant shall submit a final reclamation plan for review by POS at least six months prior to December 31, 2037. POS may request modifications to the plan and the applicant shall make good faith reasonable efforts to incorporate POS' requests into the final reclamation plan.

CEMEX is open to working collaboratively with Boulder County and the DRMS to amend the current reclamation plan with Boulder County input and have the final reclamation plan reviewed by POS at least six months prior to December 31, 2037. Revisions to the plan will require DRMS signoff.

9. Comments specific to the reclamation seed mix.

A. Remove alfalfa from Grassland Seed Mix, unless required by CO DRMS for a nitrogen fixing forb. Could be replaced with *Hedysarum boreale* if necessary.

The seed mix listed on the current reclamation plan is the seed mix currently approved by the County and DRMS. CEMEX is open to making modifications to that mix, but any changes need to be approved by both the County and the DRMS.

B. Remove *Festuca arizonica* from mix. Not native to area. Either adjust other rates or substitute with another spp. like *Squirreltail*, *Elymus elymoides*, var. *Pueblo* if possible.

The seed mix listed on the current reclamation plan is the seed mix currently approved by the County and DRMS. CEMEX is open to making modifications to that mix, but any changes need to be approved by both the County and the DRMS.

- C. Remove *Penstemon palmeri* from mix, not native to area. Substitute with *Penstemon secundiflorus* or *Penstemon virgatus*, or *Penstemon strictus* as last resort.

The seed mix listed on the current reclamation plan is the seed mix currently approved by the County and DRMS. CEMEX is open to making modifications to that mix, but any changes need to be approved by both the County and the DRMS.

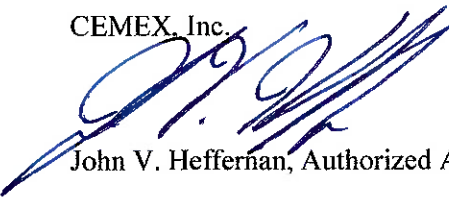
- D. Herbaceous wetland mix – remove broadleaf cattail and substitute with hardstem bulrush (*Schoenoplectus tabermontanei*), and/or other *Carex* and *Juncus* spp. to be determined by CEMEX and BCPOS depending on final hydrology if this is approved.

The seed mix listed on the current reclamation plan is the seed mix currently approved by the County and DRMS. CEMEX is open to making modifications to that mix, but any changes need to be approved by both the County and the DRMS.

10. The applicant should provide POS the document titled Dowe Flats Management and Monitoring Plan. Attached is a copy of the Dowe Flats Special Land Use Permit Twenty-Year Interim Review submitted to Boulder County Land Use in August 2014. The Dowe Flats Management and Monitoring Plan is Appendix A to the document.

Sincerely,

CEMEX, Inc.



John V. Heffernan, Authorized Agent

Enclosures:

Dowe Flats Special Land Use Permit Twenty-Year Interim Review (submitted 2014)
DRMS Annual Reports (2014-2021)

cc: Pete L'Orange, Boulder County Community Planning & Permitting

O: Projects Longmont 8591-117-8591001 and 002-Deliverables\Special Use Review Application Response to Referral Comments 2022 07 Response to BOCO POS.docx



Dowe Flats Quarry Special Land Use Permit (SU-93-14)



Twenty-Year Interim Review

August 2014

Submitted to:

Boulder County Land Use Department

Prepared by:



14 Inverness Dr East A100, Englewood, CO 80112
303-770-9788 – www.habitatmanagementinc.com

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Appendices

Appendix A	Dowe Flats Monitoring and Management Plans
Appendix B	Annual Internal Reclamation & Monitoring Information (2010-2013)
Appendix C	Annual DRMS Reclamation Reports (2010-2013)
Appendix D	Wetlands Review
Appendix E	On-Site Wind Data Monitoring Reports
Appendix F	Prairie Dog Habitat Construction
Appendix G	Alternative (Prairie) Reclamation Plan, Dowe Flats, Project, 1994

1 INTRODUCTION

On June 28, 1994, Boulder County Board of County Commissioners approved a Special Land Use Permit (Resolution #94-81 docket SU-93-14) for CEMEX, Inc.'s Dowe Flats Quarry near Lyons, Colorado. CEMEX Construction Materials South LLC, a subsidiary of CEMEX, Inc., operates the Dowe Flats Quarry. Per the requirements of this Special Land Use Permit, CEMEX has prepared this 20-Year Interim Special Land Use Review for Boulder County. The information in this review addresses compliance to the requirements associated with the nineteen conditions outlined in the original Dowe Flats Special Use Permit. Each of these conditions are listed in Section 2 below followed by compliance details. For reference, a map of the mining boundary and property boundaries associated with the property agreements (Figure 1) is attached along with seven referenced appendices. The appendices provide information relating to the original permit (SU-93-14) and agreements.

2 REVIEW OF SPECIAL USE PERMIT TERMS AND CONDITIONS

2.1 COMMITMENTS OF RECORD

Each numbered item below corresponds to the terms and conditions referenced in Paragraph 1 of the original Dowe Flats Special Land Use Permit (SU-93-14) approved on June 28, 1994, which, in turn, incorporated the commitments of record in Paragraph 7.0 of the document titled *Special Use Permit/Site Specific Development Plan and Permit Terms and Conditions and Voluntary Land Conservation and Donations*, prepared by SHB AGRA (Project E92-7075), dated May 19, 1994 (the "SHB AGRA Document"). Below each numbered item is a description of how CEMEX has satisfied these terms and conditions.

1. Screening berms built on the west side of relocated County Road 47. Unpaved roads built to County standards for rural collector. Warning signs and temporary closure when blasting is close to the road.

Comments: The screening berms were the first part of the mine plan implemented in Dowe Flats and this condition was fulfilled by the Three-Year Review. County Road 47 referred to in the permit is now North 53rd Street and at the north end of the mine becomes North 55th Street. All but the last 600 feet of North 53rd Street has screening berms; however, mining has also not reached that far north. Visual berm construction will continue as mining progresses to ensure that there are always berms in place to screen mining activities from the public roadway.

The relocated North 53rd Street was built to county specifications for an unpaved road. The county subsequently paved the road.

A blast warning sign still stands on North 53rd Street; however, blasts no longer take place near the road and the sign is now superfluous. CEMEX would like to be allowed to remove the blast sign and would like direction from Boulder County Land Use Department as to whether this would be acceptable.

2. County Road 49 vacated, bridge removed, riparian restoration in bridge area, cul-de-sac constructed at east end, emergency access easement to the property owners along County Road 49.

Comments: This condition was rescinded (Resolution 98-68) at the time of the Five-Year Review to address a Boulder County Department of Transportation request to maintain the existing bridge over St. Vrain Creek. The North 51st Bridge which allows access to North 51st Street was destroyed in the 2013 flood. Access to County Rd 49 and Highland Drive is currently being allowed by temporary revocable license through CEMEX's private entrance and road due the loss of North 51st Bridge. Boulder County DOT needs to determine schedule for rebuild of North 51st or County Road 49 Bridge.

3. Management plan for permit area to include: land use, agriculture, prairie dogs, wildlife habitat, and cultural resources.

Comments: Refer to Appendix A for the updated Management and Monitoring Plans.

4. Monitoring of raptors, wetlands (every 3 years – approved by the Army Corps and Engineers) and revegetation.

Comments: The raptor monitoring program was completed in 1998 with the submittal of the Dowe Flats Winter Raptor Study, Boulder County, Colorado: 1993-1998. Wetland boundaries have not changed within the mining boundary since the 15-Year Review, and mining operations are not found in or near any jurisdictional wetlands. Revegetation is addressed with the reclamation plan updates included in Appendix B.

5. Any post-mining development of the property is subject to land use regulations at the time of development.

Comments: There has been no post-mining development within the permit boundary. CEMEX has previously obtained a subdivision exemption approval from the County for the Dowe Flats Estates subdivision (SE-03-01) over a portion of the property. Current land use on CEMEX's property is mining and reclamation, including the mine operations center, crusher, and conveyor corridor. Boulder County Open Space manages the agricultural activities on the Boulder County Fee Title areas as indicated on Figure 1.

6. Perimeter of mine operation shall be visibly marked.

Comments: The east and south mining boundary is delineated by North 53rd Street. The west boundary is monumented with a series of cement benchmarks and 14" diameter posts (Figures 2 and 3).

7. Annual reports to County addressing: mining and reclamation progress, monitoring studies, raptor studies for 5 years, and cultural resources

Comments: Appendix B contains vegetation monitoring, topsoil salvage information, and weed management activities information for Fall 2010 through Spring 2014 as well as internal reclamation reports from 2011, 2012, and 2013. An internal reclamation report from 2010 was completed and submitted with the 15-Year Review and the 2014 report is still in progress. Additionally, the annual mining and reclamation reports submitted to the Colorado Mined Land Reclamation Board (CMLRB), Division of Reclamation Mining and Safety (DRMS, formerly Division of Minerals and Geology) are included in Appendix C.

Monitoring for buried cultural resource information during topsoil salvage by a qualified archaeological consultant took place from 1995-2008, with no reports of adverse impacts. Cultural resource monitoring has since ceased.

Other Monitoring studies and the Dowe Flats winter raptor studies were completed within the first five years after the Special Use Permit was issued and were not required after the 5-Year Review.

8. Monitoring and mitigation for the Montgomery School.

Comments: This condition was met in 2000 and details were presented in previous 5-Year Reviews.

9. Power lines will not be relocated.

Comments: No power line relocation has taken place due to mining operations.

10. Wetlands fenced in field during operations.

Comments: No jurisdictional wetlands are located within the mining boundary. Wetlands that were once thought to be present within the mining boundary (Areas 3, 4, and 5) were associated with the St. Vrain Supply Canal liner leakage. The canal was relined in 1994 and an additional study was conducted in 1997 by a wetland consultant within these three areas. The study results were sent to the Army Corps of Engineers on July 22, 1997 and a reply was sent verifying that the three subject wetlands were no longer considered to be wetlands or waters of the United States (Corps File # 199580789). Currently, there are no wet areas within the mining boundary.

The 2010 inspection located a wet zone just north of the mining boundary within the Boulder County Fee Title area (Figure 1). At the time of the 15-Year Review, CEMEX requested that the ditch be relined to prevent further potential for artificial wetland development. As of the 2014 inspection, this wet zone is still present and has developed more wetland vegetation. CEMEX will again request that the ditch be relined. A review of wetland areas including current photos and the release letter from the Army Corps of Engineers are included in Appendix D.

11. Operator will obtain all necessary County, State, and Federal permits, including County floodplain and grading permits.

Comments: These permits were obtained during mine startup operations during the first three years after Special Use Permit approval.

12. Limitation on maximum acreage of disturbance as described in January 28, 1994 Prairie Reclamation Plan.

Comments: The Prairie Reclamation Plan (Appendix G) has a maximum disturbance area of 95 acres. The yearly maximum disturbance acreage has been less than 95 acres for the entire period and is documented in the annual reports to the Colorado Mined Land Reclamation Board (Appendix C).

13. Pre-blast surveys of adjacent structures and warning of blasting to County Road 47 traffic, blast monitoring.

Comments: Pre-blast surveys were completed before commencement of mining in Dowe Flats and submitted to the county by the time of the Three-Year Review. A blast warning sign remains on what was County Road 47 (now North 53rd Street); however, blasts have not taken place near this road for more than ten years.

14. Truck haul from the Larimer County Quarry to the cement plant will cease upon full production at Dowe Flats.

Comments: The Larimer County Quarry was closed and truck haul ceased by the time of the Three-Year Review.

15. Rock production at the existing Lyons Quarries will be reduced.

Comments: No rock production has taken place at the Lyons Quarries since the Dowe Flats quarry came into production before the Five-Year Review. The majority of the Lyons Quarries have been reclaimed with only one shallow pit being maintained as a kiln dust disposal site.

16. Interim County compliance reviews at the end of years 1, 3, 5, 10, 15, and 20.

Comments: Interim reviews have been completed for years 1, 3, 5, 10, and 15. This review will serve as the 20-Year Review.

17. Cease loading and hauling operations when sustained winds exceed 30 MPH.

Comments: CEMEX maintains an anemometer on site and continuously monitors wind speed. All mining operations relating to loading and hauling cease when sustained wind speeds are over 30 MPH. Appendix E includes the dates and wind speeds for all operations shutdown periods between January 1, 2010 and June 30, 2014.

18. Investigate alternative back-up beepers.

Comments: Mine Safety and Health Administration regulations (30 CFR 56.14132) continue to require back-up beepers.

19. Amend CMLRB Permit to conform to County-approved plans.

Comments: The CMLRB permit was amended to incorporate the Prairie Reclamation Plan required by Boulder County. Seed mixtures were updated and approved by the County due to native seed availability as of the Ten-Year Review.

2.2 BOARD OF COUNTY COMMISSIONERS RESOLUTION (#94-81, 6/28/1994)

1. **Commitments of Record:** As stated in the terms and conditions set forth above and modified by the items 2 – 16 set forth below.
2. **Non-Development Covenants:** Duly executed.
3. **Donations:** Duly executed.
4. **Conveyor System:** Requirements completed.
5. **Periodic Review:** Interim reviews have been completed for years 1, 3, 5, 10, and 15. All annual reports to the DRMS are included in Appendix C.

6. **Wind Speed Limitations:** CEMEX maintains an anemometer on site. Appendix E includes the on-site data for wind speed and operations response. Loading and hauling has ceased at the Dowe Flats quarry when the wind has sustained speeds of over 30 MPH.
7. **County Road 47 Relocated:** Completed, now North 53rd Street.
8. **County Road 49 Vacated:** See comment Section 2.2. This condition was rescinded to address a Boulder County Department of Transportation request to maintain the existing bridge over St. Vrain Creek. This condition was rescinded at the time of the Five-Year Review.
9. **Power Line Relocation:** No power lines are found within the permitted mining boundary and no power line relocation has taken place due to mining operations.
10. **Back-up Beepers:** Back-up beepers are required. The federal Mine Safety and Health Administration regulation has not changed hence back-up beepers continue to be required.
11. **Perimeter of Mine Permanently Monumented and No Mining Activities Outside this Defined Area:** The east and south mining boundary was County Road 47 which has been renamed North 53rd Street. The west boundary has been monumented with a series of cement benchmarks and 14" diameter posts that are maintained and readily visible.
12. **Permits:** The CMLRB permit was amended to incorporate the Prairie Reclamation Plan required by Boulder County staff. Additional permits were obtained during mine startup operations during the first three years after Special Use Permit approval.
13. **Development Agreement:** Duly executed.
14. **Management Plans:** Original Management and Monitoring Plans were submitted to Parks and Open Space Department on September 12, 1994.
15. **Maximum Time Period of Mining-Related Activities is 31 years:** This is the 20-Year Interim Review within the permitted mining period.
16. **Operations Center:** The mine operations center was approved by the County by means of a Site Plan.

2.3 DOCKET SU-93-14: DOWE FLATS 10-YEAR INTERIM REVIEW (4/27/2006)

At the time of the Ten-Year Review several recommendations and agreements were made and subsequently implemented by CEMEX.

1. Commitment to no less than 50 acres of prairie dog habitat. Prairie dog habitat was defined as restored habitat with a soil depth of no less than four feet after settlement.

Comments: CEMEX has conducted grade restoration and has created grade restoration that fits this criterion for at least 91 acres. Appendix F shows where the prairie dog areas are on the landscape and includes photographs of these areas prior to revegetation.

2. Voluntary Improvements to the Revegetation planning.

Comments: CEMEX hired a Restoration Ecologist to consult on native revegetation, topsoil salvage, weed control, and vegetation monitoring. Appendix B includes a compilation of those activities.

Figure 1: Dowe Flats Quarry and Lands Within the Management Plan Boundary

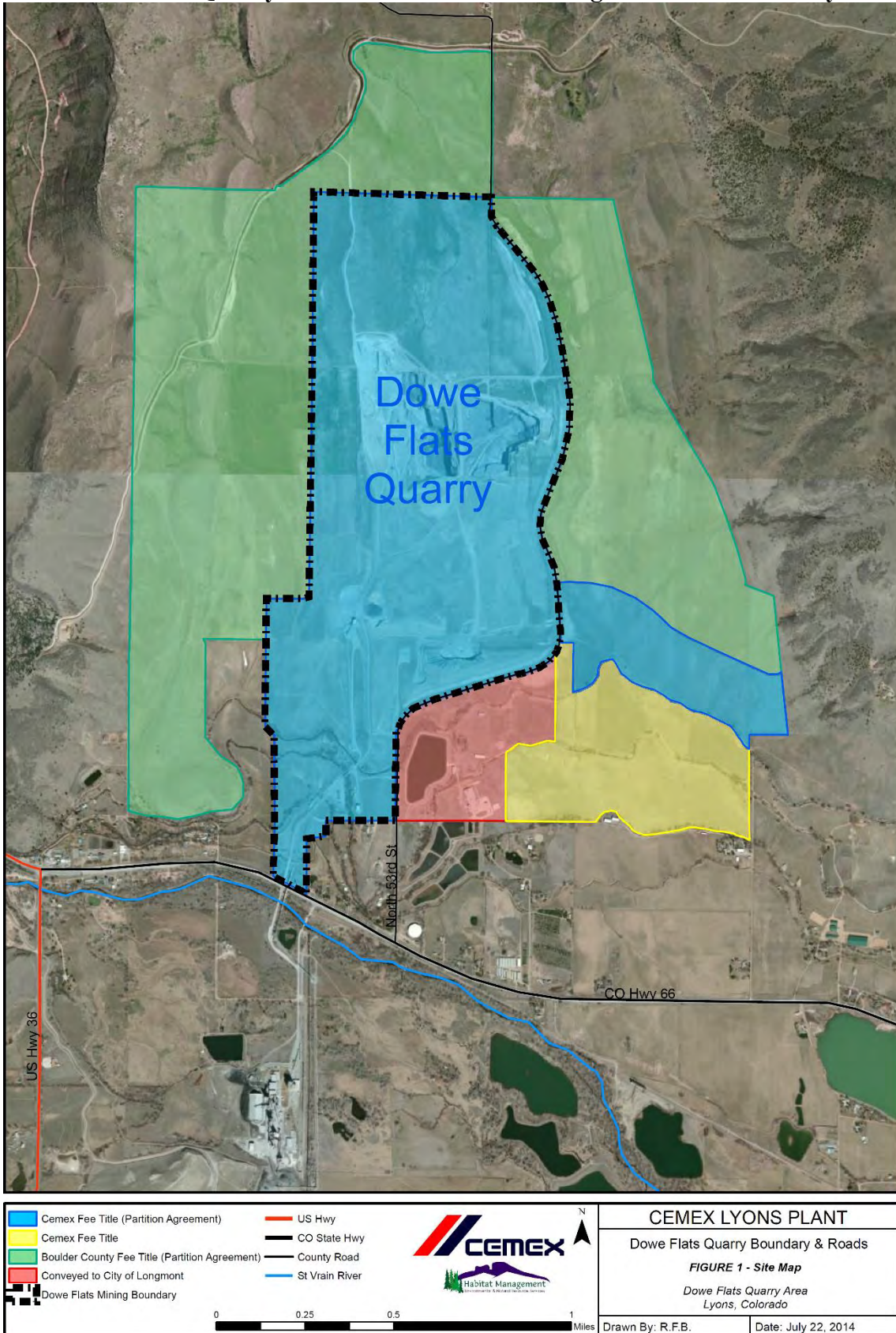


Figure 2: West Property Boundary Marker



Figure 3: North Property Boundary Marker



Appendix A

Dowe Flats Management and Monitoring Plans

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DOWE FLATS MANAGEMENT AND MONITORING PLANS

Produced by Habitat Management Inc.

for the CEMEX Mine Lyons

November, 2010

Reference Boulder County Docket SU-93-14

1 Introduction

The original Dowe Flats Project Management and Monitoring Plans were submitted to Boulder County on September 12, 1994 as a voluntary commitment made by Southdown, Inc. (now CEMEX Construction Materials South LLC, a subsidiary of Cemex, Inc.). The plans were updated during the Year 1, 3, 5, 10, and 15 Reviews. This document updates the plans for the 20-Year Review. According to the voluntary agreements made by Southdown, Inc. at the time of the approval of the Special Use Permit (SHB AGRA document dated May 19, 1994), the Management and Monitoring Plans are to address the following issues:

- Land Use
- Agriculture
- Wildlife
- Cultural Resources

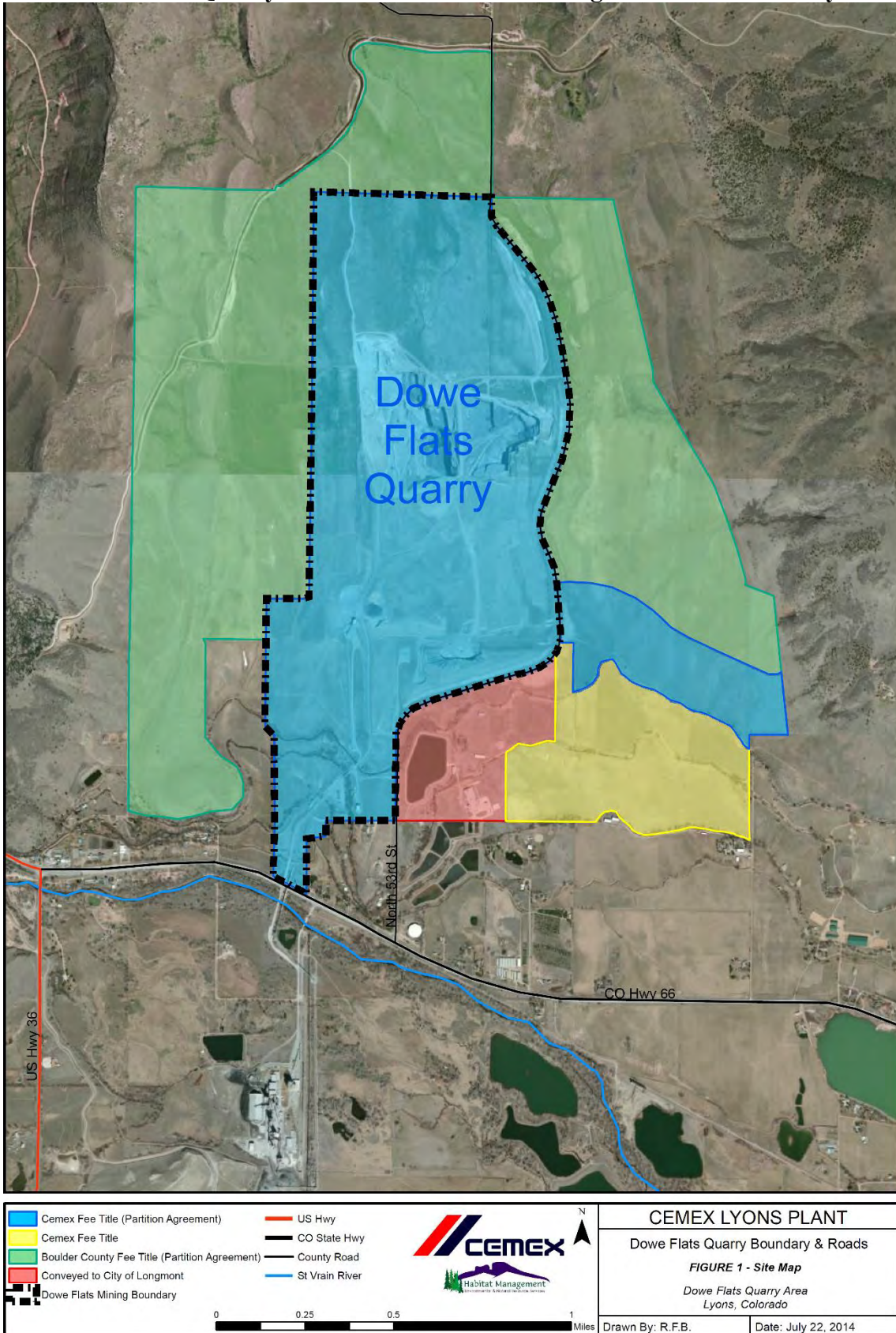
2 Land Use

Land use within the Dowe Flats Mining Boundary owned by CEMEX (Figure 1) is mining and reclamation with the undisturbed areas and the reclaimed areas functioning as wildlife habitat. CEMEX transferred 800 acres to Boulder County in the “Fee Title Partition Agreement” which was then immediately leased back to CEMEX as a buffer area around the Quarry to comply with CEMEX’s Division of Reclamation Mining and Safety Mining and Reclamation Permit (Figure 1, green). These County-owned lands, leased to CEMEX, are managed by Boulder County Open Space in agricultural use or left in their natural successional state for wildlife. CEMEX owned and Fee Title lands outside of the mining boundary (Figure 1) are also in agriculture use or left in their natural successional state for wildlife. The lands Conveyed to the City of Longmont are no longer managed by CEMEX (Figure 1, red).

3 Agriculture

Much of the land in the buffer area around the Dowe Flats Mining Boundary is in agricultural use. The County-owned lands, leased to CEMEX, are managed by Boulder County Open Space and used for various agricultural purposes. Accordingly, within the lands leased to CEMEX for buffer area, but managed by Boulder County, the County has assumed the responsibility for agricultural land use. The southwest portion of these lands are farmed by the Loukonen family who has farmed and ranched the area for more than 50 years. The northwest portion of the property has been left fallow for several years. Much of the land on the Eastern boundary of the Quarry across North 53rd / 55th Street has been transitioned to native prairie by Boulder County Open space, but some is still in agricultural use. The CEMEX owned and managed lands outside of the Mining Boundary (Figure 1, blue and yellow) are also under agricultural use.

Figure 1: Dowe Flats Quarry and Lands Within the Management Plan Boundary



4 Wildlife

Within CEMEX's ownership, areas that are outside of active mine and reclamation operations function as wildlife habitat. CEMEX has a current wildlife certification under the Wildlife at Work program issued by the Wildlife Habitat Council (www.wildlifehc.org). The Wildlife Habitat Council is a group of conservation organizations, corporations, and individuals committed to restoration which emphasize creation of native wildlife habitat. CEMEX applied for certification due to the long-term, wildlife-friendly programs that CEMEX has planned, developed, and implemented on its Lyons properties. The Wildlife Habitat Council certification attests that CEMEX has wildlife habitat programs that concentrate on native restoration and land management practices beneficial to wildlife. CEMEX's Lyons Operation also received an Honorable Mention for "Prairies for Tomorrow" supported by Pheasants Forever and Quail Forever. CEMEX, Inc. (Lyons Operation parent company) at large received the "William W. Howard C.E.O. Award" one of the Wildlife Habitat Councils most prestigious awards. Certification through this program highlights CEMEX's commitment to wildlife and to the future goals of Boulder County if and when the land is ultimately transferred to it.

4.1 Wildlife Historical Review

The Dowe Flats Special Use Permit (1994) was developed to ensure that reclamation activities would preserve winter raptor habitat. CEMEX conducted a five year Winter Raptor Study on the Dowe Flats property after approval of the Special Use Permit. Results of the study indicated that the preservation of a functioning prairie dog habitat to supply prey for the raptors was paramount. Accordingly, the original Dowe Flats Management and Monitoring Plans included the following prairie dog management actions and policies:

- A. The prairie dog population was monitored through 1998.
- B. A black-footed ferret clearance survey was completed in 1994.
- C. A burrowing owl clearance survey was completed in 1994. Burrowing owl monitoring continued through the completion of the prairie dog population monitoring in 1998.
- D. Outside of the active mine and reclamation sites and the agricultural lands, prairie dogs are allowed to maintain naturally occurring populations.
- E. Within the mine and reclamation area, prairie dogs could be removed. Periodic expansion of the mine pit removed prairie dogs through mining activities.
- F. The Lessees on the agricultural lands east of North 53rd Street control prairie dogs, as necessary.
- G. Prairie dog control was allowed to take place along the property boundaries where adjacent property owners complained of prairie dog immigration onto their properties.
- H. Shooting of prairie dogs was prohibited.

Boulder County has now assumed ownership and management of much of the area outside of the Dowe Flats Mining Boundary. The County will manage for prairie dogs in these areas according to its own policies. CEMEX will continue to manage prairie dogs on lands under its ownership (Figure 1, blue and yellow) under the existing terms of the Management and Monitoring Plans.

5 Cultural Resources

5.1 Prehistoric Sites

Within the original holdings of Southdown, Inc. there were numerous prehistoric sites that were to be monitored. The location and content of these sites are exempt from the Freedom of Information Act, and not subject to public disclosure. All of the sites identified as a part of the original Dowe Flats Cultural Resource Management Plan are now in Boulder County ownership, and monitoring of these sites has transferred to Boulder County.

5.2 Dowe Flats American Indian Advisory Council

The last meeting of the Dowe Flats American Indian Advisory Council was held in November of 1997. No subsequent meetings have been held because no cultural resources have been discovered during the removal of topsoil in the active mine area.

5.3 Historic Resources

A pre-blast survey for the Montgomery School (Michael Weston residence) was completed in 1995. Annual monitoring by a qualified historic resources consultant took place from 1995-2000, with no reports of adverse impacts. Monitoring has since ceased because mine activities moved to the north, and continue to move away from the Montgomery School.

No other significant historic resources have been monitored in connection with the Dowe Flats project.

Appendix B
Annual Internal Reclamation & Monitoring Information
(2010-2013)

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1 Introduction

CEMEX performs a number of environmental and reclamation management activities to continue to be good land stewards. Not all of these activities are requirements of the 1994 Special Land Use Permit. This Appendix details the following programs

1. Topsoil salvage and reconstruction monitored by a restoration ecologist
2. Mined land reclamation activities
3. Reclamation vegetation monitoring
4. Weed management activities

2 Topsoil Salvage

Topsoil salvage and replacement are critical components of successful mined land reclamation. Replacing topsoil provides plant-available nutrients, microbial and mycorrhizal activity, and organic matter which are all generally lacking in subsoil and overburden materials. Properly handling topsoil maintains the soil structure which increases water and oxygen infiltration. Overall, quality topsoil greatly accelerates and improves plant growth and enhances plant community development.

Topsoil and suitable subsoil materials are salvaged prior to mining associated disturbances using a variety of mobile equipment. Topsoil materials are either stockpiled separately from subsoil materials or direct hauled for final reclamation placement. Soil salvage depths are determined by horizon, organic matter content, coarse fragment content, and equipment accessibility with oversight by qualified environmental personnel. Stockpiled topsoil is placed in discrete windrows, graded, seeded, and signed for future identification as required by CMLRB regulations (Figure 1).

Since the 15-Year Review, the quarry pit has moved north, and new areas have required topsoil salvage. Topsoil salvage was completed in 2012 and 2014 with depths varying from 6 to 12 inches. In both years, topsoil was stripped with a bulldozer and pushed into windrows (Figure 2). The soil was then loaded into trucks and placed along the eastern edge of the property. As in previous years, the topsoil stockpiles continue to create the required visual berm along North 53rd Street.

Figure 1: Reclaimed topsoil stockpiles along eastern property boundary form visual berm



Figure 2: Topsoil being stripped (left) and pushed into windrows (right)

3 Mine Land Reclamation Activities

Cemex has completed interim or final reclamation on over 200 acres at the Dowe Flats Quarry over the past 18 years (Figure 3). Since the 15-Year Review, a total of 44.7 acres have been reclaimed (Table 1). The reclamation process includes backfilling the pit, placement of subsoil and/or topsoil, seed bed preparation, fertilizer application, seeding, and mulching. Backfilling is conducted whenever overburden material is stripped, but revegetation activities are not completed until a large enough area is backfilled and prepared. Revegetation was completed in 2010, 2012, and 2014, but only backfilling and soil placement were completed in 2011 and 2013 (Table 1).

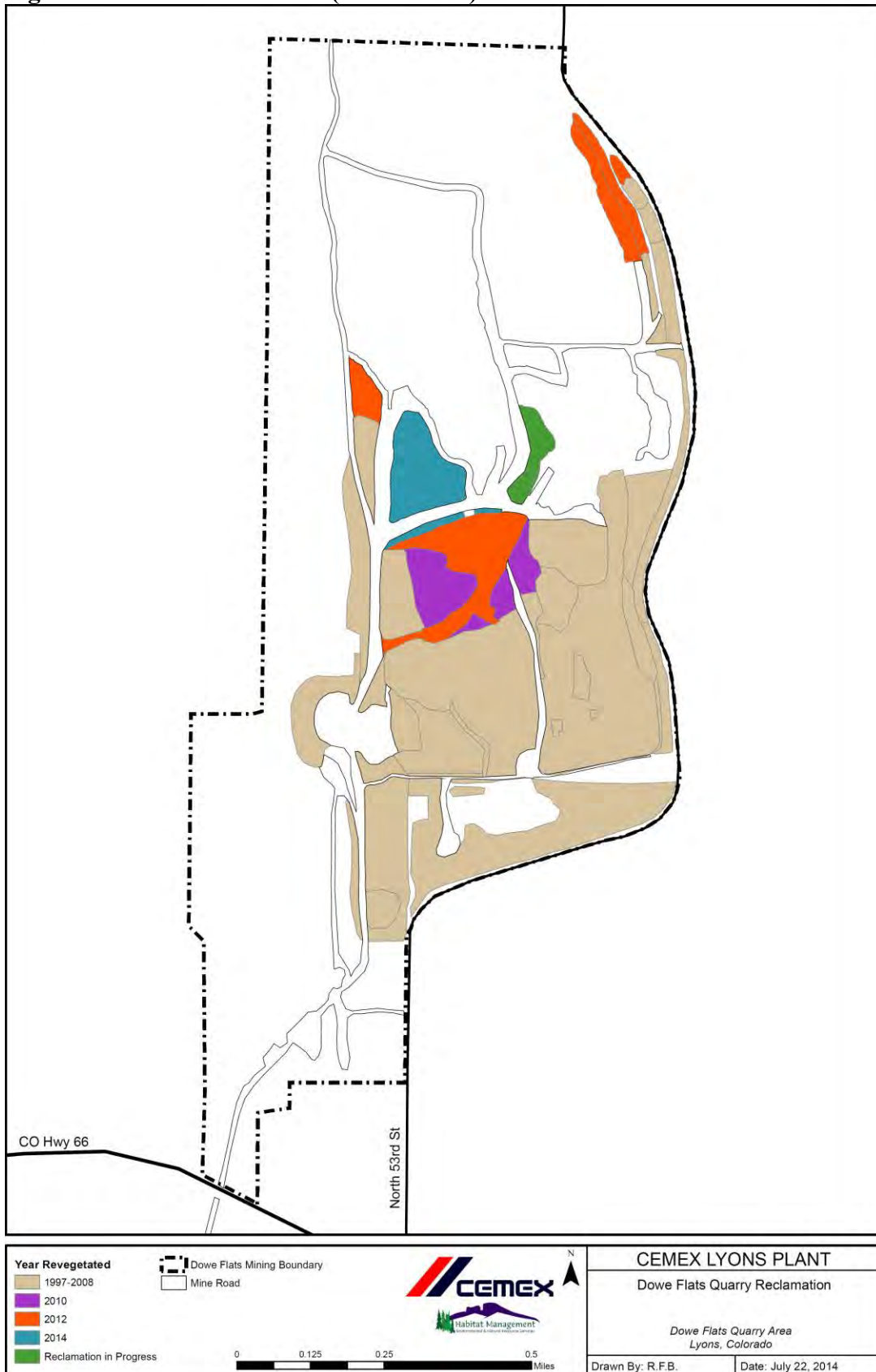
Table 1: Acres Reclaimed January 2010- July 2014

Year	Acres Completed	
	<i>Backfilling</i>	<i>Revegetation</i>
2010	0	10.9
2011	~ 11	0
2012	~ 11	22.5
2013	~ 11	0
2014	~ 4	11.3
Total		44.7

3.1 Backfilling, Soil Placement, & Seed Bed Preparation

Backfill materials are generally direct-hauled during overburden stripping activities as a part of mining. When an approximate final elevation is reached, suitable subsoil materials are hauled in and placed for reclamation. To meet prairie dog habitat requirements (Appendix F), at least four feet of soil free of large aggregate is placed. For final reclamation, topsoil is placed over the subsoil. However, for interim reclamation, the subsoil is often revegetated without additional growth media. Surface soils are ripped, disked, and/or harrowed prior to seed and fertilizer application to break compaction and prepare the seed bed.

Figure 3: Reclamation Areas (2010 – 2014)



3.2 Fertilizer Application

Fertilizer was broadcast over all areas revegetated in 2010 – 2014. In 2010 and 2012, the following applications were made:

- 230 lb/acre of nitrogen-phosphate-potassium fertilizer (14-14-10)
- 300 lb/acre of superphosphate P₂O₅ (0-46-0)
- 200 lb/acre potash K₂O (0-0-62)

In 2014, the fertilizers application was changed to the following:

- 200 lb/acre of nitrogen/phosphate fertilizer (11-52-0)
- 167 lb/acre of potash K₂O (0-0-62)

3.3 Seeding

All areas reclaimed between 2010 and 2014 were seeded with the approved perennial grass seed mixture (Table 2). The seed mixture is broadcast at a target rate of 100 seeds/square foot and seeding is completed within 24 hours of seed bed preparation.

Table 2: Perennial Grass Seed Mixture

%	Species	Common Name	PLS Lbs/Ac
9	<i>Elymus lanceolatus lanceolatus</i>	Thickspike wheatgrass Critana	2.55
10	<i>Elymus trachycaulus</i>	Slender wheatgrass	3.23
10	<i>Pascopyrum smithii</i>	Western wheatgrass Arriba	3.96
3	<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass Annatone	0.93
10	<i>Bouteloua curtipendula</i>	Side oats grama Vaughn	2.28
15	<i>Bouteloua gracilis</i>	Blue grama Alma	0.79
5	<i>Buchloe dactyloides</i>	Buffalo grass Texoka	3.89
5	<i>Koeleria macrantha</i>	Junegrass	0.09
3	<i>Oryzopsis hymenoides</i>	Indian ricegrass Paloma	0.93
10	<i>Poa canbyi</i>	Canby's bluegrass Canbar	0.47
10	<i>Sporobolus cryptandrus</i>	Sand dropseed	0.08
10	<i>Stipa viridula</i>	Green needlegrass Lodorm	2.41
100	Total		21.60

3.4 Mulching

All areas revegetated between 2010 and 2014 were mulched with certified weed-free native hay mulch. Mulch was spread at a target rate of 2 tons/acre, and crimped to a minimum depth of 4 inches. On slopes, crimping follows the approximate contours of the slope, while on flat areas crimping is performed perpendicular to the prevailing wind direction.

4 Reclamation Vegetation Monitoring

Reclamation vegetation monitoring has been conducted annually since the 15-Year Review to evaluate the success of the revegetation efforts and identify maintenance needs. Representative vegetation sampling shows general success of reclamation areas throughout the Dowe Flat Quarry and their progress toward the long-term reclamation goal of native grassland habitat similar to pre-industrial and agricultural disturbance. Data collected in reclamation areas are

compared to samples collected in an adjacent reference area on Boulder County Fee Title land. Habitat Management, Inc. conducted the monitoring in 2010 – 2013 and will conduct monitoring again in August 2014. Vegetation monitoring in 2010 was detailed in the 15-Year Review submitted in 2010, and is only briefly summarized here. Complete reclamation monitoring reports are attached from 2011 – 2013.

4.1 Cover Transect Locations

Five reclamation units were selected for quantitative monitoring in 2010 and monitored again in 2011 – 2013. Additionally, three more reclamation units were added in 2013 to represent areas reclaimed in 2010 and 2012. Cover sample transects were chosen subjectively and located in areas where the vegetation is the most representative of the overall plant community within the areas of interest. Two transects were also established in the reference area using the same methods.

4.2 Cover Sampling Methods

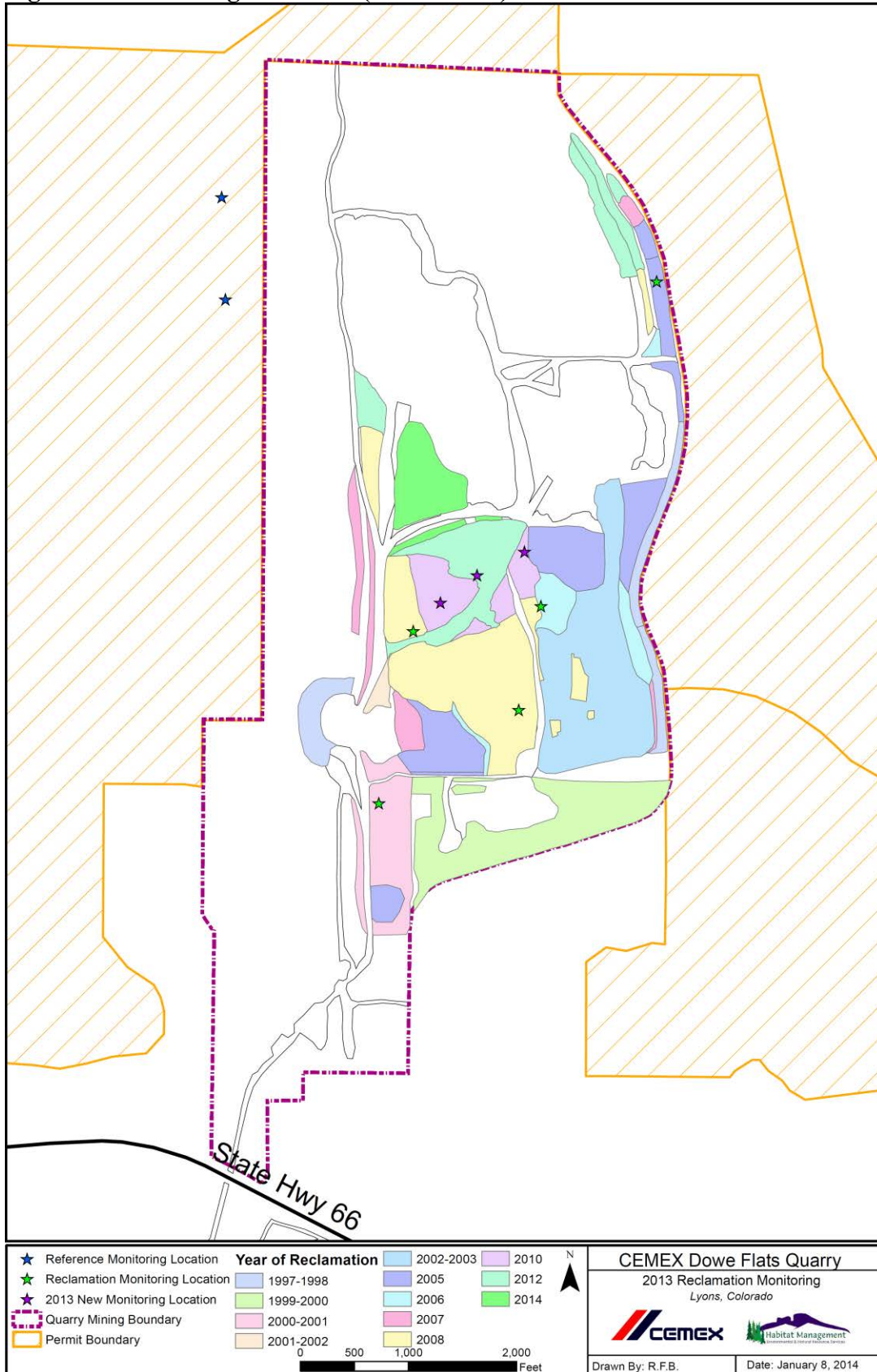
Line-transect point-intercept methods were used to collect vegetation and ground cover data. A two-point laser frame (with the laser points set horizontally 0.5 meters on either side of the transect) was used to take two ground cover measurements at 1-meter intervals along a 50-meter line-transect for a total of 100 points per transect. Cover measurements recorded “first-hit” point-intercepts by living plant species, litter, rock, or bare ground. Litter included all organic material that was produced previous to the current growing season. Rock fragments were recorded when particle size was equal to or greater than one square centimeter. Percent total vegetative cover and total ground cover were calculated from the line-transect point-intercept data.

The point- intercept cover assessment method is used to provide superior objectivity and repeatability. However, this method is somewhat biased toward collecting information about common species and is rather limited in collecting information about uncommon species. To ameliorate this issue, a total vascular plant species frequency inventory was conducted. All species occurring within one meter on either side of each cover transect (100 m² area) were recorded as a measure of species frequency and diversity. A species list was developed including scientific and common names, life forms, life cycles, and desirability. Species were designated as native, desirable, or undesirable. Desirable species include not only native regionally adapted species, but also those non-native species that had been included in a Colorado Division of Reclamation Mining and Safety (DRMS) approved seed mixture. These species lists along with the point-intercept data were used to determine species composition, diversity, and frequency on the reclamation areas.

4.3 2010 Vegetation Cover Sampling Results

Five areas were sampled in 2010 (Figure 4) with an average vegetation cover across all sampled areas of 60%. An average of 93% of the relative cover was native perennial grasses, with nine species contributing. Three shrub species were present in the revegetation areas, but did not yet contribute to the cover across all transects.

Figure 4: Monitoring Locations (2010 – 2013)



A new undisturbed native reference area had to be selected in 2010 because that used in 2005 and 2007 was disturbed by mining activities. Total vegetation cover in the reference area was very similar to the revegetated areas with an average of 59%. Fendler's threeawn (*Aristida purpurea*), a native perennial grass, dominated the native undisturbed comparison area and only three other native perennial grass species were present, in comparison to the reclaimed areas where ten perennial grass species contributed to the total cover. Hence, the revegetation areas were more diverse than the native undisturbed comparison areas. The undisturbed native comparison area also had greater average cover of undesirable species (24%) than the revegetated areas (3 %).

4.4 2011 Vegetation Cover Sampling Results

The same reclamation and reference area locations were sampled in 2011 as in 2010 (Figure 4). A complete reclamation monitoring report for 2011 is attached at the end of this Appendix. Total vegetation cover on the reclamation areas ranged from 22% to 53% with an average of $39.6 \pm 6.3\%$ (mean \pm SE) across all 5 sites. Native vegetation cover on the reclamation areas ranged from 20% to 42% with an average of $32 \pm 3.8\%$ (mean \pm SE). When non-native desirable species were added to the native species, total desirable cover averaged $34.6 \pm 5.0\%$.

Total vegetation cover on the reference area averaged 56.5% and cover of native species averaged 37.5%. A measure sometimes used by the DRMS for bond release is that a reclamation area should have cover within 80% of the reference area. By this measure three of the five reclamation areas monitored and the average of all reclamation areas would meet the standard.

The relative cover of the reclamation areas averaged 84% native, 5% non-native desirable and only 11% undesirable. However, on the reference area relative native cover was only 66%, while undesirable species made up the other 34%. A total of nine undesirable species were observed on the reclamation area compared to only three on the reference area. However, total cover of undesirable species averaged only 5% on the reclamation areas compared to 19% on the reference area.

4.5 2012 Vegetation Cover Sampling Results

The same reclamation and reference area locations were sampled in 2012 as in 2010 and 2011 (Figure 4). A complete reclamation monitoring report for 2012 is attached at the end of this Appendix. Total vegetation cover on the reclamation areas ranged from 24% to 38% with an average of $33 \pm 2.5\%$ (mean \pm SE) across all 5 sites. Native vegetation cover on the reclamation areas ranged from 24% to 36% with an average of $30 \pm 2.2\%$. When non-native desirable species were added to the native species, total desirable cover averaged $32 \pm 2.2\%$. Total vegetation cover on the reference area averaged $47.5 \pm 2.5\%$ and cover of native species averaged $35 \pm 2.0\%$. In 2012, four of the five reclamation areas monitored and the average of all reclamation areas had vegetation cover at or above 80% of the reference area equally.

Total and desirable vegetation cover decreased in all but one reclamation units, as well as the reference area, from 2011 to 2012. The general decrease could be attributed to much lower than average precipitation in 2012. This also illustrates the importance of using a reference area for monitoring, because the drought conditions affected both the reclamation and the reference area.

The relative cover of the reclamation areas averaged 91% native, 6% non-native desirable and only 3% undesirable. However, on the reference area relative native cover was only 74% while undesirable species made up the other 26%. Only one reclamation unit exhibited any undesirable

species cover and all reclamation units exhibited a greater relative cover of desirable species than the reference area.

4.6 2013 Vegetation Cover Sampling Results

In 2013, three additional reclamation area sample locations were added the five sampled in 2010 – 2012, but the reference area locations remained the same (Figure 4). A complete reclamation monitoring report for 2013 is attached at the end of this Appendix. Total vegetation cover on the reference area averaged $37.5 \pm 0.5\%$ and cover of native species averaged $35.5 \pm 1.5\%$. In 2013, four of the five reclamation areas monitored and the average of all reclamation areas had vegetation cover within 75% of the references area

Total vegetation cover in 2013 ranged from 15% to 72% with an average of $33 \pm 6.1\%$ (mean \pm SE) across all 8 sites. Native vegetation cover on the reclamation areas ranged from 6% to 30% on with an average of $21.8 \pm 2.8\%$. When non-native desirable species were added to the native species, total desirable cover averaged $23.4 \pm 3.2\%$. The vegetation cover in the 2012 reclaimed area was very different from the other areas with 72% total cover of which only 6% was desirable and the other 66% was introduced annual weeds. This heavy cover of weeds masked the underlying native grass seedlings from being counted with single hit cover data. It is common for a flush of weeds to grow in the first year after planting; however, these species generally decrease in prominence after three to five years of native establishment. When this transect was removed from the data the average total vegetation cover, native cover, and desirable cover were $27.4 \pm 2.9\%$, $25.9 \pm 2.4\%$, and $24.0 \pm 1.9\%$, respectively for the other seven reclamation units.

Average total and desirable vegetation cover decreased each year from 2011 to 2013 in the reclamation units. The total vegetation cover also decreased over this time period on the reference area, but the desirable cover held relatively constant. This general decrease could be attributed to much lower than average precipitation in 2012 and the first part of 2013. While there was extraordinary precipitation in September of 2013, the monitoring was completed in July and thus not affected. The effect was greater on the reclamation than the reference area, likely due to more established root systems present in the reference area vegetation community. With time, the reclamation will develop the root structure to better withstand drought conditions as well.

The relative cover of the reclamation areas averaged 66% native, 5% non-native desirable, and 29% undesirable. However, if the 2012 reclamation area is removed again, this changes to 89% native, 7% non-native desirable, and only 4% undesirable. On the reference area relative native cover was 95% while undesirable species made up only 5%. Three of the eight reclamation unit exhibited no undesirable species cover and five reclamation units exhibited a greater relative cover of desirable species than the reference area. By comparison, in 2012, all of the reclamation units monitored exhibited greater relative cover of desirable species than the reference area and only one had any undesirable cover. This change can likely be attributed to three factors. First, the three reclamation units added in 2013 were more recently reclaimed and thus more likely to have a higher weed presence. Second, the drought conditions of 2012 and 2013 stressed the young reclamation plant communities allowing for greater weed encroachment. Finally, the timing of monitoring in July of 2013 compared to October of 2012 allowed the capture of more annual weeds that may not have been present later in the year or may have been counted as litter.

4.7 Summary of the Vegetation Monitoring Results

The goal of vegetation monitoring efforts is to evaluate the interim success and progress of the reclamation activities. Over the past five years most of the areas monitored appear to be progressing well towards the reclamation goals and compared well to the undisturbed reference area. The reclamation areas (Figure 5 and Figure 6) are beginning to develop a similar species composition to the undisturbed reference areas (Figure 7). However, the relative abundance of the various growth forms (grasses, forbs, and shrubs) still requires further development. The shrub component of the reclamation community is the last to develop due to the slow growth of these species. The presence of shrubs species in the community has increased since 2012 and shrub species were also encountered in the cover sampling for the first time in 2013 suggesting that this community component is developing well.

Vegetation cover was sufficient to minimize wind and water erosion and weed cover was relatively low especially in the older more established monitoring areas. The entire vegetation community (including the reference area) experienced a substantial drought in 2012 and early 2013 and the effects were more pronounced on the reclamation units. The abundance of species observed that were not a part of the seed mixtures suggests that the communities are developing and benefiting from colonization from nearby populations.

Figure 5: 2013 established native perennial grass (planted 2005) on visual berm



Figure 6: 2013 established native perennial grass (planted 2010) south of the pit



Figure 7: 2013 reference area sample location



5 Weed Management

An Integrated Weed Management Program was implemented at the Dowe Flats Quarry in 2004. This program includes periodic surveys to identify and quantify weed populations, as well as guide weed control activities such as mowing, biological control, and herbicide application. While the noxious weed cover is manageable in its current state, aggressive action continues to be taken to keep populations low or, if possible, eradicate them. The most economical way to manage weeds is early control. This means identifying and managing small populations before they expand as well as taking action early in the season before the existing individuals have a chance to produce seeds.

Weed control methods implemented over the past five years at the Dowe Flats Quarry include goat grazing, mechanical mowing, hand weed removal, biological insect introduction (*Mecinus janthinus* stem-boring weevil for Dalmatian toadflax), and herbicide application. Additionally, native perennial plant communities are being planted which will directly compete for resources with weedy species. Established perennial plant communities over time will change the carbon nitrogen ratios in the soil which will allow the perennial species to outcompete the weedy species.

The methods used have been tailored to the species present. Surveys reveal infestation locations, species, and extents, and plans are made to focus on the best approach for control of each weed infestation. For instance, cereal rye (*Secale cereale*), kochia (*Bassia scoparia*), and yellow sweet clover (*Melilotus officinalis*) are all controlled by mowing, while small patches of mullien (*Verbascum thapsus*) and musk thistle (*Carduus nutans*) are controlled by hand removal. Large patches of mullein, musk thistle, houndstongue (*Cynoglossum officinale*), and bindweed (*Convolvulus arvensis*) were controlled with goat grazing. Dalmatian toad flax (*Linaria dalmatica*) has been controlled with mowing and biological control (insect introduction). Canada thistle (*Cirsium arvense*) and diffuse knapweed (*Centaurea diffusa*) are controlled with herbicide. Targeted herbicide application, goat focused grazing, and hand removal were the primary techniques employed each year.

The existing weed species managed on the Dowe Flats property from 2010 through 2014 were: bindweed, Canada thistle, musk thistle, diffuse knapweed, Dalmatian toad flax, hounds tongue, Russian thistle (*Salsola iberica*), kochia, yellow sweet clover, mullien, cereal rye, and prickly lettuce (*Lactuca serriola*). Cereal rye was aggressively managed from 2004 – 2010 at the request of Boulder County Open Space and is no longer a problem in most areas. The weevil introduced for the control of Dalmatian toadflax in 2006 has also done a good job of controlling this species and the infestation is significantly reduced. CEMEX started using a local goat grazing contractor (Golden Hooves) in 2009 and still maintains this program.

Figure 8: Golden Hooves Grazing Services 2012 weed control effort focusing on houndstongue



Figure 9: Golden Hooves Grazing Services control bindweed and Canada thistle in 2011 and 2013



Figure 10: Licensed Herbicide Applicator applies herbicide to bindweed





Dowe Flats Quarry 2011 Reclamation Monitoring Report

May 15, 2012

Submitted to:

*Denise Arthur
Environmental Manager
Cemex USA
5134 Ute Rd
Longmont, CO 80503*

Prepared by:



*14 Inverness Dr East, Ste A100
Englewood, CO 80112*

Cemex Dowe Flats Quarry 2011 Reclamation Monitoring Report

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1 Overview

The Dowe Flats Quarry Special Use Permit area at the Cemex Lyons Plant near Lyons, CO is being actively mined and concurrently reclaimed. Over 180 acres within the permit area have been reclaimed during the past 14 years using a variety of methods and techniques. On August 23-24, 2011, several reclamation areas were monitored to evaluate their success and inform maintenance needs prior to establishing eligibility for bond release. Five different areas reclaimed in the past 10 years were evaluated for vegetation cover, diversity, and weed abundance (Map 1). Additionally, an undisturbed native reference area was monitored for comparison.

These data are intended to show general success of reclamation areas throughout the Dowe Flat Quarry and their progress toward the long-term reclamation goal of native grassland habitat similar to pre-agricultural disturbance. Habitat Management, Inc. used the evaluation methods outlined in the Dowe Flats Special Land Use Permit (SU-93-14) Fifteen Year Interim Review.

2 Reclamation History

An historical summary of Cemex's reclamation and related land management activities was compiled for each reclamation area (Table 1). Historic information included growth media, fertility amendments, mulch applications, seed mixes, revegetation dates, and other associated post-reclamation management and vegetation establishment activities.

3 Reference Area Selection

An ecologically equivalent reference area was selected in the field to the west of the quarry on the "Fee Title Partition Agreement" area leased from Boulder County and managed by Boulder County Open Space. This site was established outside of the mine's affected area to ensure that it will remain undisturbed by mining, but close enough to the reclamation areas to ensure that it is subject to a similar climate. The reference area was selected to have similar soil type, topography, and wildlife access to the reclamation areas as well as exhibiting a desirable native perennial plant community similar to that desired on the final reclamation.

4 Vegetation Monitoring Methods

Quantitative monitoring methods were used to evaluate vegetation communities established on reclamation areas and the reference area. Vegetation parameters included total ground cover, total vegetation cover, desirable and native species cover, weed cover, and plant species diversity. Vegetation monitoring was conducted by a Vegetation Expert from Habitat Management Inc. with over 10 years of experience evaluating vegetation in the region.

4.1 *Transect Sample Locations*

Five reclamation units were selected for quantitative monitoring in 2011:

- D-01-PP-1: Reclaimed in 2001 with the Permanent Perennial seed mixture
- D-05-TPG-5: Reclaimed in 2005 with the Temporary Perennial Grass seed mixture
- D-06-TPG-1: Reclaimed in 2006 with the Temporary Perennial Grass seed mixture
- D-08-PP-1: Originally reclaimed in 2005 and re-treated in 2008 with the Permanent Perennial seed mixture
- D-08-PP-2: Reclaimed in 2008 with the Permanent Perennial seed mixture

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Table 1: Reclamation Unit History

Reclamation Unit	Year(s)	Acres	Soil	Seed		Fertilizer		Mulch		Notes
				Mix*	Method	Type	Rate (lbs/acre)	Type	Rate (lbs/acre)	
D-98-OTP-3	1997-1998	5.56	Topsoil	OTP	Drill	18-46-0	100	Straw	2000	
D-98-OTP-1	1997-1998	2.70	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	
D-98-OTP-2	1997-1998	3.47	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	
D-00-OTP-1	1999-2000	25.10	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	Partially used for borrow in 2010
D-01-PP-1	2000-2001	13.69	Subsoil	PP	Drill	18-46-0	100	Straw	2000	Small area reseeded in 2005
D-02-PP-1	2001-2002	1.29	Subsoil	PP	Drill	18-46-0	100	Straw	2000	End was removed for haul road
D-03-OTP-1	2002-2003	33.93	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	Several parts re-disturbed and/or re-seeded
D-05-ETP-2	2005	7.24	Subsoil	ETP	Drill	18-46-0	100	Hay	2000 (2006)	Several parts re-disturbed and/or re-seeded
D-05-ETP-1	2005	5.04	Subsoil	ETP	Drill	18-46-0	100	Hay	2000 (2006)	
D-05-ETP-3	2005	0.45	Subsoil	ETP	Drill	18-46-0	100	Hay	2000 (2006)	
D-05-PP-1	2005	7.90	Backfill	PP	Drill	18-46-0	100	Hay	2000 (2006)	Southern tip re-reclaimed in 2006
D-05-PP-2	2005	2.05	Subsoil	PP	Drill	18-46-0	100	Hay	2000 (2006)	Originally reclaimed in 2001
D-05-TPG-1	2005	1.04	Subsoil	TPG	Drill	18-46-0	100	Hay	2000 (2006)	Several parts re-disturbed and/or re-seeded
D-05-TPG-5	2005	2.77	Topsoil	TPG	Drill	18-46-0	100	Hay	2000 (2006)	Stockpile
D-05-TPG-6	2005	1.00	Subsoil	TPG	Drill	18-46-0	100	Hay	2000 (2006)	Stockpile
D-06-TAG-3	2006	0.79	Subsoil	TAG	Broadcast	18-46-0	100	Hay	2000	Originally reclaimed in 2005
D-06-TPG-1	2006	3.55	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	Part originally reclaimed in 2005
D-06-TPG-3	2006	2.64	Subsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Originally reclaimed in 2003
D-06-TPG-2	2006	0.58	Topsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Stockpile
D-07-PP-1	2007	6.47	Subsoil	PP	Broadcast	18-46-0	100	Hay	2000	
D-07-PP-2	2007	2.53	Subsoil	PP	Broadcast	18-46-0	100	Hay	2000	
D-07-TPG-3	2007	0.44	Subsoil	TPG	Broadcast	18-46-0	100	Hay	2000	
D-07-TPG-1	2007	0.83	Topsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Stockpile
D-08-PP-1	2008	5.38	Subsoil	PP	Broadcast	18-46-0	100	Hay	2000	
D-08-PP-3	2008	1.15	Backfill	PP	Broadcast	18-46-0	100	Hay	2000	Originally reclaimed in 2003
D-08-PP-2	2008	26.46	Backfill	PP	Broadcast	18-46-0	100	Hay	2000	Southern part originally reclaimed in 2005
D-08-SS-1	2008	1.54	Subsoil	SS	Broadcast	Humega		Hay	2000	Originally reclaimed in 2003
D-08-SS-2	2008	0.11	Subsoil	SS	Broadcast	Humega		Hay	2000	Originally reclaimed in 2003
D-08-SS-3	2008	0.28	Subsoil	SS	Broadcast	Humega		Hay	2000	Originally reclaimed in 2003
D-08-TAG-1	2008	5.22	Backfill	TAG	Broadcast	18-46-0	100	Hay	2000	
D-08-TPG-1	2008	0.83	Subsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Stockpile
D-10-TPG-3	2010	2.40	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	
D-10-TPG-2	2010	3.76	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	
D-10-TPG-1	2010	6.42	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	

* OTP=Original Temporary Perennial; PP=Permanent Perennial; TPG=Temporary Perennial Grass; ETP=Extended Temporary Perennial; TAG=Temporary Annual Grass; SS=Shrubs Only

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Within each reclamation unit, one transect was subjectively located in an area where the vegetation was representative of the overall plant community within the reclamation unit. Each transect was oriented in a subjectively chosen compass direction (azimuth), and the azimuth was recorded.

Two transect locations were also established in the reference area using the same methods. Both reference area transects were located approximately 400 ft west of the Permit Boundary and they were approximately 1000 ft from each other.

4.2 Monitoring Methods

4.2.1 Vegetation Cover

Line-transect point-intercept methods were used to collect vegetation and ground cover data. A two-point laser frame (with the laser points set horizontally 0.5 meters on either side of the transect) was used to take two ground cover measurements at 1-meter intervals along a 50-meter line-transect for a total of 100 points per transect. Cover measurements recorded “first-hit” point-intercepts by living plant species, litter, rock, or bare ground. Litter included all organic material that was produced previous to the current growing season. Rock fragments were recorded when particle size was equal to or greater than one square centimeter. Percent total vegetative cover and total ground cover were calculated from the line-transect point-intercept data.

4.2.2 Species Diversity and Frequency

All species occurring within one meter on either side of each cover transect (100 m² area) were recorded as a measure of species frequency and diversity. All species not immediately identifiable to the observers were collected for later identification and special care was taken to look for species of special concern. A species list was developed including scientific and common names, life forms, life cycles, and desirability (Appendix B). Species were designated as native, desirable, or undesirable. Desirable species include not only native regionally adapted species, but also those non-native species that had been included in a DRMS approved seed mixture. These species lists along with the point-intercept data were used to determine species composition, diversity, and frequency on the reclamation areas.

4.2.3 Photographs

In addition to the cover and diversity data, a photograph was taken of each transect. Photographs were taken at an approximate height of 5 feet and were oriented along the length of the transect from the starting point.

5 Results

All vegetation monitoring data for both the reclamation units and the reference areas are presented in Appendix A and summarized in Table 2. A complete species list is attached as Appendix B. All transect photos are included in Appendix C.

5.1 Vegetation Cover

Total vegetation cover on the reclamation areas ranged from 22% on the D-08-PP-2 site to 53% on the D-01-PP-1 site with an average of $39.6 \pm 6.3\%$ (mean \pm SE) across all 5 sites (Table 2, Figure 1). Native vegetation cover on the reclamation areas ranged from 20% on the D-08-PP-2 site to 42% on the D-08-PP-1 site with an average of $32 \pm 3.8\%$ (mean \pm SE) across all 5 sites.

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When non-native desirable species were added to the native species, total desirable cover averaged $34.6 \pm 5.0\%$.

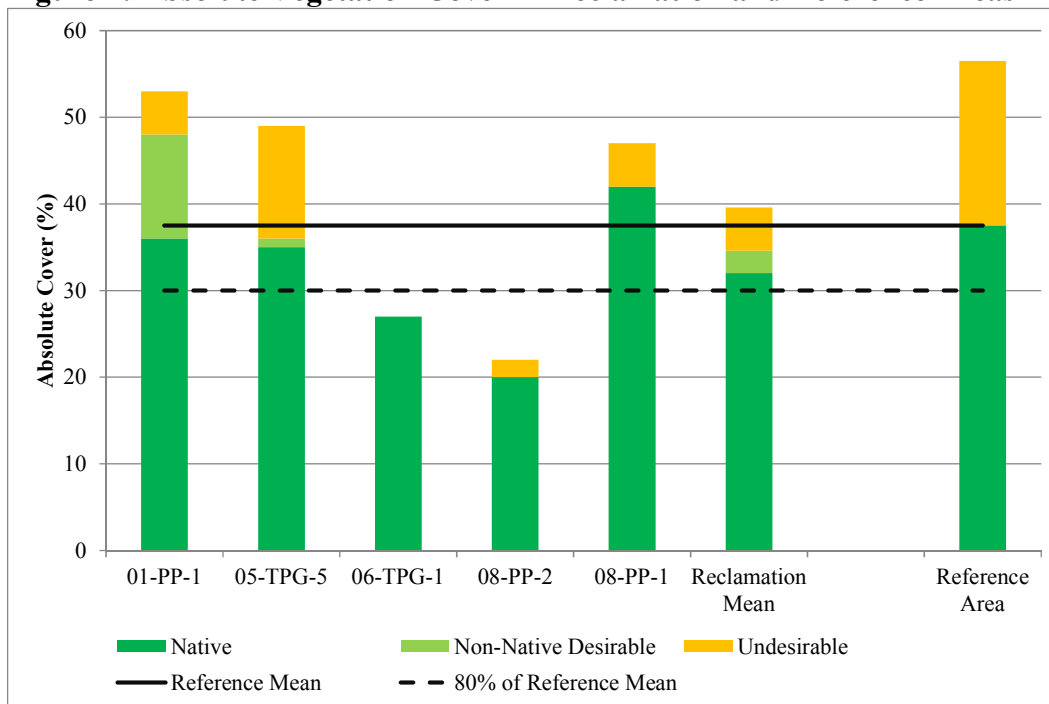
Total vegetation cover on the reference area averaged 56.5% and cover of native species averaged 37.5% (Table 2, Figure 1). No non-native desirable species were encountered during cover sampling. The D-01-PP-1 site and the D-08-PP-1 site both exhibited greater absolute cover of desirable species than the reference area. A measure sometimes used by the DRMS for bond release is that a reclamation area should have cover within 80% of the reference area. By this measure three of the five reclamation areas monitored and the average of all reclamation areas would meet the standard.

Table 2: Reclamation Monitoring Data by Reclamation Area

	Reclamation						Reference Area
	D-01-PP-1	D-05-TPG-5	D-06-TPG-1	D-08-PP-2	D-08-PP-1	Mean/Total	
Absolute Cover							
<i>Graminoids</i>	45	47	27	20	43	36.4	47.5
<i>Forbs</i>	8	1	0	2	4	3.0	5.0
<i>Shrubs</i>	0	1	0	0	0	0.2	4.0
<i>Native</i>	36	35	27	20	42	32.0	37.5
<i>Non-Native Desirable</i>	12	1	0	0	0	2.6	0
<i>Undesirable</i>	5	13	0	2	5	5.0	19
<i>All Vegetation</i>	53	49	27	22	47	39.6	56.5
<i>Ground Cover</i>	88	99	59	88	89	84.6	94.5
<i>Litter/Rock</i>	35	50	32	66	42	45.0	38
<i>Bare</i>	12	1	41	12	11	15.4	6
Relative Cover							
<i>Graminoids</i>	85	96	100	91	91	92.6	84.1
<i>Forbs</i>	15	2	0	9	9	6.9	8.8
<i>Shrubs</i>	0	2	0	0	0	0.4	7.1
<i>Native</i>	68	71	100	91	89	83.9	66.4
<i>Non-Native Desirable</i>	23	2	0	0	0	4.9	0
<i>Undesirable</i>	9	27	0	9	11	11.1	34
Species Richness							
<i>Graminoids</i>	9	3	8	8	10	13	8
<i>Forbs</i>	2	5	2	5	3	9	9
<i>Shrubs</i>	0	2	1	1	0	2	7
<i>Native</i>	7	4	7	9	7	12	20
<i>Non-Native Desirable</i>	2	1	1	1	2	3	1
<i>Undesirable</i>	2	5	3	4	4	9	3
<i>All Vegetation</i>	11	10	11	14	13	24	24

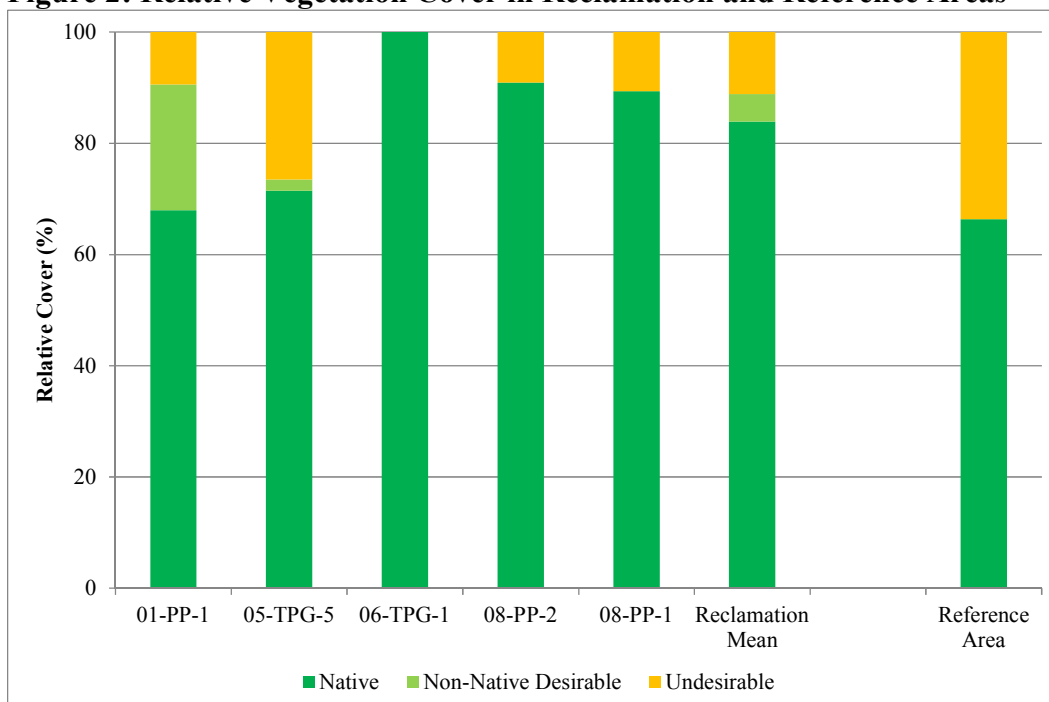
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Figure 1: Absolute Vegetation Cover in Reclamation and Reference Areas



The relative cover of the reclamation areas averaged 84% native, 5% non-native desirable and only 11% undesirable (Table 2, Figure 2). However, on the reference area relative native cover as only 66% while undesirable species made up the other 34%. One reclamation area (D-06-TPG-1) exhibited no undesirable species cover; however, three undesirable species were observed in the diversity transects.

Figure 2: Relative Vegetation Cover in Reclamation and Reference Areas

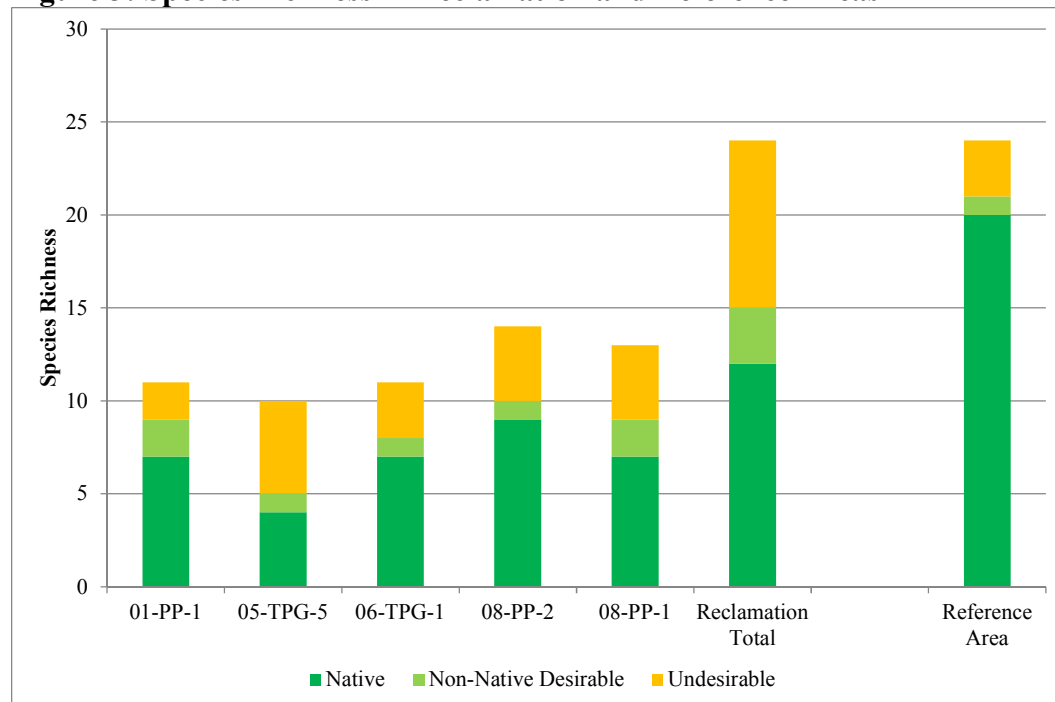


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5.2 Species Diversity and Frequency

A total of 24 species were observed along the five reclamation area transects of which 12 were native and another 3 were desirable (Figure 3). Non-native desirable species included crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*), and alfalfa (*Medicago sativa*). Within each reclamation area only 10 to 14 species were observed and no species was observed in all 5 areas. Three species slender wheatgrass (*Elymus trachycaulus*), green needlegrass (*Nassella viridula*), and Western wheatgrass (*Pascopyrum smithii*) were observed in all but the D-05-TPG-5 area. The Western wheatgrass was also observed along both of the reference area transects.

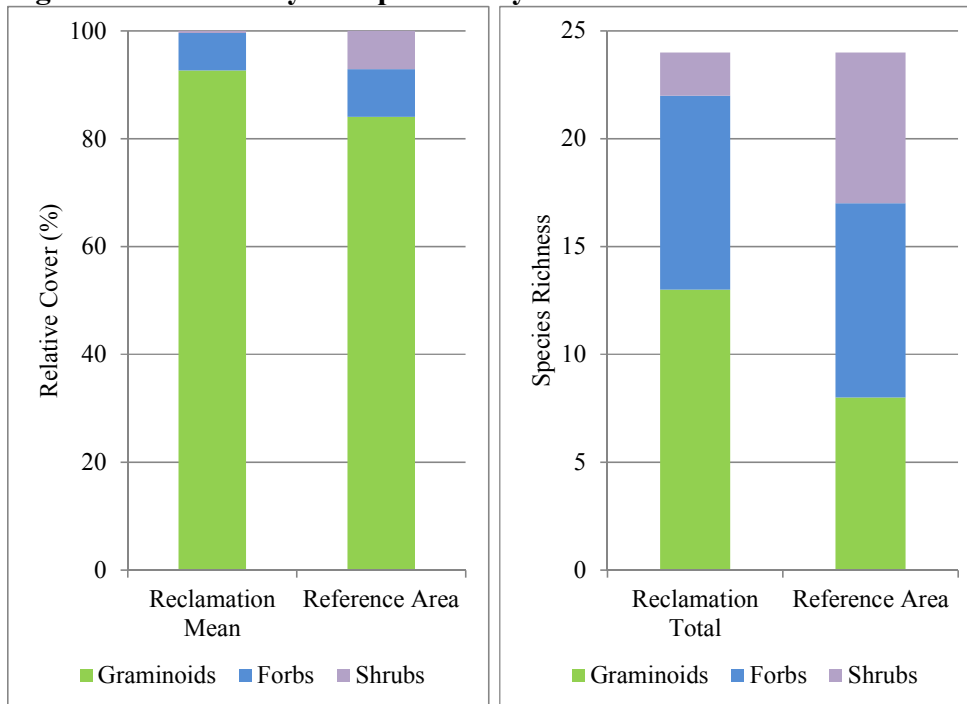
Figure 3: Species Richness in Reclamation and Reference Areas



A total of 24 species were observed along the two reference area transects of which 20 were native. Crested wheatgrass was also observed along one of the reference area transects. The two reference area transects were very similar with 20 species observed along each transect and 12 species in common. The reference area and reclamation areas also had nine species in common of which only five were native and one (crested wheatgrass) was desirable.

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Figure 4: Community Composition by Growth Form in Reclamation and Reference Areas



5.3 Weed Cover

Undesirable species cover ranged from 0% to 13% across the five reclamation monitoring units and averaged 5% overall. A total of nine undesirable species were observed with five of them contributing to the cover data: field brome (*Bromus arvensis*), sweetclover (*Melilotus officianalis*), cheatgrass (*B. tectorum*), kochia (*Kochia scoparia*), and Russian thistle (*Salsola kali*).

On the reference area only three undesirable species were observed, but they contributed 19% of the absolute cover. Cheatgrass made up 15% of the absolute cover on the two reference transects with alyssum (*Alyssum simplex*) and tall tumbled mustard (*Sisymbrium altissimum*) contributing the remaining 4%.

6 Conclusions

The goal of this monitoring effort was to evaluate the interim success and progress of the reclamation activities at the Dowe Flats Quarry. To date no reclamation bond release standards have been set and no areas are ready for release. However, all of the areas monitored appear to be progressing well towards the reclamation goals and compared well to the undisturbed reference area.

In general, the areas seeded with the permanent perennial seed mixture are establishing better than those seeded with the temporary mixture and time since seeding also appears to affect the establishment success. The abundance of species observed that were not a part of the seed mixtures also suggests that the communities are developing and benefiting from colonization from nearby populations. The weed cover at around 5% is manageable, but should continue to be closely monitored and managed to maintain the low presence.

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Appendix A: Raw Monitoring Data

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Reclamation Unit Vegetation Monitoring Data

Genus	Species	Common Name	D-01-PP-1 (Area 9)	D-08-PP-1	D-06-TPG-1 (Area 13)	D-08-PP-2 (Area 12)	D-05-TPG-5 (Area 19)	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)
Graminoid: Annual Undesirable										
Bromus	arvensis	field brome					12	12	2.40	6.06
Bromus	tectorum	cheatgrass	3	1	p			4	0.80	2.02
Subtotal			3	1	0	0	12	16	3.20	8.08
Graminoid: Perennial Desirable										
Agropyron	crisatum	crested wheatgrass	6	p	p		1	7	1.40	3.54
Bromus	inermis	smooth brome		p				0	0.00	0.00
Subtotal			6	0	0	0	1	7	1.40	3.54
Graminoid: Perennial Native										
Achnatherum	hymenoides	Indian ricegrass	3	1	1	p		5	1.00	2.53
Achnatherum	lettermanii	Letterman's needlegrass	1	p		2	34	37	7.40	18.69
Bouteloua	curtipendula	sideoats grama				1		1	0.20	0.51
Bouteloua	dactyloides	buffalograss	5		p	p		5	1.00	2.53
Bouteloua	gracilis	blue grama	2	p				2	0.40	1.01
Elymus	trachycaulus	slender wheatgrass	6	2	4	2		14	2.80	7.07
Nassella	viridula	green needlegrass	15	2	1	p		18	3.60	9.09
Pascopyrum	smithii	Western wheatgrass	4	37	21	13		75	15.00	37.88
Pseudoroegneria	spicata	bluebunch wheatgrass		p	p	2		2	0.40	1.01
Subtotal			36	42	27	20	34	159	31.80	80.30
Total Graminoid Cover			45	43	27	20	47	182	36.40	91.92
Total Desirable Graminoid Cover			36	42	27	20	34	159	31.80	80.30
Total Graminoid Species			9	10	8	8	3	13		
Total Desirable Graminoid Species			7	7	6	8	1	9		
Forbs: Annual Undesirable										
Alyssum	simplex	alyssum					p	0	0.00	0.00
Kochia	scoparia	kochia	2	1	p			3	0.60	1.52
Lactuca	serriola	prickly lettuce		p				0	0.00	0.00
Melilotus	officinalis	sweetclover		3		2		5	1.00	2.53
Salsola	kali	Russian thistle				p	1	1	0.20	0.51
Tragopogon	dubius	yellow salsify			p	p	p	0	0.00	0.00
Subtotal			2	4	0	2	1	9	1.80	4.55
Forbs: Annual Native										
Helianthus	annuus	annual sunflower					p	0	0.00	0.00
Subtotal			0	0	0	0	0	0	0.00	0.00
Forbs: Perennial Undesirable										
Convolvulus	arvensis	field bindweed				p	p	0	0.00	0.00
Subtotal			0	0	0	0	0	0	0.00	0.00
Forbs: Perennial Desirable										
Medicago	sativa	alfalfa	6			p		6	1.20	3.03
Subtotal			6	0	0	0	0	6	1.20	3.03
Total Forb Cover			8	4	0	2	1	15	3.00	7.58
Total Desirable Forb Cover			6	0	0	0	0	0	1.20	3.03
Total Forb Species			2	3	2	5	5	9		
Total Desirable Forb Species			1	0	0	1	1	2		
Shrubs: Perennial Native										
Ericameria	nauseosa	rubber rabbitbrush			p	p	1	1	0.20	0.51
Yucca	glauca	soapweed yucca					p	0	0.00	0.00
Subtotal			0	0	0	0	1	1	0.20	0.51
Total Shrub Cover			0	0	0	0	1	1	0.20	0.51
Total Shrub Species			0	0	1	1	2	2		
Total Vegetation Cover			53	47	27	22	49	198	39.6	100
Total Desirable Vegetation Cover			42	42	27	20	35	160	33.2	83.84
Total Ground Cover			88	89	59	88	99	423	84.6	
Rock			6		6	4		16	3.20	
Litter			29	42	26	62	50	209	41.80	
Bare Ground			12	11	41	12	1	77	15.40	
Total Hits			100	100	100	100	100	500	100.00	
Total Species			11	13	11	14	10	24		
Total Desirable Species			8	7	7	10	4	13		

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Reference Area Vegetation Monitoring Data

Genus	Species	Common Name	Ref 2	Ref 1	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)
Graminoid: Annual Undesirable							
Bromus	arvensis	field brome	p		0	0.00	0.00
Bromus	tectorum	cheatgrass	16	14	30	15.00	26.55
Subtotal			16	14	30	15.00	26.55
Graminoid: Perennial Desirable							
Agropyron	crisatum	crested wheatgrass	p		0	0.00	0.00
Subtotal			0	0	0	0.00	0.00
Graminoid: Perennial Native							
Aristida	purpurea	purple threeawn	1	12	13	6.50	11.50
Bouteloua	dactyloides	buffalograss	p	4	4	2.00	3.54
Bouteloua	gracilis	blue grama	p	3	3	1.50	2.65
Elymus	elymoides	squirreltail	p	3	3	1.50	2.65
Pascopyrum	smithii	Western wheatgrass	33	9	42	21.00	37.17
Subtotal			34	31	65	32.50	57.52
Total Graminoid Cover			50	45	95	47.50	84.07
Total Desirable Graminoid Cover			34	31	65	32.50	57.52
Total Graminoid Species			8	6	8		
Total Desirable Graminoid Species			5	5	5		
Forbs: Annual Undesirable							
Alyssum	simplex	alyssum	3	4	7	3.50	6.19
Sisymbrium	altissimum	tall tumbled mustard	1		1	0.50	0.88
Subtotal			4	4	8	4.00	7.08
Forbs: Perennial Native							
Artemisia	campestris	field sagewort	p	1	1	0.50	0.88
Artemisia	frigida	prairie sagewort		p	0	0.00	0.00
Heterotheca	villosa	false hairy goldenaster	p	p	0	0.00	0.00
Liatris	punctata	dotted blazing star	p		0	0.00	0.00
Lithospermum	sp.	stoneseed	p	p	0	0.00	0.00
Machaeranthera	sp	tansyaster		1	1	0.50	0.88
Sphaeralcea	coccinea	scarlet globemallow		p	0	0.00	0.00
Subtotal			0	2	2	1.00	1.77
Total Forb Cover			4	6	10	5.00	8.85
Total Desirable Forb Cover			0	2	2	1.00	1.77
Total Forb Species			8	9	11		
Total Desirable Forb Species			5	7	8		
Shrubs: Perennial Native							
Ericameria	nauseosa	rubber rabbitbrush	2	1	3	1.50	2.65
Eriogonum	effusum	spreading buckwheat		2	2	1.00	1.77
Gutierrezia	sarothrae	broom snakeweed	p		0	0.00	0.00
Krascheninnikovia	lanata	winterfat		p	0	0.00	0.00
Opuntia	polyacantha	plains pricklypear		1	1	0.50	0.88
Psoralidium	tenuiflorum	slimflower scurfpea	p		0	0.00	0.00
Yucca	glauca	soapweed yucca	1	1	2	1.00	1.77
Subtotal			3	5	8	4.00	7.08
Total Shrub Cover			3	5	8	4.00	7.08
Total Shrub Species			4	5	7		
Total Vegetation Cover			57	56	113	56.5	100
Total Desirable Vegetation Cover			37	38	75	37.5	66.37
Total Ground Cover			94	95	189	94.5	
Rock			1	3	4	2.00	
Litter			36	36	72	36.00	
Bare Ground			6	5	11	5.50	
Total Hits			100	100	200	100.00	
Total Species			20	20	26		
Total Desirable Species			14	17	20		

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Appendix B: Complete Species List

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Complete Species List

Species	Common Name
Graminoid: Annual Undesirable	
<i>Bromus arvensis</i>	field brome
<i>Bromus tectorum</i>	cheatgrass
<i>Eragrostis cilianensis</i>	stinkgrass
Graminoid: Perennial Desirable	
<i>Agropyron cristatum</i>	crested wheatgrass
<i>Bromus inermis</i>	smooth brome
Graminoid: Perennial Native	
<i>Achnatherum hymenoides</i>	Indian ricegrass
<i>Achnatherum lettermanii</i>	Letterman's needlegrass
<i>Aristida purpurea</i>	purple threeawn
<i>Bouteloua curtipendula</i>	sideoats grama
<i>Bouteloua dactyloides</i>	buffalograss
<i>Bouteloua gracilis</i>	blue grama
<i>Elymus elymoides</i>	squirreltail
<i>Elymus trachycaulus</i>	slender wheatgrass
<i>Nassella viridula</i>	green needlegrass
<i>Pascopyrum smithii</i>	Western wheatgrass
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass
Forbs: Annual Undesirable	
<i>Alyssum simplex</i>	alyssum
<i>Kochia scoparia</i>	kochia
<i>Lactuca serriola</i>	prickly lettuce
<i>Melilotus officianalis</i>	sweetclover
<i>Salsola kali</i>	Russian thistle
<i>Sisymbrium altissimum</i>	tall tumbled mustard
<i>Tragopogon dubius</i>	yellow salsify
Forbs: Annual Native	
<i>Helianthus annuus</i>	annual sunflower
Forbs: Perennial Undesirable	
<i>Convolvulus arvensis</i>	field bindweed
Forbs: Perennial Desirable	
<i>Medicago sativa</i>	alfalfa
Forbs: Perennial Native	
<i>Artemisia campestris</i>	field sagewort
<i>Artemisia frigida</i>	prairie sagewort
<i>Eriogonum effusum</i>	spreading buckwheat
<i>Heterotheca villosa</i>	false hairy goldenaster
<i>Liatris punctata</i>	dotted blazing star
<i>Lithospermum sp.</i>	stoneseed
<i>Machaeranthera sp.</i>	tansyaster
<i>Sphaeralcea coccinea</i>	scarlet globemallow
Shrubs: Perennial Native	
<i>Ericameria nauseosa</i>	rubber rabbitbrush
<i>Gutierrezia sarothrae</i>	broom snakeweed
<i>Krascheninnikovia lanata</i>	winterfat
<i>Opuntia polyacantha</i>	plains pricklypear
<i>Psoralidium tenuiflorum</i>	slimflower scurfpea
<i>Yucca glauca</i>	soapweed yucca

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Appendix C: Monitoring Photos

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Reclamation Areas



D-01-PP-1 (Area 9)



D-05-TPG-5 (Area 19)

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D-06-TPG-1 (Area 13)



D-08-PP-1

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D-08-PP-2 (Area 12)

Reference Area





Dowe Flats Quarry 2012 Reclamation Monitoring Report

February 26, 2013

Submitted to:

*Denise Arthur
Environmental Manager
Cemex USA
5134 Ute Rd
Longmont, CO 80503*

Prepared by:



*14 Inverness Dr East, Ste A100
Englewood, CO 80112
www.habitatmanagementinc.com*

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1 Overview

The Dowe Flats Quarry Special Use Permit area at the Cemex Lyons Plant near Lyons, CO is being actively mined and concurrently reclaimed. Over 200 acres within the permit area have been reclaimed during the past 14 years using a variety of methods and techniques. On October 23, 2012, several reclamation areas were monitored to evaluate their success and inform maintenance needs prior to establishing eligibility for bond release. Five different areas reclaimed in the past 10 years were evaluated for vegetation cover, diversity, and weed abundance (Map 1). Additionally, an undisturbed native reference area was monitored for comparison.

These data are intended to show general success of reclamation areas throughout the Dowe Flat Quarry and their progress toward the long-term reclamation goal of native grassland habitat similar to pre-agricultural disturbance. Habitat Management, Inc. used the evaluation methods outlined in the Dowe Flats Special Land Use Permit (SU-93-14) Fifteen Year Interim Review.

2 Reclamation History

An historical summary of Cemex's reclamation and related land management activities was compiled for each reclamation area (Table 1). Historic information included growth media, fertility amendments, mulch applications, seed mixes, revegetation dates, and other associated post-reclamation management and vegetation establishment activities.

3 Reference Area Selection

An ecologically equivalent reference area was selected in the field to the west of the quarry on the "Fee Title Partition Agreement" area leased from Boulder County and managed by Boulder County Open Space. This site was established outside of the mine's affected area to ensure that it will remain undisturbed by mining, but close enough to the reclamation areas to ensure that it is subject to a similar climate. The reference area was selected to have similar soil type, topography, and wildlife access to the reclamation areas as well as exhibiting a desirable native perennial plant community similar to that desired on the final reclamation.

4 Vegetation Monitoring Methods

Quantitative monitoring methods were used to evaluate vegetation communities established on reclamation areas and the reference area. Vegetation parameters included total ground cover, total vegetation cover, desirable and native species cover, weed cover, and plant species diversity. Vegetation monitoring was conducted by a Vegetation Expert from Habitat Management Inc. with over 10 years of experience evaluating vegetation in the region.

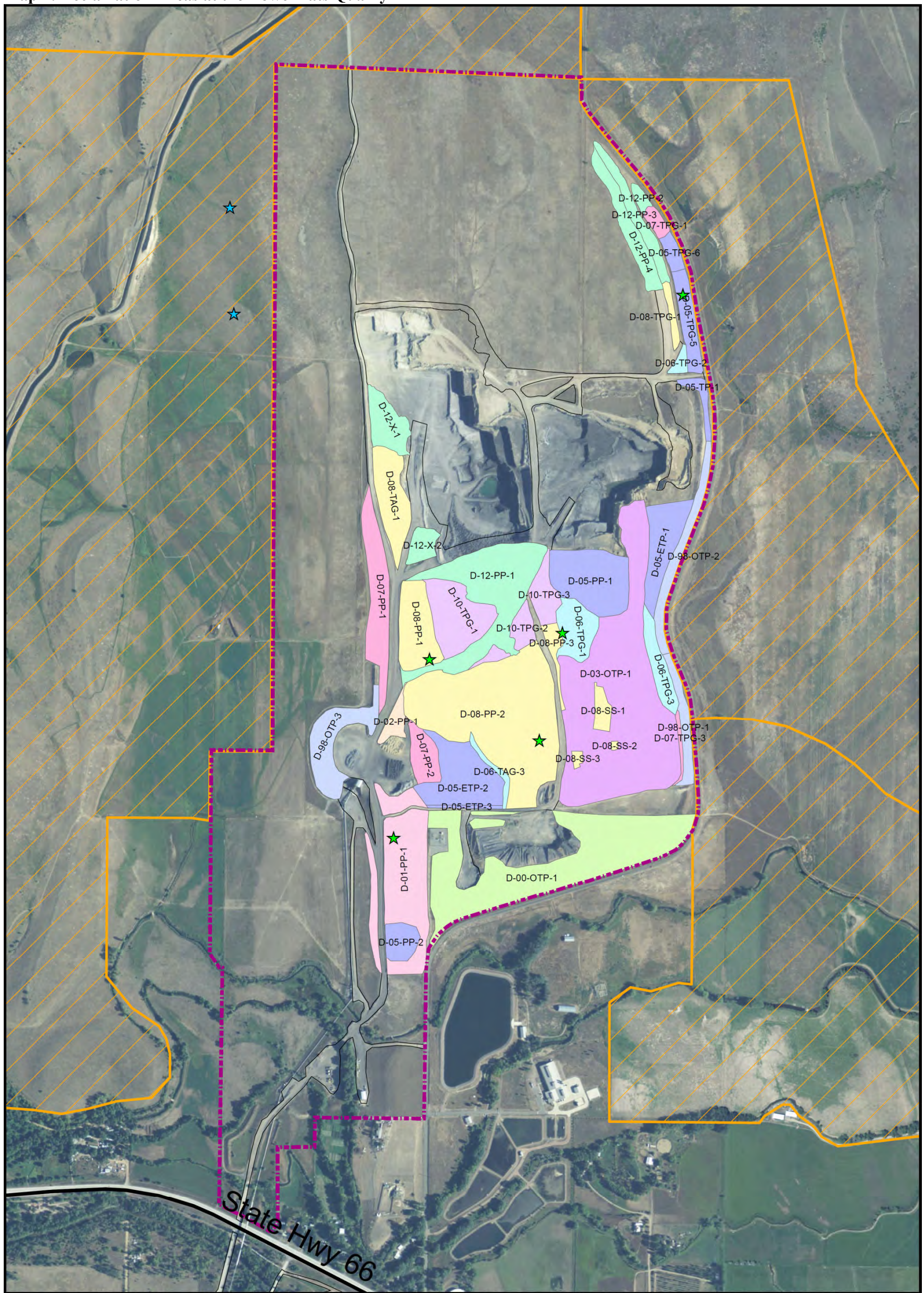
4.1 *Transect Sample Locations*

Five reclamation units were selected for quantitative monitoring in 2011 and these same locations were monitored again in 2012.

- D-01-PP-1: Reclaimed in 2001 with the Permanent Perennial Seed Mixture
- D-05-TPG-5: Reclaimed in 2005 with the Temporary Perennial Grass Seed Mixture
- D-06-TPG-1: Reclaimed in 2006 with the Temporary Perennial Grass Seed Mixture
- D-08-PP-1: Originally reclaimed in 2005 and re-treated in 2008 with the Permanent Perennial Seed Mixture
- D-08-PP-2: Reclaimed in 2008 with the Permanent Perennial Seed Mixture

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Map 1: Reclamation Areas at the Dowe Flats Quarry



Legend		Year of Reclamation			CEMEX Dowe Flats Quarry 2012 Reclamation Monitoring Lyons Plant, Lyons, Colorado	
<ul style="list-style-type: none"> Reclamation Monitoring Location Reference Monitoring Location Quarry Mining Boundary Permit Boundary 	<ul style="list-style-type: none"> 1997-1998 1999-2000 2000-2001 	<ul style="list-style-type: none"> 2001-2002 2002-2003 2005 2006 	<ul style="list-style-type: none"> 2007 2008 2010 2012 			
Drawn By: R.F.B.					Date: February 26, 2013	

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Table 1: Reclamation Unit History

Reclamation Unit	Year(s)	Acres	Soil	Seed		Fertilizer		Mulch		Notes
				Mix*	Method	Type (N-P-K)	Rate (lbs/acre)	Type	Rate (lbs/acre)	
D-98-OTP-3	1997-1998	5.56	Topsoil	OTP	Drill	18-46-0	100	Straw	2000	
D-98-OTP-1	1997-1998	2.70	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	
D-98-OTP-2	1997-1998	3.47	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	
D-00-OTP-1	1999-2000	25.10	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	Partially used for borrow in 2010
D-01-PP-1	2000-2001	13.69	Subsoil	PP	Drill	18-46-0	100	Straw	2000	Small area reseeded in 2005
D-02-PP-1	2001-2002	1.29	Subsoil	PP	Drill	18-46-0	100	Straw	2000	End was removed for haul road
D-03-OTP-1	2002-2003	33.93	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	Several parts re-disturbed and/or re-seeded
D-05-ETP-2	2005	7.24	Subsoil	ETP	Drill	18-46-0	100	Hay	2000 (2006)	Several parts re-disturbed and/or re-seeded
D-05-ETP-1	2005	5.04	Subsoil	ETP	Drill	18-46-0	100	Hay	2000 (2006)	
D-05-ETP-3	2005	0.45	Subsoil	ETP	Drill	18-46-0	100	Hay	2000 (2006)	
D-05-PP-1	2005	7.90	Backfill	PP	Drill	18-46-0	100	Hay	2000 (2006)	Southern tip re-reclaimed in 2006
D-05-PP-2	2005	2.05	Subsoil	PP	Drill	18-46-0	100	Hay	2000 (2006)	Originally reclaimed in 2001
D-05-TPG-1	2005	1.04	Subsoil	TPG	Drill	18-46-0	100	Hay	2000 (2006)	Several parts re-disturbed and/or re-seeded
D-05-TPG-5	2005	2.77	Topsoil	TPG	Drill	18-46-0	100	Hay	2000 (2006)	Stockpile
D-05-TPG-6	2005	1.00	Subsoil	TPG	Drill	18-46-0	100	Hay	2000 (2006)	Stockpile
D-06-TAG-3	2006	0.79	Subsoil	TAG	Broadcast	18-46-0	100	Hay	2000	Originally reclaimed in 2005
D-06-TPG-1	2006	3.55	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	Part originally reclaimed in 2005
D-06-TPG-3	2006	2.64	Subsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Originally reclaimed in 2003
D-06-TPG-2	2006	0.58	Topsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Stockpile
D-07-PP-1	2007	6.47	Subsoil	PP	Broadcast	18-46-0	100	Hay	2000	
D-07-PP-2	2007	2.53	Subsoil	PP	Broadcast	18-46-0	100	Hay	2000	
D-07-TPG-3	2007	0.44	Subsoil	TPG	Broadcast	18-46-0	100	Hay	2000	
D-07-TPG-1	2007	0.83	Topsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Stockpile
D-08-PP-1	2008	5.38	Subsoil	PP	Broadcast	18-46-0	100	Hay	2000	
D-08-PP-3	2008	1.15	Backfill	PP	Broadcast	18-46-0	100	Hay	2000	Originally reclaimed in 2003
D-08-PP-2	2008	26.46	Backfill	PP	Broadcast	18-46-0	100	Hay	2000	Southern part originally reclaimed in 2005
D-08-SS-1	2008	1.54	Subsoil	SS	Broadcast	Humega		Hay	2000	Originally reclaimed in 2003
D-08-SS-2	2008	0.11	Subsoil	SS	Broadcast	Humega		Hay	2000	Originally reclaimed in 2003
D-08-SS-3	2008	0.28	Subsoil	SS	Broadcast	Humega		Hay	2000	Originally reclaimed in 2003
D-08-TAG-1	2008	5.22	Backfill	TAG	Broadcast	18-46-0	100	Hay	2000	
D-08-TPG-1	2008	0.83	Subsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Stockpile
D-10-TPG-3	2010	2.40	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	
D-10-TPG-2	2010	2.06	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	
D-10-TPG-1	2010	6.42	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	
D-12-X-1	2012	3.32	Backfill	None	n/a	None	n/a	None	n/a	
D-12-X-2	2012	1.56	Backfill	None	n/a	None	n/a	None	n/a	
D-12-PP-1	2012	13.01	Subsoil	PP	Broadcast	11-28-23	260	Hay	2000	Part originally reclaimed in 2010
D-12-PP-3	2012	2.75	Subsoil	PP	Broadcast	11-28-23	260	Hay	2000	Stockpile
D-12-PP-2	2012	0.57	Subsoil	PP	Broadcast	11-28-23	260	Hay	2000	Stockpile
D-12-PP-4	2012	3.66	Subsoil	PP	Broadcast	11-28-23	260	Hay	2000	Stockpile

* OTP=Original Temporary Perennial; PP=Permanent Perennial; TPG=Temporary Perennial Grass; ETP=Extended Temporary Perennial; TAG=Temporary Annual Grass; SS=Shrubs Only

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Within each reclamation unit, one transect was located in an area that was representative of the overall plant community within the reclamation unit as determined by the vegetative expert. Each transect was oriented in a subjectively chosen compass direction (azimuth), and the azimuth was recorded.

Two transects were also established in the reference area using the same methods. Both reference area transects were located approximately 400 ft west of the Mining Boundary and approximately 1,000 ft from each other.

4.2 Monitoring Methods

4.2.1 Vegetation Cover

Line-transect point-intercept methods were used to collect vegetation and ground cover data. A two-point laser frame (with the laser points set horizontally 0.5 meters on either side of the transect) was used to take two ground cover measurements at 1-meter intervals along a 50-meter line-transect for a total of 100 points per transect. Cover measurements recorded “first-hit” point-intercepts by living plant species, litter, rock, or bare ground. Litter included all organic material that was produced previous to the current growing season. Rock fragments were recorded when particle size was equal to or greater than one square centimeter. Percent total vegetative cover and total ground cover were calculated from the line-transect point-intercept data.

4.2.2 Species Diversity and Frequency

All species occurring within one meter on either side of each cover transect (100 m² area) were recorded as a measure of species frequency and diversity. All species not immediately identifiable to the observers were collected for later identification and special care was taken to look for species of special concern. A species list was developed including scientific and common names, life forms, life cycles, and desirability (Appendix B). Species were designated as native, desirable, or undesirable. Desirable species include not only native regionally adapted species, but also those non-native species that had been included in a Colorado Division of Reclamation Mining and Safety (DRMS) approved seed mixture. These species lists along with the point-intercept data were used to determine species composition, diversity, and frequency on the reclamation areas.

4.2.3 Photographs

In addition to the cover and diversity data, a photograph was taken of each transect. Photographs were taken at an approximate height of 5 feet and were oriented along the length of the transect from the starting point.

5 Results

All vegetation monitoring data for both the reclamation units and the reference areas are presented in Appendix A and summarized in Table 2. A complete species list is attached as Appendix B. All transect photos are included in Appendix C.

5.1 Vegetation Cover

Total vegetation cover on the reclamation areas ranged from 24% on the D-06-TPG-1 site to 38% on the D-05-TPG-5 site with an average of $33 \pm 2.5\%$ (mean \pm SE) across all 5 sites (Table 2, Figure 1). Native vegetation cover on the reclamation areas ranged from 24% on the D-06-

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TPG-1 site to 36% on the D-08-PP-2 site with an average of $30 \pm 2.2\%$ across all 5 sites. When non-native desirable species were added to the native species, total desirable cover averaged $32 \pm 2.2\%$.

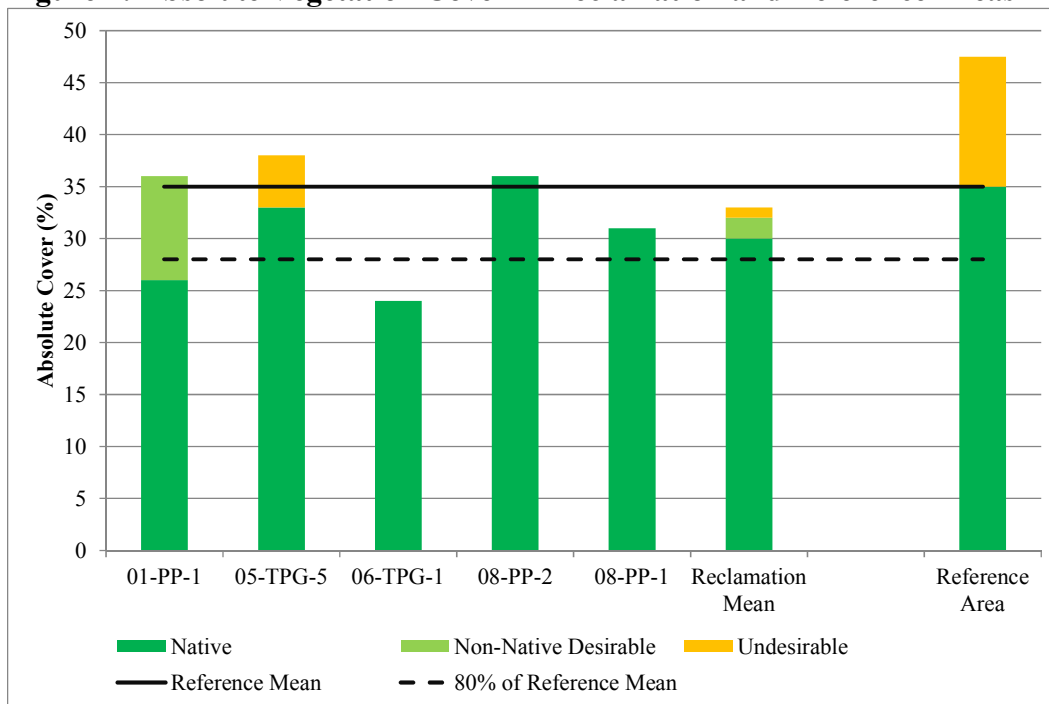
Total vegetation cover on the reference area averaged $47.5 \pm 2.5\%$ and cover of native species averaged $35 \pm 2.0\%$ (Table 2, Figure 1). No non-native desirable species were encountered during cover sampling on the reference areas. A measure sometimes used by the DRMS for bond release is that a reclamation area should have cover within 80% of the reference area. By this measure four of the five reclamation areas monitored and the average of all reclamation areas would meet the standard (Figure 1).

Table 2: Reclamation Data Summary 2011 & 2012

	Reclamation Units				Reference Area			
	2011		2012		2011		2012	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Absolute Cover								
<i>Graminoids</i>	36.4	5.4	30.6	2.5	47.5	2.5	40.5	0.5
<i>Forbs</i>	3.0	1.4	2.4	1.9	5.0	1.0	2.5	0.5
<i>Shrubs</i>	0.2	0.2	0.0	0.0	4.0	1.0	4.5	1.5
<i>Native</i>	32.0	3.8	30.0	2.2	37.5	0.5	35.0	2.0
<i>Non-Native Desirable</i>	2.6	2.4	2.0	2.0	0.0	0.0	0.0	0.0
<i>Undesirable</i>	5.0	2.2	1.0	1.0	19.0	1.0	12.5	0.5
<i>All Vegetation</i>	39.6	6.3	33.0	2.5	56.5	0.5	47.5	2.5
<i>Ground Cover</i>	84.6	6.7	89.0	2.5	94.5	0.5	96.5	1.5
<i>Litter/Rock</i>	45.0	6.1	56.0	1.1	38.0	1.0	49.0	1.0
<i>Bare</i>	15.4	6.7	11.0	2.5	5.5	0.5	3.5	1.5
Relative Cover								
<i>Graminoids</i>	92.6		92.7		84.1		85.3	
<i>Forbs</i>	6.9		7.3		8.8		5.3	
<i>Shrubs</i>	0.4		0.0		7.1		9.5	
<i>Native</i>	83.9		90.9		66.4		73.7	
<i>Non-Native Desirable</i>	4.9		6.1		0.0		0.0	
<i>Undesirable</i>	11.1		3.0		33.6		26.3	
Species Richness								
<i>Graminoids</i>	13		12		8		9	
<i>Forbs</i>	9		11		9		9	
<i>Shrubs</i>	2		3		7		5	
<i>Native</i>	12		15		20		18	
<i>Non-Native Desirable</i>	3		2		1		0	
<i>Undesirable</i>	9		9		3		5	
<i>All Vegetation</i>	24		26		24		23	

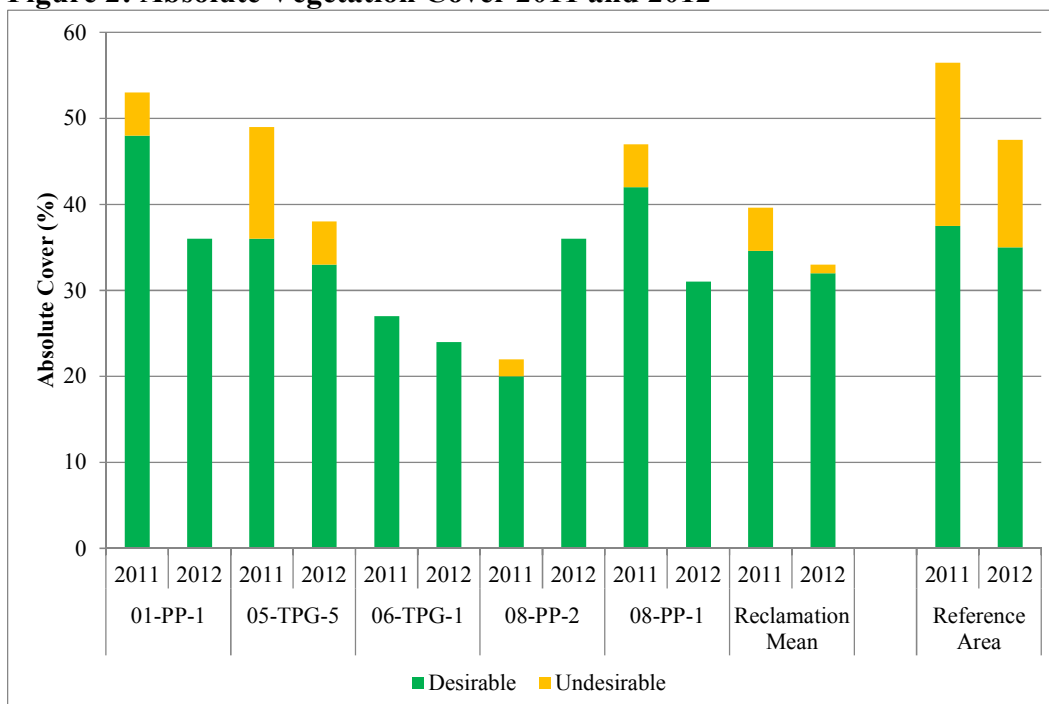
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Figure 1: Absolute Vegetation Cover in Reclamation and Reference Areas



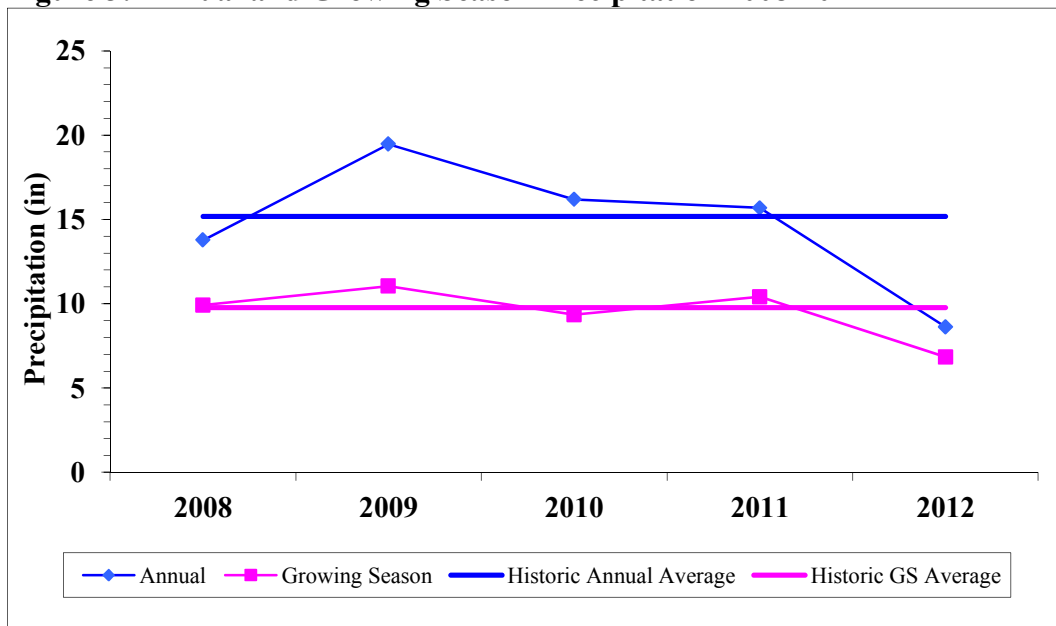
Total and desirable vegetation cover decreased in all but one reclamation units (D-08-PP-2) as well as the reference area from 2011 to 2012 (Figure 2). The general decrease could be explained by much lower than average precipitation in 2012 (Figure 3). This also illustrates the importance of using a reference area for monitoring, because the drought conditions affected both the reclamation and the reference area.

Figure 2: Absolute Vegetation Cover 2011 and 2012



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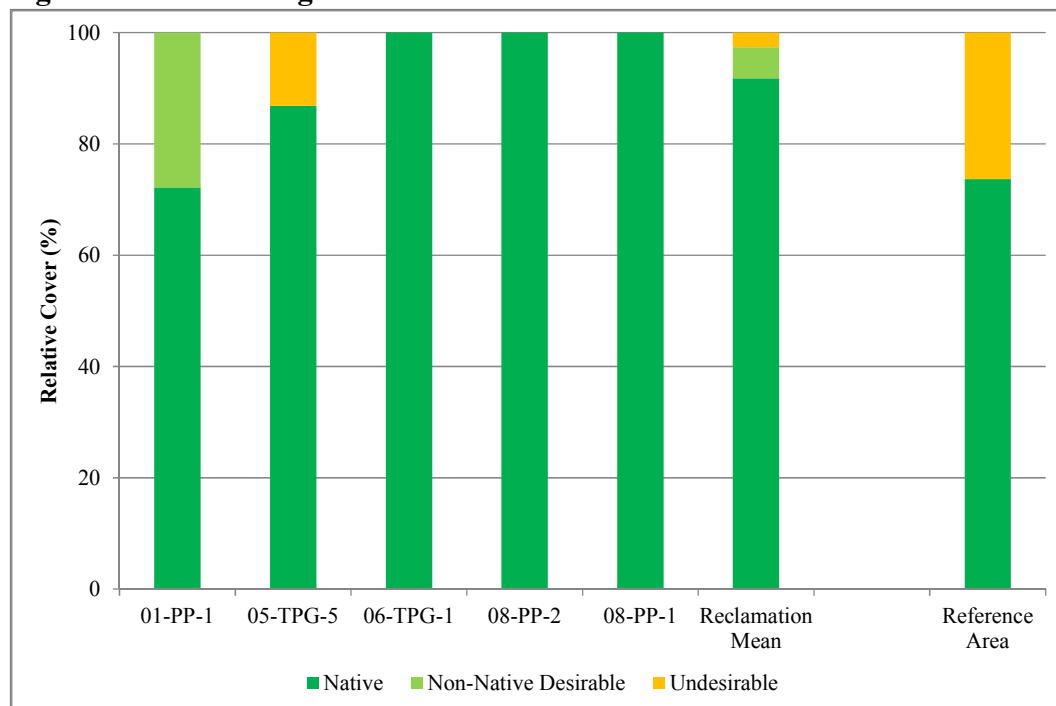
Figure 3: Annual and Growing Season Precipitation 2008-2012



* Data from Western Regional Climate Center Flatiron Reservoir Climate Station (www.wrcc.dri.edu).

The relative cover of the reclamation areas averaged 91% native, 6% non-native desirable and only 3% undesirable (Table 2, Figure 4). However, on the reference area relative native cover was only 74% while undesirable species made up the other 26%. Only one reclamation unit (D-05-TPG-5) exhibited any undesirable species cover and all reclamation units exhibited a greater relative cover of desirable species than the reference area.

Figure 4: Relative Vegetation Cover in Reclamation and Reference Areas

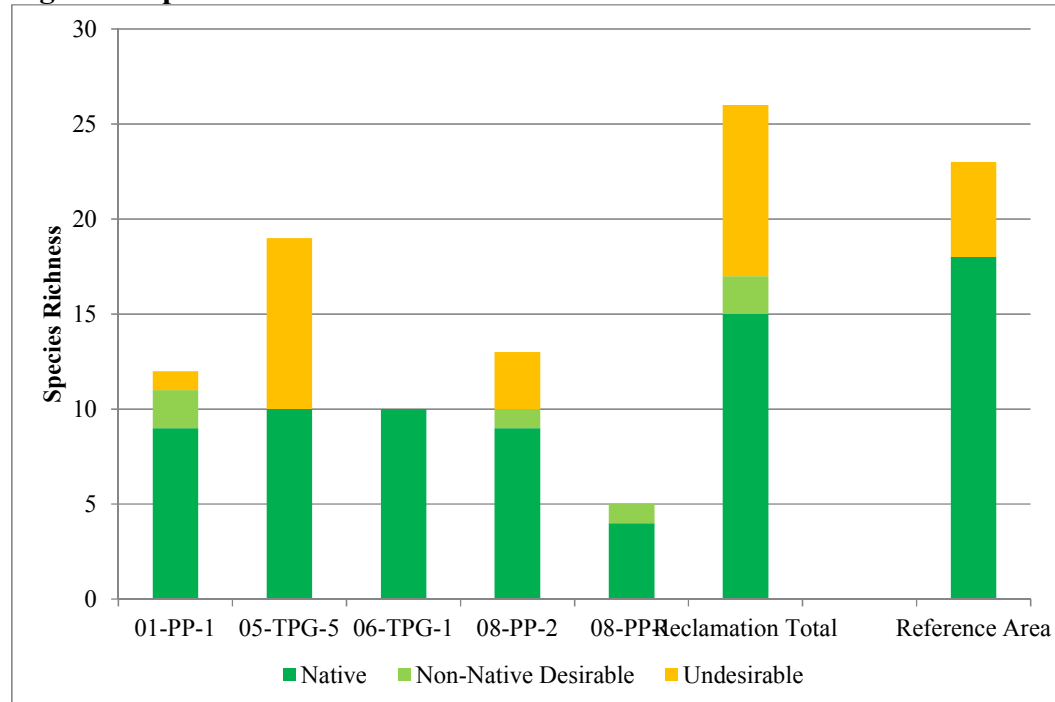


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5.2 Species Diversity and Frequency

A total of 26 species were observed along the five reclamation area transects, of which 15 were native and another two were desirable (Figure 5, Appendix B). Non-native desirable species included crested wheatgrass (*Agropyron cristatum*) and alfalfa (*Medicago sativa*). Five to 19 species were observed within each reclamation area and only Western wheatgrass (*Pascopyrum smithii*) was observed in all 5 areas. Four more grass species were observed in all but one reclamation unit: Indian ricegrass (*Achnatherum hymenoides*), Letterman's needlegrass (*A. lettermanii*), green needlegrass (*Nassella viridula*), and sideoats grama (*Bouteloua curtipendula*).

Figure 5: Species Richness in Reclamation and Reference Areas

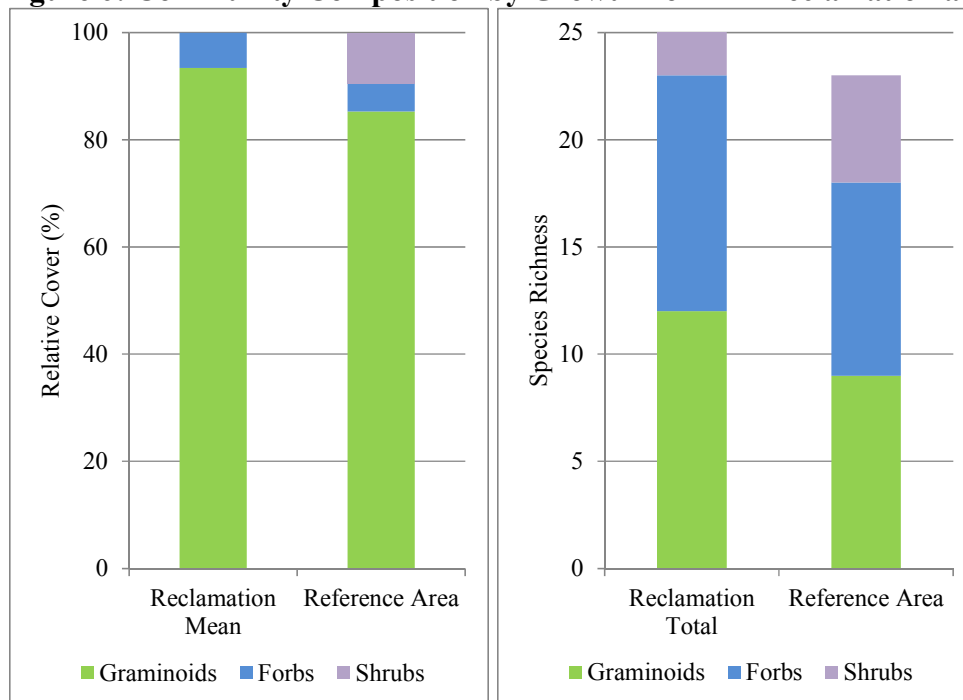


A total of 23 species were observed along the two reference area transects of which 18 were native. The two reference area transects were very similar with 12 species in common. The reference area and reclamation areas also had 12 species in common of which seven were native (five grasses and two shrubs), and five were undesirable (two grasses and three forbs). Western wheatgrass was the only species observed along all transects monitored in both the reclamation and reference areas.

The reclamation areas are beginning to develop a similar species composition to the undisturbed reference areas (Figure 6). However, the relative abundance of the various growth forms (grasses, forbs, and shrubs) requires further development. The shrub component of the reclamation community is the last to develop due to the slow growth of these species, but the presence of these species in the community suggests that they will develop.

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Figure 6: Community Composition by Growth Form in Reclamation and Reference Areas



5.3 Weed Cover

Undesirable species cover ranged from 0% to 5% across the five reclamation monitoring units and averaged only 1% overall. A total of nine undesirable species were observed with only three of them contributing to the cover data: cheatgrass (*B. tectorum*), alyssum (*Alyssum simplex*), and field bindweed (*Convolvulus arvensis*). Overall undesirable cover has decreased slightly since 2011 (Figure 2).

Five of these undesirable species were also observed on the reference area, but there they contributed 12.5% of the absolute cover. Cheatgrass made up 11% of the absolute cover on the reference transects with field bindweed contributing the remaining 1.5%. The other three species observed were field brome (*B. arvensis*), alyssum, and Dalmatian toadflax (*Linaria dalmatica*).

Four of the undesirable species observed are listed as noxious weeds by the State of Colorado. Dalmatian toadflax and musk thistle (*Carduus nutans*) are both B-List plants whose continued spread must be stopped, while cheatgrass and field bindweed are C-List species which are recommended control species. While the musk thistle was only observed on reclamation units, the other three species were observed in both the reclamation units and the reference areas.

6 Conclusions

The goal of this monitoring effort was to evaluate the interim success and progress of the reclamation activities at the Dowe Flats Quarry. To date no reclamation bond release standards have been set and no areas are ready for release. However, all of the areas monitored appear to be progressing well towards the reclamation goals and compared well to the undisturbed reference area.

In general, the areas seeded with the permanent perennial seed mixture appear to be establishing better than those seeded with the temporary mixture, but it is difficult to draw definitive

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conclusions with a small sample size. The abundance of species observed that were not a part of the seed mixtures also suggests that the communities are developing and benefiting from colonization from nearby populations. The noxious weed cover is manageable in its current state, but aggressive action should be taken to keep populations low or ideally eradicate them. The weed cover on the reference areas should also be a priority for management, and it is recommended that Cemex partner with Boulder County Open Space to prevent the spread of these weeds onto Cemex property.

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Appendix A: Raw Monitoring Data

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Reclamation Unit Vegetation Monitoring Data

Genus	Species	Common Name	D-01-PP-1	D-08-PP-1	D-06-TPG-1	D-08-PP-2	D-05-TPG-5	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)
Graminoid: Annual Undesirable										
Bromus	arvensis	field brome	p				p	0	0.00	0.00
Bromus	tectorum	cheatgrass					3	3	0.60	1.82
Subtotal			0	0	0	0	3	3	0.60	1.82
Graminoid: Perennial Desirable										
Agropyron	crisatum	crested wheatgrass	p					0	0.00	0.00
Subtotal			0	0	0	0	0	0	0.00	0.00
Graminoid: Perennial Native										
Achnatherum	hymenoides	Indian ricegrass	p		1	p	1	2	0.40	1.21
Achnatherum	lettermanii	Letterman's needlegrass	7		4	1	24	36	7.20	21.82
Bouteloua	curtipendula	sideoats grama	8		1	5	p	14	2.80	8.48
Bouteloua	dactyloides	buffalograss	1		p			1	0.20	0.61
Bouteloua	gracilis	blue grama	p	p	1			1	0.20	0.61
Elymus	trachycaulus	slender wheatgrass		p	1	2		3	0.60	1.82
Nassella	viridula	green needlegrass	p	p		5	1	6	1.20	3.64
Pascopyrum	smithii	Western wheatgrass	10	31	15	23	7	86	17.20	52.12
Pseudoroegneria	spicata	bluebunch wheatgrass			1	p		1	0.20	0.61
Subtotal			26	31	24	36	33	150	30.00	90.91
Total Graminoid Cover			26	31	24	36	36	153	30.60	92.73
Total Desirable Graminoid Cover			26	31	24	36	33	150	30.00	90.91
Total Graminoid Species			9	4	8	7	7	12		
Total Desirable Graminoid Species			8	4	8	7	5	10		
Forbs: Annual Undesirable										
Alyssum	simplex	alyssum					1	1	0.20	0.61
Lactuca	serriola	prickly lettuce					p	0	0.00	0.00
Salsola	kali	Russian thistle				p	p	0	0.00	0.00
Tragopogon	dubius	yellow salsify					p	0	0.00	0.00
Subtotal			0	0	0	0	1	1	0.20	0.61
Forbs: Annual Native										
Helianthus	annuus	annual sunflower				p	p	0	0.00	0.00
Subtotal			0	0	0	0	0	0	0.00	0.00
Forbs: Perennial Undesirable										
Carduus	nutans	musk thistle				p	p	0	0.00	0.00
Convolvulus	arvensis	field bindweed				p	1	1	0.20	0.61
Linaria	dalmatica	Dalmatian toadflax					p	0	0.00	0.00
Subtotal			0	0	0	0	1	1	0.20	0.61
Forbs: Perennial Desirable										
Medicago	sativa	alfalfa	10	p		p		10	2.00	6.06
Subtotal			10	0	0	0	0	10	2.00	6.06
Forbs: Perennial Native										
Argemone	polyanthemos	crested pricklypoppy					p	0	0.00	0.00
Linum	lewisii	blue flax	p				p	0	0.00	0.00
Subtotal			0	0	0	0	0	0	0.00	0.00
Total Forb Cover			10	0	0	0	2	12	2.40	7.27
Total Desirable Forb Cover			10	0	0	0	0	10	2.00	6.06
Total Forb Species			2	1	0	5	10	11		
Total Desirable Forb Species			2	1	0	2	3	4		
Shrubs: Perennial Native										
Ericameria	nauseosa	rubber rabbitbrush			p		p	0	0.00	0.00
Gutierrezia	sarothrae	broom snakeweed	p		p		p	0	0.00	0.00
Psoralidium	tenuiflorum	slimflower scurfpea				p		0	0.00	0.00
Subtotal			0	0	0	0	0	0	0.00	0.00
Total Shrub Cover			0	0	0	0	0	0	0.00	0.00
Total Shrub Species			1	0	2	1	2	3		
Total Vegetation Cover			36	31	24	36	38	165	33	100
Total Desirable Vegetation Cover			36	31	24	36	33	160	32	96.97
Total Ground Cover			91	86	82	89	97	445	89	
Rock			9	4	5	5		23	4.60	
Litter			46	51	53	48	59	257	51.40	
Bare Ground			9	14	18	11	3	55	11.00	
Total Hits			100	100	100	100	100	500	100.00	
Total Species			12	5	10	13	19	26		
Total Desirable Species			11	5	10	10	10	17		

Cemex Dowe Flats Quarry 2012 Reclamation Monitoring Report

Reference Area Vegetation Monitoring Data

Genus	Species	Common Name	Ref 2	Ref 1	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)
Graminoid: Annual Undesirable							
Bromus	arvensis	field brome		p	0	0.00	0.00
Bromus	tectorum	cheatgrass	10	12	22	11.00	23.16
Subtotal			10	12	22	11.00	23.16
Graminoid: Perennial Native							
Achnatherum	hymenoides	Indian ricegrass	2		2	1.00	2.11
Aristida	purpurea	purple threeawn	p		0	0.00	0.00
Bouteloua	curtipendula	sideoats grama		p	0	0.00	0.00
Bouteloua	dactyloides	buffalograss		p	0	0.00	0.00
Bouteloua	gracilis	blue grama	3	24	27	13.50	28.42
Elymus	elymoides	squirreltail		1	1	0.50	1.05
Pascopyrum	smithii	Western wheatgrass	26	3	29	14.50	30.53
Subtotal			31	28	59	29.50	62.11
Total Graminoid Cover			41	40	81	40.50	85.26
Total Desirable Graminoid Cover			31	28	59	29.50	62.11
Total Graminoid Species			5	7	9		
Total Desirable Graminoid Species			4	5	7		
Forbs: Annual Undesirable							
Alyssum	simplex	alyssum	p	p	0	0.00	0.00
Subtotal			0	0	0	0.00	0.00
Forbs: Perennial Undesirable							
Convolvulus	arvensis	field bindweed	3	p	3	1.50	3.16
Linaria	dalmatica	Dalmatian toadflax	p		0	0.00	0.00
Subtotal			3	0	3	1.50	3.16
Forbs: Perennial Native							
Artemisia	campestris	field sagewort	p	2	2	1.00	2.11
Artemisia	ludoviciana	white sagebrush	p		0	0.00	0.00
Heterotheca	villosa	false hairy goldenaster	p	p	0	0.00	0.00
Machaeranthera	sp.	tansyaster	p	p	0	0.00	0.00
Sphaeralcea	coccinea	scarlet globemallow		p	0	0.00	0.00
Unknown	Asteraceae	unknown aster	p		0	0.00	0.00
Subtotal			0	2	2	1.00	2.11
Total Forb Cover			3	2	5	2.50	5.26
Total Desirable Forb Cover			0	2	2	1.00	2.11
Total Forb Species			8	6	9		
Total Desirable Forb Species			5	4	6		
Shrubs: Perennial Native							
Ericameria	nauseosa	rubber rabbitbrush	5	2	7	3.50	7.37
Eriogonum	effusum	spreading buckwheat		1	1	0.50	1.05
Opuntia	polyacantha	plains pricklypear	p	p	0	0.00	0.00
Psoralidium	tenuiflorum	slimflower scurfpea	p	p	0	0.00	0.00
Yucca	glauca	soapweed yucca	1	p	1	0.50	1.05
Subtotal			6	3	9	4.50	9.47
Total Shrub Cover			6	3	9	4.50	9.47
Total Shrub Species			4	5	5		
Total Vegetation Cover			50	45	95	47.5	100
Total Desirable Vegetation Cover			37	33	70	35	73.68
Total Ground Cover			98	95	193	96.5	
Rock				2	2	1.00	
Litter			48	48	96	48.00	
Bare Ground			2	5	7	3.50	
Total Hits			100	100	200	100.00	
Total Species			17	18	23		
Total Desirable Species			13	14	18		

Cemex Dowe Flats Quarry 2012 Reclamation Monitoring Report

Appendix B: Complete Species List

Cemex Dowe Flats Quarry 2012 Reclamation Monitoring Report

Complete Species List

Species	Common Name	Reclamation Area		Reference Area	
		2011	2012	2011	2012
Graminoid: Annual Undesirable					
<i>Bromus arvensis</i>	field brome	x	x	x	x
<i>Bromus tectorum</i>	cheatgrass	x	x	x	x
Graminoid: Perennial Desirable					
<i>Agropyron cristatum</i>	crested wheatgrass	x	x	x	
<i>Bromus inermis</i>	smooth brome	x			
Graminoid: Perennial Native					
<i>Achnatherum hymenoides</i>	Indian ricegrass	x	x		x
<i>Achnatherum lettermanii</i>	Letterman's needlegrass	x	x		
<i>Aristida purpurea</i>	purple threeawn			x	x
<i>Bouteloua curtipendula</i>	sideoats grama	x	x		x
<i>Bouteloua dactyloides</i>	buffalograss	x	x	x	x
<i>Bouteloua gracilis</i>	blue grama	x	x	x	x
<i>Elymus elymoides</i>	squirreltail			x	x
<i>Elymus trachycaulus</i>	slender wheatgrass	x	x		
<i>Nassella viridula</i>	green needlegrass	x	x		
<i>Pascopyrum smithii</i>	Western wheatgrass	x	x	x	x
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	x	x		
Forbs: Annual Undesirable					
<i>Alyssum simplex</i>	alyssum	x	x	x	x
<i>Kochia scoparia</i>	kochia	x			
<i>Lactuca serriola</i>	prickly lettuce	x	x		
<i>Melilotus officianalis</i>	sweetclover	x			
<i>Salsola kali</i>	Russian thistle	x	x		
<i>Sisymbrium altissimum</i>	tall tumbled mustard			x	
<i>Tragopogon dubius</i>	yellow salsify	x	x		
Forbs: Annual Native					
<i>Helianthus annuus</i>	annual sunflower	x	x		
Forbs: Perennial Undesirable					
<i>Carduus nutans</i>	musk thistle		x		
<i>Convolvulus arvensis</i>	field bindweed	x	x		x
<i>Linaria dalmatica</i>	Dalmatian toadflax		x		x
Forbs: Perennial Desirable					
<i>Medicago sativa</i>	alfalfa	x	x		
Forbs: Perennial Native					
<i>Argemone polyanthemus</i>	crested pricklypoppy		x		
<i>Artemisia campestris</i>	field sagewort			x	x
<i>Artemisia frigida</i>	prairie sagewort			x	
<i>Artemisia ludoviciana</i>	white sagebrush				x
<i>Eriogonum effusum</i>	spreading buckwheat			x	x
<i>Heterotheca villosa</i>	false hairy goldenaster			x	x
<i>Liatris punctata</i>	dotted blazing star			x	
<i>Linum lewisii</i>	blue flax		x		
<i>Lithospermum sp.</i>	stoneseed			x	
<i>Machaeranthera sp</i>	tansyaster			x	x
<i>Sphaeralcea coccinea</i>	scarlet globemallow			x	x
Unknown Asteraceae	unknown aster				x
Shrubs: Perennial Native					
<i>Ericameria nauseosa</i>	rubber rabbitbrush	x	x	x	x
<i>Gutierrezia sarothrae</i>	broom snakeweed		x	x	
<i>Krascheninnikovia lanata</i>	winterfat			x	
<i>Opuntia polyacantha</i>	plains pricklypear			x	x
<i>Psoralidium tenuiflorum</i>	slimflower scurfpea		x	x	x
<i>Yucca glauca</i>	soapweed yucca	x		x	x

Cemex Dowe Flats Quarry 2012 Reclamation Monitoring Report

Appendix C: Monitoring Photos

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Reclamation Units

D-01-PP-1 (Area 9)

2011



2012



D-05-TPG-5 (Area 19)

2011



2012



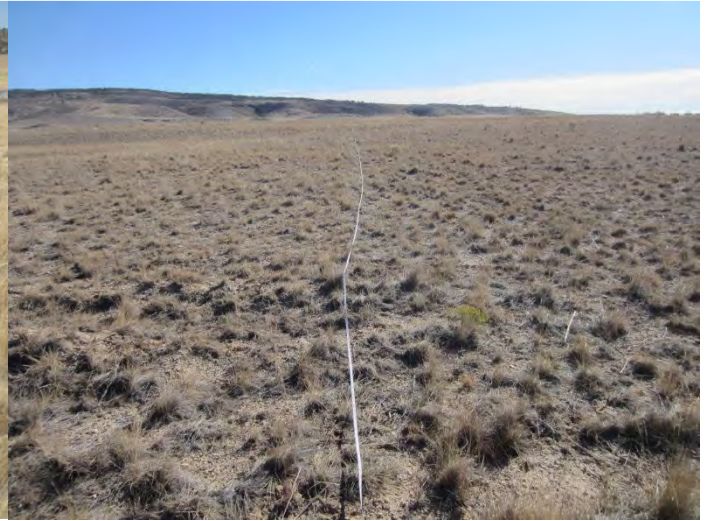
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D-06-TPG-1 (Area 13)

2011



2012



D-08-PP-1

2011



2012



D-08-PP-2 (Area 12)

2011



2012



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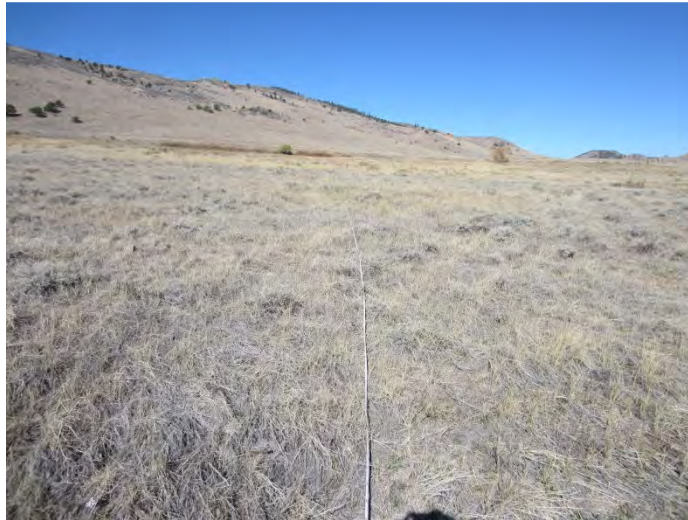
Reference Area 1

2011

2012



Reference Area 2 2012





Dowe Flats Quarry 2013 Reclamation Monitoring Report

January 15, 2014

Submitted to:

*Denise Arthur
Environmental Manager
Cemex USA
5134 Ute Rd
Longmont, CO 80503*

Prepared by:



*14 Inverness Dr East, Ste A100
Englewood, CO 80112
www.habitatmanagementinc.com*

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1 Overview

The Dowe Flats Quarry Special Use Permit area at the Cemex Lyons Plant near Lyons, CO is being actively mined and concurrently reclaimed. Over 200 acres within the permit area have been reclaimed during the past 16 years using a variety of methods and techniques. On July 19, 2013, several reclamation areas were monitored to evaluate their success and inform maintenance needs prior to establishing eligibility for bond release. Eight different areas reclaimed in the past 12 years were evaluated for vegetation cover, diversity, and weed abundance (Map 1). Additionally, an undisturbed native reference area was monitored for comparison.

These data are intended to show general success of reclamation areas throughout the Dowe Flat Quarry and their progress toward the long-term reclamation goal of native grassland habitat similar to pre-industrial and agricultural disturbance. Habitat Management, Inc. used the evaluation methods outlined in the Dowe Flats Special Land Use Permit (SU-93-14) Fifteen Year Interim Review.

2 Reclamation History

A historical summary of Cemex's reclamation and related land management activities was compiled for each reclamation area (Table 1). Historic information included growth media, fertility amendments, mulch applications, seed mixes, revegetation dates, and other associated post-reclamation management and vegetation establishment activities.

3 Reference Area Selection

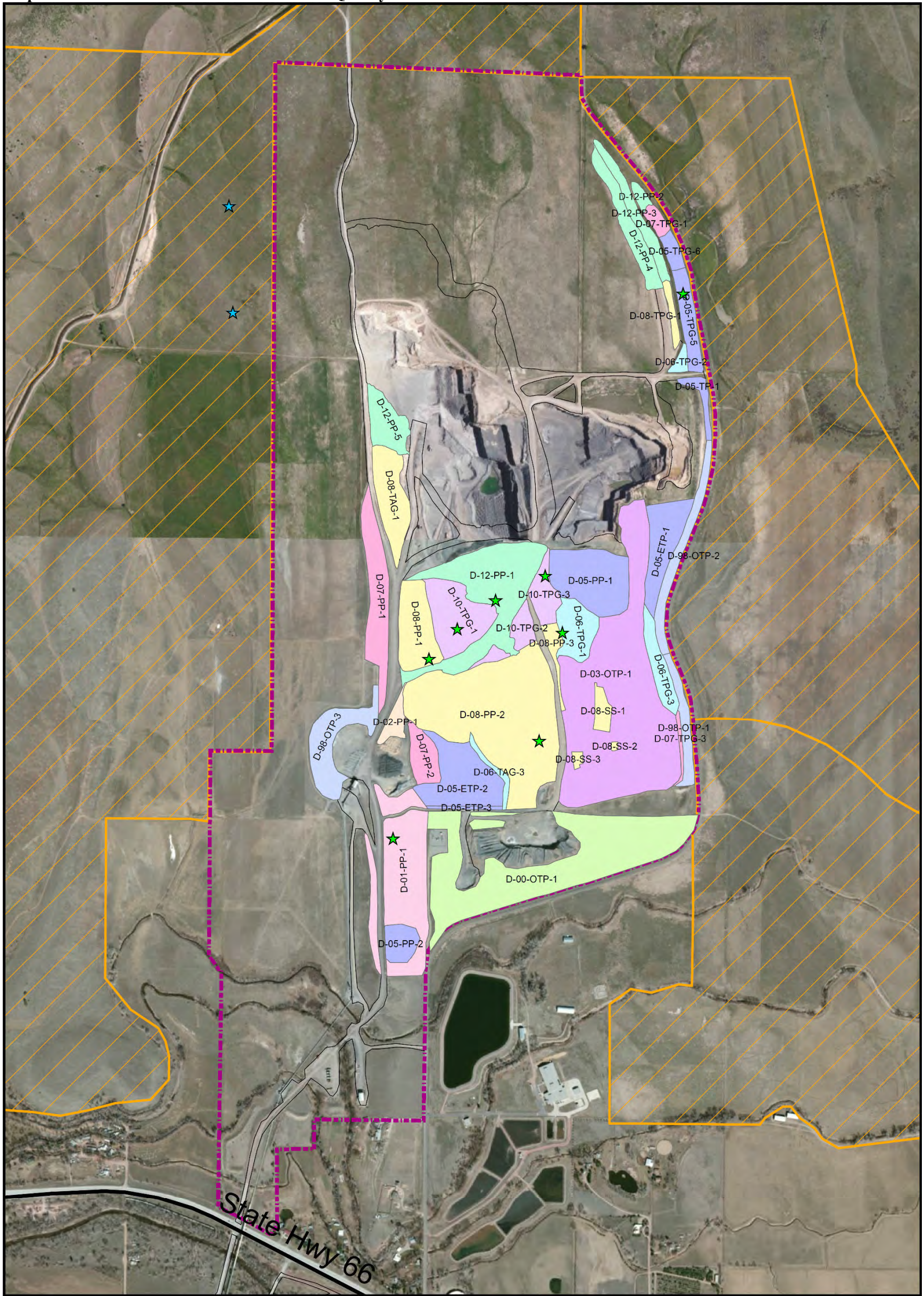
An ecologically equivalent reference area was selected in the field to the west of the quarry on the "Fee Title Partition Agreement" area leased from Boulder County and managed by Boulder County Open Space. This site was established outside of the mine's affected area to ensure that it will remain undisturbed by mining, but close enough to the reclamation areas to ensure that it is subject to a similar climate. The reference area was selected to have similar soil type, topography, and wildlife access to the reclamation areas as well as exhibiting a desirable native perennial plant community similar to that desired on the final reclamation.

4 Vegetation Monitoring Methods

Quantitative monitoring methods were used to evaluate vegetation communities established on reclamation areas and the reference area. Vegetation parameters included total ground cover, total vegetation cover, desirable and native species cover, weed cover, and plant species diversity. Vegetation monitoring was conducted by a Vegetation Expert from Habitat Management Inc. with over 10 years of experience evaluating vegetation in the region.

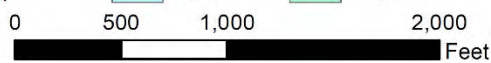
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Map 1: Reclamation Areas at the Dowe Flats Quarry



Legend

- ★ Reclamation Monitoring Location
 - ★ Reference Monitoring Location
 - Quarry Mining Boundary
 - Permit Boundary
- | Year of Reclamation | |
|---------------------|------|
| 2001-2002 | 2007 |
| 1997-1998 | 2008 |
| 2002-2003 | 2010 |
| 1999-2000 | 2012 |
| 2000-2001 | |
| 2005 | |
| 2006 | |



CEMEX Dowe Flats Quarry
2013 Reclamation Monitoring
Lyons, Colorado



Drawn By: R.F.B.

Date: January 8, 2014

Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

Table 1: Reclamation Unit History

Reclamation Unit	Year(s)	Acres	Soil	Seed		Fertilizer		Mulch		Notes
				Mix*	Method	Type (N-P-K)	Rate (lbs/acre)	Type	Rate (lbs/acre)	
D-98-OTP-3	1997-1998	5.56	Topsoil	OTP	Drill	18-46-0	100	Straw	2000	
D-98-OTP-1	1997-1998	2.70	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	
D-98-OTP-2	1997-1998	3.47	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	
D-00-OTP-1	1999-2000	25.10	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	Partially used for borrow in 2010
D-01-PP-1	2000-2001	13.69	Subsoil	PP	Drill	18-46-0	100	Straw	2000	Small area reseeded in 2005
D-02-PP-1	2001-2002	1.29	Subsoil	PP	Drill	18-46-0	100	Straw	2000	End was removed for haul road
D-03-OTP-1	2002-2003	33.93	Subsoil	OTP	Drill	18-46-0	100	Straw	2000	Several parts re-disturbed and/or re-seeded
D-05-ETP-2	2005	7.24	Subsoil	ETP	Drill	18-46-0	100	Hay	2000 (2006)	Several parts re-disturbed and/or re-seeded
D-05-ETP-1	2005	5.04	Subsoil	ETP	Drill	18-46-0	100	Hay	2000 (2006)	
D-05-ETP-3	2005	0.45	Subsoil	ETP	Drill	18-46-0	100	Hay	2000 (2006)	
D-05-PP-1	2005	7.90	Backfill	PP	Drill	18-46-0	100	Hay	2000 (2006)	Southern tip re-reclaimed in 2006
D-05-PP-2	2005	2.05	Subsoil	PP	Drill	18-46-0	100	Hay	2000 (2006)	Originally reclaimed in 2001
D-05-TPG-1	2005	1.04	Subsoil	TPG	Drill	18-46-0	100	Hay	2000 (2006)	Several parts re-disturbed and/or re-seeded
D-05-TPG-5	2005	2.77	Topsoil	TPG	Drill	18-46-0	100	Hay	2000 (2006)	Stockpile
D-05-TPG-6	2005	1.00	Subsoil	TPG	Drill	18-46-0	100	Hay	2000 (2006)	Stockpile
D-06-TAG-3	2006	0.79	Subsoil	TAG	Broadcast	18-46-0	100	Hay	2000	Originally reclaimed in 2005
D-06-TPG-1	2006	3.55	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	Part originally reclaimed in 2005
D-06-TPG-3	2006	2.64	Subsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Originally reclaimed in 2003
D-06-TPG-2	2006	0.58	Topsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Stockpile
D-07-PP-1	2007	6.47	Subsoil	PP	Broadcast	18-46-0	100	Hay	2000	
D-07-PP-2	2007	2.53	Subsoil	PP	Broadcast	18-46-0	100	Hay	2000	
D-07-TPG-3	2007	0.44	Subsoil	TPG	Broadcast	18-46-0	100	Hay	2000	
D-07-TPG-1	2007	0.83	Topsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Stockpile
D-08-PP-1	2008	5.38	Subsoil	PP	Broadcast	18-46-0	100	Hay	2000	
D-08-PP-3	2008	1.15	Backfill	PP	Broadcast	18-46-0	100	Hay	2000	Originally reclaimed in 2003
D-08-PP-2	2008	26.46	Backfill	PP	Broadcast	18-46-0	100	Hay	2000	Southern part originally reclaimed in 2005
D-08-SS-1	2008	1.54	Subsoil	SS	Broadcast	Humega		Hay	2000	Originally reclaimed in 2003
D-08-SS-2	2008	0.11	Subsoil	SS	Broadcast	Humega		Hay	2000	Originally reclaimed in 2003
D-08-SS-3	2008	0.28	Subsoil	SS	Broadcast	Humega		Hay	2000	Originally reclaimed in 2003
D-08-TAG-1	2008	5.22	Backfill	TAG	Broadcast	18-46-0	100	Hay	2000	
D-08-TPG-1	2008	0.83	Subsoil	TPG	Broadcast	18-46-0	100	Hay	2000	Stockpile
D-10-TPG-1	2010	6.42	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	
D-10-TPG-2	2010	2.06	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	
D-10-TPG-3	2010	2.40	Backfill	TPG	Broadcast	18-46-0	100	Hay	2000	
D-12-PP-1	2012	13.01	Subsoil	PP	Broadcast	11-28-23	260	Hay	2000	Part originally reclaimed in 2010
D-12-PP-2	2012	0.57	Subsoil	PP	Broadcast	11-28-23	260	Hay	2000	Stockpile
D-12-PP-3	2012	2.75	Subsoil	PP	Broadcast	11-28-23	260	Hay	2000	Stockpile
D-12-PP-4	2012	3.66	Subsoil	PP	Broadcast	11-28-23	260	Hay	2000	Stockpile
D-12-PP-5	2012	3.32	Subsoil	PP	Broadcast	11-28-23	260	Hay	2000	

* OTP=Original Temporary Perennial; PP=Permanent Perennial; TPG=Temporary Perennial Grass; ETP=Extended Temporary Perennial; TAG=Temporary Annual Grass; SS=Shrubs Only

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4.1 *Transect Sample Locations*

Five reclamation units were selected for quantitative monitoring in 2011 and monitored again in 2012 and 2013. Additionally, three more reclamation units were added in 2013 to represent areas reclaimed in 2010 and 2012.

- D-01-PP-1: Reclaimed in 2001 with the Permanent Perennial Seed Mixture
- D-05-TPG-5: Reclaimed in 2005 with the Temporary Perennial Grass Seed Mixture
- D-06-TPG-1: Reclaimed in 2006 with the Temporary Perennial Grass Seed Mixture
- D-08-PP-1: Originally reclaimed in 2005 and re-treated in 2008 with the Permanent Perennial Seed Mixture
- D-08-PP-2: Reclaimed in 2008 with the Permanent Perennial Seed Mixture
- D-10-TPG-1: Reclaimed in 2010 with the Temporary Perennial Grass Seed Mixture
- D-10-TPG-3: Reclaimed in 2010 with the Temporary Perennial Grass Seed Mixture
- D-12-PP-1: Reclaimed in 2012 with the Permanent Perennial Seed Mixture

Within each reclamation unit, one transect was located in an area that was representative of the overall plant community within the reclamation unit as determined by the vegetative expert. Each transect was oriented in a subjectively chosen compass direction (azimuth), and the azimuth was recorded.

Two transects were also established in the reference area using the same methods. Both reference area transects were located approximately 400 ft west of the Mining Boundary and approximately 1,000 ft from each other.

4.2 *Monitoring Methods*

4.2.1 *Vegetation Cover*

Line-transect point-intercept methods were used to collect vegetation and ground cover data. A two-point laser frame (with the laser points set horizontally 0.5 meters on either side of the transect) was used to take two ground cover measurements at 1-meter intervals along a 50-meter line-transect for a total of 100 points per transect. Cover measurements recorded “first-hit” point-intercepts by living plant species, litter, rock, or bare ground. Litter included all organic material that was produced previous to the current growing season. Rock fragments were recorded when particle size was equal to or greater than one square centimeter. Percent total vegetative cover and total ground cover were calculated from the line-transect point-intercept data.

4.2.2 *Species Diversity and Frequency*

All species occurring within one meter on either side of each cover transect (100 m² area) were recorded as a measure of species frequency and diversity. All species not immediately identifiable to the observers were collected for later identification and special care was taken to look for species of special concern. A species list was developed including scientific and common names, life forms, life cycles, and desirability (Appendix B). Species were designated as native, desirable, or undesirable. Desirable species include not only native regionally adapted species, but also those non-native species that had been included in a Colorado Division of Reclamation Mining and Safety (DRMS) approved seed mixture. These species lists along with the point-intercept data were used to determine species composition, diversity, and frequency on the reclamation areas.

Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

4.2.3 Photographs

In addition to the cover and diversity data, a photograph was taken of each transect. Photographs were taken at an approximate height of 5 feet and were oriented along the length of the transect from the starting point.

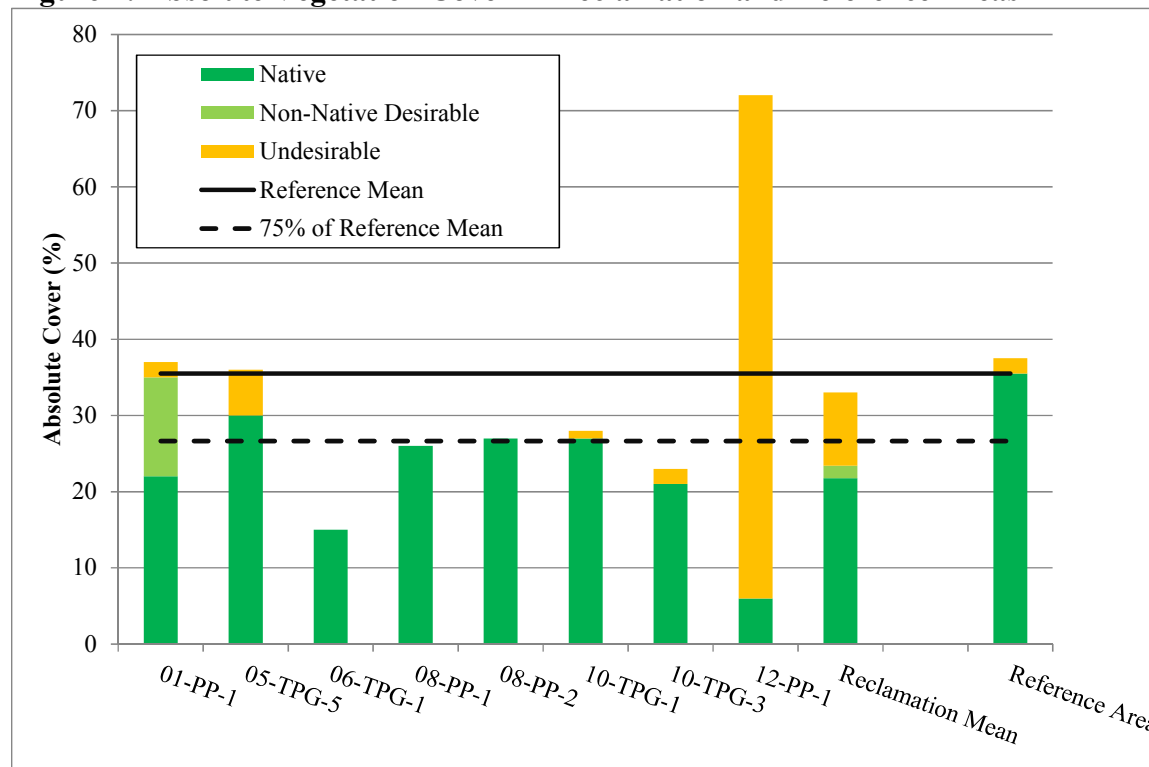
5 Results & Discussion

All vegetation monitoring data for both the reclamation units and the reference areas are presented in Appendix A and summarized in Table 2. A complete species list is attached as Appendix B. All transect photos are included in Appendix C.

5.1 Vegetation Cover

Total vegetation cover on the reclamation areas ranged from 15% on the D-06-TPG-1 site to 72% on the D-12-PP-1 site with an average of $33 \pm 6.1\%$ (mean \pm SE) across all 8 sites (Table 2, Figure 1). Native vegetation cover on the reclamation areas ranged from 6% on the D-12-PP-1 site to 30% on the D-05-TPG-1 site with an average of $21.8 \pm 2.8\%$ across all 8 sites. When non-native desirable species were added to the native species, total desirable cover averaged $23.4 \pm 3.2\%$.

Figure 1: Absolute Vegetation Cover in Reclamation and Reference Areas



The vegetation cover in D-12-PP-1 was very different from the other areas with 72% total cover of which only 6% was desirable and the other 66% was introduced annual weeds. This heavy cover of weeds masked the underlying native grass seedlings from being counted with single hit cover data. It is common for a flush of weeds to grow in the first year after planting; however, these species generally decrease in prominence after three to five years of native establishment. When this transect was removed from the data the average total vegetation cover, native cover,

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and desirable cover were $27.4 \pm 2.9\%$, $25.9 \pm 2.4\%$, and $24.0 \pm 1.9\%$, respectively for the other seven reclamation units.

Table 2: Reclamation Data Summary 2011 – 2013

	Reclamation Units						Reference Area					
	2011		2012		2013		2011		2012		2013	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Absolute Cover												
<i>Graminoids</i>	36.4	5.4	30.6	2.5	21.9	2.9	47.5	2.5	40.5	0.5	29.0	3.0
<i>Forbs</i>	3.0	1.4	2.4	1.9	10.9	8.0	5.0	1.0	2.5	0.5	4.5	2.5
<i>Shrubs</i>	0.2	0.2	0.0	0.0	0.3	0.2	4.0	1.0	4.5	1.5	4.0	0.0
<i>Native</i>	32.0	3.8	30.0	2.2	21.8	2.8	37.5	0.5	35.0	2.0	35.5	1.5
<i>Non-Native Desirable</i>	2.6	2.4	2.0	2.0	1.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0
<i>Undesirable</i>	5.0	2.2	1.0	1.0	9.6	8.1	19.0	1.0	12.5	0.5	2.0	2.0
<i>All Vegetation</i>	39.6	6.3	33.0	2.5	33.0	6.1	56.5	0.5	47.5	2.5	37.5	0.5
<i>Ground Cover</i>	84.6	6.7	89.0	2.5	84.3	3.2	94.5	0.5	96.5	1.5	90.5	7.5
<i>Litter/Rock</i>	45.0	6.1	56.0	1.1	51.3	4.9	38.0	1.0	49.0	1.0	53.0	7.0
<i>Bare</i>	15.4	6.7	11.0	2.5	15.8	3.2	5.5	0.5	3.5	1.5	9.5	7.5
Relative Cover												
<i>Graminoids</i>	92.6		92.7		66.3		84.1		85.3		77.3	
<i>Forbs</i>	6.9		7.3		33.0		8.8		5.3		12.0	
<i>Shrubs</i>	0.4		0.0		0.8		7.1		9.5		10.7	
<i>Native</i>	83.9		90.9		65.9		66.4		73.7		94.7	
<i>Non-Native Desirable</i>	4.9		6.1		4.9		0.0		0.0		0.0	
<i>Undesirable</i>	11.1		3.0		29.2		33.6		26.3		5.3	
Total Species Richness												
<i>Graminoids</i>	13		12		17		8		9		8	
<i>Forbs</i>	9		11		30		9		9		16	
<i>Shrubs</i>	2		3		5		7		5		6	
<i>Native</i>	12		15		32		20		18		22	
<i>Non-Native Desirable</i>	3		2		3		1		0		0	
<i>Undesirable</i>	9		9		17		3		5		8	
<i>All Vegetation</i>	24		26		52		24		23		30	

Total vegetation cover on the reference area averaged $37.5 \pm 0.5\%$ and cover of native species averaged $35.5 \pm 1.5\%$ (Table 2, Figure 1). No non-native desirable species were encountered during cover sampling on the reference areas. A measure sometimes used by the DRMS for bond release is that a reclamation area should have desirable cover within 75% of the reference area. By this measure four of the eight reclamation areas would meet the standard (Figure 1).

Average total and desirable vegetation cover decreased each year from 2011 to 2013 in the reclamation units (excluding D-12-PP-1) (Figure 2). The total vegetation cover also decreased over this time period on the reference area, but the desirable cover held relatively constant. The general decrease could be explained by much lower than average precipitation in 2012 and the

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first part of 2013¹ (Figure 3). This trend also illustrates the importance of using a reference area for monitoring, because the drought conditions affected both the reclamation and the reference area. The effect was greater on the reclamation than the reference area, likely due to more established root systems present in the reference area vegetation community. With time, the reclamation will develop the structure to better withstand drought conditions as well.

Figure 2: Absolute Vegetation Cover 2011 – 2013

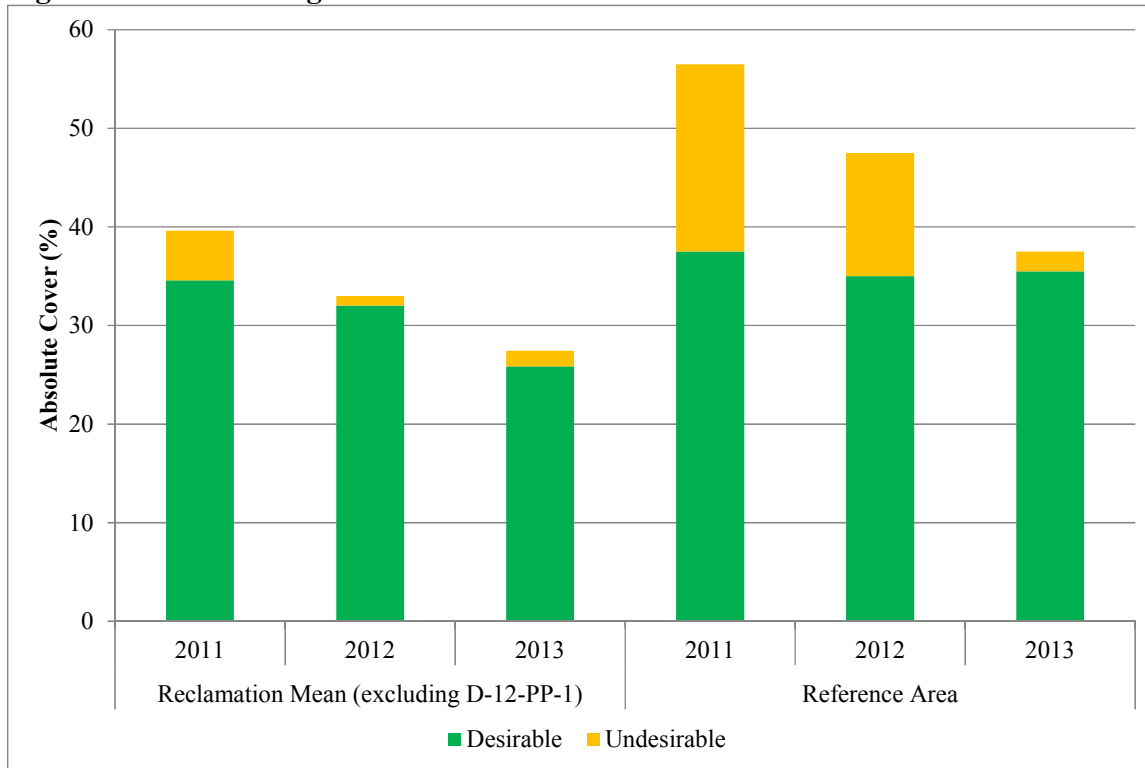
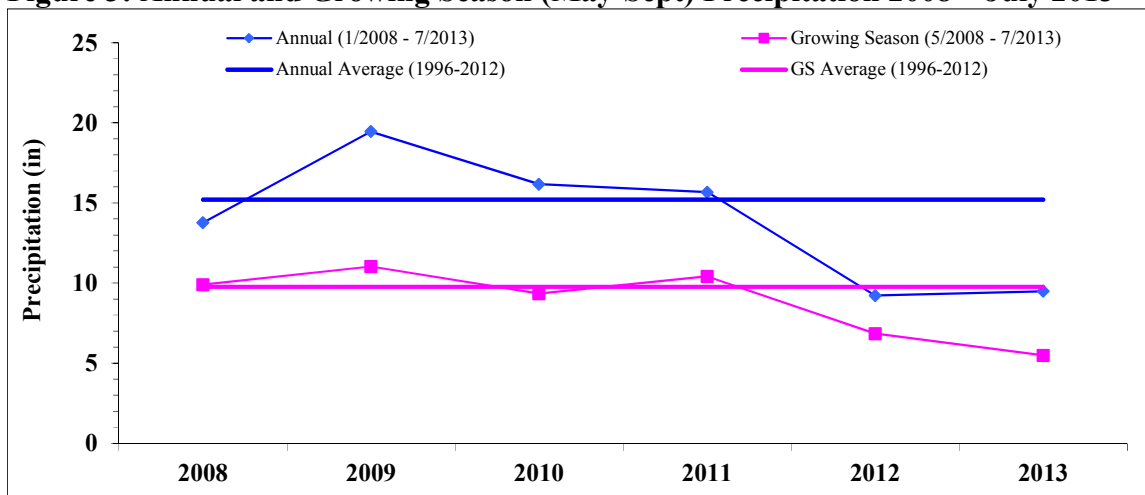


Figure 3: Annual and Growing Season (May-Sept) Precipitation 2008 – July 2013



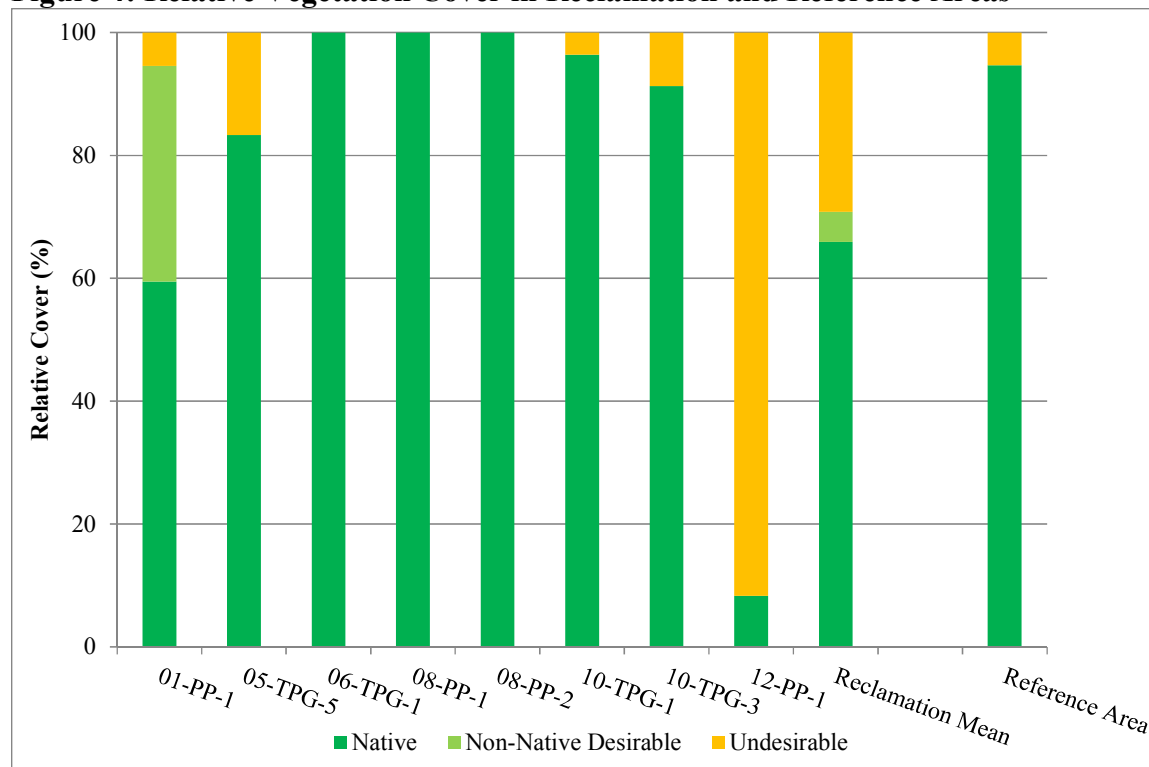
* Data from Western Regional Climate Center Flatiron Reservoir Climate Station (www.wrcc.dri.edu).

¹ While there was extraordinary precipitation in September of 2013, the monitoring was completed in July and thus not affected.

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The relative cover of the reclamation areas averaged 66% native, 5% non-native desirable, and 29% undesirable (Table 2, Figure 4). However, if D-12-PP-1 is removed again, this changes to 89% native, 7% non-native desirable, and only 4% undesirable. On the reference area relative native cover was 95% while undesirable species made up only 5%. Three of the eight reclamation unit exhibited no undesirable species cover and five reclamation units exhibited a greater relative cover of desirable species than the reference area. By comparison, in 2012, all of the reclamation units monitored exhibited greater relative cover of desirable species than the reference area and only one (D-05-TPG-5) had any undesirable cover. This change can likely be explained by three factors. First, the three reclamation units added in 2013 were more recently reclaimed and thus more likely to have weed presence. Second, the drought conditions of 2012 and 2013 stressed the young reclamation plant communities allowing for greater weed encroachment. Finally, the timing of monitoring in July of 2013 compared to October of 2012 allowed the capture of more annual weeds that may not have been present later in the year or may have been counted as litter.

Figure 4: Relative Vegetation Cover in Reclamation and Reference Areas



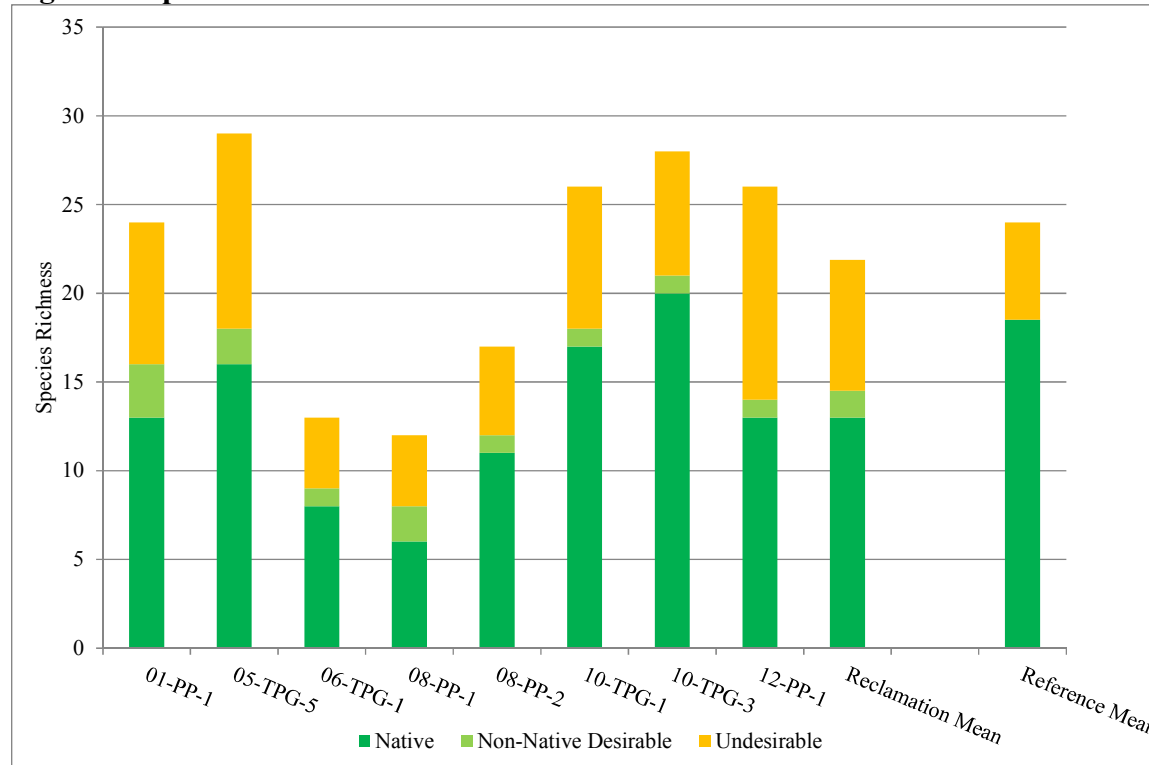
5.2 Species Diversity and Frequency

A total of 52 species were observed along the eight reclamation area transects, of which 32 were native and another three were desirable (Figure 5, Appendix B). Non-native desirable species included crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*), and alfalfa (*Medicago sativa*). Total species observed within each reclamation area ranged from 12 in D-08-PP-1 to 29 in D-05-TPG-5 and averaged 22 overall. Only three species were observed in all eight areas: Western wheatgrass (*Pascopyrum smithii*), alfalfa, and field bindweed (*Convolvulus arvensis*). Four more species (two native grasses, one native annual forb, and one weedy annual forb) were observed in all but one reclamation unit: blue grama (*Bouteloua gracilis*), slender

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wheatgrass (*Elymus trachycaulus*), sunflower (*Helianthus annuus*), and Russian thistle (*Salsola kali*). This represents a huge spike in in species richness from previous years, which is again likely due to the earlier timing of the monitoring and the expansion of monitoring areas.

Figure 5: Species Richness in Reclamation and Reference Areas

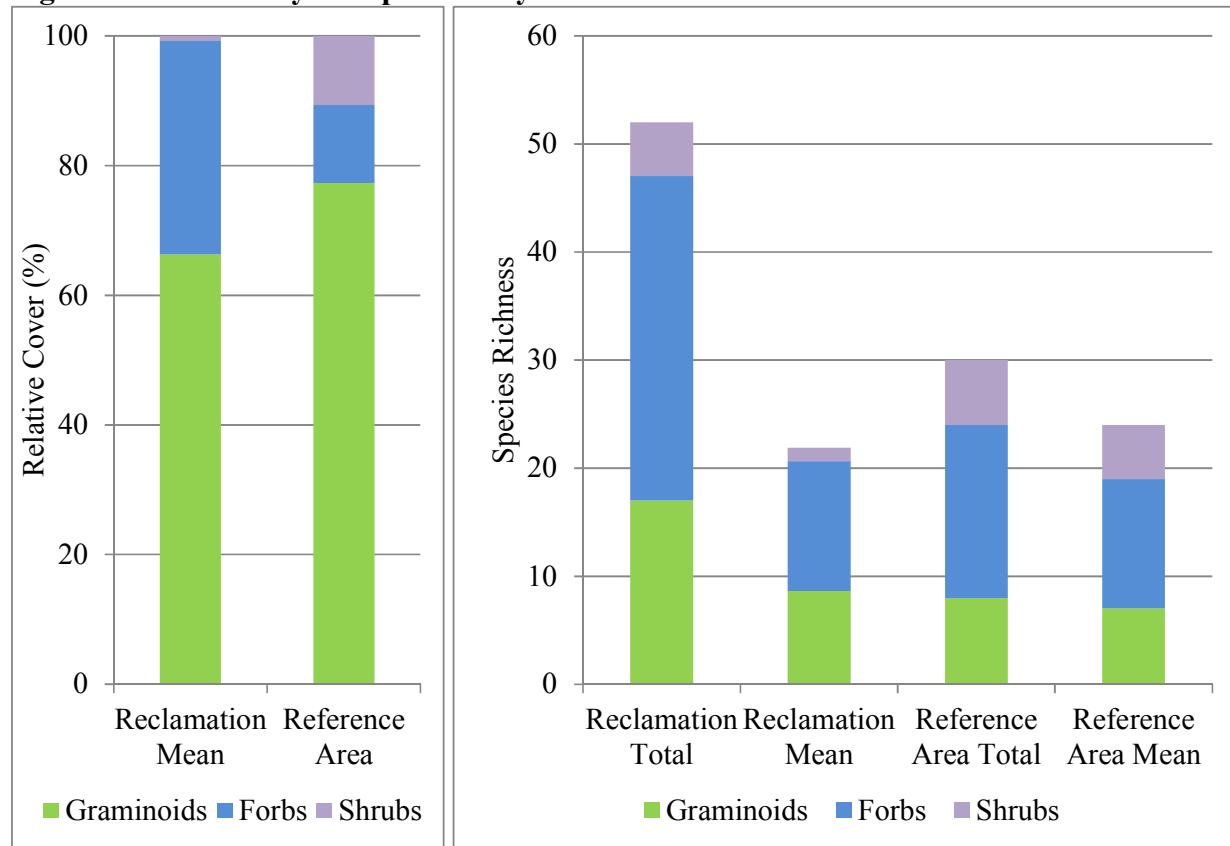


A total of 30 species were observed along the two reference area transects of which 22 were native. The two reference area transects were very similar with 18 species in common and an average of 24 species observed. The reference area and reclamation areas also had 18 species in common of which 12 were native (four grasses, four forbs, and four shrubs), and six were undesirable (two grasses and four forbs). Western wheatgrass and field bind weed were the only species observed along all transects monitored in both the reclamation and reference areas.

The reclamation areas are beginning to develop a similar species composition to the undisturbed reference areas (Figure 6). However, the relative abundance of the various growth forms (grasses, forbs, and shrubs) still requires further development. The shrub component of the reclamation community is the last to develop due to the slow growth of these species. The presence of shrubs species in the community has increased since 2012 and shrub species were also encountered in the cover sampling for the first time in 2013 suggesting that this community component is developing well.

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Figure 6: Community Composition by Growth Form in Reclamation and Reference Areas



5.3 Weed Cover

Undesirable species cover ranged from 0% to 6% across the seven older reclamation monitoring units (excluding D-12-PP-a) and averaged only 1.6% (Table 2, Appendix A). However, in D-12-PP-1 undesirable species cover was 66%. A total of 17 undesirable species were observed with seven of them contributing to the cover data: cheatgrass (*Bromus tectorum*), alyssum (*Alyssum simplex*), lambsquarters (*Chenopodium album*), kochia (*Kochia scoparia*), Russian thistle, salsify (*Tragopogon dubius*), and field bindweed.

Six of the same undesirable species were also observed on the reference area along with two additional undesirable species (stickseed and tall tumblemustard, Table 2, Appendix A). Cheatgrass was the only weed species to contribute to the cover data on the reference areas with an average of 2% absolute cover.

Five of the undesirable species observed are listed as noxious weeds by the State of Colorado. Dalmatian toadflax (*Linaria dalmatica*), musk thistle (*Carduus nutans*) and redstem stork's bill (*Erodium cicutarium*) are B-List plants whose continued spread must be stopped, while cheatgrass and field bindweed are C-List species which are recommended control species. While the musk thistle and stork's bill were only observed on reclamation units, the other three species were observed in both the reclamation units and the reference areas. Another B-list species, leafy spurge (*Euphorbia esula*) was also observed on the reference area, but not along the monitored transects.

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6 Conclusions

The goal of this monitoring effort was to evaluate the interim success and progress of the reclamation activities at the Dowe Flats Quarry. To date no reclamation bond release standards have been set and no areas are ready for release. However, most of the areas monitored appear to be progressing well towards the reclamation goals and compared well to the undisturbed reference area. The entire vegetation community including the reference area has experienced a substantial drought in 2012 and early 2013 and the effects have been more pronounced on the reclamation units. One reclamation unit (D-06-TPG-1) also continues to lag behind the other reclamation units, even those reclaimed more recently. Further evaluation of this area and potential maintenance may be warranted to enhance the reclamation success.

In general, the areas seeded with the permanent perennial seed mixture appear to be establishing better than those seeded with the temporary mixture, but it is difficult to draw definitive conclusions with a small sample size. The abundance of species observed that were not a part of the seed mixtures also suggests that the communities are developing and benefiting from colonization from nearby populations. Many more species were observed in 2013 than in 2011 or 2012, likely due to the earlier monitoring and retaining this earlier schedule is recommended for future monitoring.

The noxious weed cover is manageable in its current state, but aggressive action should be taken to keep populations low or, if possible, eradicate them. The weed cover on the reference areas should also be a priority for management, and it is recommended that Cemex partner with Boulder County Open Space to prevent the spread of these weeds onto Cemex property.

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Appendix A: Raw Monitoring Data

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Reclamation Unit Vegetation Monitoring Data

Genus	Species	Common Name	01-PP-1	05-TPG-5	06-TPG-1	08-PP-1	08-PP-2	10-TPG-1	10-TPG-3	12-PP-1	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)	Frequency (%)
Graminoid: Annual Undesirable														
Bromus	arvensis	field brome	p	p				p		p	0	0.00	0.00	50.00
Bromus	tectorum	cheatgrass	1	1							2	0.25	0.76	25.00
Subtotal			1	1	0	0	0	0	0	0	2	0.25	0.76	50.00
Graminoid: Perennial Desirable														
Agropyron	cristatum	crested wheatgrass	1			p					1	0.13	0.38	25.00
Bromus	inermis	smooth brome	p	p							0	0.00	0.00	25.00
Subtotal			1	0	0	0	0	0	0	0	1	0.13	0.38	37.50
Graminoid: Perennial Native														
Achnatherum	hymenoides	Indian ricegrass	1			p	p	3	p	p	4	0.50	1.52	75.00
Achnatherum	lettermanii	Letterman's needlegrass	5	p	p		1	1	p		7	0.88	2.65	75.00
Bouteloua	curtipendula	sideoats grama	3		p		3	3	p		9	1.13	3.41	62.50
Bouteloua	dactyloides	buffalograss	2	p					p		2	0.25	0.76	37.50
Bouteloua	gracilis	blue grama	2	p	1		3	3	p	p	9	1.13	3.41	87.50
Elymus	elymoides	squirreltail								p	0	0.00	0.00	12.50
Elymus	glaucus	blue wildrye						1	p		1	0.13	0.38	25.00
Elymus	trachycaulus	slender wheatgrass		1	p	p	2	2	2	3	10	1.25	3.79	87.50
Hesperostipa	comata	needle and thread						1	1		2	0.25	0.76	25.00
Koeleria	macrantha	prairie junegrass				1	p				1	0.13	0.38	25.00
Nassella	viridula	green needlegrass	1	26			1	1	p		29	3.63	10.98	62.50
Pascopyrum	smithii	Western wheatgrass	8	2	13	24	17	6	5	3	78	9.75	29.55	100.00
Pseudoroegneria	spicata	bluebunch wheatgrass		1		1		6	12	p	20	2.50	7.58	62.50
Subtotal			22	30	14	26	27	27	20	6	172	21.50	65.15	100.00
Total Graminoid Cover			24	31	14	26	27	27	20	6	175	21.88	66.29	100.00
Total Desirable Graminoid Cover			23	30	14	26	27	27	20	6	172	21.63	65.53	100.00
Total Graminoid Species			11	10	5	6	8	11	11	7	17			
Total Desirable Graminoid Species			9	8	5	6	8	10	11	6	15			
Forbs: Annual Undesirable (continued on next page)														
Alyssum	simplex	alyssum	p						p	1	1	0.13	0.38	37.50
Chenopodium	album	lambsquarters	1	p					p	p	1	0.13	0.38	50.00
Erodium	cicutarium	redstem stork's bill								p	0	0.00	0.00	12.50
Kochia	scoparia	kochia	p	p	p			p	p	48	48	6.00	18.18	75.00
Lactuca	serriola	prickly lettuce		p						p	0	0.00	0.00	25.00
Melilotus	officinalis	sweetclover		p			p	p	p	p	0	0.00	0.00	62.50
Polygonum	aviculare	prostrate knotweed								p	0	0.00	0.00	12.50
Salsola	kali	Russian thistle	p	3	p		p	1	p	17	21	2.63	7.95	87.50

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Reclamation Unit Vegetation Monitoring Data (continued)

Genus	Species	Common Name	01-PP-1	05-TPG-5	06-TPG-1	08-PP-1	08-PP-2	10-TPG-1	10-TPG-3	12-PP-1	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)	Frequency (%)
Forbs: Annual Undesirable (continued from previous page)														
Solanum	sp.	unknown nightshade 1								p	0	0.00	0.00	12.50
Tragopogon	dubius	yellow salsify	p	1	p	p	p	p			1	0.13	0.38	75.00
Verbascum	thapsus	common mullein				p				p	0	0.00	0.00	25.00
Subtotal			1	4	0	0	0	1	0	66	72	9.00	27.27	100.00
Forbs: Annual Native														
Chenopodium	fremontii	Fremont's goosefoot	p	p						p	0	0.00	0.00	37.50
Descurainia	pinnata	western tansymustard		p							0	0.00	0.00	12.50
Euphorbia	marginata	snow on the mountain		p					p	p	0	0.00	0.00	37.50
Helianthus	annuus	annual sunflower	p	p		p	p	p	p	p	0	0.00	0.00	87.50
Verbena	bracteata	bigbract verbena								p	0	0.00	0.00	12.50
Subtotal			0	0	0	0	0	0	0	0	0	0.00	0.00	87.50
Forbs: Perennial Undesirable														
Carduus	nutans	musk thistle		p		p	p		p		0	0.00	0.00	50.00
Convolvulus	arvensis	field bindweed	p	1	p	p	p	p	2	p	3	0.38	1.14	100.00
Linaria	dalmatica	Dalmatian toadflax		p				p			0	0.00	0.00	25.00
Taraxacum	officinale	common dandelion						p			0	0.00	0.00	12.50
Subtotal			0	1	0	0	0	0	2	0	3	0.38	1.14	100.00
Forbs: Perennial Desirable														
Medicago	sativa	alfalfa	12	p	p	p	p	p	p	p	12	1.50	4.55	100.00
Subtotal			12	0	0	0	0	0	0	0	12	1.50	4.55	100.00
Forbs: Perennial Native														
Achillea	millefolium	common yarrow			p			p			0	0.00	0.00	25.00
Allium	textile	textile onion		p							0	0.00	0.00	12.50
Argemone	polyanthemos	crested pricklypoppy		p					p	p	0	0.00	0.00	37.50
Artemisia	frigida	prairie sagewort	p		p			p			0	0.00	0.00	37.50
Astragalus	drummondii	Drummond's milkvetch						p	p		0	0.00	0.00	25.00
Linum	lewisii	blue flax	p	p				p	p	p	0	0.00	0.00	62.50
Ratibida	columnifera	upright prairie coneflower						p	p		0	0.00	0.00	25.00
Solanum	sp.	unknown nightshade 2								p	0	0.00	0.00	12.50
Sphaeralcea	coccinea	scarlet globemallow							p		0	0.00	0.00	12.50
Subtotal			0	0	0	0	0	0	0	0	0	0.00	0.00	75.00
Total Forb Cover			13	5	0	0	0	1	2	66	87	10.88	32.95	100.00
Total Desirable Forb Cover			12	0	0	0	0	0	0	0	12	1.50	4.55	100.00
Total Forb Species			11	17	7	6	7	14	15	19	30			
Total Desirable Forb Species			5	8	3	2	2	7	8	8	15			

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Reclamation Unit Vegetation Monitoring Data (continued)

Genus	Species	Common Name	01-PP-1	05-TPG-5	06-TPG-1	08-PP-1	08-PP-2	10-TPG-1	10-TPG-3	12-PP-1	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)	Frequency (%)
Shrubs: Perennial Native														
Atriplex	canescens	fourwing saltbush						p	1		1	0.13	0.38	25.00
Ericameria	nauseosa	rubber rabbitbrush		p	1		p		p		1	0.13	0.38	50.00
Gutierrezia	sarothrae	broom snakeweed	p	p							0	0.00	0.00	25.00
Krascheninnikovia	lanata	winterfat	p								0	0.00	0.00	12.50
Psoralidium	tenuiflorum	slimflower scurfpea					p				0	0.00	0.00	12.50
Subtotal			0	0	1	0	0	0	1	0	2	0.25	0.76	75.00
Total Shrub Cover			0	0	1	0	0	0	1	0	2	0.25	0.76	75.00
Total Shrub Species			2	2	1	0	2	1	2	0	5			
Total Vegetation Cover			37	36	15	26	27	28	23	72	264	33.00	100	100
Total Desirable Vegetation Cover			35	30	15	26	27	27	21	6	186	23.38	70.83	100.00
Total Ground Cover			89	95	65	81	88	86	80	90	674	84.25		
Rock			6		5	1	10				22	2.75		
Litter			46	59	45	54	51	58	57	18	388	48.50		
Bare Ground			11	5	35	19	12	14	20	10	126	15.75		
Total Hits			100	100	100	100	100	100	100	100	800	100.00		
Total Species			24	29	13	12	17	26	28	26	52			
Total Desirable Species			16	18	9	8	12	18	21	14	35			

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Reference Area Vegetation Monitoring Data

Genus	Species	Common Name	Ref 1	Ref 2	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)	Frequency (%)
Graminoid: Annual Undesirable								
Bromus	arvensis	field brome		p	0	0.00	0.00	50.00
Bromus	tectorum	cheatgrass	p	4	4	2.00	5.33	100.00
Subtotal			0	4	4	2.00	5.33	100.00
Graminoid: Perennial Native								
Aristida	purpurea	purple threeawn	6	1	7	3.50	9.33	100.00
Bouteloua	dactyloides	buffalograss	5	1	6	3.00	8.00	100.00
Bouteloua	gracilis	blue grama	10	1	11	5.50	14.67	100.00
Elymus	elymoides	squirreltail	3	1	4	2.00	5.33	100.00
Muhlenbergia	torreyi	ring muhly	p		0	0.00	0.00	50.00
Pascopyrum	smithii	Western wheatgrass	2	24	26	13.00	34.67	100.00
Subtotal			26	28	54	27.00	72.00	100.00
Total Graminoid Cover			26	32	58	29.00	77.33	100.00
Total Desirable Graminoid Cover			26	28	54	27.00	72.00	100.00
Total Graminoid Species			7	7	8			
Total Desirable Graminoid Species			6	5	6			
Forbs: Annual Undesirable								
Lactuca	serriola	prickly lettuce		p	0	0.00	0.00	50.00
Lappula	sp.	unknown stickseed	p		0	0.00	0.00	50.00
Sisymbrium	altissimum	tall tumbled mustard		p	0	0.00	0.00	50.00
Tragopogon	dubius	yellow salsify		p	0	0.00	0.00	50.00
Subtotal			0	0	0	0.00	0.00	100.00
Forbs: Perennial Undesirable								
Convolvulus	arvensis	field bindweed	p	p	0	0.00	0.00	100.00
Linaria	dalmatica	Dalmatian toadflax	p	p	0	0.00	0.00	100.00
Subtotal			0	0	0	0.00	0.00	100.00
Forbs: Perennial Native								
Allium	textile	textile onion	p		0	0.00	0.00	50.00
Artemisia	campestris	field sagewort	p	p	0	0.00	0.00	100.00
Artemisia	frigida	prairie sagewort	p		0	0.00	0.00	50.00
Artemisia	ludoviciana	white sagebrush	p	1	1	0.50	1.33	100.00
Eriogonum	effusum	spreading buckwheat	5	p	5	2.50	6.67	100.00
Heterotheca	villosa	false hairy goldenaster	1	p	1	0.50	1.33	100.00
Linum	lewisii	blue flax		p	0	0.00	0.00	50.00
Phyla	cuneifolia	wedgeleaf		p	0	0.00	0.00	50.00
Sphaeralcea	coccinea	scarlet globemallow	1	p	1	0.50	1.33	100.00
Unknown	forb	unknown forb	p	1	1	0.50	1.33	100.00
Subtotal			7	2	9	4.50	12.00	100.00
Total Forb Cover			7	2	9	4.50	12.00	100.00
Total Desirable Forb Cover			7	2	9	4.50	12.00	100.00
Total Forb Species			11	13	16			
Total Desirable Forb Species			8	8	10			
Shrubs: Perennial Native								
Ericameria	nauseosa	rubber rabbitbrush	2	3	5	2.50	6.67	100.00
Gutierrezia	sarothrae	broom snakeweed	p		0	0.00	0.00	50.00
Krascheninnikovia	lanata	winterfat	p		0	0.00	0.00	50.00
Opuntia	polyacantha	plains pricklypear	p	p	0	0.00	0.00	100.00
Psoralidium	tenuiflorum	slimflower scurfpea	1	1	2	1.00	2.67	100.00
Yucca	glauca	soapweed yucca	1	p	1	0.50	1.33	100.00
Subtotal			4	4	8	4.00	10.67	100.00
Total Shrub Cover			4	4	8	4.00	10.67	100.00
Total Shrub Species			6	4	6			
Total Vegetation Cover			37	38	75	37.5	100	100
Total Desirable Vegetation Cover			37	34	71	35.5	94.67	100
Total Ground Cover			83	98	181	90.5		
Rock			1	1	2	1.00		
Litter			45	59	104	52.00		
Bare Ground			17	2	19	9.50		
Total Hits			100	100	200	100.00		
Total Species			24	24	30			
Total Desirable Species			20	17	22			

Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

Appendix B: Complete Species List

Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

Complete Species List

Species	Common Name	Reclamation Area			Reference Area		
		2011	2012	2013	2011	2012	2013
Graminoid: Annual Undesirable							
<i>Bromus arvensis</i>	field brome	x	x	x	x	x	x
<i>Bromus tectorum</i>	cheatgrass	x	x	x	x	x	x
Graminoid: Perennial Desirable							
<i>Agropyron cristatum</i>	crested wheatgrass	x	x	x	x		
<i>Bromus inermis</i>	smooth brome	x		x			
Graminoid: Perennial Native							
<i>Achnatherum hymenoides</i>	Indian ricegrass	x	x	x		x	
<i>Achnatherum lettermanii</i>	Letterman's needlegrass	x	x	x			
<i>Aristida purpurea</i>	purple threeawn				x	x	x
<i>Bouteloua curtipendula</i>	sideoats grama	x	x	x		x	
<i>Bouteloua dactyloides</i>	buffalograss	x	x	x	x	x	x
<i>Bouteloua gracilis</i>	blue grama	x	x	x	x	x	x
<i>Elymus elymoides</i>	squirreltail			x	x	x	x
<i>Elymus glaucus</i>	blue wildrye			x			
<i>Elymus trachycaulus</i>	slender wheatgrass	x	x	x			
<i>Hesperostipa comata</i>	needle and thread			x			
<i>Koeleria macrantha</i>	prairie junegrass			x			
<i>Muhlenbergia torreyi</i>	ring muhly						x
<i>Nassella viridula</i>	green needlegrass	x	x	x			
<i>Pascopyrum smithii</i>	Western wheatgrass	x	x	x	x	x	x
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	x	x	x			
Forbs: Annual Undesirable							
<i>Alyssum simplex</i>	alyssum	x	x	x	x	x	
<i>Chenopodium album</i>	lambsquarters			x			
<i>Erodium cicutarium</i>	redstem stork's bill			x			
<i>Kochia scoparia</i>	kochia	x		x			

Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

Complete Species List (continued)

Species	Common Name	Reclamation Area			Reference Area		
		2011	2012	2013	2011	2012	2013
Forbs: Annual Undesirable (continued)							
<i>Lactuca serriola</i>	prickly lettuce	x	x	x			x
<i>Lappula sp.</i>	unknown stickseed						x
<i>Melilotus officianalis</i>	sweetclover	x		x			
<i>Polygonum aviculare</i>	prostrate knotweed			x			
<i>Salsola kali</i>	Russian thistle	x	x	x			
<i>Sisymbrium altissimum</i>	tall tumbled mustard				x		x
<i>Solanum sp.</i>	unknown nightshade			x			
<i>Tragopogon dubius</i>	yellow salsify	x	x	x			x
<i>Verbascum thapsus</i>	common mullein			x			
Forbs: Annual Native							
<i>Chenopodium fremontii</i>	Fremont's goosefoot			x			
<i>Descurainia pinnata</i>	western tansymustard			x			
<i>Euphorbia marginata</i>	snow on the mountain			x			
<i>Helianthus annuus</i>	annual sunflower	x	x	x			
<i>Verbena bracteata</i>	bigbract verbena			x			
Forbs: Perennial Undesirable							
<i>Carduus nutans</i>	musk thistle		x	x			
<i>Convolvulus arvensis</i>	field bindweed	x	x	x		x	x
<i>Linaria dalmatica</i>	Dalmatian toadflax		x	x		x	x
<i>Taraxacum officianale</i>	common dandelion			x			
Forbs: Perennial Desirable							
<i>Medicago sativa</i>	alfalfa	x	x	x			
Forbs: Perennial Native							
<i>Achillea millefolium</i>	common yarrow			x			
<i>Allium textile</i>	textile onion			x			x
<i>Argemone polyanthemus</i>	crested pricklypoppy		x	x			

Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

Complete Species List (continued)

Species	Common Name	Reclamation Area			Reference Area		
		2011	2012	2013	2011	2012	2013
Forbs: Perennial Native (continued)							
<i>Artemisia campestris</i>	field sagewort				X	X	X
<i>Artemisia frigida</i>	prairie sagewort			X	X		X
<i>Artemisia ludoviciana</i>	white sagebrush					X	X
<i>Astragalus drummondii</i>	Drummond's milkvetch			X			
<i>Eriogonum effusum</i>	spreading buckwheat				X	X	X
<i>Heterotheca villosa</i>	false hairy goldenaster				X	X	X
<i>Liatris punctata</i>	dotted blazing star				X		
<i>Linum lewisii</i>	blue flax		X	X			X
<i>Lithospermum sp.</i>	stoneseed				X		
<i>Machaeranthera sp</i>	tansyaster				X	X	
<i>Phyla cuneifolia</i>	wedgeleaf						X
<i>Ratibida columnifera</i>	upright prairie coneflower			X			
<i>Solanum sp.</i>	unknown nightshade			X			
<i>Sphaeralcea coccinea</i>	scarlet globemallow			X	X	X	X
Unknown Asteraceae	unknown aster					X	
Unknown forb	unknown forb						X
Shrubs: Perennial Native							
<i>Atriplex canescens</i>	fourwing saltbush			X			
<i>Ericameria nauseosa</i>	rubber rabbitbrush	X	X	X	X	X	X
<i>Gutierrezia sarothrae</i>	broom snakeweed		X	X	X		X
<i>Krascheninnikovia lanata</i>	winterfat			X	X		X
<i>Opuntia polyacantha</i>	plains pricklypear				X	X	X
<i>Psoralidium tenuiflorum</i>	slimflower scurfpea		X	X	X	X	X
<i>Yucca glauca</i>	soapweed yucca	X			X	X	X

Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

Appendix C: Monitoring Photos

Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

Reclamation Units

2011

D-01-PP-1
2012

2013



2011

D-05-TPG-5
2012

2013



Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

D-06-TPG-1
2012

2011

2013



D-08-PP-1
2012

2011

2013



Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

2011



D-08-PP-2
2012



2013



D-10-PP-1
2013



Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

D-10-PP-2
2013



D-12-PP-1
2013



Cemex Dowe Flats Quarry 2013 Reclamation Monitoring Report

Reference Area 1

2011



2012



2013



Reference Area 2

2012



2013



Appendix C
Annual Reclamation Reports (2010 – 2013)
Submitted to the Division of Reclamation Mining and Safety



September 7, 2010

Mr. Jim Dupler
Division of Reclamation Mining and Safety
Department of Natural Resources
1313 Sherman Street, Room 215
Denver, Colorado 80203

RECEIVED
SEP 07 2010
Division of Reclamation,
Mining and Safety

**RE: Lyons Quarry, Permit No. M-1977-208
Dowe Flats Quarry, Permit No. M-1993-041
Silica Quarry, Permit No. M-1977-361**

Dear Mr. Dupler:

Enclosed are the annual reclamation reports for Permits M-1977-208 (Lyons Quarry), M-1993-041 (Dowe Flats Quarry), M-1977-341 (Larimer County Quarry) and M-1977-361 (Silica Quarry).

Annual fees in the following amounts were sent to your office under separate cover:

- \$791 for Permit No. M-1977-208
- ✓▪ \$791 for Permit No. M-1993-041
- \$323 for Permit No. M-1977-361

Please contact me if you have any questions concerning these reports.

Sincerely,

CEMEX, INC.

A handwritten signature in black ink, appearing to read "PR Fischer".

Patrick R. Fischer
Quarry Manager



ANNUAL RECLAMATION REPORT

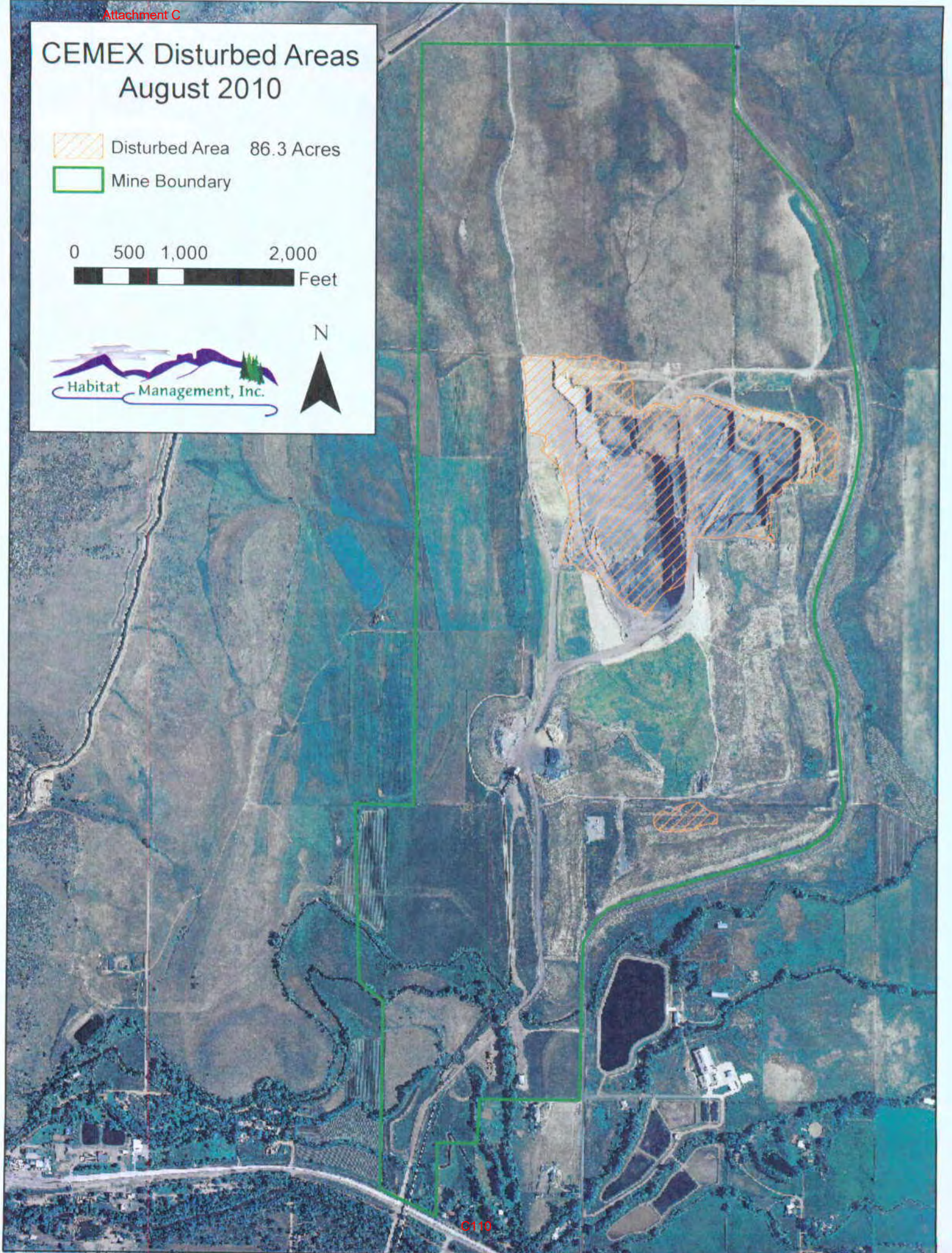
DOWE FLATS MINE, LYONS, COLORADO PERMIT NO. M-1993-041 2009 – 2010

The purpose of this report is to comply with the Mined Land Reclamation Act of 1976, Statute 34-32-112 of House Bill No. 1065. This report follows the requirements covering annual reports in the Rules and Regulations of Colorado Mined Land Reclamation Board, Section 2.4. The permit for the Dowe Flats Mine was issued on May 20, 1993 and amended on December 14, 1994.

During the latest reporting period, reclamation activities were limited to the placement, grading and contouring of subsoil and topsoil. These areas of soil placement, approximately ten to twelve acres, will be re-vegetated during the fourth quarter 2010. The attached figure shows the areas of disturbance as of the third quarter 2010.

CEMEX Disturbed Areas August 2010

-  Disturbed Area 86.3 Acres
-  Mine Boundary





September 2, 2011

Mr. Jim Dupler
Division of Reclamation Mining and Safety
Department of Natural Resources
1313 Sherman Street, Room 215
Denver, Colorado 80203
Via Certified Mail (7009 3410 0002 0993 8610)

RECEIVED

SEP 08 2011
Division of Reclamation,
Mining and Safety

**RE: Lyons Quarry, Permit No. M-1977-208
Dowe Flats Quarry, Permit No. M-1993-041
Silica Quarry, Permit No. M-1977-361**

Dear Mr. Dupler:

Enclosed are the annual reclamation reports for Permits M-1977-208 (Lyons Quarry), M-1993-041 (Dowe Flats Quarry), M-1977-341 and M-1977-361 (Silica Quarry).

Annual fees in the following amounts were sent to your office under separate cover:

- \$791 for Permit No. M-1977-208
- \$791 for Permit No. M-1993-041
- \$323 for Permit No. M-1977-361

Please contact me if you have any questions concerning these reports.

Sincerely,

A handwritten signature in black ink, appearing to read "PR Fischer".

Patrick R. Fischer
Quarry Manager
CEMEX, INC.
Email: patrickr.fischer@cemex.com



ANNUAL RECLAMATION REPORT

DOWE FLATS MINE, LYONS, COLORADO PERMIT NO. M-1993-041 2010 – 2011

The purpose of this report is to comply with the Mined Land Reclamation Act of 1976, Statute 34-32-112 of House Bill No. 1065. This report follows the requirements covering annual reports in the Rules and Regulations of Colorado Mined Land Reclamation Board, Section 2.4. The permit for the Dowe Flats Mine was issued on May 20, 1993 and amended on December 14, 1994.

During the latest reporting period, reclamation activities at the Dowe Flats Quarry consisted of placement, grading and contouring of subsoil and topsoil, and re-vegetation of approximately 22 acres. The attached figure shows the areas of disturbance as of the third quarter 2011.

CEMEX 2011 Disturbed Areas August 2011

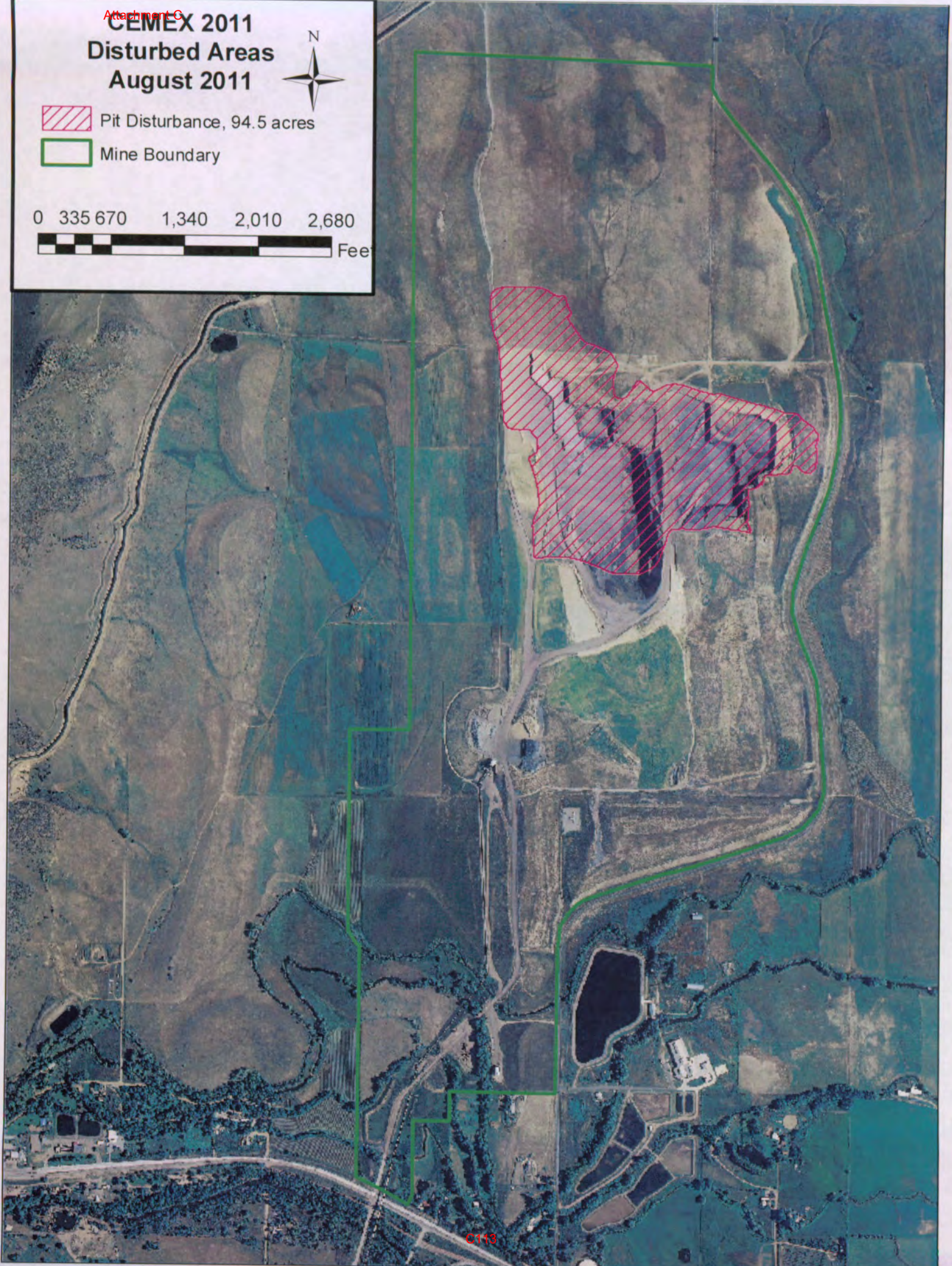


Pit Disturbance, 94.5 acres



Mine Boundary

0 335 670 1,340 2,010 2,680





RECEIVED

✓
DEC 05 2012

Division of Reclamation,
Mining & Safety ✓

December 4, 2012

Division of Reclamation, Mining and Safety
1313 Sherman St., Room 215
Denver, CO 80203
Attention: Jim Dupler

Via FEDEX
TRK 7942 1418 5544

Subject: CEMEX, Inc. Reclamation Reports Submittal

Dear Jim Dupler:

Enclosed are the annual reclamation reports and pertinent maps for the reporting period 2011-2012 of the following quarries associated with CEMEX, Inc.:

- ✓ 1. Dowe Flats (Permit M-1993-041)
2. Lyons Quarry (Permit M-1977-208)
3. Silica Quarry (Permit M-1977-361)

Please note that the answers to some questions in separate sheets attached to each report. Also, the checks were sent in October 2012

Thank you for extending the deadline for our submission of the reports mentioned above.

With best regards,

For: Patrick Fischer, Quarry Manager

A handwritten signature in black ink, appearing to read 'Denise Arthur'.

Denise Arthur, Ph.D.
Environmental Manager

112c Annual Report

Permittee Name:	CEMEX, Inc.	Permit Number:	M-1993-041
Operation Name:	Dowe Flats Mine	County:	Boulder
Annual Fee Due:	\$791.00	Anniversary Date:	September 8, 2012
Permit Acreage:	1,854.45	Current Bond Amt:	\$3,177,550.00

According to C.R.S. 34-32.5-116 or 34-32-116, each year, on the anniversary date of the permit, an operator shall submit the Annual Fee, an Annual Report and Map showing the extent of current disturbances to affected land, required monitoring information, reclamation accomplished to date and during the preceding year, any new disturbance that is anticipated to occur during the upcoming year, any reclamation that will be performed during the upcoming year, the dates for the beginning of active operations, and the date active operations ceased for the year.

Information contained in this report will be reviewed by the Division upon receipt and prior to the next compliance inspection of the site. If, while completing this report, you learn that your site is not in compliance with the rules and the act, it is advisable that the issues be rectified promptly to avoid possible enforcement action.

1. Is the site identification sign posted in accordance with Rule 3.1.12(1). YES NO
2. Is the affected area boundary clearly marked in accordance with Rule 3.1.12(2). YES NO
3. Is the mine site in final reclamation (all material extraction and stockpile removal is complete)?
If "YES," please note time limits related to completion of reclamation, Rule 3.1.3. YES NO
4. What was the date of last excavation, processing or hauling activity at the mine? current
5. Does the mine operate more than 180 days per year?
If "NO", please review Rule 1.13 to assure that your mine is in compliance. YES NO
6. Has this mine been granted: YES NO
 - a) approval of TEMPORARY CESSATION Status?
 - b) approval for INTERMITTENT OPERATION?
7. Number of acres currently affected (mining + incomplete and or unreleased reclamation). _____
8. Number of acres that were newly affected during the current report year. _____
9. Number of acres that were reclaimed during the current report year. _____
10. Estimated new acreage to be affected in the next report year. _____
11. Estimated acres to be reclaimed in the next report year. _____
12. **Total acres** in various stages of reclamation, since permitted mining activities began:

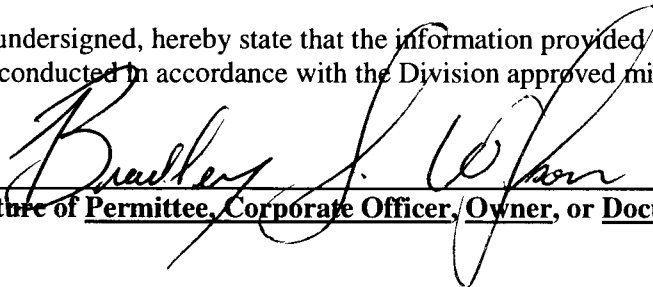
Total acres backfilled:		Total acres seeded w/ approved mix:		Total acres w/topsoil replaced:		Total acres mulched w/ approved mulch:	
Total acres graded:		Total acres fertilized w/ apvd fertilizer:		Topsoil replacement depth (in.):		Mulch application rate (tons/ac):	
Seed application method:		Fertilizer application method:		Mulch application method:			

13. Is weed control being conducted in accordance with an approved Weed Control Plan? YES NO N/A
 If "YES", indicate the weed species, control area, control type, application rate and treatment date on the report map.
14. Is adequate topsoil reserved for reclamation, based on your approved permit? YES NO N/A
 If "NO", please explain:
15. Is the reserved topsoil vegetated/stabilized in accordance with Rule 3.1.9(1)? YES NO N/A
 If "NO" please explain:
16. If mining has exposed groundwater, is the site in compliance with the approved mining plan and Office of the State Engineer (Well Permit, S.W.S.P., and/or Permanent Augmentation Plan)? ~~YES~~ NO N/A
17. Are all hazardous materials stored within approved spill containment structures? YES NO N/A
18. Is your financial warranty value sufficient to cover the cost to complete reclamation? YES NO N/A
19. Is your basis for legal right to enter still valid? YES NO
20. Does your permit require you to submit monitoring information annually? YES NO N/A
 If "Yes", please attach the required monitoring results to this Annual Report.
21. As required by rule, attach a map to this report that accurately depicts the permit boundary, current affected area boundary and location of the acreages specified in items 7- 12 and 14. UPDATED MAP ATTACHED: ✓

Division records indicate the following permittee contact information. If this information is not current, please type or print current contact information:

Permittee Contact:	Patrick Fischer	
Permittee Company:	CEMEX, Inc.	
Address:	P.O. Box 529 Lyons, CO 80540	
Phone Number:	(303) 823-2100	
Fax Number:	(303) 823-2199	
Email Address:	CF.PR.email	

I, the undersigned, hereby state that the information provided in this report is true and accurate, and that site operations are being conducted in accordance with the Division approved mining and reclamation plans.


 Signature of Permittee, Corporate Officer, Owner, or Documented Designee

12-3-2012
 Date

DOWE FLATS: DRMS Annual Report Additional Acreage Information

- 7. Number of acres currently affected = 289.8 acres**
 - a. Dowe Flats Pit = 80.4 acres
 - b. Interim Reclamation (potentially to be re-disturbed) = 184.5 acres
 - c. Reclamation In Progress = 24.9 acres

- 8. Number of acres newly affected during the current report year**
 - a. Dowe Flats Quarry = 10.7 acres

- 9. Number of acres that were reclaimed during the current report year**
 - a. In Progress (not completed in the 2011-2012 report year) = 24.9 acres

- 10. Estimated new acreage to be affected in the next report year**
 - a. Dowe Flats Quarry = 35 acres

- 11. Estimated acres to be reclaimed in the next report year**
 - a. New and In Progress Reclamation = 25 – 50 acres

- 12. Total Acres in various stages of reclamation, since permitted mining activities began**

The acreages for backfilling, grading, seeding, and amendments are for a snapshot in time and do not include acres that have been completed since 1993, but were re-disturbed and/or re-reclaimed. Areas that have been treated multiple times are not counted more than once.

- a. Total Acres Backfilled = 74.7 acres**
 - i. includes only areas where the pit has been filled in to reach a final grade
- b. Total Acres Graded = 191.5 acres**
 - i. Includes all areas that have been reclaimed as well as several areas where reclamation is still in progress
- c. Total Acres Seeded = 209.4 acres**
 - i. Includes all areas that have been seeded at least once including stockpiles
- d. Total Acres Fertilized = 209.4 acres**
 - i. This number includes all areas treated with various applications traditional chemical fertilizer as well as those treated with Humega
- e. Total Acres Topsoiled = 191.5 acres**
 - i. Includes all areas where a suitable growth media has been applied including both topsoil and subsoil
- f. Total Acres Mulched = 209.4 acres**
 - i. Areas reclaimed before 2005 were mulched with straw, while more recent applications have been native weed-free grass hay.
- g. Topsoil Replacement Depth:** Topsoil is applied at 4 to 8 inches per the reclamation plan.
- h. Mulch Application Rate:** 2 tons hay or straw per acre

- i. **Seed Application Method:** Seed was drilled from 1998-2005 and broadcast subsequently
- j. **Fertilizer Application Method:** Broadcast spreader
- k. **Mulch Application Method:** Spreader or blower

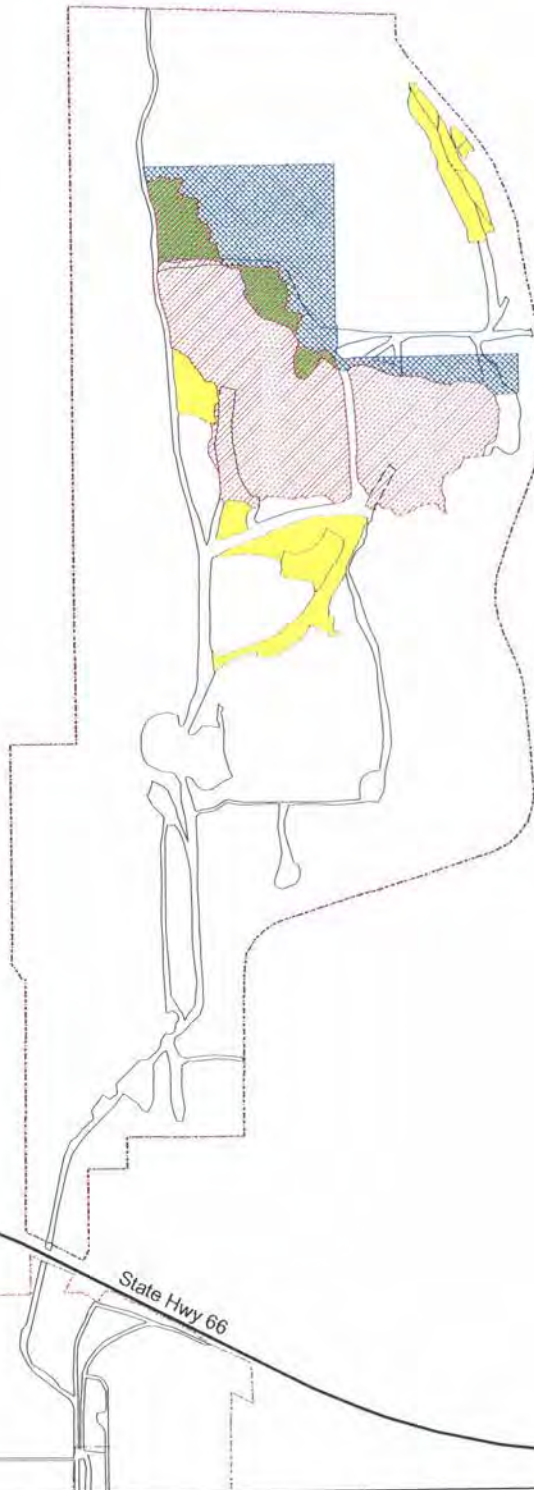
13. Weed Control – N/A

14. Topsoil Reserve – Yes

15. Topsoil Stabilization – Yes

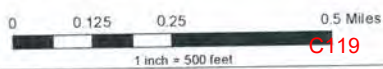
21. Maps

- a. **Map 1: Disturbance Areas Dowe Flats**
 - i. Total affected to date
 - ii. Newly affected in 2012
 - iii. Estimated affected for 2013
- b. **Map 2: Reclaimed Areas to Date Dowe Flats**
 - i. Total area reclaimed to date (1998- 2012)
 - ii. Reclamation in Progress
 - iii. Estimated reclamation for 2012
- c. **Map 3: Dowe Flats Backfill, Grading, and Topsoil Treatments 2012**
- d. **Map 4: Dowe Flats Specific Reclamation Treatments 2012**
 - i. Soil Amendments & Revegetation



Legend

- Pit Disturbance Boundary
- Dowe Flats Quarry Permit Boundary
- 2011-2012 New Mining Disturbance
- Fresh Water
- Anticipated 2012-2013 Mining Disturbance
- Impacted Water
- Reclamation in Progress



Cemex Dowe Flats 2012 DRMS Report

Map 1; Disturbance Areas

Prepared By:

Drawn By: RFB

Checked By: RFB

Approved By:

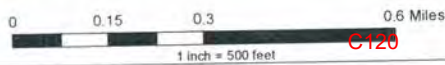


Date: September 28, 2012



Legend

-  Final Reclamation
-  Interim Reclamation
-  Reclamation in Progress
-  Dowe Flats Quarry Permit Boundary
-  Fresh Water
-  Impacted Water



Cemex Dowe Flats 2012 DRMS Report

Map 2: Reclamation to Date

Prepared By:



Drawn By: RFB






Checked By: RFB

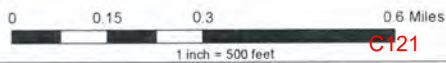
Approved By:

Date: September 28, 2012



Legend

-  Backfilled Areas
-  Growth Media Application & Final Grading
-  Growth Media Stockpile
-  Dowe Flats Quarry Permit Boundary
-  Fresh Water
-  Impacted Water



CT21

Cemex Dowe Flats 2012 DRMS Report

Map 3: Backfill, Grading, and Growth Media Treatments

Prepared By:

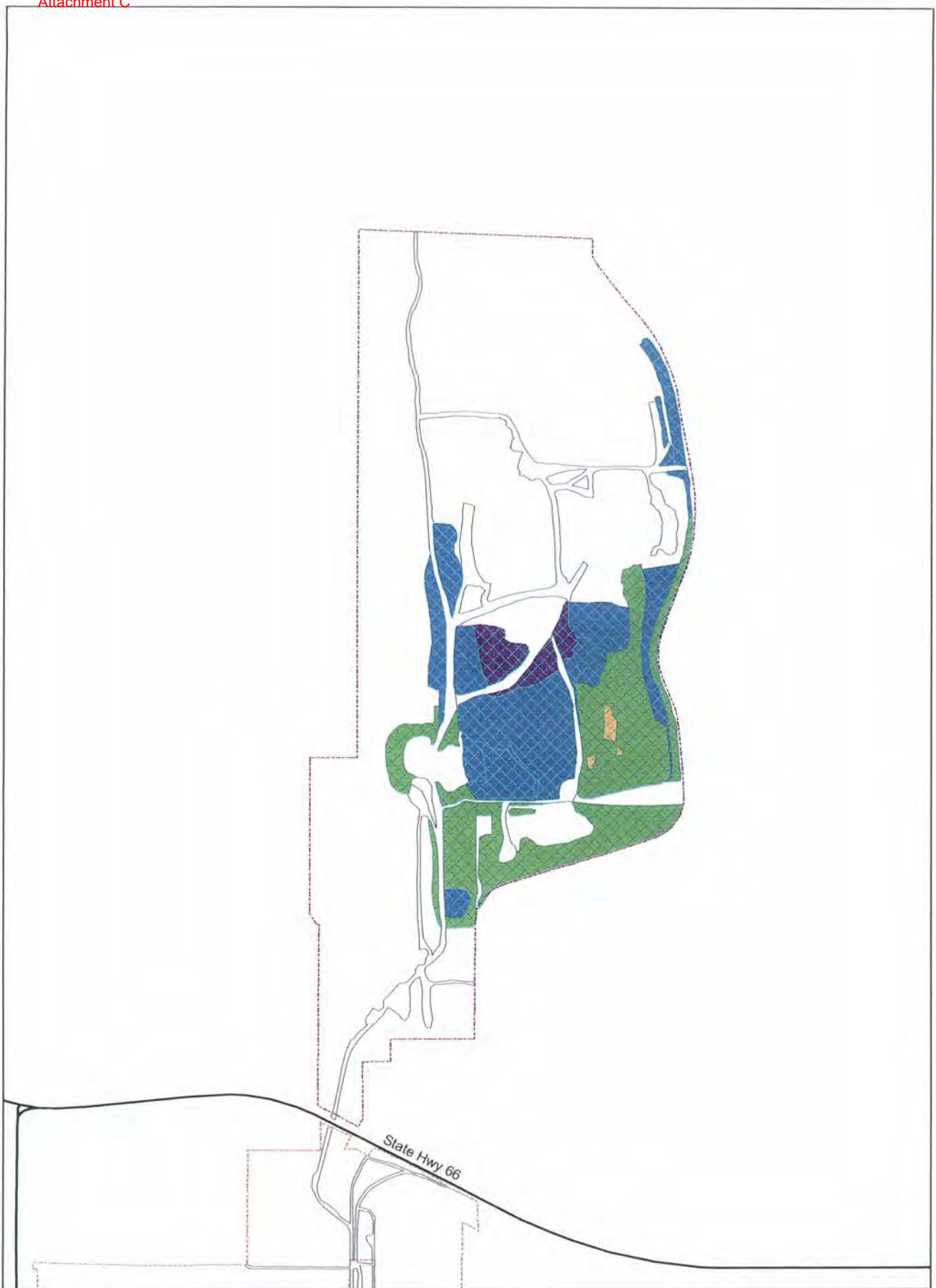


Drawn By: RFB

Checked By: RFB

Approved By:

Date: September 28, 2012



Legend

Seed Application (Various DRMS Approved Mixtures)
 Dowe Flats Quarry Permit Boundary

Fertilizer & Mulch Application

- 18-46-0 (NPK) & Hay Mulch
- 14-14-10 (NPK) & Hay Mulch
- 18-46-0 (NPK) & Straw Mulch
- Humeqa & Hay Mulch

Fresh Water
 Impacted Water

0 0.15 0.3 0.6 Miles

1 inch = 500 feet

Cemex Dowe Flats 2012 DRMS Report

Map 4: Reclamation Treatments

Prepared By:	Drawn By: RFB
	Checked By: RFB
	Approved By:
	Date: September 28, 2012

Habitat Management

www.habitatmanagementinc.com



November 25, 2013

Division of Reclamation Mining and Safety
1313 Sherman St., Room 215
Denver, CO 80203
Attention: Jim Dupler

Via FedEx
TRK 797246388418

RE: CEMEX, Inc. Reclamation Reports Submittal

Dear Mr. Dupler:

Enclosed are the annual reclamation reports and pertinent maps for the reporting period of 2012-2013 for the following CEMEX, Inc. properties:

1. Dowe Flats (Permit #M-1993-041)
2. Lyons Quarry (Permit #M-1977-208)
3. Silica Quarry (Permit #M-1977-361)

The annual fee checks were sent in October. Patrick Fischer the former Quarry Manager is no longer with CEMEX, Inc., please update all three above permits to reflect Bradley Shane Wilson as the new contact person temporarily until. Thank you for extending the deadline for our submission of these reports.

Sincerely,

A handwritten signature in blue ink, appearing to read "Denise T. Arthur".

Denise T Arthur Ph.D.
Environmental Manager

RECEIVED

NOV 26 2013

DIVISION OF RECLAMATION
MINING AND SAFETY

MAC

ARRpt

Fee's already Rec'd.

DIVISION OF RECLAMATION MINING AND SAFETY

NOV 26 2013

112c Annual Report

RECEIVED

Permittee Name:	CEMEX, Inc.	Permit Number:	M-1993-041
Operation Name:	Dowe Flats Mine	County:	Boulder
Annual Fee Due:	\$791.00	Anniversary Date:	September 8, 2013
Permit Acreage:	1,854.45	Current Bond Amt:	\$3,389,460.00

According to C.R.S. 34-32.5-116 or 34-32-116, each year, on the anniversary date of the permit, an operator shall submit the Annual Fee, an Annual Report and map showing the extent of current disturbances to affected land, required monitoring information, reclamation accomplished to date and during the preceding year, any new disturbance that is anticipated to occur during the upcoming year, any reclamation that will be performed during the upcoming year, the dates for the beginning of active operations, and the date active operations ceased for the year.

Information contained in this report will be reviewed by the Division upon receipt and prior to the next compliance inspection of the site. If, while completing this report, you learn that your site is not in compliance with the rules and the act, it is advisable that the issues be rectified promptly to avoid possible enforcement action.

1. Is the site identification sign posted in accordance with Rule 3.1.12(1). YES NO
2. Is the affected area boundary clearly marked in accordance with Rule 3.1.12(2). YES NO
3. Is the mine site in final reclamation (all material extraction and stockpile removal is complete)? YES NO
If "YES," please note time limits related to completion of reclamation, Rule 3.1.3.
4. What was the date of last excavation, processing or hauling activity at the mine? CURRENT
5. Does the mine operate more than 180 days per year YES NO
If "NO", please review Rule 1.13 to assure that your mine is in compliance.
6. Has this mine been granted: YES NO
a) approval of TEMPORARY CESSATION Status? YES NO
b) approval for INTERMITTENT OPERATION?
7. Number of acres currently affected (mining + incomplete and or unreleased reclamation). 300.4
MINING = 84.2 UNRELEASED = 216.2
8. Number of acres that were newly affected during the current report year. 11.5
9. Number of acres that were reclaimed during the current report year. 33.3
COMPLETE = 23.3 IN PROGRESS = 10
10. Estimated new acreage to be affected in the next report year. 30
11. Estimated acres to be reclaimed in the next report year. 20-40

12. **Total acres** in various stages of reclamation, since permitted mining activities began:

Total acres backfilled:	<u>81.4</u>	Total acres seeded w/ approved mix:	<u>206.2</u>	Total acres w/topsoil replaced:	<u>203.2</u>	Total acres mulched w/ approved mulch:	<u>206.2</u>
Total acres graded:	<u>200.2</u>	Total acres fertilized w/ apvd fertilizer:	<u>206.2</u>	Topsoil replacement depth (in.):	<u>≥ 4-8 inches</u>	Mulch application rate (tons):	<u>2 ton/ACRE</u>
Seed application method:	<u>DRILL - 1998-2005 BROADCAST 2005-2013</u>		Fertilizer application method:	<u>BROADCAST</u>		Mulch application method:	<u>SPREADER or BLOWER</u>

- 13. Is weed control being conducted in accordance with an approved Weed Control Plan? YES NO N/A
If "YES", indicate the weed species, control area, control type, application rate and treatment date on the report map.
- 14. Is adequate topsoil reserved for reclamation, based on your approved permit? YES NO N/A
If "NO", please explain:
- 15. Is the reserved topsoil vegetated/stabilized in accordance with Rule 3.1.9(1)? YES NO N/A
If "NO" please explain:
- 16. If mining has exposed groundwater, is the site in compliance with the approved mining plan and Office of the State Engineer (Well Permit, S.W.S.P., and/or Permanent Augmentation Plan)? YES NO N/A
- 17. Are all hazardous materials stored within approved spill containment structures? YES NO N/A
- 18. Is your financial warranty value sufficient to cover the cost to complete reclamation? YES NO N/A
- 19. Is your basis for legal right to enter still valid? YES NO
- 20. Does your permit require you to submit monitoring information annually? YES NO N/A
If "Yes", please attach the required monitoring results to this Annual Report.
- 21. As required by Colorado Mined Land Reclamation Act and/or Colorado Land Reclamation Act for the Extraction of Construction Materials (C.R.S. 34-32-116 or 34-32.5-116), attach a map to this report that accurately depicts the permit boundary, current affected area boundary and location of the acreages specified in items 7- 12 and 14.
UPDATED MAP ATTACHED: SEE MAPS 1-3 ATTACHED

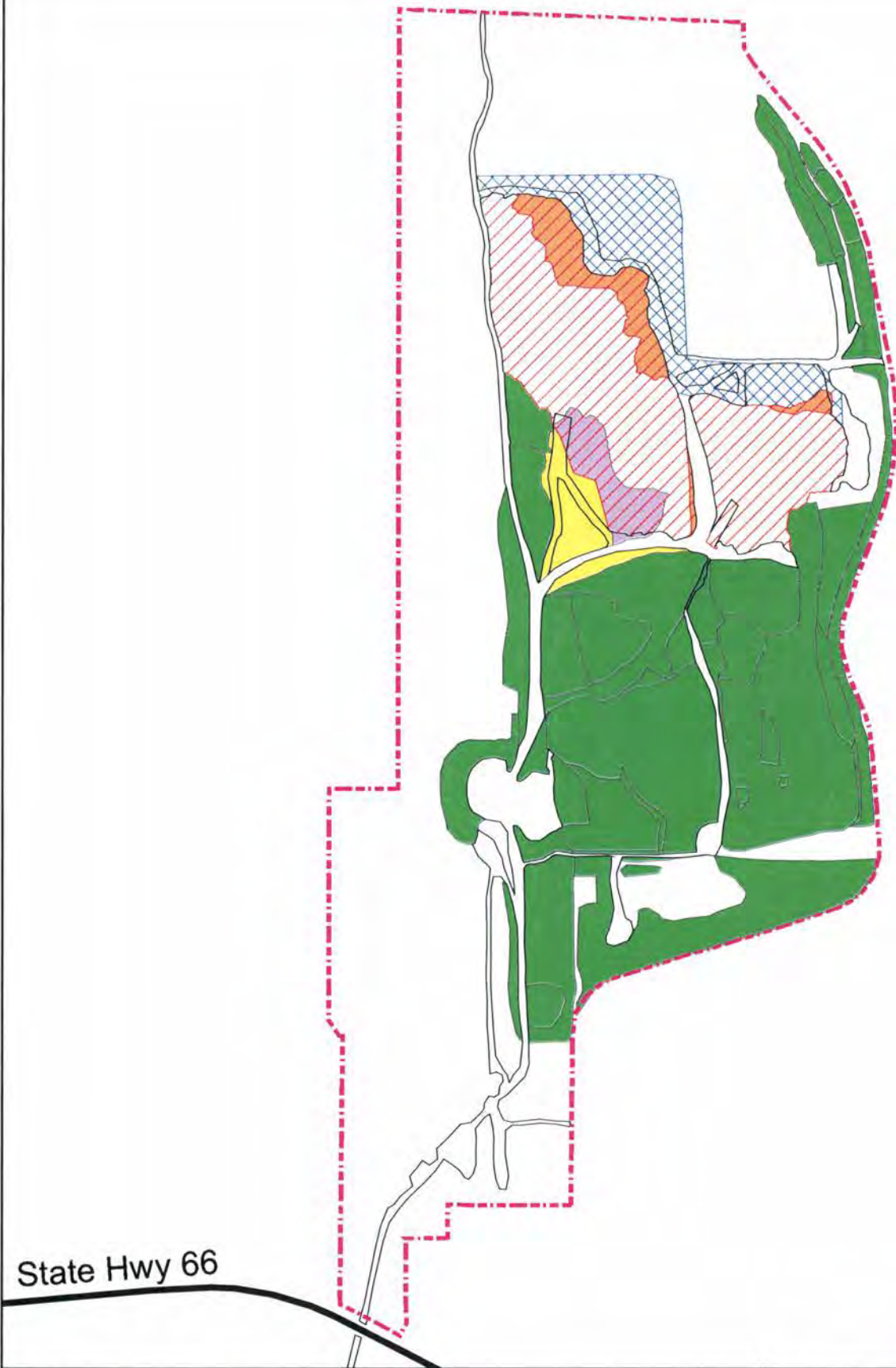
Division records indicate the following permittee contact information. If this information is not current, please type or print **current** contact information:

Permittee Contact:	Patrick Fischer	<u>BRADLEY S. WILSON</u>
Permittee Company:	CEMEX, Inc.	
Address:	P.O. Box 529 Lyons, CO 80540	
Phone Number:	(303) 823-2100	
Fax Number:		<u>303-823-2199</u>
Email Address:	CF.PR.email	<u>Bradleys.wilson@cemex.com</u>

I, the undersigned, hereby state that the information provided in this report is true and accurate, and that site operations are being conducted in accordance with the Division approved mining and reclamation plans.

Bradley S. Wilson
Signature of Permittee, Corporate Officer, Owner, or Documented Designee

11-25-2013
Date



State Hwy 66



Pit Disturbance Boundary	Dowe Flats Quarry Permit Boundary
2012-2013 New Mining Disturbance	Fresh Water
Anticipated 2013-2014 Mining Disturbance	Impacted Water
Unreleased Reclamation	
Reclamation in Progress	
Anticipated Reclamation 2014	

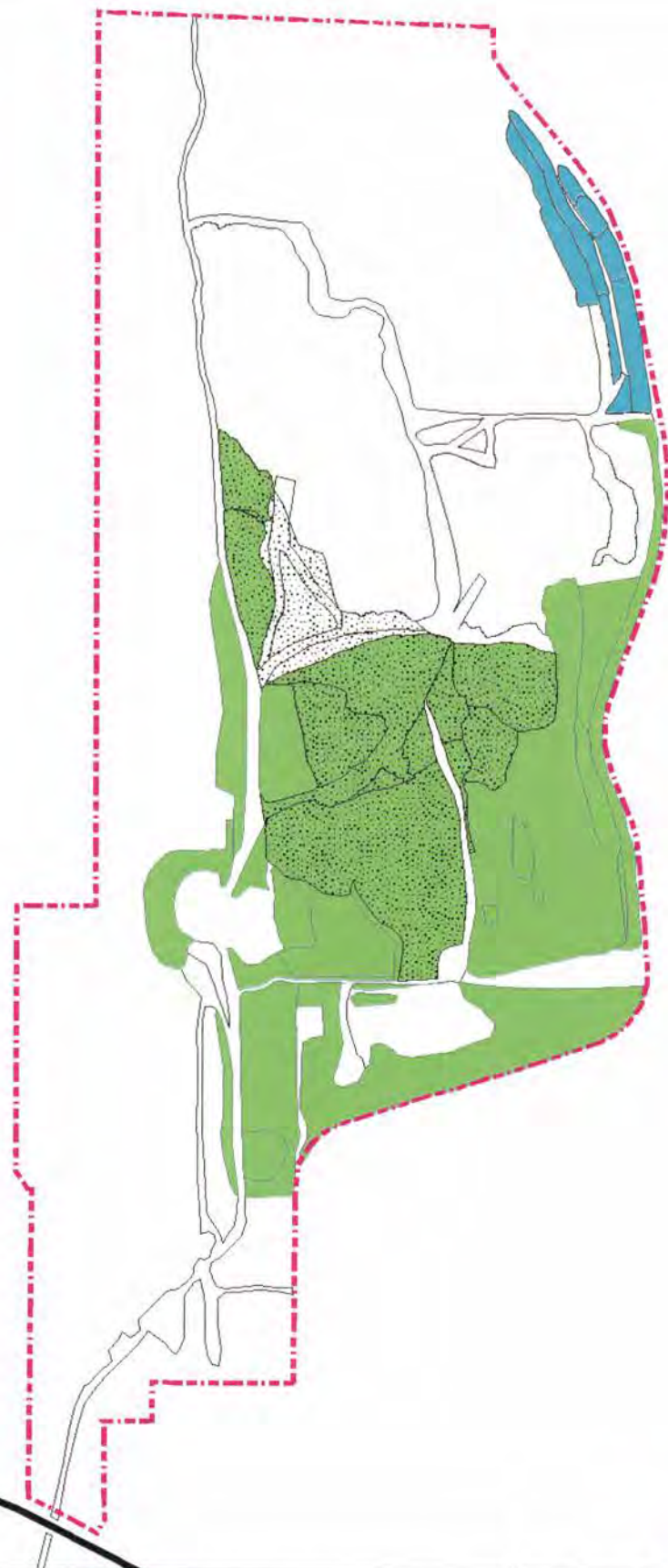
0 0.1 0.2 0.4 Miles

 1 inch = 1,200 feet

Dowe Flats 2013 DRMS Report
 Permit #M-1993-041

Map 1: Disturbance & Reclamation Areas

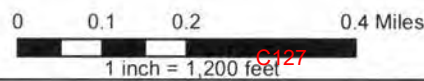
Prepared By:	Drawn By: RFB
Habitat Management www.habitatmanagementinc.com	Checked By: RFB
	Approved By: DTA
	Date: 9/30/13



State Hwy 66



-  Backfilled Areas
-  Growth Media Stockpile
-  Growth Media Application & Final Grading
-  Dowe Flats Quarry Permit Boundary
-  Fresh Water
-  Impacted Water



Dowe Flats 2013 DRMS Report
Permit #M-1993-041

Map 2: Backfill, Grading & Growth Media

Prepared By:



Drawn By: RFB

Checked By: RFB

Approved By: DTA

Date: 9/30/13






C127







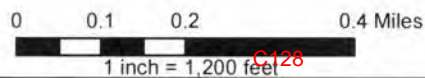
State Hwy 66



Fertilizer & Mulch Application

-  18-46-0 (NPK) & Hay Mulch
-  14-14-10 (NPK) & Hay Mulch
-  11-28-23 (NPK) & Hay Mulch
-  18-46-0 (NPK) & Straw Mulch
-  Humega & Hay Mulch

-  Seed Application (Various Approved Mixtures)
-  Dowe Flats Quarry Permit Boundary
-  Fresh Water
-  Impacted Water



Dowe Flats 2013 DRMS Report
Permit #M-1993-041

Map 3: Reclamation Treatments

Prepared By:



Drawn By: RFB

Checked By: RFB

Approved By: DTA

Date: 9/30/13

**Appendix D
Wetlands Review**

Introduction

No jurisdictional wetlands are located within the Dowe Flats Mining Boundary. Three wetland areas that were once thought to be present within the mining boundary were associated with the Saint Vrain Supply Canal liner leakage. The canal was relined in 1994 and in 1997, CEMEX hired a wetland consultant to conduct an additional study of these three areas. The study results were sent to the U.S. Army Corps of Engineers (ACOE). On July 22, 1997, the ACOE replied verifying that the three subject wetlands were no longer considered to be wetlands or waters of the United States (Corps File # 199580789, Figure 4).

Both the 2010 inspection for the 15-Year Review and the 2014 inspection for this review, found no wet areas within the mining boundary. However, a wet area of approximately one acre just north of the mining boundary on Boulder County Fee Title land was identified in the 2010 inspection and is still present (Figure 1 and Figure 2).

The dominant vegetation in the wet zone at this time is a mixture of wetland and upland plant species, with more wetland species present than at the time of the 2010 inspection. Dominant species include rushes (*Juncus* spp.), curly dock (*Rumex crispus*), fringed brome (*Bromus ciliata*), Kentucky bluegrass (*Poa pratensis*), moth mullein (*V. blattaria*), and common mullein (*Verbascum thapsus*) with considerable cover of willows (*Salix* sp.) and thistles (*Cirsium* sp.) on the margins (Figure 3).

At the time of the 15-Year Review, CEMEX requested that the ditch be relined to prevent potential for future artificial wetland development. CEMEX will again make this request.

Figure 1: Wet area on Boulder County Fee Title land north of the mining boundary (photo facing southeast)



Figure 2: Mine Boundary marker south of wet area (photo facing east)

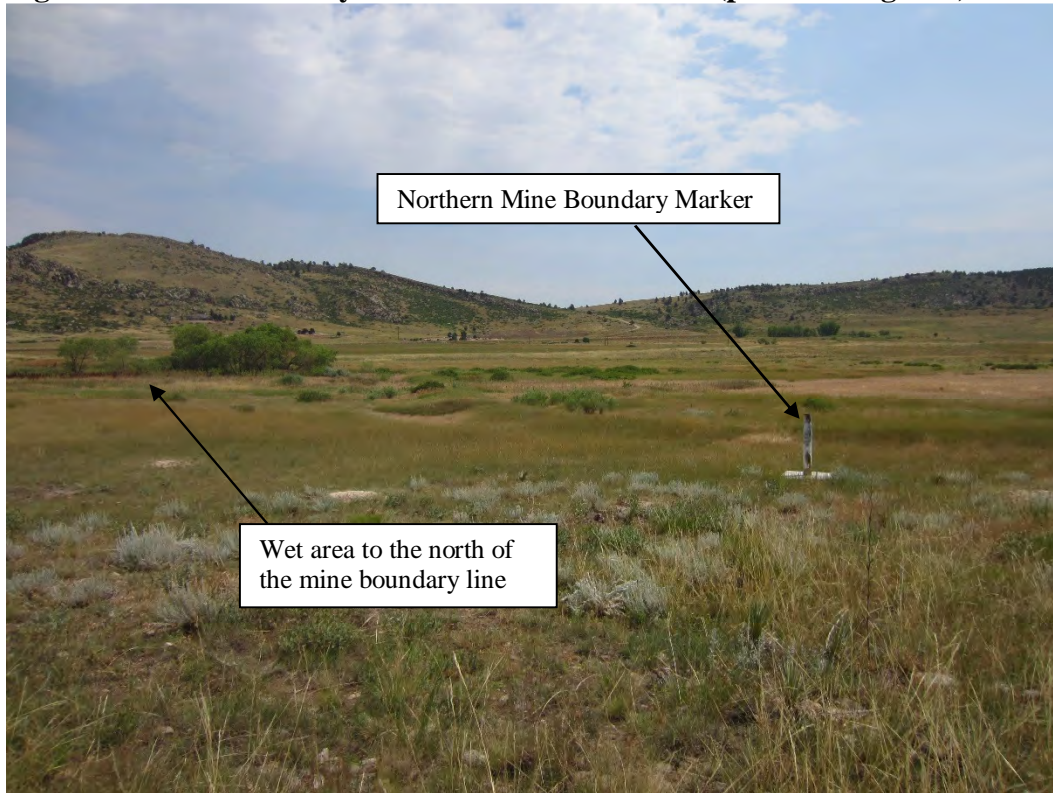
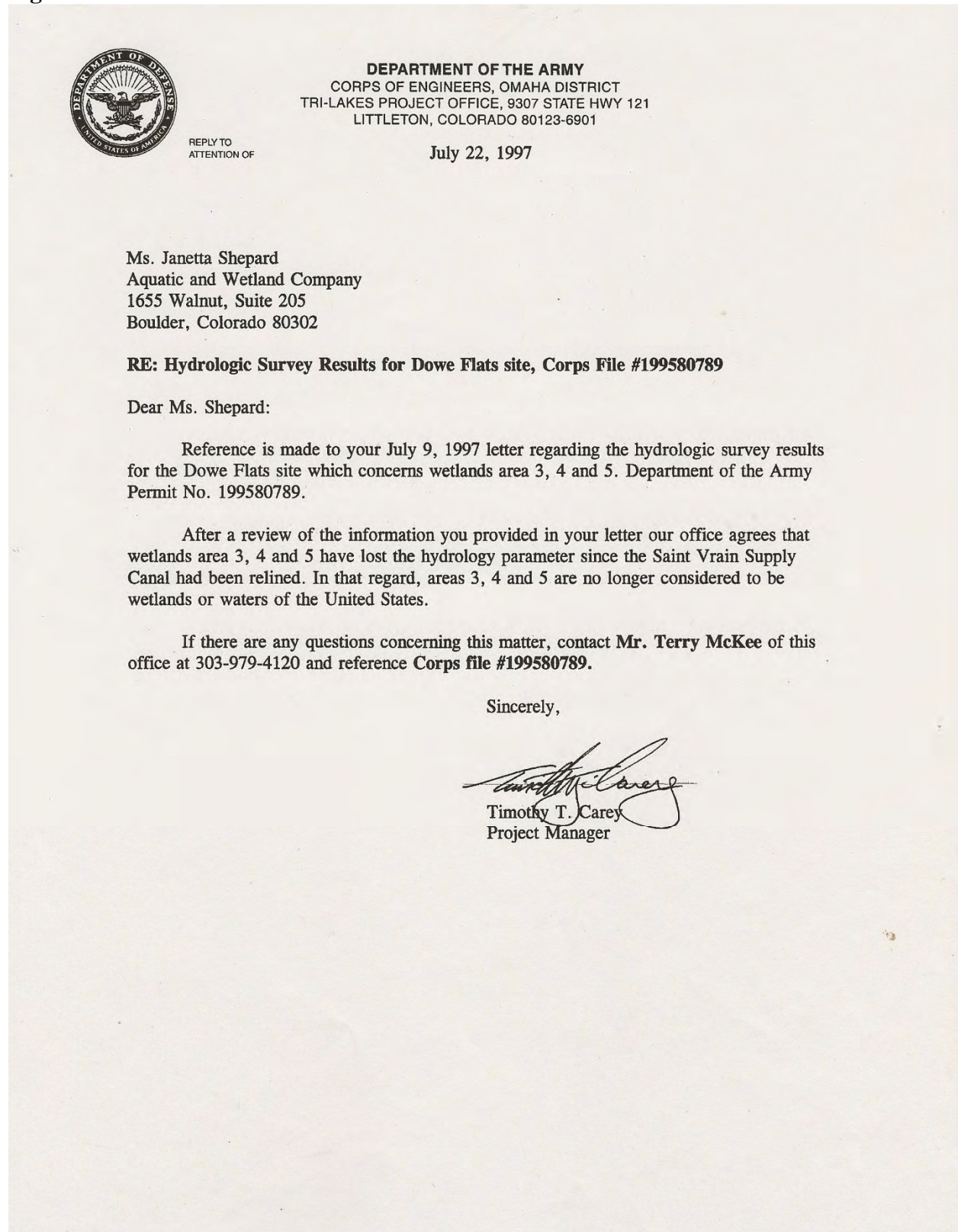


Figure 3: Close-up of the wet area vegetation



Figure 4: 1997 ACOE Release Letter



Appendix E
On-Site Wind Data Monitoring Reports

Introduction

Per the Dowe Flats Special Land Use Permit (SU-93-14), CEMEX maintains an anemometer (Figure 1) on site and continuously monitors wind speed. All mining operations relating to loading and hauling cease when the sustained wind speeds exceed 30 MPH. At 28 MPH, material is no longer loaded on conveyors, and all material already on conveyors is transported to the “end of the line” before the conveyor shuts down. Table 1 provides a summary of operations shutdown events each year during the review period. Tables 2 – 6 include the dates and wind speeds recorded for all operations shut downs during the review period.

Figure E-1: Dowe Flats Anemometer

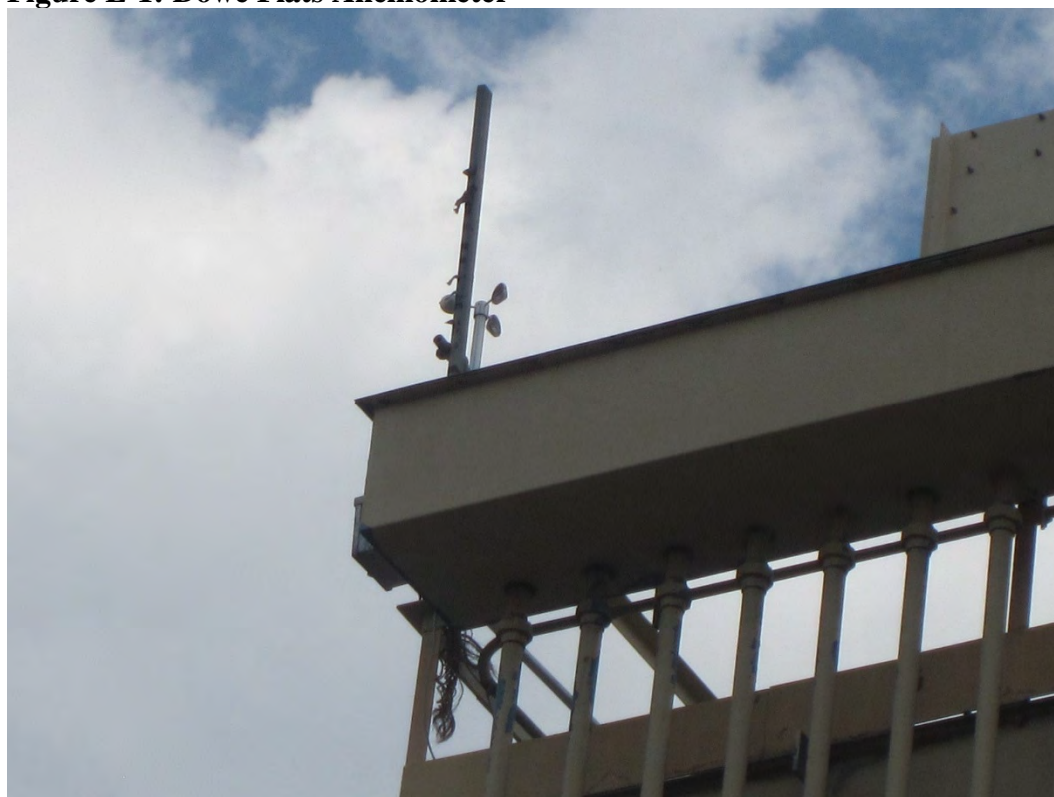


Table E-1: Operations Shutdown Summary January 2010 – June 2014

Year	Number of Events	Exceedance Duration (Minutes)	Operating Hours	Exceedance
2010	21	2,042	8,760	0.39%
2011	26	2,752	8,760	0.52%
2012	25	1,758	8,784	0.33%
2013	12	827	8,760	0.16%
2014*	35	119	4,344	0.05%

* Data for 2014 only available through June 30th.

20-Year Interim Review of Terms & Conditions
Dowe Flats Special Use Permit (SU-93-14)

Appendix E

Table E-2: 2010 Dates and Wind Speeds of Operations Shutdown

Date	Exceedance Duration (Minutes)	Average MPH
3/23/2010	14	30.6
3/30/2010	74	32.8
4/3/2010	89	32.6
4/13/2010	296	37.0
5/4/2010	402	37.9
5/4/2010	5	30.1
5/4/2010	230	31.6
5/24/2010	100	35.7
9/9/2010	86	32.5
10/8/2010	13	30.2
10/26/2010	115	34.5
11/7/2010	5	30.2
11/25/2010	24	31.5
12/3/2010	364	33.7
12/3/2010	3	30.1
12/3/2010	101	31.6
12/3/2010	79	31.4
12/3/2010	14	30.5
12/29/2010	6	30.2
12/29/2010	1	30.0
12/29/2010	21	30.3

20-Year Interim Review of Terms & Conditions
Dowe Flats Special Use Permit (SU-93-14)

Appendix E

Table E-3: 2011 Dates and Wind Speeds of Operations Shutdown

Date	Exceedance Duration (Minutes)	Average MPH
1/22/2011	19	31.3
2/13/2011	49	33.4
2/20/2011	81	32.3
3/11/2011	365	41.0
3/17/2011	3	30.1
3/17/2011	216	32.5
3/22/2011	543	37.2
3/22/2011	46	31.3
4/3/2011	144	33.2
4/16/2011	4	30.1
4/17/2011	67	31.6
4/29/2011	253	35.4
5/9/2011	66	31.9
5/30/2011	166	34.7
5/30/2011	65	32.6
5/31/2011	12	30.3
10/6/2011	39	33.6
11/5/2011	5	30.1
11/5/2011	17	30.3
11/12/2011	45	31.1
11/12/2011	289	40.2
11/18/2011	79	32.4
12/28/2011	25	31.1
12/31/2011	68	32.4
12/31/2011	17	30.3
12/31/2011	69	32.6

20-Year Interim Review of Terms & Conditions
Dowe Flats Special Use Permit (SU-93-14)

Appendix E

Table E-4: 2012 Dates and Wind Speeds of Operations Shutdown

Date	Exceedance Duration (Minutes)	Average MPH	Maximum MPH	Minimum MPH
1/18/2012	109	33.7	36.37	30.02
1/18/2012	19	30.4	30.73	30.06
1/18/2012	3	30.1	30.12	30.00
1/18/2012	15	30.4	30.55	30.07
1/19/2012	10	30.5	30.90	30.14
1/20/2012	255	38.6	44.55	30.04
2/21/2012	23	30.4	30.77	30.01
2/22/2012	152	33.3	35.26	30.01
2/22/2012	123	34.0	36.10	30.03
2/22/2012	196	36.0	42.87	30.04
2/22/2012	150	36.0	42.12	30.03
2/22/2012	3	30.0	30.03	30.01
2/29/2012	1	30.0	30.03	30.03
2/29/2012	1	30.0	30.02	30.02
3/26/2012	76	31.2	32.02	30.02
3/26/2012	1	30.0	30.04	30.04
3/26/2012	11	30.2	30.30	30.03
3/26/2012	2	30.0	30.03	30.03
4/7/2012	305	36.6	42.56	30.08
5/27/2012	77	31.1	32.29	30.01
5/27/2012	91	31.8	33.25	30.07
7/23/2012	78	32.3	34.55	30.01
7/25/2012	28	30.8	31.35	30.05
9/3/2012	12	30.8	31.11	30.18
12/17/2012	17	30.2	30.31	30.04

20-Year Interim Review of Terms & Conditions
Dowe Flats Special Use Permit (SU-93-14)

Appendix E

Table E-5: 2013 Dates and Wind Speeds of Operations Shutdown

Date	Exceedance Duration (Minutes)	Average MPH	Maximum MPH	Minimum MPH
5/1/2013	52	41.8	52.51	30.50
5/1/2013	90	44.0	53.94	30.36
8/21/2013	65	43.5	57.81	30.03
8/21/2013	36	33.0	33.41	30.34
8/22/2013	104	184.8	320.53	34.33
11/17/2013	122	32.4	34.53	30.12
12/2/2013	49	30.8	31.38	30.04
12/2/2013	32	30.9	31.52	30.13
12/10/2013	5	30.2	30.30	30.14
12/10/2013	49	34.7	36.59	30.03
12/11/2013	11	33.1	35.94	30.21
12/24/2013	212	33.6	38.59	30.04

20-Year Interim Review of Terms & Conditions
Dowe Flats Special Use Permit (SU-93-14)

Appendix E

Table E-6: 2014 Dates and Wind Speeds of Operations Shutdown

Date	Exceedance Duration (Minutes)	Average MPH	Maximum MPH	Minimum MPH
1/3/2014	19	30.6	30.81	30.02
1/3/2014	22	31.0	31.74	30.04
1/12/2014	96	33.7	36.57	30.13
1/29/2014	89	32.7	34.58	30.01
1/29/2014	72	31.8	33.33	30.08
2/16/2014	116	34.0	37.26	30.22
2/17/2014	38	31.6	32.71	30.01
2/17/2014	166	34.3	39.16	30.06
2/17/2014	65	34.7	37.26	30.07
2/18/2014	90	33.6	37.11	30.02
2/18/2014	4	30.0	30.08	30.01
2/21/2014	3	30.0	30.06	30.02
2/21/2014	23	30.6	31.02	30.01
2/21/2014	122	31.6	32.37	30.05
3/17/2014	70	32.0	33.38	30.02
4/9/2014	857	52.1	85.66	30.10
4/9/2014	1	30.1	30.11	30.11
4/9/2014	434	42.2	50.93	30.03
4/10/2014	131	34.0	38.51	30.01
4/10/2014	108	34.2	36.43	30.04
4/11/2014	319	39.5	46.09	30.02
4/11/2014	64	31.0	31.87	30.03
4/11/2014	14	30.2	30.31	30.01
4/12/2014	407	40.4	53.14	30.06
4/12/2014	3	30.0	30.02	30.00
4/12/2014	196	32.1	33.35	30.04
4/12/2014	86	33.2	34.97	30.07
4/13/2014	175	31.5	33.05	30.04
4/13/2014	703	50.3	71.24	30.10
4/14/2014	159	49.6	57.74	30.52
4/15/2014	84	39.0	45.08	30.03
4/15/2014	236	40.6	47.60	30.02
4/15/2014	230	40.5	68.37	30.02
4/16/2014	248	35.7	38.35	30.06
4/16/2014	197	36.8	38.99	30.09

**Appendix F
Prairie Dog Habitat Review**

Introduction

During the 10-Year Review, Boulder County requested additional information regarding the prairie dog habitat reclamation process. Boulder County had a concern that the restored areas may not have sufficient soil depth free of large aggregate material and that the soil would not be sufficiently compacted. Large aggregate would inhibit prairie dog digging and insufficient compaction could allow burrow collapse. CEMEX engaged Michael Figgs with LREP, Inc. and Denise Arthur with ESCO Associates to research the reclamation process for the placement of soil in terms of both soil depth and compaction. A memo was submitted to Todd Tucker of Boulder County by Michael Figgs on July 27, 2005 providing the requested information.

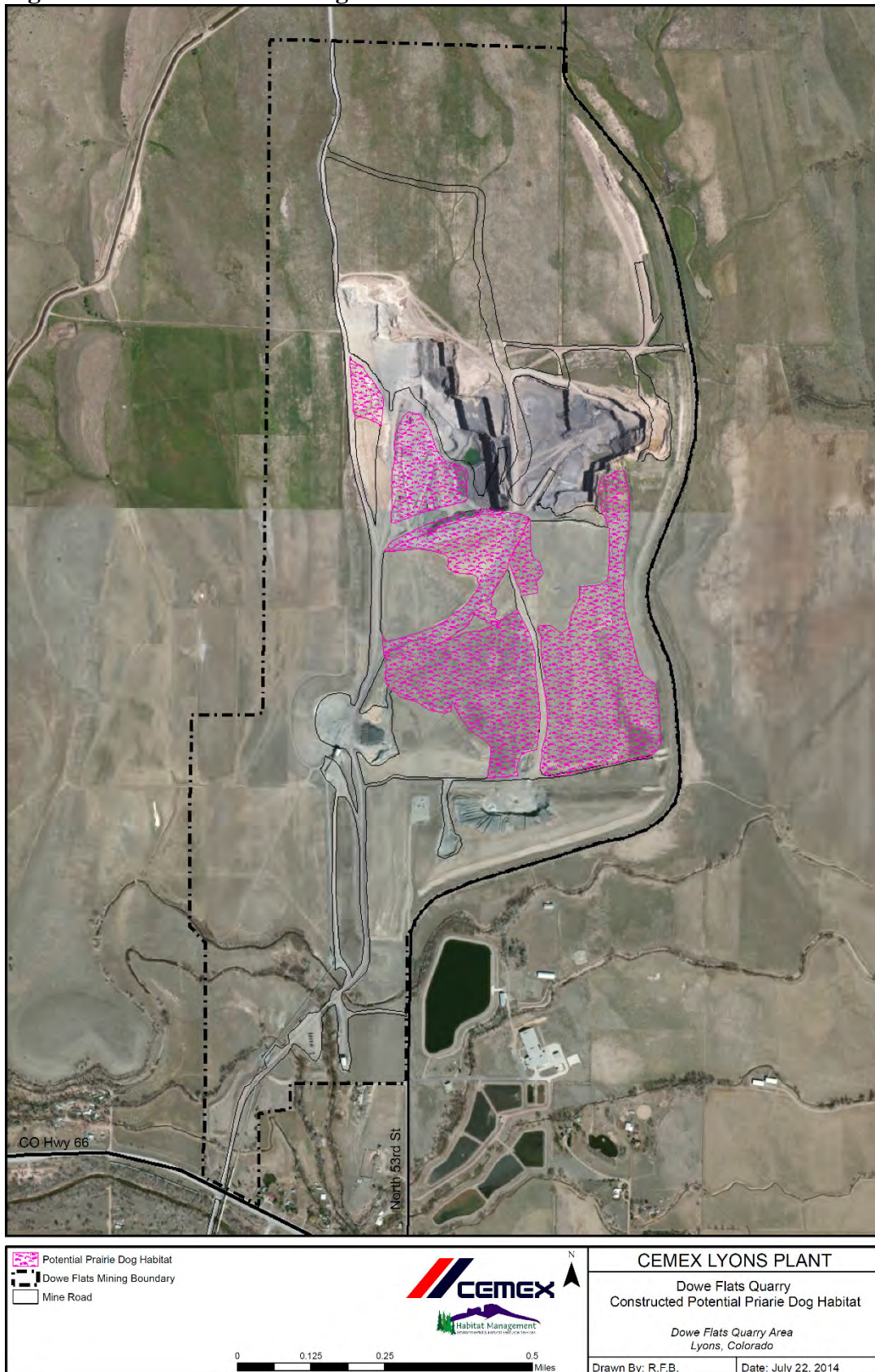
While it was not a requirement of the permit, CEMEX agreed to create a minimum of 50 acres of reclamation with a minimum of four feet of soil depth free of large aggregate after soil settlement. The process for creating potential prairie dog habitat was directed by Denise Arthur of ESCO Associates and CEMEX continues to follow these guidelines when conducting fill activities if conditions allow (Figure 1).

At the time of the 15-Year Review, 58 acres of prairie dog habitat soil replacement had occurred. As of July 2014, this area has increased to 91 acres (Figure 2). The areas indicated on the figure have not necessarily been revegetated with the permanent seed mixture nor have they had topsoil replacement. However, the areas do have the required minimum of four feet of material after settlement to more than satisfy the 50 acres of the constructed prairie dog habitat. These areas will be seeded with native vegetation when final topsoil placement has been conducted.

Figure 1: 2014 reclamation with over 6-ft of compacted subsoil for potential prairie dog habitat (equipment tire is approximately 12-ft)



Figure 2: Potential Prairie Dog Habitat Areas



**Appendix G
Alternative Prairie Reclamation Plan**



ALTERNATIVE (PRAIRIE) RECLAMATION PLAN

DOWE FLATS PROJECT

Southdown, Inc.

January 28, 1994





EXECUTIVE SUMMARY

Southdown, Inc. has developed this alternative reclamation plan in response to a request by the Boulder County Parks Department and Land Use staff. The plan was prepared by Dr. David Buckner, Mike Figgs and SHB AGRA staff. The alternative reclamation plan has the following key elements:

1. The mine area is restored to a prairie grassland ecosystem.
2. Approximately 20 acres of created wetlands are planned in the northeast portion of the mine.
3. The maximum acreage of land disturbance at any one time is reduced from 115 to 95 acres.
4. The average annual acreage of disturbance over the 25-year mine life is less than 65 acres.
5. The total acreage disturbed over the life of the mine is reduced from 695 acres to 385 acres.
6. County Road 47 is relocated in the East Valley instead of the West Valley, thus eliminating all disturbance in the West Valley west of Limestone Ridge.
7. Overburden and waste rock are placed back into the mined out areas instead of being used to create completely new landforms in the valley.
8. Setbacks from property lines and buffers around active mining and reclamation are greatly increased.

The alternative reclamation plan will reduce the acreage of disturbance, dust emissions (because reclamation equipment is moving far shorter distances), water augmentation needs (because less groundwater is exposed), and potential archaeological disturbance. The valley will appear much the same as it does today, except that the overall ground surface will be lowered about six feet (because the volume of reclamation material is slightly less than the volume of the mined out area). The six feet deficit will be spread out uniformly over the valley and will be barely noticeable.

The alternative reclamation plan does not have nearly the diversity of the originally proposed plan. The original plan had 11 types of vegetation communities; the alternative plan has two.



The original plan created hills, valleys, cliffs, ponds, wetlands and marshes as well as numerous and varied microtopography. The alternative plan creates gently sloping prairie with a single 20-acre wetland. The original plan created a diverse wildlife habitat and ecosystem capable of supporting many different species. The alternative plan does not accomplish this. Also, the original plan separated prairie dog communities to prevent total population loss due to a potential outbreak of bubonic plague. The alternative plan does not separate prairie dog communities.

Each plan has its advantages and disadvantages. Southdown is willing to implement whichever plan the community considers most compatible and consistent with Comprehensive Plan goals.



EXHIBIT D - MINING PLAN

Four horizons have been targeted for mining at Dowe Flats based principally on their calcium carbonate content and utilization potential at Southdown's nearby cement plant. The west limb of a southward plunging syncline contains the four beds of interest; all outcrop along a general north/south strike and exhibit gentle dips to the east. The Western most seam (also the stratigraphically lowest) has been somewhat resistant to erosion and is referred to as the Hi-Cal ridge. Expressions of the other horizons are more subdued and these are known locally as simply the 2nd, 3rd, and 4th ridges (Map E shows the areal extent of mining for the four ridges with the overlaps due to the stratigraphic superposition of the limestone beds).

A primary objective of the mining plan has been to achieve a 25-year project life, given the expected product mix deriving from the four minable seams and the overall annual tonnage that must be delivered to the cement plant. Currently this annual figure is 760,000 tons, with roughly 40% to 45% of this amount contributed each by the Hi-Cal and 3rd ridges. Because the Hi-Cal ridge, at its outcrop, dips more steeply than the others, the desire is to maximize mining along its strike length and to avoid excessive down-dip extraction; the objective is to minimize waste handling associated with the removal of the limestone beds. As a result of these factors, it has been determined that the Hi-Cal bed will need to be mined over a strike length of almost 8,000 feet and that the 2nd and 3rd seams will be extracted over a linear distance of 5,000 feet. Only 1,900 feet of the 4th ridge outcrop will be disturbed.

Mining of each of the respective beds is planned to begin at a southern point along the outcrop, with the pit faces advancing toward the north. Since the limestone will be transported to the south for delivery to the plant, the southerly starting location should serve to minimize haulage costs during the early years of operation.

Entry into each of the four pits will be from the west; in-pit and mine haulroads are planned with a surface width of 60 feet in order to allow safe two-way traffic, and grades will be held to a maximum of 8%. This latter figure will be significant only on the Hi-Cal ridge wherein the outcrop dip attains an inclination of nearly 13%.

Mine development will be essentially a box cut operation whereby overburden removed during a given point in mining is placed to backfill a previously mined portion of the mine. As discussed



in Exhibit E, the final ground surface will generally approximate the original ground surface, at a depressed elevation. During the initial phases of mining, waste rock must be placed in an interim stockpile to develop sufficient space in the pits for concurrent mining and reclamation operations.

Prior to commencing production of limestone from the mine, an area encompassing two years of limestone production will be stripped from each pit. As the first year's limestone production is mined, overburden will be removed from the portion of the pit to be mined in year three of operation. Accordingly, top soil and waste rock resulting from the initial three years of limestone production will be placed in an interim stockpile as indicated on Exhibit E. Beginning with the second year of mining, overburden will be removed from the areas to be mined in year four and will be used to fill the year one pit area. Top soil would however have to be stockpiled until sufficient areas are backfilled to allow final topsoil placement. After the second year of mining, reclamation would become concurrent with mining. Top soil and overburden removed from an area of the mine would be hauled directly to reclamation placement. The interim stockpile will be removed near the end of mine life and used to backfill the final three years of pit.

After removal of topsoil from within the stockpile area, the interim stockpile will be constructed to the approximate line and grade indicated in Exhibit E. The stockpile is to contain 2.6 million cubic yards of waste rock and 111,600 cubic yards of topsoil.

The mine plan will result in the excavation of 14.2 million cubic yards of in place waste rock and 9.5 millions cubic yards of limestone for cement production, resulting in a total mine volume of 23.7 million cubic yards. Experience at the Lyons Quarry demonstrates the waste rock increases or bulks in volume by a factor of 50 per cent, resulting in a volume of backfill of 20.5 million cubic yards. The net backfill deficit results in the post-reclamation ground surface being below original ground contour.

All field equipment will be diesel powered and no powerlines will need to be constructed into Dowe Flats. Drills will be required to prepare the overburden and limestone for blasting; dozers are needed to assist in levelling drill sites following removal of any topsoil with scrapers. The blasted rock will be lifted by front loaders and deposited into off-road haulers for disposition onto land to be reclaimed or for transportation to the plant (limestone).



Production rock will be hauled to the plant by truck on a private, dedicated haul road. Trucks will be 85-ton dumps. The haul road location is shown on Map E and will cross four irrigation ditches and State Highway 66 and the Burlington Northern Railroad track at grade. The road will go over the St. Vrain River, cross land owned by Frontier Materials, Inc., then cross Boulder County Road 49 and enter the cement plant property.

Improvements to public roadways will be performed as necessary and as required by the Boulder County Public Works Department and the Colorado Department of Transportation.

The Hi-Cal bed is made up of limestone beds 1 to 2 feet in thickness separated by thin shale or clay partings. This bed has the highest lime content of any of the horizons at Dowe Flats and therefore will be the most important of the horizons mined. In order to obtain sufficient material from this bed to supply plant needs for the 25-year project life, a maximum 1,100-foot width pit is proposed. Maximum pit depth is estimated to be approximately 125 feet as measured from the original ground surface.

The 2nd Ridge consists of many thin limestone seams interbedded with shale. Reserves have been calculated to a pit depth of 70 feet.

The 3rd Ridge has a thickness of about 30 feet. Recent studies have shown that the formation may be divided into three bands: a top higher-alkali portion nearly 8 feet thick; a center lower-alkali band 15 to 16 feet in thickness; and a bottom zone of lower lime content which may be upwards of 10 feet thick. These bands have traditionally been designated by chemical analysis. They are very difficult to distinguish in the quarries by visual observation. Maximum pit depths will likely be 60 feet.

The 4th Ridge formation contains relatively high quantities of pyrite where it is fresh and unaltered. Near-surface weathering has removed the pyrite and has upgraded at least this portion of the 4th Ridge to a useful material. Mining depths in this horizon will be somewhat shallower than in the other limestone units, with a maximum of approximately 30 feet.

A summary of mine data is shown on the attached spreadsheet.



**DOWE FLATS PROJECT - LYONS, CO
MINING & RECLAMATION PLAN SUMMARY**

	Hi-Cal	2nd Ridge	3rd Ridge	4th Ridge	TOTAL
Term in Years	25	25	25	25	25
Production Tons	7,600,000	1,700,000	8,900,000	800,000	19,000,000
Acres*	170	56	104	6	336
Cubic Yards of Production Rock	3,800,000	850,000	4,450,000	400,000	9,500,000
Mine Waste in Cubic Yards**	10,000,000	2,000,000	2,100,000	182,000	14,300,000

* Ridges overlap; acreage given is for each ridge regardless of overlap, total acreage mined is 312.

** Includes topsoil, unconsolidated overburden, and waste rock. Volumes shown are bank cubic yards. Bulking factors of 20% for unconsolidated overburden and 50% for waste rock were used. The total volume of loose cubic yards placed on the reclaimed surface is 20,500,000.

The maximum acreage disturbed at any given time (year 3) is 95 acres. The average annual acreage of disturbance over the 25-year mine life is less than 65 acres.



EXHIBIT E - RECLAMATION PLAN

Type of Reclamation

The Dowe Flats reclamation plan has been developed with the following main objectives:

- Create a native grassland habitat such as was likely to have occurred in the valley before disturbance by agriculture. Topography will approximate that of the original land surface, with the exception of a wetland area that will be created in the northeast portion of the mined area. As set forth here, the reclamation plan is directed toward continuance of a raptor prey base comprised of prairie dogs and other small mammals, as well as waterfowl and non-game birds that frequent wetlands.
- Reduction of visual liabilities of the mining disturbance by backfilling the pits to approximate original contour.

Map F shows the post-mining and reclamation topography. During the first three years of pit excavation, no removed overburden can be replaced in the pit. Overburden will be placed in the Interim Waste Rock and Topsoil Storage Area shown on Map E. After that time, overburden from the advancing pit will be placed directly in the previously mined pit areas. Material stored in the interim storage pile will ultimately be returned to the pits as part of backfill during the middle to latter portion of the life of mine.

Post-reclamation Land Use

Land use after reclamation will be primarily wildlife habitat for prairie species and livestock grazing and will be consistent with similar uses of adjacent and nearby lands, both public and private. The reclaimed landscapes will be capable of supporting livestock grazing as they did prior to mining and as similar lands in the area currently do.



Reclamation Schedule

Reclamation will occur concurrently with mining (except for the first three years of pit excavation, during which period the stored waste will be revegetated until it is again moved as pit backfill). Mining will proceed, generally, from south to north. Where possible, topsoil will be immediately hauled directly to graded sites and placed prior to revegetation. For the first three years, topsoil will need to be stored in the areas indicated on Exhibit E.

Reclamation Procedures

Regrading

Through the course of mining, stored wasterock from the first three years' mining area will be used in the backfill of the advancing pit. The regraded surface can be replaced within approximately six feet of the original surface elevation, except in the northeast corner where a depression will accompany the development of approximately 20 acres of wetland. A visual screen approximately six feet in height will be constructed along the relocated county road. This screen will have sideslopes no steeper than 4(h):1(v).

In the regraded areas where wasterock was used as fill, fine overburden will be placed to depths from 2 to 5 feet prior to topsoil placement to provide subsoil for revegetation.

Topsoil Salvage

Topsoil will be salvaged to a depth of 12 inches. Soil will be transported to the storage pile indicated on Map E, or placed directly on a graded surface in preparation for seeding/planting.

Topsoil Storage

Topsoil will be stored in piles with slopes no steeper than 4(h):1(v). An interceptor berm will be constructed around each pile. The stored material will be stabilized as indicated under **Temporary Surface Stabilization**, below.

Topsoil Placement

Topsoil will be replaced on graded slopes at depths of 4 to 8 inches. Prior to placement, the graded slopes will be left rough to facilitate adhesion of the topsoil layer. Topsoil depth will be monitored during placement by reclamation personnel to verify that it is within the specified range of depths.



Seedbed Preparation

Areas to be seeded will be ripped following topsoil placement to a depth of 18 inches to relieve subsoil compaction caused by heavy machinery traffic. Areas to be seeded will be cultipacked; if necessary, they will be disced to reduce clod size. If ready during the period of April 1 to October 1, the appropriate cover crop will be sown (see Mulching below). If outside that time range, 2 tons/acre of clean long-fiber straw will be spread and crimped into the surface.

Seed Mixes

Listed in Tables E-1 and E-2 are planting specifications for the two post-reclamation vegetation types. In these tables, rates of application of Pure Live Seed (PLS)/acre are shown. Plant communities to be created during reclamation include the following:

- Grassland (Table E-1) - This type is planned for the bulk of the reclaimed mine area. The result will be a grassland of predominantly native grasses and forbs that approximates what may have occupied Dowe Flats before settlement and massive agricultural disturbance. [REDACTED] but excepting the wetland area. Topsoil depth will be 4 to 8 inches.
- Wetland (Table E-2) - This community will be established in a low area in the northeast portion of the mined area that will be wetted by ground water seepage and capillary rise from the water table. Topsoil depth will 4 to 8 inches.

Seeding Methods

Drill seeding will be used in all grassland area seeding and will be oriented on the contour. The seed drill will be a "Grassland" type drill with at least two seed boxes, one of which will have picker wheels, or other means of handling fluffy seed. It will be equipped with double disk furrow openers, depth bands set at 1/4 to 1/2 inch, and packer wheels or drag chains. During planting, the legume, smooth, or small seed box will be filled with the aggressive cool season species indicated in the Plant Material Mixes (Tables E-1 and E-2) and every second and third drop tube out of this box will be blocked so that these aggressive species are placed only in every third furrow; thus, in two furrows of each three, the less aggressive cool season grasses, as well as the warm season grasses and the forbs (and shrubs, where applicable) will be planted alone. This will allow these less aggressive species to develop without the often fatal direct competition of more aggressive cool season grasses. (Note that these listed mixes do not include



any of the extremely aggressive introduced cool season grasses that so often overwhelm all other components, even in seed mixes that seem to contain a large proportion of native species). In the wetland areas, if some areas are too wet to support tractor and drill, the area will be broadcast seeded, at rates twice those shown in Table E-2.

Mulching

The preferred means of providing the protective cover necessary to shelter germinating seeds is use of a cover crop. Cover crop species and periods during which they may be profitably planted are listed in Table E-3. Use of cover crop is preferred because 1) it results in a stronger vertical surface structure than other mulching methods, providing much superior protection from erosive and desiccating effects of wind, 2) it provides more organic matter and often better surface cover than other forms of mulch, and 3) it reduces the possibility of introduction of additional weed seed. These cover crops will be sown using a drill equipped with coulter wheels and furrow openers spaced between 10 and 16 inches. If the seedbed is not ready to plant between April 1 and October 1, then use of a straw mulch will be undertaken. Two (2) tons of clean long-fiber straw will be spread and crimped into the soil surface prior to seeding. In areas to be broadcast seeded, seeding will precede application of mulch which will be either hydromulched with 1600 lbs. of thermally produced wood fiber mulch, or covered with 2 tons of clean long-fiber straw. In either case, the applied mulch will be anchored with 100 lbs/acre of Psyllium-based tackifier.

Temporary Surface Stabilization

Certain areas, such as overburden and topsoil stockpiles, roadcuts, or fills, will require establishment of a vegetation cover to protect the surface from erosion until disposition of the underlying material in final reclamation. Following completion of earthmoving, such temporary areas will be drill seeded with a cover crop as indicated in Table E-3, followed by drilling of the seed mix indicated in Table E-4. If a cover crop cannot be used, the area will be seeded with the mix indicated in Table E-4 and then mulched as indicated in **Mulching** above, either with straw or hydraulically-applied wood fiber, and anchored with tackifier. On the Interim Wasterock Storage Pile, topsoil will be placed at depths of 4 to 8 inches to support a vegetation cover capable of controlling erosion. As overburden is removed from this pile, soil will be salvaged for replacement on the original surface beneath the pile and subsequent revegetation to grassland.



Fertilizer

Phosphate in the form of treble superphosphate will be spread at the rate of 30 lb P₂O₅ per acre during seedbed preparation and incorporated into the upper 6 inches of soil. After the preparation of the seedbed, no fertilizer amendments to permanently seeded areas are planned; such well-intentioned actions have proven to encourage the competition of weeds to the substantial detriment of desirable but often slow-growing native species. If severe nitrogen deficiency reveals itself in the first few years after seeding, the minimum necessary amendment of nitrogen fertilizer will be made.

Weed Control

Weed growth in the planted areas will be monitored and any development of weeds that may cause significant damage to the desirable planted species will be discouraged by mowing; or in the case of perennial plants listed as noxious in Colorado and Boulder County, plowed and replanted or treated with a glyphosate-based herbicide.


Table E-1. Plant Material Mixes - Grassland

<u>Scientific Name</u>	<u>Common Name - Variety^a</u>	<u>Seeding</u>	
		<u>Rate (PLS lb/ac)^b</u>	
<u>GRASSES</u>			
Agropyron dasystachyum ^c	Thickspike Wheatgrass - Critana	0.4	1.0
Agropyron inerme ^c	Beardless Bluebunch Whtgs - Whitmar	2.2	5.5
Agropyron riparium ^c	Streambank Wheatgrass - Sodar	0.6	1.5
Agropyron smithii ^c	Western Wheatgrass - Arriba	1.5	3.8
Agropyron spicatum ^c	Bluebunch Wheatgrass - Secar	1.9	4.8
Bouteloua curtipendula	Sideoats Grama - Vaughn	0.9	2.3
Bouteloua gracilis	Blue Grama - Native, Alma	0.2	0.5
Buchloe dactyloides	Buffalo Grass	2.9	7.3
Festuca arizonica ^c	Arizona Fescue - Redondo	0.6	1.5
Koeleria macrantha	Junegrass	0.03	0.08
Oryzopsis hymenoides	Indian Ricegrass - Nezpar, Paloma	1.9	4.8
Poa canbyi	Canby Bluegrass - Canbar	0.2	0.5
Schizachyrium scoparium	Little Bluestem - Blaze, Pastura	1.0	2.5
Stipa comata	Needleandthread	1.4	3.5
Stipa viridula	Green Needlegrass - Lodorm	0.9	2.3
<u>FORBS</u>			
Achillea lanulosa	Western Yarrow	0.01	0.03
Aster glaucodes	Glaucous Aster	0.06	0.15
Coreopsis tinctoria	Plains Coreopsis	0.03	0.08
Heliomeris multiflora	Showy Goldeneye	0.03	0.08
Linum lewisii	Blue Flax	0.11	0.28
Medicago sativa	Alfalfa - Ladak	0.16	0.40
Penstemon palmeri	Palmer Penstemon - Cedar	0.05	0.13
Petalostemon purpureum	Purple Prairie Clover - Kanab	0.11	0.28
Ratibida columnifera	Prairie Coneflower	0.03	0.08
Sphaeralcea coccinea	Orange Globemallow	0.06	0.15

^a Variety unnamed native unless specified ^b PLS = Pure Live Seed
 species that will be sown only in every third drill furrow.

^c More aggressive


Table E-2. Plant Material Mixes - Herbaceous Wetland

<u>Scientific Name</u>	<u>Common Name - Variety^a</u>	<u>Seeding Rate (PLS lb/ac)^b</u>	
GRASSES			
Asclepias incarnata	Swamp Milkweed	NA	0.25
Scirpus paludosus	Alkali Bulrush	NA	2.0
Typha latifolia	Broadleaf Cattail	NA	2.0
		<u>Planting Rate</u>	
		<u>Stems / acre</u>	
Juncus arcticus	Baltic Rush	---	100---
Sagittaria latifolia	Common Arrowhead	---	400---
Scirpus acutus	Hardstem Bulrush	---	500---
Scirpus pungens	Threesquare	---	500---

^a Variety unnamed native unless specified ^b PLS = Pure Live Seed


Table E-3. Cover Crops for Use in Revegetation

<u>Crop</u>	<u>Date of Planting</u>	<u>Date of Seeding</u>	<u>Rate(PLS lb/ac)</u>
Wheat/Wheatgrass Hybrid ("Regreen)	4/1 to 5/15	Next fall	35
	8/15 to 10/1	Next spring	35
Oats	4/1 to 5/15	Next fall	30
Winter Wheat	8/1 to 10/1	Next fall	25
Spring Barley	4/1 to 5/15	Next fall	30
Long-season (southern) sorghum	5/15 to 7/15	Next fall	10


Table E-4. Plant Material Mixes -Temporary Stabilization Sites

<u>Scientific Name</u>	<u>Common Name - Variety^a</u>	<u>Seeding</u>	
		<u>Rate (PLS lb/ac)^b</u>	
<u>GRASSES</u>			
Agropyron dasystachyum	Thickspike Wheatgrass - Critana	3.0	6.0
Agropyron riparium	Streambank Wheatgrass - Sodar	3.0	6.0
Agropyron smithii	Western Wheatgrass - Arriba	3.0	6.0
Agropyron trachycaulum	Slender Wheatgrass - Premier, San Luis	3.0	6.0
Festuca rubra	Creeping Red Fescue - Dawson	1.0	3.0

^a Variety unnamed native unless specified ^b PLS = Pure Live Seed

SEP 02 2014

DIVISION OF RECLAMATION,
MINING & SAFETY-MINERALS
FEE REPORT MAP

112c Annual Report

Permittee Name:	CEMEX	Permit Number:	M-1993-041
Operation Name:	Dowe Flats Mine	County:	Boulder
Annual Fee Due:	\$791.00	Anniversary Date:	September 8, 2014
Permit Acreage:	1,854.45	Current Bond Amt:	\$3,389,460.00

According to C.R.S. 34-32.5-116 or 34-32-116, each year, on the anniversary date of the permit, an operator shall submit the Annual Fee, an Annual Report and Map showing the extent of current disturbances to affected land, required monitoring information, reclamation accomplished to date and during the preceding year, any new disturbance that is anticipated to occur during the upcoming year, any reclamation that will be performed during the upcoming year, the dates for the beginning of active operations, and the date active operations ceased for the year.

Information contained in this report will be reviewed by the Division upon receipt and prior to the next compliance inspection of the site. If, while completing this report, you learn that your site is not in compliance with the rules and the act, it is advisable that the issues be rectified promptly to avoid possible enforcement action.

1. Is the site identification sign posted in accordance with Rule 3.1.12(1). YES NO
2. Is the affected area boundary clearly marked in accordance with Rule 3.1.12(2). YES NO
3. Is the mine site in final reclamation (all material extraction and stockpile removal is complete)?
If "YES," please note time limits related to completion of reclamation, Rule 3.1.3. YES NO
4. What was the date of last excavation, processing or hauling activity at the mine? Current
5. Does the mine operate more than 180 days per year?
If "NO", please review Rule 1.13 to assure that your mine is in compliance. YES NO
6. Has this mine been granted: a) approval of TEMPORARY CESSATION Status? YES NO
b) approval for INTERMITTENT OPERATION? YES NO
7. Number of acres currently affected (mining + incomplete and or unreleased reclamation). 304.1
Mining = 71.2 Unreleased = 232.9
8. Number of acres that were newly affected during the current report year. 14.9
9. Number of acres that were reclaimed during the current report year. 32.7
Complete = 11.3 In Progress = 21.4
10. Estimated new acreage to be affected in the next report year. 20-25
11. Estimated acres to be reclaimed in the next report year. 10-20

12. Total acres in various stages of reclamation, since permitted mining activities began:

Total acres backfilled:	<u>113.9</u>	Total acres seeded w/ approved mix:	<u>211.5</u>	Total acres w/topsoil replaced:	<u>205.5</u>	Total acres mulched w/ approved mulch:	<u>211.5</u>
Total acres graded:	<u>205.5</u>	Total acres fertilized w/ apvd fertilizer:	<u>211.5</u>	Topsoil replacement depth (in.):	<u>2-4-8"</u>	Mulch application rate (tons/ac):	<u>2</u>
Seed application method:	<u>Drill (1993-2005) Broadcast (2006-2014)</u>	Fertilizer application method:	<u>Broadcast</u>	Mulch application method:	<u>Spreader or Blower</u>		

- 13. Is weed control being conducted in accordance with an approved Weed Control Plan? YES NO N/A
If "YES", indicate the weed species, control area, control type, application rate and treatment date on the report map.
- 14. Is adequate topsoil reserved for reclamation, based on your approved permit? YES NO N/A
If "NO", please explain:
- 15. Is the reserved topsoil vegetated/stabilized in accordance with Rule 3.1.9(1)? YES NO N/A
If "NO" please explain:
- 16. If mining has exposed groundwater, is the site in compliance with the approved mining plan and Office of the State Engineer (Well Permit, S.W.S.P., and/or Permanent Augmentation Plan)? YES NO N/A
- 17. Are all hazardous materials stored within approved spill containment structures? YES NO N/A
- 18. Is your financial warranty value sufficient to cover the cost to complete reclamation? YES NO N/A
- 19. Is your basis for legal right to enter still valid? YES NO
- 20. Does your permit require you to submit monitoring information annually? YES NO N/A
If "Yes", please attach the required monitoring results to this Annual Report.
- 21. As required by Colorado Mined Land Reclamation Act and/or Colorado Land Reclamation Act for the Extraction of Construction Materials (C.R.S. 34-32-116 or 34-32.5-116), attach a map to this report that accurately depicts the permit boundary, current affected area boundary and location of the acreages specified in items 7- 12 and 14.
UPDATED MAP ATTACHED: _____ *See attached maps 1-3*

Division records indicate the following permittee contact information. If this information is not current, please type or print **current** contact information:

Permittee Contact:	Bradley S. Wilson	
Permittee Company:	CEMEX	
Address:	PO Box 529 Lyons, Co 80540	
Phone Number:	(303) 823-2100	
Fax Number:	(303) 823-2199	
Email Address:	CF.PR.email	

I, the undersigned, hereby state that the information provided in this report is true and accurate, and that site operations are being conducted in accordance with the Division approved mining and reclamation plans.

Bradley S. Wilson
Signature of Permittee, Corporate Officer, Owner, or Documented Designee

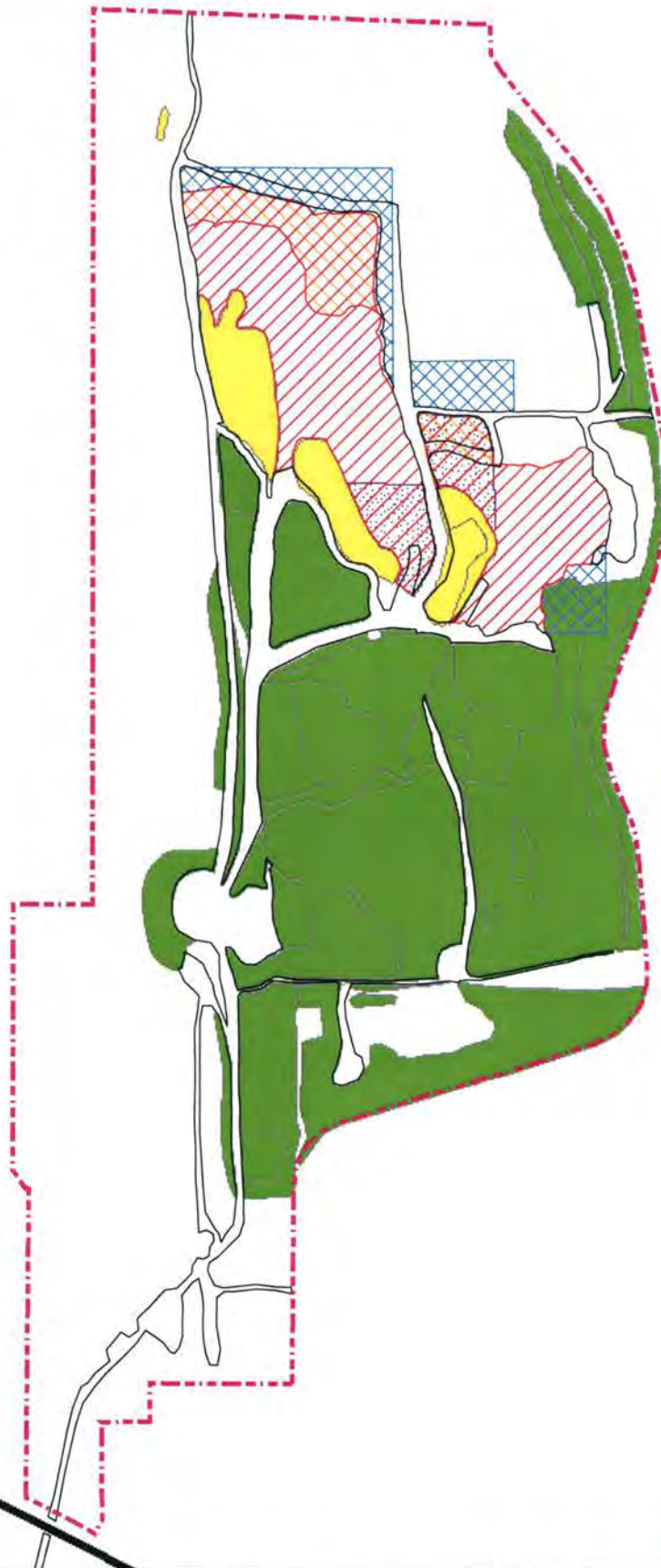
8-28-2014
 Date



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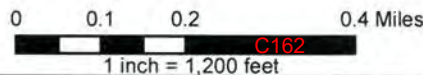
DIVISION OF RECLAMATION
MINING AND SAFETY



State Hwy 66



	Pit Disturbance Boundary		Dowe Flats Quarry Permit Boundary
	2013-2014 New Mining Disturbance		Fresh Water
	Anticipated 2014-2015 Mining Disturbance		Impacted Water
	Unreleased Reclamation		
	Reclamation in Progress		
	Anticipated Reclamation 2014-2015		



Dowe Flats 2014 DRMS Report
Permit #M-1993-041

Map 1: Disturbance & Reclamation Areas

Prepared By:



Drawn By: RFB

Checked By: RFB

Approved By: MLW

Date: 8/29/14

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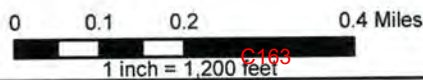
DIVISION OF RECLAMATION
MINING AND SAFETY



State Hwy 66



-  Backfilled Areas
-  Growth Media Stockpile
-  Growth Media Application & Final Grading
-  Dowe Flats Quarry Permit Boundary
-  Fresh Water
-  Impacted Water



Dowe Flats 2014 DRMS Report
Permit #M-1993-041

Map 2: Backfill, Grading & Growth Media

Prepared By:



Drawn By: RFB

Checked By: RFB

Approved By: MLW

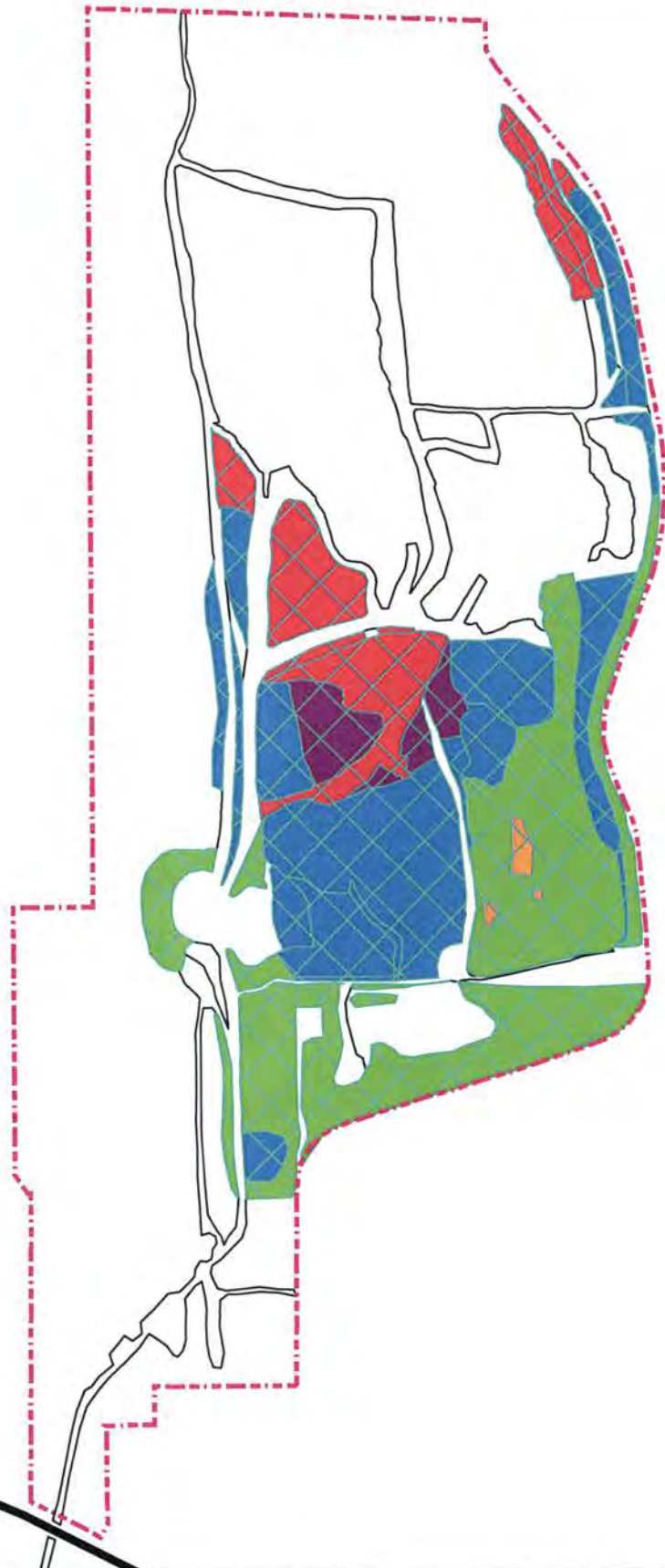
Date: 8/29/14

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DIVISION OF RECLAMATION
MINING AND SAFETY



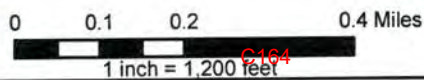
State Hwy 66



Fertilizer & Mulch Application

- 18-46-0 (NPK) & Hay Mulch
- 14-14-10 (NPK) & Hay Mulch
- 11-28-23 (NPK) & Hay Mulch
- 18-46-0 (NPK) & Straw Mulch
- Humega & Hay Mulch

- Seed Application (Various Approved Mixtures)
- Dowe Flats Quarry Permit Boundary
- Fresh Water
- Impacted Water



Dowe Flats 2014 DRMS Report
Permit #M-1993-041

Map 3: Reclamation Treatments

Prepared By:



Drawn By: RFB

Checked By: RFB

Approved By: MLW

Date: 8/29/14

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SEP 08 2015

DIVISION OF RECLAMATION,
MINING & SAFETY-MINERALS
FEE REPORT MAP SW

112c Annual Report

Permittee Name:	CEMEX	Permit Number:	M-1993-041
Operation Name:	Dowe Flats Mine	County:	Boulder
Annual Fee Due:	\$791.00	Anniversary Date:	September 8, 2015
Permit Acreage:	1,854.45	Current Bond Amt:	\$3,389,460.00

According to C.R.S. 34-32.5-116 or 34-32-116, each year, on the anniversary date of the permit, an operator shall submit the Annual Fee, an Annual Report and Map showing the extent of current disturbances to affected land, required monitoring information, reclamation accomplished to date and during the preceding year, any new disturbance that is anticipated to occur during the upcoming year, any reclamation that will be performed during the upcoming year, the dates for the beginning of active operations, and the date active operations ceased for the year.

Information contained in this report will be reviewed by the Division upon receipt and prior to the next compliance inspection of the site. If, while completing this report, you learn that your site is not in compliance with the rules and the act, it is advisable that the issues be rectified promptly to avoid possible enforcement action.

1. Is the site identification sign posted in accordance with Rule 3.1.12(1)? YES NO
2. Is the affected area boundary clearly marked in accordance with Rule 3.1.12(2)? YES NO
3. Is the mine site in final reclamation (all material extraction and stockpile removal is complete)? YES NO
If "YES," please note time limits related to completion of reclamation, Rule 3.1.3.
4. What was the date of last excavation, processing or hauling activity at the mine? Current
5. Does the mine operate more than 180 days per year? YES NO
If "NO", please review Rule 1.13 to assure that your mine is in compliance.
6. Has this mine been granted: YES NO
a) approval of TEMPORARY CESSATION Status? YES NO
b) approval for INTERMITTENT OPERATION?
7. Number of acres currently affected (mining + incomplete and or unreleased reclamation): 324.6
mining Area = 76.1 acres unreleased redamation = 248.5 acres
8. Number of acres that were newly affected during the current report year: 22.5
9. Number of acres that were reclaimed during the current report year: 31
Complete = 12.6 In progress = 18.4
10. Estimated new acreage to be affected in the next report year: 20-25
11. Estimated acres to be reclaimed in the next report year: 10-20

12. Total acres in various stages of reclamation, since permitted mining activities began:

Total acres backfilled:	137.2	Total acres seeded w/ approved mix:	213.6	Total acres w/topsoil replaced:	205.5	Total acres mulched w/ approved mulch:	213.6
Total acres graded:	209.7	Total acres fertilized w/ apvd fertilizer:	213.6	Topsoil replacement depth (in.):	>4-8"	Mulch application rate (tons/ac):	2 tons/ac
Seed application method:	Drill (98-05) Broadcast (06-13)		Fertilizer application method:	Broadcast		Mulch application method:	Spreader or Blower

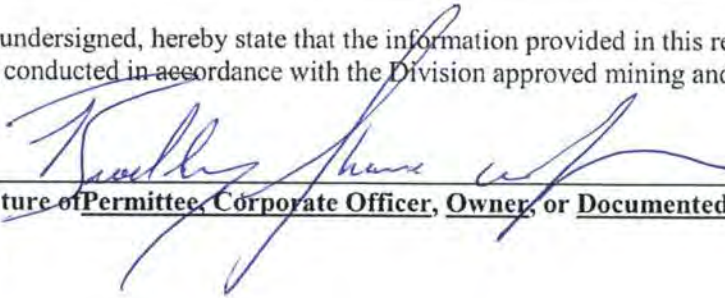
13. Is weed control being conducted in accordance with an approved Weed Control Plan? YES NO N/A
If "YES", indicate the weed species, control area, control type, application rate and treatment date on the report map.
14. Is adequate topsoil reserved for reclamation, based on your approved permit? YES NO N/A
If "NO", please explain:
15. Is the reserved topsoil vegetated/stabilized in accordance with Rule 3.1.9(1)? YES NO N/A
If "NO" please explain:
16. If mining has exposed groundwater, is the site in compliance with the approved mining plan and Office of the State Engineer (Well Permit, S.W.S.P., and/or Permanent Augmentation Plan)? YES NO N/A
17. Are all hazardous materials stored within approved spill containment structures? YES NO N/A
18. Is your financial warranty value sufficient to cover the cost to complete reclamation? YES NO N/A
19. Is your basis for legal right to enter still valid? YES NO
20. Does your permit require you to submit monitoring information annually? YES NO N/A
If "Yes", please attach the required monitoring results to this Annual Report.
21. As required by Colorado Mined Land Reclamation Act and/or Colorado Land Reclamation Act for the Extraction of Construction Materials (C.R.S. 34-32-116 or 34-32.5-116), attach a map to this report that accurately depicts the permit boundary, current affected area boundary and location of the acreages specified in items 7- 12 and 14.
UPDATED

MAP ATTACHED: 3 maps attached

Division records indicate the following permittee contact information. If this information is not current, please type or print **current** contact information:

Permittee Contact:	BradleyS. Wilson	
Permittee Company:	CEMEX	
Address:	PO Box 529 Lyons, Co80540	
Phone Number:	(303) 823-2100	
Fax Number:	(303) 823-2199	
Email Address:	Bradleys.wilson@cemex.com	

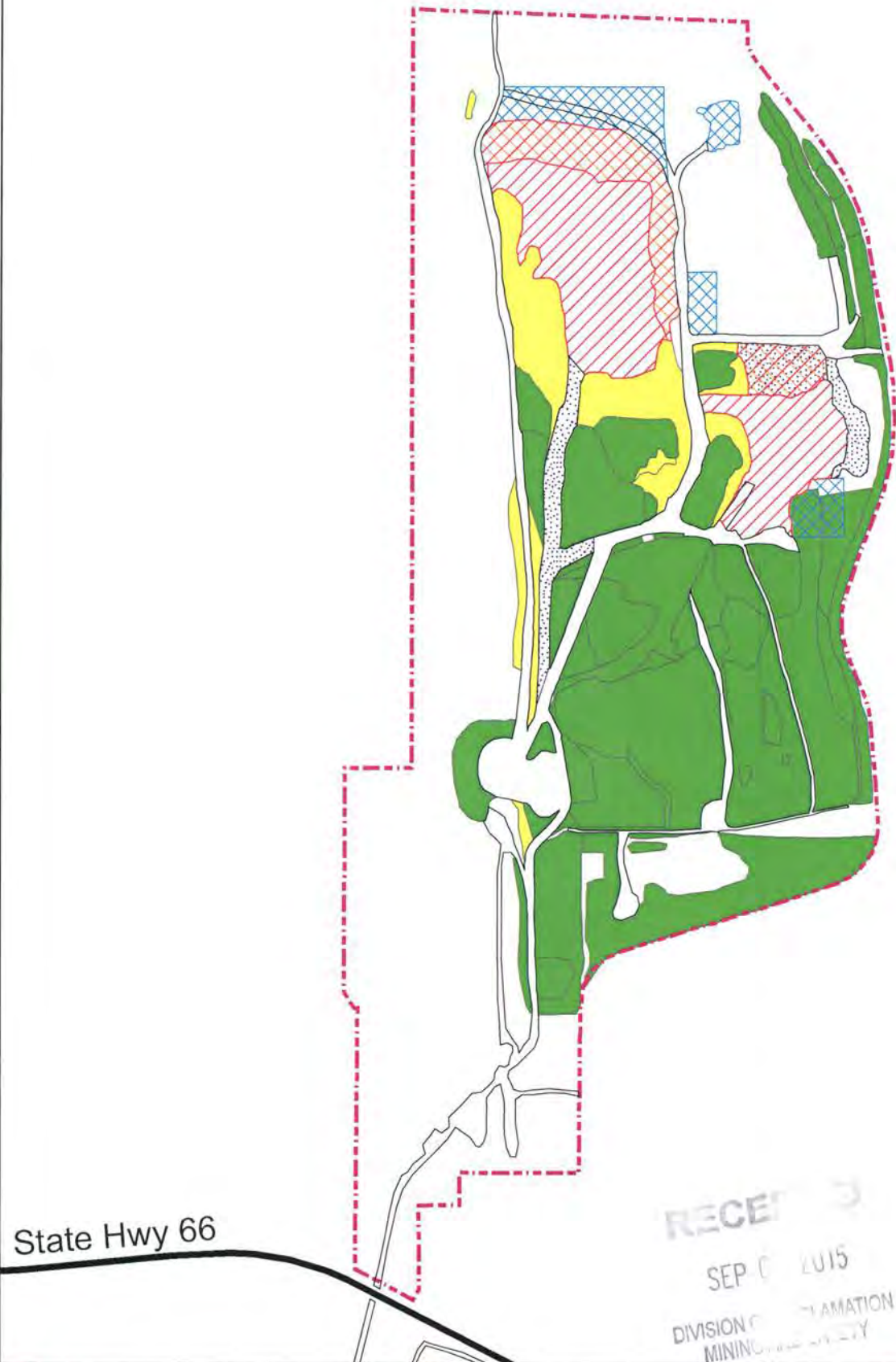
I, the undersigned, hereby state that the information provided in this report is true and accurate, and that site operations are being conducted in accordance with the Division approved mining and reclamation plans.



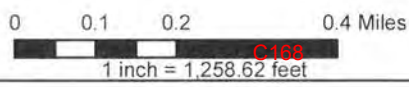
Signature of Permittee, Corporate Officer, Owner, or Documented Designee

9-8-2015
Date

M-AF-01



- Dowe Flats Quarry Permit Boundary
- Pit Disturbance Boundary
- 2014-2015 New Mining Disturbance
- Anticipated 2015-2016 Mining Disturbance
- Unreleased Reclamation
- Reclamation in Progress
- Anticipated Reclamation 2015-2016



Dowe Flats 2015 DRMS Report
Permit #M-1993-041

Map 1: Disturbance & Reclamation Areas

Prepared By:

Drawn By: RFB

Checked By: RFB

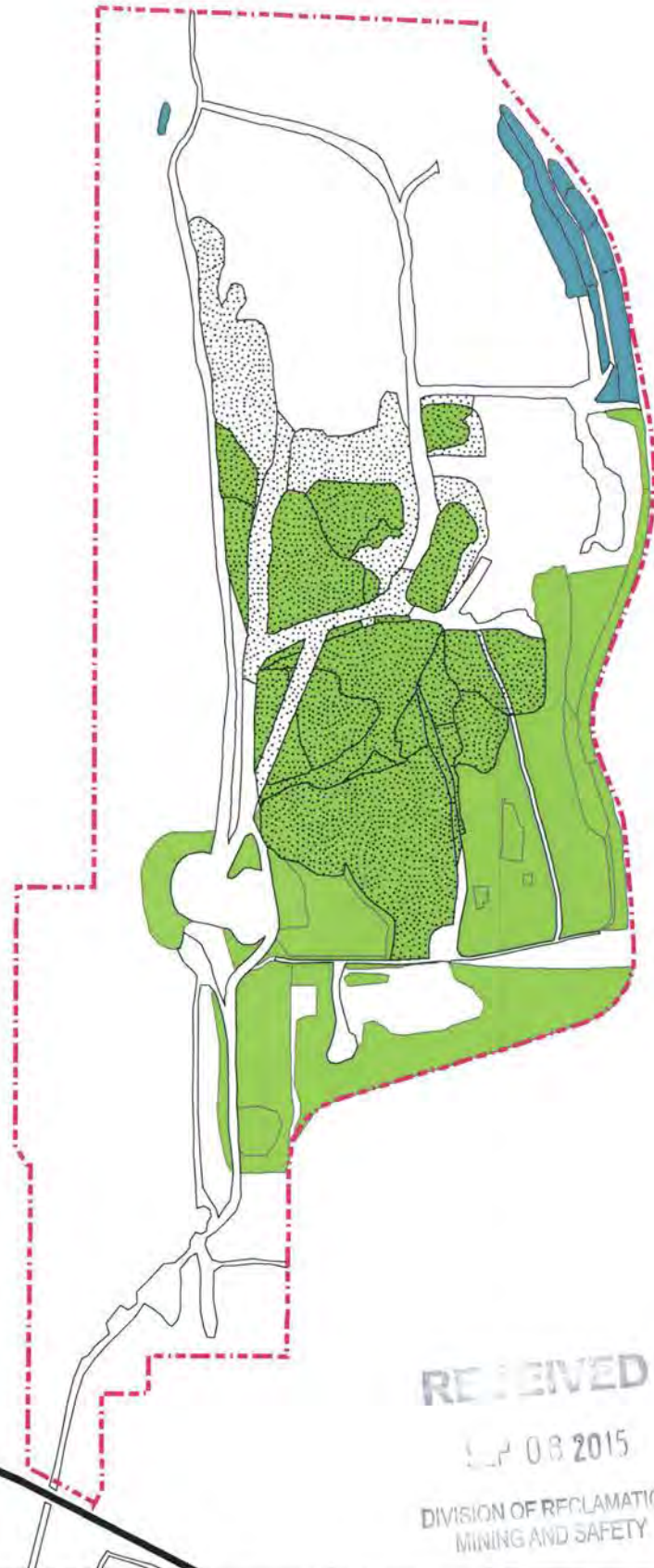
Approved By: KWS

Date: 8/19/15



Habitat Management
www.habitatmanagementinc.com





State Hwy 66

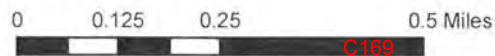
RECEIVED

SEP 08 2015

DIVISION OF RECLAMATION
MINING AND SAFETY



-  Dowe Flats Quarry Permit Boundary
-  Backfilled Areas
-  Growth Media Stockpile
-  Growth Media Application & Final Grading



Dowe Flats 2015 DRMS Report
Permit #M-1993-041

Map 2: Backfill, Grading & Growth Media

Prepared By:

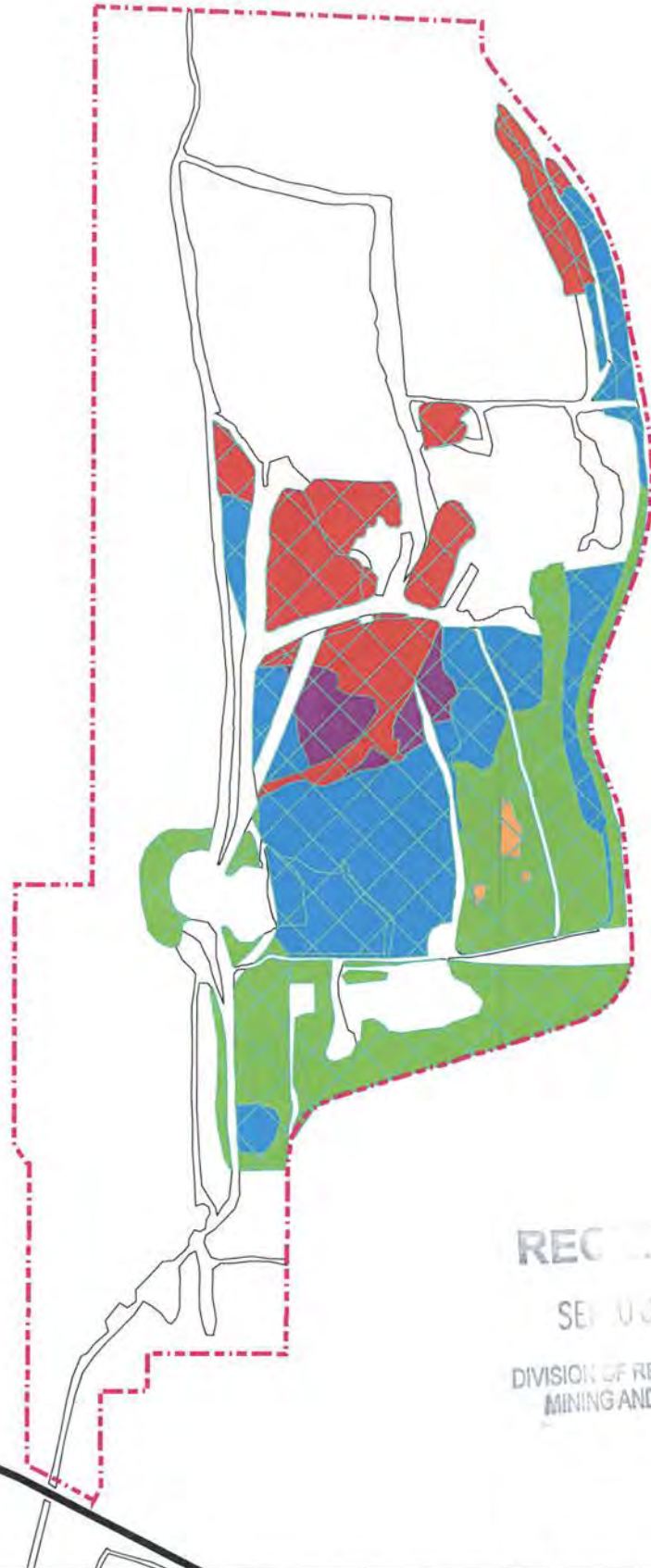
Drawn By: RFB

Checked By: RFB

Approved By: KWS

Date: 8/19/15





RECEIVED

SEP 03 2015

DIVISION OF RECLAMATION
MINING AND SAFETY

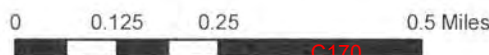
State Hwy 66



Fertilizer & Mulch Application

- 18-46-0 (NPK) & Hay Mulch
- 14-14-10 (NPK) & Hay Mulch
- 11-28-23 (NPK) & Hay Mulch
- 18-46-0 (NPK) & Straw Mulch
- Humega & Hay Mulch

- Seed Application (Various Approved Mixtures)
- Dowe Flats Quarry Permit Boundary



C170

Dowe Flats 2015 DRMS Report

Permit #M-1993-041

Map 3: Reclamation Treatments

Prepared By:



Drawn By: RFB

Checked By: RFB

Approved By: KWS

Date: 8/19/15

112c Annual Report

(DRMS Office Use Only)	Permit Number:	M-1993-041
	Permittee Name:	CEMEX, Inc.
	Operation Name:	Dowe Flats Mine
	County:	Boulder
	Anniversary Date:	September 8, 2016
	Current Bond Amt:	\$3,389,460.00
	Annual Fee Due:	\$791.00
	Permit Acreage:	1,854.45
	DRMS Specialist	MAC

According to C.R.S. 34-32.5-116 or 34-32-116, each year, on the anniversary date of the permit, an operator shall submit the Annual Fee, an Annual Report and Map showing the extent of current disturbances to affected land, required monitoring information, reclamation accomplished to date and during the preceding year, any new disturbance that is anticipated to occur during the upcoming year, any reclamation that will be performed during the upcoming year, the dates for the beginning of active operations, and the date active operations ceased for the year.

Information contained in this report will be reviewed by the Division upon receipt and prior to the next compliance inspection of the site. If, while completing this report, you learn that your site is not in compliance with the rules and the act, it is advisable that the issues be rectified promptly to avoid possible enforcement action.

1. Is the site identification sign posted in accordance with Rule 3.1.12(1)? YES NO
2. Is the affected area boundary clearly marked in accordance with Rule 3.1.12(2)? YES NO
3. Is the mine site in final reclamation (all material extraction and stockpile removal is complete)?
If "YES," please note time limits related to completion of reclamation, Rule 3.1.3. YES NO
4. What was the date of last excavation, processing or hauling activity at the mine? Current
5. Does the mine operate more than 180 days per year?
If "NO", please review Rule 1.13 to assure that your mine is in compliance. YES NO
6. Has this mine been granted: a) approval of TEMPORARY CESSATION Status? YES NO
b) approval for INTERMITTENT OPERATION? YES NO
7. Number of acres currently affected (mining + incomplete and or unreleased reclamation): 369.2
Mining = 85.7 Unreleased Reclamation = 283.5
8. Number of acres that were newly affected during the current report year: 19.7
9. Number of acres that were reclaimed during the current report year: 57.7
Reclamation in progress = 57.7
10. Estimated new acreage to be affected in the next report year: 10-20
11. Estimated acres to be reclaimed in the next report year: 10-20

12. **Total acres** in various stages of reclamation, since permitted mining activities began:

Total acres backfilled:	260.4	Total acres seeded w/ approved mix:	199.2	Total acres w/topsoil replaced:	156	Total acres mulched w/ approved mulch:	199.2
Total acres graded:	216.7	Total acres fertilized w/ apvd fertilizer:	199.2	Topsoil replacement depth (in.):	74-8	Mulch application rate (tons/ac):	2
Seed application method:	Drill (98-05) Broadcast (05-15)		Fertilizer application method:	Broadcast	Mulch application method:	Spreader or Blower	

13. Is weed control being conducted in accordance with an approved Weed Control Plan? YES NO N/A
If "YES", indicate the weed species, control area, control type, application rate and treatment date on the report map.
14. Is adequate topsoil reserved for reclamation, based on your approved permit? YES NO N/A
If "NO", please explain:
15. Is the reserved topsoil vegetated/stabilized in accordance with Rule 3.1.9(1)? YES NO N/A
If "NO" please explain:
16. If mining has exposed groundwater, is the site in compliance with the approved mining plan and Office of the State Engineer (Well Permit, S.W.S.P., and/or Permanent Augmentation Plan)? YES NO N/A
17. Are all hazardous materials stored within approved spill containment structures? YES NO N/A
18. Is your financial warranty value sufficient to cover the cost to complete reclamation? YES NO N/A
19. Is your basis for legal right to enter still valid? YES NO
20. Does your permit require you to submit monitoring information annually? YES NO N/A
If "Yes", please attach the required monitoring results to this Annual Report.
21. As required by Colorado Mined Land Reclamation Act and/or Colorado Land Reclamation Act for the Extraction of Construction Materials (C.R.S. 34-32-116 or 34-32.5-116), attach a map to this report that accurately depicts the permit boundary, current affected area boundary and location of the acreages specified in items 7- 12 and 14. UPDATED

MAP ATTACHED: 4 maps attached

Division records indicate the following permittee contact information. If this information is not current, please type or print **current** contact information:

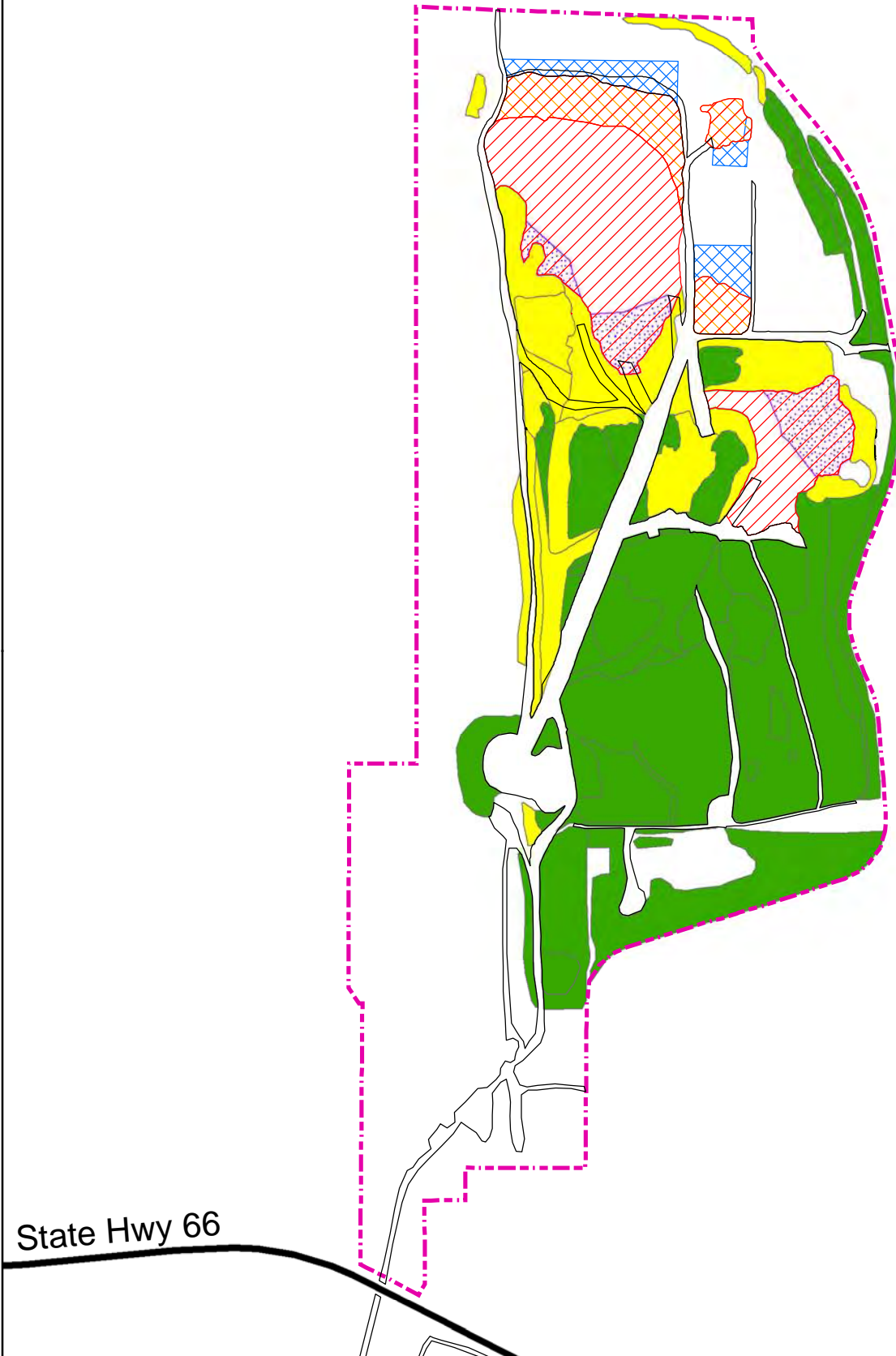
Permittee Contact:	Bradley S. Wilson	
Permittee Company:	CEMEX, Inc.	
Address:	PO Box 529 Lyons, Co 80540	
Phone Number:	(303) 823-2100	
Fax Number:	(303) 823-2199	
Email Address:	Bradleys.wilson@cemex.com	

I, the undersigned, hereby state that the information provided in this report is true and accurate, and that site operations are being conducted in accordance with the Division approved mining and reclamation plans.

Signature of Permittee, Corporate Officer, Owner, or Documented Designee

 Date

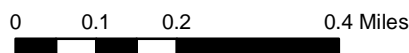
M-AF-01



State Hwy 66



- Dowe Flats Quarry Permit Boundary
- Pit Disturbance Boundary
- 2015-2016 New Mining Disturbance
- Anticipated 2016-2017 Mining Disturbance
- Unreleased Reclamation
- Reclamation in Progress
- Anticipated Reclamation 2016-2017



C174

Dowe Flats 2016 DRMS Report
Permit #M-1993-041

Map 1: Disturbance & Reclamation Areas

Prepared By:

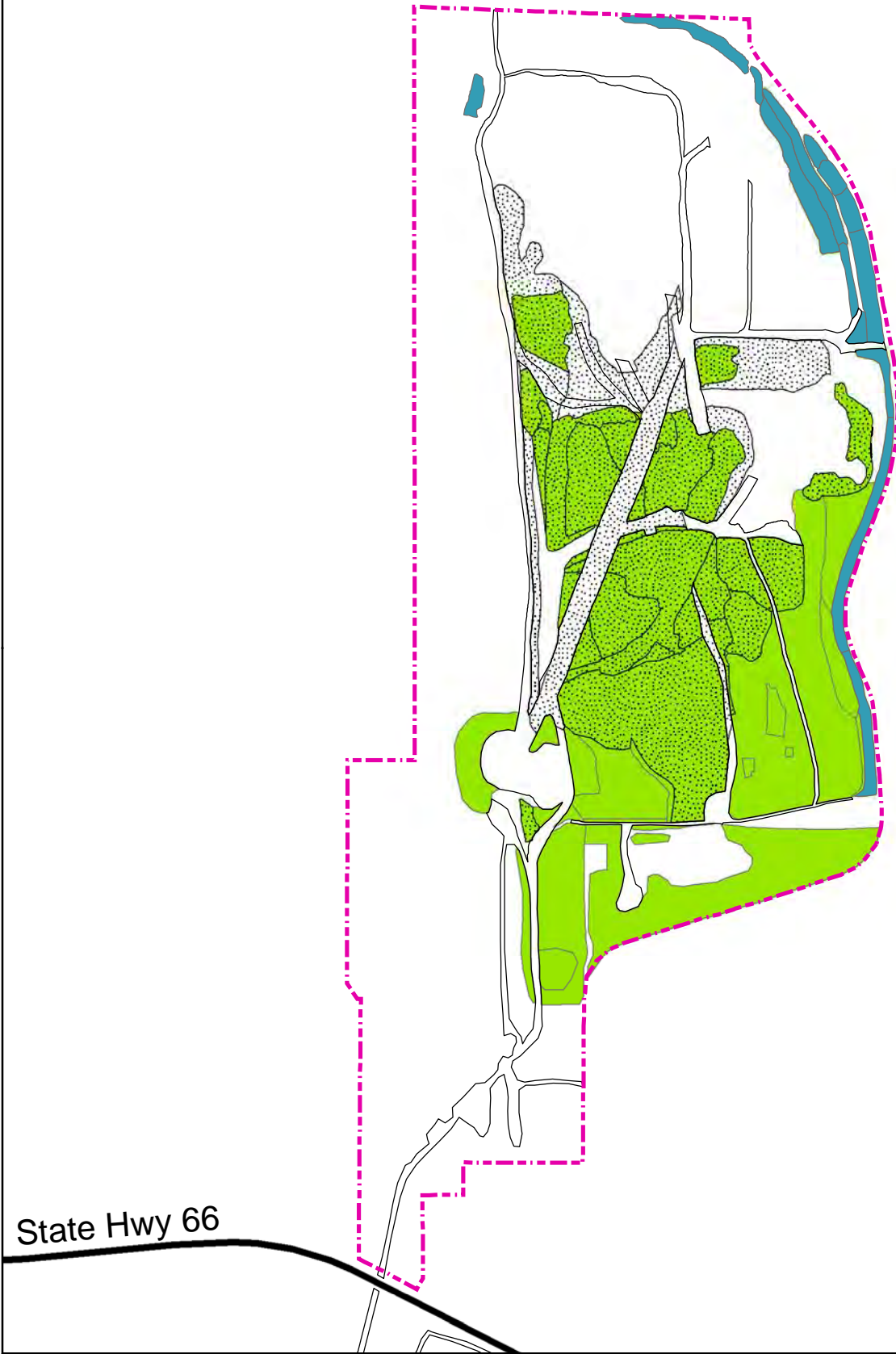
Drawn By: RFB

Checked By: RFB

Approved By: MLW

Date: 9/1/2016

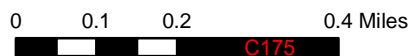




State Hwy 66



-  Dowe Flats Quarry Permit Boundary
-  Backfilled Areas
-  Growth Media Stockpile
-  Growth Media Application & Final Grading



Dowe Flats 2016 DRMS Report
Permit #M-1993-041

Map 2: Backfill, Grading & Growth Media

Prepared By:

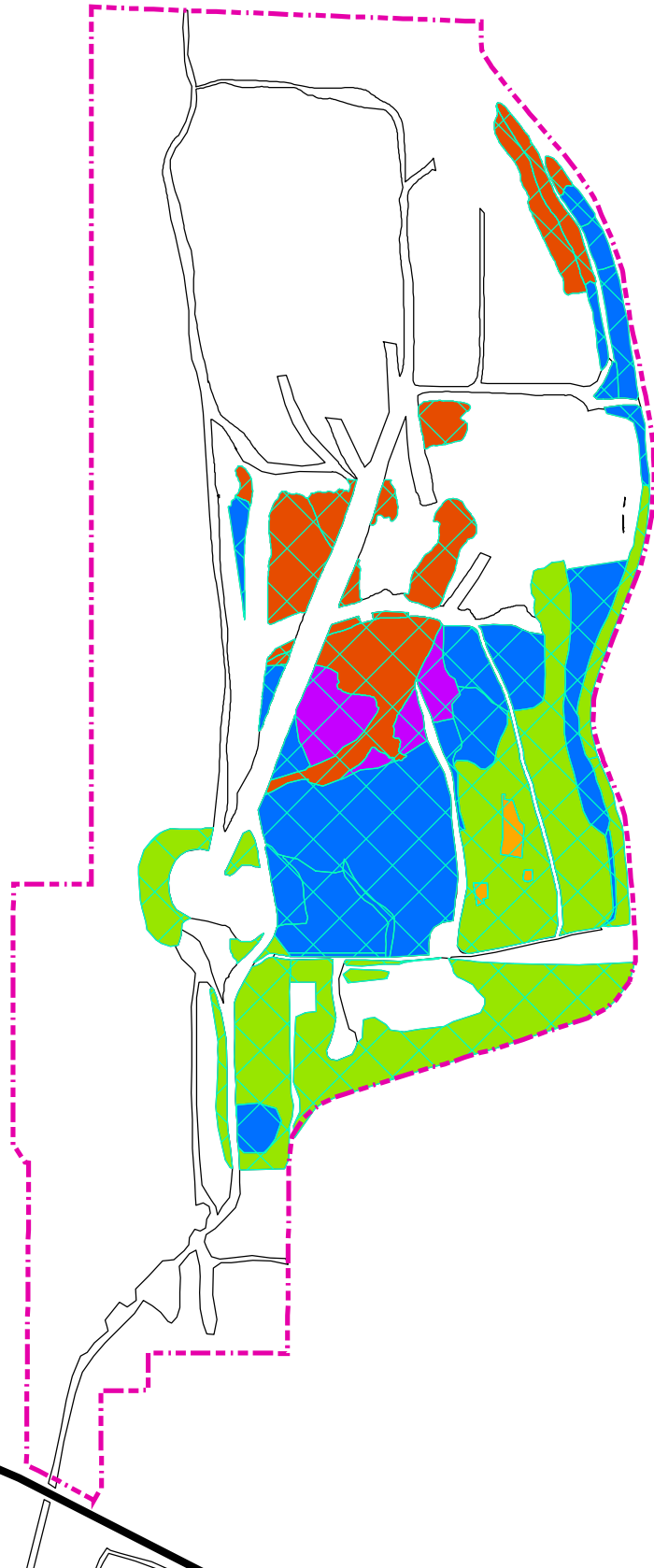
Drawn By: RFB



Checked By: RFB

Approved By: MLW

Date: 9/2/2016





State Hwy 66



Fertilizer & Mulch Application

-  18-46-0 (NPK) & Hay Mulch
-  14-14-10 (NPK) & Hay Mulch
-  11-28-23 (NPK) & Hay Mulch
-  18-46-0 (NPK) & Straw Mulch
-  Humega & Hay Mulch



-  Seed Application (Various Approved Mixtures)
-  Dowe Flats Quarry Permit Boundary

0 0.1 0.2 0.4 Miles

C176

Dowe Flats 2016 DRMS Report

Permit #M-1993-041

Map 3: Reclamation Treatments

Prepared By:

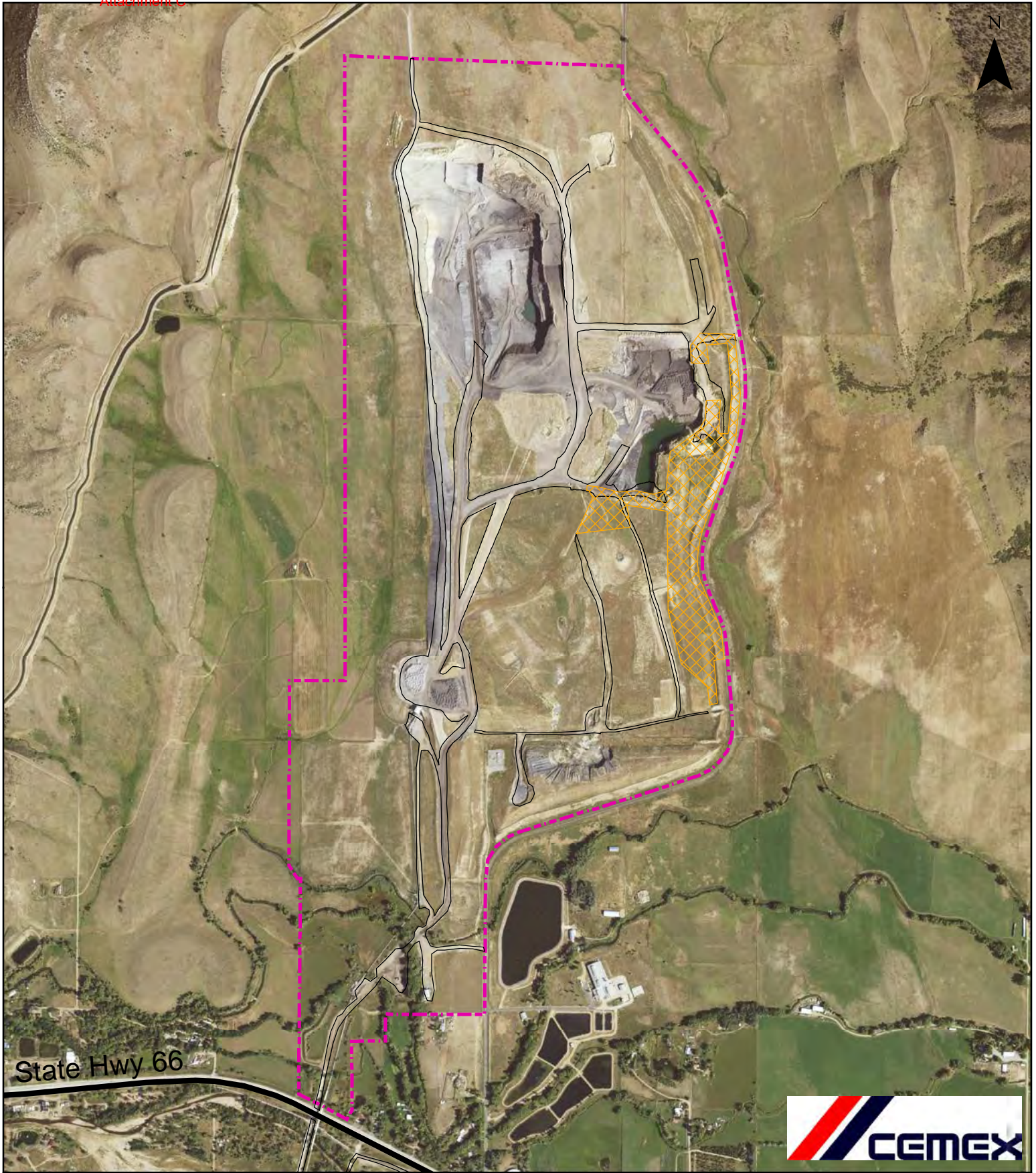


Drawn By: RFB

Checked By: RFB

Approved By: MLW




Date: 9/2/2016



State Hwy 66



Legend

-  Canada thistle, Dalmatian toadflax, Musk thistle, & Common mullein
-  Dowe Flats Quarry Permit Boundary
-  Roads

0 500 1,000 2,000 Feet



C177

Dowe Flats Quarry

Permit #M-1993-041

2015 Weed Treatment Areas

Prepared By:



Drawn By: RFB

Approved By: MC

Date: 1/4/2016

112c Annual Report

(DRMS Office Use Only)	Permit Number:	M-1993-041
	Permittee Name:	CEMEX, Inc.
	Operation Name:	Dowe Flats Mine
	County:	Boulder
	Anniversary Date:	September 8, 2017
	Current Bond Amt:	\$3,389,460.00
	Annual Fee Due:	\$791.00
	Permit Acreage:	1,854.45
	DRMS Specialist	AME

According to C.R.S. 34-32.5-116 or 34-32-116, each year, on the anniversary date of the permit, an operator shall submit the Annual Fee, an Annual Report and Map showing the extent of current disturbances to affected land, required monitoring information, reclamation accomplished to date and during the preceding year, any new disturbance that is anticipated to occur during the upcoming year, any reclamation that will be performed during the upcoming year, the dates for the beginning of active operations, and the date active operations ceased for the year.

Information contained in this report will be reviewed by the Division upon receipt and prior to the next compliance inspection of the site. If, while completing this report, you learn that your site is not in compliance with the rules and the act, it is advisable that the issues be rectified promptly to avoid possible enforcement action.

1. Is the site identification sign posted in accordance with Rule 3.1.12(1)? YES NO
2. Is the affected area boundary clearly marked in accordance with Rule 3.1.12(2)? YES NO
3. Is the mine site in final reclamation (all material extraction and stockpile removal is complete)? YES NO
If "YES," please note time limits related to completion of reclamation, Rule 3.1.3.
4. What was the date of last excavation, processing or hauling activity at the mine? Current
5. Does the mine operate more than 180 days per year? YES NO
If "NO", please review Rule 1.13 to assure that your mine is in compliance.
6. Has this mine been granted: YES NO
a) approval of TEMPORARY CESSATION Status? YES NO
b) approval for INTERMITTENT OPERATION?
7. Number of acres currently affected (mining + incomplete and or unreleased reclamation): 396.9
mining = 87.9 Unreleased reclamation = 309
8. Number of acres that were newly affected during the current report year: 17.3
9. Number of acres that were reclaimed during the current report year: 77.7
Completed = 42.2 In Progress = 35.5
10. Estimated new acreage to be affected in the next report year: 10-20
11. Estimated acres to be reclaimed in the next report year: 10-20

12. **Total acres** in various stages of reclamation, since permitted mining activities began:

Total acres backfilled:	279.6	Total acres seeded w/ approved mix:	239.5	Total acres w/topsoil replaced:		Total acres mulched w/ approved mulch:	239.5
Total acres graded:	241.7	Total acres fertilized w/ apvd fertilizer:	239.5	Topsoil replacement depth (in.):	>4-8	Mulch application rate (tons/ac):	2
Seed application method:	Drill (1998-2005) Broadcast (2005-2016)		Fertilizer application method:	Broadcast		Mulch application method:	Spreader or Blower

13. Is weed control being conducted in accordance with an approved Weed Control Plan? YES NO N/A
If "YES", indicate the weed species, control area, control type, application rate and treatment date on the report map.
See attached report
14. Is adequate topsoil reserved for reclamation, based on your approved permit? YES NO N/A
If "NO", please explain:
15. Is the reserved topsoil vegetated/stabilized in accordance with Rule 3.1.9(1)? YES NO N/A
If "NO" please explain:
16. If mining has exposed groundwater, is the site in compliance with the approved mining plan and Office of the State Engineer (Well Permit, S.W.S.P., and/or Permanent Augmentation Plan)? YES NO N/A
17. Are all hazardous materials stored within approved spill containment structures? YES NO N/A
18. Is your financial warranty value sufficient to cover the cost to complete reclamation? YES NO N/A
19. Is your basis for legal right to enter still valid? YES NO
20. Does your permit require you to submit monitoring information annually? YES NO N/A
If "Yes", please attach the required monitoring results to this Annual Report.
21. As required by Colorado Mined Land Reclamation Act and/or Colorado Land Reclamation Act for the Extraction of Construction Materials (C.R.S. 34-32-116 or 34-32.5-116), attach a map to this report that accurately depicts the permit boundary, current affected area boundary and location of the acreages specified in items 7- 12 and 14. UPDATED

MAP ATTACHED: 3 maps attached

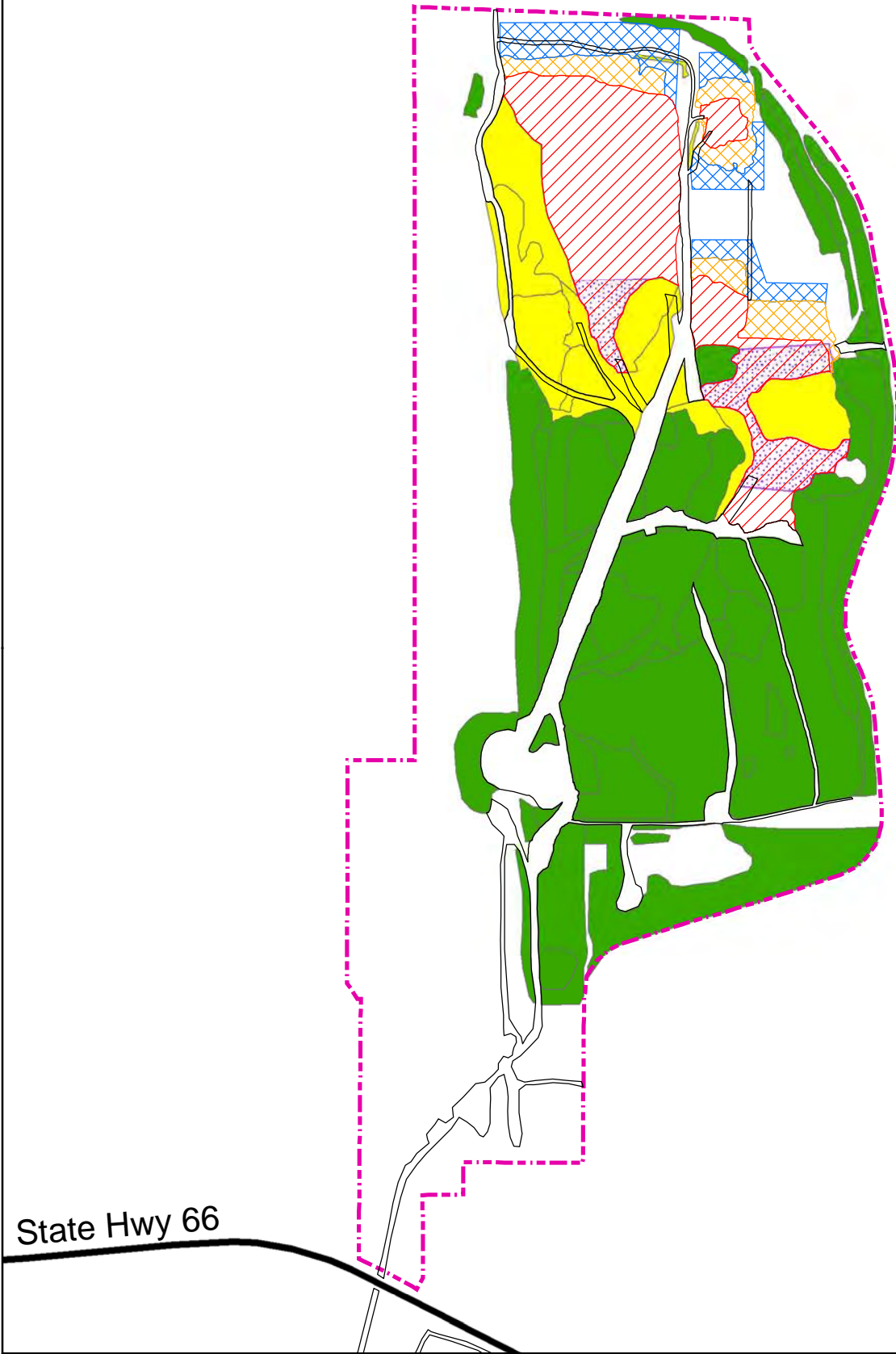
Division records indicate the following permittee/landowner contact information (blank fields indicate that we do not have information on record). If this information is blank or not current, please type or print **current** contact information:

Permittee Contact:	Bradley S. Wilson	
Permittee Company:	CEMEX, Inc.	
Address:	PO Box 529 Lyons, Co 80540	
Phone Number:	(303) 823-2100	
Fax Number:	(303) 823-2199	
Email Address:	Bradleys.wilson@cemex.com	
Permitting Contact:	John Lohr	Michael L. Whitehead
Company:	CEMEX, Inc.	
Address:	P.O. Box 529 Lyons, CO 80540	
Phone Number:	(303) 823-2100	
Fax Number:		
Email Address:		Michaell.whitehead@cemex.com
Inspection Contact:	John Lohr	Dennis Luke
Company:	CEMEX, Inc.	
Address:	P.O. Box 529 Lyons, CO 80540	
Phone Number:	(303) 823-2100	
Fax Number:		
Email Address:		Dennism.luke@Cemex.com

I, the undersigned, hereby state that the information provided in this report is true and accurate, and that site operations are being conducted in accordance with the Division approved mining and reclamation plans.

Signature of **Permittee, Corporate Officer, Owner, or Documented Designee**

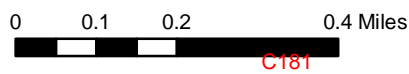
Date



State Hwy 66



- Dowe Flats Quarry Permit Boundary
- Pit Disturbance Boundary
- 2016-2017 New Mining Disturbance
- Anticipated 2018 Mining Disturbance
- Unreleased Reclamation
- Reclamation in Progress
- Anticipated Reclamation 2018



C181

Dowe Flats 2017 DRMS Report
Permit #M-1993-041

Map 1: Disturbance & Reclamation Areas

Prepared By:

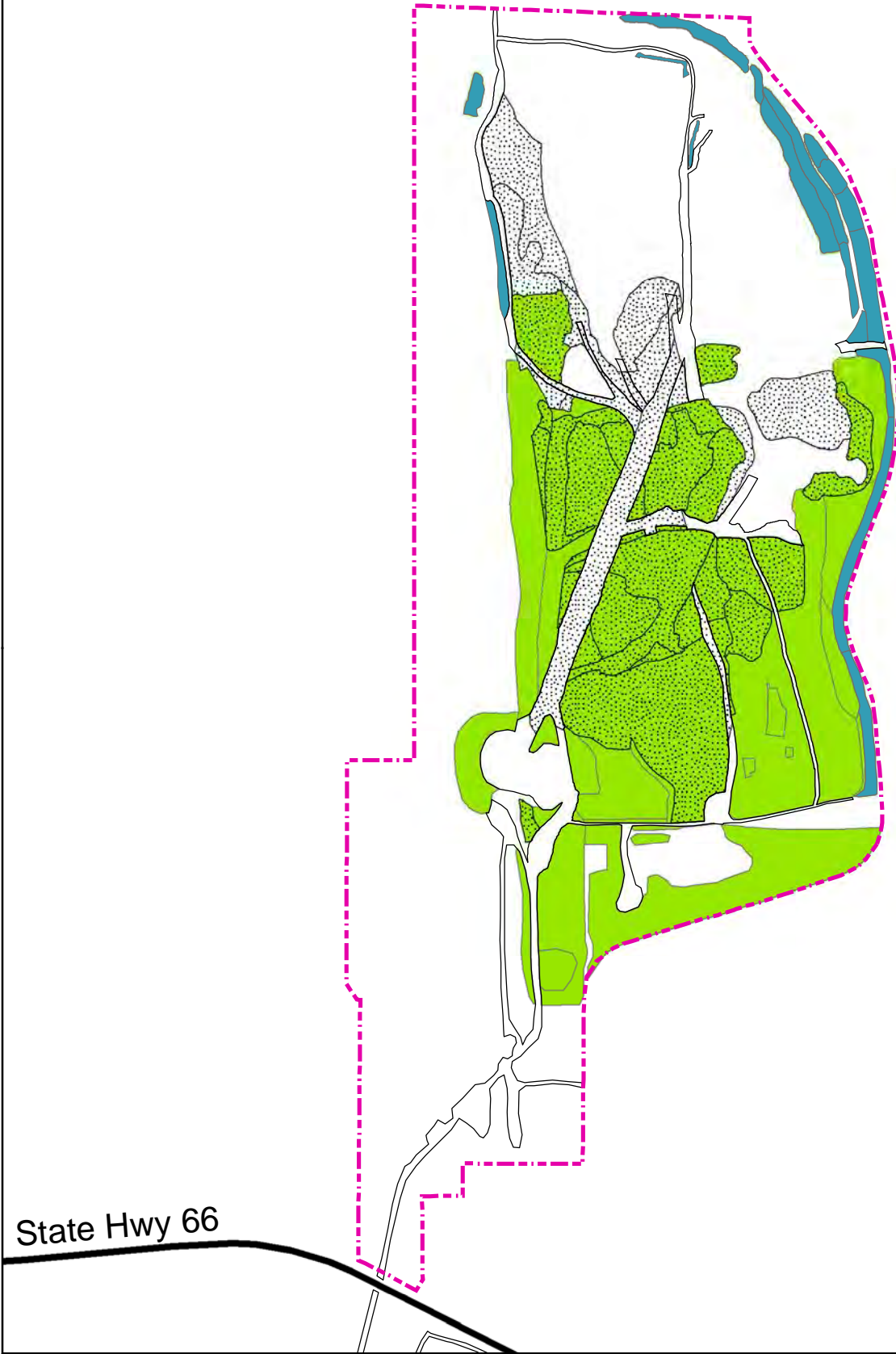
Drawn By: RFB

Checked By: DML

Approved By: DML





Date: 8/28/2017

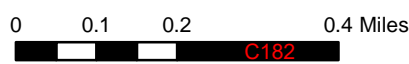




State Hwy 66



-  Dowe Flats Quarry Permit Boundary
-  Backfilled Areas
-  Growth Media Stockpile
-  Growth Media Application & Final Grading



Dowe Flats 2017 DRMS Report
Permit #M-1993-041

Map 2: Backfill, Grading & Growth Media

Prepared By:

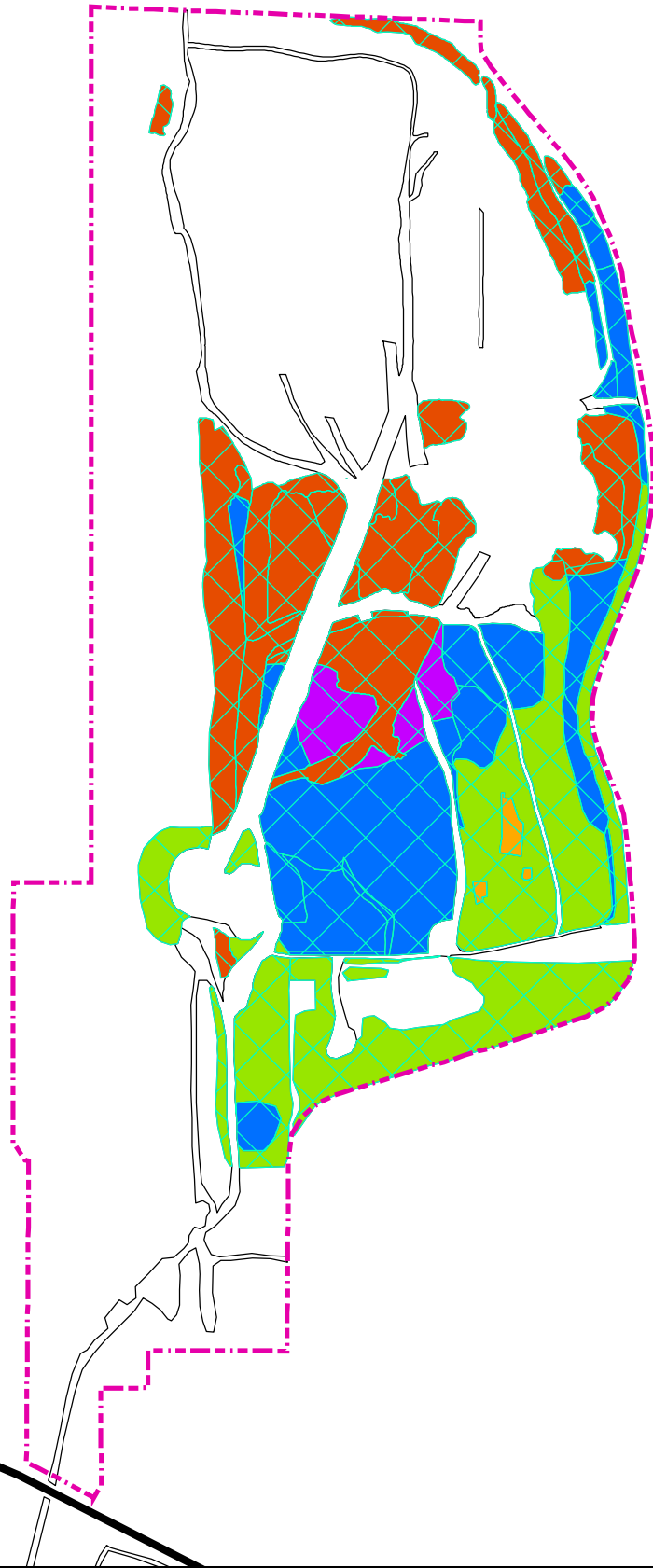
Drawn By: RFB



Checked By: DML

Approved By: DML

Date: 8/28/2017





State Hwy 66



Fertilizer & Mulch Application

-  18-46-0 (NPK) & Hay Mulch
-  14-14-10 (NPK) & Hay Mulch
-  11-28-23 (NPK) & Hay Mulch
-  18-46-0 (NPK) & Straw Mulch
-  Humega & Hay Mulch



-  Seed Application (Various Approved Mixtures)
-  Dowe Flats Quarry Permit Boundary

0 0.1 0.2 0.4 Miles



C183

Dowe Flats 2017 DRMS Report

Permit #M-1993-041

Map 3: Reclamation Treatments

Prepared By:



Drawn By: RFB

Checked By: DML

Approved By: DML

Date: 8/28/2017

Native Lands Weed Control LLC Commercial Applicator #15817 Herbicide Application Record

Date: 5/25/2017 Project Location: 5134 Ute Highway Longmont CO, 80503

Project Name: Cemex Lyons Quarry Time Frame: Start 7:30 AM End: 10:30AM

Pesticide (s) used:

Manufacturer	Trade Name/EPA Number	oz/gal	Rate applied
<u>DOW</u>	<u>Opensight/62719-597</u>	<u>0.1</u>	<u>2.5 oz / acre</u>
<u>Drexel</u>	<u>Surf-Ac 910</u>	<u>0.32</u>	<u>8 oz / acre</u>

Carrier: Water 50 gal

Total Area Treated: 2.0 acre

Target Pest: Diffuse knapweed, Musk thistle, Canada thistle, Dalmation toadflax

Site, crop, commodity treated: Dowe Flats Quarry, Pasture East of N 55 Street

Weather: Partly Cloudy Wind: NE at 2 mph Temperature: 78° F

Applicator Name: Ryan Costa License Number: 28721

Native Lands Weed Control LLC Commercial Applicator #15817 Herbicide Application Record

Date: 5/25/2017 Project Location: 5134 Ute Highway Longmont CO, 80503

Project Name: Cemex Lyons Quarry Time Frame: Start 11:00 AM End: 12:30PM

Pesticide (s) used:

Manufacturer	Trade Name/EPA Number	oz/gal	Rate applied
<u>Nufarm</u>	<u>Polaris/228-534</u>	<u>0.64</u>	<u>16 oz/ acre</u>
<u>Drexel</u>	<u>Surf-Ac 910</u>	<u>0.32</u>	<u>8 oz/ acre</u>

Carrier: Water 50 gal

Total Area Treated: 2.0 acre

Target Pest: All Vegetation

Site, crop, commodity treated: Conveyor Belt, Rock Ballast

Weather: Partly Cloudy Wind: E at 8 mph Temperature: 82° F

Applicator Name: Ryan Costa License Number: 28721

Native Lands Weed Control LLC Commercial Applicator #15817 Herbicide Application Record

Date: 5/25/2017 Project Location: 5134 Ute Highway Longmont CO, 80503

Project Name: Cemex Lyons Quarry Time Frame: Start 1:30 PM End: 5:30PM

Pesticide (s) used:

Manufacturer	Trade Name/EPA Number	oz/gal	Rate applied
<u>DOW</u>	<u>Opensight/62719-597</u>	<u>0.1</u>	<u>2.5 oz / acre</u>
<u>Drexel</u>	<u>Surf-Ac 910</u>	<u>0.32</u>	<u>8 oz / acre</u>

Carrier: Water 50 gal

Total Area Treated: 2.0 acre

Target Pest: Diffuse knapweed, Musk thistle, Canada thistle, Dalmation toadflax

Site, crop, commodity treated: Dowe Flats Quarry, East side of N 55 Street

Weather: Partly Cloudy Wind: NE at 2 mph Temperature: 78° F

Applicator Name: Ryan Costa License Number: 28721

Native Lands Weed Control LLC Commercial Applicator #15817 Herbicide Application Record

Date: 6/10/2017 Project Location: 5134 Ute Highway Longmont CO, 80503

Project Name: Cemex Lyons Quarry Time Frame: Start 7:00 AM End: 1:30PM

Pesticide (s) used:

Manufacturer	Trade Name/EPA Number	oz/gal	Rate applied
<u>DOW</u>	<u>Opensight/62719-597</u>	<u>0.1</u>	<u>2.5 oz / acre</u>
<u>Drexel</u>	<u>Surf-Ac 910</u>	<u>0.32</u>	<u>8 oz / acre</u>

Carrier: Water 100 gal

Total Area Treated: 4.0 acre

Target Pest: Diffuse knapweed, Musk thistle, Canada thistle, Dalmatian toadflax

Site, crop, commodity treated: Dowe Flats Quarry, Pasture East of N 55 Street

Weather: Sunny Wind: _____ Temperature: 90° F

Applicator Name: Ryan Costa License Number: 28721

**Native Lands Weed Control LLC
Commercial Applicator #15817
Herbicide Application Record**

Date: 6/25/2017 Project Location: 5134 Ute Highway Longmont CO, 80503

Project Name: Cemex Lyons Quarry Time Frame: Start 8:30 AM End: 12:30PM

Pesticide (s) used:

Manufacturer	Trade Name/EPA Number	oz/gal	Rate applied
<u>DOW</u>	<u>Opensight/62719-597</u>	<u>0.1</u>	<u>2.5 oz / acre</u>
<u>Drexel</u>	<u>Surf-Ac 910</u>	<u>0.32</u>	<u>8 oz / acre</u>

Carrier: Water 50 gal

Total Area Treated: 2.0 acre

Target Pest: Diffuse knapweed, Musk thistle, Canada thistle, Dalmatian toadflax

Site, crop, commodity treated: Lyons Quarry, Dowe Flats Quarry, Pasture East of N 55 Street

Weather: Cloudy Wind: _____ Temperature: 84^o F

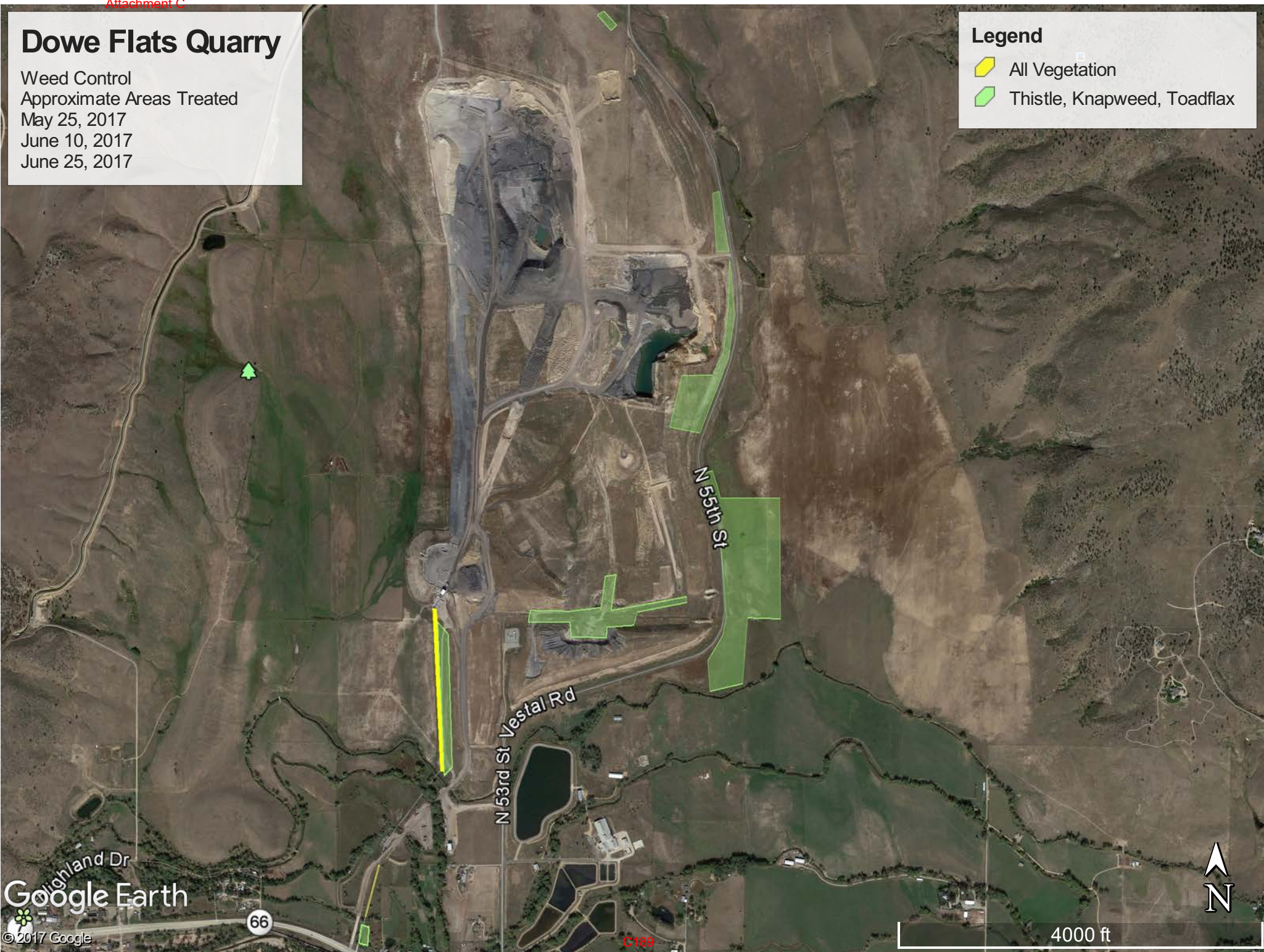
Applicator Name: Ryan Costa License Number: 28721

Dowe Flats Quarry

Weed Control
Approximate Areas Treated
May 25, 2017
June 10, 2017
June 25, 2017

Legend

- All Vegetation
- Thistle, Knapweed, Toadflax



Minerals Reclamation Permit Annual Report

COLORADO
 Division of Reclamation,
 Mining and Safety
 Department of Natural Resources

Disclaimer

Under the terms of your NOI or Reclamation Permit and Colorado Statutes, you must submit Annual Fees and Annual Reports (including a map). You must pay the Annual Fee and submit an Annual Report each year until reclamation responsibility release is granted. The Annual Fee is not a renewal fee. The Fee and Report are for LAST YEAR'S mining and reclamation season, and MUST be paid even if your operation was inactive.

If you have requested reclamation responsibility release from the Division of Reclamation, Mining and Safety ("Division") but your permit is not released by the anniversary date listed below, the Annual Fee MUST be paid. If the permit is released before the anniversary date, then by Statute, it is not necessary to pay an Annual Fee or submit an Annual Report for that year.

Division records indicate the following is due:

Select Permit Number *

Only Permit Numbers with currently due Annual Fees will be listed. If the Permit Number is not listed, then the Annual Fees are not due, the Permit Number has already been submitted, or the Permit Number Annual Fee payment has been processed.

M1993041

Select Anniversary Date *

09-08-2018

PLEASE REMEMBER TO CLICK "SUBMIT" AFTER YOU HAVE COMPLETED YOUR REPORT AND PAYMENT.

Please check the box indicating you have read and understand the terms of the Annual Report and Annual Fee *

I understand and agree to the terms

General Information**Permittee Name**

CEMEX, Inc.

Operation Name

Dowe Flats Mine

Permit Number	Fee Due	Permit Acreage
M1993041	791.00	1854.45

County	Anniversary Date	Current Bond Amount
Boulder	09-08-2018	3389460.00

Permittee Contact Information**Permitting Contact Name**

Bradley Wilson

Company

CEMEX, Inc.

Address 1

PO Box 529

Address 2

City	State	Zip Code
Lyons	co	805400000

Phone #	Fax #
3038232100	3038232199

Permitting Contact Email Address

Bradleys.wilson@cemex.com

Is the Permitting Contact information listed above correct? If it is not correct your organization's Administrator will receive an email notification. *

Yes No

Annual Report Questions

Information contained in this report is required and will be reviewed by the Division upon receipt and prior to the next compliance inspection of the site. If, while completing this report, you learn that your site is not in compliance with the rules and the act, it is advisable that the issues be rectified promptly to avoid possible enforcement action.

1. Is the site identification sign posted in accordance with Rule 3.1.12(1). *

Yes No

2. Is the affected area boundary clearly marked in accordance with Rule 3.1.12(2). *

Yes No

3. Is the mine site in final reclamation (all material extraction and stockpile removal is complete)? *

If "YES," please note time limits related to completion of reclamation, Rule 3.1.3.

Yes No

4. Has excavation, processing or hauling activity commenced at the site? *

Yes No

What was the date of last excavation, processing or hauling activity at the mine? *

9/5/2018

5. Does the mine operate more than 180 days per year? *

If "NO", please review Rule 1.13 to assure that your mine is in compliance.

Yes No

6. Has this mine been granted approval of TEMPORARY CESSATION Status? *

Yes No

7. Has this mine been granted approval for INTERMITTENT OPERATION? *

Yes No

For the following questions, please note that numeric values must include one decimal place, such as "0.0" for

zero acres, or 10.2 instead of 10.23.

8. Number of acres currently affected (mining + incomplete and or unreleased reclamation). * (?)

409.9

9. Number of acres that were newly affected during the current report year * (?)

15.1

10. Number of acres that were reclaimed during the current report year. * (?)

29.8

11. Estimated new acreage to be affected in the next report year. * (?)

15.0

12. Estimated acres to be reclaimed in the next report year. * (?)

15.0

13. Total acres in various stages of reclamation, since permitted mining activities began:

Total acres backfilled * (?)

294.6

Total acres graded * (?)

256.7

Total acres seeded with approved mix * (?)

233.4

Seed Application Method *

Broadcast seeding

Total acres fertilized with aproved fertilizer * (?)

233.4

Fertilizer Application Method *

Tractor spreader

Total acres with topsoil replaced * (?)

193.7

Topsoil replacement depth (in.) * (?)

8.0

Total acres mulched with approved mulch * (?)

233.4

Mulch application rate (tons/ac) * (?)

2.0

Mulch Application Method *

Crimping, with tractor

14. Is weed control being conducted in accordance with an approved Weed Control Plan? *

If "YES", indicate the weed species, control area, control type, application rate and treatment date on the report map.

Yes No N/A

15. Is adequate topsoil reserved for reclamation, based on your approved permit? *

If "NO", please explain

Yes No N/A

16. Is the reserved topsoil vegetated/stabilized in accordance with Rule 3.1.9(1)? *

If "NO", please explain

Yes No N/A

17. If mining has exposed groundwater, is the site in compliance with the approved mining plan and Office of the State Engineer (Well Permit, S.W.S.P., and/or Permanent Augmentation Plan)? *

Yes No N/A

18. Are all hazardous materials stored within approved spill containment structures? *

Yes No N/A

19. Is your financial warranty value sufficient to cover the cost to complete reclamation? *

Yes No N/A

20. Is your basis for legal right to enter still valid? *

Yes No

21. Does your permit require you to submit monitoring information annually? *

Yes No N/A

22. As required by Colorado Mined Land Reclamation Act and/or Colorado Land Reclamation Act for the Extraction of Construction Materials (C.R.S.34-32-116 or 34-32.5-116), attach a map to this report that accurately depicts the permit boundary, current affected area boundary and location of the acreages specified in items 8-12 and 15. *

Only PDF formatted files can be uploaded.

Disturbance_2018-Dowe.pdf	261.01KB
Grading+Cover 2018-Dowe.pdf	284.87KB
Reclamation Treatments 2018-Dowe.pdf	237.89KB

23. If you have supplemental information you would like to provide, please upload it here.

Only PDF formatted files can be uploaded.

24. Rule 5.7 requires submittal of final abandonment reports within 60 days for any drill hole(s) with artesian flows and no later than 12 months for all other completed drill holes. If drill holes are a component of your exploration/prospecting activities, have they been properly abandoned?

Yes No NA

Annual Fee Payment

Payment Confirmation Number * (?)

94672526

Signature

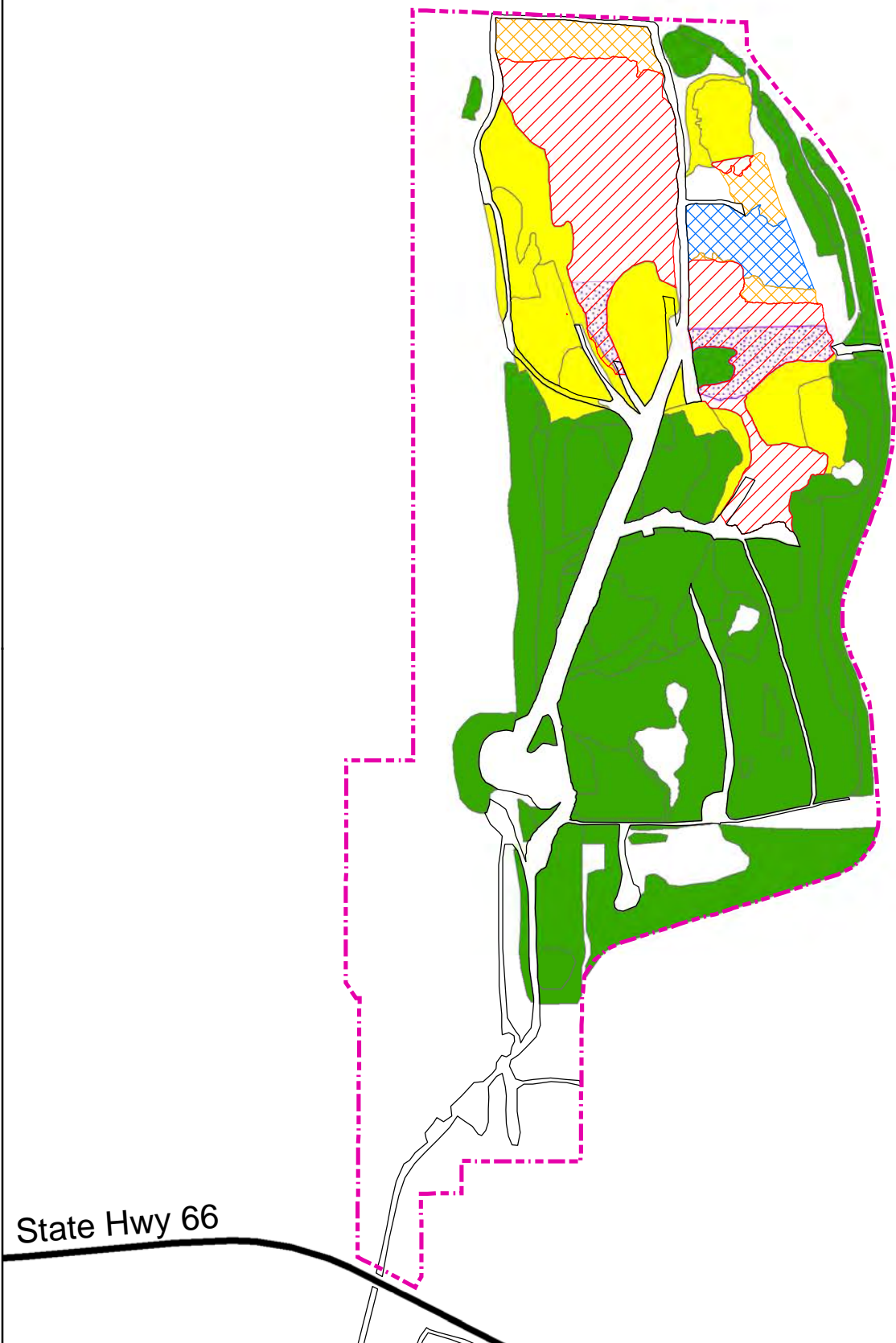
Submittal Date

09-06-2018

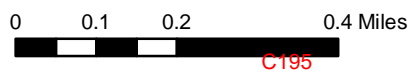
I, the undersigned, hereby state that the information provided in this report is true and accurate, and that site operations are being conducted in accordance with the Division approved mining and reclamation plans. *

I Agree

If you do not see the "Submit" button after completing your report, try to un-check and then re-check the "I Agree" box.



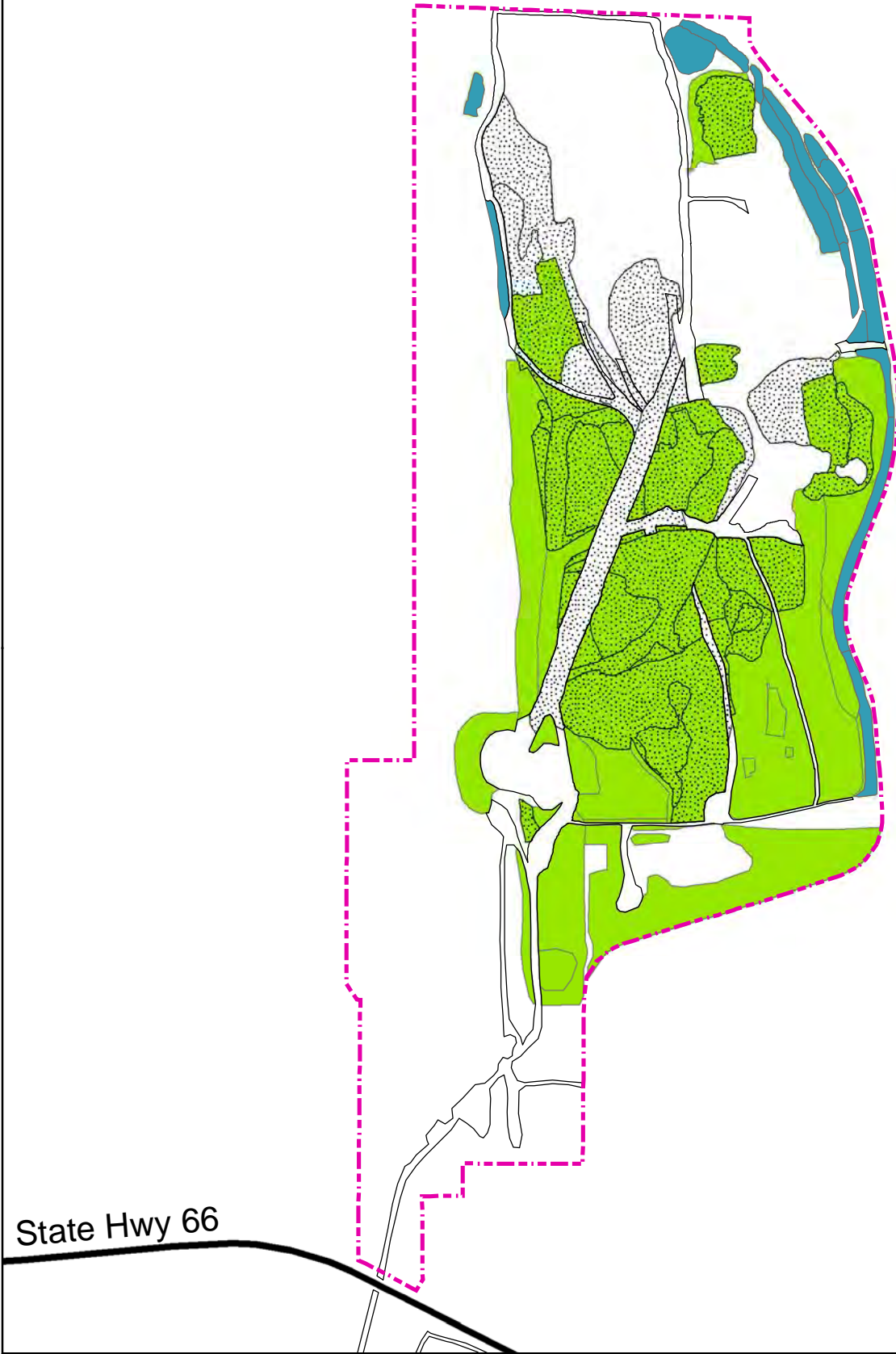
- Dowe Flats Quarry Permit Boundary
- Pit Disturbance Boundary
- 2017-2018 New Mining Disturbance
- Anticipated 2019 Mining Disturbance
- Unreleased Reclamation
- Reclamation in Progress
- Anticipated Reclamation 2019




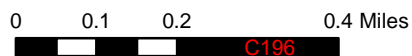
Dowe Flats 2018 DRMS Report
Permit #M-1993-041

Map 1: Disturbance & Reclamation Areas

Prepared By:	Drawn By: RFB
Habitat Management www.habitatmanagementinc.com	Approved By: DML
	Mapped: 8/22/2018
	Drawn: 9/4/2018



-  Dowe Flats Quarry Permit Boundary
-  Backfilled Areas
-  Growth Media Stockpile
-  Growth Media Application & Final Grading



Dowe Flats 2018 DRMS Report
Permit #M-1993-041

Map 2: Backfill, Grading & Growth Media

Prepared By:

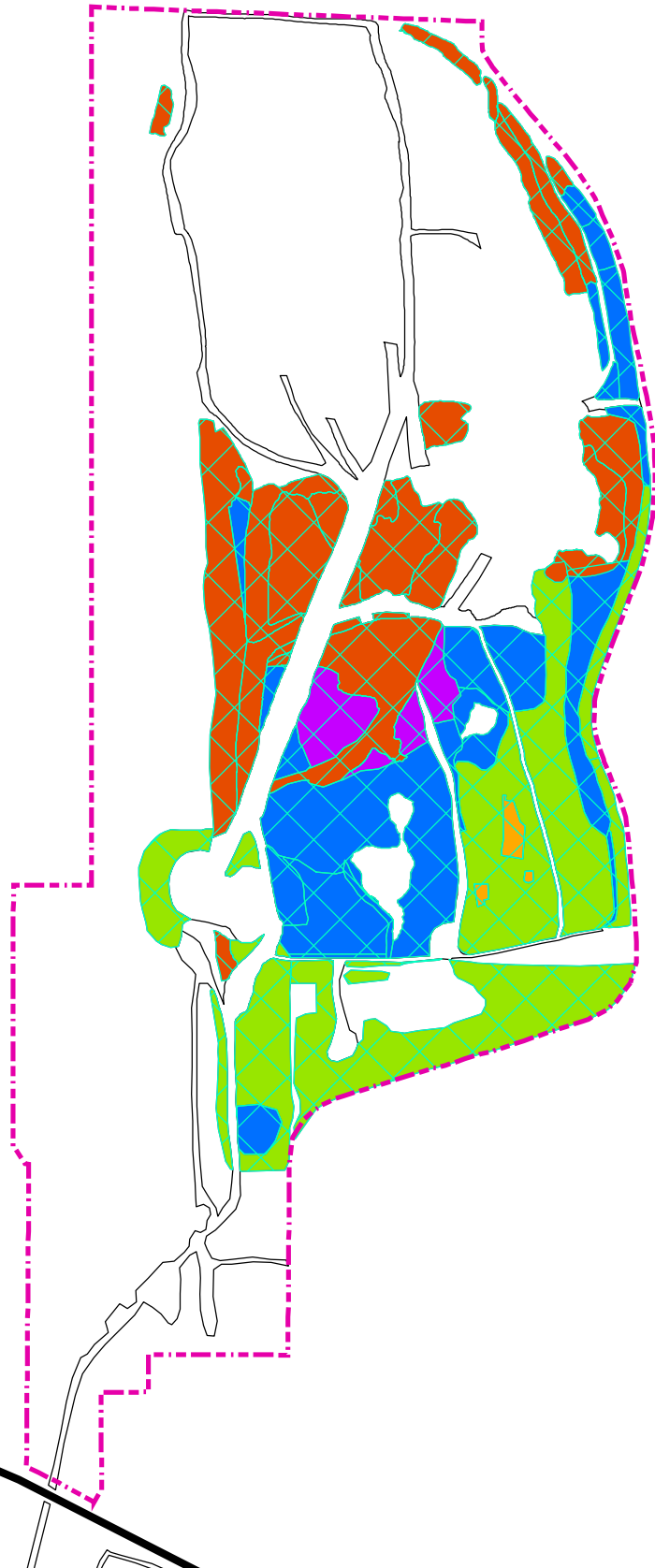
Drawn By: RFB



Approved By: DML

Mapped: 8/22/2018

Drawn: 9/4/2018



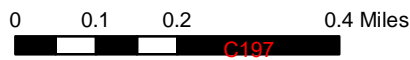
State Hwy 66



Fertilizer & Mulch Application

- 18-46-0 (NPK) & Hay Mulch
- 14-14-10 (NPK) & Hay Mulch
- 11-28-23 (NPK) & Hay Mulch
- 18-46-0 (NPK) & Straw Mulch
- Humega & Hay Mulch

- Seed Application (Various Approved Mixtures)
- Dowe Flats Quarry Permit Boundary



Dowe Flats 2018 DRMS Report
Permit #M-1993-041

Map 3: Reclamation Treatments

Prepared By:



Drawn By: RFB

Approved By: DML

Mapped: 8/22/2018

Drawn: 9/4/2018

Minerals Reclamation Permit Annual Report

COLORADO
 Division of Reclamation,
 Mining and Safety
 Department of Natural Resources

General Information

Disclaimer

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Division records indicate the following is due:

Select Permit Number *

Only Permit Numbers with currently due Annual Reports and Fees will be listed. If nothing appears in the dropdown box below, there are no annual fees or reports due for any of your permits.

M1993041

Select Anniversary Date *

09-08-2019

PLEASE REMEMBER TO CLICK "SUBMIT" AFTER YOU HAVE COMPLETED YOUR REPORT AND PAYMENT.

Please check the box indicating you have read and understand the terms of the Annual Report and Annual Fee *

I understand and agree to the terms

General Information

Permittee Name

CEMEX, Inc.

Operation Name

Dowe Flats Mine

Permit Number	Fee Due	Permit Acreage
M1993041	791.00	1854.45

County	Anniversary Date	Current Bond Amount
Boulder	09-08-2019	3389460.00

Proceed

Contact Information

Here is the contact information we have on file for this permit. If any of it is inaccurate, you will have the opportunity to correct it after this form has been submitted.

1. Upon submission of this form you will be presented with a link to the contact information update form.
2. There is a question asking about the accuracy of this information at the bottom of this page. Indicating that it is inaccurate will send an e-mail to notify your administrator to make the appropriate changes.

Permittee Contact Information

Permittee Contact Name

Uwe Lubjuhn

Permittee Company

CEMEX, Inc.

Permittee Address 1

PO Box 529

Permittee Address 2

Permittee City	Permittee State	Permittee Zip
Lyons	CO	805400000

Permittee Phone #	Permittee Fax #
3038232101	3038232199

Permittee Contact Email Address

uwe.lubjuhn@cemex.com

Permitting Contact Info

Permitting Contact Name

Scott Marcus

Permitting Company

CEMEX, Inc.

Permitting Address 1

P.O. Box 529

Permitting Address 2

Permitting City	Permitting State	Permitting Zip
Lyons	CO	805400000

Permitting Phone #	Permitting Fax #
3038232124	3038232199

Permitting Contact Email Address

scotta.harcus@cemex.com

Inspection Contact Info

Inspection Contact Name

Cita Cisse

Inspection Company

CEMEX, Inc.

Inspection Address 1

P.O. Box 529

Inspection Address 2

Inspection City	Inspection State	Inspection Zip
Lyons	CO	805400000

Inspection Phone #	Inspection Fax #
7202078492	3038232199

Inspection Contact Email Address

cita.cisse@cemex.com

Is the Permitting Contact information listed above correct? If it is not correct your organization's Administrator will receive an email notification. *

Yes No

[Previous](#) [Proceed](#)

Annual Report Questions

Annual Report Questions

Information contained in this report is required and will be reviewed by the Division upon receipt and prior to the next compliance inspection of the site. If, while completing this report, you learn that your site is not in compliance with the rules and the act, it is advisable that the issues be rectified promptly to avoid possible enforcement action.

1. Is the site identification sign posted in accordance with Rule 3.1.12(1). *

Yes No

2. Is the affected area boundary clearly marked in accordance with Rule 3.1.12(2). *

Yes No

3. Is the mine site in final reclamation (all material extraction and stockpile removal is complete)? *

If "YES," please note time limits related to completion of reclamation, Rule 3.1.3.

Yes No

4. Please enter the date of last activity at the mine (excavation, processing or hauling). Or, if activity has not yet begun, please indicate so.*

No activity yet Yes, activity has begun 9/6/2019

5. Does the mine operate more than 180 days per year? *

If "NO", please review Rule 1.13 to assure that your mine is in compliance.

Yes No

6. Has this mine been granted approval of TEMPORARY CESSATION Status? *

Yes No

7. Has this mine been granted approval for INTERMITTENT OPERATION? * (?)

Yes No

For the following questions, please note that numeric values must include one decimal place, such as "0.0" for zero acres, or 10.2 instead of 10.23.

8. Number of acres currently affected (mining + incomplete and or unreleased reclamation). * (?)

393.3

9. Number of acres that were newly affected during the current report year * (?)

4.3

10. Number of acres that were reclaimed during the current report year. * (?)

3.0

11. Estimated new acreage to be affected in the next report year. * (?)

10.0

12. Estimated acres to be reclaimed in the next report year. * (?)

10.0

13. Total acres in various stages of reclamation, since permitted mining activities began:

Total acres backfilled * (?)

158.5

Total acres graded * (?)

256.7

Total acres seeded with approved mix * (?)

233.4

Seed Application Method *

Broadcast seeding

Total acres fertilized with aproved fertilizer * (?)

233.4

Fertilizer Application Method *

Tractor spreader

Total acres with topsoil replaced * (?)

194.8

Topsoil replacement depth (in.) * (?)

8.0

Total acres mulched with approved mulch * (?)

233.4

Mulch application rate (tons/ac) * (?)

2.0

Mulch Application Method *

Crimping, with tractor

Previous

Proceed

Annual Report Questions

14. Is weed control being conducted in accordance with an approved Weed Control Plan? *

If "YES", indicate the weed species, control area, control type, application rate and treatment date on the report map.

Yes No N/A

15. Is adequate topsoil reserved for reclamation, based on your approved permit? *

If "NO", please explain

Yes No N/A

16. Is the reserved topsoil vegetated/stabilized in accordance with Rule 3.1.9(1)? *

If "NO", please explain

Yes No N/A

17. If mining has exposed groundwater, is the site in compliance with the approved mining plan and Office of the State Engineer (Well Permit, S.W.S.P., and/or Permanent Augmentation Plan)? *

Yes No N/A

18. Are all hazardous materials stored within approved spill containment structures? *

Yes No N/A

19. Is your financial warranty value sufficient to cover the cost to complete reclamation? *

Yes No N/A

20. Is your basis for legal right to enter still valid? *

Yes No

21. Does your permit require you to submit monitoring information annually? *

Yes No N/A

22. As required by Colorado Mined Land Reclamation Act and/or Colorado Land Reclamation Act for the Extraction of Construction Materials (C.R.S.34-32-116 or 34-32.5-116), attach a map to this report that accurately depicts the permit boundary, current affected area boundary and location of the acreages specified in items 8-12 and 15. *

Only PDF formatted files can be uploaded.

Disturbance_2019-Dowe_withTable.pdf	263.66KB
Grading+Cover 2019-Dowe.pdf	282.02KB
Reclamation Treatments 2019-Dowe.pdf	239.33KB
Weed_Report_2019-Dowe.pdf	1.85MB

23. If you have supplemental information you would like to provide, please upload it here.

Only PDF formatted files can be uploaded.

24. Rule 5.7 requires submittal of final abandonment reports within 60 days for any drill hole(s) with artesian flows and no later than 12 months for all other completed drill holes. If drill holes are a component of your exploration/prospecting activities, have they been properly abandoned?

Yes No NA

Previous

Proceed

Annual Fee Payment

Annual Fee Payment

Payment Confirmation Number * (?)

118627820

Signature

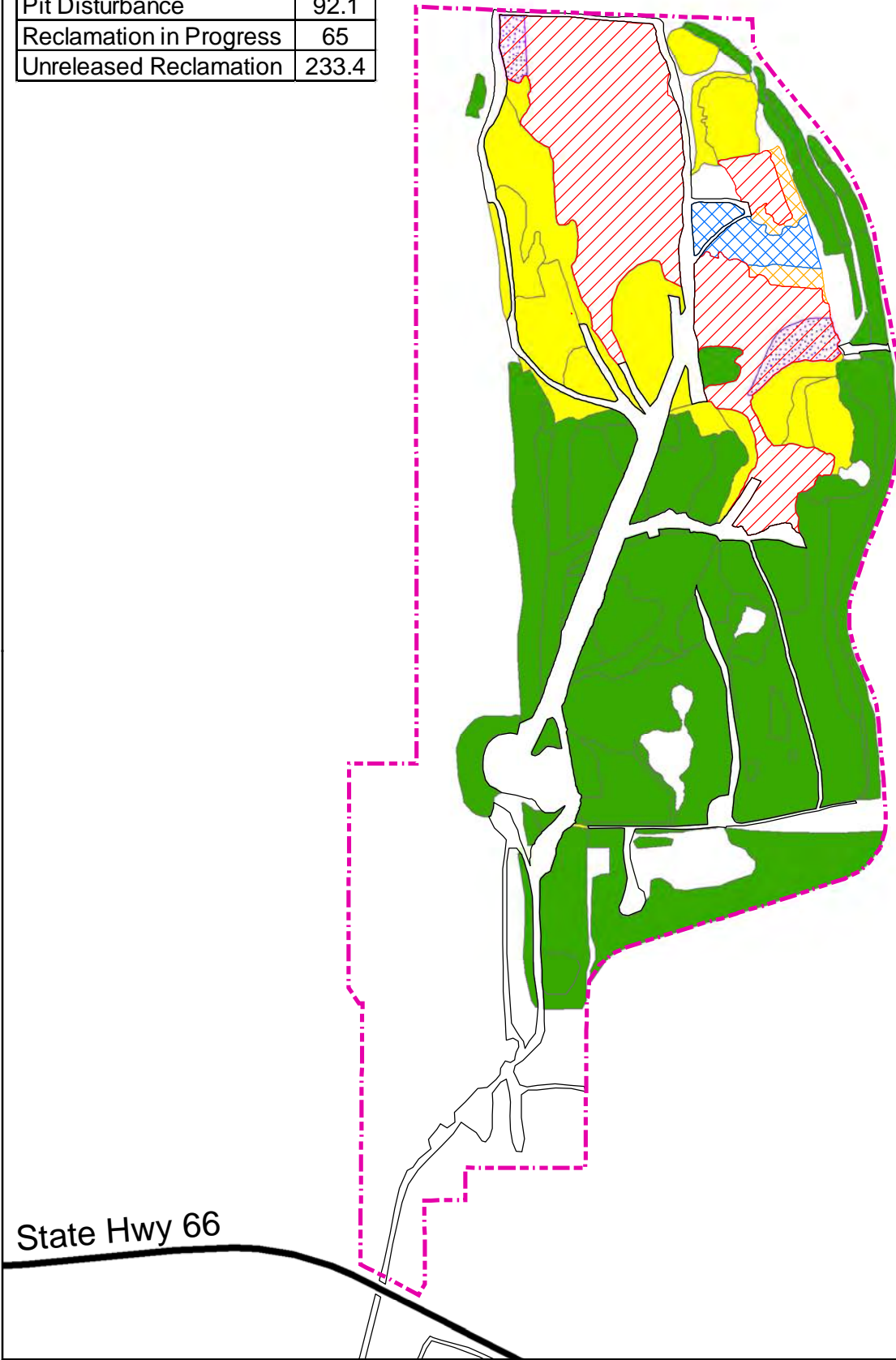
I, the undersigned, hereby state that the information provided in this report is true and accurate, and that site operations are being conducted in accordance with the Division approved mining and reclamation plans. *

I Agree

If you do not see the "Submit" button after completing your report, try to un-check and then re-check the "I Agree" box.

Previous

Area	Acres
Pit Disturbance	92.1
Reclamation in Progress	65
Unreleased Reclamation	233.4



State Hwy 66



 Dowe Flats Quarry Permit Boundary	 Unreleased Reclamation
 Pit Disturbance Boundary	 Reclamation in Progress
 2018-2019 New Mining Disturbance	 Anticipated Reclamation 2019
 Anticipated 2019 Mining Disturbance	

Dowe Flats 2019 DRMS Report
Permit #M-1993-041

Map 1: Disturbance & Reclamation Areas

Prepared By:

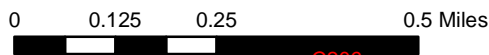
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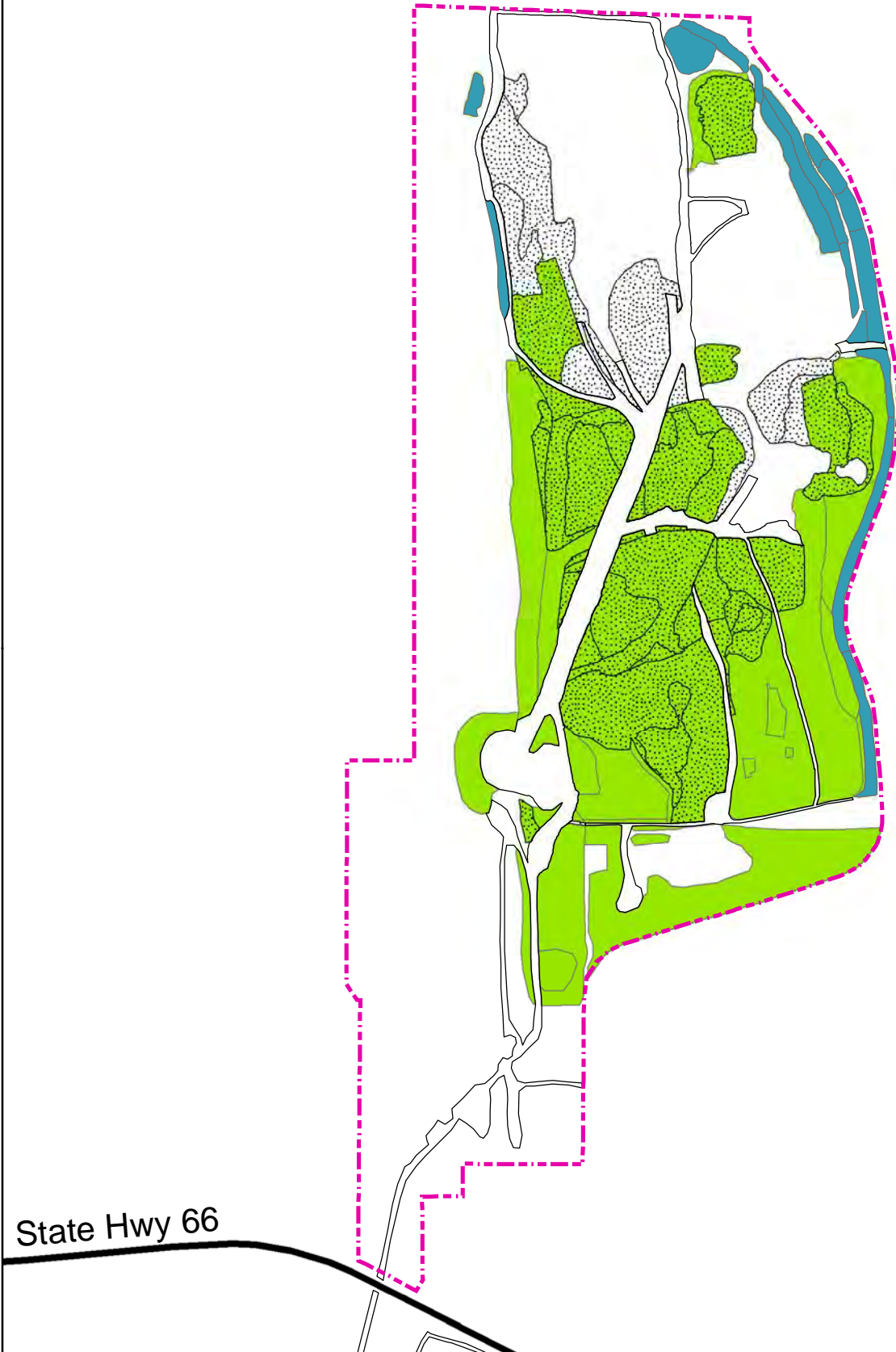



Approved By: CC

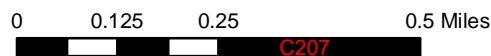
Mapped: 8/27/2019

Drawn: 8/29/2019





-  Dowe Flats Quarry Permit Boundary
-  Backfilled Areas
-  Growth Media Stockpile
-  Growth Media Application & Final Grading



Dowe Flats 2019 DRMS Report
Permit #M-1993-041

Map 2: Backfill, Grading & Growth Media

Prepared By:

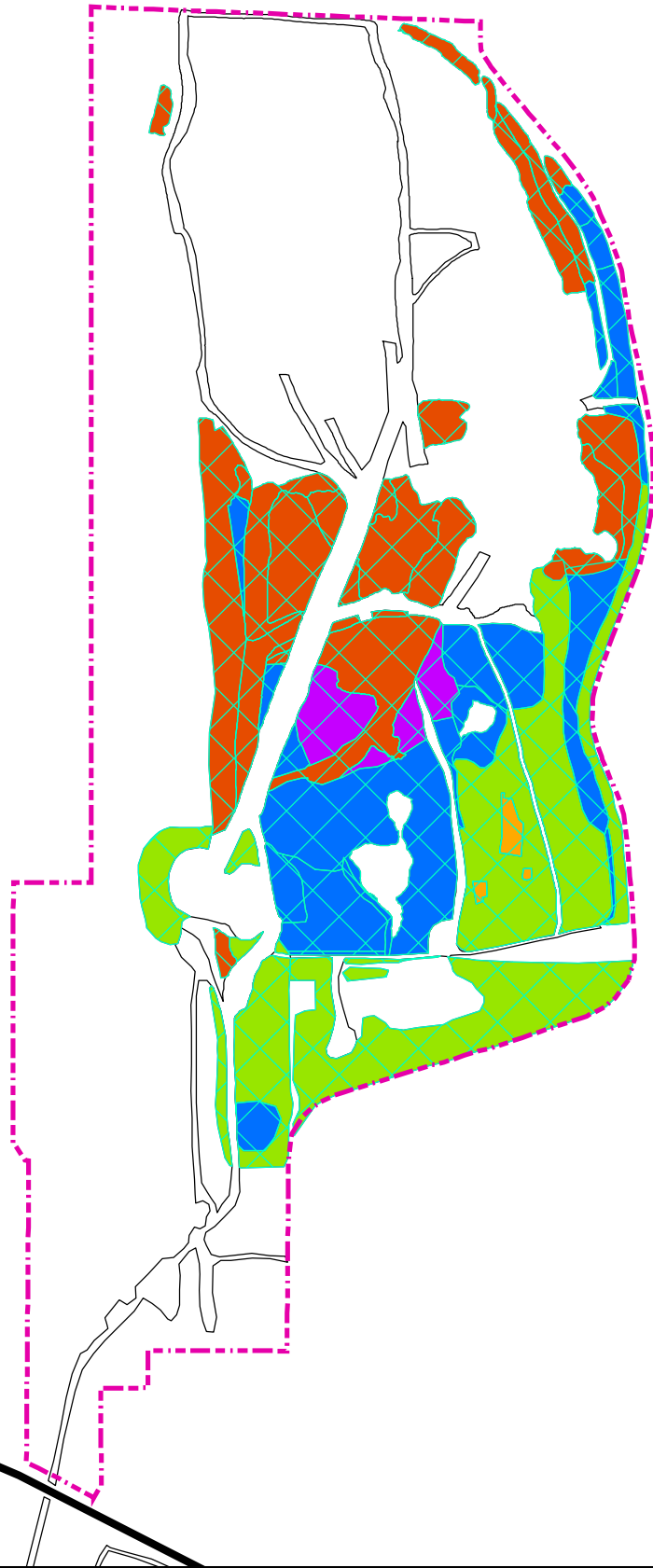
Drawn By: RFB



Approved By: CC

Mapped: 8/27/2019

Drawn: 8/29/2019



State Hwy 66



Fertilizer & Mulch Application

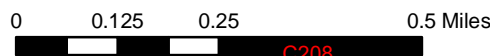
-  18-46-0 (NPK) & Hay Mulch
-  14-14-10 (NPK) & Hay Mulch
-  11-28-23 (NPK) & Hay Mulch
-  18-46-0 (NPK) & Straw Mulch
-  Humega & Hay Mulch



Seed Application (Various Approved Mixtures)



Dowe Flats Quarry Permit Boundary



C208

Dowe Flats 2019 DRMS Report

Permit #M-1993-041

Map 3: Reclamation Treatments

Prepared By:



Drawn By: RFB

Approved By: CC

Mapped: 8/27/2019

Drawn: 8/29/2019

Habitat Management, Inc.
Commercial Herbicide Applicator (CO #11318)
Herbicide Application Record



Location: Cemex Dowe Flats Quarry **County:** Boulder County

East Gravel Pit

Date: 6/19/2019 9:09 AM to 3:53 PM

Customer: Cemex, 5134 Ute Highway, Longmont, CO 80503

Qualified Supervisor: Matt Clark #29724

Applicators: Matt Clark, Kait Lopez

Weather: Sunny 71 degrees F. **Wind:** 2 mph out of N

Site/Crop: Reclamation/Revegetation Area

Target Plants: Knapweed, diffuse - Centaurea diffusa - List B, Mullen, common - Verbascum thapsus - List C, Thistle, Canada - Cirsium arvense - List B, Thistle, Musk - Carduus nutans - List B, Toadflax, Dalmatian - Linaria dalmatica/genistifolia- List B, Houndstongue - Cynoglossum officinale - List B

Application Equipment: Orange Kubota #3 **Equipment Rate:** 50 GPA - Orange Kubota #2 Spot Spray (Handgun) **Application Method:** Spot-Spraying **Carrier:** Water

Herbicide Applied	Application Rate	Total Amount Applied	Dillution Rate
Spray Indicator - Blue Dye	12 fl oz per acre	15 fl oz	0.24 fl oz per gallon
Telar XP - 352654 - Chlorsulfuron	1 Oz (weight) per acre	1.25 Oz (weight)	0.02 Oz (weight) per gallon
Weedar 64 - 71368-1 - 2,4-D	32 fl oz per acre	40 fl oz	0.64 fl oz per gallon
Dyne-Amic - Adjuvant	24 fl oz per acre	30 fl oz	0.48 fl oz per gallon

Total Application: 1.25 acre

Application Notes: Meet with Emily McMurtrey to discuss treatment locations at Lyons Plant. Did not target field bindweed.

NPDES COMPLIANCE (Only Applicable to Aquatic Sites)

Aquatic site: No

Use Pattern: Weeds and Algae

Is equipment properly calibrated?

Did you conduct visual monitoring for adverse incidents?

Were any adverse incidents identified?

Habitat Management, Inc.
Commercial Herbicide Applicator (CO #11318)
Herbicide Application Record



Location: Cemex Dowe Flats Quarry **County:** Denver County

Upland Pond Embankment & Cut Fill Berm

Date: 6/20/2019 10:58 AM to 1:02 PM

Customer: Cemex, 5134 Ute Highway, Longmont, CO 80503

Qualified Supervisor: Matt Clark #29724

Applicators: Matt Clark, Kait Lopez

Weather: Sunny 75 degrees F. **Wind:** 3 mph out of N

Site/Crop: Reclamation/Revegetation Area

Target Plants: Mullen, common - Verbascum thapsus - List C, Thistle, Canada - Cirsium arvense - List B, Thistle, Musk - Carduus nutans - List B

Application Equipment: Orange Kubota #3 **Equipment Rate:** 50 GPA - Orange Kubota #2 Spot Spray (Handgun) **Application Method:** Spot-Spraying **Carrier:** Water

Herbicide Applied	Application Rate	Total Amount Applied	Dilution Rate
Spray Indicator - Blue Dye	12 fl oz per acre	3 fl oz	0.24 fl oz per gallon
Dyne-Amic - Adjuvant	24 fl oz per acre	6 fl oz	0.48 fl oz per gallon
Weedar 64 - 71368-1 - 2,4-D	32 fl oz per acre	8 fl oz	0.64 fl oz per gallon

Total Application: 0.25 acre

Application Notes: Treated embankments above small wetland area east side of gravel pit. Treated cut berm along 55th street inside fence line.

NPDES COMPLIANCE (Only Applicable to Aquatic Sites)

Aquatic site: No

Use Pattern: Weeds and Algae

Is equipment properly calibrated?

Did you conduct visual monitoring for adverse incidents?

Were any adverse incidents identified?

Habitat Management, Inc.
Commercial Herbicide Applicator (CO #11318)
Herbicide Application Record



Location: Cemex Dowe Flats Quarry **County:** Boulder County

East Of Gravel Pit

Date: 6/20/2019 8:28 AM to 10:56 AM

Customer: Cemex, 5134 Ute Highway, Longmont, CO 80503

Qualified Supervisor: Matt Clark #29724

Applicators: Matt Clark, Kait Lopez

Weather: Sunny 70 degrees F. **Wind:** 2 mph out of NW

Site/Crop: Reclamation/Revegetation Area

Target Plants: Mullen, common - Verbascum thapsus - List C, Thistle, Canada - Cirsium arvense - List B, Thistle, Musk - Carduus nutans - List B, Toadflax, Dalmatian - Linaria dalmatica/genistifolia- List B

Application Equipment: Orange Kubota #3 **Equipment Rate:** 50 GPA - Orange Kubota #2 Spot Spray (Handgun) **Application Method:** Spot-Spraying **Carrier:** Water

Herbicide Applied	Application Rate	Total Amount Applied	Dillution Rate
Spray Indicator - Blue Dye	12 fl oz per acre	6 fl oz	0.24 fl oz per gallon
Dyne-Amic - Adjuvant	24 fl oz per acre	12 fl oz	0.48 fl oz per gallon
Telar XP - 352654 - Chlorsulfuron	1 Oz (weight) per acre	0.5 Oz (weight)	0.02 Oz (weight) per gallon
Weedar 64 - 71368-1 - 2,4-D	32 fl oz per acre	16 fl oz	0.64 fl oz per gallon

Total Application: 0.5 acre

Application Notes: Don't target field bindweed or red steam fillaree.

NPDES COMPLIANCE (Only Applicable to Aquatic Sites)

Aquatic site: No

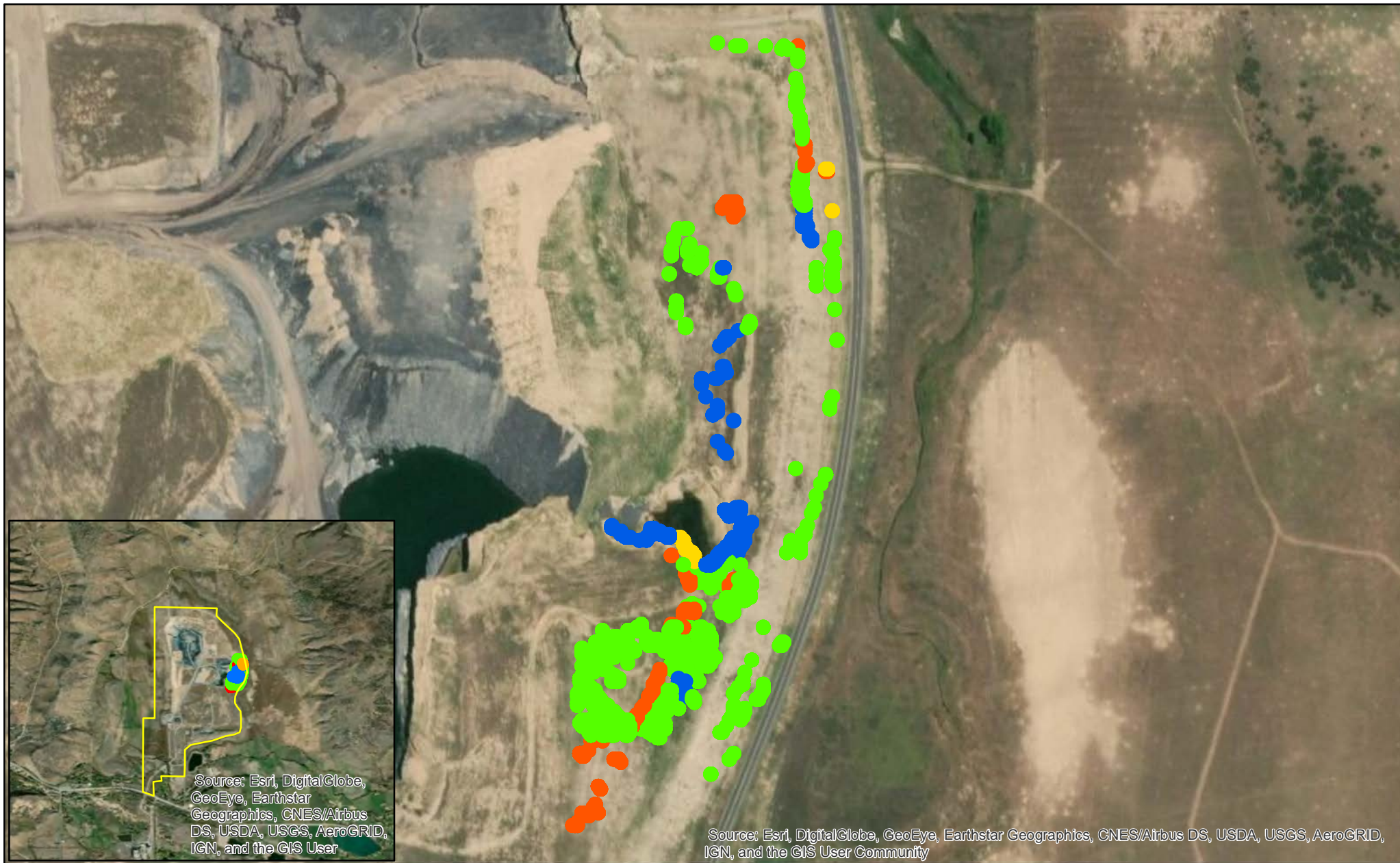
Use Pattern: Weeds and Algae

Is equipment properly calibrated?

Did you conduct visual monitoring for adverse incidents?

Were any adverse incidents identified?

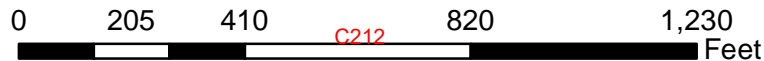
2019 Dowe Flats Noxious Weed Treatment



Legend

Species

- Canada thistle
- Dalmatian toadflax
- Common mullein
- Diffuse knapweed
- Musk thistle



Created By: JF
Date: 07/09/2019
Reviewed By: MC

Minerals Reclamation Permit Annual Report

COLORADO
 Division of Reclamation,
 Mining and Safety
 Department of Natural Resources

General Information

Disclaimer

Under the terms of your NOI or Reclamation Permit and Colorado Statutes, you must submit Annual Fees and Annual Reports (including a map). You must pay the Annual Fee and submit an Annual Report each year until reclamation responsibility release is granted. The Annual Fee is not a renewal fee. The Fee and Report are for LAST YEAR'S mining and reclamation season, and MUST be paid even if your operation was inactive.

If you have requested reclamation responsibility release from the Division of Reclamation, Mining and Safety ("Division") but your permit is not released by the anniversary date listed below, the Annual Fee MUST be paid. If the permit is released before the anniversary date, then by Statute, it is not necessary to pay an Annual Fee or submit an Annual Report for that year.

Division records indicate the following is due:

Select Permit Number *

Only Permit Numbers with currently due Annual Reports and Fees will be listed. If nothing appears in the dropdown box below, there are no annual fees or reports due for any of your permits.

M1993041

Select Anniversary Date *

09-08-2020

PLEASE REMEMBER TO CLICK "SUBMIT" AFTER YOU HAVE COMPLETED YOUR REPORT AND PAYMENT.

Please check the box indicating you have read and understand the terms of the Annual Report and Annual Fee *

I understand and agree to the terms

General Information

Permittee Name

CEMEX, Inc.

Operation Name

Dowe Flats Mine

Permit Number	Fee Due	Permit Acreage
M1993041	791.00	1854.45

County	Anniversary Date	Current Bond Amount
Boulder	09-08-2020	3389460.00

Proceed

Contact Information

Here is the contact information we have on file for this permit. If any of it is inaccurate, you will have the opportunity to correct it after this form has been submitted.

1. Upon submission of this form you will be presented with a link to the contact information update form.
2. There is a question asking about the accuracy of this information at the bottom of this page. Indicating that it is inaccurate will send an e-mail to notify your administrator to make the appropriate changes.

Permittee Contact Information

Permittee Contact Name

Uwe Lubjuhn

Permittee Company

CEMEX, Inc.

Permittee Address 1

PO Box 529

Permittee Address 2

Permittee City	Permittee State	Permittee Zip
Lyons	CO	805400000

Permittee Phone #	Permittee Fax #
3038232101	3038232199

Permittee Contact Email Address

uwe.lubjuhn@cemex.com

Permitting Contact Info

Permitting Contact Name

Scott Harcus

Permitting Company

CEMEX, Inc.

Permitting Address 1

P.O. Box 529

Permitting Address 2

Permitting City	Permitting State	Permitting Zip
Lyons	CO	805400000

Permitting Phone #	Permitting Fax #

3038232124

3038232199

Permitting Contact Email Address

scotta.harcus@cemex.com

Inspection Contact Info

Inspection Contact Name

Cita Cisse

Inspection Company

CEMEX, Inc.

Inspection Address 1

P.O. Box 529

Inspection Address 2

Inspection City

Lyons

Inspection State

CO

Inspection Zip

805400000

Inspection Phone #

7202078492

Inspection Fax #

3038232199

Inspection Contact Email Address

cita.cisse@cemex.com

Is the Permitting Contact information listed above correct? If it is not correct your organization's Administrator will receive an email notification. *

Yes No

Previous

Proceed

Annual Report Questions

Annual Report Questions

Information contained in this report is required and will be reviewed by the Division upon receipt and prior to the next compliance inspection of the site. If, while completing this report, you learn that your site is not in compliance with the rules and the act, it is advisable that the issues be rectified promptly to avoid possible enforcement action.

1. Is the site identification sign posted in accordance with Rule 3.1.12(1). *

Yes No

2. Is the affected area boundary clearly marked in accordance with Rule 3.1.12(2). *

Yes No

3. Is the mine site in final reclamation (all material extraction and stockpile removal is complete)? *

If "YES," please note time limits related to completion of reclamation, Rule 3.1.3.

Yes No

4. Please enter the date of last activity at the mine (excavation, processing or hauling). Or, if activity has not yet begun, please indicate so. *

No activity yet Yes, activity has begun 9/8/2020

5. Does the mine operate more than 180 days per year? *

If "NO", please review Rule 1.13 to assure that your mine is in compliance.

Yes No

6. Has this mine been granted approval of TEMPORARY CESSATION Status? *

Yes No

7. Has this mine been granted approval for INTERMITTENT OPERATION? * (?)

Yes No

For the following questions, please note that numeric values must include one decimal place, such as "0.0" for zero acres, or 10.2 instead of 10.23.

8. Number of acres currently affected (mining + incomplete and or unreleased reclamation). * (?)

311.6

9. Number of acres that were newly affected during the current report year * (?)

4.2

10. Number of acres that were reclaimed during the current report year. * (?)

1.9

11. Estimated new acreage to be affected in the next report year. * (?)

5.0

12. Estimated acres to be reclaimed in the next report year. * (?)

10.0

13. Total acres in various stages of reclamation, since permitted mining activities began:

Total acres backfilled * (?)

209.8

Total acres graded * (?)

279.8

Total acres seeded with approved mix * (?)

234.4

Seed Application Method *

Broadcast seeding

Total acres fertilized with approved fertilizer * (?)

234.4

Fertilizer Application Method *

Tractor spreader

Total acres with topsoil replaced * (?)

219.6

Topsoil replacement depth (in.) * (?)

8.0

Total acres mulched with approved mulch * (?)

228.1

Mulch application rate (tons/ac) * (?)

2.0

Mulch Application Method *

Crimping, with tractor

[Previous](#)

[Proceed](#)

Annual Report Questions

14. Is weed control being conducted in accordance with an approved Weed Control Plan? *

If "YES", indicate the weed species, control area, control type, application rate and treatment date on the report map.

Yes No N/A

15. Is adequate topsoil reserved for reclamation, based on your approved permit? *

If "NO", please explain

Yes No N/A

16. Is the reserved topsoil vegetated/stabilized in accordance with Rule 3.1.9(1)? *

If "NO", please explain

Yes No N/A

17. If mining has exposed groundwater, is the site in compliance with the approved mining plan and Office of the State Engineer (Well Permit, S.W.S.P., and/or Permanent Augmentation Plan)? *

Yes No N/A

18. Are all hazardous materials stored within approved spill containment structures? *

Yes No N/A

19. Is your financial warranty value sufficient to cover the cost to complete reclamation? *

Yes No N/A

20. Is your basis for legal right to enter still valid? *

Yes No

21. Does your permit require you to submit monitoring information annually? *

Yes No N/A

22. As required by Colorado Mined Land Reclamation Act and/or Colorado Land Reclamation Act for the Extraction of Construction Materials (C.R.S.34-32-116 or 34-32.5-116), attach a map to this report that accurately depicts the permit boundary, current affected area boundary and location of the acreages specified in items 8-12 and 15. *

Only PDF formatted files can be uploaded.

Disturbance_2020-Dowe.pdf	265.29KB
Grading+Cover 2020-Dowe.pdf	258.46KB
Reclamation Treatments 2020-Dowe.pdf	251.63KB

23. If you have supplemental information you would like to provide, please upload it here.

Only PDF formatted files can be uploaded.

24. Rule 5.7 requires submittal of final abandonment reports within 60 days for any drill hole(s) with artesian flows and no later than 12 months for all other completed drill holes. If drill holes are a component of your exploration/prospecting activities, have they been properly abandoned?

Yes No NA

Previous

Proceed

Annual Fee Payment

Annual Fee Payment

Payment Confirmation Number * (?)

149892626

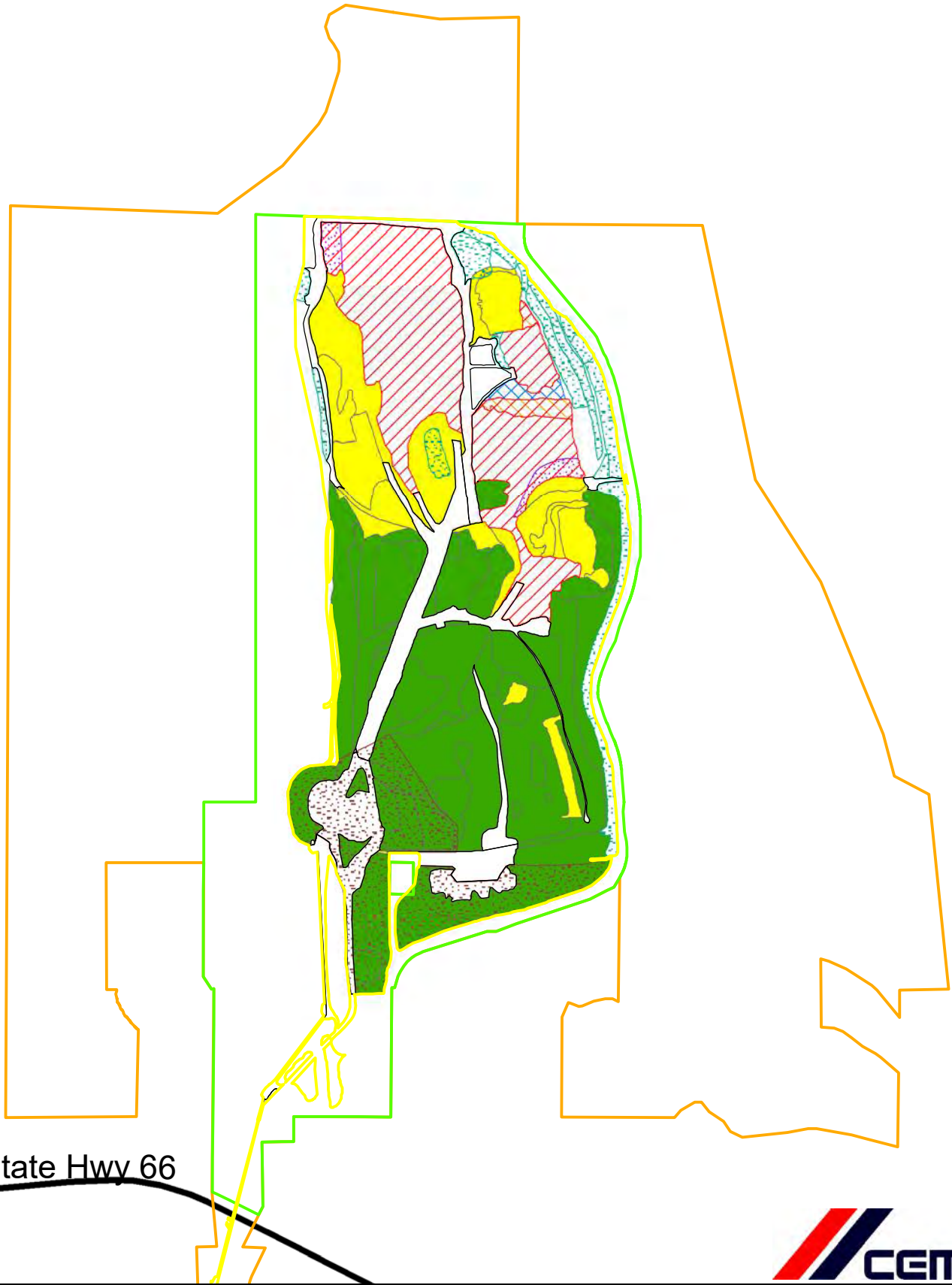
Signature

I, the undersigned, hereby state that the information provided in this report is true and accurate, and that site operations are being conducted in accordance with the Division approved mining and reclamation plans. *

I Agree












If you do not see the "Submit" button after completing your report, try to un-check and then re-check the "I Agree" box.

[Previous](#)



State Hwy 66



- | | | | |
|--|--|---|------------------------|
|  | Pit Disturbance Boundary |  | Growth Media Stockpile |
|  | 2019/20 New Mining Disturbance |  | Waste Rock Stockpile |
|  | Anticipated 2020/21 Mining Disturbance |  | Affected Area Boundary |
|  | Unreleased Reclamation |  | Permit Boundary |
|  | Reclamation in Progress |  | Property Boundary |
|  | Anticipated Reclamation 2020-2021 | | |

0 0.25 0.5 Miles

C221

Dowe Flats 2020 DRMS Report
Permit #M-1993-041

Map 1: Disturbance & Reclamation Areas

Prepared By:

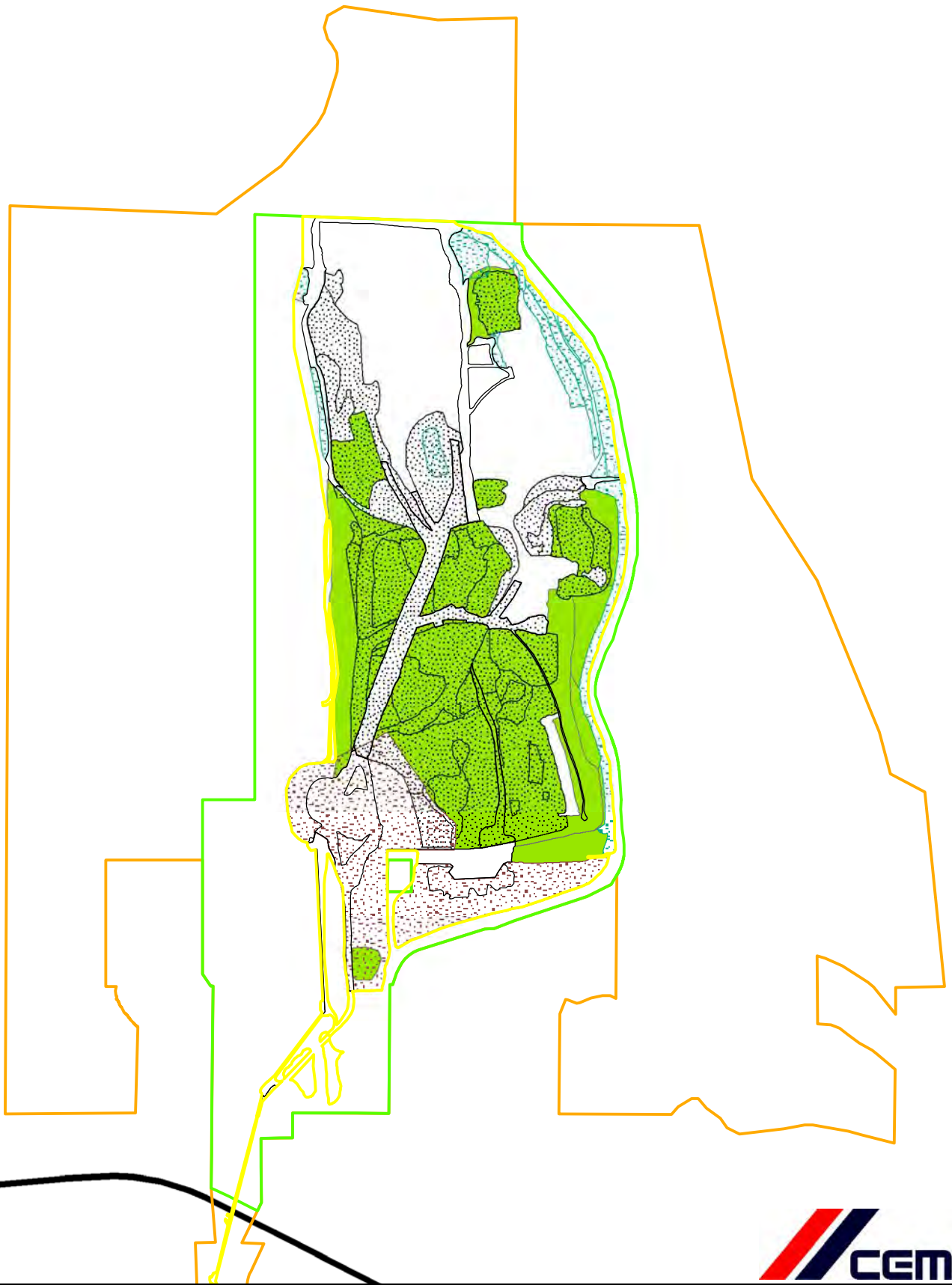
Drawn By: RFB










Approved By: CC

Mapped: 9/1/2020

Drawn: 9/4/2020



-  Backfilled Areas
-  Growth Media Application & Final Grading
-  Growth Media Stockpile
-  Waste Rock Stockpile
-  Affected Area Boundary
-  Permit Boundary
-  Property Boundary

0 0.25 0.5 Miles



C222

Dowe Flats 2020 DRMS Report
Permit #M-1993-041

Map 2: Backfill, Grading & Growth Media

Prepared By:



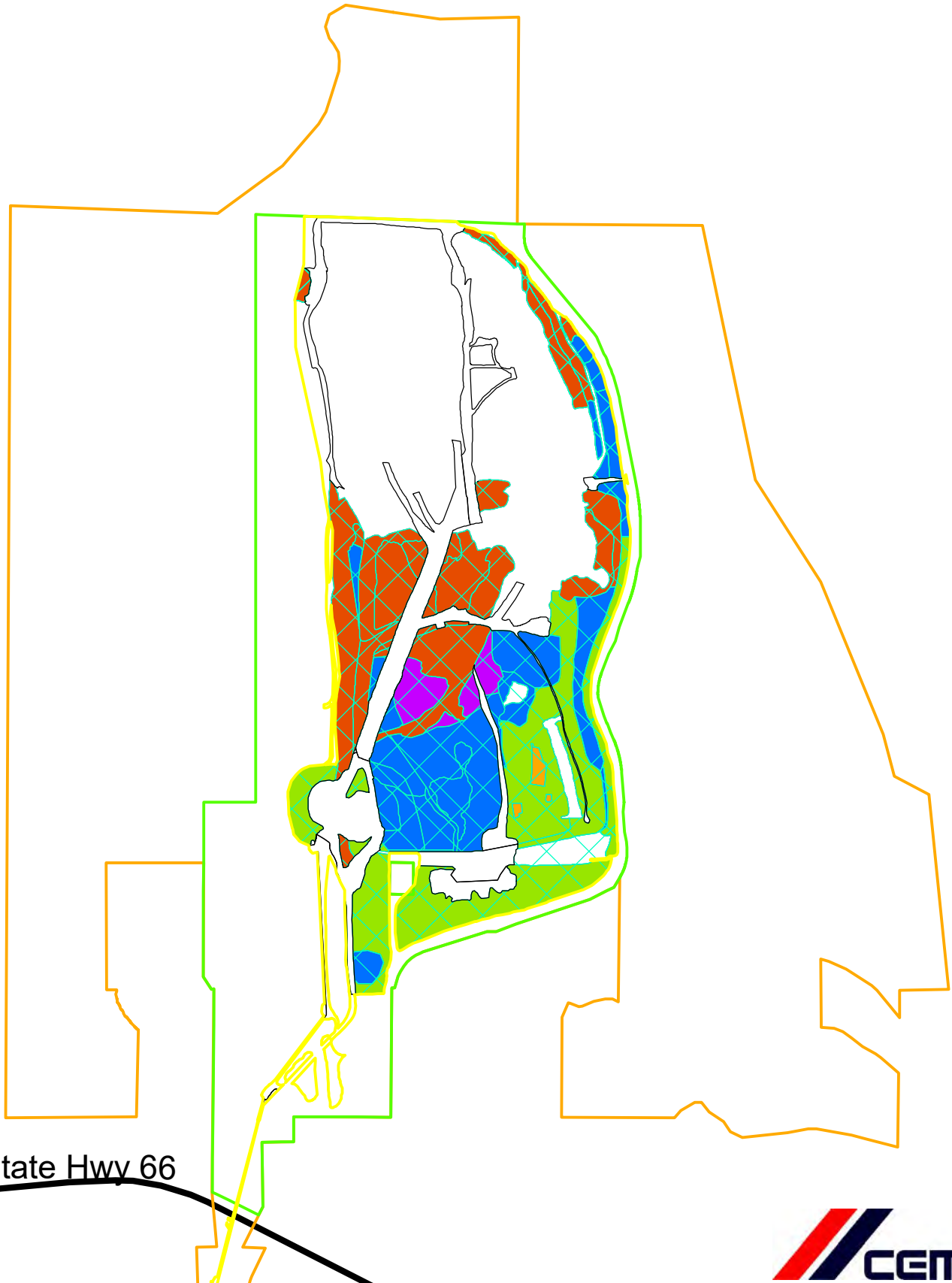
www.habitatmanagementinc.com

Drawn By: RFB

Approved By: CC

Mapped: 9/1/2020

Drawn: 9/4/2020



State Hwy 66



Fertilizer & Mulch Application

- 18-46-0 (NPK) & Hay Mulch
- 14-14-10 (NPK) & Hay Mulch
- 11-28-23 (NPK) & Hay Mulch
- 18-46-0 (NPK) & Straw Mulch
- Humega & Hay Mulch

- Seed Application (Various Approved Mixtures)
- Affected Area Boundary
- Permit Boundary
- Property Boundary

0 0.25 0.5 Miles



Dowe Flats 2020 DRMS Report
Permit #M-1993-041

Map 3: Reclamation Treatments

Prepared By:



Drawn By: RFB

Approved By: CC

Mapped: 9/1/2020

Drawn: 9/4/2020

Minerals Reclamation Permit Annual Report

COLORADO
 Division of Reclamation,
 Mining and Safety
 Department of Natural Resources

General Information

Disclaimer

Under the terms of your NOI or Reclamation Permit and Colorado Statutes, you must submit Annual Fees and Annual Reports (including a map). You must pay the Annual Fee and submit an Annual Report each year until reclamation responsibility release is granted. The Annual Fee is not a renewal fee. The Fee and Report are for LAST YEAR'S mining and reclamation season, and MUST be paid even if your operation was inactive.

If you have requested reclamation responsibility release from the Division of Reclamation, Mining and Safety ("Division") but your permit is not released by the anniversary date listed below, the Annual Fee MUST be paid. If the permit is released before the anniversary date, then by Statute, it is not necessary to pay an Annual Fee or submit an Annual Report for that year.

Division records indicate the following is due:

Select Permit Number *

Only Permit Numbers with currently due Annual Reports and Fees will be listed. If nothing appears in the dropdown box below, there are no annual fees or reports due for any of your permits.

M1993041

Select Anniversary Date *

09-08-2021

PLEASE REMEMBER TO CLICK "SUBMIT" AFTER YOU HAVE COMPLETED YOUR REPORT AND PAYMENT.

Please check the box indicating you have read and understand the terms of the Annual Report and Annual Fee *

I understand and agree to the terms

General Information

Permittee Name

CEMEX, Inc.

Operation Name

Dowe Flats Mine

Permit Number	Fee Due	Permit Acreage
M1993041	791.00	1854.45

County	Anniversary Date	Current Bond Amount
Boulder	09-08-2021	12683299.00

Proceed

Contact Information

Here is the contact information we have on file for this permit. If any of it is inaccurate, you will have the opportunity to correct it after this form has been submitted.

1. Upon submission of this form you will be presented with a link to the contact information update form.
2. There is a question asking about the accuracy of this information at the bottom of this page. Indicating that it is inaccurate will send an e-mail to notify your administrator to make the appropriate changes.

Permittee Contact Information

Permittee Contact Name

Uwe Lubjuhn

Permittee Company

CEMEX, Inc.

Permittee Address 1

PO Box 529

Permittee Address 2

Permittee City	Permittee State	Permittee Zip
Lyons	CO	805400000

Permittee Phone #	Permittee Fax #
3038232101	3038232199

Permittee Contact Email Address

uwe.lubjuhn@cemex.com

Permitting Contact Info

Permitting Contact Name

Scott Harcus

Permitting Company

CEMEX, Inc.

Permitting Address 1

P.O. Box 529

Permitting Address 2

Permitting City	Permitting State	Permitting Zip
Lyons	CO	805400000

Permitting Phone #	Permitting Fax #

3038232124

3038232199

Permitting Contact Email Address

scotta.harcus@cemex.com

Inspection Contact Info

Inspection Contact Name

Cita Cisse

Inspection Company

CEMEX, Inc.

Inspection Address 1

P.O. Box 529

Inspection Address 2

Inspection City

Lyons

Inspection State

CO

Inspection Zip

805400000

Inspection Phone #

7202078492

Inspection Fax #

3038232199

Inspection Contact Email Address

cita.cisse@cemex.com

Is the Permitting Contact information listed above correct? If it is not correct your organization's Administrator will receive an email notification. *

Yes No

Previous

Proceed

Annual Report Questions

Annual Report Questions

Information contained in this report is required and will be reviewed by the Division upon receipt and prior to the next compliance inspection of the site. If, while completing this report, you learn that your site is not in compliance with the rules and the act, it is advisable that the issues be rectified promptly to avoid possible enforcement action.

1. Is the site identification sign posted in accordance with Rule 3.1.12(1). *

Yes No

2. Is the affected area boundary clearly marked in accordance with Rule 3.1.12(2). *

Yes No

3. Is the mine site in final reclamation (all material extraction and stockpile removal is complete)? *

If "YES," please note time limits related to completion of reclamation, Rule 3.1.3.

Yes No

4. Please enter the date of last activity at the mine (excavation, processing or hauling). Or, if activity has not yet begun, please indicate so. *

No activity yet Yes, activity has begun 9/8/2021

5. Does the mine operate more than 180 days per year? *

If "NO", please review Rule 1.13 to assure that your mine is in compliance.

Yes No

6. Has this mine been granted approval of TEMPORARY CESSATION Status? *

Yes No

7. Has this mine been granted approval for INTERMITTENT OPERATION? * (?)

Yes No

For the following questions, please note that numeric values must include one decimal place, such as "0.0" for zero acres, or 10.2 instead of 10.23.

8. Number of acres currently affected (mining + incomplete and or unreleased reclamation). * (?)

480.4

9. Number of acres that were newly affected during the current report year * (?)

2.3

10. Number of acres that were reclaimed during the current report year. * (?)

1.7

11. Estimated new acreage to be affected in the next report year. * (?)

5.0

12. Estimated acres to be reclaimed in the next report year. * (?)

10.0

13. Total acres in various stages of reclamation, since permitted mining activities began:

Total acres backfilled * (?)

240.0

Total acres graded * (?)

188.1

Total acres seeded with approved mix * (?)

231.9

Seed Application Method *

Broadcast seeding

Total acres fertilized with approved fertilizer * (?)

229.5

Fertilizer Application Method *

Tractor spreader

Total acres with topsoil replaced * (?)

196.5

Topsoil replacement depth (in.) * (?)

8.0

Total acres mulched with approved mulch * (?)

225.6

Mulch application rate (tons/ac) * (?)

2.0

Mulch Application Method *

Crimping, with tractor

Previous

Proceed

Annual Report Questions

14. Is weed control being conducted in accordance with an approved Weed Control Plan? *

If "YES", indicate the weed species, control area, control type, application rate and treatment date on the report map.

Yes No N/A

15. Is adequate topsoil reserved for reclamation, based on your approved permit? *

If "NO", please explain

Yes No N/A

16. Is the reserved topsoil vegetated/stabilized in accordance with Rule 3.1.9(1)? *

If "NO", please explain

Yes No N/A

17. If mining has exposed groundwater, is the site in compliance with the approved mining plan and Office of the State Engineer (Well Permit, S.W.S.P., and/or Permanent Augmentation Plan)? *

Yes No N/A

18. Are all hazardous materials stored within approved spill containment structures? *

Yes No N/A

19. Is your financial warranty value sufficient to cover the cost to complete reclamation? *

Yes No N/A

20. Is your basis for legal right to enter still valid? *

Yes No

21. Does your permit require you to submit monitoring information annually? *

Yes No N/A

22. As required by Colorado Mined Land Reclamation Act and/or Colorado Land Reclamation Act for the Extraction of Construction Materials (C.R.S.34-32-116 or 34-32.5-116), attach a map to this report that accurately depicts the permit boundary, current affected area boundary and location of the acreages specified in items 8-12 and 15. *

Only PDF formatted files can be uploaded.

Disturbance_2021-Dowe.pdf	266.45KB
Grading+Cover 2021-Dowe.pdf	260.82KB
Reclamation Treatments 2021-Dowe.pdf	254.65KB

23. If you have supplemental information you would like to provide, please upload it here.

Only PDF formatted files can be uploaded.

24. Rule 5.7 requires submittal of final abandonment reports within 60 days for any drill hole(s) with artesian flows and no later than 12 months for all other completed drill holes. If drill holes are a component of your exploration/prospecting activities, have they been properly abandoned?

Yes No NA

Previous

Proceed

Annual Fee Payment

Annual Fee Payment

Payment Confirmation Number * (?)

174585304

Signature

I, the undersigned, hereby state that the information provided in this report is true and accurate, and that site operations are being conducted in accordance with the Division approved mining and reclamation plans. *

I Agree

If you do not see the "Submit" button after completing your report, try to un-check and then re-check the "I Agree" box.

[Previous](#)



State Hwy 66



	Pit Disturbance Boundary		Growth Media Stockpile
	2020/21 New Mining Disturbance		Waste Rock Stockpile
	Anticipated 2021/22 Mining Disturbance		Affected Area Boundary
	Unreleased Reclamation		Permit Boundary
	Reclamation in Progress		Property Boundary
	Anticipated Reclamation 2020-2021	0 0.25 0.5 Miles	

Dowe Flats 2021 DRMS Report
Permit #M-1993-041

Map 1: Disturbance & Reclamation Areas

Prepared By:

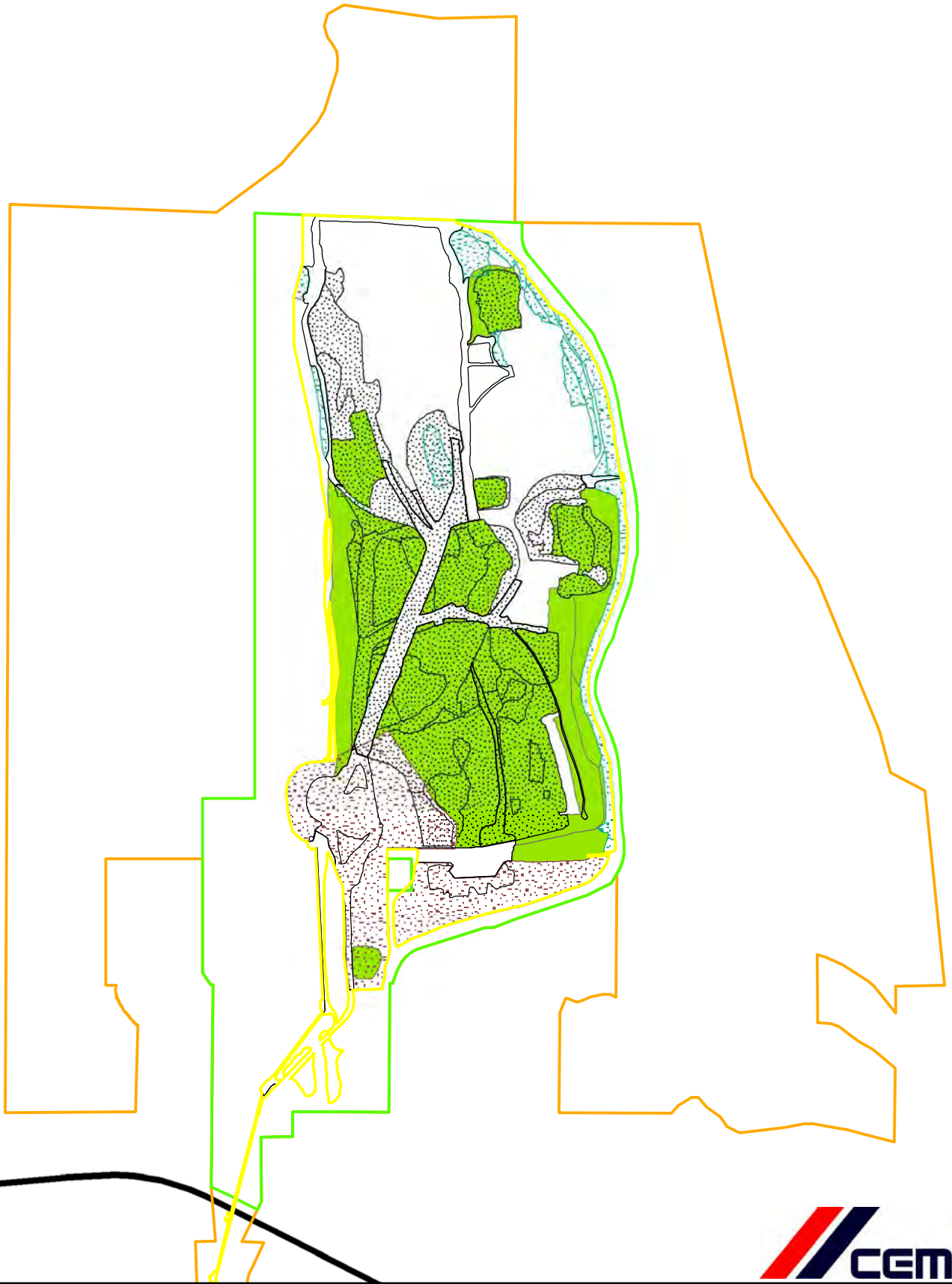
Drawn By: RFB










Approved By: PC

Mapped: 7/26/2021

Drawn: 8/24/2021



-  Backfilled Areas
-  Growth Media Application & Final Grading
-  Growth Media Stockpile
-  Waste Rock Stockpile
-  Affected Area Boundary
-  Permit Boundary
-  Property Boundary

0 0.25 0.5 Miles



Dowe Flats 2021 DRMS Report

Permit #M-1993-041

Map 2: Backfill, Grading & Growth Media

Prepared By:

Drawn By: RFB

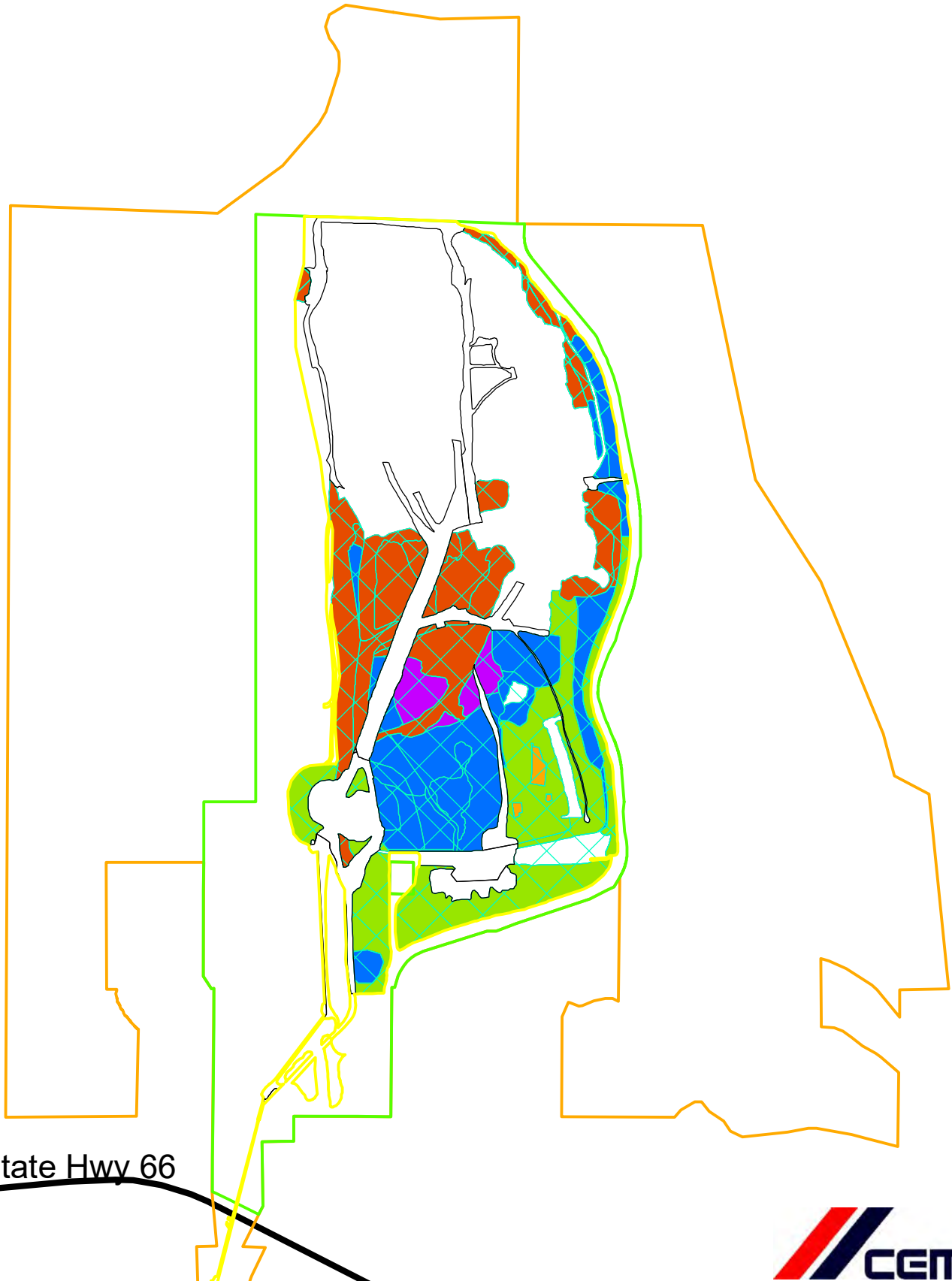


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Approved By: PC

Mapped: 7/26/2021

Drawn: 8/24/2021



State Hwy 66



Fertilizer & Mulch Application

- 18-46-0 (NPK) & Hay Mulch
- 14-14-10 (NPK) & Hay Mulch
- 11-28-23 (NPK) & Hay Mulch
- 18-46-0 (NPK) & Straw Mulch
- Humega & Hay Mulch

- Seed Application (Various Approved Mixes)
- Affected Area Boundary
- Permit Boundary
- Property Boundary

0 0.25 0.5 Miles



C234

Dowe Flats 2021 DRMS Report

Permit #M-1993-041

Map 3: Reclamation Treatments

Prepared By:



Drawn By: RFB

Approved By: PC

Mapped: 7/26/2021

Drawn: 8/24/2021



July 21, 2022

Ron West
Natural Resource Planner
Boulder County Parks & Open Space
5201 St. Vrain Road
Longmont, CO 80503

RE: Response to Referral Comments on SU-22-0003 CEMEX Dowe Flats Mining & Reclamation Extension

Dear Ron:

We have reviewed your comments about CEMEX's request to update the Special Use Permit for the Dowe Flats project to extend the life of the quarry. Below is a listing of each of your comments followed by a response to each comment. *The responses are provided in italics.*

Review Criteria Statement, Page 1:

The application divides the compatibility question into two arenas – the existing mine, and its future reclaimed condition. Staff questions whether the newly-proposed reclamation concept would be compatible with the surrounding area. Pre-mining, the site was mixed grass prairie with minimal topographical features. The newly-proposed reclamation concept would introduce a headwall and a pond/wetland, among other features. These do not seem compatible with the pre-mine environment, and are thus likely not compatible with the surrounding area.

If the mine extension proposal is not approved, the details of final reclamation would be of immediate concern. However, if the mine life is extended, there would be abundant time to reach agreements between the applicant, the state, and the county for what the final reclamation plan would include.

The application states that the newly-proposed reclamation plan would, "...result in the site being reclaimed with established, healthy vegetation much sooner because existing landforms on the site that have already been reseeded and contain very well-established, healthy vegetation could be preserved" (emphasis added).

While ostensibly true, whatever final reclamation conditions are eventually agreed upon, they would result in permanent conditions -- what the site will look like for the indefinite future. It is important that whatever these conditions are to be, that they are determined to be the most appropriate conditions, with agreement by the county and state. That such conditions may take additional years to be reached – by re-working temporarily established vegetation -- is not relevant.

Indeed, on the south side of the highway is a huge, artificial landform – a ridge-like feature of overburden deposition about a half-mile long and 130-feet tall. This is the result of earlier, 1970's mining on the south side of the highway. In the 1970's, such a landform was deemed appropriate as a final condition of reclamation. It is almost certain that such a large artificial landform would not be approved today, but this feature is now a permanent and unchangeable part of the county.

In other words, we need to get the reclamation of Dowe Flats "right."

CEMEX understands that Parks and Open Space wants this site to be reclaimed to all grasslands and to eliminate the wetland approved as part of the existing reclamation plan. CEMEX is willing to work collaboratively with Boulder County and the Colorado Division of Reclamation Mining and Safety (DRMS) to amend the requirements of the existing reclamation plan.

Review Criteria Statement, Page 3

In this section, the application lists about 20 goals and policy statements, discussing whether the proposal would be in accordance with the Comprehensive Plan. Staff could question several of the application's responses to these goals and policy statements, though most are outside of staff's purview. Just one environmental topic is included here. Page 5 defines an environmental resource as "...any material, service, or information from the environment that is valuable to society," and that therefore, "The limestone and shale existing at the site are an environmental resource...requiring extraction to utilize their benefits..." Standard ecological understanding is that mined material is a non-renewable, natural *resource*, yes, but to argue that mining the commodity is therefore beneficial to the environment is inappropriate to a reasonable discussion of the issue.

As stated on pages IN-1 and IN-2 of the Comprehensive Plan, "The Plan provides guidance in the decision making process, but not the 'final word.' It is the responsibility of decision makers to balance a range of goals and policies in the context of a specific case. There is no formulaic path to accomplish this; it is not a matter of counting policies that support one factor versus another, but rather an exercise in determining the outcome that best reflects the Plan's overall Guiding Principles given the unique circumstances of the situation." CEMEX attempted to be as comprehensive and complete as possible in the application to be helpful to staff, but staff may differ in opinion as to whether a particular section of the Comprehensive Plan is applicable in this case.

Development Report, Cultural Resources, Page 2

The fact that some lands, designated as Archeologically Sensitive Areas, would be removed from the permit boundary is moot since all mining activities need to comply with the Cultural Resource Management Plan, regardless.

CEMEX can confirm that all mining activities comply with the Cultural Resource Management Plan.

Recommendations

- The above discussion should be considered during review.

Acknowledged.

- It is unclear if the 15-year timeframe – for both the mine and the plant sites – includes structure removal and revegetation. In other words, would revegetation of the sites be finalized in the year 2037, or would the process of final revegetation begin in 2037?

The timeframe is 15 more years for mining at Dowe Flats exclusive of the time to reclaim after mining is complete. Revegetation of the Dowe Flats site will be in process in 2037, but a three-year period is provided thereafter during which reclamation will need to be completed. Reclamation of the parcels on which the County will have an option to purchase are expected to proceed on the same three-year timeframe.

- There is a plugged/abandoned oil & gas well near the center of the subject parcel. Based on aerial photography, this area has been disturbed. Given the regular blasting from on-going mining, and the potential for more blasting, the condition and efficacy of the plugged well should be investigated. This should occur after mining operations cease and before the land's final disposition.

This request has been noted, although CEMEX is not aware of the presence of any plugged or abandoned oil & gas wells at Dowe Flats.

- Since the mine would excavate additional deposits, staff assumes that additional overburden would need to be temporarily stockpiled on the surface. Where would this be placed? Should such details be addressed under the state's mining permit?

Additional overburden in the excavated areas would need to be removed and stockpiled on site, as it has previously. Such material movement is addressed in the DRMS permit.

- Staff defers to the POS-specific referral for detailed natural resource comments such as reclamation recommendations.

Acknowledged.

Sincerely,

CEMEX, Inc.

A handwritten signature in blue ink, appearing to read 'J. V. Heffernan', is written over the printed name below.

John V. Heffernan, Authorized Agent

cc: Pete L'Orange, Boulder County Community Planning & Permitting



July 21, 2022

Jessica Epstein
Environmental Health Specialist
Environmental Health Division
Boulder County Public Health
3450 Broadway
Boulder, CO 80304

RE: Response to Referral Comments on SU-22-0003 CEMEX Dowe Flats Mining & Reclamation Extension

Dear Jessica:

We have reviewed your referral comments about CEMEX's request to update the Special Use Permit for the Dowe Flats project. Below is the comment you shared with us followed by CEMEX's response. *The response is provided in italics.*

Air Quality:

Boulder County Public Health would be willing to support the mining extension at Dowe Flats for an additional 15 years if Cemex can commit to completing the upgrades and improvements to the plant necessary to address long standing and ongoing fugitive dust and maintenance issues. BPCCH requests Cemex completes the Lyons plant upgrades.

Management along with BCPH staff has identified as necessary future improvements. Specifically: conveyor belt enclosures, solid closures where there are curtains, Clinker Pit improvement-enclosure with direct conveyance to the A-Frame storage (this is one of the biggest problem areas), broken baghouse detectors, paving the east haul road and improved camera surveillance of the plant.

CEMEX welcomes opportunities to make modifications to the Lyons Plant that would enhance dust mitigation and minimize maintenance issues.

Sincerely,

CEMEX, Inc.

A handwritten signature in blue ink, appearing to read "John V. Heffernan".

John V. Heffernan, Authorized Agent

cc: Pete L'Orange, Boulder County Community Planning & Permitting



August 4, 2022

Victoria Simonsen
Town Administrator
Town of Lyons
432 5th Avenue
P.O. Box 49
Lyons, CO 80540
vsimonsen@townoflyons.com

RE: Responses to Referral Comments for SU-22-0003 CEMEX Dowe Flats Mining & Reclamation Extension

Dear Administrator Simonsen:

We have reviewed the referral comments submitted by the Town of Lyons about CEMEX's request to update the Dowe Flats Special Use Permit to extend the life of the quarry. While the letter was directed to Boulder County Community Planning & Permitting, we take this opportunity to respond to various statements made in the letter and to provide additional context.

We understand the Town recommends the County Planning Commission recommend denial of the referenced permit application. As a general matter, the permitting of Dowe Flats quarry is separate and distinct from the operational entitlements of the cement plant, and CEMEX would like the County to consider CEMEX's permit application on that basis. CEMEX has been open about its interest in seeking an amendment to extend operations at Dowe Flats, including a presentation during a 2019 meeting of the Town's Board of Trustees. As you will recall from that presentation, the current proposal reflects an extension of time that is significantly less than the 25 years then contemplated based on the approximate mineable resources remaining in the quarry.

Below is a listing of the Town of Lyons' specific comments made in its 07/22/22 letter followed by CEMEX's responses. *The responses are provided in italics.*

The Town of Lyons recommends against granting the 15-year Special Use Permit extension to the applicant for the following reasons:

- The Town does not believe that CEMEX can continue plant operations indefinitely if the SUP is extended. The current mining permit, M-1977-208, mandates that should mining operations cease north of SH 66 at the Dowe Flats quarry, the cement plant south of SH 66 in turn must be demolished and the land reclaimed to "irrigated pasture" (please refer to Appendix Item 8 for the 2004 map filed with the State of Colorado, as well as the 2002 letter from the Colorado Division of Minerals & Geology).

Continued cement plant operations are not contingent upon continued mining at Dowe Flats, as the permit at issue does not pertain to the cement plant operation.

The mining permit cited in the Town's comment – M-1977-208 – pertains to mining operations on property surrounding the cement plant south of SH 66 and known as the Lyons Mine (or Lyons Quarry), where mining operations have ceased, and reclamation is ongoing. The Dowe Flats quarry operates north of SH 66 under mining permit M1993-041. It is the Dowe Flats quarry that is the subject of the pending application.

The letter from the State of Colorado Division of Minerals and Geology included by the Town in its support of expedited reclamation of the cement plant does not pertain to cessation of mining and subsequent reclamation at Dowe Flats. It pertains to cessation of mining operations at the Lyons Quarry. Moreover, after acknowledging the County's confirmation that the cement plant operates as a nonconforming use, the letter provides that the cement plant becomes subject to

reclamation under the permit for Lyons Quarry (not Dowe Flats) only after the cement plant is no longer in operation. ("It appears that once the facility is no longer in operation, the nonconforming use will terminate and be subject to reclamation under DMG permit M-1977-208.")

Notwithstanding its entitlement to continued cement plant operations, CEMEX has offered the concession of an accelerated termination of cement plant operations if the SUP for Dowe Flats is extended as proposed in the application. We believe that proposing cessation of cement plant operations at a date certain to coincide with the cessation of mining at Dowe Flats at the end of the requested 15-year period, despite no permitting or other obligation to do so, helps resolve any misperceptions around this issue and provides certainty to all stakeholders. This certainty should facilitate future regional and local planning.

- Permitting and oversight is unclear.
 - If mining at Dowe Flats ceases, will the Colorado Department of Mining and Reclamation permit pertaining to both the north and south sides of the property expire?

As noted above, there is no single state "permit pertaining to both the north and south sides of the property." Mining permit M-1977-208 is for Lyons Quarry (south of SH 66), while Dowe Flats (north of SH 66) operates under mining permit M1993-041. Thus, regardless of the County's determination on the pending application to extend the period for the Dowe Flats quarry operation under M1993-041, the Lyons Quarry permit (M-1977-208) would not be implicated.

If the quarry operation at Dowe Flats ceases, the reclamation requirements for Dowe Flats associated with permit M1993-041 will apply.

- What is the status of the Title V Clean Air Act expired permit? EPA Region 8 has thus far been unable to determine an answer.

CEMEX submitted its air permit renewal application to Colorado Department of Public Health and Environment (CDPHE) on March 1, 2021. A Permit Shield was granted March 12, 2021 and remains in effect.

- If CEMEX will, as they say, truck in materials to process at the plant, do they require CDOT approval? What are the estimated vehicular and safety impacts? Where will the materials come from? Will this jeopardize DRCOG TIP funding?

The cement plant has received materials via truck over its years of operation and would continue to do so from various sources. Provided operations continue within existing cement plant entitlements, no additional permits would be necessary if the Dowe Flats quarry permit is not extended. CEMEX is unaware of potential impacts, if any, on DRCOG TIP funding.

- The Greenhouse Gas Emissions and Energy Management for Manufacturers in Colorado (GEMM) rule requires CEMEX specifically to undergo an emissions audit in 2022. The GEMM rule requires facilities that show through an audit process they are using GHG Best Available Control Technologies and Energy Best Management Practices to achieve an additional 5% reduction in their GHG emissions. Has CEMEX undertaken this audit process?

The GEMM rule audit requirements do not pertain to the Dowe Flats quarry operation which is the subject of the permit application.

CEMEX has engaged a consulting firm to perform a GEMM audit of the cement plant. The first such audit will be completed by year end in compliance with the rule, and future audits will be on a 5-year recurring schedule.

- The application does not support the 2020 Boulder County Comprehensive Plan's listed primary philosophies of
 - Growth should be channeled to municipalities
 - Agricultural land should be protected
 - Preservation of our environmental and natural resources should be a high priority in making land use decisions

CEMEX's land use application addresses how its extension request complies with the Comprehensive Plan's primary philosophies.

- For Boulder County to reach its 2030 climate goals, both mining and plant operations should either cease or be held to current standards. The Lyons CEMEX facility violates Federal clean air regulations and emitted more than 357,000 tons of CO₂ in 2020 alone. Fugitive silica dust storms are common and well-documented. There is an urgent need to redouble our efforts to combat climate change.

CEMEX respects the establishment of Boulder County's 2030 climate goals. Indeed, CEMEX has established its own ambitious goals to achieve a 40% reduction in CO₂ emissions globally by 2030 and to reach carbon neutrality across its full value chain by 2050. CEMEX recognizes these goals cannot be achieved alone, as they will require engagement across all aspects of CEMEX's operations and depend on advances in technology and innovation. Likewise, efforts to achieve the County's climate goals are not expected to be borne by any individual, company or industry. Nor should they be.

CEMEX endeavors to comply fully with applicable laws and regulations and disputes any suggestion that the Dowe Flats quarry and the cement plant are not held to standards applicable to them, as well as the unfounded assertion that the cement plant is in violation of Federal Clean air regulations. To support such a proposition by reference to a 2013 settlement of alleged violations denied by CEMEX arising from modifications to the plant during 1997-2000 is disingenuous at best. We suggest it would be more productive to focus on the present, rather than citing historical matters.

- There are environmental justice concerns given the location of the facility in relation to the County and Town's limited stock of affordable housing.

We interpret this comment to refer to the Dowe Flats quarry as it is the subject of the permit application. Other than two smaller parcels in the southeastern portion of the quarry, Dowe Flats is currently subject to options in favor of Boulder County and would not be available for affordable housing without Boulder County's participation. The current application does not change that dynamic.

- The Special Use Permit is set to expire in September of 2022. Both the Town and the surrounding community took CEMEX at their word on the matter; if granted, there is no prohibition against CEMEX applying for an additional SUP prior to 2037.

Any further extension of the mining permit would be at the discretion of the County, which would be subject to the same or similar process as the present application.

- There is also no prohibition against CEMEX selling the plant to another General Industrial operator, such as an asphalt producer.

The County has oversight of land use, not continuity of ownership of the underlying operation. As the cement plant currently operates as a pre-existing non-conforming use, any sale for another General Industrial land use that constitutes a material enlargement in the scope of pre-existing uses would require future County land use authorization. Otherwise, while we have come to understand that there may be speculation by some within the community about a sale of the

cement plant property to an asphalt operator in particular, we are not aware of any basis for that.

- In addition, there are several other considerations currently at play:
 - The Town of Lyons is in the process of revising its 2010 Comprehensive Plan, which provisionally envisions scenarios within both the Eastern Corridor and its Primary Planning Area.
 - The approved Colorado Department of Transportation SH 66 Planning & Environmental Linkages Study Report (please refer to Appendix Item 9)
 - The soon to be revised 2012 IGA between the Town and County (please refer to Appendix Item 10 for both the general IGA and the CEMEX-specific IGA)

We acknowledge these entities have various ongoing work in which CEMEX does not participate. To the extent the Town made CEMEX aware of its interest in possibly installing a renewable energy project within the area designated in the 2012 CEMEX-specific IGA as the "CEMEX Municipal Facilities Area," we ensured the County was also informed of the Town's interest in this regard.

- Our opportunities to shepherd the direction of land use in our Primary Planning area is being hampered. The current proposal does not provide a sufficient framework for the Town of Lyons to affect annexation or zoning of our PPA at the plant site. Remediation, reclamation, and rezoning the main plant site will directly and positively impact Lyons, the surrounding community, and Boulder County as a whole.

As with the IGA between the County and Lyons, CEMEX has not played a role in the manner in which those entities engage in regional planning concerning how this land will be utilized after operations at the cement plant conclude. Moreover, CEMEX received assurances that the County and Town have remained engaged in those regards.

- The opportunities for transforming this high-polluting mine and plant include creating a state-of-the-art eco village that can be a centerpiece for the County, have a net zero impact on the environment, and offer a solar generation facility to power the entire Town of Lyons; we are our own electric utility as it stands.

While we disagree with this characterization of our operations, CEMEX is not averse to discussing various alternative options for potential future use of the Lyons' Planning Area (as currently configured or as may be changed pursuant to a new IGA between the County and Lyons) after the cement plant has concluded its operations. We do not believe the requested extension of the existing operation at Dowe Flats would be inherently inconsistent with all potential future uses, nor do we believe the proposed timeline for the cement plant closure would be. In fact, even the referenced conceptual projects would almost certainly require significant time for development and ultimately would benefit from locally sourced building materials to lessen their impact on the environment.

Thank you for your consideration. If you have any questions or need any additional information, please let me know.

Sincerely,

CEMEX, Inc.


John V. Heffernan, Authorized Agent

NOTICE OF PUBLIC HEARING FOR MINERAL OWNERS FOR SU-22-0003

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Boulder County Land Use Department

Courthouse Annex Building
 2045 13th Street • PO Box 471
 Boulder, Colorado 80302
 Phone: 303-441-3930 • Fax: 303-441-4856
 Email: planner@bouldercounty.org
www.bouldercounty.org/lu
 Office Hours: Monday — Friday 8 a.m. to 4:30 p.m.
 Closed Tuesdays 8 to 10 a.m.

Intake Stamp
Docket#:

Applicant's Certificate of Compliance

With Article 65.5 of Title 24, Colorado Revised Statutes (H.B. 01-1088, Effective July 1, 2001).

Note to Applicant & Land Use Department:

This form must be completed for any application for development under the Boulder County Land Use Code which (1) requires a public hearing before the Planning Commission or Board of County Commissioners, and which (2) is either (a) any kind of planned unit development, subdivision, or resubdivision/replat sketch plan, preliminary plan, or final plat application, or (b) an application for any other type of Land Use Code approval which anticipates new surface development ("a Subject Application").


- I. The Applicant must complete the following certification as a prerequisite to the Land Use Department accepting as complete any Subject Application which is tendered for processing to the Land Use Department on or after July 1, 2001. [Applicants for an approval of an application such as Site Plan Review, which is granted administratively and may not require a public hearing, do not need to complete the following certifications unless and until their application is appealed to or called up for a public hearing]:

I, CEMEX, Inc. & Boulder County Parks & Open Space Applicant for the following named development under the Boulder County Land Use Code Dowe Flats Special Use (Docket # _____) ("the proposed Development"), hereby certify that I or my agent have examined the records in the Office of the Boulder County Clerk and Recorder to determine if any owners or lessees of any severed mineral estate in the property which is the subject of the Proposed Development ("the Subject Property") (i.e., owners or lessees of mineral rights constituting less than full fee title in the Subject Property) can be identified, as required by Article 65.5 of Title 24, Colorado Revised Statutes (also known as "H.B. 01-1088" ("the Act")). Further, based on this examination, I have determined that (check applicable entry):

- No such mineral estate owners or lessees exist in the Subject Property.
- Mineral estate owners or lessees exist in the Subject Property to whom notice of the County's initial public hearing on my application will need to be sent as required by the Act.

Certification:

I certify that the information and exhibits I have submitted are true and correct to the best of my knowledge.

Applicant Signature: 	Applicant Name: <u>John Heffernan</u>	Date: <u>5/2/22</u>
Applicant Signature:	Applicant Name:	Date:

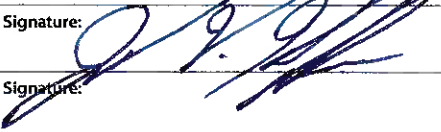
Note: The same person(s) signing the development/docket application form on behalf of the Applicant must also sign the foregoing certification.

II. If the Applicant has certified above that mineral estate owners or lessees exist in the Subject Property to whom notice of the County's initial public hearing on the Subject Application will need to be sent as required by Article 65.5 of Title 24, Colorado Revised Statutes (H.B. 01-1088, effective July 1, 2001) ("the Act"), then the Applicant must complete the following additional certification as a prerequisite to the Land Use Department proceeding with the initial public hearing (before the Planning Commission or Board of County Commissioners, as applicable) on the Subject Application:

I, CEMEX, Inc. & Boulder County Parks & Open Space, Applicant for the following named development under the Boulder County Land Use Code CEMEX Dowe Flats Mining & Reclamation Extension (Docket # SU-22-0003) ("the Proposed Development"), hereby certify that I or my agent have sent a notice, by first-class mail, not less than thirty days before the date scheduled for the initial public hearing on the Subject Application/Proposed Development, to: (1) all mineral estate owners or lessees in the Subject Property, containing the time and place of the initial public hearing, the nature of the hearing, the location of the Subject Property, and the name of the Applicant, and (2) the County, containing the name and address of all mineral estate owners or lessees in the Subject Property, all as required by the Act. I further acknowledge and agree that while the County has no obligation whatsoever to check or independently determine my compliance with the Act, to the extent information becomes know to the County indicating that I have failed to comply with the public hearing notice requirement of the Act, the County may, in its discretion, refuse to set, continue, reschedule, or vacate any public hearing on the Subject Application to enable proper notice to mineral estate owners or lessees under the Act, and may take such other action regarding any approval of the Subject Application as authorized by the Act. I further acknowledge and agree that to the extent any other state statute or provision of the County's Land Use Code purport to entitle me to action or a decision on the Subject Application within a designated period of time, this certification and agreement constitute a written waiver of any such entitlement to the extent necessary for me to comply with the public hearing notice requirements of the Act.

Certification:

I certify that the information and exhibits I have submitted are true and correct to the best of my knowledge.

Applicant Signature: 	Applicant Name: John V. Heffernan	Date: <u>7/19/22</u>
Applicant Signature:	Applicant Name:	Date:

Note: The same person(s) signing the development/docket application form on behalf of the Applicant must also sign the foregoing certification.



P.O. Box 336337
Greeley, CO 80633

Phone (970) 351-0733
Fax (970) 351-0867

LIST OF MINERAL OWNERS AND MINERAL LESSEES for NOTIFICATION
(CEMEX Inc. Property)

Subject Property:

Township 3 North, Range 70 West, 6th P.M., Boulder County, CO
Sections 9, 10, 15, 16 and 21: Those tracts of lands being more particularly
described on Exhibit A

Zeren Land Services, an oil and gas title research company, states that to the best of its knowledge the following is a true and accurate list of the names and addresses of the mineral owners and mineral leasehold owners entitled to notice under the Surface Development Notification Act, Colorado Revised Statutes §24-65.5-101, *et seq.* in the Subject Property based upon the records of the Boulder County Assessor and Clerk Recorder as of September 7, 2021 at 7:45 a.m.:

Mineral Owners:

First Int of Denver NA Hill Found
c/o ICG
P.O. Box 659
Wichita Falls, TX 76307

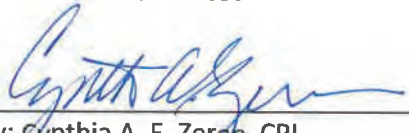
Estate of Paul J. Zenobia and
Frances E. Zenobia
3644 Meadow Park Loop NE
Salem OR, 97305

Mineral Leasehold Owners:

None (entitled to notice)

Dated this 20th day of September, 2021

ZEREN LAND SERVICES


By: Cynthia A. E. Zeren, CPL
Certified Professional Landman #4044

At the request of **Tetra Tech** ("Client"), Zeren Land Services, an independent land consulting firm, has prepared the foregoing list of mineral estate owners entitled to notice under the Surface Development Notification Act, Colorado Revised Statutes §24-65.5-101, *et seq.*

Zeren Land Services, searched (i) the records of the Boulder County Assessor relating to the Subject Property for persons identified therein as mineral estate owners, and (ii) the records of the Boulder County Clerk and Recorder relating to the Subject Property for recorded requests for notification in the form specified in the Surface Development Notification Act. The results of these searches are set forth above in this List of Mineral Owners Entitled to Notice. At the date of the search, the records of the Assessor and the Clerk and Recorder were posted through September 7, 2021 at 7:45 A.M.

Zeren Land Services, agreed to prepare this listing for the Client only if the Client agreed that the liability of Zeren Land Services, would be strictly limited to the amount paid by the Client for such services. Zeren Land Services, makes no warranty, express, implied or statutory, in connection with the accuracy, completeness or sufficiency of such listing of mineral estate owners. In the event the listing proves to be inaccurate, incomplete, insufficient or otherwise defective in any way whatsoever or for any reason whatsoever, **the liability of Zeren Land Services, shall never exceed the actual amount paid by Client to Zeren Land Services**, for the listing.

In order to induce Zeren Land Services, to provide such services, **Client further agreed to indemnify and hold Zeren Land Services, its managers, members and employees, harmless from and against all claims by all persons (including, but not limited to Client) of whatever kind or character arising out of the preparation and use of each such listing of mineral estate owners, to the extent that such claims exceed the actual amount paid to Client by Zeren Land Services, for such listing.** Client specifically intends that both the foregoing limitation on liability and foregoing indemnification shall be binding and effective without regard to the cause of the claim, inaccuracy or defect, including, but not limited to, breach of representation, warranty or duty, any theory of tort or of breach of contract, or the fault or negligence of any party (including Zeren Land Services) of any kind or character (regardless of whether the fault or negligence is sole, joint, concurrent, simple or gross). **Client's use of this listing evidences Client's acceptance of, and agreement with, this limitation on liability and the indemnification.**

Date: September 20, 2021

ZEREN LAND SERVICES

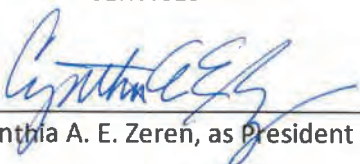
By: 
Cynthia A. E. Zeren, as President

EXHIBIT A

Township 3 North, Range 70 West, 6th P.M.

Sections 16 & 21: Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and Outlots A and B, Dowe Flats Estates, according to the Subdivision Exemption Plat thereof recorded April 16, 2004 at Reception No. 2577189, being a part of the S½ of Section 16 and the N½ of Section 21

AND;

Township 3 North, Range 70 West, 6th P.M.

Sections 15 & 16: A parcel of land located in Sections 15 and 16, being more particularly described as follows:

Commencing at the Southeast corner of Section 16 whence the South Quarter corner of Section 16 bears North 89°53'89" West 2636.34 feet, said line forming the basis of bearings for this description; thence along the East line of the c of Section 16, North 00°39'56" East 1329.84 feet to the Northwest corner of the SW¼SW¼ of Section 15 and the True Point of Beginning;

Thence along the North line of the SW¼SW¼ of Section 15, South 89°46'36" East 1029.62 feet to the westerly line of a parcel of land described by Deed recorded at Reception No. 1607221 of Boulder County Records; thence along said westerly line the following seven (7) courses ;

- 1) Along the arc of a curve to the right (said curve having a radius of 480.00 feet, a central angle of 58°12'29", chord of said arc bears South 43°21'02" West 466.94 feet) a distance of 487.64 feet;
- 2) South 72°27'17" West 842.99 feet;
- 3) South 79°51'58" West 164.51 feet;
- 4) South 66°40'53" West 95.20 feet;
- 5) South 72°27'17" West 700.00 feet;

thence along the arc of a curve to the left (said curve having a radius of 490.00 feet, a central angle of 43°10'06", chord of said arc bears South 50°52'14" East 360.51 feet) a distance of 369.18 feet;

thence along the arc of a curve to the left (said curve having a radius of 815.00 feet, a central angle of 6°35'15", chord of said arc bears South 25°59'33" West 93.65 feet) a distance of 93.70 feet to the West line of the SE¼SE¼ of Section 16;

thence along the East line of the SE¼SE¼ of Section 16, North 00°34'36" East 872.57 feet to the Southwest corner of that tract of land described by Deed recorded under Reception No. 1668922; thence along South and East line of said tract the following two courses:

- 1) South 89°19'41" East 264.08 feet;
- 2) North 00°33'47" East 330.00 feet to the North line of the Southeast Quarter of the Southeast Quarter of Section 16; thence South 89°19'41" East 1056.19 feet to the True Point of Beginning.

AND ;

Township 3 North, Range 70 West, 6th P.M.

Sections 9, 10, 15 & 16: A tract of land located in Sections 9, 10, 15 and 16, described as follows:

Commencing at the South Quarter Corner of said Section 9 from which the Southeast Corner of said Section 9 bears S87°27'25"E, 2644.89 feet, thence North 87°28'55" West, 86.80 feet along the South line of SW¼ of said Section 9 to the True Point of Beginning;

Thence South 00°00'00" West, 3490.76 feet;

Thence South 89°58'20" East, 1377.93 feet to the West line extended Northerly of the SE¼SE¼ of said Section 16;

Thence South 00°34'45" West, 600.00 feet along the West line extended Northerly of the SE¼SE¼ of said Section 16 to the Northwest Corner of the SE¼SE¼ of said Section 16;

Thence South 89°18'43" East, 1320.20 feet along the North line of the SE¼SE¼ of said Section 16 to the Northeast Corner thereof;

Thence South 89°45'38" East, 1028.99 feet along the North line of the SW¼SW¼ of said Section 15 to the Westerly right-of-way line of Boulder County Road No. 47 as described in Exhibit A in Special Warranty Deed recorded on Film 2126 under Reception No. 1607221 of the records of Boulder County, Colorado;

The following courses and distances are along the Westerly and Northerly right-of-way line of said Boulder County Road No. 47;

Thence Northerly, 155.73 feet along the arc of a curve concave to the West to a point of tangent, said arc having a radius of 480.00 feet, a central angle of 18°35'21" and being subtended by a chord that bears North 04°59'58" East, 155.05 feet;

Thence North 04°17'43" West, 777.37 feet to a point of curve to the left;

Thence Northwesterly, 324.08 feet along the arc of said curve to a point tangent, said arc having a radius of 1000.00 feet, a central angle of 18°34'07" and being subtended by a chord that bears North 13°34'46" West, 322.67 feet;

Thence North 22°51'50" West, 269.77 feet to a point of curve to the right;

Thence Northerly, 532.46 feet along the arc of said curve to a point tangent, said arc having a radius of 700.00 feet, a central angle of 43°34'56" and being subtended by a chord that bears North 01°04'22" West, 519.71 feet;

Thence North 20°43'06" East, 780.37 feet to a point of curve to the left;

Thence Northeasterly, 544.21 feet along the arc of said curve to a point tangent, said arc having a radius of 1500.00 feet, a central angle of 20°47'14" and being subtended by a chord that bears North 10°19'29" East, 541.23 feet;

Thence North 00°04'09" West, 218.20 feet to a point of curve to the left;

Thence Northerly, 344.09 feet along the arc of said curve to a point tangent, said arc having a radius of 2000.00 feet, a central angle of 09°51'26" and being subtended by a chord that bears North 04°59'52" West, 343.66 feet;

Thence North 09°55'35" West, 911.61 feet to a point of curve to the left;

Thence Northwesterly, 1032.58 feet along the arc of said curve to a point tangent, said arc having a radius of 2000.00 feet, a central angle of 29°34'53" and being subtended by a chord that bears North 24°43'02" West, 1021.15 feet;

Thence North 39°30'28" West, 741.51 feet to a point of curve to the right;

Thence Northwesterly, 246.83 feet along the arc of said curve, said arc having a radius of 420.00 feet, a central angle of 33°40'21" and being subtended by a chord that bears North 22°40'17" West, 243.29 feet;

Thence South 89°37'09" East, 70.50 feet to the Westerly line of that strip of land as described in Exhibit A in Special Warranty Deed recorded on Film 2126 under Reception No. 1607222;

Thence leaving the Northerly right-of-way line of said Boulder County Road No. 47, Northerly, 49.31 feet along the Westerly line of that strip of land as described in Exhibit A on said Film 2126 under Reception No. 1607222 and along the arc of a curve concave to the East to a point tangent, said arc having a radius of 350.00 feet, a central angle of 8°04'19" and being subtended by a chord that bears North 03°02'57" West, 49.27 feet;

Thence North 00°59'12" East, 152.30 feet along the West line of that strip of land as described in Exhibit A on said Film 2126 under Reception No. 1607222 to the East-West Centerline of said Section 10;

Thence North 89°10'22"W, 1.43 feet along the East-West Centerline of said Section 10 to the West Quarter Corner of said Section 10;

Thence North 88°00'00" West, 2749.89 feet along the East-West Centerline of said Section 9 to a point from which the True Point of Beginning bears South 00°00'00" West;

Thence South 00°00'00" West, 2642.02 feet to the True Point of Beginning.

PUBLIC HEARING NOTIFICATION

A Public Hearing will be held before the Boulder County Planning Commission on August 17, 2022 at 1:30 p.m. regarding CEMEX's Dowe Flats Mining and Reclamation Extension request. The hearing will be held virtually; details about the meeting and how you can participate will be published by Boulder County closer to the date of the meeting.

Docket Number: SU-22-0003
Docket Type: Special Use Review
Application Name: CEMEX Dowe Flats Mining and Reclamation Extension
Proposed Project: Special Use/Site Specific Development Plan review to amend an existing Special Use approval (SU-93-14) for limestone/shale open mining/quarrying located at the Dowe Flats Quarry, extending approved mining activities for an additional 15 years; the original permit area of 1,911 acres to be reduced to 709 acres; the concluding of cement plant operations at the facility located south of Highway 66 within the same 15-year timeframe; with concurrent reclamation of wildlife habitat.
Project Location: 13301 55th Street, Parcel #120316000050, located approximately 0.5 mile north of the intersection of N. 53rd Street and state Highway 66, in Sections 9, 10, 15, and 16, Township 3N, Range 70W, Boulder County, Colorado.
Property Zoning: Agricultural (A)
Applicant/Owner: CEMEX, Inc., c/o John Heffernan
Agent: Pam Hora, Tetra Tech
County Planner: Pete L'Orange

The following link can be used to obtain general information from Boulder County's website about the Planning Commission hearing and how to watch or register to participate in the hearing:

<https://bouldercounty.gov/government/boards-and-commissions/planning-commission/>

If you would like additional information regarding this proposal the file is public information and is available for review online at:

<https://landuse.boco.solutions/boco.lu.docketlistings/app/detail.html?docket=SU-22-0003>

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Tracking #: 9590 9402 4754 8344 9791 67			
Total			\$7.85

Grand Total:			\$15.70
Credit Card Remitted			\$15.70
Card Name: VISA			
Account #: XXXXXXXXXXXX6808			
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Attachment D

From: [LU Land Use Planner](#)
To: [L"Orange, Pete](#)
Subject: FW: [EXTERNAL] Ask a Planner - Michael Loukonen - Docket # SU-22-0003 -
Date: Monday, June 6, 2022 4:27:08 PM

-----Original Message-----

From: Ask A Planner <no-reply@wufoo.com>
Sent: Monday, June 6, 2022 4:12 PM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Ask a Planner - Michael Loukonen - Docket # SU-22-0003 -

If your comments are regarding a specific Docket, please enter the Docket number: Docket # SU-22-0003

Name: Michael Loukonen

Email Address: mdllbs@earthlink.net

Phone Number: (303) 823-6268

Please enter your question or comment: To Whom it may Concern, I approve of the extension of mining operations at the Dowe Flats site, it is not only a key production facility for the production of cement which is a requirement of our way of life. It has been a source of financial support as a large employer and source income for employees, materials / concrete suppliers, local towns and cities pumping Millions of dollars into the local economy every year for half a century. The plant was placed here because the raw materials were at this site, you can only mine natural resources where they exist. When you apply for a permit you can only estimate the time it will take to mine the quarry to it's full extent and with the massive investment in a cement plant you need to use it to it's full extent. It is a large greenhouse gas emitter but that is the price that each and everyone concerned must pay to live in todays world because we use concrete products

every day of our life's. Cemex has been a good neighbor and a caring steward of their property.

Public record acknowledgement:

I acknowledge that this submission is considered a public record and will be made available by request under the Colorado Open Records Act.

Attachment D

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: [EXTERNAL] Docket SU-22-0003
Date: Thursday, June 9, 2022 7:21:16 AM

[@L'Orange, Pete](#)

Fyi

bbg

From: Allison Schultz <ali@reboot.io>
Sent: Wednesday, June 8, 2022 7:47 PM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Docket SU-22-0003

I am writing to provide my thoughts on Docket SU-22-0003

Considering the impact this will have on the surrounding area, and my neighborhood (we're on St. Vrain Road), we hope that this application is turned down in favor of the rest of us and the downstream effects on the local area land/air/environment.

- Ali

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: [EXTERNAL] Docket SU-22-0003
Date: Thursday, June 9, 2022 7:21:48 AM

[@L'Orange, Pete](#)

Fyi
bbg

From: Jerry Colonna <jerry@reboot.io>
Sent: Thursday, June 9, 2022 7:12 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Cc: Allison Schultz <ali@reboot.io>
Subject: [EXTERNAL] Docket SU-22-0003

I am writing to provide my thoughts on Docket SU-22-0003.

As a neighbor to the plant, living at 6078 Saint Vrain Road, I am very concerned about CEMEX' application to extend its existing permit beyond the current expiration date of September 2022. The St. Vrain valley has proven to be remarkably important for the whole of the county and preserving the beautiful and rare quality of the valley should be a priority for all in the county...and not just those of us who live nearby.

I urge you to decline Cemex' request to extend their permit (or, at the very least, limit the continuation of the existing permit, to no more than one additional year to give all involved time to transition away from the plant's operations).

Given its high contribution of CO₂, it's critically important we--all of us, residents, commissioners, and even the folks at CEMEX--work together to reduce emissions and preserve the beauty of the valley.

With gratitude,

Jerry Colonna
6078 St. Vrain Road
Longmont, CO 80503
516-408-0000

Attachment D

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: [EXTERNAL] Docket SU-22-0003
Date: Thursday, June 9, 2022 8:01:35 AM

[@L'Orange, Pete](#)

Fyi
bbg

From: TJ McIntyre <66tjmcintyre@gmail.com>
Sent: Thursday, June 9, 2022 7:56 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Docket SU-22-0003

I am writing to provide my thoughts on Docket SU-22-0003 Please **do not** let CEMEX operate at all past their currently scheduled expiration date of September 30, 2022.

Boulder County needs to take bold steps to reverse climate change, and this is a straightforward one.

TJ McIntyre
3045 15th Street
Boulder, CO 80304

Attachment D

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: Docket SU-22-0003
Date: Thursday, June 9, 2022 8:43:09 AM

[@L'Orange, Pete](#)

Fyi

bbg

From: Dana Bacardi <dana@therewithcare.org>
Sent: Thursday, June 9, 2022 8:35 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Docket SU-22-0003

I am writing to provide my thoughts on Docket SU-22-0003

No thank you, please do your part to help our planet!

Dana Bacardi

From: [Luke Vernon](#)
To: [L'Orange, Pete](#)
Subject: Re: [EXTERNAL] Docket SU-22-0003
Date: Thursday, June 9, 2022 8:57:05 AM

Pete - One other idea... I would be in favor of this permit if CEMEX was forced to capture their emissions. If they took accountability for the emissions, that would be the ultimate resolution in my mind. Otherwise, they could just take their operations to another site elsewhere and the real problem (GHG emissions) wouldn't be solved. Boulder would just be pushing it to another city. So if the county required carbon capture, that is how we solve the ultimate problem.

Thank you!
Luke Vernon

On Jun 9, 2022, at 8:34 AM, L'Orange, Pete <plorange@bouldercounty.org> wrote:

Thank you for your message. We have received your comment, and it will be entered into the record.

If you have any questions or any additional comments, please do not hesitate to reach out to us again.

Sincerely,

Pete L'Orange | Planner II
Boulder County Community Planning & Permitting
Courthouse Annex | 2045 13th Street | Boulder, CO 80302
Mailing address: PO Box 471 | Boulder, CO 80306
Direct: 303-441-1418 | Main: 303-441-3930
plorange@bouldercounty.org
www.bouldercounty.org/lu

-----Original Message-----

From: LU Land Use Planner <planner@bouldercounty.org>
Sent: Thursday, June 9, 2022 7:36 AM
To: L'Orange, Pete <plorange@bouldercounty.org>
Subject: FW: [EXTERNAL] Docket SU-22-0003

@L'Orange, Pete
Fyi
bbg

-----Original Message-----

Attachment D

From: Luke Vernon <bouldervernon@gmail.com>
Sent: Thursday, June 9, 2022 7:34 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Docket SU-22-0003

I am writing to provide my thoughts on Docket SU-22-0003

I'm deeply concerned about extending the Dowe Flats Mining Permit another 15 years and the environmental impact it will have. As a community member, as a local business owner, and as a global citizen, I take a stand against activities like this that set us back environmentally.

The community and so many business owners and citizens do so much to mitigate their impact on the climate, and for the County to approve this permit, which ultimately generates over 7% of the greenhouse gas emissions of the entire County, goes against everything that we are all working for and that people in the community want. We have limited time for the planet to reverse global warming, and Boulder is trying to be a leader in that regard. To approve this permit would be hypocritical and shortsighted.

Please don't allow it!

Thank you,

Luke Vernon

Attachment D

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: Docket SU-22-0003
Date: Thursday, June 9, 2022 9:50:17 AM

[@L'Orange, Pete](#)

Fyi
bbg

From: Jacobson, Ian <Ian.Jacobson@ecoproducts.com>
Sent: Thursday, June 9, 2022 9:46 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Docket SU-22-0003

I am writing to provide my thoughts on Docket SU-22-0003

I believe a permit extension should only be permissible if CEMEX takes immediate steps to radically reduce CO2 emissions associated with the plant.

Boulder County needs to reduce CO2 emissions, not continue them.

Sincerely,

Ian Jacobson

2925 15th St.

Boulder, CO 80304

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From: [LU Land Use Planner](#)
To: [L"Orange, Pete](#)
Subject: FW: [EXTERNAL] Docket SU-22-0003
Date: Thursday, June 9, 2022 11:22:06 AM

Andrea Vaughn | Long Range Planner I
Boulder County Community Planning & Permitting

Mailing address: PO Box 471 Boulder, CO 80306

Main: 303-441-3930 471 | Direct: 303-441-1356

avaughn@bouldercounty.org

www.bouldercounty.org

From: Millicent Kang <millicentkang@comcast.net>
Sent: Thursday, June 9, 2022 11:11 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Docket SU-22-0003

I am writing to provide my thoughts on Docket SU-22-0003

I am aware that a permit renewal is approaching for CEMEX Lyons and would like that denied as I understand that this operation is the #1 Green House emitter in Boulder County. As a community committed to climate action and creating healthy environmental habitats and recreational areas, I strongly voice my opposition to the extension of this permit.

Millicent Kang
Boulder resident

From: [LU Land Use Planner](#)
To: [L"Orange, Pete](#)
Subject: FW: [EXTERNAL] SU-22-0003
Date: Thursday, June 9, 2022 12:55:24 PM

Andrea Vaughn | Long Range Planner I
Boulder County Community Planning & Permitting

Mailing address: PO Box 471 Boulder, CO 80306
Main: 303-441-3930 471 | Direct: 303-441-1356
avaughn@bouldercounty.org
www.bouldercounty.org

From: Andy Sepac <andysepac@gmail.com>
Sent: Thursday, June 9, 2022 12:32 PM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] SU-22-0003


Hello,

It's time for Cemex cement plant to close down as planned many years ago. The surrounding area, especially Longmont has seen much growth and the plant has no place in it's current state and location. It would be very interesting to get operational data as to how much chemical pollution it's spewing into the air. I'm sure it's cancer causing pollutants would be a concern for all of us who live in the area if residents became aware and most would be very excited and happy to see it move to a different, less populated and touristy location.

I work in Boulder and live in Lyons and have been in the area over a decade.

Andy Sepac

--


RE/MAX Alliance on Walnut & Downtown
1911 11th St., Ste. 107, Boulder, CO 80302
C: 303-875-2006 O: 303.442.3180 F: 303.442.6765
Andysepac@gmail.com

Attachment D

From: [Jen Miller](#)
To: [LU Land Use Planner](#)
Cc: [Boulder County Board of Commissioners](#)
Subject: [EXTERNAL] SU-22-0003
Date: Thursday, June 9, 2022 2:49:42 PM

Hello,

I'm writing to ask to please delay Boulder County Planning Commission's review scheduled for July 20th, as we need more time to answer the questions posted today.

As a parent in Lyons, and someone who frequents the parks and creeks, it's important we figure out a way to best protect our environment and our community.

Thanks so much,
Jen Kubis
Lyons, CO

From: [Seth Levine](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket SU-22-0003
Date: Thursday, June 9, 2022 3:57:33 PM

I am writing to provide my thoughts on Docket SU-22-0003, the extension of the license for the Cemex plant. I strongly oppose extending their license and allowing them to continue to operate. My family and I have lived in the St Vrain Valley for over a decade - in sight of the plant, which is loud, creates light pollution, operates 24x7, and is a stain on our community. Additionally, as I'm sure you know, it is the number 1 greenhouse gas emitter in Boulder County. Why the county would elect to allow them to operate for *another* 15 years instead of turning the area into open space is beyond me. Cemex has operated under their license and made plenty of profit at this site. It's time to turn it back to the community.

Thank you for your consideration.

Respectfully,

Seth Levine

seth j. levine
seth@sethlevine.com

possibly sent by my thumbs. or by talking to the person inside my phone. please excuse any typos.

Attachment D

From: [juliedonn](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Cemex (Lyons) application for permit renewal and ongoing operations, offer of open space
Date: Thursday, June 9, 2022 3:39:30 PM

To the staff of the Boulder County Planning Dept., Community Planning and Permitting, I am a resident of Lyons, Boulder County, and write to ask that the deadline for the Lyons BOT to give feedback and respond to the Cemex proposal be delayed until December, 2022, the timeline that Lyons' mayor pro tem Jocelyn Farrell has indicated to me is a reasonable time for our BOT to complete work on our comprehensive plan and coordinate that work with the board's consideration of all stakeholders' input, including the town of Lyons residents.

I would also like to express my very deep disappointment to hear from our town administrator, Victoria Simonsen, that the negotiations re: Cemex' proposal have thus far only included Boulder County and Cemex. The disrespect that this indicates for our town is shocking, and guarantees that town government and residents will become involved and vocal.

Respectfully,
Julie Boyle
Lyons, CO

Attachment D

From: [Amy Neener](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket SU-22-0003
Date: Thursday, June 9, 2022 5:15:51 PM

I am writing to provide my thoughts on Docket SU-22-0003

We completely support the extension of their permit. Cemex provides tons of jobs for locals that are good paying with great benefits without requiring college education. We need more places like that in the Boulder county area. We know many individuals and families that work for Cemex and it would completely devastate their lives if they no longer had their jobs.

Amy Neener

From: [Amber Revoir](#)
To: [LU Land Use Planner](#); [Boulder County Board of Commissioners](#); dvasquez@townoflyons.com
Subject: [EXTERNAL] SU-22-0003
Date: Thursday, June 9, 2022 8:45:56 PM

To Whom It May Concern,

I am writing today as a concerned resident of the Town of Lyons regarding the CEMEX plant proposal.

I ask that you delay the Boulder County Planning Commission review scheduled for July 20th. We need more time to answer the questions posed and mitigate CEMEX impacts on our community.

Personally speaking, I have lived in Colorado since 2007, Boulder County since 2012, and the Town of Lyons since 2019. In my time here, I have ridden up and down Highway 36 many times, dismayed by the eyesore that is the CEMEX plant churning out emissions and light pollution at all hours of the day and night. As we see the real-time effects of climate change in the country, state, county and town with shorter winters, longer fire seasons and poor air quality, I urge you to consider action for current and future residents versus a business.

Additionally, with its track record of EPA violations and being the top producer of greenhouse gases in Boulder County, I would like to see this plant end operations as planned, this year.

Sincerely,

Amber
arevoir@gmail.com

From: [Lynn Leathers](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Cemex Lyons and Dowe Flats Mining Permit
Date: Thursday, June 9, 2022 10:39:21 PM

Boulder County Community Planning and Permitting Division,

Pease give time for this decision!
It is so important!

Cemex is the #1 major contributor to Greenhouse gas emitter in Boulder County. Isn't Boulder County already behind on reaching its goals to reduce greenhouse gas and the goals of the Paris Climate agreement? Does it make sense to extend a permit for our biggest contributor? They haven't upgraded their plant like most other cement plants in the Country. Im sure they know how to update their plant and make it clean. Why haven't they done it? Would they be required to become clean? What have they done to earn a permit extension, besides offer us a lot of Money? Are we going to be bought out of our goals for the Environment?

What about the increase in Silica dust when they have to haul and dump materials at the site because they no longer have the materials close by? What about the health and safety of human life? Wildlife? Has there been a risk management inspection? Has air quality been tested? How many heavy metals and toxic substances are released into the air? Do they wet down the loads as they are dumped and keep them enclosed? What about the Nitrous Oxide Emissions? Do we know what health and environmental affects to expect in the future if the permit were extended?

What about the large increase in truck traffic? Would they be required to only drive the loads in at night when it won't affect traffic?

Who would be held accountable for all of the impacts on our environment from this decision?

Please delay this decision and give time for more information, and to share with the public.

Sincerely,

Lynn Leathers
12645 North Foothills Highway
Longmont, Co 80503

Attachment D

From: [Kayann Short](#)
To: [LU Land Use Planner](#)
Cc: [Boulder County Board of Commissioners; dvasquez@townoflyons.com](#)
Subject: [EXTERNAL] Extension for public comment on SU-22-0003
Date: Friday, June 10, 2022 7:32:17 AM

Please delay the Boulder County Planning Commission's review of SU-22-003 on the Cemex extension proposal currently scheduled for July 20th. The public and other governmental interests need more time to evaluate this proposal. I am a farm owner adjacent to Doves Flat who is impacted by mining operations and heavy truck traffic on Highway 66. I am concerned about this proposal, including environmental impacts, development plans for the area, and reclamation requirements. Public review for a proposal of this magnitude should not be rushed.

Thank you,
Kayann Short
Stonebridge Farm

Attachment D

From: [John Martin](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] SU-22-0003
Date: Friday, June 10, 2022 8:01:16 AM

Please delay the Boulder County Planning Commission's review of SU-22-003 on the Cemex extension proposal currently scheduled for July 20th. The public and other governmental interests need more time to evaluate this proposal. I am a farm owner adjacent to Dowe Flats who is impacted by mining operations and heavy truck traffic on Highway 66. I am concerned about this proposal, including environmental impacts, development plans for the area, and reclamation requirements. Public review for a proposal of this magnitude should not be rushed.

Thank you,

John Martin
Stonebridge Farm

From: [Betsy Burton](#)
To: [LU Land Use Planner](#)
Cc: [MICHAEL WHIPP](#)
Subject: [EXTERNAL] Cemex negotiations
Date: Friday, June 10, 2022 10:21:06 AM

We are requesting that you delay the Boulder County Planing Commission review scheduled for July 20th.

There needs to be more time.

Thank you,
Betsy Burton and Mike Whipp

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[Betsy Burton](#)

[LyonsFarmette.com](#)



From: [Joe Matta](#)
To: [LU Land Use Planner](#)
Cc: [Boulder County Board of Commissioners](#)
Subject: [EXTERNAL] Docket #SU-22-0003 | Dowe Flats Mining in Lyons, CO
Date: Friday, June 10, 2022 10:27:38 AM

Hi,

This e-mail is in regards to the new review related to extending mining permits for Cemex in Lyons, CO.

As a Boulder County citizen I request you **delay the Boulder County Planning Commission Review scheduled for July 20th. We, as citizens, need more time to answer the questions and evaluate the impacts posed by this proposed extension.**

This appears to be happening too quickly, without enough time for citizens to educate themselves and provide adequate feedback and input.

In addition, given negative environmental impacts (being the largest emitter in the county), the low economic contribution to the county and the city of Lyons, and the low local employment levels it is unclear why this extension would even be considered.

Please delay!

Thank you,
Joe

Attachment D

From: [Edna Johnson](#)
To: [LU Land Use Planner](#)
Cc: [Boulder County Board of Commissioners](#)
Subject: [EXTERNAL] SU-22-0003
Date: Friday, June 10, 2022 11:04:57 AM

Hello,

This letter is in reference to the CEMEX plant request to continue operations in Boulder County for an additional 15 years.

Those of us who live in Lyons **deserve ample time to review the proposal** and share our views. The allotted time is inadequate, unfair and smacks of insider dealings. I urge you to do the right thing and delay until, **at minimum, September.**

I will add that it's shameful that this manufacturing plant is allowed to operate as the number one polluter in Boulder County -- by far -- without impunity. What's more, its lights burn all night, impacting wildlife, and its noise levels far exceed the allowed and disclosed limits. It's an eyesore that affects visitor perceptions of the community. The corporation is a global behemoth that gives a paltry amount back to the community.

How is this possible in a state that prides itself on its environmental responsibility, its beauty and its respect for its citizens?

Edna Johnson
74 County Rd 69
Lyons, CO 80540

Attachment D

From: [Agnes Rey Giraud](#)
To: [LU Land Use Planner](#)
Cc: [Boulder County Board of Commissioners](#)
Subject: [EXTERNAL] SU-22-003
Date: Friday, June 10, 2022 11:08:44 AM

Please delay Boulder County Planning Commission review scheduled for July 20th. We all need more time to review the facts and assess the impact to the local residents and the environment.

Respectfully,

--

Agnes Rey-Giraud
Lyons, CO

From: [Trudie Webster](#)
To: [LU Land Use Planner](#); dvasquez@townoflyons.com
Subject: [EXTERNAL] CEMEX
Date: Friday, June 10, 2022 11:15:46 AM

Hello,

I would like to express my concern that Cemex has once again asked to continue its business in our neighborhood.

I have lived in my home for 44 years now and Cemex has always been the dirty neighbor. I can remember in the early years here getting up and finding a white layer of dust over everything outside, I cannot count the number of times I have called Boulder County Health Department to tell them of an upset at the plant, I cannot count the number of times their trucks have slowed traffic along Hwy 66 to a crawl - and its getting worse every year. Cemex can be heard at night even with my windows closed in the dead of winter churning out its product - and I live over 2.5 miles from the plant.

Oddly, I have had cancer, a neighbor to the west has had cancer, a neighbor to the east has had cancer. Is that a coincidence?

I understand that Boulder County is poised to inherit significant land but I have to ask you AT WHOSE EXPENSE DOES THAT COME?

We in this neighborhood have had to endure Cemex for years now and its time it comes to an end. Boulder County should think of its citizenry first and not extend their mining permit or their plant production. Consider if they end up having to truck in all of their raw materials? I cannot even imagine how congested both Hwy 66 and Hwy 36 will become. Why not tell Cemex to rebuild a plant in Weld County - Weld County would love the dirty business. And what of Boulder County's adherence to the 2030 Paris Climate Goal and Greenhouse Gas Reduction Commitments? And what of the evidence that Cemex contributes to 7.3% of the total of Boulder County's greenhouse gases? And what of the immediate neighborhood area? I just find it sad that Boulder County does not think of its people first.

I ask you also: What has Cemex contributed to the community? Nothing that I know of.

Please, please do not extend any permits to Cemex, their time has come to an end.

Thank you,

Trudie Webster
6604 McCall Dr
Longmont, CO 80503

From: [Mikel G.](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket SU-22-0003
Date: Friday, June 10, 2022 12:37:08 PM

To Whom it may concern:

I am writing to provide my thoughts on Docket SU-22-0003

I have had wildfires hit within 1 mile of my mountain house in Boulder County on two occasions. It is time for us all to roll up our sleeves and do anything we can to protect the climate for our children.

NOT permitting this plant, would be not only a great step for our local community to send to polluting industries, but would get a lot of headlines and would be a great example for all.

We need to shift towards newer and more efficient industries that produce less or no green house gasses.

Mike Goicoechea
CEO

MotorCloud LLC

Attachment D

From: [Greg McRae](#)
To: [LU Land Use Planner](#)
Cc: [Boulder County Board of Commissioners](#)
Subject: [EXTERNAL] SU-22-0003
Date: Friday, June 10, 2022 1:23:38 PM

Please delay Boulder County Commission review scheduled for July 20th as more time is needed to answer the questions posed. As a Lyons resident since 2000 I believe it is important to allow the community members to become aware and voice any concerns the operation of the plant may impart.

Thank you,
Greg McRae
Lyons Resident.

From: mervarkennelwest@aol.com
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket#SU-22-003
Date: Friday, June 10, 2022 1:25:40 PM

We live at 15457 Moss Rock Ct., Longmont, CO 80503, and are located northeast of Dowe Flats. Our home was built here in 1984.

Regarding the Cemex application, we prefer that the Cemex permit be extended for another 15 years. We are not in favor of increased open space, although that option is preferable to new residential or commercial construction on the property were Cemex not granted an extension.

We have not reviewed any of the environmental data, so cannot comment on that. Each successive administrator has reduced air pollution based on our observations. We visited the plant about 5 years ago, and spoke with the manager at that time. Mr. Mervar was among the original construction workers when the plant was built.

Regarding potential health hazards, to our knowledge we have suffered none. Water application is frequently done to control dust.

What would be the impact on job availability for the Lyons community if Cemex was to close? Lyons is undergoing inevitable change which is not welcomed by many of its long time residents. We hope that Lyons is not becoming too economically dependent on tourism. Having recently visited Greece, the hazards of reliance on tourism was clearly apparent.

Boulder County Open Space is reportedly making an offer to purchase the land if Cemex closes. Our experiences with the Rabbit Mountain Park and Open Space has not been completely positive. Particularly during the first phases of the pandemic, when outdoor recreation alternatives were so popular, we experienced a significant uptick in trespassing on the private roads and lands of the Indian Gap subdivision. Fires were also set on the most western edge of our property. Weekend popularity frequently results in congested roadways near the park - both from cyclists and hikers who park their vehicles next to and in the road - which makes for dangerous situations. Lastly, both private road associations (Indian Gap and Dakota Ridge) had to collect from residents extra revenue to purchase cluster box unit mailboxes due to continued vandalism of our mailboxes. The US Postal service personnel and Boulder County Sheriff officers both felt the proximity to the Open Space area was a contributing factor.

If Cemex operations are halted, it is essential that restoration obligations be enforced.

We hope this input is of use to the Planning Review process.

Charles and Nancy Mervar

From: [Katherine Jonjak](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Cemex extended use
Date: Friday, June 10, 2022 1:48:02 PM

Docket # SU-22-0003

To Whom it may concern:

As a resident of Boulder County directly impacted by traffic patterns, pollution and particles floating in the air. I am opposed to the continued industrial use of the property. My family has lived in Lyons for over 30 years. We bought a house after the flood of 2013, in the path of pollution and particles of Cemex. We bought the house with the understanding that Cemex northern side of operations would end in 2022. Here are just a few of the things that have impacted my family directly related to Cemex.

My daughter an all-state athlete developed asthma at the age of 17 after living in the area.

There is a layer of fine particles that seep into the household that form a white powder dust that must be cleaned daily. It is all over the house. Those particles are in the air everywhere around Rabbit Mountain open space and the mining pit. It is not normal dust or road dust. It is something very different.

The truck traffic has increased as trucks are moving all day. Not just on 66, but on 53.

Finally, Cemex was already given concessions to continue to operate until this closing date with the understanding that it would become open space at this time. I would not have bought a house in the area knowing that mining would continue through to 2037. The value of my house may decrease with the closing of this deal.

Please stick to the original agreement and end mining on the northern side of 66. Clean up this part of Boulder County.

Thank you,

Katherine Jonjak

303-823-0824

From: [Jennifer Murnan](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket SU-22-0003
Date: Friday, June 10, 2022 2:19:17 PM

I am writing to provide my thoughts on Docket SU-22-0003. I have been a lifelong resident of Boulder County.

I do not want Cemex to be granted an extension on its mining permit. I have been waiting for many years for Cemex's strip mining to come to a close.

It is past time for reclamation on Dowe Flats to commence.

Thank you for your consideration.

Jennifer Murnan

5125 Ute Hwy

Longmont, CO 80503

From: [Bart Lorang](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] SU-22-0003
Date: Friday, June 10, 2022 2:33:42 PM

Greetings,

I live at 12800 N Foothills Hwy, Lyons, CO 80540. I received a postcard indicating that my comments regarding the special use application were due June 10th, 2022.

The application and proposal has many long term implications, and raises a number of questions that need to be answered before providing comment.

Respectfully, I request an extension to provide comment until October 31st, 2022 so that I can perform a proper analysis and provide the planning department with a thorough analysis of the application and proposal.

Regards,

Bart Lorang

Attachment D

From: [Bengt Bergstrom](#)
To: [LU Land Use Planner](#)
Cc: [Boulder County Board of Commissioners](#)
Subject: [EXTERNAL] SU-22-0003
Date: Friday, June 10, 2022 2:56:10 PM

Dear planner,

We request that the application by CEMEX for an extension of the Dowe Flats Mining permit is denied.

We moved from the California SF Bay Area to Lyons and our asthmatic symptoms have increased. The emission of silicate from the mine is spreading outside the mine itself and can be deleterious to patients with pulmonary disease.

CMEX is by far the largest emitter of carbon dioxide in the county and this is contrary to the commitment by Boulder county to reduce carbon emissions. To buy electric cars to offset the CMEX emissions is not realistic since most families cannot afford to buy new expensive car.

The financial incentives that CMEX offers are at best insufficient and can at worst be seen as inappropriate inducements.

Bengt Bergstrom MD PhD, Margaretha Engberg Bergstrom RN.

Sent from my iPhone

From: [Kathleen Cassidy](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket SU-22-0003
Date: Friday, June 10, 2022 4:41:50 PM

I am writing to provide my thoughts on Docket SU-22-0003

I live in the area, but this is the first time I'm hearing about this...I can't believe the speed at which this is trying to get pushed through! This is a very large decision that will be impacting us for years to come, and I say no, no do not approve this application in such a hasty move. If you lived in this area then you too would hear the constant drone of Cemex, you too would see the glaring glow that is ever present during the night, and you would smell the odor from Cemex. And if you lived here where the trucks barrel down Highway 66, you would not agree to any extension.

These trucks cause peripheral pollution, and they are a menace and hazard on the road. Have you been about to go through a green light only to have to stop because a huge truck has made the decision to run through the light because stopping is not possible? Welcome to Highway 66 and 75th Street...

If this application goes through I'm seeing a widening of Highway 66 in our future to "accommodate" the increased traffic-aka trucks...

This is one of the last few, small rural areas in Boulder County. Cyclists treasure these routes. Many people grow food around here, not so easy with global warming, but that will only be made worse with continued intensive trucking traffic.

This is the most scenic road left in Boulder County.

And what about the effect of continuing Cemex operations on the local wildlife that is struggling with global warming? Cemex has had their time. Now it's over.

NO to extending their contract!

Sincerely,

Kathleen Cassidy
720-609-5069
Kcassidy2400@yahoo.com

Sent from my iPad

Attachment D

From: mikepaige@gmail.com
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket # SU-22-0003
Date: Friday, June 10, 2022 4:47:43 PM

I'm writing in regards to Cemex planned use for the next 15 years. I live within a couple miles of the plant at 12996 N Foothills Hwy, Longmont, CO 80503. We constantly hear the noise from the plant but it is especially noticeable and extremely loud at night. They also have blasted at their property across the street from us and it was felt throughout Lyons in 2021 (and was documented in the Daily Camera). They said they would notify the Town and locals if they were to blast again but I'm certain they did blast again in Feb 2022 without notice again. The land belongs to Open Space and the People of Boulder County and should be used to extend the Greenway from Longmont to Lyons now and not in 15 years time. Cemex continues to try to extend their lease. They promised to vacate in 2022. It's time we keep them to that promise and not kick it down the road again.

Mike Paige

Attachment D

From: [Rene Doubleday](#)
To: [LU Land Use Planner](#)
Cc: [Boulder County Board of Commissioners](#)
Subject: [EXTERNAL] SU-22-0003
Date: Friday, June 10, 2022 4:54:43 PM

I am a commercial property owner at 4651-4652 Ute Highway in Lyons. I would like to go on record to ask for a delay in the review of the above docket until October to allow the town of Lyons and its residents proper time for due diligence.

Thank you.

Rene Doubleday
Generator Development
Project Management
303-884-8158

Attachment D

From: [Paul Tamburello](#)
To: [LU Land Use Planner](#)
Cc: [Boulder County Board of Commissioners; Dolores Vasquez](#)
Subject: [EXTERNAL] Docket: SU-22-0003
Date: Friday, June 10, 2022 4:57:17 PM

I am a commercial property owner at 4651-4652 Ute Highway in Lyons. I would like to go on record to ask for a delay in the review of the above docket until October to allow the town of Lyons and its residents proper time for due diligence.

Thank you.

Paul Tamburello / Owner / Broker

Generator Real Estate, LLC

The Family Jones

Little Man Ice Cream

www.thinkgenerator.com

www.thefamilyjones.co

www.littlemanicecream.com

3222 Tejon St. Studio A

Denver, CO 80211

o/ 303 991 6204

c/ 303 210 6404

From: [Diana vann](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket # SU-22-0003
Date: Friday, June 10, 2022 4:58:34 PM

I'm writing in regards to Cemex planned use for the next 15 years. I live within a couple miles of the plant at 12996 N Foothills Hwy, Longmont, CO 80503.

We constantly hear the noise from the plant but it is especially noticeable and very loud at night. The truck traffic is dangerous and constant. I am also concerned about air and water quality.

They have blasted at their property without warning on several occasions. I complained to the state, and it took several months, but they promised to provide notice if they were ever to do it again. However, I have felt more blasting without notice. It was felt throughout Lyons in 2021 (and was documented in the Daily Camera).

The land belongs to Open Space and the People of Boulder County and should be used to extend the Greenway from Longmont to Lyons now and not in 15 years time.

Cemex continues to try to extend their lease. They promised to vacate in 2022. It's time we keep them to that promise and not kick it down the road again.

-Diana Vann

From: [Wendy Kahn gmail](mailto:Wendy.Kahn@gmail.com)
To: [LU Land Use Planner; dvasquez@townoflyons.com](mailto:dvasquez@townoflyons.com)
Cc: [Boulder County Board of Commissioners; Michael Robson](#)
Subject: [EXTERNAL] Docket SU-22-0003
Date: Friday, June 10, 2022 7:46:29 PM

Dear Boulder County Planning, Boulder County Commissioners and Town of Lyons,

I am writing to provide my thoughts on Docket SU-22-0003

My name is Wendy Kahn and my husband, Michael Robson and I live at 6152 Hygiene Road, Longmont, CO 80503

I am a Realtor practicing in Boulder County for more than 30 years. I have anecdotal first hand experience with the negative effect Cemex has on the Lyons and Hygiene area, Presently, I have a client waiting to buy in Lyons who is concerned with Cemex's presence in the county and the outcome of this decision. These clients are presently renting in Lyons and have nothing but great things to say about the community. In their opinion, the only negative is the local existence of the Cemex company's operations . In another case that took place in 2011, my client was looking at purchasing a home at 11678 N. 59th (near Hygiene and 59th) and decided against buying it after researching the numerous emission violations of the Cemex company. (I am happy to have these folks forward this in their own works if needed or desired.).

We also personally witness dust plumes, dust clouds and loud machinery coming from the plant.

It would be our first choice to have Cemex wrap things up and exit the county as soon as possible. Given that they are a large contributor to pollution in the county and the county is committed to "**reduce community GHG emissions 45% below 2005 levels by 2030 and 90% below 2005 levels by 2050**" (a quote from Boulder county), it would seem to be the right decision.

We understand that these things are not always that straightforward and simple. With that in mind, the timeline on this decision seems too short to analyze the situation sufficiently. At the very least, I would like to ask that the Boulder County Planning Commission review scheduled for July 20th be extended in order to figure out the best course of events.

In closing, we would like to encourage the planning commission and the county commissioners to take this opportunity to start immediately addressing climate change in Boulder county, instead of kicking the can down the road. Now is the time.

It is our wish that Cemex exit the county and that all future requests from them be denied to encourage their speedy closing of the plant.

Wendy Kahn Robson
6152 Hygiene Rd.
Longmont, CO 80503

Attachment D

From: [Ask A Planner](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Ask a Planner - Mary Jones - SU-22-0003 -
Date: Friday, June 10, 2022 8:15:19 PM

If your comments are regarding a specific Docket, please enter the Docket number: SU-22-0003

Name: Mary Jones

Email Address: marycolleenjones@gmail.com

Please enter your question or comment: I want to express my need for the Boulder County Commissioners to refrain from approving this application until more research on the environmental impact to surrounding properties has been done. Mining was to be halted and now it seems that a payoff is taking place. This may benefit Cemex and Boulder County Open Space at the detriment of individuals living nearby. Please do not agree to this unless and until there is time to allow for more hearings, studies and community input.

Public record acknowledgement:

I acknowledge that this submission is considered a public record and will be made available by request under the Colorado Open Records Act.

From: [Martha Gilbert](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket number SU-22-0003
Date: Friday, June 10, 2022 10:45:59 PM

Greetings,

I am writing on behalf of Docket number SU-22-003. I live across the highway from the cemex plant and have 3 children 5 and under. I hear the hum of the plant at night, and the dumping of material through out the day. I've also watched the mine in the nearby open space grow over the last seven years and my family has been eagerly awaiting the end of the mining permit. Many families and activists I have known in the area have long fought for this and I was dismayed to find out about the proposed extension. When I spoke with other community members, they had no idea of the proposal extension or short timeline.

Lyons is a beautiful community with such potential for conscious, balanced growth in a good way. My husband grew up here, is internationally recognized artist, and we love the land deeply. This proposed extension is not in the interest of the Lyons community, the local environment and wildlife, or future generations. I strongly urge you to reject this proposal, or in the very least, to grant more time before a decision is made so more community members may learn about it, ask questions, and come up with potential alternatives.

Thank you,
Martha Jones

--

970.946.6583
[Martha Gilbert Jones](#)

Attachment D

From: [kitty](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket # SU-22-0003
Date: Saturday, June 11, 2022 6:29:56 AM

Hello,

I live right above the CEMEX dig site near Rabbit Mountain Open Space on Moss Rock Court. I strongly oppose the extension. They are notorious polluters and have had issues with the county . I'm sick of the clouds of nuisance dust and the constant low grind industrial noise. Also the giant pit below our houses certainly does nothing for our view nor property values...let the land restoration begin!

Margaret Lockhart

From: [Michael Joseph](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket SU-22-0003
Date: Saturday, June 11, 2022 8:39:20 AM

I am writing to provide my thoughts on Docket SU-22-0003

Boulder county and it's residents should be given more time to consider the options before granting cemex another 15 year permit to mine in the dowe flats.

This activity has major implications to the environment in Boulder county, and Cemex is a major source of CO2 emissions in the county. We need more time as a community to consider these implications, and cemex's application for a special use permit should not be approved until the community has had time to consider the implications and options.

Thank you,
Michael Joseph
Boulder county resident

--

-Michael

From: [Ashley Stolzmann](#)
To: [Boulder County Board of Commissioners](#)
Cc: [Megan Davis](#); [Jeff Durbin](#); [LU Land Use Planner](#)
Subject: [EXTERNAL] Extension Requested
Date: Saturday, June 11, 2022 9:37:19 PM

Hello Boulder County Commissioners,

I am writing to support Lyons' request for an extension on their referral comments in your upcoming land use hearing for Cemex. With everything impacting our Boulder County communities right now, they have not had time for their public process in order to complete their due diligence and supply you with the needed referral information and feedback. Please extend their comment deadline to October per their request.

Among all the hardships and extra work that justify an extension for the review (including a global pandemic, the passing of LaVerne Johnson, the untimely death of a Lyons firefighter, the Lyons election, and more) Lyons has been helping Louisville and East County with our recovery. Lyons generously welcomed fire survivors to their community in the immediate wake of the fire. Most recently, Mayor Hollie Rogin and Manager Victoria Simonsen took time from their work to help Louisville understand some solutions they implemented in their flood recovery work. The solutions they showed us ranging from affordable housing with CDBGDR funds, property acquisition for mitigation, private property hardening programs to prevent future damage, and public property infrastructure improvements all will help East County with our recovery. I am very grateful for the help and wisdom that Lyons has offered our East County communities.

I hope you can find a solution to allow for an extension on the referral comment period because of all the extenuating circumstance that Lyons is facing, including their kindness and support of East County in our emergency.

Thank you and I am available for a meeting if you would like to discuss this request.

Best,

Ashley Stolzmann
Louisville Mayor
303-570-9614
AshleyS@LouisvilleCO.gov

Attachment D

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: [EXTERNAL] Docket SU-22-0003
Date: Wednesday, June 8, 2022 3:43:46 PM

[@L'Orange, Pete](#)

Fyi
bbg

From: Michele Leonard <michele.contractor@lastmile-ed.org>
Sent: Wednesday, June 8, 2022 3:39 PM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Docket SU-22-0003

I am writing to provide my thoughts on Docket SU-22-0003 (CEMEX Dowe Flats Mining and Reclamation Extension). CEMEX has an extensive history of violating the terms of its permits with Boulder County, the state of Colorado and federal regulatory agencies. Under no circumstances should you extend their special use permit for mining operations. This land should revert to open space, as planned.

It would be unconscionable for Boulder County to extend CEMEX's operations as it is the #1 green house admitter in the area and has shown total disregard for the fragile local environment, in addition to its negative worldwide impact to global warming.

Also, the timeline for decision making by your board, especially the public comment period, is insufficient and a cause for concern in itself.

Sincerely,
Michele Leonard
Lyons, CO

Attachment D

From: [josh shelton](#)
To: [LU Land Use Planner](#)
Cc: [Boulder County Board of Commissioners](#)
Subject: [EXTERNAL] SU-22-0003
Date: Thursday, June 9, 2022 3:21:26 PM

There's a review regarding Cemex and its future operations scheduled to take place June 20th. I'm a Lyons resident that is asking the meeting be delayed to allow further discussion.

Sincerely,

Josh Shelton
127 Falcon Ln

From: [Glowacki, Therese](#)
To: [tamar.krantz](#)
Cc: [L'Orange, Pete](#)
Subject: RE: [EXTERNAL] Fwd: The Sunriser | Smokestacks, a quarry and open space. Which will it be?
Date: Friday, June 17, 2022 2:08:29 PM

Hi Tamar,

Thank you for your interest in the CEMEX property and restoration. Below is the link to the Community Planning and Permitting (CPP) page where you can review and provide written input on the extension application.

Link to CPP page on CEMEX:

<https://landuse.boco.solutions/boco.lu.docketlistings/app/detail.html?docket=SU-22-0003>

If you would like to hear the details of open space acquisition proposal, staff will be presenting that at our Parks and Open Space Advisory Committee meeting this coming Thursday, June 23 at 6:30 on Zoom. Below is the link to watch and to sign up to talk.

<https://www.bouldercounty.org/government/boards-and-commissions/parks-and-open-space-advisory-committee/>

I am also including Pete L'Orange on this email. He is the CPP planner in charge of this review. He will know if they are creating a list to notify interested members of the public about important dates for public input and presentations.

I hope this is helpful and we really appreciate your interest in this very important topic.

Therese Glowacki,
Director, BCPOS

From: tamar.krantz <tamarkrantz@gmail.com>
Sent: Friday, June 17, 2022 9:25 AM
To: Glowacki, Therese <tglowacki@bouldercounty.org>
Subject: [EXTERNAL] Fwd: The Sunriser | Smokestacks, a quarry and open space. Which will it be?

Hi Therese,

I saw your name in this story about the Cemex plant and mine and the option for the county to purchase all the area after it is closed and reclaimed.

How do stay informed? When will there be public hearings on this issue? I would love to see this area reclaimed and purchased by the county. I am concerned about the long timeline.

Thanks,

Tamar Krantz
Louisville resident

----- Forwarded message -----

From: **Danika | The Colorado Sun** <newsletters@coloradosun.com>

Date: Thu, Jun 16, 2022 at 9:40 AM

Subject: The Sunriser | Smokestacks, a quarry and open space. Which will it be?

To: <tamarkrantz@gmail.com>

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Thursday, June 16, 2022

Smokestacks, a quarry and open space. Which will it be?

Plus: Use of Colorado River water needs to be slashed by a quarter, Republican primary in highly-competitive CD8 is Democrats' latest target for attack ads, and more Colorado news

Danika Worthington + Eric Lubbers

[Presentation Editor](#) | [CTO & Newsletter Wrangler](#)



Good morning, Colorado.

I cannot pretend to be an avid hockey fan. All I know is what I've learned from watching the movie "**Miracle**" over and over again, and I don't think reciting **Mike Eruzione's** "[I play for... the United States of America](#)" is very helpful in an actual game.

But given that the **Avalanche** are closer and closer to winning the Stanley Cup, I figured I'd join the bandwagon. So last night, I turned on the game against the **Tampa Bay Lightning**, did a couple Google searches ("What is icing") and cheered along with the rest of the state when **Andre Burakovsky** scored an overtime goal to win the game.

I'll be watching along for the rest of the series, but don't worry, I'll leave the analysis up to cartoonist **Drew Litton** and the rest of the Sun staffers who actually know what they're talking about. (You should [ask Michael Booth](#) about the flag hanging up in his home office.)



I'll leave this intro with the inspiring words of **Kurt Russell** in his performance as legendary coach **Herb Brooks**, "If we played 'em 10 times, they might win nine. But not this game. Not tonight." This really has nothing to do with the Sunriser but it's a [damn good speech](#). (Oh wait, sorry, that's the wrong link. [Here's the right one.](#))

>>

Danika



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THE NEWS

THE LATEST FROM THE SUN

WATER

Colorado River water use may have to be slashed by a quarter to avert crisis, federal official warns



The headwaters of the Colorado River flow near Kremmling, above Gore Canyon, on Aug. 13, 2020.
(Dave Timko, This American Land)

“Colorado water users are on the front lines of climate change.”

— Colorado River Commissioner Becky Mitchell

1 million acre-feet

25%

How much drought and other climate factors reduced the water available for Upper Basin states last year

How much less water the Upper Basin used in 2021 compared to 2020

Our use of the Colorado River far outpaces its supply. But the vast majority of cuts needed to rebalance it shouldn't come from Colorado and other Upper Basin states, Colorado water officials say, but rather from Lower Basin states. Why? Well, while the Upper Basin was using a quarter less water last year, the Lower Basin was using ... more water than before. **Chris Outcalt** looks at the uneven use and what it could mean for all of us. >> [STORY](#)

ENVIRONMENT

[**Boulder County has choices to make about smokestacks, a quarry and open space. Which way will they go?**](#)



Cemex's cement plant on Monday near Lyons. (Hugh Carey, The Colorado Sun)

Cemex has a proposition for Boulder County. Its kiln, which releases some of the largest amounts of greenhouse gases of any industrial plant in the state, could in theory, stay open forever. But the company is willing to close it if the county renews its mining permit at the quarry across the street. The same quarry that gouges into a popular open space area and tumbles rocks into a conveyor belt over Colorado 66 near Lyons. As **Michael Booth** wonders, is it a deal with the devil of long-term pollution and disruption? >> [STORY, PODCAST](#)

The GOP primary in Colorado's highly competitive 8th Congressional District is Democrats' latest TV ad target

National Democrats are paying large amounts for TV ads advancing the most conservative — and controversial — candidates in Colorado's new 8th Congressional District. Seems counterintuitive, but they have their reasons: A more controversial candidate may find it harder to attract enough votes from the broader electorate to win the general election. But it's a risky strategy for the party. If it backfires, Democrats will have helped place election deniers and staunchly anti-abortion candidates in the most influential positions of government. **Sandra Fish** and **Jesse Paul** have more. >> [STORY](#)

MORE NEWS

- **Denver ready to ante \$45 million as contender to host 2026 FIFA World Cup.** >> Denver Sports Commission boss says the city has raised half the money needed to host the World Cup and insists no taxpayer dollars were involved in the bid. >> [STORY](#)
 - **Man dies after raft overturns in northern Colorado's Poudre River.** >> The man, whose name and age have not been released, was on a privately owned raft and was not part of a commercial trip. >> [STORY](#)
-

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THE COLORADO REPORT

THE BEST JOURNALISM FROM IN AND AROUND THE STATE

= source has article meter or paywall

- **Pagano family's oldest Pass Key restaurant closes in Pueblo.** >> If you're from Pueblo or had family there, as I did growing up, reading

that headline might give you a nostalgic heart attack. But it's not quite as bad as it seems. The legendary Italian sausage sandwiches are still being slung at three other locations, it's just the OG spot that operated since 1969 that has closed down. >> [Pueblo Chieftain](#)

- **A trend-setting Denver restaurant group is now employee-owned.** >> The **Edible Beats** group of restaurants — including Linger, Root Down, Vital Root and others — is now the latest Colorado company to convert to an employee stock ownership plan. >> [The Denver Post](#)
- **Universal free meals at Garfield Re-2 discontinued.** >> Yet another school district will discontinue the Universal School Meals Program — which kept millions of children from experiencing hunger during the pandemic — as federal funding is set to end June 30. >> [Post-Independent](#)
- **Will RTD really be free in August? That's the plan, but it's not guaranteed.** >> RTD is notoriously one of the most expensive transit systems in the country. Denver's ozone and vehicle smog is a constant summer companion. But even though a bill has passed to offer free transit rides during the month of August, a plan to actually execute the law is still pending approval. >> [Denverite](#)
- **Funeral home director accused of illegally selling body parts reaches plea deal.** >> Court records show that **Megan Hess**, accused of selling body parts around the globe and giving fake ashes to clients from her Montrose funeral home, reached a plea deal with prosecutors before trial. The terms of the deal have not been disclosed. >> [The Denver Post](#)
- **How to assemble a costume for the Colorado Renaissance Festival.** >> News you can use, folks. News you can use. >> [5280](#)

>>

[Eric](#)

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THE OPINION PAGE

COLORADO COLUMNS

COMMUNITY

- **Lorelei Cloud**, member of the **Southern Ute Indian Tribal Council**, and **Celene Hawkins**, of **The Nature Conservancy**: [“Tribal Nations must be at the table to find the West’s water solutions”](#)

The Colorado Sun is a nonpartisan news organization, and the opinions of columnists and editorial writers do not reflect the opinions of the newsroom. [Read our ethics policy for more on The Sun’s opinion policy](#) and submit columns, suggest writers or provide feedback at opinion@coloradosun.com.

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Today's Thing

Today's Thing is something we've used, bought, cooked, visited, watched, listened to or otherwise enjoyed lately. These aren't ads, just recommendations – but if you want to support us, [you can become a member](#)! Got something to share? Email things@coloradosun.com.

MAP STUFF



A 2:57 lesson about why Colorado is shaped the way it is. >> Colorado isn't a rectangle: It has 697 sides, making it a hexahectaennecontakaiheptagon. You may already know that, but in this short video that is part of "Weird Borders" — one of my favorite series on TikTok — @GateNerd tells us how the borders were created in the first place and *why* the lines aren't on the straight and narrow. *Spoiler:* It has to do with some big stones we used before GPS. >> [@GateNerd on TikTok](#)

>>

Eric

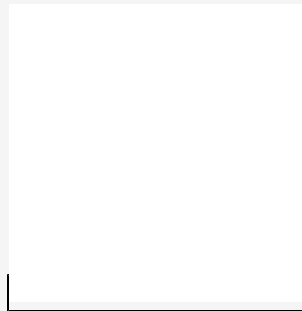


Come Saturday, if you listen closely enough starting at about 6 p.m., you may just hear Michael Booth and Kevin Simpson shouting at their TVs during game 2 of the Stanley Cup finals. Go Avs!

That's still days away, but thankfully we have some Colorado Sun stories for you to read to kill the time.

— *Danika & Eric*

UNDERWRITTEN BY



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From: [LU Land Use Planner](#)
To: [L"Orange, Pete](#)
Subject: FW: [EXTERNAL] Docket SU - 22 - 0003
Date: Friday, June 17, 2022 2:37:20 PM

From: Tim Weiss <timothymweiss@gmail.com>
Sent: Friday, June 17, 2022 8:35 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Docket SU - 22 - 0003

I am writing to provide my thoughts on Docket SU-22-0003. I am a Lyons resident, homeowner, and Boulder business owner. My company, [Optera](#), supports many of the largest companies in the world in decarbonizing their operations, supply chain, or use of products. I believe the proposed extension to the Dowe Flats permit is a bad option for Boulder County and its residents, and here are a few reasons why:

1. This mining operation does not meaningfully contribute to the local economy while being the county's highest source of GHG emissions.
2. The mine is located on ecologically valuable land. Elk spend their winters in and around Rabbit Mountain Open Space, and opening this additional land up for them and removing nearby industrial operations would further support their populations.
3. The mine is located on economically valuable land. Open space and outdoor recreation are one of the most significant drivers of the Lyons economy. Expanding the Rabbit Mountain Open space to include this land as soon as possible would be another boon to the local economy. Allowing another 15 years to go by seems like a poor choice.
4. Boulder County must continue to lead the way on climate goals and initiatives. Our county is a national leader in the fight against Climate Change. We must continue to make swift and bold actions in the next 5-10 years to achieve the goals of the Paris Agreement. Applying economic pressure to Cemex by removing this local source of material would greatly accelerate the decommissioning of this highly inefficient coal-fired cement plant.

I hope you all consider these thoughts and choose not to renew this permit.

Best,
Tim

Attachment D

From: [Glowacki, Therese](#)
To: [Amanda Dumenigo](#)
Cc: [Case, Dale](#); [L'Orange, Pete](#); hrogin@townoflyons.com; [Richard Cargill](#); [Claudia Berg](#)
Subject: RE: CEMEX Dowe Flats Mining & Reclamation Extension Docket Number SU-22-0003 & SU 93-14
Date: Friday, June 17, 2022 4:20:11 PM
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[image004.png](#)
[image005.png](#)
[image006.png](#)
[image007.png](#)
[image008.png](#)
[image009.png](#)
[image010.png](#)

Hello Amanda, thank you very much for your email. I wanted you to know that I understand many of the communities concerns with any extension of the CEMEX Plant. I am glad that you have an organized group that can help consolidate your recommendations to our Community Planning and Permitting Department for their consideration of the extension request.

Boulder County Parks and Open Space does not have a stance on whether the mine and the plant should be extended. That is a community discussion that includes Boulder County's Planning Commission and County Commissioners.

Below is the link to the Community Planning and Permitting (CPP) page where you can review the application and provide written input on the extension.

Link to CPP page on CEMEX:

<https://landuse.boco.solutions/boco.lu.docketlistings/app/detail.html?docket=SU-22-0003>

If you would like to hear the details of open space acquisition proposal, staff will be presenting that at our Parks and Open Space Advisory Committee meeting this coming Thursday, June 23 at 6:30 on Zoom. Below is the link to watch and to sign up to talk.

<https://www.bouldercounty.org/government/boards-and-commissions/parks-and-open-space-advisory-committee/>

Pete L'Orange is the CPP planner in charge of this review. He will know if they are creating a list to notify interested members of the public about important dates for public input and presentations.

I hope this is helpful and we really appreciate your interest in this very important topic.

Therese Glowacki,
Director, BCPOS

From: Amanda Dumenigo <amanda@horsense.net>
Sent: Tuesday, June 14, 2022 9:42 AM

To: Glowacki, Therese <tglowacki@bouldercounty.org>

Cc: Case, Dale <dcase@bouldercounty.org>; L'Orange, Pete <plorange@bouldercounty.org>; hrogin@townoflyons.com; Richard Cargill <rcargill@aol.com>; Claudia Berg <claudia@ridgeranchbeef.com>

Subject: [EXTERNAL] CEMEX Dowe Flats Mining & Reclamation Extension Docket Number SU-22-0003 & SU 93-14

Hello Ms Glowacki,

My name is Amanda Dumenigo. I am the Co-Founder and Executive Director of Save Our St Vrain Valley, SOSVV, Inc.. I'd like to congratulate you on your new position as the Director of BCPOS. Richard Cargill, co-founder of SOSVV, Inc. mentioned that you two spoke on the phone last week.

I would like to share some information for your consideration regarding Cemex's extension request for Dowe Flats, and to provide recent historical context as Richard Cargill noted that you seemed relatively unaware of the community's opposition to a continuation of mining at Dowe Flats since their 25 years of approved mining expires on September 30th, 2022.

Unfortunately, POS has already made recommendations to the Planning Commission in favor of Cemex's extension proposal; POS did so without the Public Comment period running its course or communicating with the community most affected by the proposed extension of mining at Dowe Flats. In recent history, POS has a verifiable track record of endorsing expired Special Uses in the St Vrain Valley— the least developed river valley in the Front Range. These endorsements seem to benefit foreign multinational corporations and POS' land acquisition and special interests, but are to the detriment of the environment, Climate Change, and the community's interests.

POS arguably resurrected Martin Marietta's Special Use 96-18 vis-a-vis approaching Martin Marietta directly, requesting their assistance with the 2013 flood restoration, claiming that it would be a \$6 M savings to the County, and positing that Marietta's Special Use 96-18 was an active SU. The judicial record evidences that POS erred and operated under the disinformation that SU 96-18 was still an active SU—POS did so in spite of the facts that 1. SU 96-18 was in cessation with Division of Restoration Mining & Safety, DRMS (since 2011), *and* that 2. then POS Director, Eric Lane, stated in an April 27th, 2017 letter to US Fish & Wildlife that "Martin Marietta has initiated a review of the Special Use Permit with the Boulder County Land Use Department as a step toward potentially mobilizing the mining operation since none of the mining activity permitted in 1998 has yet to begin" (attached #5). Thanks to SOS' work over the last five years, there is now a consensus among the local regulatory agencies and a legal precedent that Marietta's SU 96-18 has expired; however, POS' endorsement in 2016 was a costly proposition, and our Community has funded the fact checking and judicial review.

SOS effectively opposed POS' suggestion that Marietta be the contractor for the 2013 flood restoration on the basis of a conflict of interest, specifically that the Director of Land Use was still reviewing SOS's assertions that Martin Marietta's 1998 SU 96-18 had expired due to the Five Year Lapse Provision in the Land Use Code, and the uncontested fact that no mining activity (the permitted use) had occurred on the site in at least a decade.

The CO Appeals Court and the CO Supreme Court agreed with SOS's claim that SU 96-18 has expired. And in 2022 Director Case officially reversed his 2017 decision re Marietta's SU 96-18. POS enlisted Marietta's flood restoration assistance under the misinformation that Marietta would be mining this site and had a valid SU permit to mine. It seems that POS' endorsement of a 15 year extension for Dowe Flats' SU 93-14 is equally premature. It seems that once again POS is promoting mining in the St Vrain Valley based on Special Use permits that have run their course and without considering the original agreements made by the County and the Operator, the environmental impact, carbon footprint, or its impact on the community.

I'd like to remind you that in 2002, Amy Brawley, POS' Acquisition Manager told the *Daily Camera* that "...by purchasing the land and connecting the open space area, the County helps preserve an important habitat for wildlife...[and] the majority of the funds came from a .25% tax designed for open space purchases...". John Lohr, Cemex's Plant manager in 2002 echoed POS' enthusiasm, stating that "[Cemex's] excited about the prospect [Dowe Flats] because basically it ensures that the entire valley will be Open Space"! (Please view attached 1 min video).

This begs the questions: When? Why should anyone trust that this would be a final 15 years of Cemex mining Dowe Flats, when thus far POS refuses to recognize the expiration of special uses, to honor the agreements it made in 2002, *and* chooses to ignores the Land Use Directors' 2019 research and conclusion that mining in Dowe Flat's cease on September 30th, 2022?

In a June 14th, 2019 official letter to then Cemex Plant Manager, Dr Uwe Lubjuhn, Director Case determined that "September 30, 2022 is the date when mining must cease [at Dowe Flats]" (Attached). We've been aware that Cemex has since bought the Covenant, and made several financial incentives to POA in exchange for extension of SU permit; however, that does not disqualify the other substantiations that Director Case sites in his letter, including Boulder County Land Use Resolution #94-81, effective on May 26, 1994, "...a mining permit that allowed for a period of 25 years from the 'date of commencement' of mining...defined in paragraph 15 of the Resolution as...the moment of at least 100,000 tons of mined material from the permit area to the plant site... [and] On September 30, 1997 Southdown [Cemex's predecessor in interest] sent Boulder County a letter indicating this had occurred...making September 30th, 2022 the end of the 25 year mining period."

The environmental and health concerns that SOS highlighted in 2019 opposing the 25 year extension of Dowe Flats, SU 93-14, and our advocacy to the County to uphold original agreements between the Operator and the County still apply; shaving a decade off the duration of extraction doesn't change these facts at all.

According to Boulder County's data (below), we would expect that POS would impose that Cemex conduct a new environmental impact study as a condition for *your* endorsement to mine Dowe Flats for another 15 years. Please consider that Cemex's environmental impact study is over 2.5 decades old, conditions in the area have dramatically changed (as noted by your predecessor in his letter to US Fish & Wildlife), and that CEMEX is the #1 Polluter in Boulder County.

Cemex Represents **7.3%** of county Greenhouse Gas Emissions in Boulder County

- **Cemex plant Produces 17X** the **emissions as the entire Town of Lyons combined**
- **Cemex Emits 357,101** mtCO₂e annually, the equivalent of **~25,000** Boulder County residents^{1,3}
- Cemex Publicly stated it is going to operate **indefinitely**
- Over next 30 years, Cemex is expected to emit **10 million mtCO₂e**

Boulder County committed to reduce emissions from **15 mtCO₂e => 7 mtCO₂e per capita** by the year 2030²

CEMEX Lyons plant represents a full 1 mtCO₂e per capita or
..... **12.5% of the 2030 reduction target**

Has POS consider *how* Boulder County could possibly meet its 2030 goal if it allows Cemex to mine for another 15 years? The data suggests that upholding the expiration of Dowe Flats SU 93-14 would greatly help the County meet its pledge to reduce carbon emissions by ~half by 2030.

Lastly, Cemex's offer to cease operations at the old cement plant, built long ago by Martin Marietta, in a decade & a half from now, is not as reassuring as it is being marketed to be. This concession does NOT offer the community any assurance of a reprieve from cement manufacturing exposure as there appears to be nothing in Cemex's offer that would prevent them from selling the plant to another operator, who can then import raw materials, build an asphalt plant, etc. For example, are you aware that Martin Marietta currently has a CO state permit for an asphalt plant in the St Vrain Valley? Incidentally, years ago a member of our Board asked that this special use be removed from the equation, but was told no, in case the County change its mind. Recent history reveals a pattern of the County changing its mind.

SOS formally request that POS reconsider its endorsement to the Planning Commission for Cemex's SU-22-0003 permit extension pertaining to SU 93-14.

The favor of a response is appreciated, especially should you be able to provide answers to my questions. Please file this email, including attachments, in public comment Docket Number SU-22-0003.

Please let me know if you have any questions or difficulty opening / reviewing the attachments.

Sincerely,

Amanda Dumenigo
Executive Director
[SOSVV, Inc](#)

1. [Boulder County's 2016 Greenhouse Gas Emissions Inventory and Modeling Report - October 2018](https://assets.bouldercounty.org/wp-content/uploads/2018/12/2016-ghg-inventory-and-strategies-)
(<https://assets.bouldercounty.org/wp-content/uploads/2018/12/2016-ghg-inventory-and-strategies->

Attachment D

[report-oct ober-2018-final.pdf](#))

2. Boulder County Climate Action (<https://www.bouldercounty.org/climate-action-2/>)
3. EPA Facility Level GHG Emissions (<https://ghgdata.epa.gov/ghgp/main.do>)
4. [Lawsuit Targets Air Pollution at Aging CEMEX Cement Plant in Lyons](https://wildearthguardians.org/press-releases/lawsuit-targets-air-pollution-at-aging-cemex-cement-plant-in-lyons/)
(<https://wildearthguardians.org/press-releases/lawsuit-targets-air-pollution-at-aging-cemex-cement-plant-in-lyons/>)

final_lu_cemxltr_june copy.pdf
10.9 MB

[Click to Download](#)

Letter to USFWS_2017-06-27.pdf
43 KB

[Click to Download](#)

10000000_329390259374379_3081561545896608231_n.mp4
11 MB

Attachment D

From: [Greg Lowell](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Docket SU-22-0003
Date: Wednesday, June 22, 2022 5:51:35 PM

I am writing to provide my thoughts on Docket SU-22-0003

I urge you to approve the 15-yr. Dowe Flats permit for CEMEX.

The 15-year window affords a set date for CEMEX to cease operation. If not approve, CEMEX will continue to operate indefinitely with materials shipped in by truck and rail from Wyoming and other locations.

Please approve the 15-year permit.

Thank you,

Greg Lowell
411 Raymond Court
Lyons, CO

From: [GERARD KELLY](#)
To: [L'Orange, Pete](#)
Cc: [Glowacki, Therese](#)
Subject: [EXTERNAL] BCNA Comments on the Dowe Flats Permit Application, Docket SU-22-0003
Date: Monday, July 4, 2022 2:28:20 PM

Greetings Mr. L'Orange

Boulder County Nature Association (BCNA) is leaning towards supporting the mining extension (i.e., the deal to close the Dowe Flats mining site and the Cemex plant in 2037). We believe, in the long term, the deal would end up being beneficial to the citizens of the County and its environment. In 15 years Dowe Flats and the Cemex plant would be gone forever. Fifteen years of additional mining and plant operation represents a very short duration compared to a long future without the associated traffic and pollution, and all their costs (e.g., impacts on health and the environment); without air quality violations and regulatory enforcement costs; and with the addition of open space and valuable habitat. In addition, the mining permit extension would preclude the hauling of materials from elsewhere to the plant into a potentially long future, with all of the associated risks and impacts. However, in order to take a more definitive position on the permit extension, BCNA would like answers to some questions, which are presented below.

- There would be adverse public health and environmental impacts associated with 15 additional years of mining. Has the County assessed and documented these impacts? Have impacts of mining at Dowe Flats been compared with the impacts of mining elsewhere and transporting material to the plant? Have impacts of mining for an additional 15 years been compared with the long-term benefits of closing Dowe Flats and the Cemex plant? Will the County make and present to the public a case to support the additional 15 years of mining?
- Are details on the closure of the Dowe Flats and the Cemex plant, including site reclamation, presented in the permit application? For example, would the sites be cleaned up to meet public health standards for residential use or some other specified use? Would the sites be reclaimed to allow wildlife habitats to re-establish and function as healthy ecosystems? If such details are not contained in the application, would they be contained in another document associated with the deal?
- Approximately how many acres are currently affected by the mining operation? What is the anticipated additional acreage of surface disturbance from mining operations between now and 2025, and from 2026-2037?
- How many acres are in the Municipal Facilities area, and how likely is the town of Lyons to grant permission for the County to acquire it? Also, which of the resources listed on p. 4 of the 6/23/22 County memo to POSAC for the property south of Hwy 66 are located in the Municipal Facilities area (i.e., resources that the county would not acquire without permission from Lyons)? From the map it looks like a pretty significant portion of the property south of Hwy 66, including

the St Vrain Creek portion, is in the Municipal Facilities area.

- Would it be economically feasible for CEMEX to keep operating the plant if the mining permit were not renewed and material were needed to be trucked or shipped in by train? If the plant were to continue operating by transporting in material, would it have the potential to make emissions and dust worse than the status quo?
- Have negotiations between the County and Cemex ended, or will they continue? Could the deal, as currently presented, change significantly?
- If Cemex's outputs are high in the next 15 years, and business is good, would Cemex be able to apply for another extension to operate beyond 2037? How binding would the agreement be?

There would be tangible benefits from the County getting the plant subject to the County land use code, getting a solid closure date, having more control over reclamation, and protecting an extra 1,000+ acres of open space from future development, which could be substantial if Lyons would annex and increase housing density beyond the county code.

BCNA would greatly appreciate receiving responses to these questions prior to the hearing before the Planning Commission. We would be able to submit additional comments based on your responses and as additional information becomes available.

Thank you very much for your assistance. We look forward to working with you and others associated with the County to make this deal as beneficial as possible to the citizens of the County and its environment.

Respectfully,
Gerry Kelly
BCNA Board President
Boulder County Nature Association
720-839-5210
<https://bcna.org>

On 06/29/2022 2:04 PM L'Orange, Pete <plorange@bouldercounty.org> wrote:

Yes, public questions and comments will be accepted through to when the Board of County Commissioners close their public hearing; that hearing has not been scheduled yet (it will be scheduled after the Planning Commissioner has held their hearing, which also has not been scheduled yet – the absolute **earliest** the Planning Commissioner could hear this would be July 20th). Members of the

public can submit comments at any time and they will included in the public record. And those can be sent directly to me.

Thanks!

Pete L'Orange | Planner II

Boulder County Community Planning & Permitting

Courthouse Annex | 2045 13th Street | Boulder, CO 80302

Mailing address: PO Box 471 | Boulder, CO 80306

Direct: 303-441-1418 | Main: 303-441-3930

plorange@bouldercounty.org

www.bouldercounty.org/lu

From: LU Land Use Planner <planner@bouldercounty.org>

Sent: Wednesday, June 29, 2022 1:33 PM

To: gerardkelly49@comcast.net; LU Land Use Planner

<planner@bouldercounty.org>; L'Orange, Pete <plorange@bouldercounty.org>

Subject: RE: [EXTERNAL] Ask a Planner - Gerry Kelly - SU-22-0003 - 13301 55TH STREET

Hi Gerry,

Thanks for your email. You are welcome to send comments and questions to Pete at plorange@bouldercounty.org

[@L'Orange, Pete](#)

Bonnie Gracia

On-call Planner

Boulder County Community Planning & Permitting | P.O. Box 471, Boulder, CO 80306

303-441-3930 | bgracia@bouldercounty.org

Service hours are 8 a.m.-4:30 p.m. Monday, Wednesday, Thursday, Friday, and 10 a.m.-4:30 p.m. on Tuesday

Sign-up for Boulder County news at boco.org/e-news

Due to COVID-19, the Boulder County Community Planning & Permitting Department is conducting business and providing services virtually. Please visit us online at <https://www.boco.org/cpp> for more information.

From: Ask A Planner <no-reply@wufoo.com>
Sent: Wednesday, June 29, 2022 1:21 PM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Ask a Planner - Gerry Kelly - SU-22-0003 - 13301 55TH STREET

Boulder County Property Address : 13301 55TH STREET

If your comments are regarding a specific Docket, please enter the Docket number: SU-22-0003

Name: Gerry Kelly

Email Address: gerardkelly49@comcast.net

Please enter your question or comment: Regarding CEMEX Dowe Flats Mining and Reclamation Extension, is the County accepting comments and questions from the public at this time? Should we send comments and questions to the lead planner, Pete L'Orange, or to BCPOS, Therese Glowacki?

What is Pete L'Orange's email -- pl'orange@bouldercounty.org?

Thank you,

Public record acknowledgement:

I acknowledge that this submission is considered a public record and will be made available by request under the Colorado Open Records Act.

From: [Lily Trienens](#)
To: [LU Land Use Planner](#); [L'Orange, Pete](#)
Subject: [EXTERNAL] SU-22-0003 Cemex Requested Permit Extension
Date: Tuesday, July 5, 2022 9:52:29 AM

Dear Pete and County Planning team,

I am a resident of unincorporated Boulder County and am writing in strong opposition to Cemex's request to extend their Dowe Flats mining permit for another 15 years.

Climate Impacts:

We don't have another 15 years to delay. The climate emergency is now. Boulder County is on the frontlines, faced with the most destructive wildfire in Colorado history just months ago and hundreds of homes and habitat lost in the 2013 floods with recovery still ongoing nearly a decade later.

If Boulder County plans to actually meet its bold, needed climate commitments to reduce greenhouse gas emissions from 15mtCO₂e to 7mtCO₂e per capita by 2030, this project cannot continue. Cemex is the leading polluter in Boulder County:

- Responsible for 7.3% of all greenhouse gas emissions in Boulder County;
- Generating 17X the emissions as the entire Town of Lyons combined;
- Emitting 357,101 mtCO₂e annually, the equivalent of ~25,000 Boulder County residents.

Environmental & Ecological Impacts:

Cemex's attempts to present its plans as aligned with Boulder County environmental and ecological goals is a farce. I should hope that Boulder County does not buy that more mining is in any way protecting and preserving the land and ecosystem. The only option that protects and preserves this land is to end mining now and reclaim and restore the ecosystem as agreed to in 1994 by Boulder County and the original operator and since reiterated and upheld three times since, most recently by Director Dale Case in 2019. I am shocked and ashamed that Boulder County Parks and Open Space is willing to sacrifice this area for another 15 years through backroom deals with Cemex in order to potentially save a bit of money in 15 years, if Cemex holds up its end of the deal.

Health Impacts:

The surrounding area is much more densely populated today than it was in 1994. Cemex and the Dowe Flats mining area are in the midst of neighborhoods and the silica dust dispersed in uncontrollable fugitive dust events travelling to surrounding communities exposes thousands of residents to potential chronic lung and other health impacts.

I write today to urge you not to fall for the false dichotomies and empty promises of Cemex. Cemex is trying to threaten the County to act saying that they would otherwise truck in materials--however, it is unlikely that this would be economically viable for the long term especially with fuel costs, labor, and inflation at an all time high. Cemex cannot be trusted with the commitments it lays out in deals with Boulder County 15 years from now. If for instance Cemex were to sell to another corporation, just as the original operator sold to Cemex, these empty promises could be null and void, and the County would have sacrificed this land to 15 years of mining for naught. Cemex has proven themselves to be an untrustworthy player--their history of labor and environmental abuses, including a lawsuit

brought against Cemex by the EPA, cannot be ignored. Cemex had their time. Now it's time to reclaim and regenerate the land.

You have the power today to decide the course of the future of northern Boulder County. You are faced with a choice between status quo industrialization, ecological destruction, and emissions of the last 30 years--generating a total of nearly 50 years of mining in Dowe Flats. Or you can pave the way toward a future of regeneration, ecological diversity and abundance, and protected land in this area.

Please deny SU-22-0003 and Cemex's request for another 15 years of mining operations. Hold Cemex to its original pledge and commitments under the 1994 mining permit. Boulder County has already held up its end. of the deal, now hold Cemex accountable to its responsibilities.

Thank you for your consideration.

Lily Trienens

From: [LU Land Use Planner](#)
To: [L"Orange, Pete](#)
Subject: FW: [EXTERNAL] Ask a Planner - Rachael Scala - SU-22-0003 - 13301 55TH STREET
Date: Tuesday, July 5, 2022 12:11:06 PM

-----Original Message-----

From: Ask A Planner <no-reply@wufoo.com>
Sent: Tuesday, July 5, 2022 11:39 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Ask a Planner - Rachael Scala - SU-22-0003 - 13301 55TH STREET

Boulder County Property Address : 13301 55TH STREET If your comments are regarding a specific Docket, please enter the Docket number: SU-22-0003

Name: Rachael Scala

Email Address: rachaescalagmail.com

Phone Number: (720) 597-4382

Please enter your question or comment: Reaching out to extend my comment on the future of the Cemex Lyons kiln & Dowe Flats mine as a citizen of Lyons, CO and 8-year Boulder County Resident. I comment through my professional lens as a Forest School & Permaculture landscaper/educator in the area, working with people ages 2-60+.

Seeing how the Cemex plant employs many and has been a contributor to our community and beyond for infrastructure material, I understand there are many implications in addition to the extractive and polluting externalities of the operation. That said, I ask a series of questions as to how both Lyons sites and Cemex may evolve with the current permit extension at stake.

Can alternative use with economic gain replace Cemex' current operation? Is there another way to BOTH contribute to local infrastructure and employ people by pivoting the kiln facility to something more regenerative/carbon sequestering? Would the conversion of Dowe Flats to open space mean not only restoration of habitat, but enduring, open & wild space? As a landscaper, these broad-scale conversions involve design, installation bids, and potentially volunteer support to de-commission the mine and convert back to wild, open space, which would open new roles and create lasting opportunities for guardianship (rangers, guides, educators, farmers, etc.).

What kind of land do we want to leave for future generations' enjoyment and stewardship? That which includes private property boundaries barricading increasingly-depleted stores in the earth's crust of raw material? Or that which holds thriving wildlife and a return to ecological equilibrium as our region faces more threats from drought, wildfire, and other complications around climate change and population growth? Boulder County is one of the leading counties for carbon sequestration, alternative travel and community participation for collective betterment. Let's show it and act wiser in this instance.

Citing my educator role & involvement with the Thorne Environmental Experience in E. Boulder (one of my landscape maintenance sites), I see the potential for Cemex' sites in Lyons, like Thorne, to become a place of learning and inspiration to co-create with nature. Thorne, both a non-profit and BVSD education site, is a living example in its transformation from landfill to wild wetland, teeming with biodiversity and native habitat. This site has lasted generations and continues to engage students and community around a respectful relationship with nature, a greater return than a landfill ever could be.

Do you see this potential for Cemex' sites? A wild space/conversion and cultural/nature learning center would boost the area's use, given crowd pressure on the local Lyons/Longmont/North Boulder trail/recreation networks as more people turn to the outdoors as a part of their routine and quality of life.

Thank you for considering my input and I look forward to the outcome of this site.
Public record acknowledgement:

Attachment D

I acknowledge that this submission is considered a public record and will be made available by request under the Colorado Open Records Act.

Attachment D

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: [EXTERNAL] Ask a Planner - Sheldon Sands - SU-22-0003 - 1612 Green Place, Longmont CO
Date: Tuesday, July 12, 2022 10:13:25 AM

@L'Orange, Pete
Fyi
bbg

-----Original Message-----

From: Ask A Planner <no-reply@wufoo.com>
Sent: Tuesday, July 12, 2022 10:08 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Ask a Planner - Sheldon Sands - SU-22-0003 - 1612 Green Place, Longmont CO

Boulder County Property Address : 1612 Green Place, Longmont CO If your comments are regarding a specific Docket, please enter the Docket number: SU-22-0003

Name: Sheldon Sands
Email Address: sheldonjsands@gmail.com
Phone Number: (303) 807-8735

Please enter your question or comment: As a Boulder county resident since 1981, I have long supported and benefited from Boulder's Open Space program, including many of its acquisitions such as Heil and Caribou Ranch. While the prospect of adding the land run by CEMEX for its mining site North of Hwy 66 is enticing, I do not support extending that use for another 15 years.

As the biggest polluter in Boulder County and the 4th biggest polluter in Colorado, it is time to send the strongest signal possible to CEMEX that we wish for them to close down their Boulder County operation. Ending their mining at the Dowe Flats site of course does not close down their facility, but it could seriously hamper their viability moving forward. In light of the climate change emergency, we need to quickly find and advance replacements for cement in all possible areas of construction, and where absolutely needed, greatly reduce the emissions from existing and any future cement plants.

Ending CEMEX's mining operation at this site would indeed open up a variety of possibilities for the use of this land, which after clean-up could still end up as part of Boulder County Open space, or for instance: a mix of park land and much needed affordable housing.

Sincerely,
Sheldon Sands, Longmont
Public record acknowledgement:

I acknowledge that this submission is considered a public record and will be made available by request under the Colorado Open Records Act.

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: [EXTERNAL] Ask a Planner - kathleen sands - SU-22-0003 - 435 Park Drive
Date: Tuesday, July 12, 2022 10:55:07 AM

@L'Orange, Pete
Fyi
bbg

-----Original Message-----

From: Ask A Planner <no-reply@wufoo.com>
Sent: Tuesday, July 12, 2022 10:37 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Ask a Planner - kathleen sands - SU-22-0003 - 435 Park Drive

Boulder County Property Address : 435 Park Drive If your comments are regarding a specific Docket, please enter the Docket number: SU-22-0003

Name: kathleen sands

Email Address: solasands@gmail.com

Phone Number: (303) 642-6144

Please enter your question or comment: Comments to Boulder County Open Space: 7 good reasons to let Cemex's mining permit expire:

Financially it would encourage them to take their operations elsewhere and we can possibly acquire all that land for open space.

Public health of our community: One of the highest polluters in Colorado, based in Mexico, Cemex is among the highest polluters in Colorado (per local scientists—the 4th highest) and emits around 10 percent (experts have estimated at 7-13 percent) of greenhouse gasses in Boulder County alone—which makes them the worst polluter in all surrounding counties. Then there's the silicon dust that the plant spews into our air which is known to cause asthma. My Mother lives in downtown Lyons about 2 miles from the plant and has asthma and is constantly using her inhaler—surely exasperated from all the dust spewing into the air. We need to encourage them to leave in every way possible for the public health of our community and not extend their mining permit.

The climate crisis: The most important issue we can address in Colorado and Nationwide since the U.S. has been among the highest polluters in the world affecting the entire globe; especially affecting those who are not significant polluters. Our state alone has already seen flooding, unusual temperature fluctuations, higher winds, draught, water shortages, fires etc. which meteorologists and other scientists are pinning on climate change which we know is caused by greenhouse gasses. Cement production contributes an extremely high amount of these gasses and the Earth is warming at an alarming rate. This is not a disputed fact among experts in the field. Additionally, cement on the ground causes more heat and when foliage or grasses are replaced with cement, the sequestering of carbon is not able to happen. Therefore, we should find other alternatives to cement; not support the industry by throwing money at them so that the county can acquire more open space to get a reduced price for the land. In fact, we need to do everything possible to help slow climate change and the weather events that are associated with it and consider the cost of those types of events. Remember the cost of the floods and recent fires for instance? That is just the beginning! We need to do the right thing in this respect and not support the largest contributors to global warming. If they leave, we may have the opportunity to get all the land for open space anyway, not just part of it.

Cost to Boulder County Citizens: Acquiring open space at a (deal rate) of \$14.1 million dollars (plus the \$1.7 million already given to the plant) at the expense of a 15 year extension is not worth the affects of the pollution on the environment. This money could be used for human services or car chargers, solar fields, wind turbines etc. natural herbicides (instead of Round Up on parks—I believe Lyons is already doing this successfully as well as many other parks around the country if Boulder needs advice on this), etc.

Reclamation of Dowe Flats: There could be years of clean up and many millions of dollars lost in that land to make

it safe for public. Who knows what they have buried there? If Cemex decides to stay after their permit is expired, clean up could be part of the negotiation pieces for leaving sooner and for “a reduced cost” for that land. The sooner they leave, the sooner we can acquire ALL of that land, but not at the expense of 15 years of high polluting. This space needs much reclamation likely and could be at least partly used for much needed housing—not the million dollar type, but the more necessary small, more affordable houses for younger, new families and retirees downsizing.

Water use: Making cement takes a lot of water use which is water we in Colorado need badly. This is another huge cost of having that plant here.

Ugly: The placement of that plant is some of the most beautiful land with a gorgeous backdrop of mountains and is completely wasted on that ugly plant. Also that area should be open space where the plant is located.

Boulder County should let the mining permit expire, then let Cemex decide whether to stay or not. It’s possibly not feasible for them to operate here if they can’t use the local raw materials available. They may leave on their own volition with NO cost to our county or environment or air quality (people). Then the county could buy it on the free market; maybe for a little more than they would without negotiating our air quality. It’s not worth the cost to get the better deal for the land. If they decide to stay, then we can start thinking about incentives for them to leave; start throwing money and negotiations at them then to get rid of them sooner and start restoring the land there and deciding what to do with it. They should be responsible for the clean up though. It could be a negotiation piece as previously stated. If they leave sooner we could take some of the responsibility for clean up for example. Then we could have all that land for Open Space!

We need clean air and water while doing our part to slow down the affects of climate change now—not a cement factory in our county polluting our air, using our water and contributing largely to global warming! It is our responsibility to do so for the County, Colorado and the entire globe to get rid of large causes of global warming sooner than later.

Public record acknowledgement:

I acknowledge that this submission is considered a public record and will be made available by request under the Colorado Open Records Act.

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: [EXTERNAL] Ask a Planner - Mariellen wendel - SU-22-0003 - 435 Park drive
Date: Tuesday, July 12, 2022 10:55:26 AM

@L'Orange, Pete
Fyi
bbg

-----Original Message-----

From: Ask A Planner <no-reply@wufoo.com>
Sent: Tuesday, July 12, 2022 10:49 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Ask a Planner - Mariellen wendel - SU-22-0003 - 435 Park drive

Boulder County Property Address : 435 Park drive If your comments are regarding a specific Docket, please enter the Docket number: SU-22-0003

Name: Mariellen wendel

Email Address: mariellenwendel@gmail.com Phone Number: (720) 438-8225 Please enter your question or comment: Please do not extend the Cemex mining permit even a single day! I have asthma and the silicon dust coming from the plant that is in the air in Lyons where I live makes it worse! I literally can't breathe some days and have to close my doors and stay inside with an air purifier. I am 80 years old and would like to enjoy the last days of my life as long as possible with my grandson and family and friends.

I am also concerned about global warming and understand that this type of factory puts out a lot of green house gasses and that cements is also not good for global warming. We should send a message to them that this type of activity is not welcome and make them continue to find new places to go until maybe someday, they will decide to do operations more cleanly or go into a more renewable business instead. We should not be compromising our air quality for this type of activity in our community.

Also it is an eye sore in our otherwise beautiful community.

Public record acknowledgement:

I acknowledge that this submission is considered a public record and will be made available by request under the Colorado Open Records Act.

Attachment D

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: [EXTERNAL] Ask a Planner - Wylie Hobbs - SU-22-0003 - 11683 Pointe View Drive, Longmont, CO 80503
Date: Wednesday, July 13, 2022 9:13:10 AM

[@L'Orange, Pete](#)

Fyi

bbg

From: Ask A Planner <no-reply@wufoo.com>
Sent: Wednesday, July 13, 2022 9:01 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Subject: [EXTERNAL] Ask a Planner - Wylie Hobbs - SU-22-0003 - 11683 Pointe View Drive, Longmont, CO 80503

Boulder County Property Address : 11683 Pointe View Drive, Longmont, CO 80503

If your comments are regarding a specific Docket, please enter the Docket number: SU-22-0003

Name: Wylie Hobbs

Email Address: wylie@wyliehobbs.com

Phone Number: (617) 447-4374

Please enter your question or comment: I have been loosely documenting the air pollution from the CEMEX Plant in Lyons for several months (we only moved here last year). I have several pictures of the sprawling dust clouds emitted by this facility which subsequently blow right into raptor nesting areas, farm/ranch land and residential homes. I find it egregious that they have been allowed to do this for so many years and that they are using their deep pockets to make people turn the other way. They are currently up for permit renewal and it would be such a disaster for our community for that to happen. Please put a stop to this. <https://imgur.com/gallery/wl4MqKj>

Public record acknowledgement:

I acknowledge that this submission is considered a public record and will be made available by request under the Colorado Open Records Act.

From: [juliedonn](#)
To: [LU Land Use Planner](#)
Subject: [EXTERNAL] Cemex permit extension application for Dow Flats quarry
Date: Thursday, July 14, 2022 4:59:17 PM

To the Planning and Community Development Commission and the Board of County Commissioners,

I am a resident of Boulder County. Please accept this request that the Board of County Commissioners unanimously and vigorously oppose the Cemex permit extension for the Dow Flats Quarry, and all the incentives the company is offering to Boulder County. It will render the ambitious climate change goals the county has established impossible to achieve. I am not convinced the company can afford to continue to operate the cement plant by trucking and railroading in the necessary materials. Continued plant operation will continue to pollute the entire county's air with silica dust. And I do not believe the company has been a good neighbor to the county and especially to Lyons: they have repeatedly refused to upgrade the plant operations to limit carbon and silica dust emissions to counter the massive contributions to climate change and poor air quality, and they are not prepared to cease other possible materials manufacture at the Lyons plant at the end of the 15-year period: the door remains wide open for them to sell the plant to another polluting operator, or to manufacture other emissions-producing products themselves.

I also believe the cost-benefit ratios of granting vs. denying the permit extension remain unknown, because it is impossible for the county to assess at this time the condition of the existing plant and surrounding property relative to contaminants present. As per history ad infinitum, the state, county, and town of Lyons could possibly be responsible for cleanup at the site, at an unknowable cost.

I request that these comments to be entered into the public record at BOCC meetings where this issue is discussed. Thank you!

Julie Boyle
970-397-6041

Attachment D

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: SU-22-0003
Date: Tuesday, July 19, 2022 7:17:29 AM

@L'Orange, Pete
Fyi
bbg

-----Original Message-----

From: bronwyn lyonspt.com <bronwyn@lyonspt.com>
Sent: Monday, July 18, 2022 8:38 PM
To: LU Land Use Planner <planner@bouldercounty.org>
Cc: Boulder County Board of Commissioners <commissioners@bouldercounty.org>
Subject: [EXTERNAL] SU-22-0003

To Whom It May Concern:

I am writing to request that the extension requested by Cemex, be denied.
They have clearly have shown us repeatedly over the years, that they do not care about rules and regulations.
They do not respect the environment, or those of us living in the surrounding area.
Please do not allow them to pollute anymore by denying their request.
Thank you,
Bronwyn Muldoon

From: [LU Land Use Planner](#)
To: [L"Orange, Pete](#)
Subject: FW: [EXTERNAL] SU-22-003
Date: Tuesday, July 19, 2022 3:39:04 PM

From: Kristin Powell <pioneerfamilyllc@gmail.com>
Sent: Tuesday, July 19, 2022 3:16 PM
To: LU Land Use Planner <planner@bouldercounty.org>; mdavis@townoflyons.com
Cc: Boulder County Board of Commissioners <commissioners@bouldercounty.org>; dvasquez@townoflyons.com
Subject: [EXTERNAL] SU-22-003

Dear Town of Lyons and Boulder Co Planners,

My name is Kristin Powell. My husband Jerry Powell and I have been residents of Lyons since 1997. We oppose extending a mining permit to CEMEX at Dowe Flats.

Thank you for taking the time to seek public input into CEMEX's proposal to continue mining at Dowe Flats. I have been involved in tracking CEMEX's air quality compliance for the past 15+ years. I have reported many instances of CEMEX's poor housekeeping in terms of silica dust events and unwashed trucks leaving the plant to Gabi Hoeffler and State Inspector David Huber over the years. In 2003, the Colorado Air Pollution Control Division fined CEMEX in Lyons, Colorado an amount of \$280,000 for its failure to control silica dust from being released into the atmosphere. In 2006, The U.S. E.P.A. fined CEMEX in Lyons, Colorado \$1, 500,000 for air quality violations. CEMEX is still at it. The most recent dust event I recorded on my iPhone was on June 22, 2022 at 8:32 pm on N. 61st St. It was a completely wind-free evening and no excuses for CEMEX to be releasing silica dust into the environment. My husband Jerry was also a witness to this dust event.

We are lacking critical information needed to consider any extension of the existing permit. From my understanding, CEMEX is stating that if mining at Dowe Flats ceases without an extension of their permit period, the company will continue to run its plant indefinitely. Where would CEMEX get the materials they will need to continue to run the plant indefinitely? They will have to be sourced and brought into the area by truck, creating new issues such as additional truck traffic, pollution and safety concerns to an already congested Front Range corridor. I am concerned that CEMEX (not a good neighbor) will be holding us hostage; we are in fear that CEMEX will run the plant indefinitely, but is that any worse than what's happening today? Please consider CEMEX's track record and lack of compliance before you trust this company.

I encourage you to seek further information before granting an extension to the Dowe Flats permit to CEMEX.

Thank you for your consideration.

Kristin and Jerry Powell

Attachment D

107 Longs Peak Drive, Lyons CO

Attachment D

From: [LU Land Use Planner](#)
To: [L"Orange, Pete](#)
Subject: FW: [EXTERNAL] SU-22-0003
Date: Wednesday, July 20, 2022 9:51:42 AM

-----Original Message-----

From: suzanne pomeroy <sfp899@gmail.com>
Sent: Wednesday, July 20, 2022 9:24 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Cc: Boulder County Board of Commissioners <commissioners@bouldercounty.org>
Subject: [EXTERNAL] SU-22-0003

I stand opposed to the permit renewal of CEMEX I am shocked to know that this facility is exempt from updated emissions codes and is the # 1 polluter in Boulder County. I've lived in Lyons for 20 years and was never informed of this fact and the possible risks to our health and environment I urge you to take appropriate action to either not renew or impose the updated standards. [Insert your questions and concerns, your opinion]

[Insert your and your recommendation

Accept

Accept with Conditions

Reject

Reject with Counter Proposal

]

[Add any personal details/experiences that are important to you!] Thank you Suzanne Pomeroy

Sent from my iPhone

From: [LU Land Use Planner](#)
To: [L'Orange, Pete](#)
Subject: FW: [EXTERNAL] Cemex (SU-22-003)
Date: Thursday, July 21, 2022 7:25:24 AM

[@L'Orange, Pete](#)

Fyi
bbg

From: Edward Kean <Ed@Bluegrass.com>
Sent: Thursday, July 21, 2022 5:48 AM
To: LU Land Use Planner <planner@bouldercounty.org>
Cc: comissioners@bouldercounty.org; dvasquez@townoflyons.com
Subject: [EXTERNAL] Cemex (SU-22-003)

Regarding Cemex Special Use Mine extension Planning Application Docket SU-22-03

-

Cemex's cement factory area south of Hwy 66 and their Dowe Flats quarry are very connected per The State of Colorado Department of Public Health and Environment [CDHPE] and the Town of Lyons.

According to CDPHE, Cemex's mining and cement production permitting expired a few months ago and Cemex's renewal application has been under review for 16 months. Per CDPHE - when the Dowe Flats quarry ceases mining, Cemex's accepted written reclamation plan will take effect including removal of all structures and kiln and reclamation of all lands to "pasture".

The Town of Lyons (TOL) Boulder County (BOCO) long standing Intergovernmental Agreement (IGA) is not addressed by BOCO but is addressed by Cemex in SU-22-003 and will however require an amendment.

According to CDPHE, Cemex has submitted no plans to shift to non-local materials which they must submit for review and approval to continue using their kiln to make cement if their local quarry ceases operation.

Per Cemex's representative by phone, Boulder County Parks and Open Space has been negotiating with Cemex for two years in a secret "open" process which has purposely excluded all of its neighbors except BOCO Open Space Department to extend mining for 15 years under a threat of cement production "forever" including on-going heinous pollution violations and CO2 emissions if BOCO does not grant said extension.

In return for a 15 year extension Cemex is offering BOCO increased existing open space purchase options in and around the Dowe Flats area plus new Open Space options around the cement factory and cessation of cement manufacturing but with Cemex retaining ownership of their factory. There is no mention of what the factory

will become at the end of the requested 15 year mining extension nor any limits of how the factory will be used during the 15 year extension, i.e. no mention of tire burning or asphalt manufacturing.

Although BOCO POS has a mandate to find and purchase open space at all costs, if BOCO approves this special mining extension to fulfil their mandate it will be doing so at the cost of 15 more years of the largest single CO2 emissions in Boulder County and one of the four largest emitters in Colorado plus continuing dust emissions at Dowe Flats in direct contravention of BOCO's 2030 greenhouse gas reduction goals and our current severe ozone air violations.

In the 1990's BOCO and Cemex created the Dowe Flats special use mine with ending mining this year and reclamation of the area for open space however both are now negotiating to extend those agreements and postpone open space creation in contradiction to what was promised to the public back then which makes it predictable that no current or future agreements will ever be completed.

Please research and confirm all of the above and recommend to BOCO Commissioners that extending BOCO's Cemex special use mining permit -

- would be a grievous dereliction of previous agreements and promises to the public regarding Dowe Flats reclamation and conversion to BOCO open space.

- would be a grievous dereliction of BOCO's 2030 greenhouse gas emission goals.

- would ignore that it is highly unlikely that Cemex can viably continue cement production at it's outdated 1969 factory including - expired State permits, lack of plans or permits for continuing operations going forward without a connected mine, reclamation plans Cemex created for when connected mining ceases, and no published plans re: new Gemm Phase 1 regulations.

- means that previously documented / multi-million\$ EPA fined cancer-causing silica dust and highly likely Chromium IV dust emissions will continue with no effective regulation.

- would need to overlook expectations based on past Cemex history to complete agreements, and that such un-neighborly behaviour can be expected to continue and repeat "forever" which is normal with a Global 2000 company and it's shareholders,

- will have been fueled by BOCO's fear of development where no such fear is warranted and BOCO's open space at all costs mandate.

Thank you for your consideration of my comments,

Edward Kean

Boulder County Resident since 1976

From: [Sarah Lorang](#)
To: [LU Land Use Planner](#)
Cc: dvasquez@townoflyons.com; comissioners@bouldercounty.org
Subject: [EXTERNAL] SU-22-003 - Feedback regarding CEMEX mining extension proposal
Date: Friday, July 22, 2022 2:41:43 AM

Dear Boulder County Planning and Permitting Office,

We have many questions and concerns about the negotiation between CEMEX and Boulder County Parks and Open Space that resulted in the proposal and application for CEMEX to extend its mining at Dowe Flats for an additional 15 years, but chief among them is that no other stakeholders were consulted or considered and that is evident with the binary deal that was presented. **The Town of Lyons is presenting an alternative proposal as a counter, and we are very supportive of pursuing.**

The binary deal on the table is 15 years or indefinite. The 15-year extension proposal as currently crafted does not explicitly include demolition/reclamation of the plant, nor acquisition of the plant itself by Boulder County. We believe the "indefinite operations" alternative is a false choice, as our detailed financial analysis has demonstrated that it is likely unprofitable for CEMEX to truck in raw materials from a remote location. Further, the details of this "indefinite" alternative should be provided to the public. Where would the source materials come from? What would the traffic patterns look like? What would be the impact to public health and safety? These are all facts that are required by the public and commissions to make an informed decision.

Importantly, the state level mining permit that covers the plant area south of Highway 66 does not allow CEMEX to change the primary source of their materials from the Dowe Flats location without a significant amendment or revision to the mining permit that covers the plant area south of Highway 66. In the state mining division's view, the Dowe Flats mining operation and the cement plant operation are inextricably and fundamentally linked (the conveyor itself that links the two properties are part of the Dowe Flats permit, as just one example). In the event that Dowe Flats ceases mining operations and CEMEX would want the plant to continue operations and avoid its mandatory reclamation, the state mining division would need to revise or amend the mining permit that governs the plant, given that all other nearby mining resources have been exhausted. At this stage, there is sufficient evidence that Dowe Flats Mine and the Plant are not truly independent operations. And frankly, common sense dictates this as well.

We recommend that the application be rejected, and that an alternative proposal be considered.

Additionally, some of our biggest concerns are below:

- **The pollution problem (the physical plant) does NOT go away in 2037.** The application and proposal says "we [CEMEX] will cease cement plant operations" in 2037. The door is open to sell it to ANOTHER cement plant (something they tried to do in 2016), or to another general industrial use. Good Neighbors of Lyons met with CEMEX Lyons on June 21st and they confirmed that they have no plans to shut down the plant, tear it down, reclaim it, or anything else that removes it from operation. The ~60 acre plant parcel is not part of this negotiation. When I asked what they would do with it, they said it was zoned General Industrial, so they thought someone would buy it for that use. Janis Whisman of Parks and Open Space confirmed (on June 23rd) that CEMEX did not offer the plant as part of the negotiation. She went on to say that "they plan to keep it, but plan to not operate it". CEMEX is a publicly traded company with a fiduciary duty to maximize shareholder value. They can't just sit on a multi-million dollar asset like Janis claims they intend to do. Also, CEMEX themselves said something different. **Allowing the plant to still stand at the end of any extension should be a non-starter. It needs to be demolished.**
- **2030 Climate Goals would not be met with the plant in operation.** CEMEX produces 357,000 tons of carbon every year. The #2 polluter in Boulder County only produces 55,000 tons per year. Related, is a \$14M investment into the CEMEX plant land really money well spent on open space, if that open space has a ~60 acre polluting behemoth in the center of it all? **15 years is too long of an extension; 3-5 years would be reasonable and still allow us to meet and exceed our climate goals.**
- **The Town of Lyons should have been part of the negotiation, and NEEDS to be involved in a counter proposal.** The spirit of the 2012 IGA was to expand the Eastern Corridor, including the CEMEX plant parcel, with an eco village and some light commercial space to provide much needed tax revenue to the Town of Lyons. Some of the land in the CEMEX proposal was earmarked for Lyons in the yet-to-be-renegotiated IGA, and they should have been involved in the negotiation. This proposal violates the spirit of the 2012 IGA, and portions of the actual IGA.
- **Eastern Corridor development would likely be halted.** With a 15-year extension, light commercial businesses would be less likely to invest in the Eastern Corridor, thus negatively impacting future (much needed) revenue for the Town of Lyons.

Again, we respectfully ask that Boulder County Planning and Permitting reject the application and proposal to extend mining, and instead work with all stakeholders in the community to craft a counter proposal that creates a win for everyone involved (which we believe is the case with what the Town of Lyons is proposing). Thank you for your time.

Sincerely,

Good Neighbors of Lyons
Sarah and Bart Lorang
12800 Foothills Hwy
Longmont, CO 80503

From: [Kayann Short](#)
To: [LU Land Use Planner](#)
Cc: [Boulder County Board of Commissioners; dvasquez@townoflyons.com](#)
Subject: [EXTERNAL] SU-22-003
Date: Friday, July 22, 2022 6:40:38 AM

As property owners living across Highway 66 from Cemex, we would like to see operations cease much sooner than fifteen years. We don't believe this type of extractive industry is consistent with Boulder County's environmentally sustainable future.

However, should the permit be extended for any amount of time, we ask that additional regulations be put in place to meet environmental concerns regarding dust and emissions from all mining and production operations. We are particularly concerned with fugitive dust events from uncovered mining pits.

Additionally, we ask that immediate measures be taken to lessen the high amount of truck traffic coming and going from Cemex. These trucks are traffic hazards for everyone living near the plant or traveling that stretch of an already busy highway. They substantially increase noise, dust, and other emissions along highway 66. We also ask that all trucks leaving the Cemex property be required to wash before exiting. That would mean creating a second wash station for the transport trucks that bring in materials to the plant and bring dust onto the highway as they leave the plant.

We are glad Cemex is negotiating to leave Boulder County. Now it's up to local government to ensure that in the time Cemex remains, their practices are consistent with high environmental and community standards.

Thank you,
Kayann Short and John Martin
Stonebridge Farm

RESOLUTION 94-81

A RESOLUTION CONDITIONALLY APPROVING BOULDER COUNTY LAND USE DOCKETS #SU-93-14 ("DOWE FLATS MINING & RECLAMATION PROJECT") AND #V-93-8 ("DOWE FLATS VACATION/RELOCATION OF COUNTY ROAD 47 AND VACATION OF A PORTION OF COUNTY ROAD 49"): A REQUEST FOR A SPECIAL USE PERMIT AND ASSOCIATED SITE SPECIFIC DEVELOPMENT PLAN FOR A LIMESTONE/SHALE OPEN MINING/QUARRYING OPERATION ON 312 ACRES WITHIN A 1911-ACRE PERMIT AREA, AND A REQUEST TO VACATE AND RELOCATE THE EXISTING ALIGNMENT OF COUNTY ROAD 47 AND TO VACATE PORTIONS OF COUNTY ROAD 49, ON PROPERTY LOCATED AT DOWE FLATS, EAST OF THE TOWN OF LYONS, NORTH OF U.S. HIGHWAY 66, WEST OF RABBIT MOUNTAIN, IN SECTIONS 9, 10, 15, 16, 21 & 22, T3N, R7OW.

WHEREAS, Southdown, Inc., a Louisiana Corporation, through its agent John Lohr ("Applicant"), has requested approval for a special use permit, with associated site specific development plan, to mine limestone and shale on a 312-acre area within a 1911-acre permit area on the property which is generally known as "Dowe Flats" and which is located as described in the caption to this Resolution, above ("the Subject Property"), in the A-Agricultural Zoning District in unincorporated Boulder County; and

WHEREAS, the Applicant has also requested approval of a vacation and relocation of existing County Road 47, as well as a vacation of portions of County Road 49, which are necessary as part of the mining operation; and

WHEREAS, the mining request includes mining of 100 acres at a time, with extraction of 760,000 tons a year, over a maximum 25-year mining period, with the mining to progress from south to north on the mining site at the rate of 300 feet per year, and also includes the transport of mined material from the mining site to the Applicant's existing cement plant (Southwestern Portland Cement Company) on the south side of U.S. Highway 66, and reclamation of the mining site; and

WHEREAS, the above-described request was processed and reviewed as Boulder County Land Use Docket #SU-93-14/#V-93-8 ("the Docket"), as further described in the Boulder County Land Use Department Planning Staff's Memorandum and written recommendation to the Boulder County Board of County Commissioners ("the Board") dated May 26, 1994, with its attachments ("the Staff Recommendation"); and

WHEREAS, on March 30, 1994, the Boulder County Planning Commission ("the Planning Commission") held a duly-

noticed public hearing on the Docket, and recommended conditional approval of the Docket to the Board, as set forth in the Planning Commission's Certificate of Resolution to the Board dated March 30, 1994; and

WHEREAS, on May 26, 1994, the Board held a duly-noticed public hearing on the Docket ("the Public Hearing"), at which time the Board considered the Staff Recommendation; the recommendation of the Planning Commission; and the documents and testimony presented by the staffs of the County Land Use Department, the County Parks and Open Space Department, and the County Attorney; the Applicant's representatives John Lohr, Paul Banks, and Mike Figgs; and numerous members of the public speaking both for and against the Docket; and

WHEREAS, considering the record of the Public Hearing, the Board finds that, subject to the conditions set forth in this Resolution, below, which are reasonable conditions necessary to allow the Docket to meet the applicable approval criteria, the Docket can be approved, on the basis that the Docket meets the criteria for special use approval and a site specific development plan set forth in Articles 20-301 and 19-301 of the Boulder County Zoning Resolution, and further, the vacation request portion of the Docket will not leave any adjoining land without an established public road or private access easement connecting said land with another established public road; and

WHEREAS, title to the roadways proposed to be vacated in the Docket shall vest in accordance with Part 3 of Article 2 of Title 43, C.R.S., as amended, upon recordation of a resolution of the Board confirming that the Applicant has complied with all applicable terms and conditions for relocating and reconstructing County Road 47 and for vacating County Road 49 as set forth in this Resolution and the Development Agreement to be executed in conformity with this Resolution (the "Development Agreement").

NOW, THEREFORE, BE IT RESOLVED that the Docket is hereby approved, on the basis and terms set forth in this Resolution, above, and subject to the following conditions and commitments:

1. The commitments of record of the Applicant be met, including those listed in the Applicant's summary of May 19/20, 1994, as modified by the following conditions.

2. Non-development Covenants

a. The life of mine non-development covenant shall cover the Permit Property, the West Dowe Flats Donation Parcel, and the Northwest Dowe Flats Property.

b. In the event of a future annexation, the County shall continue to have the right to enforce the non-development covenant, and no waiver or modification of this covenant by an annexing entity shall affect the enforcement rights of the County.

3. Donations

In accordance with the terms and conditions set forth in the Development Agreement, the Applicant will make the following voluntary donations of property to the County:

a. A conservation easement, including appropriate access rights, to protect and preserve the four archaeological sites on the West Dowe Flats Donation Parcel, to be granted contemporaneously with execution of the Development Agreement between the Applicant and the Board.

b. The West Dowe Flats Donation Parcel and the Northwest Dowe Flats Property to be granted for use as open space upon the occurrence of all of the following events: (1) commencement of mining, defined as the movement of at least 100,000 tons of mined material from the permit area to the existing cement plant site; (2) placement of the overland conveyor and crusher into regular operation (operation following start-up testing) in connection with the mining of the permit area; and (3) County acceptance of relocated County Road 47, vacation of old County Road 47, and vacation of portions of County Road 49. The Applicant shall escrow the deeds to the West Dowe Flats Donation Parcel and the Northwest Dowe Flats Property at the time of execution of the Development Agreement. The deeds shall include access rights. A condition of the donation is that no general public access shall be allowed on the West Dowe Flats Donation Parcel in perpetuity, and no general public access shall be allowed on the

Northwest Dowe Flats Property until at least 2030.

c. Contemporaneously with Southdown's dedication to the County of relocated County Road 47, a 25-foot-wide easement on the east side of said relocated road shall be granted to the County for limited uses as a hiking, equestrian, bicycle and non-motorized vehicle trail.

d. Prior to the completion of the conveyance of the donation parcels and the trail corridor to the County, the Applicant shall not convey away any of its rights, title, or interest in easements or other access ways for these properties as specified in the Development Agreement. Upon acquisition of the properties, the County shall not allow general public access to or from them via the Indian Gap Subdivision.

e. In the event of a future annexation, the County shall continue to have the right to enforce the commitment for donation of these properties, and no waiver or modification by an annexing entity shall affect the enforcement rights of the County.

4. Conveyor System

a. A conveyor system shall be used to haul material from the permit area to the existing cement plant. Limited truck haul may be used during the first two years of mining to transport up to 100,000 tons of mined material per year.

b. A new bridge and access road to the existing cement plant will be built, the old bridge removed, and the disturbed land restored. County Land Use Department Staff review and approval of final plans for the conveyor, including color, location, and landscaping within the Highway 66 view corridor, shall occur prior to construction.

c. No more than 200,000 tons of material may be transported to the plant until the conveyor commences operation and the County accepts the construction of relocated County Road 47.

d. In order to mitigate the impacts of the conveyor system, including noise, dust, and vibration, the Applicant shall make a reasonable purchase/option offer to persons owning existing residences within 500 feet of the conveyor system. Such offer shall be based on a reasonable appraisal of the property's value without the Dowe Flats mining operation in place. The offer shall be delivered to the affected property owners or sent to the owners by certified mail, return receipt requested, and shall provide the owners with 60 days (or such longer time as the Applicant may desire) to accept or reject the offer or submit a counteroffer. If the offer is accepted, the Applicant shall purchase the buffer property.

5. Periodic Review

a. The permit shall be subject to both interim and on-going review and assessment. The cost of studies or data produced by the Applicant as part of the required reviews, as well as of the County staff's time to process the reviews, shall be borne by the Applicant.

b. Interim reviews shall occur (as measured from the date of the Board's adoption of this Resolution) at the end of years one, three, and five and then occur every five years thereafter. Interim reviews shall be to review the monitoring/management plans and compliance with the permit terms, conditions, and commitments of record.

c. The Applicant shall also submit to the County Land Use Department copies of the annual reports mandated by the Colorado Mine Land Reclamation Board (CMLRB).

6. If sustained winds exceed 30 MPH at the site, loading and hauling operations will cease until the wind speed drops below 30 MPH. Crushing, conveying, and drilling operations may continue. Wind speed shall be measured at the mine site.

7. County Road 47 is to be relocated to the proposed western alignment through the east valley of Dowe Flats. Relocation of County Road 47 shall require approval of plans by the County Engineer and provision of a Letter of

Credit for 15% of the cost of the relocation to cover a one-year warranty. Upon acceptance by the County of the relocated portion of County Road 47, and upon the Applicant's conveyance of the trail easement described in 3(c) hereof, the County shall vacate the portions of old County Road 47 which have been relocated, said vacation to be confirmed by recordation of a separate Board resolution.

8. Subject to the retention of easements for existing utilities, County Road 49 shall be vacated south from Highway 66 to the Bullock/Southdown property line upon the occurrence of the following conditions: (i) Southdown's construction of a cul-de-sac at the end of and on the public road at said property line, as depicted on Exhibit L to the Development Agreement; and (ii) installation of an emergency access gate at said cul-de-sac. The occurrence of the preceding conditions shall be confirmed by the adoption and recordation of a separate Board resolution vacating such road as soon as possible after the County Transportation Department determines that the foregoing requirements have been met. After vacation is confirmed, Southdown shall allow adjacent property owners emergency access to Highway 66 over the vacated road through its property or over a new road to be constructed thereon.
9. Power line relocation shall be minimal and will coincide with road relocation.
10. The Applicant shall investigate and pursue the use of alternate safety warning devices for operations in the pit to replace the use of MSHA backup beepers.
11. The perimeter of the areas to be disturbed by mining and reclamation operations will be permanently monumented on the ground, with no mining activities to occur outside of this defined area.
12. The Applicant shall obtain all other permits as required and necessary, and shall amend its CMLRB permit to conform to the Board's approval

herein of the proposed "prairie" reclamation plan.

13. Execution of the Development Agreement by the Applicant as approved by the Board in conformity with this Resolution shall be required.
14. Final management plans, including agricultural, prairie dog and cultural resource plans, shall be approved by the County Land Use and Parks Departments' Staffs prior to the commencement of any mining or mining related activities.
15. Once mining has commenced (defined as the movement of at least 100,000 tons of mined material from the permit area to the plant site), the mining operation as approved herein shall be completed in no more than 25 years. The post-mining reclamation phase of the operation shall be completed in three years (or within such longer time only if expressly authorized or required by the Colorado Mined Land Reclamation Board). The maximum time period for all mining-related activity under this permit shall be 31 years.
16. A temporary operations center consisting of a small office/meeting structure, and parking, refueling, and maintenance area, may be located in the permit area only if a specific site plan for the center is reviewed and approved by the Board, and only if the center is removed after mining is completed.

A motion to conditionally approve the Docket, as stated above, was made by Commissioner Page, seconded by Commissioner Hume, and passed by a 3-0 vote of the Board.

ADOPTED this 28th day of June, 1994, in conformity with the Board's discussion on the proposed Resolution at its regularly convened public business meetings on June 9 and 14, 1994, nunc pro tunc the 9th and 14th days of June and the 26th day of May, 1994.

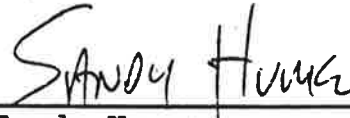
BOARD OF COUNTY COMMISSIONERS OF
BOULDER COUNTY:



Ronald K. Stewart, Chair



Homer Page, Vice Chair



Sandy Hume

ATTEST:


Clerk to the Board

**APPLICATION FOR BOULDER COUNTY
SPECIAL USE PERMIT
AND
SITE SPECIFIC DEVELOPMENT PLAN
FOR
MINING AND RECLAMATION**

DOWE FLATS

**Southdown, Inc.
(Southwestern Portland Cement)
P.O. Box 529
Lyons, Colorado 80540
(303) 534-4206**

**SHB AGRA Project E92-7075
June 1, 1993**

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1.0 INTRODUCTION

Pursuant to the Boulder County Zoning Resolution, Southdown, Inc. (Southwestern Portland Cement) herewith submits concurrent applications for a Special Use Permit and Site Specific Development Plan for mining and reclamation at Dowe Flats.

Approval of the permits, as submitted, would accomplish the following three goals.

- 1) Ensure long-term stability of the cement plant. Given historical levels of permitted output of cement products, it has been estimated that the proposed mine plan would provide cement plant reserves for 25 years.
- 2) Screen visual and noise impacts of the mining operation and create valuable wildlife habitat with an innovative reclamation plan. The mine will be reclaimed in a fashion compatible with the surrounding neighborhood.
- 3) Accommodate the construction of a reservoir in the East Valley of Dowe Flats. The mine and reclamation plan has been designed to accommodate dam construction. A separate, but concurrently processed, Special Use Application for water storage has been submitted.

The mine and reclamation plans have been designed to achieve all three of these goals during the 25 year life-of-mine.

A Regular 112 Reclamation Permit application for mining and reclamation has been made to the Colorado Mined Land Reclamation Board (CMLRB). The CMLRB application document has been submitted to Boulder County and is herein incorporated by reference into this Special Use application. Also 11 Technical Appendices are attached to this application to support the findings in this document and to comply with County submittal requirements.

Mine operations are detailed in the CMLRB permit, and this permit application should be used as a companion volume to this Boulder County Special Use Permit application, as the county permit does not duplicate all of the mine operation details found in the CMLRB permit.

Materials to be mined within the context of this plan are limestone and shale which will be

transported by haul trucks to the existing cement plant, located one mile to the south of Dowe Flats. County Road 47, in the central portion of Dowe Flats, is proposed to be relocated to accommodate mining.

Production rock will be hauled to the cement plant on a private haul road. Hauling will be done in 85 ton haul trucks crossing State Highway 66 at grade, and proceeding south into the plant. The haul road will have to be constructed prior to mining and will also cross the Burlington Northern Railroad tracks, the St. Vrain River, property owned by Frontier Materials, County Road 49 and then into the cement plant property.

Improvements to public roadways will be performed as necessary and as required by Boulder County and the Colorado Department of Transportation.

1.1 Project Summary

Included with this permit application is the "Dowe Flats Project Summary" which presents brief descriptions of:

- The Proponent
- Mining and Reclamation Plans
- Water Storage Plans
- Permits/Appraisals Required
- Project Team/Contact People for Additional Information
- Public and Agency Review Process
- Color Photos of Existing Area, Mine Reclamation Plan, and Conceptual Reservoir
- Project Vicinity Maps

1.2 Format of the Permit Application

The commentary of the Dowe Flats Mine and Reclamation Permit applications generally follows the format of Article 20, "Uses Permitted By Special Review", and Article 19, "Site Specific Development Plan, of the Boulder County Zoning Resolution (as amended February 1992)", which is the applicable regulatory document for permitting procedures within Boulder County. Although a Special Use Permit must be obtained prior to approval of a Site Specific Development Plan, they may be applied for concurrently, as in the case of this Mine and

Reclamation Permit application.

The permit commentary, generally follows each section of each Article in the Zoning Resolution. Each section of Article 20 and 19 of the Zoning Resolution is addressed, unless response to a section is considered to not apply to this proposal.

2.0 APPLICATION FORMS

Completed application forms, lists of agents, and landowner signatures are attached to this application.

3.0 PROFESSIONAL QUALIFICATIONS

The professional qualifications of the consulting team are attached to this application.

4.0 SITE PLAN

Total Acres

The total acreage within the Special Use Permit boundary is 1,911. Individual property ownership in and around the permit boundary is shown on Map 1. Map 1 also shows the mine haul road to the cement plant and the proposed corridor for the relocated County Road 47.

Location Map

Dowe Flats is located in north-central Boulder County, approximately two miles east of the Town of Lyons, five miles northwest of the City of Longmont, two miles south of Larimer County, and twelve miles north of the City of Boulder. A site location map is shown on Map 2.

Name, Address, Phone of Applicant, Engineer, Surveyor

This information is attached to this application.

Boundary Lines With Dimensions, Township & Range, Sections

The boundary of this Special Use application is shown on Map 1.

Existing and Proposed Topographic Contours

Map 1 displays existing topographic contours. Exhibit F of the CMLRB application displays the approximate post mining topographic contours.

Significant Existing and Proposed Features

Existing site features are shown on Map 3. Proposed features, including the mine and reclamation plan, are shown in Exhibits C, D, E and F of the CMLRB application.

Description of Existing and Proposed Roads, Road Rights-of-way

Existing roads are shown on Map 3. Proposed roads, including the mine haul road and the relocated County Road 47, are shown on Map 1. The main road construction activities are the relocation of County Road 47 and the construction of the private haul road. In addition to these, internal haul roads will be constructed, used temporarily, and reclaimed. These internal roads are within the mining and reclamation area.

Relocated County Road 47 will be constructed to the County's local access road standards. It will be a gravel road (as it is now) approximately 22 ft. wide (travel lanes). The mine haul road will be approximately 60 ft. wide, except for the bridge over the St. Vrain River, which will be a single travel lane 30 ft. wide.

Description of Buildings Mine Operations Center Conceptual Plan

The mine operations center for the Dowe Flats mining and reclamation project will be the Harroun farm, shown on Map 3. The Harroun farm is currently used as a feed lot and for growing crops. Although this activity is planned to continue, certain buildings will be demolished, others will be remodeled and new structures will be built. Access will remain where it currently is (off County Road 47) and parking for 20 employees and visitors will be

constructed. Lighting will be improved as required by the Mine Safety and Health Administration. The existing water and sewer on the farm will be upgraded to service mine employees.

As discussed below, 16,200 sq. ft. of existing buildings will be utilized for the mine operations center. This makes up a large part of the 25,400 sq. ft. total proposed for the operations center. Of that total, 1,700 square feet will be office related and 22,200 sq. ft. will be covered storage, mine vehicle maintenance area, and covered parking for mine operations vehicles. The 1,500 sq. ft. farmhouse at the mine operations center will be boarded up and not used for any purpose.

Another existing farmhouse, barn, and small sheds southwest of the mine operations center will continue to be used by the tenant rancher. Square footage of these are not included in the mine operations center conceptual plan.

Existing buildings and structures

Existing buildings at the proposed mine operations center site consist of a farmhouse, three animal feed stalls and associated feed lots, a metal quonset hut, three sheet metal sheds, a milk house, and various small storage sheds. The milk house, one sheet metal shed, and miscellaneous small sheds in poor condition will be removed.

Locations of existing buildings to be retained are shown on Map 3A. The approximate square footage and proposed use for each are as follows:

Farmhouse	1,500 sq. ft. - will be boarded up and not used
Metal quonset hut	7,500 sq. ft. - covered parking of haul trucks
Sheet metal shed	3,200 sq. ft. - storage and garage for pick up trucks
Sheet metal shed	4,000 sq. ft. - garage for pick up trucks
Total sq. ft. retained	16,200 sq. ft.

The three feed lots and associated feeding stalls and small grain storage sheds will be retained and continue to be used for raising farm animals.

Proposed new buildings

Locations of building envelopes for proposed new construction are shown on Map 3A.

A new single-story 1,700 sq. ft. operations center office building is proposed to be constructed with concrete block exterior treatment. This building will not exceed 35 feet in height. It will house three offices, a records room, and two bathrooms with showers to serve up to 15 men and 3 women. The office building will be located within a building envelope having the following setbacks:

North (existing Vestal Road)	1,666 feet
West (existing North 53rd Street)	748 feet
East (east Mine Permit Boundary)	4,439 feet
South (south Mine Permit Boundary)	817 feet

An equipment maintenance building may be required in the future. It is planned to be approximately 7,500 sq. ft. and constructed of prefabricated metal and concrete block. The maintenance building will not exceed 50 feet in height as required by the Boulder County Zoning Resolution Article 4-301 for Agricultural Districts. The maintenance building envelope is located with setbacks as follows:

North (existing Vestal Road)	1,913 feet
West (existing North 53rd Street)	555 feet
East (east Mine Permit Boundary)	4,483 feet
South (south Mine Permit Boundary)	529 feet

Employee Access Road and Parking

The existing access road will be retained for employee and visitor access to the mine operations center. A 6,000 sq. ft. parking area will be added adjacent to the proposed office building as shown on Map 3A. This will provide space for 20 administrative employee, mine employee and visitor cars. The access road and parking area will be used for passenger vehicles only and will be surfaced with compacted gravel.

Mining Equipment Access Road

A new 50 feet wide road providing access for mining equipment and haul trucks to the covered parking at the mine operations center is proposed. For safety reasons, this is located to keep mining equipment traffic separate from passenger vehicles. The approximate location and corridor is shown on Map 3A. The mining equipment access road will be surfaced with compacted gravel.

Lighting of the Mine Operations Center

Outdoor lighting will be installed at six locations for employee safety and will be directed so as to avoid shining off the mine operations center property. One light post will be located on the employee access road and four will be located within the proposed employee parking area. One light post will be located outside of the haul truck parking quonset hut building and directed to illuminate the interior. No lighting will exceed 25 feet in height as required by Article 22-701 of the Boulder County Zoning Resolution. General locations of light posts are shown on Map 3A.

Landscaping

Landscaping plans are fully described and depicted in the reclamation plan, Exhibits E and F of the CMLRB application.

Wells/Water Line

Water supplies associated with the existing structures on the Harroun property will be used for personnel at the mine operation center. Water required for the operation of the mine (e.g. dust control) will be supplied from the applicants' existing water rights in the area.

Design and Layout of Sewer Service

Sanitary sewer facilities associated with the existing structures on the Harroun property will be utilized for the mine operation center.

Exterior Lighting Fixtures

Lighting will be used as required by MSHA and where necessary for safety. Mining will not take place after dark.

Traffic Signs

Traffic signs will be erected as required on the relocated County Road 47. Signage will also be required for the mine haul road crossing of State Highway 66 and County Road 49 (North 51st). The applicant will work with the Colorado Department of Highways and Boulder County to determine and fulfill signage requirements.

Overlot Grading Plans

Overlot grading plans are described and depicted in the reclamation plan, Exhibits E and F of the CMLRB application.

Storm Drainage Plans

Storm drainage will be diverted and directed into the mined out areas such that no runoff from disturbed ground enters natural drainageways or ditches or will be directed through a sediment pond prior to discharge.

Parking Areas

Parking areas associated with the existing and new structures on the Harroun property will be utilized for the mine operation center.

Number of employees

The mine is expected to employ up to 20 people, some of whom are currently employed by the applicant.

5.0 DEVELOPMENT REPORT

5.1 Title Report

A title report for the property is attached to this application.

5.2 Description of Site Features

5.2.1 Geography

Dowe Flats is a triangular valley that resulted from erosion of less-resistant geologic strata in the interior of a plunging syncline. Ridges of more resistant beds surround the valley on three sides. The valley floor has low topographic relief and slopes toward the south at an average 2% gradient. There is a maximum of approximately 700 feet of topographic relief between the valley floor and the top of the ridges. The 40-foot high Limestone Ridge transects the western half of the valley. The valley is drained by small intermittent streams and ephemeral gullies.

5.2.2 Drainages

Dowe Flats is a three-sided basin, with the floor of the basin comprising some 2000 acres. Dowe Flats is so named because of the wide, flat, and uniformly-sloping floor of the valley. The area is flanked by the slopes of Rabbit Mountain to the east and Indian Mountain to the west. Dowe Pass bounds the valley on the north.

The total area of the drainage basin is comparatively small, no more than 4500 acres. A spine-like ridge rises 40 feet above the valley floor and trends due north to separate Dowe Flats into the East Valley and the West Valley (Map 3). This drainage divide, called "Limestone Ridge" (or "Hi-Cal Ridge") separates the East and West Valleys into two individual sub-basins. At approximately 3000 acres, the East Valley is the larger drainage, extending north of the West Valley to Dowe Pass. Exhibit G of the CMLRB application contains a detailed discussion of site hydrology.

The East Valley is drained by a small intermittent creek that owes some of its flow to seepage from the St. Vrain supply canal and agricultural irrigation. The West Valley lacks a well

defined drainage feature, although the valley bottom collects water in a series of wetlands, which are also augmented by seepage from the St. Vrain supply canal and agricultural irrigation. The Supply Ditch intercepts drainage from both valleys.

5.2.3 Floodways

St. Vrain Creek is the only Overlay Zoned floodplain near this project and it is not within the mine area. The only relevance to this project is the mine haul road crossing of the St. Vrain Creek Floodplain. Map 4 shows the mine haul road crossing of the Overlay Zoned Floodplain of the St. Vrain Creek. Haul road construction in the floodplain will be done in compliance with the County's Floodplain Zoning requirements.

5.2.4 High Ground Water

A detailed discussion of groundwater is contained in Exhibit G of the CMLRB application. A groundwater issue associated with this project is the Syntex landfill located north of this project in Dowe Pass. Groundwater contamination from the Syntex site has not migrated off site and does not affect the Dowe Flats project. This statement is evidenced by the following:

1. The site is under enforcement action by the State of Colorado and is undergoing active clean up.
2. The Northern Colorado Water Conservancy District (Northern), City of Boulder, and City of Longmont have signed a "Settlement Agreement" with Syntex which stipulates that the St. Vrain Water Supply Canal is not impacted by groundwater contamination from the Syntex site (the agreement is attached as an appendix to this application).
3. Northern has installed groundwater monitoring wells downgradient of the Syntex site and upgradient of the canal. The wells are sampled quarterly and indicate no contamination.
4. Baseline surface and groundwater quality monitoring for the Dowe Flats project indicates no contamination from the Syntex site is present on the Dowe Flats

project property (monitoring reports for four quarters are attached as an appendix to this application).

5.2.5 Wetlands

Existing Conditions

An inventory of federally regulated wetlands was conducted within the general confines of the Dowe Flats basin in 1987 (Aquatic and Wetland Consultants, Inc., 1987). Results of the inventory have been verified by the U.S. Army Corps of Engineers, Omaha Regulatory District, (ACOE) as documented in a letter from ACOE dated 25 September 1987. An additional wetlands inventory was conducted in 1990 (Aquatic and Wetland Consultants, Inc., 1990). Inventory results have received concurrence by ACOE (wetlands data, map and ACOE letters are attached as an appendix to this application).

A total of 45.1 acres of wetlands was inventoried in 1987, and another 8.5 acres were inventoried in 1990. The combined total of jurisdictional wetlands within the project area is approximately 53.6 acres.

Wetlands located within the valley typically follow natural drainage features or occur as isolated seeps. Some of the wetlands appear to be supported, at least in part, by seepage from the St. Vrain Supply Canal and other irrigation ditches which traverse the property. Wetlands located south of Highway 66 in proximity to St. Vrain Creek, are also supported by localized seepage, or appear to be remnant floodplain features.

Most of the wetlands within the Dowe Flats basin are dominated by herbaceous species including:

cattail	<i>Typha angustifolia</i>
three-square rush	<i>Scirpus americanus</i>
bulrush	<i>Scirpus acutus</i>
arctic rush	<i>Juncus arcticus</i>
sedges	<i>Carex</i> spp.
reed canary grass	<i>Phalaroides arundinacea</i>

Cottonwoods (*Populus* spp.) and willows (*Salix* spp.) intermittently border the small drainageways.

Riparian areas characterized by mature cottonwood and willow stands border St. Vrain Creek and the Supply, Highland, Rough and Ready, and Palmerton irrigation ditch corridors, but were not included as part of this study because they are not considered to be wetlands by federal definition. The only impacts to riparian features will be from crossings by the Mine Haul Road. There will be no mining on or near these ditches and related riparian features. These areas will be further protected by mine operation setbacks and reclamation buffers. Some ditch related riparian zones will be secluded by the reclaimed overburden features, increasing the wildlife habitat function.

Project Impacts

Mining operations in the valley will avoid wetland impact entirely with the possible exception of a temporary crossing of the unnamed drainage in the east valley. A crossing of the drainage may be required to transport overburden from the mine site to reclamation areas located east of the drainage. The temporary crossing can be authorized by a Section 404 Nationwide Permit (#26) and will be removed and reclaimed to its original condition as part of the project reclamation plan.

The Haul Road, linking the mining operation to the cement plant, will cross the St. Vrain River and one isolated wetland located in the borrow ditch of the railroad. Both the wetland and river crossing for the roadway can be authorized separately from the mining operation by Section 404 Nationwide Permits (#14 and #26).

Mitigation

Since fill in jurisdictional wetlands totaling one acre or more will be avoided, an individual Section 404 permit application for the mining and reclamation activities is not required. Notwithstanding this fact, approximately 37 acres of wetland and 44 acres of open water areas are incorporated into the mine reclamation plan design, resulting in a net increase of wetlands and aquatic resource within the valley. It is anticipated that groundwater will fill and/or saturate low-lying areas of the mine pit that will not be backfilled. These areas will develop wetland

characteristics with time and add to the diversity of habitat types that are anticipated to occur through reclamation.

5.2.6 Topography

Project topography has been previously discussed.

5.2.7 Vegetation

Existing Conditions

The vegetation of the project area has been described by Holistic Resource Management (1987), and Esco Associates, Inc. (1987). Vegetation reports for the project area are attached to this application as an appendix.

Improved Pasture

Improved pasture areas were probably once cultivated and later planted to Russian wild rye (*Elymus junceus*). These areas are heavily used by cattle and are occupied by large numbers of black-tailed prairie dogs. The cumulative effect of foraging by these animals has resulted in pronounced overgrazing and invasion of weedy plants. Invader species include:

snakeweed	<i>Xanthocephalum sarothrae</i>
musk thistle	<i>Carduus nutans</i>
Canada thistle	<i>Cirsium arvense</i>
common bindweed	<i>Convolvulus arvensis</i>
plains prickly poppy	<i>Argemone polyanthemus</i>

Hay Pasture

Hay pasture is irrigated land that has been planted to such domestic forage grasses as:

smooth brome	<i>Bromopsis inermis</i>
orchard grass	<i>Dactylis glomerata</i>

common timothy
tall fescue

Phleum pratense
Festuca arundinacea

These lands are mowed for hay during the growing season and may later be given over to grazing after the growing season.

Cultivated Land

Cultivated land is managed primarily for the production of small grains, especially winter wheat and oats, and occasionally corn. Most of this land is managed in a strip rotation pattern in which alfalfa is periodically rotated in to improve soil fertility and tilth.

Upland Grassland along Limestone Ridge

The grassland along Limestone Ridge is a remnant of the original vegetation cover on the shallow soils and convex portion of Dowe Flats. Although it has been heavily disturbed by grazing and other activities, it retains a diversity of native plants not found in the more extensive created pastures and adjacent cultivated land. Dominant species in this stand are the following perennial native grasses:

blue grama	<i>Bouteloua gracilis</i>
western wheatgrass	<i>Agropyron smithii</i>
needle-and-thread	<i>Stipa comata</i>
bottlebrush squirreltail	<i>Sitanion longifolium</i>
Fendler three-awn	<i>Aristida fendleriana</i>

along with the following perennial non-native grasses:

intermediate wheatgrass	<i>Agropyron intermedium</i>
standard crested wheatgrass	<i>Agropyron desertorum</i>
smooth brome	<i>Bromus inermis</i>
Russian wild rye	<i>Elymus junceus</i>

Native annual grasses present in very small amounts are:

sixweeks fescue	<i>Vulpia octoflora</i>
false buffalograss	<i>Munroa squarrosa</i>

Introduced annual grasses are locally abundant, and include:

cheatgrass (especially abundant)	<i>Bromus tectorum</i>
Japanese brome	<i>Bromus japonicus</i>
annual ryegrass	<i>Secale cereale</i>
wheat	<i>Triticum aestivum</i>

Shrubs are scattered sparsely but rather uniformly and include:

rubber rabbitbrush	<i>Chrysothamnus nauseosus</i>
winterfat	<i>Krascheninnikovia lanata</i>
three-leaf sumac	<i>Rhus trilobata</i>
prickly rose	<i>Rosa acicularis</i>
snakeweed	<i>Xanthocephalum sarothrae</i>

Among the numerous native perennial forbs present are:

textile onion	<i>Allium textile</i>
prickly poppy	<i>Argemone polyanthemom</i>
fringed sage	<i>Artemisia frigida</i>)
white prairieaster	<i>Aster ericoides</i>
Porter aster	<i>Aster porteri</i>
slender milkvetch	<i>Astragalus gracilis</i>
three-leaf milkvetch	<i>Astragalus tridactylus</i>
downy paintbrush	<i>Castilleja sessiliflora</i>
mouse-ear chickweed	<i>Cerastium arvense</i>
James hiddenflower	<i>Cryptantha jamesii</i>
wafer-parsnip	<i>Cymopterus acaulis</i>
white prairie clover	<i>Dalea candida</i>

low fleabane	<i>Erigeron pumilus</i>
slenderbush wildbuckwheat	<i>Eriogonum effusum</i>
robust spurge	<i>Euphorbia robusta</i>
wallflower	<i>Erysimum asperum</i>
evolvulus	<i>Evolvulus nuttalliana</i>
blanketflower	<i>Gaillardia aristata</i>
scarlet gaura	<i>Gaura coccinea</i>
ironplant goldenweed	<i>Haplopappus spinulosus</i>
stiff sunflower	<i>Helianthus rigidus var. subrhomboideus</i>
hairy goldenaster	<i>Heterotheca villosa</i>
thread-leaved hymenopappus	<i>Hymenopappus filifolius</i>
low bladderpod	<i>Lesquerella montana</i>
sandlily	<i>Leucocrinum montanum</i>
spotted gayfeather	<i>Liatris punctata</i>
Lewis flax	<i>Linum lewisii</i>
salt-and-pepper	<i>Lomatium orientale</i>
bractless blazingstar	<i>Mentzelia nuda</i>
yellow blazingstar	<i>Mentzelia speciosa</i>
lanceleaf chimingbells	<i>Mertensia lanceolata</i>
musineon	<i>Musineon divaricatum</i>
false dandelion	<i>Nothocalais cuspidata</i>
yellow stemless eve. primrose	<i>Oenothera brachycarpa</i>
cutleaf evening primrose	<i>Oenothera coronopifolia</i>
Colorado loco	<i>Oxytropis lambertii</i>
James nailwort	<i>Paronychia jamesii</i>
sidebells penstemon	<i>Penstemon secundiflorus</i>
plains bahia	<i>Picradeniopsis oppositifolia</i>
narrowleaf scurfpea	<i>Psoralea tenuiflora</i>
Britton skullcap	<i>Scutellaria brittonii</i>
lambstongue groundsel	<i>Senecio integerrimus</i>
broom groundsel	<i>Senecio spartioides</i>
stiff goldenrod	<i>Solidago rigida</i>
cowboy's delight	<i>Sphaeralcea coccinea</i>
Rio Grande greenthread	<i>Thelesperma megapotamicum</i>

Easter daisy	<i>Townsendia cf. hookeri</i>
Dakota vervain	<i>Verbena ambrosifolia</i>

Introduced perennial forbs present in the grassland on Limestone Ridge include:

field bindweed	<i>Convolvulus arvensis</i>
black medic	<i>Medicago lupulina</i>
alfalfa	<i>Medicago sativa</i>
common dandelion	<i>Taraxacum officinale</i>

Native annual and biennial forbs present include:

thyme-leaf spurge	<i>Chaemaesyce serpyllifolia</i>
gray goosefoot	<i>Chenopodium incanum</i>
yellow-center thistle	<i>Cirsium ochrocentrum</i>
wavy-leaf thistle	<i>Cirsium undulatum</i>
hare's ear	<i>Conringia orientalis</i>
Carolina draba	<i>Draba reptans</i>
Ellisia	<i>Ellisia nyctelea</i>
snow-on-the-mountain	<i>Euphorbia marginata</i>
plains sunflower	<i>Helianthus petiolaris</i>
Virginia pepperweed	<i>Lepidium virginicum</i>
dragonhead	<i>Moldavica parviflora</i>
black nightshade	<i>Solanum americanum</i>

A variety of introduced annual and biennial forbs and grasses are abundant in this area, including:

alyssum	<i>Alyssum minus</i>
redroot pigweed	<i>Amaranthus retroflexus</i>
littlepod falseflax	<i>Camelina microcarpa</i>
musk thistle	<i>Carduus nutans</i>
diffuse knapweed	<i>Centaurea diffusa</i>
purple mustard	<i>Chorispora tenella</i>

pinnate tansymustard	<i>Descurainia pinnata</i>
flixweed tansymustard	<i>Descurainia sophia</i>
filaree	<i>Erodium cicutarium</i>
common sunflower	<i>Helianthus annuus</i>
summercypress	<i>Kochia iranica</i>
stickseed	<i>Lappula redowskii</i>
false salsify	<i>Podospermum laciniatum</i>
Russian-thistle	<i>Salsola iberica</i>
Jim Hill mustard	<i>Sisymbrium altisissimum</i>
salsify	<i>Tragopogon dubius</i>
bracted verbena	<i>Verbena bracteata</i>

Lowland Grassland

These areas occur on heavy soils on low slope areas in the overburden storage area on the northern end of the West Valley of Dowe Flats and downslope from the St. Vrain Supply Canal. The dominant species present are the following perennial native grasses in order of dominance:

western wheatgrass	<i>Agropyron smithii</i>
streambank wheatgrass	<i>Agropyron dasystachyum</i> var. <i>riparium</i>

Other species locally conspicuous include the perennial grass foxtail barley (*Hordeum jubatum*), the annual grasses cheatgrass (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*), and the following perennial forbs:

fog fruit	<i>Phyla cuneifolia</i>
two-groove milkvetch	<i>Astragalus bisulcatus</i>
Short milkvetch	<i>Astragalus shortianus</i>
Dalmation toadflax	<i>Linaria dalmatica</i>
Pacific aster	<i>Aster adscendens</i>
bastard toadflax	<i>Comandra umbellata</i>
cowboy's delight	<i>Sphaeralcea coccinea</i>

Also common are annual (or biennial) forbs including:

pennyroyal	<i>Hedeoma hispida</i>
alyssum	<i>Alyssum minus</i>
moth mullein	<i>Verbascum blattaria</i>

Other Vegetation Types of the Area Not to be Disturbed by Direct Effects of Mining

Vegetation of the permit area that will not be disturbed by direct effects of mining, but which could be disturbed by ancillary facilities includes:

Natural vegetation types

- Upland Grassland with Shrubs
- Mountain Mahogany/Skunkbrush Shrubland
- Ponderosa Pine Woodland
- Riparian Shrubs in Upland Drainages
- Riparian Trees and Shrubs along Irrigation Ditches
- Riparian Forest
- Skunkbrush/Plum/Chokecherry Shrubland
- Wetland

Land use-defined vegetation types

- Dry Pasture

Upland Grassland with Scattered Dryland Shrubs

This grassland unit is characterized by the occasional occurrence of mountain mahogany (*Cercocarpus montanus*) and skunkbrush (*Rhus trilobata*) shrubs, mainly on microsites of shallow soil, where grass competition is limited. The grass matrix is dominated by a mixture of cool and warm season native perennial species including:

western wheatgrass	<i>Agropyron smithii</i>
needle-and-thread	<i>Stipa comata</i>
junegrass	<i>Koeleria macrantha</i>
sideoats grama	<i>Bouteloua curtipendula</i>

blue grama	<i>Bouteloua gracilis</i>
little bluestem	<i>Schizachyrium scoparium</i>
Indiangrass	<i>Sorghastrum nutans</i>

Some local areas are overwhelmingly dominated by the introduced annual grasses Japanese brome (*Bromus japonicus*) and cheatgrass (*Bromus tectorum*).

Mountain Mahogany/ Skunkbrush Shrubland

An extensive area is distinguished by a heavy cover of mountain mahogany. In some parts, there are scattered ponderosa pine (*Pinus ponderosa*). Herbaceous understory consists of sparse cover of species mentioned in the next type description.

Ponderosa Pine Woodland

This vegetation type is dominated by ponderosa pine which provides from about 30 to 100 percent canopy cover. The understory is variously comprised of native grasses and shrubs. Ponderosa Pine Woodland grades into Mountain Mahogany Shrubland, and thus may have a dense mountain mahogany shrub understory.

Riparian Shrubs and Small Trees along Upland Drainages

Occurring in narrow strips along a few sheltered drainages are developments of mesic shrubs including:

American plum	<i>Prunus americana</i>
chokecherry	<i>Padus virginianus</i> var. <i>melanocarpa</i>
willow	<i>Salix</i> sp.
hawthorn	<i>Crataegus</i> sp.

The willows and hawthorns reach heights of a few meters.

Tree species occurring sporadically include:

boxelder	<i>Acer negundo</i>
plains cottonwood	<i>Populus deltoides</i>
lanceleaf cottonwood	<i>P. x acuminata</i>
peachleaf willow	<i>Salix amygdaloides</i>

Riparian Trees and Shrubs Along Irrigation Ditches

The tree species plains cottonwood and peachleaf willow intermittently border the four irrigation ditches present in the south end of Dowe Flats. Occurring with these trees are shrubs including:

Russian olive	<i>Eleagnus angustifolia</i>
sandbar willow	<i>Salix exigua</i>
hawthorn	<i>Crataegus sp.</i>

Riparian Forest along Major Watercourses

This type is confined to the immediate proximity of South St. Vrain Creek where the proposed transportation corridor crosses the creek. Dominant trees present are:

peachleaf willow	<i>Salix amygdaloides</i>
crack willow	<i>Salix fragilis</i>
boxelder	<i>Acer negundo</i>
plains cottonwood	<i>Populus deltoides</i>
narrowleaf cottonwood	<i>Populus angustifolia</i>

Other tree species present include:

Russian olive	<i>Eleagnus angustifolia</i>
sandbar willow	<i>Salix exigua</i>
New Mexico locust	<i>Robinia neomexicana</i>

Shrub species present are:

prickly rose	<i>Rosa acicularis</i>
Wood's rose	<i>Rosa woodsii</i>
chokecherry	<i>Padus virginiana</i> var. <i>melanocarpa</i>
wild plum	<i>Prunus americana</i>
snowberry	<i>Symphoricarpos</i> cf. <i>occidentalis</i>

Perennial grasses and grasslikes present include:

mannagrass	<i>Glyceria striata</i>
Kentucky bluegrass	<i>Poa agassizensis</i>
reed canarygrass	<i>Phalaris arundinacea</i>
Nebraska sedge	<i>Carex nebrascensis</i>
broom sedge	<i>Carex scoparia</i>
foxtail	<i>Alopecurus pratensis</i>

Perennial forbs present include:

spotted knapweed	<i>Centaurea maculata</i>
American speedwell	<i>Veronica americana</i>
willowherb	<i>Epilobium adenocaulon</i>
bouncing bet	<i>Saponaria officinalis</i>
field mint	<i>Mentha arvensis</i>
Canada thistle	<i>Cirsium arvense</i>
cress	<i>Rorippa palustris</i> ssp. <i>hispida</i>

Annual (and biennial) forbs present include:

ragweed	<i>Ambrosia</i> sp.
musk thistle	<i>Carduus nutans</i>
burdock	<i>Arctium minus</i>

Vines present are:

western virgin's bower	<i>Clematis ligusticifolia</i>
wild hops	<i>Humulus lupulus</i>

Skunkbrush/ Plum/Chokecherry Shrubland

In these areas, deep colluvial deposits support thickets of the following shrubs:

skunkbrush	<i>Rhus trilobata</i>
American plum	<i>Prunus americana</i>
Chokecherry	<i>Padus virginiana</i> var. <i>melanocarpa</i>
squaw currant (occasional)	<i>Ribes cereum</i>
hackberry (occasional)	<i>Celtis occidentalis</i>

The American plum and chokecherry do not achieve their typical heights, staying mostly below one meter. This is attributable to the fact that they occur on south- and west-facing slopes that are naturally relatively dry and hot.

Wetland

These areas, occurring in depressions and drainage bottoms, qualify as wetlands due to the abundance of wetland indicator species at particular locations and may include portions of the Riparian Forest unit. Species include:

Nebraska sedge	<i>Carex nebrascensis</i>
broom sedge	<i>Carex scoparia</i>
Baltic rush	<i>Juncus arcticus</i> ssp. <i>balticus</i>
interior rush	<i>Juncus interior</i>
threesquare	<i>Scirpus americanus</i>
foxtail barley	<i>Hordeum jubatum</i>
tall fescue	<i>Festuca arundinacea</i>
curly dock	<i>Rumex crispus</i>

In the wettest areas, broadleaf cattail (*Typha latifolia*) and hardstem bulrush (*Scirpus acutus*) occur. There are local areas of heavy cover by reed canarygrass (*Phalaris arundinacea*).

Dry Livestock Pasture

This type consists of areas with various histories, united by the presence of dry, well-drained soils and periodic heavy livestock grazing disturbance. The dominant species reflect these conditions and include the following perennial grasses and grasslikes:

smooth brome	<i>Bromopsis inermis</i>
Kentucky bluegrass	<i>Poa agassizensis</i>
sun sedge	<i>Carex heliophila</i>

the annual grass cheatgrass (*Bromus tectorum*),

several perennial forbs:

hairy goldenaster	<i>Heterotheca villosa</i>
gumweed	<i>Grindelia squarrosa</i>
alfalfa	<i>Medicago sativa</i>
spotted knapweed	<i>Centaurea maculata</i>
common bindweed	<i>Convolvulus arvensis</i>

the following annual (or biennial) forbs:

mullein	<i>Verbascum thapsus</i>
musk thistle	<i>Carduus nutans</i>

the following shrubs:

rubber rabbitbrush	<i>Chrysothamnus nauseosus</i>
Wood's rose	<i>Rosa woodsii</i>

and the succulent pricklypear cactus (*Opuntia polyacantha*).

Other Vegetation Mapping Units

In addition to the above-described vegetation types, three miscellaneous land use areas have been delineated.

Commercial property

These are areas where the surface is occupied by business facilities.

Non-agricultural Disturbed Land

This category includes various mostly linear areas disturbed by public roads, the St. Vrain Supply Canal, and irrigation ditches on the south end of Dowe Flats.

Residential Property

These are areas occupied by private residences, mostly in close proximity to Highway 66 south of Dowe Flats.

Project Impacts

Vegetation to be impacted by the proposed Dowe Flats mining operation is predominantly of an agricultural nature and is either currently under cultivation or consists of previously planted European or Asian forage species. Any remaining native vegetational cover is situated on the crest and upper slopes of Limestone Ridge and the northern portion of the West Valley. Although the area has been heavily impacted by grazing and other agricultural activities, it retains a substantial diversity of native plants not found in the more extensive created pastures and adjacent cultivated land. Numerous field surveys have indicated that no species considered rare, threatened or endangered presently exist on Limestone Ridge. A file search of the Colorado Natural Areas Program plant inventory list revealed that no plant species of concern are present in the project area. A survey for *Spiranthes Diluvialis* will be performed in July or August, 1993 and the results will be forwarded to Boulder County.

During the mining activity phase of the project, the vegetation of the quarry sites will be

removed. After regrading and reclamation, the restored vegetation will comprise far more diverse biological communities than the present ones, which are limited by homogeneous, nearly flat topography and biological simplification caused by agricultural use (refer to Exhibits E and F of the CMLRB application).

Mitigation

During the reclamation phase of the project, existing degraded vegetational and soil resources will be replaced by a landscape providing a greater diversity of topography, vegetation, and wildlife habitat. Aesthetic qualities will also be enhanced. Vegetation types will include upland grasslands and shrublands, wet meadows and marshes, as well as open water, and moist shrubland and forests in protected coves.

5.3 Soils

Main Soil Types of the Permit Area

Soils of the Dowe Flats project area were mapped by the U.S. Soil Conservation Service (1975) as part of the Boulder County Soil Survey (see also Exhibit I of the CMLRB application). The three main units mapped in areas that will be disturbed by mining are LaPorte very fine sandy loam, Manvel loam, and Gaynor silty clay loam.

LaPorte Soils

The LaPorte soils are shallow and well-drained and develop over limestone and limy shale. They are of moderate permeability, but because of their shallowness, have low water-retention capacity.

The upper horizon on the Dowe Flats site is a sandy loam from 4 to 7 inches thick, which is somewhat thinner than the 8 inch thickness described in SCS (1975) for this horizon. Location of LaPorte soils in this area coincides closely with the 1975 SCS data, although some areas mapped by SCS as Gaynor are actually LaPorte. Thickness of the A horizon varies from 4 to 10 inches.

Manvel Soils

The Manvel soils are deep and develop on calcareous, loamy alluvium, which is located on the broad central areas of Dowe Flats, away from limestone outcrops and the slopes of Rabbit Mountain. The thickness of the surface (A) horizon varies from 4 to 6 inches.

Gaynor Soils

The Gaynor soils are moderately deep soils derived from loamy alluvial and wind-blown materials. They are located in areas of wind deposits, sites difficult to accurately predict. Many of the areas mapped by the SCS as Gaynor are actually of the LaPorte or Manvel series. The surface material likely to be salvaged for reclamation (A and AC horizons) averages 8 inches in thickness.

Other Soils of the Permit Area

Soil units that will not be disturbed by the Dowe Flats project or which will experience only very minor disturbance include: Ascalon sandy loam, Ascalon-Otero complex, Baller stony sandy loam, Calkins sandy loam, Loveland soils, Nunn sandy clay loam, Nunn clay loam, Valmont clay loam, and Valmont cobbly clay loam.

Ascalon Soils

Ascalon soils are fine loamy, mixed, mesic Aridic Argiustolls, deep and well-drained, formed on terraces and uplands in loamy mixed alluvium and wind-laid materials. A sandy loam surface horizon of about 8 inches is underlain by a textural B-horizon of about 11 inches. Below this, a calcareous subsoil extends to a depth of 60 inches or more.

Baller Soils

Baller soils are loamy-skeletal, mixed, xeric Lithic Haplustolls, shallow and well-drained, and are formed on upland ridges and slopes in loamy residuum weathered from sandstone. Typically, the surface layer is a grayish brown stony sandy loam about 10 inches thick.

Below this, 5 inches of light brownish gray very stony sandy loam overlies the sandstone parent material.

Calkins Soils

Calkins soils are coarse loamy, mixed, mesic Cumulic Haplaquolls, are deep and somewhat poorly drained, and are formed from loamy alluvium on low terraces and bottomlands. Typically, the surface layer is a grayish brown sandy loam extending to a depth of 40 inches. Below this, a light-brownish gray coarse sandy loam extends to 60 inches or more.

Loveland Soils

Loveland soils are fine loamy over sandy or sandy-skeletal, mixed (calcareous), mesic Typic Haplaquolls, are deep and somewhat poorly drained, and are formed on loamy alluvium overlying sandy and gravelly material on terraces and bottomlands. The surface layer is typically a calcareous dark grayish brown light clay loam about 20 inches thick, mottled in the lower parts. Below this a layer of gypsic and strongly calcareous mottled light clay loam about 10 inches thick overlies mottled light brownish-gray gravelly sand extending to a depth of 60 inches or more.

Nunn Soils

Nunn soils are fine montmorillonitic, mesic Aridic Argiustolls, are deep and well-drained, and are formed on terraces and valley side slopes in loamy alluvium. Typically the surface layer is a grayish brown clay loam about 10 inches thick. The subsoil is a brown and very pale brown clay, grading to clay loam, about 10 inches thick. Below this, the substratum is a calcareous very pale brown clay extending to 60 inches or more.

Otero Soils

Otero soils are coarse loamy, mixed (calcareous), mesic Ustic Torriorthents, are deep and well-drained, and are formed on terraces, rolling uplands, and valley slopes in loamy alluvium and wind-laid materials. Typically, the surface layer is a strongly calcareous brown sandy loam about 6 inches thick. The subsoil is a pale brown sandy loam about 6 inches thick. The

substratum material is a strongly calcareous light yellowish brown sandy loam, extending to a depth of 60 inches or more, with lime concretions in the upper parts.

Valmont Soils

Valmont soils are clayey over loamy-skeletal, montmorillonitic, mesic Aridic Argiustolls, are deep and well-drained, and are formed on old, high terraces in cobbly and gravelly loamy alluvium. The surface layer is a grayish brown light clay loam, with varying amounts of gravel and cobbles, about 4 inches thick. An upper subsoil layer of brown clay loam about 3 inches thick overlies a middle subsoil layer of brown light clay about 13 inches thick. The lower subsoil is a calcareous light brown gravelly clay loam about 4 inches thick. Below this, a layer of pinkish-white and light brown very gravelly loam extends to a depth of 60 inches or more.

Soils Suitability

Soil samples have been submitted to the Colorado State University Soils Laboratory for verification of reclamation suitability. Slight modifications to the boundaries of soil units have been made, but are not considered to be critical because all material is anticipated to be rated as suitable for revegetation, and all units are likely to be salvageable to similar depths.

Based on recommendations by the USDA Soil Conservation Service (SCS), soils at this site are not suitable for cultivation due to erosion hazard and slow permeability. Soils on the project site have been cultivated historically, and have suffered some degradation of surface horizon thickness as a consequence. The reclamation plan is based upon SCS recommendations which indicate that the highest use of these soils would be that of supporting a cover of perennial vegetation to be used for livestock grazing and/or wildlife habitat (see also Holistic Resource Management, 1987).

During mining these soils will be sequentially removed, stored temporarily, and relocated, then revegetated to a perennial vegetational cover. The existing soil profiles will be lost during salvage, but after reclamation the soil will be overlain by a protective, mostly native

vegetational cover that will allow soil development to proceed to a degree that it has been unable to reach during its most recent history of agricultural use (refer to Exhibit I of the CMLRB application).

5.4 Geological Characteristics

5.4.1 Background

In 1985 a study was completed by Fox Consultants that provided a detailed summary of the geologic setting of the Dowe Flats area for the purpose of assisting in the planning and execution of subsurface explorations and engineering investigations in this area. This study addresses regional and local bedrock stratigraphy and structural geology. The scope of the Fox report has included compilation of existing geologic data through August 1984 and interpretation of these data aided by aerial photography interpretation and site reconnaissance. Map 5 shows a geologic map of the project area.

5.4.2 Regional Geologic Setting

Regional Stratigraphy

A maximum of approximately 12,700 feet of sediments is found in the vicinity of Dowe Flats. Only those formations beneath the lower Pierre Shale are present at Dowe Flats. In general, the geologic section is composed of alternating sandstone and shale layers with some limestones. Beginning at the bottom of the section and working upward in both depth and time, the individual units display a variety of depositional origins

Precambrian basement rock, including both plutonic and metamorphic rocks, is exposed in the mountains west of Lyons. These rocks are generally massive, hard, and tough when fresh, but coarser-grained materials can weather to grus. The basal Fountain Formation was deposited during erosion of the ancestral Rocky Mountains. The Lyons Formation above it is a beach deposit. The overlying Lykins Formation is a marine shale and the Entrada is an eolian deposit. The Morrison Formation and the Lytle Formation of the Dakota Group are both continental deposits, while all units between the South Platte Formation of the Dakota Group and the Pierre Shale were deposited in various marine environments as the seas transgressed and receded

through the area. The overlying Fox Hills Sandstone is a transitional beach type sandstone formed as the seas regressed from the area for the last time, and the uppermost Laramie Formation is a series of interbedded nonmarine claystones and shales with an occasional coal seam. During the Tertiary period, Precambrian, Paleozoic and Mesozoic rocks were invaded by igneous intrusives. One such large intrusive body is present about 2 miles southwest of Lyons and is currently being developed for commercial aggregate and riprap.

Mineral utilization near Dowe Flats includes production of cement from the Fort Hays limestone in a pit south of Dowe Flats, and quarrying of Lyons sandstone west of the site for building blocks. Existing and former gravel pits are present along St. Vrain Creek just south of Dowe Flats from Lyons to Longmont. Farther to the east are several oil fields that produce from sandstones and limestones at depth. Coal mining occurred in the early part of the century from the Laramie Formation, but is presently inactive in the area.

Regional Geologic Structure

The Dowe Flats area is in the Foothills Belt, a transition zone between the Front Range physiographic province to the west and the Denver Basin physiographic province to the east. The Front Range, which is the eastern most range of the Southern Rocky Mountains, begins on the northern side of the Arkansas River in southern Colorado and extends northward for approximately 185 miles to the Wyoming border. The range varies from 25 to 45 miles in width (Boos and Boos, 1957), and was formed by vertical uplift and subsequent erosion of the sedimentary strata to expose the Precambrian core. Remnants of the original sedimentary cover, now present as truncated sedimentary rocks along the uplift flank, are tilted by drag along the uplift boundaries. The more resistant tilted rocks, generally sandstones and some carbonates, form linear hogbacks that parallel the mountain front. The less resistant shales have been eroded away to form linear valleys between the hogbacks. This linear system of valleys and ridges is present along most of the eastern Front Range boundary.

The Denver Basin is a major structural basin east of the Rocky Mountains beginning south of Pueblo, Colorado and extending northward to the vicinity of Torrington, Wyoming. It spans approximately 180 miles at its widest point just south of the Colorado border. The basin is highly asymmetric with an axis that is subparallel to the mountain front and about 10 to 30 miles east of it. The proximity of the axis to the mountains results in a steep western limb and a

gently sloped eastern limb.

The Foothills Belt is a transitional area about 5 to 10 miles wide between these two major physiographic provinces. The sedimentary beds adjacent to the Precambrian mountain front are steeply dipping and occasionally overturned. The dip progressively decreases in the younger formations as they outcrop at greater distances from the mountain front. Between Lyons and the northern Colorado border a series of northwest-trending high-angle bedrock faults offset the sedimentary beds. Draping of sediments over these faults produces a series of en-echelon folds and faults. Taken together, these intermediate-scale structural deformations, regional deformations produced by the Front Range and the Denver Basin, and more localized small-scale folding and faulting, result in a generally complex geologic setting throughout the Foothills Belt.

5.4.3 Dowe Flats Site Geology

Local Stratigraphy

The important formations in this area are all Upper Cretaceous in age and are limited to the middle of the regional stratigraphic column. They include the Dakota Group, the Benton Formation, the Niobrara Formation and the Pierre Shale. The general stratigraphic descriptions in this section are summarized from three graduate theses that contained detailed lithologic descriptions compiled during field mapping and section measurement activities (Quam, 1932; Hunter, 1947; Masters, 1957). These documents provide the best available specific lithologic information on Dowe Flats. The most important stratigraphic units in Dowe Flats are, from oldest to youngest, the Dakota Group, containing the Lytle and South Platte formations; the Benton Formation; the Niobrara Formation, containing the Fort Hays and Smoky Hill members, and the Pierre Shale.

Dakota Group - The Dakota Group contains the upper beds on the cuestas surrounding Dowe Flats. It has an average thickness in this area of 330 feet, and is subdivided into the lower Lytle and upper South Platte formations.

The Lytle Formation consists of nonmarine fluvial deposits. The lowest part is a fine to coarse-grained massive brown sandstone intercalated with a basal conglomerate

containing quarter to half-inch diameter chert pebbles and granite fragments mixed with finer materials in a secondary silica cement. This bed is approximately 40 feet thick. The upper portion of the Lytle Formation consists of a series of variegated red and yellow claystones that, on exposure, weather to a reddish surface soil. This deposit varies in thickness from 30 to 60 feet.

The South Platte Formation constitutes the upper part of the Dakota Group. Deposits in this interval are marine and near-marine in origin. The Plainview Member is a platy, fine-grained, hematite-stained quartzose and sandstone. It varies in thickness from 20 to 30 feet through differential incising of the underlying claystones. The middle part of the South Platte Formation is a 125 to 175-foot thick gray to black carbonaceous shale interbedded with thin, buff-colored siltstones and sandstones. The uppermost part of this formation is the Muddy member, a massive, ridge-forming tan quartzose sandstone 20 to 30 feet thick that is slightly cross-bedded and distinctly jointed.

The Benton Formation - The Benton Formation is a 500-foot thick layer of fine-grained marine deposits. The lowest part is composed of dark gray to black fossiliferous sandy shales. The middle portion is a zone of light to dark gray argillaceous limestone and dark gray to black calcareous shales. The upper part is calcareous dark gray sandy shales. Numerous thin but laterally continuous bentonite layers are found throughout the formation. The lower, middle, and upper parts are often referred to as the Graneros Shale, the Greenhorn Limestone, and the Carlile Shale, respectively.

The Codell Sandstone is the uppermost unit in the Benton Formation. In the Dowe Flats area, it has a 15-foot total thickness and can be divided into a 7-foot thick gray siltstone beneath an 8-foot thick silty sandstone. This silty sandstone directly underlies the Niobrara Formation.

The Niobrara Formation - The Niobrara Formation is traditionally separated into two units, the Fort Hays and Smoky Hill members. The Fort Hays Member is an extremely fine-grained, light gray limestone with thin interbedded shales. A section of Fort Hays Member at the south end of Dowe Flats measured 16.5 feet thick (Lowman, 1977). Limestone accounted for 13.6 feet or 82% of the outcrop thickness. The limestone is distributed as blocks ranging in thickness from 0.5 to 3.1 feet and vertical joints spaced on 1 to 3-foot centers. The remaining 2.9 feet of material is distributed as 11 thin bentonite layers having an average thickness of 6 inches. Drilling in other areas within the Dowe Flats valley has indicated an average limestone thickness of 20 feet (Mallette, 1962).

The overlying Smoky Hill Member of the Niobrara Formation is generally described as a dark gray, calcareous, fossiliferous marine shale. However, characterization of the Smoky Hill Member as shale on a regional scale does not account for several separate limestone beds present in the Dowe Flats vicinity. At Dowe Flats, limestones within the Smoky Hill Member have been described at an outcrop along the Little Thompson River (Quam, 1932) and mapped in the Dowe Flats valley (Mallette, 1962). An 11-foot thick limestone unit 100 feet above the base of the Smoky Hill Member was mapped by Mallette in Dowe Flats, but was not described by Quam in the Little Thompson River outcrop. All the other materials in the bottom 200 feet of the Smoky Hill Member are dark gray to black, pyritiferous, calcareous, marine shales. A second 20-foot thick limestone bed was mapped at Dowe Flats and measured in the Little Thompson outcrop at the interval from 200 to approximately 220 feet above the bottom of the Smoky Hill. A final limestone bed, with a base about 256 feet above the Smoky Hill Member, was also located in both field efforts; however, its thickness was measured as 12 feet by Mallette (1962) and 43 feet by Quam (1932). Based upon interpretation of geophysical logs from oil exploration wells drilled 10 to 15 miles south and east of the site (Lowman, 1977), the 43-foot value appears to be more realistic.

The fact that the limestones in the Smoky Hill Member are not discussed in regional geologic summary papers indicates that they are local in nature and probably disappear to the north and south.

The Pierre Shale - The lower Pierre Shale is the uppermost unit considered in this

report. Only the lower 500 feet of the Pierre Shale are found in Dowe Flats; the remainder has been eroded away. The lower 2500 feet of Pierre Shale are homogeneous dark brown to gray-black marine shale that weathers to a buff color. The basal portion of the Pierre Shale, immediately above the Niobrara Formation, is sandy, but the sand content decreases in the main portion of the shale.

Local Structure

This section briefly introduces the major structural components of the Dowe Flats area.

The area surrounding Dowe Flats is structurally complex with several types of structural features of differing scales overprinted upon each other. Despite detailed studies, interpretations, and reinterpretations, the origin and exact relationship between all of the structural features remains unclear.

The regional Dakota hogback that parallels the eastern side of the Front Range through central and northern Colorado forms the ridge that separates Dowe Flats from the town of Lyons. The hogback ridge is normally a monocline formed by the uplift of the Front Range, but in this area it appears as the eastern limb of a doubly-plunging anticline with an axis approximately located on the eastern edge of the Lyons town limits.

On the northern side of Dowe Flats in the vicinity of Dowe Pass, the regional hogback has been offset approximately 2 miles by a major northwest-trending high-angle fault with a trace along the Little Thompson River. This fault is one of the many large faults that have offset the hogback. The southwest side containing Dowe Flats is the downthrown block, with displacement estimated at 600 feet (Hunter, 1947).

Rabbit Mountain is a large, southward-plunging anticline that forms the ridge east of Dowe Flats. It has a steeply-dipping eastern limb and a gently-dipping western limb, a structural style opposite to the general trend of folding along the Front Range. In addition, several smaller faults and canoe folds overprinted on this anticline distort and disrupt the bedding to produce further structural complexity.

Dowe Flats itself is underlain by a southward-plunging syncline. This syncline is nearly

symmetrical with no significant folding and faulting at the south end of Dowe Flats. Its northern boundary is the extremely complex Dowe Pass area, an intensely folded area containing numerous anticlines and synclines along with some faulting.

Two faults are shown within the eastern portion of Dowe Flats by Mallette (1962). One high-angle northeast-trending fault is located in the northwestern quadrant of Section 15. The other fault is located in the eastern half of Section 15 and trends northwest. Both faults are inferred and are shown with very small offsets. However, documentation of evidence for these faults is not provided by Mallette's report, and they were not mapped by the several other major investigators of the Dowe Flats area. In addition, examination of large-scale aerial photography in connection with this study did not reveal any evidence for the northeast-trending fault and only limited evidence for the northwest-trending fault. Therefore, the northeast-trending fault is not believed to be present, and the northwest-trending fault, if present, is only a localized small-scale feature.

All of these units are upper Cretaceous in age. The synclinal structure of the central Dowe Flats basin is such that the youngest (Pierre Shale) formation is exposed over much of the eastern portion of the valley bottom with the older strata forming concentric horseshoe-like rings as they outcrop around the valley perimeter on the east and west margins.

Structurally, the region surrounding Dowe Flats is extremely complex with both intense and sometimes superimposed folding as well as Post-Cretaceous faulting. In this context, the simplicity of the central interior portion of Dowe Flats is almost anomalous. Interpretation of available information does not indicate the presence of major faulting, shearing, or significant folding in the interior portion of Dowe Flats.

5.5 Environmental Impacts

5.5.1 Surface Water

The mine project area does not contain any perennial streams. Only minor intermittent drainages are present. Storm runoff from disturbed land will be diverted and directed into the mined out areas such that no discharge to the St. Vrain Creek occurs (i.e. discharge resulting from runoff from disturbed land) or will be directed into a sediment pond. Any runoff from the

project area to drainages feeding St. Vrain Creek will meet applicable water quality standards.

Runoff from disturbed land will not be allowed to drain into any of the ditches present downgradient of the mining operation.

5.5.2 Air Quality

The applicant has installed an air quality/meteorological monitoring station on the property. Data have been collected pursuant to making an application for an air quality permit to the Colorado Air Pollution Control Commission (Colorado Department of Health). The operation will comply with all the terms, conditions, standards and monitoring requirements of that permit. Baseline monitoring data, communications with the State Health Department, air quality computer modeling and copies of the permit application will be forwarded to the County when they are available.

5.5.3 Land--Groundwater, Soils, Geology and Topography

A detailed discussion of groundwater is present in Exhibit G of the CMLRB application. The mining operation is not anticipated to impact groundwater quality or quantity. All applicable water quality standards will be complied with. Mining will not significantly impact drinking water wells in the area. Blasting vibrations will not damage domestic wells (see Blasting Technical Appendix). If necessary, a well permit will be obtained from the Colorado Division of Water Resources to comply with the requirements for ground water inflow into a mine and resulting evaporative losses.

Soils, geology and topography have been previously discussed.

5.5.4 Flora

Flora has been discussed in the Section on Vegetation.

5.5.5 Wildlife (Fauna)

Existing Conditions

Wildlife issues were originally described by Western Ecosystems, Inc. (1987). This report is attached as an appendix to this application.

Discussions with Boulder County, the Colorado Division of Wildlife (CDOW), U.S. Fish and Wildlife Service (USFWS), and the Colorado Mined Land Reclamation Division (CMLRD), indicate that as a result of Dowe Flats wildlife analyses, studies, and existing data, a wildlife data base exists that is adequate to meet local and state permitting requirements. Existing data includes CDOW WRIS maps and Latilong reports, the Rabbit Mountain Deer Study by Boulder County Parks and Open Space, wintering raptor and cliff nesting raptor studies by the Boulder County Nature Association, and 12 years of Longmont Christmas Bird Counts in the project vicinity. To complete this data base, additional burrowing owl and black-footed ferret surveys are scheduled to occur in summer 1993 and winter 1993/94, respectively.

Habitat

Study area characteristics, physiography, habitat and vegetation types present in the Dowe Flats area have been described by ESCO Associates (1987) and Western Ecosystems Inc. (1987). Significant habitats are shown in Map 6.

The marginal croplands and intensively utilized pasture on the permit area support below average wildlife richness and abundance values. However, some of these low quality habitats support large prairie dog towns which are ecologically important because of the prey base they represent, particularly for a large number of wintering raptors.

Relatively undisturbed habitats surrounding the project area (Rabbit Mountain, Indian Mountain, St. Vrain Creek Corridor) support rich wildlife communities. Daily and seasonal wildlife movements between these areas cross the project area and add to the importance of the site.

Wildlife Species

Two primary wildlife issues are associated with the project area: prairie dogs as raptor prey base and big game.

The prairie dog/raptor issue is clearly the most ecologically important wildlife issue associated with the project. Holistic Resource Management (1987) located 3,142 active prairie dog burrows on approximately 869 acres in 1987 and prairie dogs have expanded their distribution in recent years. This colony is important to a relatively large number of bald eagles (a state and federal endangered species) and ferruginous hawks (a federal candidate species) that winter in and around Dowe Flats. Other terrestrial and avian predators also exploit this prey base. Associated with this issue are the eagle and hawk roost/hunting perch sites in cottonwoods flanking the Supply and Highland irrigation ditches (refer to Map 6).

Big game, including mule deer, white-tailed deer, and elk, are seasonally present in and around the project area. Mule deer are the species of greatest concern, since they utilize Dowe Flats to a greater extent than the other big game species. Mule deer use Dowe Flats as an east-west movement corridor and, to a limited extent, as winter range.

Other sensitive wildlife-related issues associated with the project area include the riparian corridor and nongame values along St. Vrain Creek, potential destruction of raptor nest trees, and general loss of wildlife habitat.

Project Impacts

This section describes impacts to wildlife during and after mining and reclamation operations. Description of wildlife impacts considers the implementation of avoidance, minimization, mitigation and enhancement measures outlined in the reclamation plan. Discussions are detailed for those wildlife species and groups that are of special concern, and are less specific for other wildlife groups (refer to Exhibits E, F, & H in CMLRB application.)

Raptors

Although a wide variety of raptors seasonally hunt Dowe Flats, specific concerns focus on bald eagles and ferruginous hawks because of the permit area's importance to these endangered and candidate species. Mining impacts to raptors will be entirely indirect, as the result of reduced prey base availability. This reduction will be most significant during winter (November through March) when relatively large numbers of these birds focus on the permit area's large prairie dog towns. Therefore, the focus of the raptor issue is the availability of prairie dogs as prey base for raptors throughout the mining process.

Prairie dog towns in the project area were initially documented by Holistic Resource Management (1987). All acreages used in this section were updated in 1991 and will be updated in 1993, but are still approximate due to the dynamic nature of prairie dog distribution and a conservative estimate of the acreage of reclaimed areas that would be suitable for prairie dog habitat.

Prairie dog distribution in the valley is as widespread as it has ever been in recent years, due in part to reduced prairie dog control efforts by the present land managers. Prairie dogs have been controlled for decades in this valley by poisoning, plowing, shooting, and by other methods. As a result of the recent reduction in prairie dog control efforts, and due to the fact that Dowe Flats has avoided recent plague epizootics which periodically decimate local populations, prairie dogs are presently distributed throughout most of the valley.

Prairie dog distribution has recently expanded from four towns in the valley, and now totals at least 1,547 acres across the bottom of Dowe Flats. The largest town, running the length of the valley, totals at least 800 acres and is the only town that will be directly or indirectly affected by mining, reclamation, and road realignment. Over the 25 year life of mining activity, much of this town will be affected by mining, although no more than 12% at any given time.

As mining proceeds up the valley, reclamation will follow. Reclaimed landforms, specifically designed to accommodate prairie dogs and raptors, would be rapidly colonized as early successional vegetative communities provide ideal prairie dog habitat. A minimum of 30% of the affected acres would be reclaimed as suitable habitat for prairie dogs, lagomorph and deer habitats. Additional reclamation features (e.g. rimrocks) and reclaimed habitats would be

oriented toward enhancing lagomorph and deer habitats, additional prey species for the large raptors.

As mining begins and progresses, individuals in portions of the large prairie dog town would either be killed or would colonize adjacent unoccupied habitats. Raptors hunting these towns for prairie dogs and other resident prey species may decrease in numbers due to direct and indirect influences of mining activity, including reduced prey availability, avoidance of prey in habitat adjacent to mining and human activity, and the disturbance and temporary abandonment of roost sites, hunting perches, and hunting areas adjacent to haul roads and the relocated county road.

Post-reclamation prairie dog habitat in the valley would total approximately 75% of that now present. Additional suitable, but presently unoccupied adjacent habitats within the permit area, would also be available for colonization during or after the mining process, but are not included in these totals. The reclamation plan design spatially isolates post-mining prairie dog colonies to a greater degree than at present, thereby reducing the probability that a plague epizootic, which routinely decimates prairie dog towns along the Front Range, would wipe out the entire raptor prey base in Dowe Flats.

In addition to the perpetuation, specific reclamation, and isolation of large prairie dog towns, implementation of the raptor mitigation and enhancement measures discussed below are expected to more than compensate for any values lost during the mining process. These measures are summarized under Mitigation.

Big Game

Although mule deer, white-tailed deer, and elk are seasonally present in the vicinity of the permit area, big game concerns focus primarily on mule deer because of the relative importance of the permit area to this species. Elk winter range overlaps the western and northern portions of the permit area, but these areas of intensively utilized pasture and rotated agricultural fields are generally fallow in winter and are not used by elk during most years. White-tailed deer in the vicinity of the permit area are generally associated with the riparian habitats flanking the irrigation ditches to the south of the permit area. Accordingly, the basic big game mitigation assumption is that if the seasonal needs of mule deer can be met on and through the permit area,

those of elk and white-tails will also be protected.

The primary importance of the Dowe Flats permit area to mule deer is as a broad, east-west movement corridor that presently extends along the length of the valley. Important winter ranges on Rabbit Mountain are accessed by deer moving east across Dowe Flats in the fall. This pattern is reversed in spring as some deer migrate west to higher elevation summer ranges.

Winter range values of Dowe Flats are marginal because native vegetation is heavily utilized by cattle and prairie dogs, leaving little standing biomass during winter, and because agricultural crops are generally fallowed for the winter. Mule deer, which use portions of Dowe Flats during winter, take pressure off the heavily utilized Rabbit Mountain winter range. The intensity of utilization on Rabbit Mountain has been exacerbated in recent years by an increasing deer population and the CDOW's difficulty in managing this herd because the area and surrounding lands are closed to all hunting or to public hunting.

The proposed mining would have little adverse effect on the local deer herd. Although deer would be locally restricted from active pits and from areas awaiting reclamation, local and seasonal movements across Dowe Flats would continue. Broad corridors north and south of active mining and within the existing corridor would be more than adequate to accommodate continued movements.

The only obstacles that would restrict east-west deer movements from portions of their present corridor would be unreduced highwalls and ponds/lakes. However, neither of these features would adversely affect deer movements, because configuration of reclaimed landforms in these areas have been specifically designed to facilitate east-west movements. Valleys, buffered from the surrounding area by ridges, and vegetated with valuable big game foraging and cover species, should allow for leisurely, undisturbed residency as well as movements. The existing corridors also extend north and south of the permit area, so it would not be necessary to accommodate all future movements within the permit area. If fencing is constructed to restrict deer from reclaimed areas until after the vegetation can withstand big game grazing, east-west corridors would be provided between large fenced reclaimed areas to allow for continued movements.

Mining activity is not expected to significantly increase traffic volumes on County Road 47, and

no increase in big game highway mortalities is expected along the relocated County Road 47 or Highway 66. Haul truck activity between the mine and plant would be at 35 mph or less, speeds at which big game-vehicle collisions are infrequent. The movement corridor south of the proposed mine is sufficiently wide through unrestricted habitats to allow for continued movements. Disturbances to deer in this corridor will occur primarily from non-mine related activities and are not expected to force deer south onto Highway 66.

Threatened and Endangered Species

With the exception of the aforementioned effects and mitigation for bald eagles and ferruginous hawks, there is no evidence to suggest that any terrestrial state or federal threatened, endangered, or candidate species, including the whooping crane, sandhill crane, peregrine falcon, interior least tern, piping plover, white-faced ibis, western snowy plover, mountain plover, long-billed curlew, Preble's meadow jumping mouse, black-footed ferret, or swift fox would be adversely affected by the mining and reclamation option proposed for this project. Surveys for black-footed ferrets will be conducted in Dowe Flats during winter 1993/94 following USFWS (1989) protocol.

Other Wildlife Groups

Other wildlife groups, including small mammals, nongame birds, waterfowl and shorebirds, terrestrial predators, raptors, and fish, will experience minor impacts during mining, but will significantly benefit from the highly productive habitats that are created following mining. Although mitigation and enhancement measures would focus on the needs of raptors and big game, the diverse post-mining habitats would be exploited by other wildlife groups, greatly improving present trends of wildlife diversity and abundance.

Representatives of some wildlife groups now inhabiting the area will be displaced from localized portions of Dowe Flats for the life of the mining effort. Moreover, some species (e.g., badger, ring-necked pheasant, and vesper sparrow) may have a slightly smaller acreage of suitable habitat following mining and reclamation than now exists. However, none of the wildlife species now present would disappear and the greater diversity and abundance of wildlife supported by the post-mining habitats should outweigh the reduced abundance of species with affinities toward more common habitats of crop land and intensively utilized pasture.

MITIGATION

The mitigation discussion in this section refers to the Reclamation Plan which is found in Exhibits E and F of the CMLRB permit application.

Raptors

Proposed raptor habitat mitigation and enhancement measures include:

- Avoidance of the bald eagle roost/ hunting perches in the mature-decadent cottonwoods flanking the irrigation ditches east of the present county road.
- Establishment of a large cottonwood stand and numerous smaller stands that could eventually serve as a bald eagle roost. Although only a few cottonwoods would be removed from the haul road corridor crossing the ditches, it is expected that vehicular disturbance could displace eagles from a maximum zone within approximately 100 yards of each side of these roads (a 200 yard corridor). This distance is based on observations of perched, roosting, and hunting bald eagles adjacent to similar active mining operations at Southwestern's Lyons mine, approximately two miles south of Dowe Flats. It is expected that portions of the present roost would remain viable, although its capacity could be reduced. To enhance future roost availability in Dowe Flats, a replacement cottonwood stand would be established within the reclamation mosaic in an area visually (minimum 0.25 mile buffer zone) screened from potential disturbances outside the reclaimed landscaping.
- Installation of raptor hunting perches throughout the affected area. Initially, one to three telephone poles would be established atop reclaimed landforms to facilitate aerial predation. Poles would be established along the perimeter and within the interior of reclaimed areas overlooking prairie dog towns, reclaimed rimrock areas, and those habitats that are expected to be colonized by prairie dogs. Eventually, cottonwoods and ponderosa pines planted in shallow drainage basins atop and between landforms would naturally replace the function of the artificial poles. Bald eagles currently roost in and hunt from cottonwoods in an existing mine pit, south of the Southwestern plant.
- Creation of landforms and water features with diverse habitats supporting other (non

prairie dog) prey species (e.g., small rodents, lagomorphs, nongame birds, and waterfowl). The additional raptor hunting opportunities provided by the wildlife prey base in these habitats could compensate for reduced prairie dog availability. (refer to reclamation plan).

- Creation of rimrock habitat for lagomorphs, potential prey species for bald and golden eagles, ferruginous hawks, and other raptors.
- Creation of landforms which visually screen the relocated county road from raptor hunting, roosting, and nesting areas. This measure will make the prey base more available to hunting raptors.
- Retention of unreduced highwalls in appropriate areas to provide suitable sites for cliff-nesting raptors. No such cliff nesting habitat presently exists in Dowe Flats. There would be up to 2,500 feet of highwalls, 100 to 130 feet tall and 1,000 feet of highwalls, approximately 30 feet tall. Such cliffs, surrounded by proposed, complementary landforms/vegetation types and visually screened from most of the Dowe Flats valley bottom, could realistically be occupied by great horned owls, American kestrels, prairie falcons, golden eagles, ferruginous hawks, red-tailed hawks, barn owls, and common ravens. Depending on final highwall characteristics, "potholes" could be created (1 per 100 linear feet of cliff) to create additional nesting ledges. Other raptors, such as long-eared owls and sharp-shinned and Cooper's hawks, could also nest in adjacent habitats. These cliffs would also be used as nest sites for potential prey species (e.g., rock doves) and other wildlife ecologically important to the community (e.g., swallows). Refer to reclamation plan discussion and reclaimed landforms.

No burrowing owls have been observed in Dowe Flats, however a systematic replicated survey for burrowing owls will be conducted between May and August, 1993. If owls are located, appropriate mitigation measures that are acceptable to Boulder County and the proponent, will be cooperatively developed and implemented.

Big Game

After mining and reclamation, Dowe Flats would support much more valuable seasonal big game

habitats than are now present. Diverse landforms would support a variety of native vegetation types (e.g., grasslands, shrublands, herbaceous and shrubby wetlands, thickets and groves of trees) seasonally important to big game and other wildlife groups (see reclamation plan). Buffering landforms, cover, forage, and additional water sources will not only facilitate and enhance movements and winter range values, but also provide suitable fawning, transitional, and summer habitats. It is likely that the post-mine community would support a resident deer herd.

Threatened and Endangered Species

With the exception of the aforementioned effects and mitigation for bald eagles and ferruginous hawks, there is no evidence to suggest that any terrestrial state or federal threatened, endangered, or candidate species, including the whooping crane, sandhill crane, peregrine falcon, interior least tern, piping plover, white-faced ibis, western snowy plover, mountain plover, long-billed curlew, Preble's meadow jumping mouse, black-footed ferret, or swift fox would be adversely affected by the mining and reclamation plans proposed for this project. A black-footed ferret survey will be performed in the winter of 1993/1994 and the results will be forwarded to the County Parks and Open Space Department.

Other Wildlife Groups

Although mitigation and enhancement measures would focus on the needs of raptors and big game, post-mining conditions and opportunities would be exploited by other wildlife groups, greatly improving present levels of wildlife diversity and abundance.

In addition to previously mentioned mitigation measures, landforms (e.g., convoluted ridges, incised valleys, creeks, ponds, cliffs, islands, and gently rolling topography) will be created that support a diversity of vegetation types and a correspondingly rich wildlife community. Components within these landforms will include grasslands, shrublands, herbaceous and shrubby wetlands, thickets and groves of trees, nesting cliffs/ drop-offs for fisheries, spawning beds, waterfowl nesting/ roosting islands, and diving and dabbling duck foraging areas. The goal of reclamation within the former mine pits is to create an ecological community and setting similar to that of White Rocks along Boulder Creek, considered to be one of the most diverse and unique wildlife habitats in Boulder County.

5.5.6 Cultural Resources

Archaeology

Existing Conditions

The Dowe Flats region has received considerable attention from both professional and amateur archaeologists, beginning with Jack Moomaw (Burney 1989a). Archaeological resources were being recorded at Dowe Flats as early as 1949. Subsequent inventories were undertaken by the Lyons Chapter of the Colorado Archaeological Society during the 1970s and early 1980s. The documentation by Nykamp (1984a and 1984b) describes the Rabbit Mountain survey conducted by the Lyons Chapter of the Colorado Archaeological Society.

Thirty-two prehistoric and historic sites and isolated finds have been previously recorded in or near the Dowe Flats project area, primarily on Rabbit Mountain. Several sites have also been recorded west of the project area on Indian Mountain, including a presumed archaeoastronomy site, tipi rings, and other stone features.

The only formal excavations conducted near the study area were completed by Cassells and Farrington (1986) at site 5BL876, the Indian Mountain site. This multicomponent site consists of at least 10 stone circles. Stone flakes and a ceramic sherd were recovered at this site.

Although a wealth of archaeological sites have been recorded near the project area, definitive analysis and clear determinations regarding the significance of these sites is generally lacking. Detailed site descriptions with surveyed boundaries are often absent. Only the one site on Indian Mountain has undergone subsurface testing.

Virtually no systematic, detailed archaeological inventory or comprehensive report on the prehistory has ever been completed for the Dowe Flats region as a geographic unit. Without having comprehensive information treating the whole of Indian Mountain, Dowe Flats, and Rabbit Mountain, the cumulative significance of the local prehistoric resources cannot be determined. Burney (1989a, 1989b), as a part of the initial Dowe Flats project survey, has taken the first step to comprehensively report on these resources, and recommended specific actions to continue this process. Additional archaeological and historical studies are being undertaken

on selected portions of the Rabbit Mountain Open Space (Gleichmen 1992). In addition, upcoming consultations with various Indian tribes, regarding the proposal, may provide significant information on the past use of Dowe Flats by Indian peoples.

Based on these recent surveys and research of archaeological site files and literature, it is well documented that Dowe Flats had been intensively occupied for thousands of years by Indian peoples. Archaeological studies conducted by Burney and Associates, Inc. are attached as an appendix to this application.

State of Archaeological Resources

In studying the archaeological history of Dowe Flats, one is impressed with the number of prehistoric artifacts that have been collected and removed from the area since historic settlement began. Despite this irretrievable loss, archaeological resources still exist.

Dowe Flats has been under cultivation for many years and agricultural practices have impacted the archaeological resources, particularly the integrity of intra-site configurations. As noted by Moomaw (1960):

"When I homesteaded on Rabbit Mountain in 1915, there were seven tipi rings near the cabin. The land to the west of the homestead was plowed up, and through the years wind-blown soil has completely covered these seven rings. I also destroyed dozens of rings while clearing fields for farming. This same process has gone on in the vast areas now being farmed in this region..."

Meier (1987) notes the impacts of the Town of Noland on archaeological resources in the Indian Mountain area from historical documentation:

"Sundays at Noland were generally lazy days. Many of the men climbed the high ridge to the east [Indian Mountain] and searched for old Indian graves."

"There was, at one time, a lot of Indian writing on the cliffs at the top of Indian Ridge...but most of it has been chipped off and hauled away."

"The children's out-of-school hours were spent in search of adventure and Indian relics."

"One of the men managed to find a bit of adventure in one of the Indian hideouts when he had a narrow escape from a wild cat while hunting Indian beads."

Given the intense activity in the Noland and Lyons area during the height of the quarrying era, it is remarkable that any prehistoric cultural materials remain on Indian Mountain, and that the rings and structures on both Indian Mountain and Rabbit Mountain were not severely disturbed.

Through the cumulative effects of collecting, defacing, development, plowing, and other disturbances, the prehistoric resources of north-central Boulder have been diminished. The state of archaeological resources is regrettable both in terms of the loss of significant amounts of material, and the integrity of what remains. As archaeological resources become increasingly diminished, the long term conservation of the remaining resources becomes even more significant.

Project Surveys and Documented Resources

Table 5.5.6-1 lists twelve archaeological projects completed between April 18, 1989, and February 3, 1991 in conjunction with this permit application. In all, approximately 1550 acres have undergone intensive Class III pedestrian surveys. In addition to the field surveys, documentary research was conducted at the State Historical Preservation Office, Lyons Redstone Museum, Boulder Historical Society and Museum, and the University of Colorado Museum. Consultation regarding the American Indian resources known and yet to be discovered for Dowe Flats is being pursued with the Northern Ute, Ute Mountain Ute, Southern Ute, Northern Arapaho and Cheyenne, Southern Arapaho and Cheyenne, the Eastern Shoshone, and Commanche tribes.

As a result of the field surveys, two sites and 31 isolated finds have been recorded. Sites include 5BL2431 and 5BL3129. Site 5BL2431 underwent limited subsurface testing in 1990 and has been identified as a deeply buried campsite dating as early as 660 B.C. Project archaeologists have determined that the site is eligible for the National Register of Historic Places (Grant 1990). Site 5BL3129 was identified in 1990 and contains tipi rings. This site has not undergone detailed investigations.

Isolated finds include ground and chipped stone artifacts. These 31 isolated finds recorded throughout the project area demonstrate the disarticulated character of the once intact prehistoric remains present on the ground surface.

The mine plan avoids direct impacts of all known and recorded archaeological sites. Site 5BL2431 is approximately 850 feet from the nearest mine and reclamation activity. Site 5BL3129 is more than 800 feet from mining and reclamation activities and adjacent to reclaimed overburden deposits. Of primary concern then, is the potential for the presence of subsurface sites throughout the mine and reclamation area. Since these sites can not be detected until earth moving activities begin, it is recommended that a specific mitigation process, as described below, be agreed to prior to start up of project activities. Monitoring of ground disturbing activities of soils potentially containing archaeological deposits is recommended as part of this process.

Mitigation

Because the majority of land in the Dowe Flats project area is owned by private parties or the Boulder County Parks and Open Space Department, it is assumed that Boulder County will be the lead agency in the management and disposition of prehistoric and historic cultural resources. There are no state or federal lands in the project area. The project does not require a federal "undertaking" with respect to Section 106 of the National Historic Preservation Act. However, the applicant has agreed to use this Federal regulation as a model in the mitigation and management process.

It is anticipated that Boulder County will work closely with the Colorado State Historic Preservation Office (SHPO) regarding the mitigation of adverse impacts. Mitigation or data recovery can include several measures, from avoidance to complete excavation.

There is a significant potential that archaeological materials may be exposed during mining activities, particularly in areas having adequate soil depth to support undisturbed cultural materials below the ubiquitous plow zone. A contingency plan to address this situation will be included in the Cultural Resources Management Plan. In addition, it is possible to adjust the boundaries of reclaimed landscape features without constraining the overall reclamation plan.

A formal process is proposed in order to identify and implement specific management and mitigation measures as the need arises, as displayed in Table 5.5.6-2.

Historic Resources

Project Area Surveys

Survey methodology followed two steps. The first step identified research sources and types of information available to support the historic context and property evaluations. Sources included a file search at the State Historical Preservation Office. Michael Burney's report (1989a) of his archaeological survey of Dowe Flats proved of great utility. Bibliographic searches were undertaken at local repositories such as Colorado Historical Society, Denver Public Library, University of Colorado Library, water companies, and contacts with county offices (recorder, assessor, county agricultural extension agent). The documentary information collected from these sources was evaluated and developed into the historical context of the project area. Such work met all requirements for a historic context as specified by the Colorado Survey Manual and National Register of Historic Places Bulletin 16.

The second step of the methodology was site specific field research, to fulfill the requirements of a Class II level survey under Colorado guidelines and applicable Secretary of the Interior standards. From this research, data for documentation and management recommendations for the properties was generated. The information was used during form preparation, final context writing, survey report writing, and recommendations of site eligibility for the National Register of Historic Places. The cultural history report is attached as an appendix to this application.

Historic Context

The history of the lands that comprise the Dowe Flats area is dominated by the evolution of a high plains, rural agricultural lifestyle. Other factors, particularly mining and quarrying, influenced the area's history. The pertinent historic themes for Dowe Flats include:

- | | | |
|----|---|-----------|
| 1. | exploration and fur trade | 1700-1845 |
| 2. | Colorado gold rush and early settlement | 1858-1870 |
| 3. | early agricultural and ranching development | 1870-1895 |

- | | | |
|----|--|-----------|
| 4. | quarrying and urban growth and development | 1870-1900 |
| 5. | ranching and farming | post 1900 |
| 6. | the Great Depression and World War II | 1929-1945 |

Project Survey Results

Class I and Class II Dowe Flats historic surveys (Western Historical Studies, Inc., 1990) identified and recorded six buildings, structures, and features. Of the six resources of sufficient age (50 years or older) to be considered as possibly significant historic resources, four of the resources were irrigation ditches (Supply, Highland, Rough and Ready, and Palmerton); one was an equipment shed and the other was a thresher or corn sheller and an associated jumble of used fencing. The four ditches are recommended as eligible for inclusion in the National Register of Historic Places (NRHP) with appropriation dates of 1862. All of the ditches have a high degree of integrity, convey the feeling of irrigation supply ditches and represent a major theme of northern Boulder County agricultural development. Near the study area, along one of the ditches, is a ditch walker's shanty.

The Class I study identified two other resources previously determined eligible for the NRHP. These were the Montgomery School (5BL242) and the Gerstenkorn Homestead (5BL241) located on nearby Colorado 66.

Project Impacts

Primary Impacts

Construction and use of the Mine Haul Road may have potential minor impacts on the four irrigation ditches. Impacts include placement of new bridges and culverts. A ditch walker's shanty associated with the Rough and Ready Ditch is within one of the proposed transportation corridors, and may be impacted depending upon the final haul road alignment. There are no significant resources in the area disturbed by mining and reclamation.

Secondary Impacts

The Montgomery School, and other presently unrecorded resources along Highway 66, are located in areas that are not expected to be subject to secondary impacts from construction and mining activity. Blasting vibrations from the Hi-Cal pit on Limestone Ridge are not expected to have significant impact on the Montgomery School. Vibrations from blasting and haul trucks have been described in the Blasting Technical Appendix and the project historian is evaluating this information. The historian's report will be forwarded to the County.

Mitigation

Because the four ditches are similar in function and character, a mitigation plan for one has been developed that can be applied to all. Should these resources become subject to adverse impact, a formal request should be made to the State Historic Preservation Office (SHPO) for a concurrence of the eligibility recommendations and an agreement to a mitigation plan for the resources. If there is federal participation, a consultation process with the Advisory Council on Historic Preservation must be initiated by the federal agency to gain council comment on the proposed mitigation efforts. For those resources recorded in the historic resources survey and determined to be eligible, the most appropriate mitigation plan would be to complete a permanent record of the sites. This record might be limited to medium or large format archival photography and more detailed histories of the properties. Above that level, a Historic American Engineering Record (HAER) study of each resource could be performed. A HAER study typically includes 4" x 5" archival photography, preparation of detailed drawings and writing of a narrative history of the property. Such studies have been used to successfully

mitigate other irrigation ditches in Boulder County.

For the Montgomery School and other presently unrecorded resources along Highway 66, no mitigation plans are offered at this time. These resources are sufficiently removed from the direct impact areas so that no plans, other than avoidance, need be addressed at this time. Any of these resources could be incorporated into the Cultural Resources Management Plan process for long term monitoring.

5.6 Adequate Water Supply

Operations Center

The operations center for the Dowe Flats project will be housed in the existing structures on the Harroun farm. The existing water supply on the Harroun farm will have to be supplemented with the applicants' existing water rights in the area to supply potable and production water (e.g. water for dust control).

5.7 Adequate Sewerage System

The operations center for the Dowe Flats project will be housed in the existing structures on the Harroun farm. The existing sewerage system may have to be enlarged to accommodate increased use by mine employees.

5.8 Utility Relocation Corridor

As discussed in Section 5.10 below, County Road 47 must be vacated. The road relocation will affect buried telephone cable belonging to U. S. West and the mining and reclamation will affect power lines owned by Poudre Valley Rural Electric Association (PVREA). Negotiations are in progress between the applicant and U. S. West regarding relocation of the telephone cable.

PVREA is suggesting the applicant include a utility relocation corridor for the power lines as part of Boulder County Special Use permit approval. The proposed new 200' wide corridor, agreed upon between PVREA and the applicant, is shown on Map 1 of this permit application. It will cross the southern portion of the mine permit in an area not disturbed by mining.

Power poles will be installed so as to avoid the mapped wetlands in the vicinity of the new utility corridor. The power line corridor was specifically designed to minimize impacts to cottonwoods and shrub understory along irrigation ditches.

5.9 Government Services

Government services are not required for this project.

5.10 Transportation Impacts

State Highway 66

Access and crossing of State Highway 66 will be subject to the State Highway Access Code. An access permit will be applied for and all required terms, conditions and mitigations will be implemented. Plans for the access and crossing, as well as any required mitigation, will be developed by the Colorado Department of Highways in conjunction with the Boulder County Public Works Department.

County Road 47

For the purposes of this project the existing County Road 47 (North 53rd Street and North 55th Street) must be vacated. The vacation is requested because North 53rd Street will be impacted by the Hi-Cal quarry, and North 55th Street will be impacted by the Third Ridge quarry. In addition, it is not considered appropriate or safe for a public road to run through the middle of a quarry operation. In addition, the County Road is within the reservoir influence zone, and at such time as a reservoir is constructed, it would be necessary to relocate the road.

The vacation of County Road 47 is proposed to begin approximately one half mile north of State Highway 66 and relocated into the West Valley of Dowe Flats. The one half mile of the road to remain north of State Highway 66 will serve as local private access and mine access (Map 1).

The vacation is proposed to end where the St. Vrain Supply Canal crosses the existing North 55th Street. The section of road north of this point may serve as access to the Rabbit Mountain

Open Space and the St. Vrain Supply Canal.

That section of North 53rd Street south of the St. Vrain Supply Canal and south to where the boundary of the Rabbit Mountain Open Space turns east may remain as restricted local access for the applicant and Rabbit Mountain Open Space properties, or removed entirely.

Numerous alternatives were evaluated in consideration of the new alignment of County Road 47. Alternative alignments evaluated in addition to the preferred alternative include:

1. North 61st St. north along the western slopes of Rabbit Mountain to the north end of Dowe Flats
2. Using the preferred alternative with a new access point on Colorado Highway 66 between North 53rd St. and Highland Drive
3. Highland Drive north through the western edge of the West Valley
4. Highland Drive and the St. Vrain Supply Canal maintenance road.

The preferred alignment presented in this proposal is based upon and best satisfies the following criteria:

1. Avoidance and minimization of impacts to environmental constraint areas including wetlands, archaeological sites, wildlife habitat, and open space
2. Spatially separating the mine and reservoir operations in the East Valley, and the Mine Haul Road in the West Valley and on Limestone Ridge
3. The need to maintain a safe access from State Highway 66
4. Preference for the shortest, most direct route
5. Avoidance of costly engineering and maintenance (tight corners, steep grades, large cuts & fills, deep shade)
6. Preference to maintain the right-of-way in Southdown's ownership
7. Minimization of scenic impacts in the Dowe Flats area
8. Minimizing neighborhood impacts from the realigned County Road 47.

9. Recognition that Boulder County Department of Transportation and Colorado Department of Transportation will review alternatives and determine the final alignment.

Transportation Analysis

A detailed traffic impact analysis was performed for various hauling alternatives. Public road hauling and private road hauling were considered, as well as 25 ton and 85 ton haul truck scenarios. The preferred alternative is a private haul road west of the existing plant entrance road (County Road 49) using 85 ton haul trucks. Southdown prefers the larger trucks because it involves fewer crossings and therefore less potential interference with Highway 66 traffic. The larger trucks are also more economical for plant operations. Southdown also desires to have the crossing signalized, and activated only at the times of actual crossings.

Traffic related to plant capacity, employees, suppliers, etc. will not increase because the Dowe Flats Mine will not increase plant output, it will extend the life of the plant. Employee traffic to the proposed mine will only be shifted from other Southdown locations. Also, approval of full production at Dowe Flats will eventually eliminate 12,000 truck trips per year which currently haul limestone for 11 miles on county roads and on State Highway 66, from the Larimer County quarry.

The traffic analysis indicates that even during the peak season there will be sufficient gaps in the flow of existing traffic to allow trucks to safely cross Highway 66 at grade. The crossing does not meet the requirements for a traffic light although Southdown wants to install one. To enhance safety and operations, the following measures could be considered:

- The haul road should be restricted to haul trucks only, perhaps using signs and gates.
- Advance warning signs and flashing beacons should be installed on State Highway 66 to advise motorists of trucks entering.
- The intersection should be illuminated even though no night hauling is proposed (darkness comes early in the winter months).

- The 20-year traffic projection indicates gaps may not be adequate 20 years from now. If this happens, hauling could be limited during peak traffic hours or the intersection could be signalized.

The transportation analysis is in the Technical Appendix.

6.0 REFERRAL

A comprehensive permit referral list was developed in cooperation with the Boulder County Planning Department. The referral list includes a total of 75 entities that will be informed in detail on the permit applications as follows:

Regulatory and Planning Agencies	
Municipal & County	7
State & Federal	10
Neighborhoods	10
Utilities	3
Environmental, Planning and Community Organizations	13
Indian Tribes	9
Media	6
Mine Industry Organizations	9
Water Providers	8

The referral list is updated and modified on a monthly basis. The referral list has been developed into a permit document matrix and attached to this permit application.

6.1 Community Information Program

To supplement the County permit referral process, the applicant developed a Community Information Program (CIP) to provide for direct communication with the interested parties on the current referral list, plus other entities or individuals that become involved in the permit process.

There are five structured phases to the CIP as follows.

Phase I

Introductory Meetings (prior to or at time of submittal of permit application)

These are 20-30 minute meetings consisting of a 10-minute presentation and 10-20 minutes of questions and answers. Content focuses on: 1) current plant operations, 2) introducing the Project Management and Coordinating team, 3) describing the Dowe Flats Project in broad terms. At this time, the applicant requests that each group appoint a Permit contact person, and that each group appoint a committee to review the forthcoming permit applications.

Phase II

Detailed Presentations (early in the referral period)

Approximately two hours or longer meetings where the project is described in detail. Presentations will be customized to the obvious concerns of each agency or entity. The purpose of Phase II meetings is to ensure that individual groups have the level of information necessary for them to make reasonable evaluations of the permit application.

Phase III

Meetings to Consider Interest Group Concerns (late in the referral period)

These meetings are designed to hear the concerns of each agency or citizen group. Ideally, each group will have heard the Phase II detailed presentations, their committees will have read and

evaluated the permit applications and appropriate technical appendices, and will be prepared to express specific concerns regarding the project. The goal of Phase III is to ensure that each agency or citizen group concerns have been heard by the Project applicant and consultants.

Phase IV

County Staff Review (after the referral period, and prior to final staff recommendation)

After the close of the referral period, staff will evaluate referral comments as well as incorporate their own issues into a final staff recommendation. Ideally, each of the agencies and citizen groups that the Project team approached during the referral period will have expressed their concerns by this time and additional mitigation plans may be offered at this time. The goal will be to address the address the reasonable concerns expressed during the referral period into the permit application.

Phase V

Final Meetings (after final staff recommendation, prior to public hearings)

These are follow up meetings with individual groups to discuss how the concerns expressed during the referral period have been addressed and incorporated into the permit application.

Some entities on the Community Information Program List may only request a Phase I meeting. It is anticipated that other entities, such as nearby property owners and environmental organizations may need several additional meetings, beyond what is described herein, in order to address their concerns. The CIP will be customized for each entity as necessary.

Interspersed during and after Phase II may be field trips to the Dowe Flats area, as requested by the citizen groups.

Prior to permit application submittal on June 1, the applicant had:

- completed Phase I CIP meetings with 38 of the 75 entities on the referral list,

- contacted an additional 23 entities and requested Phase I CIP meetings,
- mailed letters on May 3 to all 250 adjacent property owners and other neighbors,
- on May 14 provided a press release to six area newspapers.

7.0 CONDITIONS AND STANDARDS FOR APPROVAL

7.1 Minimum Zoning Requirements Compliance

The project area is zoned Agriculture. The project is consistent with special uses permitted in the Agriculture Zone District as demonstrated in this permit application.

7.2 Harmony With Character of Neighborhood/Compatible With Surrounding Area

Description of the Neighborhood

The immediate neighborhood, generally a one mile zone reaching beyond the project boundary, is rural in character. Residential development is thinly scattered throughout the area, with only three small subdivisions within or near the one mile radius. The densest development is along the north side of Highway 66, approximately one-half to one mile south of the project boundary.

Dowe Flats is unique in Boulder County in that the valley bottom north of the Supply Ditch has no permanent residences. There is one residence at the north end of the valley as it rises up into the Dakota Hogback. Thus Dowe Flats presents an open, undeveloped landscape.

The neighborhood may be split into four geographic units based upon the natural setting of Dowe Flats. The properties described below are not under control of the applicant unless specified.

North

This end of Dowe Flats forms the head of the valley, turning steeply upward into the Dakota Hogback. The Larimer County border is approximately one mile north of the north end of Dowe Flats.

The Indian Gap Subdivision contains ten lots and is three-quarters to one mile northwest of the project area.

In addition to the Indian Gap Subdivision there are four properties north of the project area, to the Larimer County border.

The Indian Gap neighborhood mailing list maintained by the applicant has 42 property owners, indicating that a number of residences in Larimer County are served by County Road 47.

West

Indian Mountain forms the western boundary of Dowe Flats, rising 300 to 1000 feet above the valley bottom. South of the Indian Gap subdivision, there are 3 undeveloped properties on Indian Mountain. One is owned by the United States government and is considered surplus federal property. The 283 acre Card parcel is owned by the applicant.

East

East of the project boundary. Rabbit Mountain, rising 300 to 600 feet above the valley, forms the eastern boundary of Dowe Flats. There are 4 properties in this area. With approximately 1,300 acres, the largest neighboring land owner, in terms of total acreage, is Boulder County with the Rabbit Mountain Open Space.

Peper Ridge Farms, a 3 lot subdivision, is one and one-quarter miles to the east. This subdivision is completely screened from the project by the southern portion of Rabbit Mountain.

South

The south end of Dowe Flats is the open end of the valley, bordered by St. Vrain Creek. There are 24 properties bounded by the project boundary on the north, Colorado Highway 66 on the south, Highland Drive on the west, and North 61st Street on the east. The 5 properties to the west of the Limestone Ridge are screened from the quarries by Limestone Ridge. The 19 properties east of Limestone Ridge will be screened from the mine quarries by the gently rolling topography of the valley bottom and the construction of reclaimed landscapes. All four irrigation ditches lie between 8 of these properties and the project area.

South of Highway 66, the Southwestern's Lyons Plant is the major landholding. Along St. Vrain Creek are a few widely scattered residences and a number of active and reclaimed gravel mines.

The McCall Lake Subdivision with 8 developed lots is one mile to the southeast of the project area.

7.3 Accordance with Boulder County Comprehensive Plan

Applicable Goals and Policies for the Dowe Flats Project

Policy

Diverse, compatible, and functional land use patterns should be established and, when necessary, revised to prevent urban and rural decay.

Commentary

The project maintains mining, agricultural, and wildlife land uses in north-central Boulder County. Existing industrial facilities at the cement plant are maintained.

Policy

Within Community Service Areas a suitable balance between employment opportunities and available housing, in light of the labor force and other demographic characteristics of the community, should be established or maintained.

Commentary

The project is within the Town of Lyons Potential Service Area. The effect of this permit application is to maintain existing jobs at the Southwestern Portland Cement Company plant. The Lyons Comprehensive Plan Planning Policies direct that the town should maintain its small-town atmosphere while supporting a diversity of employment activities. There are no impacts on housing supply. The Lyons Comprehensive Plan anticipates mining in Dowe Flats.

Environmental Management Policy

Unique or distinctive natural features and systems and cultural features and sites should be conserved and preserved in recognition of the irreplaceable character of such resources and their importance to the quality of life. Other resources should be managed in a manner which is consistent with sound conservation practices, while enhancing compatibility between natural and man-made characteristics.

Commentary

The project preserves the function of existing features; no irreplaceable features are impacted. The reclamation plan is designed to mimic the topographic relief and wildlife habitat values of Rabbit Mountain. The agricultural and wildlife land uses developed through the reclamation plan are compatible with neighboring open space. Mining land use is compatible with cultural history and land use of Town of Lyons.

Policy

Air, water, and noise pollution; inappropriate development in natural hazard areas; and overall environmental degradation should be reduced as much as possible or eliminated in order to prevent potential harm to life, health and property.

Commentary

This project complies with state regulations governing air, water, and noise pollution. The project is designed with adequate buffers to protect the safety and health of the public.

Policy

Critical wildlife habitats should be conserved and preserved in order to avoid the depletion of wildlife and to perpetuate and encourage a diversity of species in the County.

Commentary

The reclamation plan greatly enhances the existing wildlife habitat. Functional movement and cross-valley migration corridors are developed for deer and elk. Adjacent to this project, on Rabbit Mountain, is critical habitat for white-tailed deer. The reclamation plan addresses this issue by maintaining big game movement corridors through Dowe Flats south to St. Vrain Creek and west to Indian Mountain. The majority of the valley-wide prairie dog habitat is not impacted, thus preserving and enhancing prey base for raptors.

Policy

Critical plant associations and rare plant sites should be conserved and preserved to encourage a diversity of plant types within the County and to perpetuate the species.

Commentary

No rare plants exist in the project area. Limestone Ridge was thoroughly searched for rare plants, particularly Bell's Twinpod, without positive results. The reclamation plan

accommodates future plantings of species that prefer shale and limestone outcrops. The reclamation plan conforms with USDA Soil Conservation Service recommendations for existing soil types. Vegetational diversity is greatly enhanced with the development of the reclamation plan.

Policy

Wetlands which are important to maintaining the overall balance of ecological systems should be conserved.

Commentary

Wetlands impacts are less than one acre total. The reclamation plan creates approximately 44 acres of open water and 37 acres of wetlands.

Policy

Unique or critical environmental resources shall be conserved and preserved in a manner which assures their protection from adverse impacts, with the private sector, non-county agencies and other governmental jurisdictions being encouraged to participate.

Commentary

The reclamation plan is implemented through the private sector without the use of government funds. The applicant has participated in private sector land conservation on nearby lands in the Foothills Highway (US 36) Scenic Corridor where 175 acres have been removed from mining, with additional restrictions applying to development and protection of wetlands.

Policy

Productive agricultural land is a limited resource of both environmental and economic value and should be conserved and preserved.

Commentary

The vast majority of the project area is constrained by soil types suited only for range and wildlife habitat land uses. The 160 acre Harroun parcel is the only significant agricultural parcel (lands of state-wide importance). Most of this parcel is not impacted by the project, and will remain in agricultural use.

Parks and Open Space Policy

Provision should be made for open space to meet human needs throughout the County in order to protect and enhance the quality of life and enjoyment of the environment.

Commentary

The mine plan buffers and setbacks provide open space for the 25 year life of the mine operation. The reclamation plan is designed to mimic the topographic relief and wildlife habitat values of the neighboring Rabbit Mountain Open Space.

Policy

Open space should be promoted as an urban-shaping method and as a means of protecting from development those areas which have significant environmental, scenic or cultural value.

Commentary

The reclamation plan will serve as a buffer to the Rabbit Mountain Open Space. The project area is functionally integrated with Rabbit Mountain to provide wildlife movement corridors across Dowe Flats.

Policy

A County-wide trail system shall be promoted to serve transportation and recreation purposes.

Commentary

The proposal has no conflicts with the St. Vrain Supply Canal and the St. Vrain Creek trail corridors.

Residential Goals

[none applicable]

Community Facilities Policy

Development should not place any undue burdens on any existing community.

Commentary

Minimal community services are required. The proposal maintains existing jobs and industrial facilities.

Economic Conditions Policy

A balanced, diversified economy should be encouraged in order to maintain and enhance the quality of life of Boulder County citizens by assuring desirable local employment opportunities and strengthening and stabilizing the tax base.

Commentary

The Southwestern Portland Cement Company's Lyons plant provides 83 jobs with an annual payroll of \$3.5 million. Southwestern spends an average of \$10.5 million per year for supplies and materials. The mine permit provides for the continued operation of the existing plant, approximating historical levels of output. The plant pays a \$850,000 per year in property, personal, and equipment taxes to Boulder County agencies, but utilizes few community services.

Policy

Commercial or industrial development should provide an attractive, safe and healthy environment which does not have an adverse impact upon the surrounding area.

Commentary

The existing cement plant has been a neighborhood feature for 24 years. The mine proposal will phase out 6000 individual 25-ton truck trips per year on an 11 mile haul route on county roads and Colorado Highway 66. The Mine Haul Road has been designed to minimize conflicts on County Road 47 and Colorado Highway 66. All applicable state and federal permits will be secured.

Policy

Rehabilitation of existing commercial and industrial facilities should be promoted where feasible. A climate for industry which is consistent with community growth desires and the ability of the community to absorb growth should be encouraged.

Commentary

The proposed land use is recognized in the Lyons Comprehensive Plan. The proposal maintains existing jobs and industrial facilities and is not expected to create conflicts with growth policies.

Transportation Policy

An efficient, coordinated, multi-mode transportation system, which will provide adequate and safe movement of people and goods, should be promoted while avoiding undesirable environmental impacts.

Commentary

The proposal will eventually remove existing mine traffic from N 83rd and 75th Streets, Colorado Highway 66, and Hygiene Road. In addition to vehicular traffic, N 83rd and 75th Streets and Colorado Highway 66 are designated bike routes and receive extensive use by bikers.

Policy

The aesthetic quality of the County should be given full consideration when locating, designing or upgrading any part of the transportation system, in order to preserve and enhance public enjoyment of such facilities as mountain roads, bridges, scenic overlooks and landscape plantings.

Commentary

County Road 47 will be designed in accordance with the specifications of the Boulder County Department of Transportation.

Public Involvement Policy

The County shall encourage citizen public participation in the making of decisions by public and quasi-public bodies which significantly affect citizens.

Commentary

In addition to the required public hearings and standard referral process, the applicant has proceeded with a Community Information Program that is unprecedented in scope.

Governmental Relations Policy

The County shall encourage and promote coordination and cooperation between Federal, State and Local Governmental entities charged with making decisions which significantly affect land used in Boulder County.

Commentary

All appropriate agencies are involved in the project; including the US Fish and Wildlife Service, US Army Corps of Engineers and Colorado Division of Wildlife.

7.4 No Overintensive Use of Land

The proposed use is not considered over-intensive.

7.5 Capital Improvement Program Impacts

No county funds are required for this project.

7.6 Governmental Services Impacts

No governmental services are required for the mining operation.

7.7 Traffic Congestion

Refer to discussion in Section 5.10 and the transportation analysis in the Technical Appendix.

7.8 Noise and Blasting

7.8.1 Noise

A detailed noise analysis was performed at Dowe Flats to characterize the ambient noise conditions and to predict the noise impacts from the proposed mining and hauling activities. Noise impact mitigation techniques are also proposed.

The applicable noise standard is State of Colorado noise law and it has been determined that these standards can be met (the stringent residential standards) at the property line except when reclamation work is occurring near that boundary. Slight exceedances of off-site noise standards will be experienced at these times during reclamation. The sculpting of reclaimed

landforms could be setback from the property line to prevent these noise standard exceedances but this could compromise the integrity and goals of the overall reclamation plan.

Noise emissions during mining of all four ridges, for the entire life of the mine, will not exceed noise standards at the property line. Haul truck noise emissions for the various hauling alternatives cause slight exceedances of noise standards at some off-site properties. These properties are, however, located along Highway 66 and the existing traffic noise will mask the haul truck noise to an extent. Mitigation for haul truck noise includes the installation of noise control kits, speed control, and prohibition of Jacobs Brakes. Haul trucks meet EPA noise standards for public highways. Additional noise mitigation includes use of topographic barriers (i.e. reclamation hills), noise control kits on mining equipment, and movable noise shields around rock drills.

The noise analysis is in the Technical Appendix.

7.8.2 Blasting Impacts

An evaluation was made of potential impacts of blasting operations at the Dowe Flats project on the surrounding area. The complete blasting analysis and evaluation is presented in an engineering report presented in the Blasting Technical Appendix.

Outside the mine permit area, the primary blasting impacts are the ground vibrations and air overpressure resulting from the blasting. To assess the magnitude of these affects, an analysis was completed of monitoring data developed at the Lyons Quarry which currently provides materials to the Southwest Portland Cement Plant. In that the blasting operations currently conducted at the existing quarry is in the same geologic setting at Dowe Flats and the proposed blasting operation will be essentially the same as at Lyons Quarry, the existing operation provides a very good representation of Dowe Flats blasting impacts.

Data developed at the Lyons Quarry was analyzed to develop predictive relationships between ground vibration and air overpressure levels as a function of distance from the blast and the amount of explosive used. With these relationships, estimations of the maximum level of air overpressure and ground vibration measured as peak particle velocity were made at various distances from the limits of the mine area. These estimates are considered conservative in that:

1. An upper bound limit of all measured blasting data was used in determining the predictive relationships used.
2. Blasting was considered to occur at the nearest point within the mine excavation limits.
3. The upper bound amounts of explosive weights per blast that has been historically used at Lyons Quarry were considered.
4. A more restrictive method of calculating the resulting peak ground motion was used than is required by current U.S. Office of Surface Mining Reclamation and Enforcement (OSRME) regulations.

With the degree of conservatism incorporated into the analysis, the resulting prediction of ground vibration and air overpressure are considered to be upper limit values (i.e. worst case). A significant number of blasts would induce offsite impacts below the projected levels.

Comparing the projected maximum values to standards established by OSRME, the maximum offsite effects are within the established limits. Ground vibration and air overpressure levels resulting from the proposed blasting can be maintained below levels that would induce building damage off the mine permit boundary. Because of the relative sensitivity of humans to the blasting induced impacts, there will be some level of human perception of the blasting away from the mine boundary, the comparative level depending on location and individual sensitivity.

7.9 Adequate Landscape, Buffer and Setback, Screening

Visual issues will be discussed under this section. An in depth visual analysis of the mine and reclamation project is described in the Visual Analysis technical appendix. The inherent visual mitigation features in the reclamation plan are presented in detail in Exhibits E and F of the CMLRB reclamation permit. The following discussion provides a summary of these reports as they relate to this section.

7.9.1 Landscape and Screening

The reclaimed landscape outside the active mine pits are specifically designed to screen mine

operations from foreground views for approximately one half mile to the east, west and north, and will screen views to the south into the distant background (beyond one half mile) due to the flat relief in this direction. Screening is specifically provided for:

- County Road 47 from Colorado Highway 66 north to a point one quarter mile south of Dowe Pass,
- Colorado Highway 66 east of the County Road 47, including residences in this area,
- that portion of County Road 47 that will connect to the Rabbit Mountain Open Space,
- the parking lot and adjacent low lying areas of the Rabbit Mountain Open Space.

The phased development of the reclaimed landscape outside of the pit quarries will be linked to screening the active in-pit operations. This plan provides for screening of the majority of mine operations, however there will be occasional temporary visibility of mine operations at:

- the peak of Limestone Ridge, ahead of the advancing out of pit reclaimed landscapes,
- limited portions of the in-pit haul road on Limestone Ridge,
- most of the out of pit portion of the haul road.

7.9.2 Buffer and Setback

Through acquiring numerous properties in the Dowe Flats area since 1984, the applicant has been able to provide for extensive buffer and setback from mine operations. The 313 acre mine pit boundary, developed over the 25 year operation, is centrally located within the 1,911 acre mine and reclamation permit boundary, as displayed in Map 1. Considered from this maximum 25 year mine pit boundary, setbacks from one quarter mile up to three quarters of a mile are provided, and average in excess of one half mile. Minimum one quarter mile setbacks occur at the north and south ends of the Hi-Cal pit. These locations will receive first priority for development of landscaped features adjacent the pit.

7.9.3 Maximum Area of Disturbance

Within the flat valley bottom of Dowe Flats, including the low lying topography to the south along Colorado Highway 66, the landscaping features described above will provide effective visual mitigation of mine operations. As the topographic relief rises at the edges of Dowe Flats along Indian Mountain to the west, Rabbit Mountain on the east, and the Dowe Pass area to the north, the reclaimed out of pit landscape will not provide screening from mine operations. Setbacks provided by the mine permit boundary and the central location of the mine pits within the permit boundary will constrain these unscreened viewpoints to locations at a minimum of one half to one mile distant, depending upon the specific viewpoint. These setbacks will reduce the immediacy of the visual impact, however it is clear that from elevated areas adjacent to Dowe Flats some portions of the mine operations will be visible. Due to the nature of the pit quarries, where mining proceeds downward into the valley floor, there will be some additional, but limited screening of mine operations from the elevated viewpoints.

In order to reduce the scope of these impacts, the applicant proposes to set an average maximum area of disturbance at 100 acres at any one time during the entire 25 year mine operation. The maximum area of disturbance will typically be as follows:

Pit Quarries	50.0 acres
Ongoing Out of Pit Reclamation	40.0 acres
Permanent Haul Road	6.6 acres
<u>Temporary Haul Roads</u>	<u>3.4 acres</u>
Total	100.0 acres

This 100 acre maximum requires a significant reduction of operational disturbance area as currently practiced at the quarries south of the cement plant and at the Larimer County quarry.

7.9.4 Additional Visual Impacts Mitigation

The Dowe Flats project as proposed also provides for additional visual mitigation as follows:

- retirement and reclamation of the majority of the quarry operations south of the cement plant,
- retirement and reclamation of the Larimer County quarry,
- Dowe Flats reclamation designed and bonded in excess of minimum state regulations,
- Haul Road is the least visually intrusive alternative for bringing the mine product to the plant.

8.0 SPECIAL USE FOR MINING

The Colorado Mined Land Reclamation Board Regular 112 Permit application is incorporated into this Special Use Application by reference. It includes the mining and reclamation plans proposed to Boulder County.

The mine plan objectives are:

1. to provide 25 years of raw material reserves for the cement plant

2. to anticipate and accommodate construction of a reservoir in the East Valley of Dowe Flats during or after mining activity.

The reclamation plan has been developed with the following objectives:

1. Create the most diverse wildlife habitat possible; the diverse topography possible resulting from mining makes this objective particularly attractive and feasible. The opportunities to establish woody vegetation in various parts of the post-mining landscape and take advantage of water entering the lower parts of excavated areas will greatly enhance the value of the area to a variety of game and non-game wildlife.
2. Reduce the strong north-south linear nature of the mining disturbance by introducing topographic grain at differing angles and providing the distraction of varying vegetational texture and form. This necessitates establishment of cross-pit topography as well as topography extending away from the mine area to connect visually with natural topographic features, and again distract the viewer from the mining features underlying the area.
3. The proposed vegetation mosaic, that includes species and plant community structures that occur naturally, will represent an extension of native vegetation on areas adjacent to Dowe Flats, including Rabbit Mountain, Indian Mountain, and other foothills of the northern Front Range.
4. The reclamation plan does not impair and accommodates reservoir construction in the East Valley.

Reclamation will proceed at the earliest stages of mining as topography is built from overburden materials, and topsoil is replaced. Earth will be moved from the area to be mined to its final site by use of the mine haulage trucks, whereupon it will be graded to the desired contours by dozers. Topsoil will be hauled to the site in trucks or scrapers and spread to appropriate depths.

Land use after reclamation will be primarily wildlife habitat and will be consistent with similar

uses of adjacent and surrounding lands, both public and private. Steep land to the west on Indian Mountain and to the east on Rabbit Mountain is currently valuable wildlife habitat. Accordingly, the development of structurally diverse topography, water sources, aquatic habitat, and diverse vegetative communities on what had formerly been primarily plowed marginal agricultural land on the project site will enhance the usefulness of the entire area to wildlife.

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TABLE 5.5.6-1

**Archaeology Projects Completed at Dowe Flats
between April 18, 1989, and February 3, 1990.**

<u>Author and Date</u>	<u>Subject</u>
Burney 1989a	Archaeological survey of the east side of Dowe Flats from the Supply Ditch north to elevation 5400
Burney 1989b	Initial Archaeology Management Strategy
Burney 1989c	Dowe Flats Archaeology Executive Summary
Grant 1990	The limited testing of 5BL2431
Burney and Germer 1991	Dickens/Peicker, Harroun, and Frontier Materials properties
Burney and Germer 1991	The northern section of the West Valley of Dowe Flats reserved for the overburden generated during the first seven years of mining
Burney and Germer 1991 in the West Valley	County Road 47 realignment corridor
Burney and Germer 1991	Portions of the Card property relevant to the proposed County Road 47 realignment corridor
Burney and Germer 1991 Ridge	Mine Haul Road in the "incidental use area" west of the Limestone
Burney and Germer 1991 the 5400' pool elevation	Northern portions of the East Valley and Limestone Ridge above
Burney and Germer 1991	Reconnaissance of site 5BL793
Cummings 1991	Pollen and phytolith analysis at 5BL2431

TABLE 5.5.6-2

Proposed Cultural Resources Management Process

1. Submit all cultural resources reports to State Historical Preservation Office (SHPO) for review, (completed March, 1993).
2. Introductory meeting with SHPO, Boulder County Parks and Open Space Dept. (BCPOS) and project consultants to review submitted reports and discuss overall project design (completed May, 1993).
3. Follow-up meeting with SHPO and project consultants to develop a Cultural Resources Management Plan (including a draft mitigation plan, Indian consultation process, paleontology, historic archaeology, and a review of the ethnographic, ethnohistoric, and historic literature for Indian use of the Dowe Flats area, including Lyons and the St. Vrain Creek).
4. Submit Special Use Permit Application and Site Specific Development Plan.
5. Complete Cultural Resources Management Plan, possibly including a Memorandum of Agreement (MOA) with SHPO and BCPOS.
6. Review MOA with Lyons Redstone Museum and the Colorado Archaeological Society. Define the role these organizations will fill in the execution of the Cultural Resources Management Plan.
7. Incorporate applicable terms of MOA and Cultural Resources Management Plan into the Boulder County Special Use Permit and Site Specific Development Plan for the mine and reclamation plan.
8. Interim reviews of the Cultural Resources Management Plan, as provided in the terms of the Site Specific Development Plan and/or Development Agreement.

**MANAGEMENT AND MONITORING PLANS
DOWE FLATS PROJECT**

BOULDER COUNTY DOCKET SU-93-14 AND V-93-8

September 12, 1994

Submitted by:

Michael G. Figgs
LREP, Inc.
2635 Mapleton Ave. #77
Boulder, CO 80304
(303) 447-1899
Fax (303) 545-9415

Submitted on behalf of:

Southdown, Inc.
P.O. Box 529
Lyons, CO 80540
(303) 823-6685
Fax (303) 443-5887

MANAGEMENT AND MONITORING PLANS

DOWE FLATS PROJECT

INTRODUCTION

In granting permits for mining and reclamation by Southdown, Inc. in Dowe Flats, Boulder County and the Colorado Mined Land Reclamation Board have required certain management and monitoring plans in the terms and conditions of the permit approvals. This document is submitted in fulfillment of these requirements for monitoring and management plans.

During the permit approval process, an extensive record was created by means of baseline natural resource studies, supplemental studies, staff recommendations, public testimony, the Board of County Commissioners resolution, the Development Agreement, and the amended state reclamation permit. This record delineates the permit conditions, including the requirements for the management and monitoring plans discussed herein. Documents with specific application to this issue include:

1. November 9, 1993 memorandum from Boulder County Parks Staff to the Parks and Open Space Advisory Committee (POSAC)
2. January 28, 1994 memorandum to Boulder County Parks and Open Space Department from Paul Banks, SHB AGRA, Inc.
3. February 4, 1994 memorandum from Parks Staff to POSAC
4. March 1994 Dowe Flats Project Summary, Mining and Reclamation, including terms and conditions agreed to by Southdown

PERSONNEL

This proposal uses the same personnel and organizational format as the Dowe Flats permits. The environmental studies consultant team is as follows:

<u>Domain</u>	<u>Company</u>	<u>Contact</u>
Land Use, Team Supervision	LREP, Inc.	Michael G. Figgs
Vegetation	Esco Associates, Inc.	Dr. David L. Buckner
American Indian Affairs	Burney & Associates, Inc.	Michael S. Burney
Archaeology	Paragon Consultants	Marcus P. Grant
Historic	Western Historical Studies, Inc.	Dr. Steven F. Mehls
Wetlands	Aquatic & Wetland Consultants, Inc.	Lauranne P. Rink
Wildlife	Western Ecosystems, Inc.	Richard W. Thompson

CONTENT OF PLANS

Boulder County has requested the following items be addressed in the management and monitoring plans:

1. land use plan - Land Use Domain
2. agriculture management plan - Vegetation Domain
3. reclamation report with standards for progress - Vegetation Domain
4. convening of the Dowe Flats American Indian Advisory Council, as needed - American Indian Affairs Domain
5. cultural resource training for the quarry personnel - Archaeology Domain
6. annual monitoring of archaeological sites - Archaeology Domain
6. monitoring of the Montgomery School for blast damage - Historic Domain
7. revisions of the Cultural Resource Management Plan, as needed - Historic Domain
8. ongoing field delineations and mapping of wetlands every three years, with approval by the Army Corps of Engineers (ACOE) - Wetland Domain
9. winter raptor study for first five years - Wildlife Domain
10. prairie dog study to coincide with the raptor study - Wildlife Domain
11. prairie dog management plan - Wildlife Domain
12. black-footed ferret clearance survey - Wildlife Domain

Items 1., 2., 5.-7., and 9.-12. are individually addressed in detail under the domain headings in this report, as referenced in the list above. Item 4. will be addressed by means of the amended Colorado Mined Land Reclamation Board permit. Item 4. will be conducted on an as needed basis. Item 8. will be completed following ACOE protocol.

LAND USE PLANS

Land use for areas within the mine and reclamation permit boundary are displayed in Figure 1.

Land use categories and boundaries on the "Dowe Flats Property", as described in the Development Agreement, generally correspond to land uses allowed and parcel delineations found in the Term Deed between Southdown, Inc.(Southdown) and Marigold 41.

The Term Deed does not apply to the "South Dowe Flats Property" and "Southeast Dowe Flats Property" in the Development Agreement. (These parcels are also referred to as the Harroun and Dickens/Peicker parcels on Map 1., parcels 1. and 4., Boulder County Special Use Permit application.)

An interim non-development covenant applies to the "Permit Property", including the Dowe Flats Property, and those portions of the South Dowe Flats Property and Southeast Dowe Flats Property within the mine permit boundary, wherein Southdown will not permit the construction of new roads and buildings other than those permitted explicitly or as accessory uses for the mine and reclamation operation. For example, a power substation for the crusher or a parking lot for trailhead use may be built on the South Dowe Flats property.

In addition to these parcels within the mine permit boundary, land uses have been determined for two other parcels outside of the mine permit boundary, described in the Development Agreement as follows:

<u>Property</u>	<u>Land Use</u>
Northwest Dowe Flats Property (Card parcel)	Open Space
West Dowe Flats Donation Parcel (portions of the Lamy parcel)	Open Space

The Open Space land use includes monitoring and preservation of archaeological sites, educational and ceremonial activities for American Indians as determined by the Dowe Flats American Indian Advisory Council (DFAIAC), and closure to the general public. As described in the Development Agreement, Southdown will not permit the construction of new roads or buildings on these two Open Space parcels. However, Southdown may erect temporary structures for the benefit of the DFAIAC (i.e., sweatlodges accessed by unimproved roads).

Southdown has executed and granted to Boulder County conservation easements to protect and preserve the four archaeological sites on the "West Dowe Flats Donation Parcel".

**SHORT-TERM
AGRICULTURAL MANAGEMENT PLAN
for
Southwestern Portland Dowe Flats Property
During the Operation of Limestone Mining Operations**

General Objectives

It has been assumed in the development of this plan that some amount of agricultural activity will continue on the Dowe Flats as it has for well over 100 years. Inasmuch as the soils of the site are classified by the U.S. Soil Conservation Service as marginal to unsuitable for dryland cropping, and they are locally highly eroded already, it is believed appropriate to retire some of the cultivated areas east of Limestone Ridge and place them in either ungrazed (or infrequently grazed) native grass cover or improved pasture for use as grazing land/prairie dog habitat. In consideration of the wishes of the local resident lessees, some areas will continue to be managed for small grain production for the near term. The lessee will be encouraged to alter cultivation practices to improve or at least retard the rate of degradation of the east valley soils.

Native Grassland Conversion

Areas shown on Map 2 as subject to Native Grassland Conversion are between relocated County Road 47 (CR 47) or the east valley drainage channel/wetland and the proposed mining area and as such would be difficult to manage for grazing cattle. These areas will have a cover crop sown during the spring (Table 1) to be followed by seeding of the seed mix listed in Table 2 in fall. These seeded areas will have improved soil stability compared to the present condition. Included in this grassland seeding will be the berm to be built along the west side of relocated CR 47.

Small Grains in Strip Rotation

Areas shown on Map 1 as Small Grains in Strip Rotation will be subject to continued management for the production of small grains including wheat, barely, oats, or corn. The lessee will be encouraged to consider options for 1) decreasing the amount of time that these lands are completely bare and 2) adoption of low impact/low tillage techniques and equipment.

Grazing Management

Areas converted to native grassland will not be routinely grazed; short duration, high intensity grazing in winter/early spring grazing may be undertaken on some years as the need to manage vegetational composition indicates, and the logistics of controlling cattle near the mining operations allows. The mine area will be fenced to exclude unwanted domestic grazing animals beginning in Spring 1995.

Weed Management

If one of the following noxious perennial weeds becomes established in converted native grassland, it will be removed by manual methods (pulling, chopping, or plowing, as necessary, to be repeated as many times as required to eliminate the species from the area): spotted knapweed, diffuse knapweed, leafy spurge, Canada thistle.

Areas South of Supply Ditch

Agricultural lands under Southwest Portland control (South Dowe Flats Property and Southeast Dowe Flats Property) that are south of the Supply Ditch (the northernmost of four irrigation ditches) will continue to be used as in previous years, largely for the irrigated production of hay.

West Valley

Areas in the west valley (i.e. west of Limestone Ridge) will be managed as they have been in recent years, that is, mostly for grazing, with the exception of the irrigated cropland/hayland immediately west of the central portion of Limestone Ridge which is also occasionally used for winter grazing.

Table 1. Cover Crops for Use in Revegetation

<u>Crop</u>	<u>Date of Planting</u>	<u>Date of Seeding^a</u>	<u>Rate(PLS lb/ac)</u>
Oats	4/1 to 5/15	Next fall	30
Winter Wheat	8/1 to 10/1	Next fall	25
Spring Barley	4/1 to 5/15	Next fall	30
Long-season (southern) sorghum	5/15 to 7/15	Next fall	10

^a Date of seeding of perennial mix

Table 2. Plant Material Mixes - Native Grassland Conversion

Scientific Name	Common Name - Variety^a	Seeding Rate (PLS lb/ac)^b
GRASSES		
Agropyron dasystachyum ^c	Thickspike Wheatgrass - Critana	1.4
Agropyron riparium ^c	Streambank Wheatgrass - Sodar	1.4
Agropyron smithii ^c	Western Wheatgrass - Arriba	5.9
Bouteloua curtipendula	Sideoats Grama - Vaughn	1.1
Bouteloua gracilis	Blue Grama - Native, Alma	0.2
Buchloe dactyloides	Buffalo Grass	2.3
Oryzopsis hymenoides	Indian Ricegrass - Nezpar, Paloma	0.6
Schizachyrium scoparium	Little Bluestem - Blaze, Pastura	0.2
Stipa viridula	Green Needlegrass - Lodorm	0.7
FORBS		
Achillea lanulosa	Western Yarrow	0.05
Gaillardia aristata	Blanketflower	0.1
Linum lewisii	Blue Flax -Appar	0.4
Oenothera hookeri	Hooker Evening Primrose	0.01
Penstemon strictus	Rocky Mtn. Beardtongue	0.1
Ratibida columnifera	Prairie Coneflower	0.02
Rudbeckia hirta	Black-eyed Susan	0.02

^a Variety unnamed native unless specified ^b PLS = Pure Live Seed; rate assumes drill seeding

^c More aggressive species that will be sown only in two of every three drill furrows.

**SCOPE OF WORK:
DOWE FLATS QUARRY PERSONNEL CULTURAL RESOURCES TRAINING**

Prepared by
Paragon Consultants
3240 Perry Street
Denver, Colorado 80212

Prepared for
Southwestern Portland Cement Company
P.O. Box 529
Lyons, Colorado 80540

June 23, 1994

Introduction

The terms and conditions of Southwestern's Special Use permit to operate a limestone quarry on Dowe Flats are derived in part from a draft Cultural Resources Management Plan (CRMP) prepared by Mehls et al. (1994). Included in this document is a stipulation that, "Key members of the Southdown staff will receive training on cultural resource matters..." (P. 134). Specific procedures for accomplishing this task are outlined below, followed by a detailed cost estimate.

Scope of Work

Training of personnel will encompass the following topics:

- I. What are cultural resources?
 - A. Prehistoric resources
 - B. Historic resources
- II. What do cultural properties look like on the ground?
 - A. Prehistoric resources
 1. Surface manifestations (Slides)
 2. Subsurface manifestations (Slides)
 - B. Historic resources
 1. Surface manifestations (Slides)
 2. Subsurface manifestations (Slides)
- III. What is the intrinsic value of cultural properties?
 - A. Research potential
 - B. Public interest and education
 - C. American Indian concerns
- IV. What are the relevant laws that apply to cultural properties?
 - A. Federal legislation
 - B. State legislation
 - C. County regulations
 - D. American Indian involvement
- V. How are cultural properties managed?
 - A. Agency-specific responsibilities
 1. Roles of SHPO and Advisory Council
 2. Other agencies as appropriate
 3. Roles of consultants and private groups (CAS)
 - B. 106 process
 1. Significance criteria
 2. Nomination process
 3. Treatment plans
- VI. Summary, Relevant highlight pertaining to Dowe Flats

It is estimated that the actual training process will require approximately 4 hours and may involve a field trip to one or more sites in the permit area. Materials will include slides and printed handouts.

**SCOPE OF WORK:
DOWE FLATS CULTURAL RESOURCES MONITORING**

Prepared by

Paragon Consultants
3240 Perry Street
Denver, Colorado 80212

Prepared for

Southwestern Portland Cement Company
P.O. Box 529
Lyons, Colorado 80540

June 23, 1994

Introduction

The terms and conditions of Southwestern's Special Use permit to operate a limestone quarry on Dowe Flats are derived in part from a draft Cultural Resources Management Plan (CRMP) prepared by Mehls et al. (1994). Included in this document is a stipulation that, "All known cultural sites will be visited each calendar year and their condition assessed..." (P. 134). Specific procedures for accomplishing this task are outlined below, followed by a detailed cost estimate.

Scope of Work

Within the mine permit area is a total of 21 cultural sites (this number includes sites 5BL2431 and 5BL3139 recorded in 1989 and 1991, respectively, and does not include known sites with in the present silica quarry area). The time required to assess various sites' conditions will vary depending on their size and complexity and depending on whether significant changes have occurred. It is estimated that on average approximately 45 minutes will be required to examine each property, including travel time within the permit area. This totals 2 person/days; an additional 0.5 person/day would be required for travel time to and from the project area.

A brief report of findings will be submitted to the plant manager and to Boulder County. If significant changes are found to have occurred on any property, a Colorado Site Reevaluation form will be filed with the State Historic Preservation Office (SHPO) in addition to being appended to the report.

Sites located on the West Dowe Flats Donation Parcel (Lamy Property) and Northwest Dowe Flats Property (Card Parcel) will not be monitored by Southwestern Portland Cement Company after these properties have been conveyed in fee title to Boulder County.

**PROPOSAL
MONTGOMERY SCHOOL MONITORING AND CULTURAL
RESOURCE MANAGEMENT PLAN ANNUAL REVISIONS**

**WESTERN HISTORICAL STUDIES, INC.
1225 ATLANTIS AVE.
LAFAYETTE, CO 80026
(303) 666-6208**

JUNE 28, 1994

MONTGOMERY SCHOOL MONITORING PLAN

The Montgomery school monitoring program outlined in the draft CRMP (pp. 132-133) and Appendix III (p. 6-7). includes four steps:

- A. Pre-blasting structural assessment to establish baseline building condition
- B. Consultation with Boulder County (BOCO) and SHPO to establish a mitigation program that preserves the architectural fabric and character of the building
- C. Annual monitoring program
- D. Mitigation, if necessary.

Step C, the annual monitoring program, outlined in more detail in Appendix III, includes annual photography and inspection of the building, review of blast vibration and over-pressure data from the blast monitoring program and comparisons of the building's condition to that reported in the previous year. For consistency, updates on the School building will include completion of the Colorado Historic Site Form. If structural damage to the school is noted, WHS will consult with Southdown's designated structural engineers for evaluation and development of a mitigation plan. The mitigation plan will be reviewed and approved by BOCO and SHPO. The annual Montgomery School status report will be included in the annual report to BOCO and SHPO regarding the status and any updates to the Dowe Flats CRMP.

CULTURAL RESOURCE MANAGEMENT PLAN ANNUAL REVISIONS

The process of annual updates and/or status reports on the CRMP will include a management summary of the cultural resources activities at the site. It is felt that this will include summaries of any survey, monitoring or mitigation activities, meetings or other activities of the DFAIAC and an evaluation of the adequacy of the CRMP programs during the past year. Also, the update will include citations for any reports issued under the CRMP during the year. Copies will be provided to BOCO, SHPO, Southdown and DFAIAC member tribes.

Western Ecosystems, Inc.

Ecological Consultants

905 West Coach Road, Boulder, CO 80302 (303) 442-6144

PROPOSED DOWE FLATS WINTER RAPTOR STUDY

June 22, 1994

Southwestern Portland Cement Company (Southwestern) has submitted a 25 year hard rock mining proposal for activity within 312 acres of a 1911 acre permit area in Dowe Flats, Boulder County, Colorado. Dowe Flats supports a large prairie dog town that is used by relatively large numbers of wintering raptors, including bald and golden eagles and ferruginous hawks. These raptors and the prairie dog prey base are of high public interest. This proposal to monitor prairie dogs, raptor use, and mining activity is being submitted to Boulder County in partial fulfillment of the terms and conditions of Boulder County Special Use Permit SU-93-14.

I. STUDY GOALS:

1. Document baseline winter raptor and prairie dog use at Dowe Flats and comparable conditions at the existing Southwestern mine to:
 - (A) assess compatibility of raptors/ prairie dogs with mining and reclamation, and
 - (B) to better predict project effects on raptor/ prairie dog use of Dowe Flats.
2. Document the relationship between wintering raptors and the local prairie dog community.
3. Contribute study results to the development of a comprehensive, long-term raptor conservation strategy for Boulder County.

II. STUDY DURATION:

November 1993 to April 1998. The baseline phase at Dowe Flats was conducted in 1993/94.

III. STUDY PERSONNEL:

Rick Thompson, Wildlife Biologist, Western Ecosystems, Inc.
Nan Lederer, Raptor Biologist, LREP, Inc.
Mike Figgs, Raptor Biologist, LREP, Inc.

DOWE FLATS WINTER RAPTOR STUDY PROPOSAL

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IV. STUDY AREA:

Dowe Flats and operating Southwestern Lyons mine and reclamation areas.

V. STUDY OBJECTIVES:

1. Determine Winter Raptor Use of Study Area.

Variables:

- Species
- Number (min.) of raptors
- Period of occupancy
- Type of use (e.g., hunting, roosting)
- Dowe Flats vs. existing mine & reclamation areas

Approach:

Conduct simultaneous, systematic, standardized, crepuscular surveys along roads in Dowe Flats and throughout the existing mine approximately every 14 (n=12 surveys) days from before ferruginous hawks and bald eagles arrive in fall (November 1) until their spring departure (April 14). Surveys will only be conducted during fair weather. Two observers will conduct each survey and route starting points will be alternated. Morning surveys will begin at least 0.5 hours before local sunrise and extend until the entire survey area is covered. Evening surveys will begin approximately 2.5 hours before local sunset and continue until at least 0.5 hours after sunset. Raptors will be identified and locations of hunting perches, nocturnal roosts, and flights mapped. Nocturnal roosts will be defined as those sites where raptors overnight, as identified before dawn (without earlier movement suspected) or after sunset (when no subsequent movement is suspected). Minimum numbers of raptors using each area will be determined during each survey.

The assumption made in this total count approach is that all raptors present in the study area during survey periods are detected. We believe that our methodology does not seriously violate this assumption because of adequate transect coverage of each survey area, the relative openness and similarity of habitats between Dowe Flats and the existing mining area, and the conspicuousness of perched eagles and buteos.

DOWE FLATS WINTER RAPTOR STUDY PROPOSAL

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Analysis:

Minimum number of different species per survey.

Histogram of numbers over residency period (for each species and for all species; for each year and for all years).

Cumulative distribution maps of all sightings for individual species over winter on prairie dog base.

2. Determine Locations and Characteristics of Roost and Perch Sites.

Variables:

Raptor species

Dowe Flats vs. existing mine & reclamation areas

Roosts vs. hunting perches.

Types of perches:

Trees: mature & decadent, other trees, open branch structure, largest tree in clump, etc.

Tall artificial structures: powerline poles and telephone poles

Short artificial structures: fence posts, center pivot, etc.

Ground

Proximity from roads, other structures (buildings), and acute or chronic activity.

Proximity from prairie dog town when hunting/ roosting.

Approach:

Locations and characteristics of roost and perch sites will be determined from mapped and labelled observations recorded during surveys (all perches "X" not labelled as roosts will be assumed to be hunting perches).

Analysis^a:

Map of perch characteristics (e.g., fence lines, power poles, trees, etc.). Determine from maps what birds were perched on (e.g., ground, power pole, etc.).

Structural characteristics of roost/ perch sites.

Chi-square (observed vs. expected) analysis

Histograms

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Analysis:

Regressions of individual and all major raptor species abundance vs. prairie dog population and acreage to determine association.

5. Monitor the Effects of Mining Activity on Prairie Dogs and Winter Raptor Use

Variables:

Proximity of prairie dogs to active mine pits, haul roads, other mine facilities, and reclamation.

Reactions of perched (hunting/ roosting) birds to small vehicles (e.g., pick-ups, cars), mining equipment (e.g., 85 and 25 ton haul trucks, graders, front-end-loaders), blasts, and reclamation.

Approach:

Follow above methodology to collect data. Disturbance data will be passively collected (i.e., disturbances will not be initiated, but recorded as they occur). The closest locations of mining and other disturbances to perched birds will be plotted on 1:400 scale survey maps or orthophotos. Distances will be measured from maps. The reaction of birds (none, alert, flight, departure) and other relevant data (Grubb and King 1991) will be noted.

Analysis:

Measure the distances of birds to various types of mine disturbances. If an adequate sample size is collected, a single-variate analysis of raptor reactions to disturbance will be conducted individual raptor species. Annual maps of the study area showing active mining areas, haul roads, other mine-related facilities, reclamation, and prairie dog and raptor distributions will be included in reports. Much of this analysis will be descriptive. For example, at the active mine prairie dog towns are located X_m away from active pits, haul roads, and other mine facilities. Prairie dogs cross active haul roads and have recolonized adjacent areas. X% of X total acres of reclamation, at least X number of years old at the existing mine, supports prairie dogs. Reclamation as young as X years has been invaded by prairie dogs.

VI. REPORTING

Annual reports will be submitted to Boulder County for the duration of the study.

DOWE FLATS WINTER RAPTOR STUDY PROPOSAL
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VII. LITERATURE CITED

Grubb, T.G. and R.M. King. 1991. Assessing human disturbance of breeding bald eagles with classification tree models. *J. Wildl. Manage.* 55:500-511.

Western Ecosystems, Inc.

Ecological Consultants

905 West Coach Road, Boulder, CO 80302 (303) 442-6144

PROPOSED DOWE FLATS PRAIRIE DOG MANAGEMENT PLAN

July 15, 1994

Southwestern Portland Cement Company (Southwestern) has submitted a 25 year hard rock mining proposal for activity within 312 acres of a 1911 acre permit area in Dowe Flats, Boulder County, Colorado. Dowe Flats supports a large black-tailed prairie dog (*Cynomys ludovicianus*) town that is used by relatively large numbers of wintering raptors, including bald and golden eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*) and ferruginous hawks (*Buteo regalis*). These raptors and the underlying prairie dog prey base are of high public interest. This plan, which addresses prairie dog management in Dowe Flats for the life of mining, is being submitted to Boulder County in partial fulfillment of the terms and conditions of Boulder County Special Use Permit SU-93-14.

1.0 BACKGROUND

By their recommendation of the Prairie Reclamation Plan (Prairie Plan) over the Diverse Wildlife Habitat Reclamation Plan, Boulder County Government, including Staff, POSAC, and Planning Commission, seek to maximize the Dowe Flats prairie dog population in order to maximize winter raptor use. While other considerations were part of this decision, Boulder County apparently recognized that while maximal prairie dog populations will support large numbers of raptors, such a dense prey base monoculture is susceptible to a plague epizootic. Introduction of plague to the system would likely decimate the prey base (a 90-99% reduction, J. Pape, Colorado Department of Health, pers. comm.) sending dependent winter raptor use to near zero until the prairie dog population began to recover.

Boulder County's mandate is also in conflict with its two principal objectives for the area: maintaining a large prairie dog population and restoring a natural short- to mid-grass prairie community (of the type that can occur in the long-term absence of prairie dogs). However, based upon prairie dog habitat affinities, social organization, and the pre-European settlement condition of what western prairies were thought to be, prairie dogs were probably not part of native, undisturbed prairie ecosystems. Current thought is that prairie dogs occupied portions of the prairie that were "opened up" as a result of intensive disturbance by bison (*Bison bison*). While these "disturbed" communities occupied by prairie dogs were as natural a component of the prairie ecosystem as those areas of short- to tall-grass prairie unaffected by intensive ungulate use, the resulting vegetative communities were quite different. Restoration and reclamation activities in Dowe Flats will establish a native prairie community, but with prairie dogs as a dominant component of the system, the vegetative

DOWE FLATS PRAIRIE DOG MANAGEMENT PLAN

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community will not be one similar to, for example, those stands on the west slope of Marshall Mesa or on Table Mountain.

2.0 LONG TERM PRAIRIE DOG MANAGEMENT GOALS

1. Establish a vegetative community on restored (i.e., presently used for agricultural crops) and reclaimed lands in the Dowe Flats project area using native prairie species. The long-term land use on these areas is wildlife habitat, specifically, prairie dogs.
2. Allow prairie dogs to maintain naturally occurring populations on the Permit Area and the development of the ecological community associated with prairie dog towns.
3. Manage prairie dogs where they conflict with mining, reclamation, or adjacent land uses and ownership.

3.0 RAPTOR STUDY GOALS

Southwestern is conducting a winter raptor study (November 1993 to April 1998) to (1) assess the compatibility of raptors and prairie dogs with mining and reclamation, (2) to better predict project effects on raptor and prairie dog use of Dowe Flats, and (3) to contribute study results to the development of a comprehensive, long-term raptor conservation strategy for Boulder County. Plague is now a natural component of the raptor-prairie dog cycle in Dowe Flats. However, if a plague epizootic is suspected that could affect prairie dogs in Dowe Flats, Southwestern will immediately notify appropriate health agencies.

4.0 MANAGEMENT AREA COVERED BY PLAN

The management area covered by this plan shall include the Dowe Flats Permit Area north of State Highway 66.

5.0 DURATION OF PLAN

This plan will be in effect from plan approval until the cessation of mining in Dowe Flats. It is Southwestern's intention that this plan remain flexible to deal with unforeseen circumstances, should they arise.

DOWE FLATS PRAIRIE DOG MANAGEMENT PLAN

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6.0 PRAIRIE DOG MONITORING

Because of their ecological importance, prairie dogs in Dowe Flats have been periodically monitored since the initiation of baseline surveys associated with proposed mine permitting (HRM 1987, Thompson 1987, 1993, unpubl. data). As part of Southwestern's proposed Winter Raptor Study, the prairie dog distributions and populations in Dowe Flats and at Southwestern's existing mine and reclaimed areas will be monitored from 1993/94 to 1997/98 to quantify the relationship between prairie dogs, raptors, and mining. Prairie dog population size in Dowe Flats will be sampled at three times of the year in 1994/95 to determine peak population and population (prey base) size at the beginning and end of winter raptor residency. Thereafter, population size will only be determined on November 1 of each year. At the existing mine, prairie dog population size will be measured annually around November 1. Population size will be determined via replicated surveys of 4 hectare plots distributed throughout the prairie dog distribution on Dowe Flats and at the existing mine and reclaimed areas. Methodology is a modification of that used by Seery (USFWS, pers. comm.) on a similar raptor/ prairie dogs study at Rocky Mountain Arsenal. Resulting density estimates will be extrapolated to prairie dog distributions to obtain total population. Annual prairie dog distribution will be determined by revising prior maps during ground surveys. Maps will be digitized in Auto CAD to calculate acreage.

7.0 REMOVAL OF PRAIRIE DOGS FROM MINE DEVELOPMENT AREAS

Following a black-footed ferret (*Mustela nigripes*) clearance survey in summer 1994 and with the finding of no ferrets, prairie dogs in the footprints of mine disturbance areas for years one and two will be removed by gassing and/or with heavy equipment. In areas of incremental mine advancement over the 25 year operating life of the mine, prairie dogs will be removed following consultation, if necessary, with the U.S. Fish and Wildlife Service (USFWS).

8.0 PRAIRIE DOGS AND RECLAMATION

Prairie dogs will be excluded from reclaimed areas to facilitate establishment of prairie vegetation. Two types of reclaimed land are at issue: (1) reclaimed mined lands and (2) retired and reclaimed agricultural lands. Each type of reclaimed land and a recommended protocol is described below.

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8.1 Reclaimed Mining Areas

As mining incrementally advances northward by approximately 10 acres per year, comparable acreages will be reclaimed in a native prairie community behind mining. These reclaimed areas, which were just recently active mining areas, will have no prairie dogs on them. Immediately following seeding, a visual barrier (Franklin and Garrett 1989, Anonymous nd.) will be established to exclude prairie dogs to facilitate vegetative establishment. In the event that no reclamation performance standards are required by the Colorado Mined Land Reclamation Board (CMLRB), prairie dogs will be excluded from reclaimed areas for at least 2 growing seasons. Prairie dogs that cross barriers into reclaimed areas will be routinely controlled by zinc phosphide poisoning. In the event that the CMLRB requires reclamation performance standards, prairie dogs will be excluded from reclaimed areas until bond release.

Permanent prairie dog and cattle exclosures will be established throughout reclaimed areas to monitor reclamation success. Exclosure details are provided in the Dowe Flats Agricultural Management Plan.

8.2 Retired Agricultural Lands

The Dowe Flats valley bottom has been under various types of agricultural use for the last 120 years. Portions of the Dowe Flats Permit Area are presently in small grain and other agricultural crops. According to Soil Conservation Service (SCS 1975) guidelines, SCS (1985), and Holistic Resource Management (1987, D. Antonio, HRM, pers. comm.), the soils in these areas should never have been plowed. Southwestern has proposed to retire that portion of the east valley, west of the central drainage, along the boundary of Rabbit Mountain Open Space, and, possibly, a portion of the Harroun Farm north of the Supply Ditch, and restore the native prairie. Refer to the Agricultural Management Plan for additional detail.

Although prairie dogs annually attempt to invade the peripheries of some of these areas, they are poisoned and plowed under by the lessee several times each year. At present, there is no time frame for retiring these agricultural lands. These lands could be retired the year following clearance surveys, or several years latter. Reclamation will proceed following USFWS consultation. Immediately following seeding, prairie dogs will be excluded from reclaimed agricultural areas with visual barriers. Prairie dogs that cross barriers into reclaimed areas will be controlled by zinc phosphide poisoning or other authorized lethal means. For additional detail, refer to the Agricultural Management Plan.

DOWE FLATS PRAIRIE DOG MANAGEMENT PLAN

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9.0 PRAIRIE DOG MANAGEMENT ELSEWHERE WITHIN THE DOWE FLATS PERMIT AREA

With the exception of areas within the Dowe Flats Permit Area covered by this plan that are affected by mining and reclamation activities, agricultural retirement and reclamation, and other existing land uses, prairie dogs will be allowed to maintain naturally occurring populations. There will be no unauthorized shooting of prairie dogs within this area. All poisoning must be authorized by Southwestern.

10.0 EMIGRATION OF PRAIRIE DOGS ONTO ADJACENT LANDS

Southwestern will not control any emigration of prairie dogs from the Permit Area. As part of this plan, Southwestern has contacted adjacent landowners to identify those who would want prairie dog emigration from Southwestern's properties controlled.

Boulder County's (1988) management plan for Rabbit Mountain delineated four prairie dog towns, which have expanded considerably since the plan was written. The plan recommended that two of the towns be eliminated, however the County has not yet implemented management recommendations. At present, three occupied, but desirable prairie dog exclusion areas include (1) the area north of the road from the parking lot, east over the top of Rabbit Mountain, (2) a five acre parcel around the picnic tables and parking area, and (3) an area along the west flank of Rabbit Mountain, southeast of the parking area (M. Sanders, pers. comm.). Prairie dog distribution on Southwestern's Permit Area abuts at least one of these areas. If the County eliminates prairie dogs from any area contiguous with Southwestern's property boundary and seeks to control prairie dog immigration, Southwestern will cooperate with the County on these areas. Cooperation with Boulder County (and other landowners) could include, and not be limited to, assisting with installation and maintenance of visual barriers along common fences, and controlling prairie dogs in an extermination zone on Southwestern's side of the fence.

11.0 PLAGUE EPIZOOTICS

If plague is suspected that could affect prairie dogs in Dowe Flats, Southwestern will immediately notify appropriate health agencies. In the event that a plague epizootic decimates the Dowe Flats prairie dog population, Southwestern, at its discretion, would consider the reintroduction of prairie dogs to Dowe Flats.

DOWE FLATS PRAIRIE DOG MANAGEMENT PLAN
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12.0 CONTACTS

Boulder County Health Dept.^f

Contacts: Tom Douville
3450 Broadway, Boulder, CO 80302
Disease Control
Information

(303) 441-1185
441-1100

Boulder County Parks and Open Space Dept.^{d,g}

Contacts: Rich Koopman^g, Michael Sanders^d
2045 13th St., Boulder 80302

441-3950

Colorado Division of Wildlife^b

Northeast Region, Contact: Don Bogart
317 West Prospect
Fort Collins, CO 80526

484-2836

Central Region, Contact: Kathi Green
6060 Broadway, Denver, CO 80216

291-7290

Colorado Department of Health^f

Contact: John Pape
4210 East 11th Ave., Denver, CO 80220
Disease Control and Epidemiology Division
After hours, weekends, & holidays

331-8337
370-9395

Colorado Department of Agriculture^{a,b,c,d}
Denver

239-4157

Colorado Mined Land Reclamation Board^g

Contacts: Bill York-Feirn
1313 Sherman St., Denver, CO 80203

866-3567

Colorado State University Cooperative Extension Service^{c,d}

Boulder County
Box B, 9595 Nelson Road, Longmont, CO 80501

776-4865

Environmental Protection Agency^{a,c}
Denver, CO

293-1730

DOWE FLATS PRAIRIE DOG MANAGEMENT PLAN

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U.S. Fish and Wildlife Service^{a,c}

Contact: Bernardo Garza

730 Simms St., Suite 290, Golden, CO 80401

231-5280

^a Federal laws; ^b State laws; ^c pesticide use; ^d control techniques; ^e need for black-footed ferret surveys; ^f plague concerns; ^g terms and conditions of permit.

13.0 LITERATURE CITED

Anonymous. nd. Prairie dog visual barrier setup guidelines. City of Boulder Open Space Operations Center. Boulder, CO. 3 pp.

Boulder County. 1988. Rabbit Mountain management plan. Boulder County Parks and Open Space Department. Boulder, CO.

Holistic Resource Management. 1987. Dowe Flats agricultural report. HRM, Hygiene, CO. 32 pp.

Franklin, W.L. and M.G. Garrett. 1989. Nonlethal control of prairie dog colony expansion with visual barriers. Wildl. Soc. Bull. 17:426-430.

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Thompson, R.W. 1987. Preliminary assessment of wildlife resources and wildlife issues associated with reservoir development in Dowe Flats, Boulder County, Colorado. Western Ecosystems, Inc. Lafayette, CO. 26 pp.

Thompson, R.W. 1993. Burrowing owl survey of the Dowe Flats project area, Boulder County, Colorado. Western Ecosystems, Inc. Boulder, CO. 4 pp.

Western Ecosystems, Inc.

Ecological Consultants

905 West Coach Road, Boulder, CO 80302 (303) 442-6144

PROPOSED DOWE FLATS PRAIRIE DOG MANAGEMENT PROTOCOL WITH REFERENCE TO BLACK-FOOTED FERRETS

July 18, 1994

1.0 INTRODUCTION

Southwestern Portland Cement Company (Southwestern) has submitted a 25 year hard rock mining proposal for activity within 312 acres of a 1911 acre permit area in Dowe Flats, Boulder County, Colorado. Major permits required for mine approval include a Boulder County Special Use Permit and a Regular Operation Reclamation Permit from the Colorado Mined Land Reclamation Board (CMLRB). Both permits have been obtained and mine development is scheduled to commence in fall 1994.

Dowe Flats supports a large black-tailed prairie dog (*Cynomys ludovicianus*) town. Black-footed ferrets (*Mustela nigripes*), a federally-listed endangered species, depend upon prairie dog towns as a source of food and shelter. Section 7 of the Endangered Species Act requires Federal agencies to determine if any action authorized, funded, or carried out by them is likely to jeopardize the continued existence of an endangered species. Although ferrets have not been documented in Colorado since the late 1940's to early 1950's (Cahalane 1954, Lechleitner 1969, Armstrong 1972), such a determination requires an appropriate survey (U.S. Fish and Wildlife Service [USFWS] 1989) in the case of nocturnal black-footed ferrets.

Although they have not been required to do so, Southwestern has voluntarily committed to conduct ferret surveys according to Federal guidelines (USFWS 1989) prior to mine development. However, as a result of some ambiguity in the guidelines, allowable discretion in their application, and idiosyncracies of the site and the 25 year mining proposal, this black-footed ferret survey protocol was developed to formalize methodology, agreed to by Southwestern and the USFWS, that would be applied over the life of the mine.

2.0 STUDY AREA

Dowe Flats is located in northeastern Boulder County (T 3 N, R 70 W, S 9, 10, 15, 16 20, and 22), north of State Highway 66, and approximately 2.5 miles east of the Town of Lyons. Southwestern's 1911 acre mine Permit Area encompasses most of the valley known as Dowe Flats. Local elevations range from approximately 5,230 feet at the North St. Vrain Creek to 5,900 feet on Indian Mountain.

DOWE FLATS PRAIRIE DOG/ BLACK-FOOTED FERRET PROTOCOL

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Dowe Flats lies in the transitional foothills zone of Colorado's Front Rang, between grasslands of the Great Plains physiographic province and the mountains of the Southern Rocky Mountains province (Boulder County 1984). This topographic area, which is 2 to 4 miles wide, is characterized by long, parallel, north-south "hogback" ridges separated by valleys.

The Dowe Flats valley bottom has been under various types of agricultural use for the last 120 years. Over 90% of the valley is currently used for cattle grazing and wheat, corn, alfalfa, and other hay production. Dominant surrounding land uses are primarily agricultural, recreational, undeveloped, and low density residential. Rabbit Mountain, a 1,119 acre parcel of Boulder County's Open Space System, is contiguous with a portion of the Permit Area's northeastern flank.

3.0 MINING PROPOSAL

The proposed limestone mine and its ancillary facilities and reclamation would disturb a total of 385 acres, centrally located within the 1911 Permit Area, over the 25 year life of the mine. Initial mine development would disturb approximately 100-150 acres. Mine development would start towards the south end of the valley and progress northward. The average annual acreage of disturbance over the life of the mine is less than 65 acres, with a maximum acreage of disturbance of 95 acres (following initial development and reclamation of stockpiles). After initial development, the mine would progress northward disturbing an average of around 10-12 acres per year. A comparable acreage of prairie reclamation would annually occur in the wake of mining.

4.0 PROPOSED BLACK-FOOTED FERRET SURVEY PROTOCOL

Discussions between the author and Mr. Bob Leachman (a USFWS Biologist specializing in black-footed ferrets) were held on December 23, 1993 and April 14, 1994 to develop the survey protocol delineated herein. This protocol is now being submitted to the USFWS for their concurrence. Because the Dowe Flats prairie dog town was measured at 1,041 acres (i.e., >1,000 acres) on April 1, 1994, the protocol begins with a section evaluating this area as a ferret reintroduction site, as required by USFWS (1989). It continues with separate protocols involving discrete components of the mining proposal where impacts to prairie dogs or their habitat would occur.

DOWE FLATS PRAIRIE DOG/ BLACK-FOOTED FERRET PROTOCOL

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4.1 IMPORTANCE OF DOWE FLATS TO BLACK-FOOTED FERRET RECOVERY

Prairie dog towns or complexes larger than 1,000 acres, such as Dowe Flats, are potentially important to black-footed ferret recovery and receive special consideration by the USFWS as reintroduction sites. Although Dowe Flats represents one of the largest prairie dog towns in Boulder County, this town and the rest of this prairie dog complex are privately owned, surrounded by increasing urbanization and human use, and relatively small compared to complexes on the Pawnee and Comanche National Grasslands, in the San Luis Valley and the Paonia-Hotchkiss area, and in the northwest part of the state near the Utah border. Following mining in Dowe Flats, lands controlled by Southwestern fall under majority control of a local developer. Therefore, the long term availability of Dowe Flats as prairie dog habitat is uncertain. These factors depreciate the suitability of Dowe Flats as a ferret reintroduction site.

4.2 INITIAL MINING DISTURBANCE OF PRAIRIE DOG TOWNS

It is far too impractical to clear the entire prairie dog complex of which Dowe Flats is a part. Therefore only the towns being affected will be surveyed. Prior to initial mine development, a clearance survey will be conducted according to current guidelines for construction projects (USFWS 1989, Page 5), clearing all 385 acres of impact area over the 25 year life of the mine and a surrounding 0.5 mile buffer zone, rather than just clearing the initial mine development area and surrounding buffer zone. The proposed survey area would extend beyond the 0.5 mile buffer zone to the southeast, southwest, and north to the edges and/or bottlenecks of the prairie dog distribution in Dowe Flats. The surveys would occur between July 1 and October 31, 1994 and follow the nocturnal survey protocol. Although the prairie dog distribution covered approximately 1,041 acres on April 1, 1994, the town is now in the midst of a plague epizootic that is reducing prairie dog densities and distribution. This distribution will be divided into thirds, with each approximately 347 acre area surveyed by 2 individuals in a vehicle and on foot over 3 consecutive nights. Thus, a total of 9 consecutive surveys will be required to cover the entire survey area.

Negative results will be interpreted as evidence that there are no ferrets in this valley. Since these towns represents the vast majority of potential ferret habitat in the surrounding area, if ferrets are not present, it is biologically unlikely that ferrets would be present in the few, small surrounding satellite towns. Mine development must then occur within one year of the clearance.

DOWE FLATS PRAIRIE DOG/ BLACK-FOOTED FERRET PROTOCOL
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4.3 SUBSEQUENT MINING DISTURBANCE OF PRAIRIE DOG TOWNS

As the mine incrementally progresses north up the valley over the project's 25 year life, additional prairie dog acreage would be disturbed. Over such a long time period, it is possible, though unlikely, that ferrets could colonize previously cleared areas in Dowe Flats. This suggests the need for additional surveys prior to the small mining advances. However, the intensity of these surveys can probably be reduced from those required for initial clearance surveys based upon (1) the absence of ferret sightings in this part of the state, (2) the proximity of local and extensive urbanization in the Denver Metropolitan Clearance Area (approximately 16 miles south, with a City of Boulder proposal currently under review by the USFWS to extend the clearance zone to within 4.3 miles south of Dowe Flats [M. Gershman, City of Boulder, pers. comm.]), (3) the presumed absence of ferrets located in Dowe Flats during the initial 1994 clearance surveys, (4) Dowe Flats representing the vast majority of habitat within the local complex where any ferrets should have gravitated, and (5) the lack of any nearby, sizeable prairie dog towns that would likely constitute a ferret emigration source for Dowe Flats. Therefore, prior to any disturbance associated with incremental mining advances, a suitable ferret survey would be conducted of the impact area and a surrounding 200m buffer area. Protocol for the 2 survey methods are outlined below.

4.3.1 Summer Surveys

Nocturnal surveys are intensive and would be conducted over 3 consecutive nights. The USFWS will be contacted prior to these surveys and brought up to speed on the project and Southdown's ferret survey protocol. The surveys would cover the proposed impact area (e.g., 10 acres) and a surrounding buffer zone of at least 200m. Assuming that the 10 acre mine expansion area is circular (it would actually be rectangular), it would have a radius of 372 feet. Adding the 656 foot (200m) buffer zone would result in a radius of 1,028 feet and a survey area of 76.3 acres. Southwestern proposes that an area this small can be adequately surveyed by 1 certified ferret surveyor (rather than the standard 2 man crew). (Guidelines suggest that a 2 person crew can cover 320 acres per night.)

After 2 of the 3 replications (assuming no ferrets are detected on replications 1 and 2), the USFWS will be contacted for verbal authorization to gas or bulldoze the prairie dogs in the impact area immediately following the third replication with negative results. A report would also be prepared for timely submittal to the USFWS. This would be the most biologically conservative management approach to insure that ferrets would not enter the clearance area between surveys and site disturbance. However, this may, at least initially, be awkward from the USFWS's perspective until a history has been established between the USFWS and Southdown personnel. The standard approach is to prepare a report following surveys and submit it to the USFWS for their concurrence. This could easily take a month,

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during which time ferrets could move into the area. If Federal guidelines were applied, mine progression would also be unauthorized during this interval.

4.3.2 Winter Surveys

Subsequent winter ferret clearance surveys are not recommended because of the unreliability of suitable survey conditions at Dowe Flats. An alternative would be to conduct the clearance survey the prior summer, gas the prairie dogs in the impact area, then establish an exclusion barrier around the impact area. Any prairie dogs that entered the exclusion area before site disturbance would be poisoned (zinc phosphide), shot, or bulldozed during topsoil stripping.

If winter surveys are conducted, the buffer zone surrounding the proposed impact area (i.e., 10 acres) would have a 0.5 mile radius. A larger radius can be rationalized because of the extended intervals between surveys and the relative ease (probably totalling only 6 man-hours/ replication) of surveying a larger surrounding buffer. The USFWS would be notified and brought up to speed before surveys were initiated. This clearance would cover virtually all prairie dog acreage in the valley. There would be less need to immediately control prairie dogs within the impact area. The USFWS could be contacted following the third replication (with negative results) for verbal authorization to control expansion area prairie dogs, or a report could be prepared and submitted to the USFWS for concurrence before prairie dog control.

4.4 TERMINATION OF FERRET SURVEYS

There have been no ferret sightings in this part of the Colorado since, at least the early 1950's. Extensive urbanization associated with the Denver Metropolitan Clearance Area occurs approximately 16 miles south of the project area and many of the same development pressures are occurring locally. Dowe Flats represents the vast majority of potential black-footed ferret habitat within the local complex where any ferrets should have gravitated. There are no other nearby, sizeable prairie dog towns that would likely constitute a ferret emigration source for Dowe Flats. The prairie dog towns on reclaimed areas of the existing mine [approximately 2 miles south of the Dowe Flats town] is considered isolated from Dowe Flats by unsuitable habitat, the St. Vrain Creek, and Highway 66. Therefore, if no ferrets are located in Dowe Flats during initial comprehensive clearance surveys and after 2 surveys of mine expansion areas, Southwestern requests that the remainder of the incremental impact areas within their Permit Area containing prairie dogs be considered cleared of the need for further ferret surveys.

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4.5 CONTROL OF PRAIRIE DOGS ON RECLAIMED AREAS

Because of the protracted period of mining activity following initial construction clearance surveys, the USFWS (B. Leachman, pers. comm.) has advocated time and site-specific recommendations on the need for ferret surveys on reclaimed lands where prairie dogs are controlled to facilitate vegetative establishment. Two types of reclaimed land will be at issue: (1) reclaimed mined lands and (2) retired and reclaimed agricultural lands. Each land type and recommended protocol is described below.

4.5.1 Reclaimed Mining Areas

As mining incrementally advances northward, by approximately 10 acres per year, comparable acreages will be reclaimed in a native prairie community behind mining. These reclaimed areas, which were just recently active mining areas, will have no prairie dogs on them. Immediately following seeding, a visual barrier will be established to exclude prairie dogs to facilitate vegetative establishment. In the event that no reclamation performance standards are required by the CMLRB, prairie dogs will be excluded from reclaimed areas for at least 2 growing seasons. Prairie dogs that cross barriers into reclaimed areas will be routinely controlled by zinc phosphide poisoning or shot without prior ferret surveys (unless ferret surveys for incremental mining advances cover these areas). In the event that the CMLRB requires reclamation performance standards, prairie dogs will be excluded from reclaimed areas until bond release.

4.5.2 Retired Agricultural Lands

The Dowe Flats valley bottom has been under various types of agricultural use for the last 120 years. Portions of the Dowe Flats Permit Area are presently in small grain and other agricultural crops. According to Soil Conservation Service (SCS 1975) guidelines, SCS (1985), and Holistic Resource Management (1987 and D. Antonio, HRM, pers. comm.), the soils in these areas should never have been plowed. Southwestern has proposed to retire that portion of the east valley, west of the central drainage, along the boundary of Rabbit Mountain Open Space, and, possibly, a portion of the Harroun Farm north of the Supply Ditch, and restore the native prairie. Refer to the Agricultural Management Plan for additional detail.

Although prairie dogs annually attempt to invade the peripheries of some of these marginal croplands, they are poisoned and plowed under by the lessee several times each year. These areas are within the area that will be covered by summer 1994 construction clearance surveys, if prairie dogs are present at the time. However, at present, there is no time frame

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for retiring these agricultural lands. These lands could be retired the year following clearance surveys, or several years latter. No ferret surveys are proposed for these agricultural lands prior to reclamation efforts. Immediately following reclamation seeding, prairie dogs will be excluded from these reclaimed agricultural areas with visual barriers. Prairie dogs that cross barriers into reclaimed areas will be controlled by zinc phosphide poisoning or other authorized lethal means.

4.6 CONCURRENCE

Southwestern would commit to the above protocol for the life of the mine. By its signature below, Southwestern also declares that the description of the mining proposal is accurate. By its signature below, the USFWS concurs with the above protocol to insure that Southwestern's mining proposal is not likely to jeopardize the continued existence of the black-footed ferret.

If our agreement is correctly set forth above, please execute and return to the undersigned one copy of this letter.

Sincerely,

Southwestern Portland Cement Company

BY: _____
Name, Title

Accepted and agreed to this _____ day of _____, 1994.

United States Fish and Wildlife Service

BY: _____
Name, Title

Accepted and agreed to this _____ day of _____, 1994.

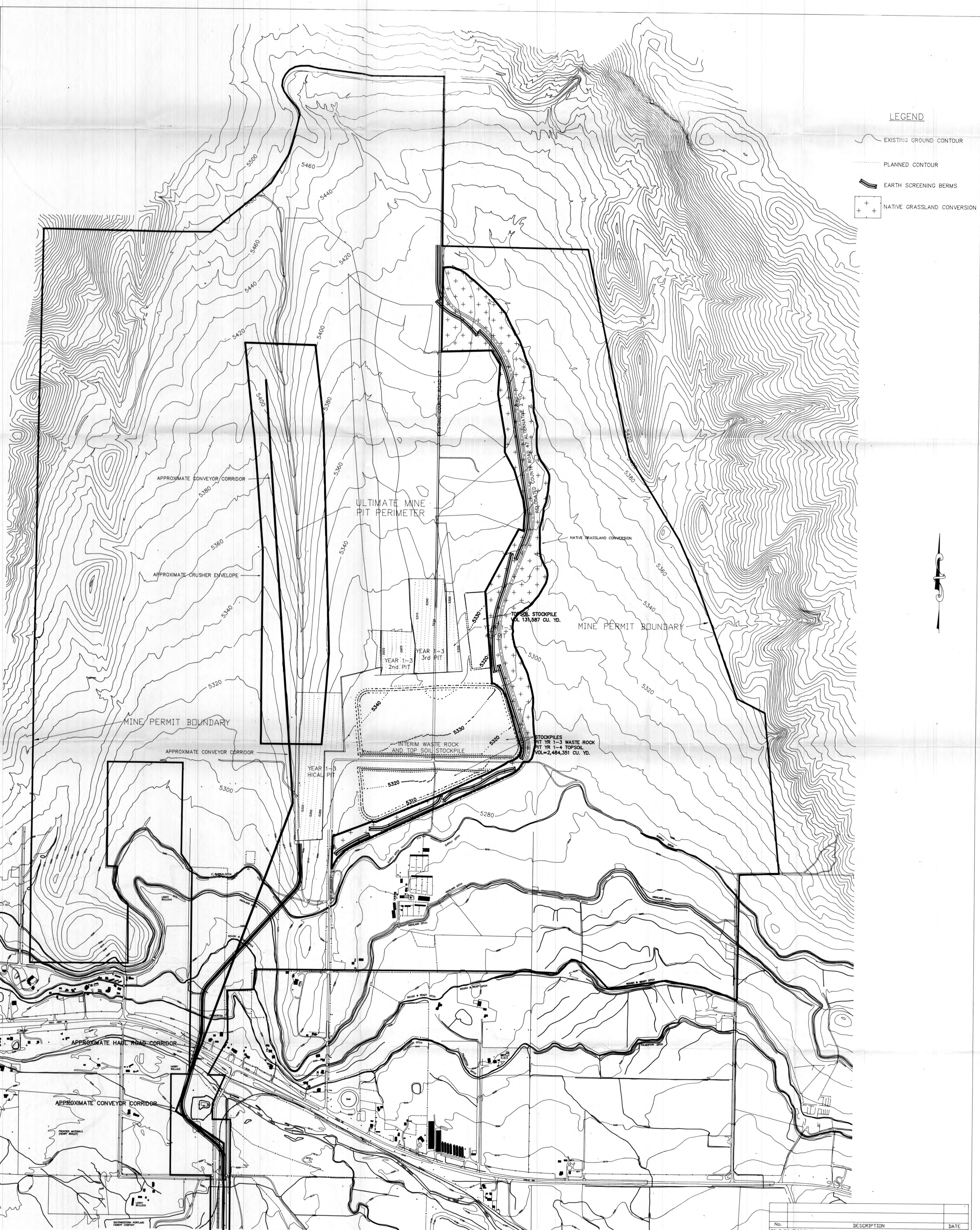
DOWE FLATS PRAIRIE DOG/ BLACK-FOOTED FERRET PROTOCOL

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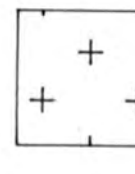
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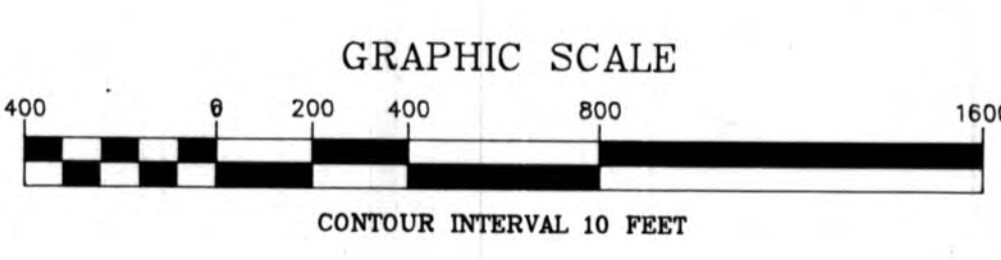
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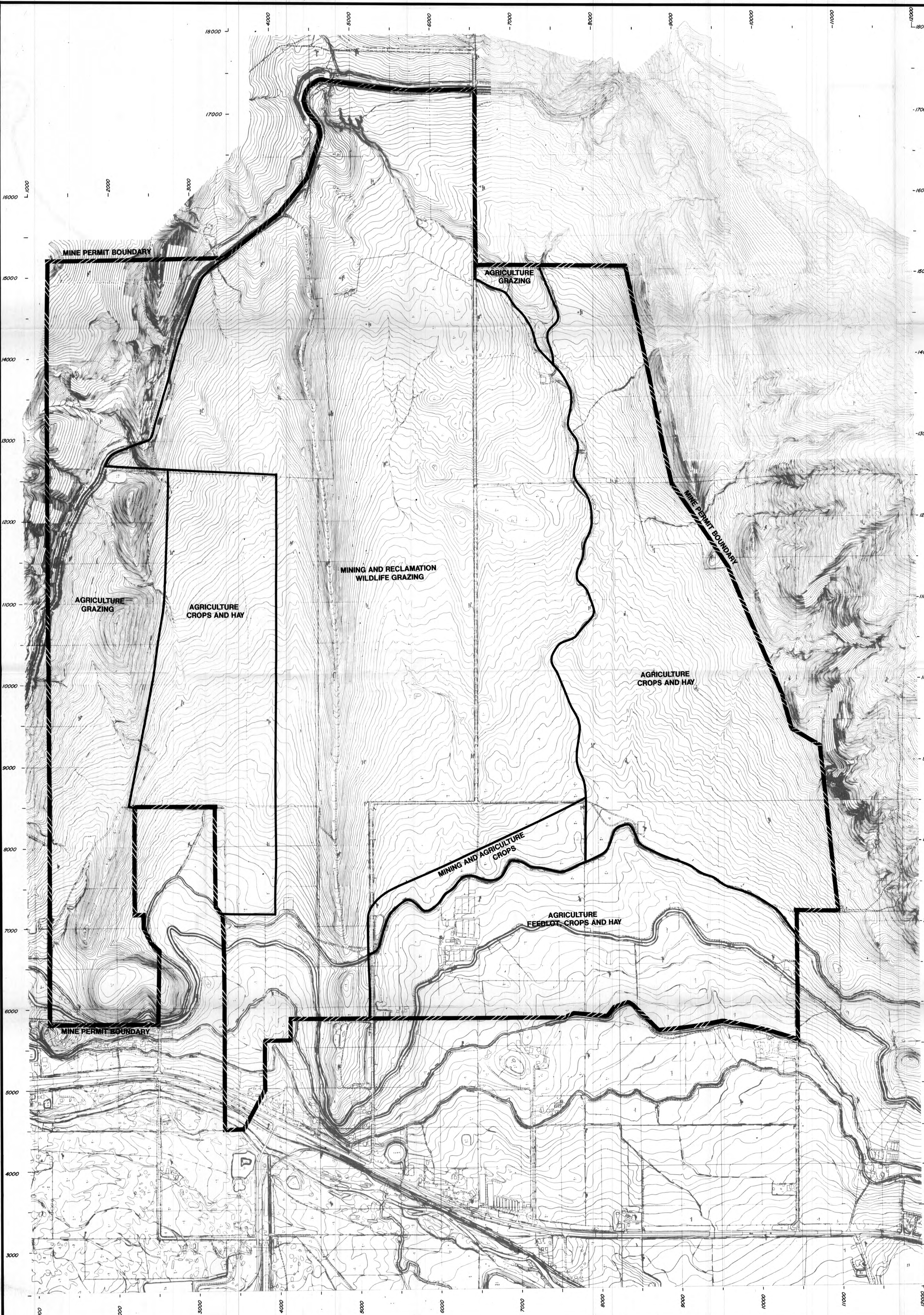


LEGEND

-  EXISTING GROUND CONTOUR
-  PLANNED CONTOUR
-  EARTH SCREENING BERMS
-  NATIVE GRASSLAND CONVERSION



No.	DESCRIPTION	DATE
FILE:00HFIG2.DWG	REVISIONS	
 SHB AGRA, INC. Engineering & Environmental Services 		
FIGURE - 2 NATIVE GRASSLAND CONVERSION DOWE FLATS MONITORING AND MANAGEMENT PLANS		
JOB No.	DATE	DESIGNED BY
		LNK
DRAWN BY	CHECKED BY	SHEET No.



WESTERN MINING LAND USE BOUNDARY IS BASED UPON TERM DEED DESCRIPTION.

LAND USE CATEGORIES ARE BASED UPON THOSE LAND USES ALLOWED IN THE TERM DEED.

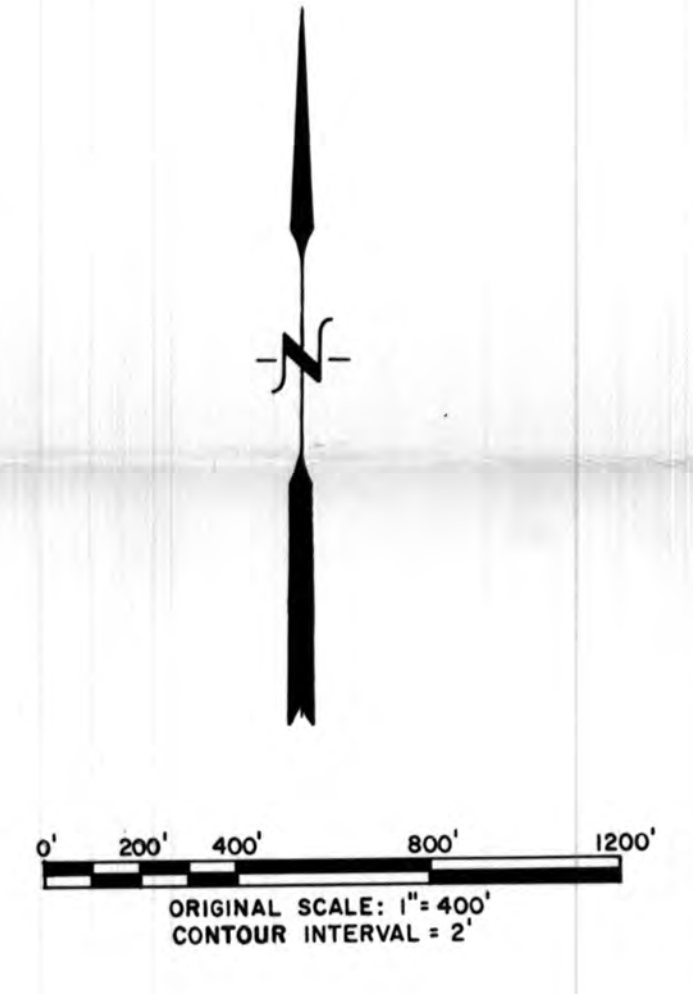


FIGURE 1.
LAND USE AND AGRICULTURE MAP
DOWE FLATS MANAGEMENT AND MONITORING PLANS

SCALE:	DATE:	PROJECT NO.:	FIGURE NO.
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**DEVELOPMENT AGREEMENT
DOWE FLATS MINE, DOCKET SU-93-14/V-93-8
SOUTHDOWN, INC.**

THIS AGREEMENT IS MADE AND ENTERED INTO this 12th day of July, 1994, by and between the Board of County Commissioners of Boulder County, Colorado, hereinafter referred to as the County, and Southdown, Inc., a Louisiana corporation, hereinafter referred to as Southdown.

RECITALS

A. The County has considered and is willing to approve a Special Use Permit and Site Specific Development Plan for limestone mining and appurtenant operations, construction of a conveyer belt and haul road connecting the Dowe Flats mine with the Cement Plant Site, vacation of certain portions of County Roads 47 and 49, and other land uses required in connection with Southdown's mining activities at Dowe Flats, east of the Town of Lyons, North of U.S. Highway 66, and west of Rabbit Mountain, in Sections 9, 10, 15, 16, 21 and 22, T3N, R70W, in unincorporated Boulder County;

B. The parties recognize that the proposed mining at Dowe Flats will require Southdown to incur substantial expense in permitting the proposal through other governmental agencies and make a substantial capital investment in pre-mine development prior to obtaining any vested rights in the proposal under established common law principles;

C. The parties mutually acknowledge and agree that the matters hereinafter set forth are reasonable conditions and requirements to be imposed by the County in connection with its approval of the proposed mining at Dowe Flats and that such matters are necessary to protect, promote, and enhance the public health, safety, and welfare;

D. Independent of any other requirements which are imposed by the County by reason of its approval of the proposed mining at the Dowe Flats, Southdown is willing to donate to the County, and the County is willing to accept, approximately 500 acres of land on Indian Mountain, near Lyons, Colorado, as open space in order to protect and preserve its scenic beauty, archaeological resources, wildlife habitat, and the viewsheds in and around Dowe Flats.

NOW, THEREFORE, in consideration of the mutual promises, covenants, and agreements contained herein, and the County's approval of a Special Use Permit and Site Specific Development Plan for the proposed mining at Dowe Flats, the parties agree as follows:

AGREEMENT

1. Definitions. In addition to any other definitions set forth in this Agreement, the following shall control the meaning of terms used in this Agreement:

1.1 "Docket" means Boulder County Land Use Docket #SU-93-14/V-93-8 ("Dowe Flats Mining and Reclamation Project and Vacation/Relocation of County Road 47").

1.2 "Dowe Flats Property" means that parcel of real property generally east of the Town of Lyons forming the central portion of the valley between Indian Mountain and Rabbit Mountain, as depicted on Exhibit A and more specifically described in Exhibit B.

1.3 "Northwest Dowe Flats Property" means that parcel of real property on Indian Mountain located northwest of Dowe Flats along the St. Vrain Supply Canal, as depicted on Exhibit A and more specifically described in Exhibit C.

1.4 "Permit Property" means those parcels of real property subject to the terms and conditions of the Approved Development as defined in Paragraph 2 of this Agreement, below, consisting of the Dowe Flats Property, the South Dowe Flats Property, and the Southeast Dowe Flats Property.

1.5 "South Dowe Flats Property" means that parcel of real property generally located to the south of the Dowe Flats Property as depicted on Exhibit A and more specifically described in Exhibit D.

1.6 "Southeast Dowe Flats Property" means that parcel of real property depicted on Exhibit A and more specifically described in Exhibit E.

1.7 "West Dowe Flats Property" means that parcel of real property on Indian Mountain generally located west of the Permit Property, as depicted on Exhibit A and more specifically described in Exhibit F.

1.8 "West Dowe Flats Donation Parcel" means that portion of the West Dowe Flats Property depicted on Exhibit A and more specifically described in Exhibit G.

1.9 The terms "Cement Plant Site," "Conveyor Belt," and "Mine Haul Road" shall be construed to refer to those facilities generally described and depicted in the official application materials for the Docket.

2. Approved Development. Pursuant to a duly-noticed public hearing on the Docket held on May 26, 1994, the County approved a Special Use Permit and Site Specific Development Plan for the proposed mining and related land uses and activities on the Permit Property, the terms and conditions of which are set forth in the County's Board of Commissioners' Resolution No. 94-81 (the "Resolution"), as adopted on June 28, 1994, and this Agreement (collectively, the "Approved Development" or "Development").

3. Vested Property Right. In consideration of the County's approval of the Development, as defined in Paragraph 2, above, the County, pursuant to C.R.S. §§ 24-68-101 et. seq., hereby grants to Southdown a Vested Property Right for the Development to proceed in accordance with the terms and conditions of the Approved Development. The Vested Property Right shall have a term of five (5) years, subject to the provisions for modification and termination contained herein. Southdown may request an extension of the Vested Property Right. The provisions of this Agreement do not in any way limit Southdown's right to establish vested rights pursuant to common law principles regarding establishment of vested rights and legal non-conforming uses. The Development shall be subject to regulations lawfully adopted by the County after the effective date of this Agreement only to the extent permitted under C.R.S. § 24-68-105 as codified on the effective date of this Agreement.

4. Termination of Vested Property Right. Except as provided in paragraph 8.9 herein, the Vested Property Right granted in Paragraph 3, above, may be terminated if the County reasonably determines, in accordance with the applicable special use procedures of the Boulder County Zoning Resolution, that Southdown is not in compliance with the terms and conditions of the Approved Development. The Vested Property Right shall also be subject to the applicable abandonment provisions of Boulder County Zoning Resolution.

5. Interim Non-Development Covenants.

5.1 West Dowe Flats Donation Parcel and Northwest Dowe Flats Property. (a) Subject to any rights exercised or restrictions imposed by any governmental authority (except that no annexation shall alter or extinguish these covenants, as set forth in Paragraph 2.b. of the Resolution), and subject to the permitted exceptions set forth in Exhibits H and I, Southdown hereby covenants and agrees that it will not permit the construction of new roads or buildings on either the West Dowe Flats Donation Parcel or the Northwest Dowe Flats Property from the date hereof until termination of the Covenant as provided by paragraph 5.1(c) herein.

(b) The Covenant granted by the preceding paragraph 5.1(a) shall apply independently to the West Dowe Flats Donation Parcel and the Northwest Dowe Flats Property, and the termination of the Covenant with respect to one parcel shall not terminate the Covenant as to the other, and each may be terminated only in compliance with provisions of paragraph 5.1(c).

(c) The Covenants granted by paragraph 5.1(a) shall terminate and be extinguished as to each parcel immediately upon the occurrence of any of the following events: (i) such parcel is donated to the County pursuant to the provisions of paragraph 8 of this Agreement; (ii) Southdown executes and records an instrument by which it abandons the Development and relinquishes the Vested Property Rights granted by this Agreement; or (iii) the Colorado Mined Land Reclamation Board ("CMLRB") releases the reclamation bond held for the Dowe Flats mine.

5.2 Permit Property. (a) Subject to any rights exercised or restrictions imposed by any governmental authority (except that no annexation shall alter or extinguish these covenants, as set forth in Paragraph 2.b. of the Resolution), and subject to the permitted exceptions set forth in Exhibit J, Southdown hereby covenants and agrees that it will not permit the construction of any new roads or buildings on the Permit Property other than those permitted explicitly or as accessory uses under the terms and conditions of the Approved Development. Notwithstanding the foregoing, Southdown shall have the right to use the Permit Property for farming, livestock grazing, feed lots, dairy operations, ranching, and existing agricultural uses permitted under the

Boulder County Zoning Resolution in the Agricultural Zoning District, and for the maintenance, repair, replacement and improvement of existing agricultural and residential buildings.

(b) This Non-development Covenant shall terminate and be extinguished immediately upon the occurrence of any of the following events: (i) Southdown executes and records an instrument by which it abandons the Development and relinquishes the Vested Property Rights granted by this Agreement; or (ii) the CMLRB releases the reclamation bond held for the Dowe Flats mine.

6. Conservation Easements. Contemporaneously with the execution of this Agreement, Southdown shall execute and grant to the County a conservation easement, including appropriate access rights, to protect and preserve the four archaeological sites on the West Dowe Flats Donation Parcel.

7. Vacation of County Roads.

7.1 County Road 47. Southdown shall construct, at its sole expense, the relocated section of County Road 47 over the Permit Property in the location generally depicted in Exhibit A (the "Relocated Road"). The Relocated Road shall be an unpaved road constructed in accordance with plans approved by the County Engineer pursuant to the County's standards for rural collector roads. Upon completion of construction and acceptance by the County, Southdown shall dedicate to the County, and the County shall accept for maintenance, a 60-foot-wide strip of land containing the Relocated Road, and the County shall vacate and abandon that section of County Road 47 generally described and depicted in Exhibit A. Southdown's grant to the County shall be by Special Warranty Deed, subject to the permitted exceptions set forth in Exhibit K. In lieu of providing any other warranties to the County, Southdown shall, at the time the Relocated Road is dedicated, provide a letter of credit to the County equal to 15% of the cost of constructing the Relocated Road, which shall remain available to County for a period of two years after the date of acceptance of the Relocated Road by the County as warranty collateral to be drawn upon by the County in those instances in which the Relocated Road fails to perform as expected for purposes of repairing damage to the Relocated Road caused by the failure of such expectations. The Letter of Credit shall be released by the County upon the second anniversary of the acceptance of the Relocated Road by the County.

7.2 County Road 49. Southdown shall construct a cul-de-sac to County standards and install a gate for emergency access at the Bullock-Southdown property line on County Road 49, as depicted on Exhibit L, in Section 21, T3N, R70W, Boulder County. Upon the County's acceptance of said cul-de-sac and gate, County Road 49 shall be vacated, subject to the retention of easements for existing utilities, from Highway 66 to the aforesaid Bullock-Southdown property line. The occurrence and satisfaction of the preceding conditions and the vacation shall be confirmed by the recordation of an appropriate separate resolution of the Board of County Commissioners. After vacation is confirmed, Southdown shall allow adjacent property owners emergency access to Highway 66 over the vacated road through its property or over a new road to be constructed thereon.

8. Donations of Land By Southdown.

8.1 Lands To Be Donated For Open Space. Subject to the terms and conditions set forth in paragraphs 8.1-8.9, inclusive, of this Agreement, Southdown commits to donate as open space, and the County hereby commits to accept as open space, all of Southdown's right, title, and interest in the Northwest Dowe Flats Property and the West Dowe Flats Donation Parcel (collectively, the "Donated Lands"), and maintain such property as non-developable open space in perpetuity. Prior to such completion of the conveyance of the Donated Lands and the trail easement along the Relocated Road described in paragraph 8.6 herein (the "Trail") to the County, as required below, Southdown shall not convey away any of its rights, title, or interest, in the easements or other access ways set forth in Exhibit M. Moreover, in the event of a future annexation, the County shall continue to have the right to enforce Southdown's commitment for the conveyance of the Donated Lands and the Trail, as set forth in this Paragraph 8, and no waiver or modification by an annexing entity shall affect the enforcement rights of the County.

8.2 Conditions Precedent To Donation. Southdown shall donate the Donated Lands to the County after all of the following conditions have occurred, said donation to be completed within 120 days after the date on which the last of the following conditions has been fulfilled:

- (i) Mining has commenced on the Permit Property. For purposes of this provision, mining shall be deemed to have commenced when at least 100,000 tons of mined

material have been moved from the Permit Property to the Cement Plant Site.

- (ii) The overland conveyor belt and crusher have been put into regular operation (operation following start-up testing) in connection with the mining of the Permit Property.
- (iii) The County has accepted the Relocated Road pursuant to paragraph 7 of this Agreement and completed the vacation of portions of County Roads 47 and 49 pursuant to paragraph 7 of this Agreement.

8.3 Terms And Conditions Of The Donation Of The Northwest Dowe Flats Property. Upon the occurrence and satisfaction of the conditions precedent set forth in paragraph 8.2 of this Agreement, Southdown shall donate the Northwest Dowe Flats Property to the County subject to the following terms and conditions:

(a) Subject to the permitted exceptions set forth in Exhibit J, general public access to the property shall be prohibited until at least 2030, provided, however, that the County may, in its discretion, allow limited access to the property by third parties for valid educational, scientific, or cultural purposes in a manner which does not impair the scenic, archaeological, wildlife, or natural environment of the property.

(b) Southdown shall not, by reason of the donation of the Northwest Dowe Flats Property to the County, be required to grant to the County any express or implied right of way, easement, or other means of access to the property other than that those described in Exhibit M, nor shall this Agreement be construed so as to require such a grant.

(c) The County shall not allow access to the Northwest Dowe Flats Property through the Indian Gap Subdivision by the exercise of any of the access rights to the Property granted by Southdown hereunder; provided, however, that the County may exercise its rights to allow access through such subdivision for firefighting or other public safety purposes or by agents or employees of the County acting within the scope of their authority.

(d) Southdown shall donate the property to the County by Special Warranty Deed subject to the permitted exceptions set forth in Exhibit I.

8.4 Terms And Conditions Of The Donation Of The West Dowe Flats Donation Parcel. Upon the occurrence and satisfaction of the conditions precedent set forth in paragraph 8.2 of this Agreement, Southdown shall donate the West Dowe Flats Donation Parcel to the County subject to the following terms and conditions:

(a) Subject to the permitted exceptions set forth in Exhibit H, general public access to the property shall be forever prohibited, provided, however, that the County may, in its discretion, allow limited access to the property by third parties for valid educational, scientific, or cultural purposes in a manner which does not impair the scenic, archaeological, wildlife, or natural environment of the property.

(b) After donation, the County shall consult with appropriate Native American tribes in order to promote the cultural interests of Native Americans in the Property and to protect and preserve the archaeological resources on the Property.

(c) Southdown shall donate the property to the County by Special Warranty Deed subject to the permitted exceptions set forth in Exhibit H.

8.5 Escrow of Deeds; Provision of Title Policies and Surveys. (a) Upon execution of this Agreement, special warranty deeds to the Donated Lands, including access, shall be executed by Southdown and deposited with a mutually acceptable escrow agent, subject to a mutually acceptable escrow agreement which requires said escrow agent to release such deeds to the County upon receipt of written mutual certification that the conditions precedent to donation set forth in paragraph 8.2 herein have been fulfilled. (b) Southdown, at its sole expense, shall furnish the County with policies of title insurance and surveys for the Donated Lands.

8.6 Trail Donation. Contemporaneously with Southdown's dedication to the County of the Relocated Road, as described in paragraph 7 herein, Southdown shall donate to the County by Special Warranty Deed an adjacent 25-foot-wide

easement on the east side of the Relocated Road limited to use as a hiking, equestrian, bicycle, and non-motorized vehicle trail.

8.7 Right To Name Donated Lands And Erect And Maintain Informational Signs. Upon donation, the Donated Lands and any part thereof shall be named the "Southdown Indian Mountain Open Space" and the Trail shall be named the "Southdown Trail." Southdown may, at its discretion, select an alternate name at any time prior to the donation of such lands, subject to the County's right to approve such alternate name, which approval shall not be unreasonably withheld. The County may not change the name designated by Southdown. The County, at Southdown's election and expense, shall erect and maintain signs on the Donated Lands and along the Trail carrying the name designated by Southdown for such property or trail. Southdown shall also have the right, at its sole election and expense, to erect and maintain an informational kiosk at the trailhead of the Trail, showing the route of the Trail and explaining the mining operations on Dowe Flats and the cement manufacturing process. The County shall have the right to approve the location, content and design of such kiosk.

8.8 Reservation of Right To Transfer Residential Development Density Rights. Southdown hereby reserves and retains the right to apply to the County to transfer residential development density rights from the Donated Lands, in accordance with any County regulations allowing for transfer of such rights which may be in effect at the time Southdown files an application for transfer. Nothing herein shall be deemed to limit the County's lawful exercise of discretion to approve or disapprove such transfer in accordance with the regulations in effect at the time Southdown requests such transfer, or to amend or repeal the regulations allowing such transfers to occur. Southdown may sell, transfer, or assign such development density rights to any other person or entity, which person or entity shall have the same rights with respect to the transfer of such development density rights as have been granted to Southdown herein.

8.9 Remedies For Breach. In the event that Southdown breaches any of its obligations under this Paragraph 8 of this Agreement, the County's remedy for such breach shall be limited to an action for specific performance, injunctive relief, declaratory judgment, and/or damages. The

County shall not, by reason of such breach, have the right to (i) revoke the Special Use Permit for the Approved Development or (ii) terminate the Vested Property Right granted herein.

9. Periodic Review. The Development shall be subject to both interim and ongoing review and assessment by the County pursuant to paragraph 5 of the Resolution.

10. Road Impact Fees. Because the Approved Development will not result in any increased impact on public roads and highways, Southdown shall not be required to participate in a County-wide road impact fee fund if the County adopts such a fee prior to the issuance of any building permits for the Approved Development which may be subject to such a fee.

11. Cancellation, Amendment, and Waiver. This Agreement may be canceled or amended or its provisions waived only upon the mutual written consent of the parties hereto, or as required to bring the Development into conformance with federal or state law.

12. Enforcement. The County and Southdown each have the authority to bring an action in Boulder District Court to compel the enforcement of this Agreement. If the Permit Property becomes included within the boundaries of any city or town, the County's right to enforce this Agreement shall automatically pass to the governing body of such city or town, subject to the limitations set forth in Paragraphs 5.1, 5.2, and 8.1, above.

13. Binding Effect. The terms and conditions of this Agreement inure to the benefit of, and are binding upon, the successors and assigns of the parties hereto.

14. Recordation. Upon execution, this Agreement, together with the Resolution, shall be recorded by Southdown or the County in the records of the Boulder County Clerk and Recorder.

15. Attorney In Fact For Marigold 41. To the extent that the consent of Marigold 41 may be necessary with respect to those provisions of this Agreement affecting the Dowe Flats Property, Southdown executes this Agreement on behalf of Marigold 41 as attorney in fact for Marigold 41 pursuant to that certain Term Deed on the Dowe Flats Property dated March 16, 1993 and recorded on March 25, 1993 on the real

estate records of the Boulder County Recorder, Filing # 01276718. Notwithstanding the foregoing, the exercise of the power of attorney by Southdown shall not be construed as, and does not extend to, the execution of any evidence of indebtedness or other monetary obligation on behalf of Marigold 41.

16. Integration. This instrument embodies the whole agreement of the parties. There are no promises, terms, conditions, or obligations other than those contained herein; and this Agreement shall supersede all previous communications, representations, or agreements, either verbal or written, between the parties hereto.

IN WITNESS WHEREOF, the parties hereto set their hands and seals as of the date set forth above.

BOULDER COUNTY

By: Ronald K Stewart
Ronald K. Stewart
Chair, Boulder County Board of County Commissioners

Attest: Jane Messerschmidt
7-14-94
Clerk of the Board

SOUTHDOWN, INC., a Louisiana corporation:

By: John W Lohr
John W. Lohr,
Division Vice President

MARIGOLD 41, a Colorado General Partnership,
BY SOUTHDOWN, INC., a Louisiana corporation, as
Attorney In Fact for Marigold 41:

By: John W Lohr
John W. Lohr,
Division Vice President,
Southdown, Inc.

Acknowledgements

STATE OF COLORADO)
) ss.
COUNTY OF BOULDER)

The foregoing instrument was acknowledged before me this 6th day of July, 1994, by John W. Lohr as Division Vice President of SOUTHDOWN, INC., a Louisiana corporation, on behalf of such corporation.

WITNESS my hand and official seal.



Deborah A. Osterman
Notary Public

My commission expires: 12-2-96.

STATE OF COLORADO)
) ss.
COUNTY OF BOULDER)

The foregoing instrument was acknowledged before me this 6th day of July, 1994, by John W. Lohr as Division Vice President of SOUTHDOWN, INC., a Louisiana corporation, as Attorney In Fact for Marigold 41.

WITNESS my hand and official seal.



Deborah A. Osterman
Notary Public

My commission expires: 12-2-96.

STATE OF COLORADO)
) ss.
COUNTY OF BOULDER)

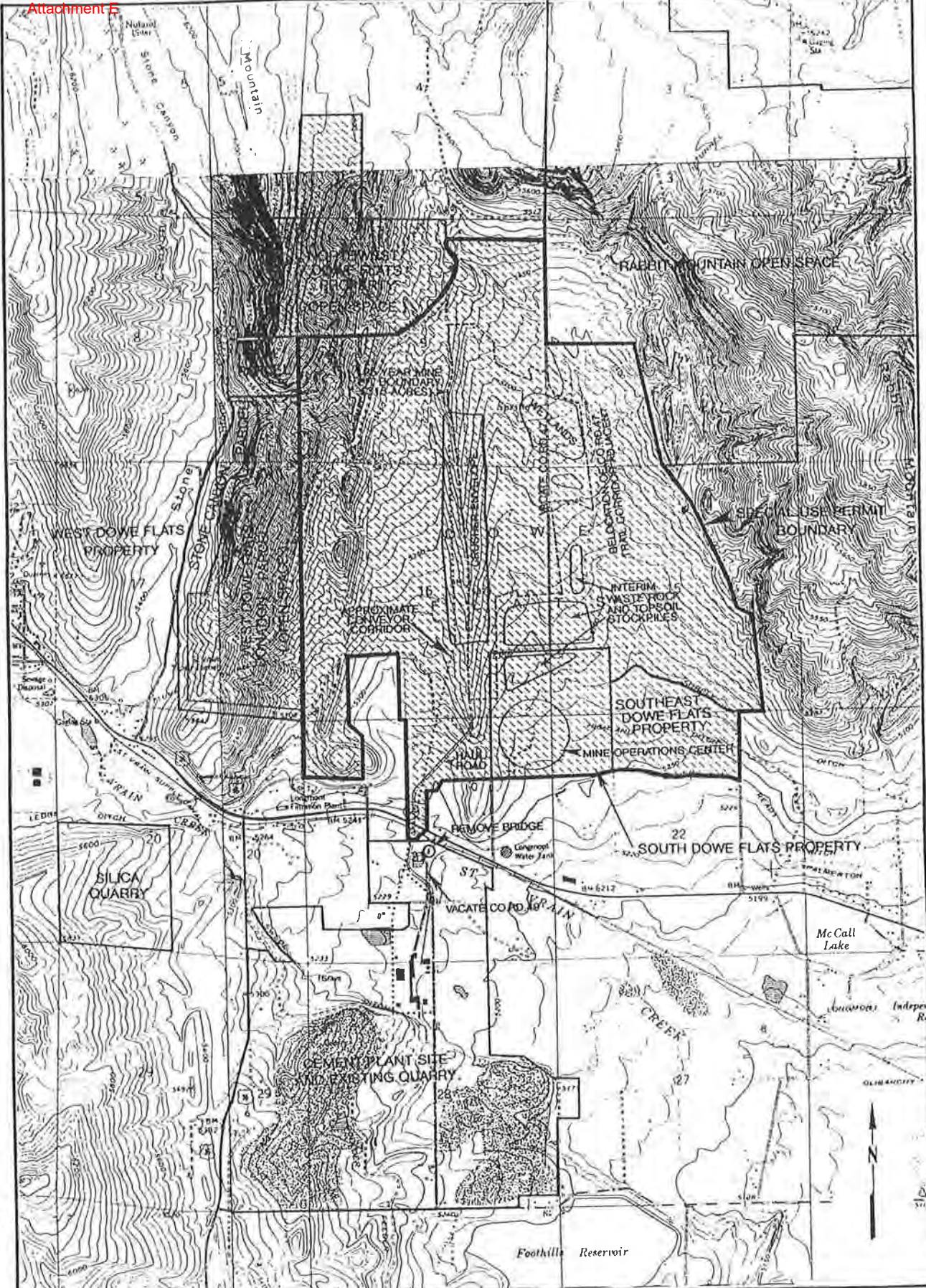
The foregoing instrument was acknowledged before me this 14th day of July, 1994, by Ronald K. Stewart, as Chair, Board of County Commissioners of BOULDER COUNTY, COLORADO, on behalf of the County.

WITNESS my hand and official seal.




Caren L. Duff
Notary Public

My commission expires: 6/17/98.




SHB AGRA, INC.
 Engineering & Environmental Services


EXHIBIT A TO DEVELOPMENT AGREEMENT
 SPECIAL USE LOCATION MAP
 DOWE FLATS PROJECT
 BOULDER COUNTY, COLORADO
 INTERIM NON-DEVELOPMENT COVENANT

A tract of land located in Sections 9, 16 and 21, all in T311, R70W of the 6th P.M., described as follows:

Commencing at the S1/4 Corner of said Section 9, from which the Southeast Corner of said Section 9 bears S87°27'25"E, 2644.65 feet, thence S57°27'25"E, 599.46 feet along the South line of the SE1/4 of said Section 9 to the TRUE POINT OF BEGINNING;

Thence N07°49'07"W, 1538.20 feet;

Thence N00°44'32"E, 1903.12 feet to the Southeasterly line of Tract "B" conveyed to the United States of America as described in Warranty Deed recorded in Book 9C3 at Page 221 of the records of Boulder County, Colorado;

Thence S40°01'00"W, 214.48 feet along the Southeasterly line of said Tract "B" to a point of curve to the right;

Thence Southwesterly, 158.24 feet along the Southeasterly line of said Tract "B" and along the arc of said curve to a point tangent, said arc having a radius of 643.00 feet, a central angle of 14°05'03" and being subtended by a chord that bears S47°04'00"W, 157.84 feet;

Thence S54°07'00"W, 799.62 feet along the Southeasterly line of said Tract "B" to the East-West Centerline of said Section 9;

Thence N88°00'00"W, 2146.94 feet along the East-West Centerline of said Section 9 to the W1/4 Corner of said Section 9;

Thence S00°24'30"W, 2618.21 feet along the West line of the SW1/4 of said Section 9 to the Southwest Corner of said Section 9;

Thence S09°27'54"W, 2773.47 feet along the West line of the NW1/4 of said Section 16 to the W1/4 Corner of said Section 16;

Thence S00°28'48"W, 2770.15 feet along the West line of the SW1/4 of said Section 16 to the Southwest Corner of said Section 16;

Thence S00°26'16"W, 1316.45 feet along the West line of the NW1/4 of said Section 21 to the Southwest Corner of the NW1/4 of the NW1/4 of said Section 21;

Thence S29°49'48"E, 1325.03 feet along the South line of the NW1/4 of the NW1/4 of said Section 21 to the Southeast Corner thereof;

Thence N03°27'00"E, 897.37 feet along the East line of the NW1/4 of the NW1/4 of said Section 21 to the approximate Easterly bank of the Supply Ditch and to the Westerly line of that tract of land conveyed to Matt Ruskie and Fannie Ruskie as described in Warranty Deed recorded in Book 584 at Page 231 of the records of Boulder County, Colorado;

Thence N41°11'48"W, 104.41 feet along the approximate Easterly bank of said Supply Ditch and along the Westerly line of that tract of land as described in said Book 584 at Page 231;

Thence N17°17'58"W, 243.37 feet along the approximate Easterly bank of said Supply Ditch and along the Westerly line of that tract of land as described in said Book 584 at Page 231;

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Thence N03°09'35"E, 111.70 feet along the approximate Easterly bank of said Supply Ditch and along the Westerly line of that tract of land as described in said Book 584 at Page 231 to the South line of the SW1/4 of said Section 16;

Thence N89°59'20"W, 137.03 feet along the South line of the SW1/4 of said Section 16 to the Southwest Corner of that tract of land conveyed to Matt and Fanny Ruski as described in Warranty Deed recorded in Book 601 at Page 45 of the records of Boulder County, Colorado and as described in Quit Claim Deed recorded in Book 603 at Page 26 of the records of Boulder County, Colorado;

Thence N00°01'40"E, 1320.00 feet along the West line of that tract of land as described in said Book 601 at Page 45 and in said Book 603 at Page 26 to the Northwest Corner thereof;

Thence S89°58'20"E, 996.00 feet along the North line of that tract of land as described in said Book 601 at Page 45 and in said Book 603 at Page 26 to the Northeast Corner thereof;

Thence S00°01'40"W, 1194.78 feet along the East line of that tract of land as described in said Book 601 at Page 45 and in said Book 603 at Page 26 to the approximate Southerly bank of said Supply Ditch and along the Northerly line of that tract of land as described in said Book 584 at Page 231;

Thence S34°07'46"E, 151.34 feet along the approximate Southerly bank of said Supply Ditch and along the Northerly line of that tract of land as described in said Book 584 at Page 231 to the South line of the SW1/4 of said Section 16;

Thence S89°58'20"E, 25.37 feet along the South line of the SW1/4 of said Section 16 to the West line of the East 30 acres of the NW1/4 of said Section 21;

Thence S00°27'46"W, 2643.55 feet along the West line of the East 30 acres of the NW1/4 of said Section 21 to the South line of the NW1/4 of said Section 21;

Thence S89°40'32"E, 279.60 feet along the South line of the NW1/4 of said Section 21 to the Southwest Corner of that tract of land conveyed to Wm. L. Parsons as described in Warranty Deed recorded in Book 70 at Page 162 of the records of Boulder County, Colorado;

Thence N27°54'28"E, 465.40 feet along the Northwesterly line of that tract of land as described in said Book 70 at Page 162 to the North-South Centerline of said Section 21;

Thence N00°27'46"E, 645.55 feet along the North-South Centerline of said Section 21 to the South line of the North 265.00 feet of the NW1/4 of the SW1/4 of the NE1/4 of said Section 21;

Thence S89°46'54"E, 330.00 feet along the South line of the North 265.00 feet of the NW1/4 of the SW1/4 of the NE1/4 of said Section 21 to the East line of the West 330.00 feet of the NW1/4 of the SW1/4 of the NE1/4 of said Section 21;

Thence N00°27'46"E, 265.00 feet along the East line of the West 330.00 feet of the NW1/4 of the SW1/4 of the NE1/4 of said Section 21 to the South line of the NW1/4 of the NE1/4 of said Section 21;

Thence S89°46'52"E, 328.67 feet along the South line of the NW1/4 of the NE1/4 of said Section 21 to the Southeast Corner of the W1/2 of the NW1/4 of the NE1/4 of said Section 21;

Thence N00°28'52"E, 1324.28 feet along the East line of the W1/2 of the NW1/4 of the NE1/4 of said Section 21 to the Northeast Corner thereof;

Thence N00°32'09"E, 2699.69 feet along the East line of the W1/2 of the W1/2 of the SE1/4 of said Section 16 to the Northeast Corner thereof;

Thence N0°29'06"E, 2700.60 feet along the East line of the W1/2 of the W1/2 of the NE1/4 of said Section 16 to the Northeast Corner thereof;

Thence N87°27'25"W, 61.76 feet along the South line of the SE1/4 of said Section 9 to the TRUE POINT OF BEGINNING;

Less and except the following described property:

Tract "B", Tract "C", Tract "F", Tract "G", Tract "I" and Tract "S" conveyed to the United States of America as described in Warranty Deed recorded in Book 903 at Page 221 of the records of Boulder County, Colorado.

Tract "F" and Tract "G" conveyed to the United States of America as described in Warranty Deed recorded in Book 905 at Page 250 of the records of Boulder County, Colorado.

Road right-of-way for Colorado State Highway No. 66.

Right-of-way for the Burlington and Northern Railroad.

All that portion of the Highland Ditch located in the W1/2 of the NW1/4 of the NE1/4 of said Section 21.

A tract of land located in the E1/2 of Section 9, the SW1/4 of Section 10, Section 15, the E1/2 of Section 16, the NE1/4 of Section 21 and in the NW1/4 of the NE1/4 of Section 22, all in T3N, R70W of the 6th P.M., described as follows:

Commencing at the S1/4 Corner of said Section 9, from which the Southeast Corner of said Section 9 bears S87°27'25"E, 2644.89 feet, thence S87°27'25"E, 599.46 feet along the South line of the SE1/4 of said Section 9 to the TRUE POINT OF BEGINNING, from which a point hereinafter referred to as Point "A" bears N07°49'07"W, 1538.20 feet;

Thence continuing S87°27'25"E, 61.76 feet along the South line of the SE1/4 of said Section 9 to the Northeast Corner of the W1/2 of the NE1/4 of said Section 16;

Thence S00°29'06"W, 2700.60 feet along the East line of the W1/2 of the NE1/4 of said Section 16 to the Southeast Corner thereof;

Thence S00°32'09"W, 2699.69 feet along the East line of the W1/2 of the NE1/4 of said Section 16 to the Southeast Corner thereof;

Thence S00°28'52"W, 1324.28 feet along the East line of the W1/2 of the NW1/4 of the NE1/4 of said Section 21 to the Southeast Corner thereof;

Thence S89°46'54"E, 658.67 feet along the South line of the NW1/4 of the NE1/4 of said Section 21 to the Southeast Corner thereof;

Thence N00°29'57"E, 1325.50 feet along the East line of the NW1/4 of the NE1/4 of said Section 21 to the Northeast Corner thereof;

Thence N00°34'45"E, 1343.19 feet along the West line of the SE1/4 of the SE1/4 of said Section 16 to the Northwest Corner thereof;

Thence S89°18'43"E, 1320.20 feet along the North line of the SE1/4 of the SE1/4 of said Section 16 to the Northeast Corner thereof;

Thence S89°45'38"E, 1321.95 feet along the North line of the SW1/4 of the SW1/4 of said Section 15 to the Northeast Corner thereof;

Thence S00°31'39"W, 683.81 feet along the East line of the SW1/4 of the SW1/4 of said Section 15 to the approximate Northerly bank of the Supply Ditch;

The following courses and distances are along the approximate Northerly bank of said Supply ditch:

Thence $N74^{\circ}34'04"E$, 66.38 feet;

Thence $N61^{\circ}42'40"E$, 199.17 feet;

Thence $N21^{\circ}00'22"E$, 276.55 feet;

Thence $N45^{\circ}56'00"E$, 75.97 feet;

Thence $N75^{\circ}25'05"E$, 176.92 feet;

Thence $S27^{\circ}00'29"E$, 306.77 feet;

Thence $S64^{\circ}35'35"E$, 357.74 feet;

Thence $S79^{\circ}34'12"E$, 142.33 feet;

Thence $S63^{\circ}57'18"E$, 182.39 feet;

Thence $S50^{\circ}18'58"E$, 112.20 feet;

Thence $S71^{\circ}54'56"E$, 168.49 feet;

Thence $S55^{\circ}53'34"E$, 189.88 feet;

Thence $S75^{\circ}12'21"E$, 184.87 feet;

Thence $S66^{\circ}08'01"E$, 196.80 feet;

Thence $S57^{\circ}15'11"E$, 312.16 feet;

Thence $S37^{\circ}39'43"E$, 194.52 feet;

Thence $S39^{\circ}28'40"E$, 236.03 feet to the East line of the NW1/4 of the NE1/4 of said Section 22;

Thence, leaving the approximate northerly bank of said Supply Ditch, $N00^{\circ}23'09"E$, 274.18 feet along the East line of the NW1/4 of the NE1/4 of said Section 22 to the Northeast Corner thereof;

Thence $S89^{\circ}54'18"E$, 532.20 feet along the South line of the SE1/4 of said Section 15 to a point from which the Southeast Corner of said Section 15 bears $S89^{\circ}54'18"E$, 793.42 feet;

Thence $N05^{\circ}48'06"W$, 2055.16 feet;

Thence $N61^{\circ}53'26"W$, 406.88 feet;

Thence $N14^{\circ}23'36"W$, 431.01 feet;

Thence $N22^{\circ}20'47"W$, 1733.69 feet;

Thence $N33^{\circ}00'42"W$, 1264.40 feet to the North line of the NW1/4 of said Section 15, from which the NW1/4 Corner of said Section 15 bears $S89^{\circ}51'50"E$, 199.23 feet;

Thence $N11^{\circ}26'41"W$, 2699.53 feet to the East-West Centerline of said Section 10;

Thence $N89^{\circ}10'22"W$, 1879.89 feet along the East-West Centerline of said Section 10 to the NW1/4 Corner of said Section 10;

Thence $N00^{\circ}16'51"E$, 2146.77 feet along the East line of the NE1/4 of said Section 9 to the Southerly line of Tract "A" conveyed to the United States of America as described in Warranty Deed recorded in Book 905 at Page 250 of the records of Boulder County, Colorado;

Thence $N88^{\circ}56'02"W$, 349.86 feet along the Southerly line of said Tract "A" to a point of curve to the left;

Thence westerly, 106.38 feet along the Southerly line of said Tract "A" and along the arc of said curve to a point tangent, said arc having a radius of 1325.00 feet, a central angle of $4^{\circ}36'00"$ and being subtended by a chord that bears $S88^{\circ}45'58"W$, 106.35 feet;

Thence $S86^{\circ}27'58"W$, 332.10 feet along the Southerly line of said Tract "A" to a point of curve to the right;

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Thence Westerly, 134.86 feet along the Southerly line of said Tract "A" and along the arc of said curve to a point tangent, said arc having a radius of 643.00 feet, a central angle of 12°01'00" and being subtended by a chord that bears N87°31'32"W, 134.61 feet;

Thence N81°31'02"W, 913.54 feet along the Southerly line of said Tract "A" and along the Southerly line of Tract "B" conveyed to the United States of America as described in Warranty Deed recorded on Film 834 as Reception No. 083286 of the records of Boulder County, Colorado, to the Easterly line of Tract "D" as described in said Book 905 at Page 250;

Thence S60°20'22"W, 196.38 feet along the Easterly line of said Tract "D" to the West line of the E1/2 of the W1/2 of the NE1/4 of said Section 9;

Thence S00°09'52"W, 246.96 feet along the West line of the E1/2 or the W1/2 of the NE1/4 of said Section 9 to the Northeasterly line of Tract "C" as described in said Book 905 at Page 250;

Thence S38°43'00"E, 73.00 feet along the Northeasterly line of said Tract "C" to a point of curve to the right;

Thence Southerly, 302.62 feet along the Easterly line of said Tract "C" and along the arc of said curve to a point tangent, said arc having a radius of 308.70 feet, a central angle of 56°10'00" and being subtended by a chord that bears S10°38'00"E, 290.64 feet;

Thence S17°27'00"W, 440.20 feet along the Easterly line of said Tract "C" and along the Easterly line of Tract "B" conveyed to the United States of America as described in Book 903 at Page 221 of the records of Boulder County, Colorado, to a point of curve to the right;

Thence Southwesterly, 140.41 feet along the Southeasterly line of said Tract "B" and along the arc of said curve to a point tangent, said arc having a radius of 356.50 feet, a central angle of 22°34'00" and being subtended by a chord that bears S28°44'00"W, 139.51 feet;

Thence S40°01'00"W, 250.22 feet along the Southeasterly line of said Tract "B" to a point from which said Point "A" bears S00°44'32"W;

Thence S00°44'32"W, 1903.12 feet to said point "A";

Thence S07°49'07"E, 1538.20 feet to the TRUE POINT OF BEGINNING.

TOGETHER WITH right-of-way for private driveway over and across the East 25.00 feet of the W1/2 of the NE1/4 of said Section 22.

TOGETHER WITH an easement for purposes of ingress and egress: Access from County Road Number 47, described as follows: 60 foot right-of-way and utility easement being the South 60 feet of the Easterly 2059.2 feet of the Southeast Quarter of Section 4, Township 3 North, Range 70 West of the 6th P.M. and the Easterly 60 feet of the West One-half of the West One-half of the Northeast Quarter of Section 9, Township 3 North, Range 70 West of the 6th P.M. to the St. Vrain Supply Canal right-of-way easement as described in Deed recorded April 1, 1952 in Book 903, Page 221; thence along the canal right-of-way easement to the Southwest Quarter of Section 9, Township 3 North, Range 70 West of the 6th P.M., County of Boulder, State of Colorado.

SUBJECT to a right-of-way for Boulder County Road No. 47 (North 53rd Street, Vestal Road and North 57th Street).

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A PARCEL OF LAND SITUATED IN THE NORTH HALF OF SECTION 9, THE EAST HALF OF THE NORTHEAST QUARTER OF SECTION 8, AND THE WEST HALF OF THE SOUTHWEST QUARTER OF SECTION 4, ALL IN TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH PRINCIPAL MERIDIAN, BOULDER, COUNTY, COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTH QUARTER CORNER OF SECTION 9; THENCE SOUTH $88^{\circ}14'56''$ EAST 666.07 FEET TO THE NORTHEAST CORNER OF THE WEST HALF OF THE WEST HALF OF THE NORTHEAST QUARTER OF SECTION 9, WHENCE THE NORTHEAST SECTION CORNER THEREOF BEARS SOUTH $88^{\circ}14'56''$ EAST 1,998.21 FEET; THENCE ALONG THE EAST LINE OF THE WEST HALF OF THE WEST HALF OF SAID NORTHEAST QUARTER SOUTH $00^{\circ}09'52''$ WEST 323.45 FEET TO A POINT ON THE WESTERLY RIGHT-OF-WAY LINE OF ST. VRAIN SUPPLY CANAL DESCRIBED BY DEED RECORDED IN BOOK 903 AT PAGE 221 OF BOULDER COUNTY RECORDS; THENCE ALONG SAID WESTERLY RIGHT-OF-WAY LINE THE FOLLOWING ELEVEN (11) COURSES:

THENCE ALONG THE ARC OF A CURVE TO THE LEFT (SAID CURVE HAVING A RADIUS OF 299.10 FEET, A CENTRAL ANGLE OF $48^{\circ}49'06''$, CHORD OF SAID ARC BEARS SOUTH $44^{\circ}57'33''$ WEST 247.21 FEET) A DISTANCE OF 254.85 FEET; THENCE SOUTH $20^{\circ}33'00''$ WEST 14.00 FEET; THENCE ALONG THE ARC OF A CURVE TO THE LEFT (SAID CURVE HAVING A RADIUS OF 299.10 FEET, A CENTRAL ANGLE OF $59^{\circ}16'00''$, CHORD OF SAID ARC BEARS SOUTH $09^{\circ}05'00''$ EAST 295.78 FEET) A DISTANCE OF 309.39 FEET; THENCE SOUTH $38^{\circ}43'00''$ EAST 209.52 FEET; THENCE SOUTH $00^{\circ}09'52''$ WEST 35.86 FEET; THENCE SOUTH $17^{\circ}27'00''$ WEST 520.49 FEET; THENCE ALONG THE ARC OF A CURVE TO THE RIGHT (SAID CURVE HAVING A RADIUS OF 226.50 FEET, A CENTRAL ANGLE OF $22^{\circ}34'00''$, CHORD OF SAID ARC BEARS SOUTH $28^{\circ}44'00''$ WEST 88.63 FEET) A DISTANCE OF 89.27 FEET; THENCE SOUTH $40^{\circ}01'00''$ WEST 464.70 FEET; THENCE SOUTH $49^{\circ}39'00''$ EAST 10.00 FEET; THENCE ALONG THE ARC OF A CURVE TO THE RIGHT (SAID CURVE HAVING A RADIUS OF 523.00 FEET, A CENTRAL ANGLE OF $14^{\circ}06'00''$, CHORD OF SAID ARC BEARS SOUTH $47^{\circ}04'00''$ WEST 128.38 FEET) A DISTANCE OF 128.71 FEET; THENCE SOUTH $54^{\circ}07'00''$ WEST 953.87 FEET TO A POINT ON THE EAST-WEST CENTERLINE OF SAID SECTION 9, WHENCE THE CENTER QUARTER CORNER THEREOF BEARS SOUTH $88^{\circ}00'00''$ EAST 688.45 FEET; THENCE NORTH $88^{\circ}00'00''$ WEST 1,951.50 FEET TO THE WEST QUARTER CORNER OF SECTION 9; THENCE ALONG THE SOUTH LINE OF THE NORTHEAST QUARTER OF SECTION 8, NORTH $89^{\circ}22'52''$ WEST 551.74 FEET, WHENCE THE SOUTHWEST CORNER OF THE EAST HALF OF SAID NORTHEAST QUARTER BEARS NORTH $89^{\circ}22'52''$ WEST 727.42 FEET; THENCE ALONG THE WESTERLY BOUNDARY LINE OF THAT TRACT OF LAND DESCRIBED BY DEED RECORDED ON FILM 1381 AT RECEPTION NO. 727921 THE FOLLOWING SIX (6) COURSES:

THENCE NORTH $16^{\circ}28'38''$ EAST 301.02 FEET (NORTH $15^{\circ}35'01''$ EAST 301.47 FEET, PER DEED AT RECEPTION NO. 727921); THENCE NORTH $04^{\circ}05'09''$ EAST 372.34 FEET (NORTH $03^{\circ}11'32''$ EAST, PER DEED AT RECEPTION NO. 727921); THENCE NORTH $15^{\circ}43'41''$ EAST 471.87 FEET (NORTH $14^{\circ}50'04''$ EAST, PER DEED AT RECEPTION NO. 727921); THENCE NORTH $00^{\circ}31'30''$ WEST 742.00 FEET NORTH $01^{\circ}25'07''$ WEST, PER DEED AT RECEPTION NO. 727921); THENCE NORTH $16^{\circ}24'05''$ WEST 414.90 FEET (NORTH $17^{\circ}17'42''$ WEST, PER DEED AT RECEPTION NO. 727921); THENCE NORTH $20^{\circ}12'01''$ WEST 397.69 FEET (NORTH $21^{\circ}05'28''$ WEST PER DEED AT RECEPTION NO. 727921) TO A POINT ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 8, WHENCE THE NORTHWEST CORNER OF THE EAST HALF OF SAID NORTHEAST QUARTER BEARS NORTH $88^{\circ}29'39''$ WEST 665.58 FEET; THENCE ALONG SAID NORTH LINE SOUTH $88^{\circ}29'39''$ EAST 592.02 FEET TO THE SOUTHWEST CORNER OF SECTION 4; THENCE NORTH $03^{\circ}52'29''$ EAST 2,640.53 FEET TO THE WEST QUARTER CORNER OF SECTION 4; THENCE SOUTH $87^{\circ}23'57''$ EAST 1,313.73 FEET TO THE NORTHEAST CORNER OF THE WEST HALF OF THE SOUTHWEST QUARTER OF SECTION 4; THENCE SOUTH $03^{\circ}53'46''$ WEST 2,620.75 FEET TO THE

SOUTHEAST CORNER OF THE WEST HALF OF THE SOUTHWEST QUARTER OF SECTION 4; THENCE ALONG THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 9 SOUTH $88^{\circ}15'47''$ EAST 1,313.32 FEET TO THE TRUE POINT OF BEGINNING;

TOGETHER WITH A 60 FOOT WIDE PRIVATE ROAD AND UTILITY EASEMENT ACROSS THE SOUTHERLY 60 FEET OF THE SOUTH 1/2 OF SECTION 4, FROM THE SOUTHWESTERLY RIGHT OF WAY LINE OF A PUBLIC ROAD KNOWN AS DAKOTA RIDGE ROAD TO THE EASTERLY LINE OF THE WEST 1/2 OF THE SOUTHWEST 1/4 OF SECTION 4, AND A 60 FOOT WIDE PRIVATE ROAD AND UTILITY EASEMENT, AND BEING 30 FEET EITHER SIDE OF THE CENTERLINE OF AN EXISTING ROAD LOCATED IN THE SOUTHWEST 1/4 OF THE SOUTHWEST 1/4 OF SECTION 4, FROM THE SOUTHERLY LINE OF SECTION 4 TO THE EASTERLY LINE OF THE WEST 1/2 OF THE SOUTHWEST 1/4 OF SECTION 4, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M.,

COUNTY OF BOULDER,
STATE OF COLORADO.

THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 15; THE SOUTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 16; THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 21; AND THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 22, ALL IN TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., COUNTY OF BOULDER, STATE OF COLORADO.

Southeast Dowe Flats Property

Those portions of Sections Fifteen and Twenty-two (22), all in Township Three (3) North, Range Seventy (70) West of the 6th P.M., County of Boulder, State of Colorado, more particularly described as follows:

Considering the North Line of the Northeast Quarter (NE1/4) of said Section 22 as bearing North 89° 54' 18" West, and with all bearings contained herein relative thereto;

Commencing at the Northeast Corner (NE Cor) of said Section 22;
 thence along the North Line of the Northeast Quarter (NE1/4) of said Section 22, North 89° 54' 18" West, 1324.60 feet to the Northwest Corner (NW Cor) of the East Half of the Northeast Quarter (E1/2 NE1/4) of said Section 22;
 thence along the West Line of said East Half of the Northeast Quarter (E1/2 NE1/4), South 0° 23' 09" West, 273.74 feet to the True Point of Beginning;
 thence North 39° 38' 40" West, 236.03 feet;
 thence North 37° 39' 43" West, 194.52 feet (crossing into said Section 15);
 thence North 57° 15' 11" West, 312.16 feet;
 thence North 66° 08' 01" West, 196.80 feet;
 thence North 75° 12' 21" West, 184.87 feet;
 thence North 55° 53' 34" West, 189.88 feet;
 thence North 71° 54' 56" West, 168.49 feet;
 thence North 50° 10' 58" West, 112.20 feet;
 thence North 63° 57' 18" West, 182.39 feet;
 thence North 79° 34' 12" West, 142.33 feet;
 thence North 64° 35' 35" West, 357.74 feet;
 thence North 27° 00' 29" West, 306.77 feet;
 thence South 75° 25' 05" West, 176.92 feet;
 thence South 45° 56' 00" West, 75.97 feet;
 thence South 21° 00' 22" West, 276.56 feet;
 thence South 61° 42' 40" West, 199.17 feet;
 thence South 74° 13' 51" West, 86.30 feet to the West Line of the Southeast Quarter of the Southwest Quarter (SE1/4 SW1/4) of said Section 15;
 thence along said West Line, South 0° 31' 39" West, 642.88 feet to the Southwest Corner (SW Cor) of said Southeast Quarter of the Southwest Quarter (SE1/4 SW1/4);
 thence along the West Line of the East Half of the Northwest Quarter (E1/2 NW1/4) of said Section 22, South 0° 26' 51" West, 1328.16 feet to the Southwest Corner (SW Cor) of the Northeast Quarter of the Northwest Quarter (NE1/4 NW1/4) of said Section 22;
 thence along the South Line of said Northeast Quarter of the Northwest Quarter (NE1/4 NW1/4), South 89° 53' 24" East, 321.09 feet;
 thence North 35° 34' 13" East, 98.28 feet;
 thence North 58° 55' 13" East, 169.00 feet;
 thence North 89° 35' 13" East, 67.00 feet;
 thence South 39° 17' 47" East, 135.00 feet;
 thence South 53° 48' 53" East, 169.62 feet;
 thence South 34° 25' 33" East, 117.84 feet;
 thence South 62° 45' 24" East, 134.28 feet;
 thence North 81° 38' 31" East, 211.87 feet;
 thence North 82° 43' 33" East, 265.82 feet;
 thence North 77° 22' 24" East, 214.94 feet;
 thence South 89° 17' 00" East, 91.89 feet;
 thence South 83° 13' 10" East, 141.03 feet;
 thence South 80° 52' 33" East, 251.86 feet;
 thence South 75° 51' 49" East, 136.06 feet;
 thence South 79° 33' 28" East, 212.71 feet;
 thence South 75° 58' 54" East, 139.44 feet to the West Line of that certain tract of land conveyed to County of Boulder by Deed recorded in Book 757 at page 563, Records of said Boulder County;
 thence along said West Line, North 0° 18' 47" East (Record North 0° 15' West), to the True Point of Beginning

EXHIBIT F

West Dowe Flats Property

A TRACT OF LAND IN THE S 1/2 SE 1/4 OF SECTION 8 AND IN THE E 1/2 OF SECTION 17, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., IN BOULDER COUNTY, COLORADO, SAID TRACT BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID S 1/2 SE 1/4, SECTION 8; THENCE S 1° 07'29" W, 1308.97 FEET TO THE SOUTHEAST CORNER OF SECTION 8; THENCE S 1° 12'28" W, 5543.88 FEET TO THE SOUTHEAST CORNER OF SECTION 17; THENCE N 85°23'04" W, 2621.84 FEET TO THE SOUTH QUARTER CORNER OF SECTION 17; THENCE N 1°22'17" E, 2863.61 FEET TO A POINT ON THE APPROXIMATE CENTERLINE OF STONE CANYON ROAD; THENCE ALONG SAID STONE CANYON ROAD THE FOLLOWING COURSES AND DISTANCES:

N 14°15'01" E, 920.08 FEET; N 23°01'22" E, 314.38 FEET;
N 9°58'20" E, 606.18 FEET; N 22°12'26" E, 961.80 FEET;
N 41°01'26" E, 257.63 FEET; N 24°04'47" E, 529.16 FEET;
N 11°11'24" E, 230.82 FEET; N 1°26'22" W, 134.23 FEET;
N 22°42'37" W, 100.28 FEET TO A POINT ON THE NORTH LINE OF SAID S 1/2 SE 1/4, SECTION 8; THENCE S 89°09'55" E, 1481.87 FEET TO THE POINT OF BEGINNING.
COUNTY OF BOULDER, STATE OF COLORADO. EXCEPT THAT PART CONVEYED IN DEED RECORDED APRIL 1, 1952 IN BOOK 903 AT PAGE 221.

EXHIBIT G

West Dowe Flats Donation Parcel

A tract of land located in the S½, SE¼, of Section 8 and the E½ of Section 17, all in T3N, R70W of the 6th P.M., Boulder County, Colorado, said tract being more particularly described as follows:

Beginning at a point on the East line of the SE¼, Section 17 from whence the Southeast corner of said Section 17 bears S01°12'28"W, 200.35 feet and with all other bearings contained herein relative thereto; thence N85°23'04"W, 1938.09 feet; thence N19°41'19"W, 1341.56 feet; thence N09°54'08"E, 1011.19 feet; thence N37°58'28"E, 393.96 feet; thence N14°15'01"E, 874.06 feet; thence N23°01'22"E, 336.99 feet; thence N09°58'20"E, 610.50 feet; thence N22°12'26"E, 798.07 feet; thence N41°01'26"E, 247.58 feet; thence N24°04'47"E, 686.31 feet; thence N11°11'24"E, 364.99 feet; thence N01°26'22"W, 168.73 feet; thence N88°23'48"W, 600.85 feet; thence N22°42'37"W, 100.29 feet; thence S89°09'55"E, 1481.87 feet along the North line of the S½, SE¼, Section 8 to the Northeast corner of said S½, SE¼; thence S01°07'29"W, 1308.98 feet to the Southeast corner of Section 8 (the Northeast corner of Section 17); thence S01°12'28"W, 2773.48 feet to the East Quarter corner of Section 17; thence S01°12'28"W, 2570.05 feet to the Point of Beginning, except that part conveyed in deed recorded April 1, 1952 in Book 903 at Page 221.

EXHIBIT H

PERMITTED EXCEPTIONS

WEST DOWE FLATS DONATION PARCEL

1. REAL PROPERTY TAXES AND ASSESSMENTS FOR 1994 AND SUBSEQUENT YEARS.
2. AN UNDIVIDED 1/2 INTEREST IN ALL OIL, GAS AND OTHER MINERALS AS RESERVED BY DEED RECORDED MAY 14, 1954 IN BOOK 950 AT PAGE 366, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.
3. RIGHT OF WAY FOR THE SAINT VRAIN SUPPLY CANAL AS SHOWN ON THE COUNTY ASSESSORS MAP AND AS CONTAINED IN INSTRUMENTS RECORDED AUGUST 5, 1953 IN BOOK 932 AT PAGE 590; APRIL 24, 1953 IN BOOK 925 AT PAGE 146; APRIL 24, 1953 IN BOOK 926 AT PAGE 146; SEPTEMBER 15, 1953 IN BOOK 936 AT PAGE 353.
4. LACK OF A RIGHT OF ACCESS FROM THE LAND TO ANY OPEN PUBLIC ROAD, STREET OR HIGHWAY.

NOTE: THIS EXCEPTION IS NECESSARY BECAUSE IT DOES NOT APPEAR FROM THE INSTRUMENTS IN THE OFFICE OF THE CLERK AND RECORDER OF THE COUNTY IN WHICH SUBJECT PROPERTY IS SITUATED THAT ANY RIGHT OF ACCESS EXISTS TO AN OPEN PUBLIC ROADWAY.

5. EASEMENT TO THE CITY OF LONGMONT RECORDED APRIL 23, 1981 ON FILM 1162 AS RECEPTION NO. 443099.
6. EASEMENT TO THE CITY OF LONGMONT RECORDED SEPTEMBER 19, 1978 ON FILM 1029 AS RECEPTION NO. 300147.
7. RIGHT OF WAY FOR LATERALS AND DITCHES AS RESERVED IN DEEDS RECORDED NOVEMBER 14, 1919 IN BOOK 446 AT PAGES 144 AND 145.
8. RESERVATIONS AS CONTAINED IN UNITED STATES PATENT RECORDED DECEMBER 19, 1891 IN BOOK 75 PAGES 513 AND 514 AND MARCH 16, 1892 IN BOOK 100 PAGE 57, AS FOLLOWS: RIGHTS OF WAY FOR DITCHES OR CANALS CONSTRUCTED BY AUTHORITY OF THE UNITED STATES.
9. COVENANTS RECORDED SEPTEMBER 20, 1993 ON FILM 1875 AT RECEPTION NO. 1338986, AND AMENDMENT RECORDED NOVEMBER 5, 1993 ON FILM 1899 AT RECEPTION NO. 1358254.

EXHIBIT IPERMITTED EXCEPTIONS

NORTHWEST DOWE FLATS PROPERTY

1. REAL PROPERTY TAXES AND ASSESSMENTS FOR 1994 AND SUBSEQUENT YEARS.
2. RESERVATION CONTAINED IN DEED FROM VIRGINIA W. HILL TO ARTHUR H. CARD AND FERN B. CARD, RECORDED MAY 14, 1954 IN BOOK 950 AT PAGE 366, WHICH READS:

RESERVING UNTO THE GRANTOR, AN UNDIVIDED 1/2 OF ALL THE OIL, GAS AND OTHER MINERALS IN, UNDER, OR THAT MAY BE PRODUCED FROM SAID ABOVE DESCRIBED LAND, TOGETHER WITH THE RIGHT OF INGRESS AND EGRESS TO SAME FOR MINING, OPERATING AND PRODUCING OIL, GAS AND OTHER MINERALS, SUBJECT TO PAYMENT BY GRANTOR, HER HEIRS, PERSONAL REPRESENTATIVES OR ASSIGNS TO THE THEN SURFACE OWNERS FOR ANY DAMAGE CAUSED BY EXERCISE OF SAID RIGHT AND OPERATIONS THEREUNDER.
3. EASEMENT FOR THE PURPOSES OF INGRESS AND EGRESS AS GRANTED TO JOEL F. KLEEVES AND JEAN ANN KLEEVES BY ARTHUR H. CARD AND FERN B. CARD IN DEED RECORDED JUNE 9, 1980 ON FILM 1120 AT RECEPTION NO. 398367.
4. THE RIGHT OF A PROPRIETOR OF A VEIN OR LODE TO EXTRACT OR REMOVE HIS ORE SHOULD THE SAME BE FOUND TO PENETRATE OR INTERSECT THE PREMISES THEREBY GRANTED AS RESERVED IN UNITED STATES PATENT RECORDED DECEMBER 19, 1891, IN BOOK 75, AT PAGE 510 AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.
5. EASEMENT AND RIGHT OF WAY FOR THE RIGHT, PRIVILEGE AND AUTHORITY TO CONSTRUCT, OPERATE AND MAINTAIN OVERHEAD AND/OR UNDERGROUND ELECTRIC LINE OR SYSTEM TOGETHER WITH THE RIGHT TO ENTER UPON SAID PREMISES, AS GRANTED TO POUDDRE VALLEY RURAL ELECTRIC ASSOCIATION INC., BY FIRST INTERSTATE BANK OF OF AZ., N.A. AS TRUSTEE, IN INSTRUMENT RECORDED JANUARY 16, 1991, ON FILM 1658 AT RECEPTION NO. 01083543.
6. EASEMENT AND RIGHT OF WAY FOR THE RIGHT, PRIVILEGE AND AUTHORITY TO CONSTRUCT, OPERATE AND MAINTAIN DITCHES, SIPHONS, AND OTHER WORKS AS MAY BE NECESSARY TO CONSTRUCT, OPERATE, AND MAINTAIN ST. VRAIN SUPPLY CANAL

AND TO DIVERT AND CONTROL SURFACE DRAINAGE TOGETHER WITH THE RIGHT TO ENTER UPON SAID PREMISES, AS GRANTED TO THE UNITED STATES OF AMERICA BY CHARLES B. HILL AND VIRGINIA W. HILL, IN INSTRUMENT RECORDED APRIL 1, 1952, IN BOOK 903 AT PAGE 221.

7. TERMS, CONDITIONS, EASEMENTS, RIGHTS OF WAY, STIPULATIONS AND OBLIGATIONS AS CONTAINED IN AND BURDENS IMPOSED BY DEDICATIONS AND GRANTS OF EASEMENTS RECORDED AUGUST 27, 1980 AT RECEPTION NO. 409904 AND SEPTEMBER 24, 1980 AT RECEPTION NO. 414148.

EXHIBIT JPERMITTED EXCEPTIONS

PERMIT PROPERTY

1. REAL PROPERTY TAXES AND ASSESSMENTS FOR 1994 AND SUBSEQUENT YEARS.

EXCEPTIONS 2 THROUGH 19 AFFECT THE DOWE FLATS PROPERTY

2. THE RIGHTS OF THE PROPRIETORS OF VEINS OR LODES TO EXTRACT OR REMOVE ORE SHOULD THE SAME BE FOUND TO INTERSECT OR PENETRATE THE HEREIN DESCRIBED PROPERTY AND EASEMENTS FOR DITCHES OR CANALS AS RESERVED IN THE VARIOUS PATENTS OF THE HEREIN DESCRIBED PROPERTY, AS RECORDED IN: BOOK 73, PAGE 509, RECORDED DECEMBER 19, 1891 AS TO THE SOUTHEAST QUARTER OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 75, PAGE 512, RECORDED DECEMBER 19, 1891 AS TO THE EAST HALF OF THE NORTHEAST QUARTER OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 75, PAGE 516, RECORDED DECEMBER 19, 1891 AS TO THE WEST HALF OF THE NORTHEAST QUARTER OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 100, PAGE 141 RECORDED AUGUST 3, 1900 AS TO THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 75, PAGE 519, RECORDED FEBRUARY 22, 1892 AS TO THE WEST HALF OF THE NORTHEAST QUARTER AND NORTH HALF OF THE NORTHWEST QUARTER OF SECTION 15, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 100, PAGE 56, RECORDED FEBRUARY 22, 1892 AS TO THE SOUTH HALF OF THE NORTHWEST QUARTER AND NORTH HALF OF THE SOUTHWEST QUARTER OF SECTION 14, TOWNSHIP 2 NORTH, RANGE 70 WEST. BOOK 369, PAGE 138, RECORDED OCTOBER 29, 1936 AS TO THE EAST HALF OF THE NORTHEAST QUARTER OF SECTION 15, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 59, PAGE 493, RECORDED DECEMBER 16, 1900 AS TO THE NORTH HALF AND THE NORTH HALF OF THE SOUTHWEST QUARTER AND NORTH HALF OF THE SOUTHEAST QUARTER AND THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 16, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 100, PAGE 57, RECORDED FEBRUARY 22, 1892 AS TO THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 21, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 75, PAGE 24, RECORDED JANUARY 13, 1887 OF THE WEST HALF OF THE NORTHEAST QUARTER OF SECTION 22, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 100, PAGE 53, RECORDED DECEMBER 19, 1891 AS TO THE SOUTHWEST QUARTER OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 122, PAGE 35, RECORDED JUNE 13, 1888, AS TO THE EAST HALF OF THE NORTHWEST AND WEST HALF OF THE NORTHEAST OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST.

3. AN EASEMENT FOR WATER PIPELINE AND INCIDENTAL PURPOSES OVER A STRIP OF LAND 12 FEET IN WIDTH, THE CENTERLINE OF WHICH IS DESCRIBED AS FOLLOWS: FROM THE NORTH QUARTER CORNER OF SECTION 21, TOWNSHIP 2 NORTH, RANGE 70 WEST OF THE 6TH P.M., RUN THE FOLLOWING COURSES: SOUTH 0°9' WEST, 2197 FEET; THENCE SOUTH 79°8' EAST, 105.4 FEET; THENCE SOUTH 44°8' EAST, 324.5 FEET TO THE POINT OF BEGINNING ON THE WEST LINE OF RICHARDSON'S LAND; RUNNING THENCE SOUTH 61°47' EAST 351.4 FEET TO THE SOUTH LINE OF RICHARDSON'S LAND; IN THE NORTHEAST QUARTER OF SECTION 21, TOWNSHIP 3 NORTH, RANGE 70 WEST AS GRANTED TO THE CITY OF LONGMONT, A MUNICIPAL CORPORATION BY DOCUMENT RECORDED MAY 14, 1910 IN BOOK 337 AT PAGE 100.
4. A PERPETUAL EASEMENT AND RIGHT OF WAY TO CONSTRUCT, OPERATE, MAINTAIN AND USE SUCH DITCH AND OTHER WORKS AS MAY BE NECESSARY TO CONSTRUCT OPERATE AND MAINTAIN THE ST. VRAIN SUPPLY CANAL, ON, OVER AND ACROSS THE FOLLOWING DESCRIBED PARCELS OF LAND HEREIN, LOCATED IN THE NORTHEAST QUARTER OF SECTION 9 AND LOCATED IN THE NORTHWEST QUARTER OF SECTION 16, BOTH IN TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., AS CONVEYED TO THE UNITED STATES OF AMERICA BY DEED RECORDED APRIL 24, 1952 IN BOOK 905 AT PAGE 250.
5. A PERPETUAL EASEMENT AND RIGHT OF WAY TO CONSTRUCT, OPERATE, MAINTAIN AND USE SUCH DITCHES AND OTHER WORKS AS MAY BE NECESSARY TO CONSTRUCT, OPERATE AND MAINTAIN THE ST. VRAIN SUPPLY CANAL, ON, OVER AND ACROSS SAID LAND LOCATED IN THE WEST HALF OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., AS CONVEYED TO THE UNITED STATES OF AMERICA BY DEED RECORDED APRIL 1, 1952 IN BOOK 903 AT PAGE 221.
6. A PERPETUAL EASEMENT TO A BORROW AND DISPOSAL AREA, TOGETHER WITH THE RIGHT TO BORROW AND WASTE; TO CONSTRUCT, OPERATE AND MAINTAIN SUCH CONSTRUCTION FACILITIES AS MAY BE INCIDENTAL THERETO, INCLUDING THE RIGHT TO FENCE SAID TRACTS, LOCATED IN THE SOUTH HALF OF THE SOUTHWEST QUARTER OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., AS CONVEYED TO THE UNITED STATES OF AMERICA BY DEED RECORDED AUGUST 5, 1953 IN BOOK 932 AT PAGE 590.
7. A PERPETUAL EASEMENT AND RIGHT OF WAY TO A BORROW AND DISPOSAL AREA, TOGETHER WITH THE RIGHT TO BORROW AND WASTE; TO FENCE SAID AREA AND TO CONSTRUCT, OPERATE AND MAINTAIN SUCH CONSTRUCTION FACILITIES AS MAY BE INCIDENTAL THERETO, LOCATED IN THE SOUTHWEST QUARTER OF

SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., AS CONVEYED TO THE UNITED STATES OF AMERICA BY DEED RECORDED SEPTEMBER 15, 1953 IN BOOK 936 AT PAGE 354.

8. EXCEPT AN UNDIVIDED ONE-HALF OF ALL OIL, GAS AND OTHER MINERALS, IN, UNDER OR THAT MAY BE PRODUCED FROM SUBJECT PROPERTY TOGETHER WITH THE RIGHT OF INGRESS AND EGRESS TO SAME FOR MINING, OPERATING AND PRODUCING OIL, GAS AND OTHER MINERALS AS RESERVED BY VIRGINIA W. HILL IN WARRANTY DEED RECORDED MAY 14, 1954 IN BOOK 950 AT PAGE 336. (AFFECTS S1/2 SECTION 4, T3N, R70W, E1/2 NE1/4, S1/2 SE1/4 SECTION 8, T3N, R70W, W1/2, W1/2 W1/2 E1/2, SECTION 9, T3N, R70W, E1/2 SECTION 17, T3N, R70W)
9. EXCEPTING AN UNDIVIDED ONE-HALF INTEREST IN ALL OIL, GAS AND OTHER MINERALS AS RESERVED BY LUCILLE K. JONES, FRANCES COMSTOCK, NELLIE LOWE AND WILLIAM R. KINCAID IN DEED RECORDED IN BOOK 1144 AT PAGE 456, THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 21, TOWNSHIP 3 NORTH, RANGE 70 WEST.
10. THE EFFECT OF THE SUPPLY DITCH AS SHOWN IN THE DITCH PLAT BOOK E PAGES 14, 15, 16, 58, 78, 79, 80, BOULDER COUNTY RECORDS.
11. TERMS, AGREEMENTS, PROVISIONS, CONDITIONS AND OBLIGATIONS AS CONTAINED IN ACCESS EASEMENT AGREEMENT BY AND BETWEEN JOEL F. KLEAVES AND JEAN ANN KLEAVES AND MARIGOLD 41, A COLORADO GENERAL PARTNERSHIP, RECORDED JANUARY 9, 1984 ON FILM 1286 AS RECEPTION NO. 597582.
12. EXCEPT AN UNDIVIDED ONE-HALF INTEREST IN AND TO ALL GAS AND OIL RIGHTS UNDERLYING SAID PREMISES, TOGETHER WITH THE RIGHT TO PROSPECT FOR, MINE AND REMOVE THE SAME, BUT THIS RESERVATION SHALL NOT INCLUDE LIMESTONE, LIME ROCK, SHALE, CLAY, SAND, GRAVEL OR MINERALS OTHER THAN GAS AND OIL, AS RESERVED BY LUCILLE K. JONES, FRANCES COMSTOCK, NELLIE LOWE AND WILLIAM R. KINCAID IN DEEDS RECORDED APRIL 13, 1959 IN BOOK 1106 AT PAGE 152, BOOK 1106, PAGE 153 AND AS CORRECTED IN BOOK 1109, PAGE 460. (AFFECTS: E1/2 E1/2 AND E1/2 W1/2 E1/2 SECTION 9, T3N, R70W; E1/2 E1/2 AND E1/2 W1/2 E1/2 SECTION 16, T3N, R70W LESS SE1/4 SE1/4; E1/2 NW1/4 NE1/4 SECTION 21, T3N, R70W)
13. AN EASEMENT FOR TRANSMISSION LINE AND INCIDENTAL PURPOSES OVER THE PROPERTY DESCRIBED AS FOLLOWS: AN EASEMENT 100 FEET IN WIDTH WHOSE CENTERLINE IS DESCRIBED AS FOLLOWS: BEGINNING AT A POINT ON THE EAST LINE OF SECTION 15, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., BOULDER COUNTY, COLORADO, 15 FEET SOUTH OF THE EAST QUARTER-

- CORNER OF SAID SECTION 15; THENCE WESTERLY PARALLEL TO AND 15 FEET SOUTHERLY OF THE EAST-WEST CENTERLINE OF SAID SECTION 15 A DISTANCE OF 50 FEET; THENCE SOUTHERLY PARALLEL AND 50 FEET WESTERLY OF THE EAST LINE OF SAID SECTION 15 TO A POINT 50 FEET NORTH OF THE SOUTH LINE OF SAID SECTION 15; THENCE WESTERLY PARALLEL TO AND 50 FEET NORTHERLY OF THE SOUTH LINE OF SAID SECTION 15 TO THE FARTHEST WESTERLY POINT FROM WHICH THE CENTERLINE OF THE EASEMENT MAY THEN BE EXTENDED IN A STRAIGHT NORTHWESTERLY LINE TO A POINT ON THE EAST LINE OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SAID SECTION 15, 11 FEET SOUTH OF THE NORTHEAST CORNER OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SAID SECTION 15 EXCEPT SUCH PORTION AS MAY ENCROACH UPON THE RIGHT OF WAY FOR SUPPLY DITCH AS GRANTED TO POUFRE VALLEY RURAL ELECTRIC ASSOCIATION BY DOCUMENT RECORDED JANUARY 25, 1971, RECEPTION NO. 965876.
14. AN EASEMENT FOR AN ELECTRIC TRANSMISSION AND/OR DISTRIBUTION LINE OR SYSTEM AND TO CUT, TRIM AND CONTROL THE GROWTH BY CHEMICAL MEANS, MACHINERY OR OTHERWISE OF TREES OR SHRUBBERY ON SAID EASEMENT AND INCIDENTAL PURPOSES OVER THE FOLLOWING DESCRIBED LAND: AN EASEMENT 100 FEET IN WIDTH WHOSE CENTERLINE IS DESCRIBED AS FOLLOWS: BEGINNING AT A POINT ON THE EAST LINE OF SECTION 15, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., BOULDER COUNTY COLORADO, 15 FEET SOUTH OF THE EAST QUARTER-CORNER OF SAID SECTION 15; THENCE WESTERLY PARALLEL TO AND 15 FEET SOUTHERLY OF THE EAST-WEST CENTERLINE OF SAID SECTION 15, A DISTANCE OF 50 FEET; THENCE SOUTHERLY PARALLEL AND 50 FEET WESTERLY OF THE EAST LINE OF SAID SECTION 15 TO A POINT 50 FEET NORTH OF THE SOUTH LINE OF SAID SECTION 15; THENCE WESTERLY PARALLEL TO AND 50 FEET NORTHERLY OF THE SOUTH LINE OF SAID SECTION 15, A DISTANCE OF 1312.5 FEET; THENCE NORTH $64^{\circ}45'$ WEST 2905 FEET, MORE OR LESS, TO A POINT ON THE EAST LINE OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SAID SECTION 15, 11 FEET SOUTH OF THE NORTHEAST CORNER OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SAID SECTION 15, EXCEPT SUCH PORTION OF THE AFORESAID EASEMENT AS WOULD LIE SOUTHERLY OF THE NORTHERLY RIGHT OF WAY LINE OF THE SUPPLY DITCH AS GRANTED TO POUFRE VALLEY RURAL ELECTRIC ASSOCIATION BY DOCUMENT RECORDED JANUARY 25, 1971, RECEPTION NO. 965876.
15. COVENANTS, CONDITIONS AND RESTRICTIONS REGARDING AN INDIVIDUAL SEWER SYSTEM, CONTAINED IN AN AGREEMENT WITH BOULDER COUNTY BOARD OF HEALTH IN DOCUMENT RECORDED MARCH 13, 1974, RECEPTION NO. 96215. AFFECTS THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 3 NORTH, RANGE 70 WEST.

16. ANY ASSESSMENT OR LIEN OF LONGS PEAK WATER DISTRICT, AS DISCLOSED BY THE INSTRUMENT RECORDED OCTOBER 17, 1991 IN FILM 1697 AT RECEPTION NO. 1136980. (AFFECTS PORTIONS OF SECTIONS 22 AND 23, T3N, R70W)
17. ANY WATER RIGHTS OR CLAIMS OR TITLE TO WATER, IN, ON OR UNDER THE LAND.
18. ANY EXISTING LEASES OR TENANCIES.
19. BARGAIN AND SALE EASEMENT DEED RECORDED FEBRUARY 14, 1990 AT FILM 1614 UNDER RECEPTION NO. 1028294, FOR THE BENEFIT OF MICHAEL D. DOLLAGHAN.

EXCEPTIONS 20 THROUGH 26 AFFECT THE SOUTH DOWE FLATS PROPERTY

20. SUCH RIGHTS AS MAY EXIST IN A ROAD OVER THAT PORTION OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 15, THE SOUTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 16 AND THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 21 LYING WITHIN NORTH 53RD AND NORTH 55TH ST. AKA COUNTY ROAD NO. 47, AND VESTAL ROAD IN THE SOUTHEAST QUARTER OF SOUTHEAST QUARTER OF SECTION 16, AS SHOWN ON A SURVEY BY ROCKY MOUNTAIN CONSULTANTS INC., DATED FEBRUARY 21, 1989.
21. RIGHT OF WAY FOR THE SUPPLY DITCH OVER A PORTION OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 15, THE SOUTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 16 AND THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 21 AND THE HIGHLAND DITCH OVER A PORTION OF THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 21 AND THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 22 AND THE ROUGH AND READY DITCH OVER A PORTION OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 22, A SHOWN ON A SURVEY BY ROCKY MOUNTAIN CONSULTANTS INC., DATED FEBRUARY 21, 1989.
22. THE RIGHTS OF THE OWNERS OF A LINE OF POLES AND WIRES ALONG THE WESTERLY AND NORTHERLY LINES OF SAID LAND AS SHOWN ON A SURVEY BY ROCKY MOUNTAIN CONSULTANTS INC., DATED FEBRUARY 21, 1989.
23. ANY CONFLICTS OR DISCREPANCIES IN THE BOUNDARY LINES BY REASON OF THE LOCATION OF FENCES AS SHOWN ON A SURVEY BY ROCKY MOUNTAIN CONSULTANTS INC., DATED FEBRUARY 21, 1989.
24. EASEMENT AND RIGHT OF WAY AS GRANTED TO POUVRE VALLEY RURAL ELECTRIC ASSOCIATION, INC., IN INSTRUMENT RECORDED JUNE 1, 1993 ON FILM 1828 UNDER RECEPTION NO. 1298320.

25. ANY WATER RIGHTS OR CLAIMS OR TITLE TO WATER, IN, ON OR UNDER THE LAND.
26. ANY EXISTING LEASES OR TENANCIES.

EXCEPTIONS 27 THROUGH 37 AFFECT THE SOUTHEAST DOWE FLATS PROPERTY

27. A CONDITION CONTAINED IN THE UNITED STATES PATENT RECORDED JANUARY 13, 1887 IN BOOK 75 AT PAGE 24, WHICH STATES AS FOLLOWS: "SUBJECT TO ANY VESTED AND ACCRUED WATER RIGHTS FOR MINING, AGRICULTURAL, MANUFACTURING OR OTHER PURPOSES, AND RIGHT TO DITCHES AND RESERVOIRS USED IN CONNECTION WITH SUCH WATER RIGHTS, AS MAY BE RECOGNIZED AND ACKNOWLEDGED BY THE LOCAL CUSTOMS, LAWS AND DECISIONS OF COURTS; AND ALSO SUBJECT TO THE RIGHT OF THE PROPRIETOR OF A VEIN OR LODGE TO EXTRACT AND REMOVE HIS ORE THEREFROM, SHOULD THE SAME BE FOUND TO PENETRATE OR INTERSECT THE PREMISES HEREBY GRANTED, AS PROVIDED BY LAW." (E1/2 NW1/4 AND W1/2 NE1/4 22-3-70)
28. A CONDITION CONTAINED IN THE UNITED STATES PATENT RECORDED JUNE 13, 1910 IN BOOK 100 AT PAGE 251, WHICH STATES AS FOLLOWS: "SUBJECT TO ANY VESTED AND ACCRUED WATER RIGHTS FOR MINING, AGRICULTURAL, MANUFACTURING OR OTHER PURPOSES, AND RIGHT TO DITCHES AND RESERVOIRS USED IN CONNECTION WITH SUCH WATER RIGHTS, AS MAY BE RECOGNIZED AND ACKNOWLEDGED BY THE LOCAL CUSTOMS, LAWS AND DECISIONS OF COURTS; AND ALSO SUBJECT TO THE RIGHT OF THE PROPRIETOR OF A VEIN OR LODGE TO EXTRACT AND REMOVE HIS ORE THEREFROM, SHOULD THE SAME BE FOUND TO PENETRATE OR INTERSECT THE PREMISES HEREBY GRANTED, AS PROVIDED BY LAW." (SE1/4 15-3-70)
29. TERMS AND CONDITIONS OF AN AGREEMENT BY AND BETWEEN FRED LOOMILLER AND JOHN WENG, CONCERNING A WATER SERVICE LINE AND THE CONSTRUCTION AND MAINTENANCE THEREOF, RECORDED MARCH 29, 1945 IN BOOK 754 AT PAGE 428.
30. RIGHT OF WAY FOR PRIVATE DRIVEWAY PURPOSES AS RESERVED IN DEED FROM MOUNTAIN SHADOW HEREFORD XL RANCH, TO EDWIN W. PEIKER, JR. VIRGINIA SUE PEIKER, JACK W. DICKENS AND LUCILLE DICKENS RECORDED MAY 9, 1972 UNDER RECEPTION NO. 017581. THE ROUTE OF SAID RIGHT OF WAY IS MORE PARTICULARLY DESCRIBED AS FOLLOWS: RIGHT OF WAY FOR PRIVATE DRIVEWAY NOT TO EXCEED 25 FEET IN WIDTH OVER AND ACROSS THE EAST SIDE OF THE W1/2 OF THE NE1/4 OF SAID SECTION 22.

31. SUCH RIGHTS AS MAY EXIST IN A DITCH OVER THAT PORTION OF THE HEREIN DESCRIBED LAND LYING WITHIN HIGHLAND DITCH, AS SHOWN ON A MAP FILED WITH THE BOULDER COUNTY ASSESSOR.
32. SUCH RIGHTS AS MAY EXIST IN A DITCH OVER THAT PORTION OF THE HEREIN DESCRIBED LAND LYING WITHIN ROUGH AND READY DITCH, AS SHOWN ON A MAP FILED WITH THE BOULDER COUNTY ASSESSOR.
33. SUCH RIGHTS AS MAY EXIST IN A DITCH OVER THAT PORTION OF THE HEREIN DESCRIBED LAND LYING WITHIN SUPPLY DITCH, AS SHOWN ON A MAP FILED WITH THE BOULDER COUNTY ASSESSOR.
34. COVENANTS, CONDITIONS AND RESTRICTIONS AS CONTAINED IN DEED BY AND BETWEEN SOUTHWESTERN CEMENT ENTERPRISES, INC., A DELAWARE CORPORATION AND ALICE K. PLATT, RECORDED JANUARY 17, 1991 UNDER RECEPTION NO. 01083841.
35. DEED OF TRUST FROM SOUTHWESTERN CEMENT ENTERPRISES, INC., A DELAWARE CORPORATION, TO THE PUBLIC TRUSTEE OF BOULDER COUNTY, FOR THE BENEFIT OF ALICE K. PLATT, SECURING AN ORIGINAL PRINCIPAL INDEBTEDNESS OF \$675,000.00, AND ANY OTHER AMOUNTS AND/OR OBLIGATIONS DATED JANUARY 16, 1991, RECORDED JANUARY 17, 1991 AT RECEPTION NO. 01083842

ASSIGNMENT OF ABOVE DEED OF TRUST TO VALLEY BANK OF LYONS RECORDED APRIL 10, 1991 ON FILM 1668 AT RECEPTION NO. 01096815.
36. ANY WATER RIGHTS OR CLAIMS OR TITLE TO WATER, IN, ON OR UNDER THE LAND.
37. ANY EXISTING LEASES OR TENANCIES.

EXHIBIT KPERMITTED EXCEPTIONS

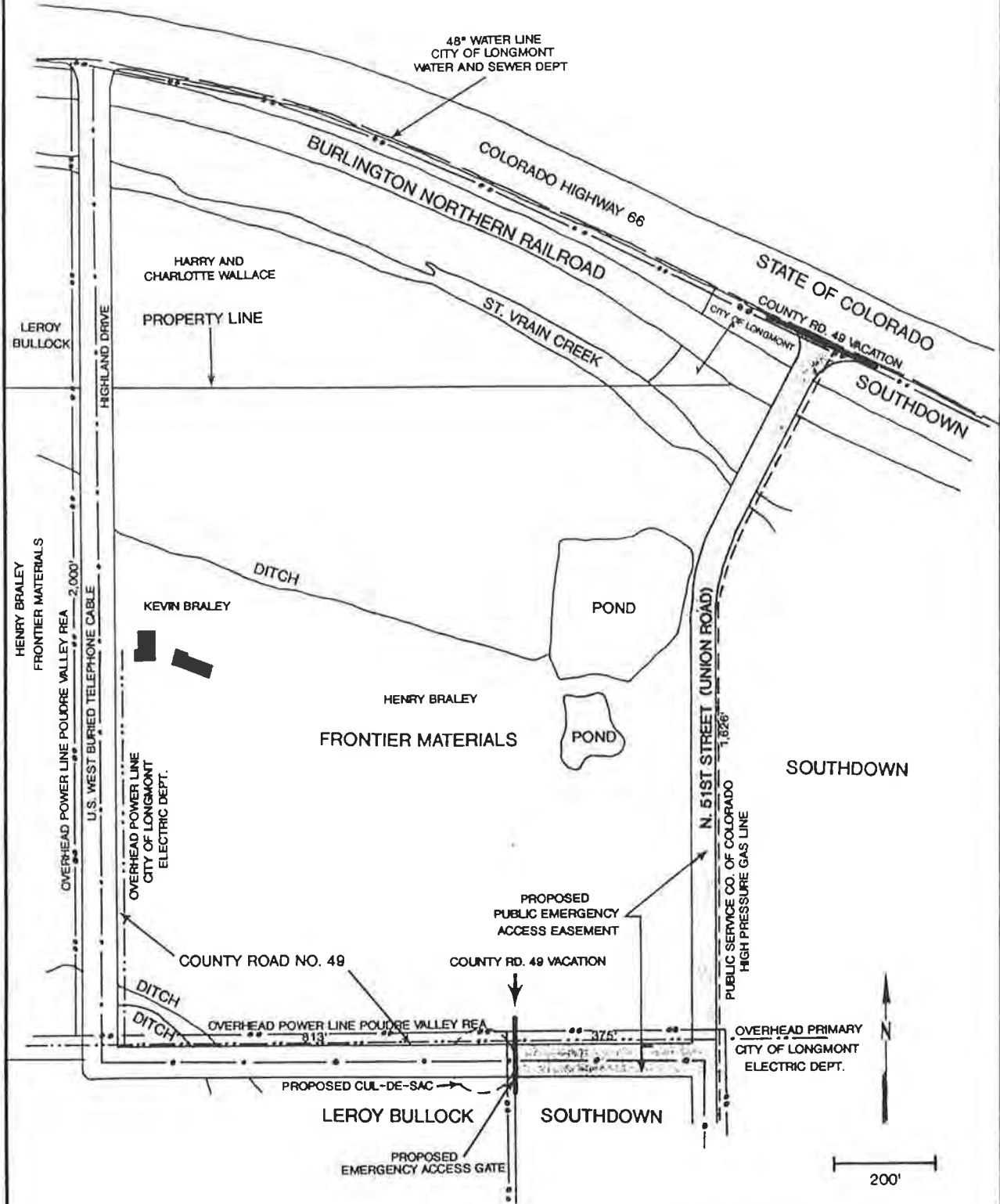
RELOCATED COUNTY ROAD 47

1. REAL PROPERTY TAXES AND ASSESSMENTS FOR 1994 AND SUBSEQUENT YEARS.
2. THE RIGHTS OF THE PROPRIETORS OF VEINS OR LODES TO EXTRACT OR REMOVE ORE SHOULD THE SAME BE FOUND TO INTERSECT OR PENETRATE THE HEREIN DESCRIBED PROPERTY AND EASEMENTS FOR DITCHES OR CANALS AS RESERVED IN THE VARIOUS PATENTS OF THE HEREIN DESCRIBED PROPERTY, AS RECORDED IN: BOOK 73, PAGE 509, RECORDED DECEMBER 19, 1891 AS TO THE SOUTHEAST QUARTER OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 75, PAGE 512, RECORDED DECEMBER 19, 1891 AS TO THE EAST HALF OF THE NORTHEAST QUARTER OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 75, PAGE 516, RECORDED DECEMBER 19, 1891 AS TO THE WEST HALF OF THE NORTHEAST QUARTER OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 100, PAGE 141 RECORDED AUGUST 3, 1900 AS TO THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 75, PAGE 519, RECORDED FEBRUARY 22, 1892 AS TO THE WEST HALF OF THE NORTHEAST QUARTER AND NORTH HALF OF THE NORTHWEST QUARTER OF SECTION 15, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 100, PAGE 56, RECORDED FEBRUARY 22, 1892 AS TO THE SOUTH HALF OF THE NORTHWEST QUARTER AND NORTH HALF OF THE SOUTHWEST QUARTER OF SECTION 14, TOWNSHIP 2 NORTH, RANGE 70 WEST. BOOK 369, PAGE 138, RECORDED OCTOBER 29, 1936 AS TO THE EAST HALF OF THE NORTHEAST QUARTER OF SECTION 15, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 59, PAGE 493, RECORDED DECEMBER 16, 1900 AS TO THE NORTH HALF AND THE NORTH HALF OF THE SOUTHWEST QUARTER AND NORTH HALF OF THE SOUTHEAST QUARTER AND THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 16, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 100, PAGE 57, RECORDED FEBRUARY 22, 1892 AS TO THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 21, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 75, PAGE 24, RECORDED JANUARY 13, 1887 OF THE WEST HALF OF THE NORTHEAST QUARTER OF SECTION 22, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 100, PAGE 53, RECORDED DECEMBER 19, 1891 AS TO THE SOUTHWEST QUARTER OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST. BOOK 122, PAGE 35, RECORDED JUNE 13, 1888, AS TO THE EAST HALF OF THE NORTHWEST AND WEST HALF OF THE NORTHEAST OF SECTION 9, TOWNSHIP 3 NORTH, RANGE 70 WEST.

3. TERMS, AGREEMENTS, PROVISIONS, CONDITIONS AND OBLIGATIONS AS CONTAINED IN ACCESS EASEMENT AGREEMENT BY AND BETWEEN JOEL F. KLEAVES AND JEAN ANN KLEAVES AND MARIGOLD 41, A COLORADO GENERAL PARTNERSHIP, RECORDED JANUARY 9, 1984 ON FILM 1286 AS RECEPTION NO. 597582.
4. EXCEPT AN UNDIVIDED ONE-HALF INTEREST IN AND TO ALL GAS AND OIL RIGHTS UNDERLYING SAID PREMISES, TOGETHER WITH THE RIGHT TO PROSPECT FOR, MINE AND REMOVE THE SAME, BUT THIS RESERVATION SHALL NOT INCLUDE LIMESTONE, LIME ROCK, SHALE, CLAY, SAND, GRAVEL OR MINERALS OTHER THAN GAS AND OIL, AS RESERVED BY LUCILLE K. JONES, FRANCES COMSTOCK, NELLIE LOWE AND WILLIAM R. KINCAID IN DEEDS RECORDED APRIL 13, 1959 IN BOOK 1106 AT PAGE 152, BOOK 1106, PAGE 153 AND AS CORRECTED IN BOOK 1109, PAGE 460.
(AFFECTS: E1/2 E1/2 AND E1/2 W1/2 E1/2 SECTION 9, T3N, R70W; E1/2 E1/2 AND E1/2 W1/2 E1/2 SECTION 16, T3N, R70W LESS SE1/4 SE1/4; E1/2 NW1/4 NE1/4 SECTION 21, T3N, R70W)
5. AN EASEMENT FOR TRANSMISSION LINE AND INCIDENTAL PURPOSES OVER THE PROPERTY DESCRIBED AS FOLLOWS: AN EASEMENT 100 FEET IN WIDTH WHOSE CENTERLINE IS DESCRIBED AS FOLLOWS: BEGINNING AT A POINT ON THE EAST LINE OF SECTION 15, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., BOULDER COUNTY, COLORADO, 15 FEET SOUTH OF THE EAST QUARTER-CORNER OF SAID SECTION 15; THENCE WESTERLY PARALLEL TO AND 15 FEET SOUTHERLY OF THE EAST-WEST CENTERLINE OF SAID SECTION 15 A DISTANCE OF 50 FEET; THENCE SOUTHERLY PARALLEL AND 50 FEET WESTERLY OF THE EAST LINE OF SAID SECTION 15 TO A POINT 50 FEET NORTH OF THE SOUTH LINE OF SAID SECTION 15; THENCE WESTERLY PARALLEL TO AND 50 FEET NORTHERLY OF THE SOUTH LINE OF SAID SECTION 15 TO THE FARTHEST WESTERLY POINT FROM WHICH THE CENTERLINE OF THE EASEMENT MAY THEN BE EXTENDED IN A STRAIGHT NORTHWESTERLY LINE TO A POINT ON THE EAST LINE OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SAID SECTION 15, 11 FEET SOUTH OF THE NORTHEAST CORNER OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SAID SECTION 15 EXCEPT SUCH PORTION AS MAY ENCROACH UPON THE RIGHT OF WAY FOR SUPPLY DITCH AS GRANTED TO POUDDRE VALLEY RURAL ELECTRIC ASSOCIATION BY DOCUMENT RECORDED JANUARY 25, 1971, RECEPTION NO. 965876.
6. AN EASEMENT FOR AN ELECTRIC TRANSMISSION AND/OR DISTRIBUTION LINE OR SYSTEM AND TO CUT, TRIM AND CONTROL THE GROWTH BY CHEMICAL MEANS, MACHINERY OR OTHERWISE OF TREES OR SHRUBBERY ON SAID EASEMENT AND INCIDENTAL PURPOSES OVER THE FOLLOWING DESCRIBED LAND: AN EASEMENT 100 FEET IN WIDTH WHOSE CENTERLINE IS DESCRIBED AS

FOLLOWS: BEGINNING AT A POINT ON THE EAST LINE OF SECTION 15, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., BOULDER COUNTY COLORADO, 15 FEET SOUTH OF THE EAST QUARTER-CORNER OF SAID SECTION 15; THENCE WESTERLY PARALLEL TO AND 15 FEET SOUTHERLY OF THE EAST-WEST CENTERLINE OF SAID SECTION 15, A DISTANCE OF 50 FEET; THENCE SOUTHERLY PARALLEL AND 50 FEET WESTERLY OF THE EAST LINE OF SAID SECTION 15 TO A POINT 50 FEET NORTH OF THE SOUTH LINE OF SAID SECTION 15; THENCE WESTERLY PARALLEL TO AND 50 FEET NORTHERLY OF THE SOUTH LINE OF SAID SECTION 15, A DISTANCE OF 1312.5 FEET; THENCE NORTH 64°45' WEST 2905 FEET, MORE OR LESS, TO A POINT ON THE EAST LINE OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SAID SECTION 15, 11 FEET SOUTH OF THE NORTHEAST CORNER OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SAID SECTION 15, EXCEPT SUCH PORTION OF THE AFORESAID EASEMENT AS WOULD LIE SOUTHERLY OF THE NORTHERLY RIGHT OF WAY LINE OF THE SUPPLY DITCH AS GRANTED TO POUDDRE VALLEY RURAL ELECTRIC ASSOCIATION BY DOCUMENT RECORDED JANUARY 25, 1971, RECEPTION NO. 965876.

7. COVENANTS, CONDITIONS AND RESTRICTIONS REGARDING AN INDIVIDUAL SEWER SYSTEM, CONTAINED IN AN AGREEMENT WITH BOULDER COUNTY BOARD OF HEALTH IN DOCUMENT RECORDED MARCH 13, 1974, RECEPTION NO. 96215. AFFECTS THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 3 NORTH, RANGE 70 WEST.
8. ANY WATER RIGHTS OR CLAIMS OR TITLE TO WATER, IN, ON OR UNDER THE LAND.
9. BARGAIN AND SALE EASEMENT DEED RECORDED FEBRUARY 14, 1990 AT FILM 1614 UNDER RECEPTION NO. 1028294, FOR THE BENEFIT OF MICHAEL D. DOLLAGHAN.
10. ANY EXISTING UTILITIES.




SHB AGRA, INC.
 Engineering & Environmental Services

AGRA
 Earth & Environmental Group
 SHB PROJECT NO. E92-7075

EXHIBIT L TO DEVELOPMENT AGREEMENT
 COUNTY ROAD 49 VACATION MAP
 DOWE FLATS PROJECT
 BOULDER COUNTY, COLORADO

EXHIBIT M

1. Rights granted pursuant to instrument recorded at reception no. 409903 in the real property records of Boulder County, Colorado, to the extent such rights benefit the Northwest Dowe Flats Property.
2. 60 foot wide private road and utility easement across the southerly 60 feet of the south 1/2 of section 4, from the southwesterly right of way line of the public road known as Dakota Ridge Road to the easterly line of the west 1/2 of the southwest 1/4 of section 4, and a 60 foot wide private road and utility easement, and being 30 feet either side of the centerline of an existing road located in the southwest 1/4 of the southeast 1/4 of the southwest 1/4 of section 4 to the easterly line of the west 1/2 of the southwest 1/4 of section 4, Township 3 North, range 70 West of the 6th P.M., County of Boulder, State of Colorado, to the extent such easements benefit the Northwest Dowe Flats Property.
3. Any access from the West Dowe Flats Donation Parcel to Stone Canyon Road (aka Nolan Drive) where said road abuts the northwesterly boundary of the West Dowe Flats Donation Parcel.
4. A nonexclusive access easement over the following described real property, constituting a portion of the Lyons Tunnel Access Road, which easement may be used to provide access to the West Dowe Flats Donation Parcel:

A portion of the parcel of land located within the east 100 feet of the NE1/4 of Section 20, Township 3 North, Range 70 West of the Sixth Principal Meridian, known as the Lyons Tunnel Access Road.

9-1

CONSERVATION EASEMENT IN GROSS

45

This Conservation Easement In Gross is granted by Southdown, Inc., a Louisiana corporation ("Grantor"), to the County of Boulder, Colorado, a body corporate and politic ("County"), on the 12th day of July, 1994.

Recitals

A. Grantor is the owner of that certain piece of real property described in Exhibit A hereto (the "Property").

B. The Property contains four archaeological sites, as described in Exhibit B hereto (the "Sites"), which are of significant cultural and historic value.

C. Grantor has entered into a Development Agreement with the County wherein Grantor has agreed to donate the Property to the County subject to certain terms and conditions.

D. Grantor now desires to grant to the County this conservation easement in order to protect and preserve the Sites from development, disturbance, or other potential damage from the date of this grant to the date on which the Property is donated to the County or, in the event such donation does not occur, in perpetuity.

Agreement

NOW, THEREFORE, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereby covenant and agree as follows:

1. Grant of Conservation Easement. Grantor hereby grants and conveys to the County a conservation easement in gross pursuant to C.R.S. § 38-30.5-101 et. seq. over the Sites described in the attached Exhibit B, subject to the permitted exceptions set forth in the attached Exhibit C (the "Conservation Easement").

2. Purpose of Grant. The intent and purpose of the grant of this Conservation Easement is to preserve and protect the archaeological features and values of the Sites.

3. Affirmative Rights. By this grant, Grantor grants to the County the following affirmative rights:

(a) To preserve and protect the archaeological features and values of the Sites.

(b) To enter upon the Property with prior notice to Grantor in order to inspect the Sites and enforce the rights granted herein, including the right to implement a management plan to protect and preserve the Sites, in a manner that will not unreasonably interfere with the proper uses being made of the Property at the time of such entry. The County's access shall be limited to vehicular access along established roads on the Property and pedestrian access to other areas. No further right of entry or possession is conveyed hereby.

4. Prohibited Activities. Grantor shall not, without the prior approval of the County, erect any structures within the Sites or do anything else on the Sites which would disturb the archeological resources within the Sites.

5. Restoration. Should any prohibited activity described in ¶ 4 of this Agreement be undertaken by the Grantor within the Sites covered by this Conservation Easement, the County shall have the right to restore the Sites to the condition that existed prior to the undertaking of such activity. In such event, the cost of such restoration shall be reimbursed to the County by Grantor. Nothing contained herein shall be construed to prohibit Grantor from exhausting all legal remedies that may be available to it in determining whether the activity undertaken on the Sites was prohibited by ¶ 4 of this Agreement.

6. Management of Sites. The County shall consult with appropriate Native American tribes in order to promote the cultural interests of Native Americans in the Sites, and to protect and preserve the archeological resources in the Sites.

7. Limitations On Access. Nothing contained herein shall be construed as affording the public access to any portion of the Property subject to this Conservation Easement. Subject to the permitted exceptions set forth in Exhibit C, Grantor shall take reasonable steps to prevent third parties from disturbing the Sites, except where such disturbances have been previously authorized by the County in order to implement a Management Plan developed pursuant to paragraph 6 of this grant.

8. Enforcement. In the event of a violation of any term, condition, covenant, or restriction contained in this Easement, the County may, after a twenty (20) day notice to Grantor providing Grantor with an opportunity to cure such violation, in the event said violation is not cured, institute an action for injunctive relief or damages, or take such other

action as it deems necessary to insure compliance with the terms, conditions, covenants, and purposes of this Easement, provided, however, that any failure to so act by the County shall not be deemed to be a waiver or a forfeiture of the right to enforce any term, condition, covenant, or purpose of this Easement in the future. In the event that the violation cannot reasonably be cured within 20 days, the County shall not institute an action as provided for herein if Southdown has commenced to cure such violation within said 20 days and is diligently proceeding to remedy said violation.

9. Termination Of Easement. The Conservation Easement shall terminate and be extinguished upon the acquisition of the Sites by the County. In the event the County does not acquire the Sites, the Conservation Easement granted herein shall be a burden upon and shall run with the Sites in perpetuity and, with respect to the remainder of the Property, shall be a burden upon and run with such remainder only to the extent of the access rights granted by ¶ 3(b) herein.

10. Miscellaneous. (a) The terms "Grantor" and the "County", and any pronouns used in place thereof, shall mean and include the successors and assigns of Grantor and the County, respectively.

(b) This instrument embodies the whole agreement of the parties with respect to the subject matter contained herein. There are no promises, terms, conditions, or obligations other than those contained herein; and this Agreement shall supersede all previous communications, representations, or agreements, either verbal or written, between the parties hereto relating to the subject matter of this Agreement. There shall be no modification of this Agreement except in writing, executed and recorded with the same formalities as this instrument.

(c) If any provision of this Conservation Easement is found to be invalid by a court of competent jurisdiction, the offending provision shall be severed and the application of any other provision of this Conservation Easement shall not be affected thereby.

EXHIBIT A

West Dove Flats Property

A TRACT OF LAND IN THE S 1/2 SE 1/4 OF SECTION 8 AND IN THE E 1/2 OF SECTION 17, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., IN BOULDER COUNTY, COLORADO, SAID TRACT BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID S 1/2 SE 1/4, SECTION 8; THENCE S 1° 07'29" W, 1308.97 FEET TO THE SOUTHEAST CORNER OF SECTION 8; THENCE S 1° 12'28" W, 5543.88 FEET TO THE SOUTHEAST CORNER OF SECTION 17; THENCE N 85°23'04" W, 2621.84 FEET TO THE SOUTH QUARTER CORNER OF SECTION 17; THENCE N 1°22'17" E, 2863.61 FEET TO A POINT ON THE APPROXIMATE CENTERLINE OF STONE CANYON ROAD; THENCE ALONG SAID STONE CANYON ROAD THE FOLLOWING COURSES AND DISTANCES:

N 14°15'01" E, 920.08 FEET; N 23°01'22" E, 314.38 FEET;
N 9°58'20" E, 606.18 FEET; N 22°12'26" E, 961.80 FEET;
N 41°01'26" E, 257.63 FEET; N 24°04'47" E, 529.16 FEET;
N 11°11'24" E, 230.82 FEET; N 1°26'22" W, 134.23 FEET;
N 22°42'37" W, 100.28 FEET TO A POINT ON THE NORTH LINE OF SAID S 1/2 SE 1/4, SECTION 8; THENCE S 89°09'55" E, 1481.87 FEET TO THE POINT OF BEGINNING.
COUNTY OF BOULDER, STATE OF COLORADO. EXCEPT THAT PART CONVEYED IN DEED RECORDED APRIL 1, 1952 IN BOOK 903 AT PAGE 221.

SITE 5 BL 4151

A tract of land to be used as a Conservation Easement, located in the East Half of Section 17, T3N, R70W of the 6th P.M., in Boulder County, Colorado; said tract being more particularly described as follows:

Commencing at the Southeast corner of said Section 17 from whence the East Quarter corner of said Section 17 bears $N1^{\circ}12'28''E$ and with all other bearings contained herein relative thereto; thence $N49^{\circ}01'29''W$, 2727.02 feet to the Point of Beginning; thence $S79^{\circ}32'30''W$, 114.28 feet; thence $N8^{\circ}07'03''W$, 188.58 feet; thence $S74^{\circ}42'04''E$, 166.89 feet; thence $S10^{\circ}13'04''W$, 123.87 feet to the Point of Beginning; thus described easement containing 0.484 acres.

SITE 5 BL 4144

A tract of land to be used as a Conservation Easement, located in the East Half of Section 17, T3N, R70W of the 6th P.M., in Boulder County, Colorado; said tract being more particularly described as follows:

Commencing at the Southeast corner of said Section 17 from whence the East Quarter corner of said Section 17 bears $N1^{\circ}12'28''E$ and with all other bearings contained herein relative thereto; thence $N28^{\circ}00'04''W$, 1484.59 feet to the Point of Beginning; thence $N14^{\circ}41'08''E$, 156.68 feet; thence $S76^{\circ}03'22''E$, 475.32 feet; thence $S18^{\circ}19'58''W$, 248.73 feet; thence $N64^{\circ}47'08''W$, 467.33 feet to the Point of Beginning; thus described easement containing 2.179 acres.

SITE 5 BL 4145

A tract of land to be used as a Conservation Easement, located in the South Half of the Southeast Quarter, Section 8 and in the East Half of Section 17, T3N, R70W of the 6th P.M., in Boulder County, Colorado; said tract being more particularly described as follows:

Commencing at the Northeast corner of said Section 17 from whence the East Quarter corner of said Section 17 bears $S1^{\circ}12'28''W$ and with all other bearings contained herein relative thereto; thence $S42^{\circ}24'16''W$, 417.63 feet to the Point of Beginning; thence $S72^{\circ}53'13''W$, 251.48 feet; thence $N26^{\circ}15'16''W$, 192.51 feet; thence $N32^{\circ}19'51''E$, 394.41 feet; thence $S65^{\circ}32'16''E$, 165.55 feet; thence $S5^{\circ}40'34''W$, 365.15 feet to the Point of Beginning; thus described easement containing 2.690 acres.

Conservation Easement
Site 5 BL 876

A tract of land to be used as a Conservation Easement, located in the East Half of Section 17, T3N, R70W of the 6th P.M., in Boulder County, Colorado; said tract being more particularly described as follows:

Commencing at the Southeast corner of said Section 17 from whence the East Quarter corner of said Section 17 bears N1°12'28"E with all other bearings contained herein relative thereto; thence N59°50'28"W, 1726.20 feet to the Point of Beginning; thence S45°12'54"E, 288.37 feet; thence S9°52'28"W, 263.62 feet; thence S74°25'54"W, 221.00 feet; thence N66°42'36"W, 263.66 feet; thence N10°33'19"W, 371.34 feet; thence N81°43'40"E, 367.46 feet to the Point of Beginning; thus described easement containing 5.036 acres.

EXHIBIT C

PERMITTED EXCEPTIONS

WEST DOWE FLATS DONATION PARCEL

1. REAL PROPERTY TAXES AND ASSESSMENTS FOR 1994 AND SUBSEQUENT YEARS.
2. AN UNDIVIDED 1/2 INTEREST IN ALL OIL, GAS AND OTHER MINERALS AS RESERVED BY DEED RECORDED MAY 14, 1954 IN BOOK 950 AT PAGE 366, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.
3. RIGHT OF WAY FOR THE SAINT VRAIN SUPPLY CANAL AS SHOWN ON THE COUNTY ASSESSORS MAP AND AS CONTAINED IN INSTRUMENTS RECORDED AUGUST 5, 1953 IN BOOK 932 AT PAGE 590; APRIL 24, 1953 IN BOOK 925 AT PAGE 146; APRIL 24, 1953 IN BOOK 926 AT PAGE 146; SEPTEMBER 15, 1953 IN BOOK 936 AT PAGE 353.
4. LACK OF A RIGHT OF ACCESS FROM THE LAND TO ANY OPEN PUBLIC ROAD, STREET OR HIGHWAY.

NOTE: THIS EXCEPTION IS NECESSARY BECAUSE IT DOES NOT APPEAR FROM THE INSTRUMENTS IN THE OFFICE OF THE CLERK AND RECORDER OF THE COUNTY IN WHICH SUBJECT PROPERTY IS SITUATED THAT ANY RIGHT OF ACCESS EXISTS TO AN OPEN PUBLIC ROADWAY.

5. EASEMENT TO THE CITY OF LONGMONT RECORDED APRIL 23, 1981 ON FILM 1162 AS RECEPTION NO. 443099.
6. EASEMENT TO THE CITY OF LONGMONT RECORDED SEPTEMBER 19, 1978 ON FILM 1029 AS RECEPTION NO. 300147.
7. RIGHT OF WAY FOR LATERALS AND DITCHES AS RESERVED IN DEEDS RECORDED NOVEMBER 14, 1919 IN BOOK 446 AT PAGES 144 AND 145.
8. RESERVATIONS AS CONTAINED IN UNITED STATES PATENT RECORDED DECEMBER 19, 1891 IN BOOK 75 PAGES 513 AND 514 AND MARCH 16, 1892 IN BOOK 100 PAGE 57, AS FOLLOWS: RIGHTS OF WAY FOR DITCHES OR CANALS CONSTRUCTED BY AUTHORITY OF THE UNITED STATES.
9. COVENANTS RECORDED SEPTEMBER 20, 1993 ON FILM 1875 AT RECEPTION NO. 1338986, AND AMENDMENT RECORDED NOVEMBER 5, 1993 ON FILM 1899 AT RECEPTION NO. 1358254.

CONSERVATION EASEMENT IN GROSS

This Conservation Easement In Gross is granted by Southdown, Inc., a Louisiana corporation ("Grantor"), to the County of Boulder, Colorado, a body corporate and politic ("County"), on the 12th day of July, 1994.

Recitals

A. Grantor is the owner of that certain piece of real property described in Exhibit A hereto (the "Property").

B. The Property contains four archaeological sites, as described in Exhibit B hereto (the "Sites"), which are of significant cultural and historic value.

C. Grantor has entered into a Development Agreement with the County wherein Grantor has agreed to donate the Property to the County subject to certain terms and conditions.

D. Grantor now desires to grant to the County this conservation easement in order to protect and preserve the Sites from development, disturbance, or other potential damage from the date of this grant to the date on which the Property is donated to the County or, in the event such donation does not occur, in perpetuity.

Agreement

NOW, THEREFORE, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereby covenant and agree as follows:

1. Grant of Conservation Easement. Grantor hereby grants and conveys to the County a conservation easement in gross pursuant to C.R.S. § 38-30.5-101 et. seq. over the Sites described in the attached Exhibit B, subject to the permitted exceptions set forth in the attached Exhibit C (the "Conservation Easement").

2. Purpose of Grant. The intent and purpose of the grant of this Conservation Easement is to preserve and protect the archaeological features and values of the Sites.

3. Affirmative Rights. By this grant, Grantor grants to the County the following affirmative rights:

(a) To preserve and protect the archaeological features and values of the Sites.

(b) To enter upon the Property with prior notice to Grantor in order to inspect the Sites and enforce the rights granted herein, including the right to implement a management plan to protect and preserve the Sites, in a manner that will not unreasonably interfere with the proper uses being made of the Property at the time of such entry. The County's access shall be limited to vehicular access along established roads on the Property and pedestrian access to other areas. No further right of entry or possession is conveyed hereby.

4. Prohibited Activities. Grantor shall not, without the prior approval of the County, erect any structures within the Sites or do anything else on the Sites which would disturb the archeological resources within the Sites.

5. Restoration. Should any prohibited activity described in ¶ 4 of this Agreement be undertaken by the Grantor within the Sites covered by this Conservation Easement, the County shall have the right to restore the Sites to the condition that existed prior to the undertaking of such activity. In such event, the cost of such restoration shall be reimbursed to the County by Grantor. Nothing contained herein shall be construed to prohibit Grantor from exhausting all legal remedies that may be available to it in determining whether the activity undertaken on the Sites was prohibited by ¶ 4 of this Agreement.

6. Management of Sites. The County shall consult with appropriate Native American tribes in order to promote the cultural interests of Native Americans in the Sites, and to protect and preserve the archaeological resources in the Sites.

7. Limitations On Access. Nothing contained herein shall be construed as affording the public access to any portion of the Property subject to this Conservation Easement. Subject to the permitted exceptions set forth in Exhibit C, Grantor shall take reasonable steps to prevent third parties from disturbing the Sites, except where such disturbances have been previously authorized by the County in order to implement a Management Plan developed pursuant to paragraph 6 of this grant.

8. Enforcement. In the event of a violation of any term, condition, covenant, or restriction contained in this Easement, the County may, after a twenty (20) day notice to Grantor providing Grantor with an opportunity to cure such violation, in the event said violation is not cured, institute an action for injunctive relief or damages, or take such other

action as it deems necessary to insure compliance with the terms, conditions, covenants, and purposes of this Easement, provided, however, that any failure to so act by the County shall not be deemed to be a waiver or a forfeiture of the right to enforce any term, condition, covenant, or purpose of this Easement in the future. In the event that the violation cannot reasonably be cured within 20 days, the County shall not institute an action as provided for herein if Southdown has commenced to cure such violation within said 20 days and is diligently proceeding to remedy said violation.

9. Termination Of Easement. The Conservation Easement shall terminate and be extinguished upon the acquisition of the Sites by the County. In the event the County does not acquire the Sites, the Conservation Easement granted herein shall be a burden upon and shall run with the Sites in perpetuity and, with respect to the remainder of the Property, shall be a burden upon and run with such remainder only to the extent of the access rights granted by ¶ 3(b) herein.

10. Miscellaneous. (a) The terms "Grantor" and the "County", and any pronouns used in place thereof, shall mean and include the successors and assigns of Grantor and the County, respectively.

(b) This instrument embodies the whole agreement of the parties with respect to the subject matter contained herein. There are no promises, terms, conditions, or obligations other than those contained herein; and this Agreement shall supersede all previous communications, representations, or agreements, either verbal or written, between the parties hereto relating to the subject matter of this Agreement. There shall be no modification of this Agreement except in writing, executed and recorded with the same formalities as this instrument.

(c) If any provision of this Conservation Easement is found to be invalid by a court of competent jurisdiction, the offending provision shall be severed and the application of any other provision of this Conservation Easement shall not be affected thereby.

EXHIBIT A

West Dowe Flats Property

A TRACT OF LAND IN THE S 1/2 SE 1/4 OF SECTION 8 AND IN THE E 1/2 OF SECTION 17, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M., IN BOULDER COUNTY, COLORADO, SAID TRACT BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID S 1/2 SE 1/4, SECTION 8; THENCE S 1° 07'29" W, 1308.97 FEET TO THE SOUTHEAST CORNER OF SECTION 8; THENCE S 1° 12'28" W, 5543.88 FEET TO THE SOUTHEAST CORNER OF SECTION 17; THENCE N 85°23'04" W, 2621.84 FEET TO THE SOUTH QUARTER CORNER OF SECTION 17; THENCE N 1°22'17" E, 2863.61 FEET TO A POINT ON THE APPROXIMATE CENTERLINE OF STONE CANYON ROAD; THENCE ALONG SAID STONE CANYON ROAD THE FOLLOWING COURSES AND DISTANCES:

N 14°15'01" E, 920.08 FEET; N 23°01'22" E, 314.38 FEET;
N 9°58'20" E, 606.18 FEET; N 22°12'26" E, 961.80 FEET;
N 41°01'26" E, 257.63 FEET; N 24°04'47" E, 529.16 FEET;
N 11°11'24" E, 230.82 FEET; N 1°26'22" W, 134.23 FEET;
N 22°42'37" W, 100.28 FEET TO A POINT ON THE NORTH LINE OF SAID S 1/2 SE 1/4, SECTION 8; THENCE S 89°09'55" E, 1481.87 FEET TO THE POINT OF BEGINNING.
COUNTY OF BOULDER, STATE OF COLORADO. EXCEPT THAT PART CONVEYED IN DEED RECORDED APRIL 1, 1952 IN BOOK 903 AT PAGE 221.

EXHIBIT B
Conservation Easements

SITE 5 BL 4151

A tract of land to be used as a Conservation Easement, located in the East Half of Section 17, T3N, R70W of the 6th P.M., in Boulder County, Colorado; said tract being more particularly described as follows:

Commencing at the Southeast corner of said Section 17 from whence the East Quarter corner of said Section 17 bears $N1^{\circ}12'28''E$ and with all other bearings contained herein relative thereto; thence $N49^{\circ}01'29''W$, 2727.02 feet to the Point of Beginning; thence $S79^{\circ}32'30''W$, 114.28 feet; thence $N8^{\circ}07'03''W$, 188.58 feet; thence $S74^{\circ}42'04''E$, 166.89 feet; thence $S10^{\circ}13'04''W$, 123.07 feet to the Point of Beginning; thus described easement containing 0.484 acres.

SITE 5 DL 4144

A tract of land to be used as a Conservation Easement, located in the East Half of Section 17, T3N, R70W of the 6th P.M., in Boulder County, Colorado; said tract being more particularly described as follows:

Commencing at the Southeast corner of said Section 17 from whence the East Quarter corner of said Section 17 bears $N1^{\circ}12'28''E$ and with all other bearings contained herein relative thereto; thence $N28^{\circ}00'04''W$, 1484.59 feet to the Point of Beginning; thence $N14^{\circ}41'08''E$, 156.68 feet; thence $S76^{\circ}03'22''E$, 475.32 feet; thence $S18^{\circ}19'58''W$, 248.73 feet; thence $N64^{\circ}47'00''W$, 467.33 feet to the Point of Beginning; thus described easement containing 2.179 acres.

SITE 5 DL 4145

A tract of land to be used as a Conservation Easement, located in the South Half of the Southeast Quarter, Section 8 and in the East Half of Section 17, T3N, R70W of the 6th P.M., in Boulder County, Colorado; said tract being more particularly described as follows:

Commencing at the Northeast corner of said Section 17 from whence the East Quarter corner of said Section 17 bears $S1^{\circ}12'28''W$ and with all other bearings contained herein relative thereto; thence $S42^{\circ}24'16''W$, 417.63 feet to the Point of Beginning; thence $S72^{\circ}53'13''W$, 251.48 feet; thence $N26^{\circ}15'16''W$, 192.51 feet; thence $N32^{\circ}19'51''E$, 394.41 feet; thence $S65^{\circ}32'16''E$, 165.55 feet; thence $S5^{\circ}40'34''W$, 365.15 feet to the Point of Beginning; thus described easement containing 2.690 acres.

Conservation Easement
Site 5 BL 876

A tract of land to be used as a Conservation Easement, located in the East Half of Section 17, T3N, R70W of the 6th P.M., in Boulder County, Colorado; said tract being more particularly described as follows:

Commencing at the Southeast corner of said Section 17 from whence the East Quarter corner of said Section 17 bears N1°12'28"E with all other bearings contained herein relative thereto; thence N59°50'28"W, 1726.20 feet to the Point of Beginning; thence S45°12'54"E, 288.37 feet; thence S9°52'28"W, 263.62 feet; thence S74°25'54"W, 221.00 feet; thence N66°42'36"W, 263.66 feet; thence N10°33'19"W, 371.34 feet; thence N81°43'40"E, 367.46 feet to the Point of Beginning; thus described easement containing 5.036 acres.

EXHIBIT C

PERMITTED EXCEPTIONS

WEST DOWE FLATS DONATION PARCEL

1. REAL PROPERTY TAXES AND ASSESSMENTS FOR 1994 AND SUBSEQUENT YEARS.
2. AN UNDIVIDED 1/2 INTEREST IN ALL OIL, GAS AND OTHER MINERALS AS RESERVED BY DEED RECORDED MAY 14, 1954 IN BOOK 950 AT PAGE 366, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.
3. RIGHT OF WAY FOR THE SAINT VRAIN SUPPLY CANAL AS SHOWN ON THE COUNTY ASSESSORS MAP AND AS CONTAINED IN INSTRUMENTS RECORDED AUGUST 5, 1953 IN BOOK 932 AT PAGE 590; APRIL 24, 1953 IN BOOK 925 AT PAGE 146; APRIL 24, 1953 IN BOOK 926 AT PAGE 146; SEPTEMBER 15, 1953 IN BOOK 936 AT PAGE 353.
4. LACK OF A RIGHT OF ACCESS FROM THE LAND TO ANY OPEN PUBLIC ROAD, STREET OR HIGHWAY.

NOTE: THIS EXCEPTION IS NECESSARY BECAUSE IT DOES NOT APPEAR FROM THE INSTRUMENTS IN THE OFFICE OF THE CLERK AND RECORDER OF THE COUNTY IN WHICH SUBJECT PROPERTY IS SITUATED THAT ANY RIGHT OF ACCESS EXISTS TO AN OPEN PUBLIC ROADWAY.

5. EASEMENT TO THE CITY OF LONGMONT RECORDED APRIL 23, 1981 ON FILM 1162 AS RECEPTION NO. 443099.
6. EASEMENT TO THE CITY OF LONGMONT RECORDED SEPTEMBER 19, 1978 ON FILM 1029 AS RECEPTION NO. 300147.
7. RIGHT OF WAY FOR LATERALS AND DITCHES AS RESERVED IN DEEDS RECORDED NOVEMBER 14, 1919 IN BOOK 446 AT PAGES 144 AND 145.
8. RESERVATIONS AS CONTAINED IN UNITED STATES PATENT RECORDED DECEMBER 19, 1891 IN BOOK 75 PAGES 513 AND 514 AND MARCH 16, 1892 IN BOOK 100 PAGE 57, AS FOLLOWS: RIGHTS OF WAY FOR DITCHES OR CANALS CONSTRUCTED BY AUTHORITY OF THE UNITED STATES.
9. COVENANTS RECORDED SEPTEMBER 20, 1993 ON FILM 1875 AT RECEPTION NO. 1338986, AND AMENDMENT RECORDED NOVEMBER 5, 1993 ON FILM 1899 AT RECEPTION NO. 1358254.

Full executed original to be returned by Title Co.

ESCROW AGREEMENT

Escrow Number _____
Denver, Colorado

This Escrow Agreement is made and entered into this 12th day of July, 1994, by and among SOUTHDOWN, INC. ("Southdown"), a Louisiana corporation, the BOARD OF COUNTY COMMISSIONERS OF BOULDER COUNTY, COLORADO ("County"), and SECURITY TITLE GUARANTY COMPANY ("Escrow Agent"), a Colorado corporation.

Recitals

A. Southdown and the County have entered into a Development Agreement setting forth certain terms and conditions relating to the use and development of the area known as Dowe Flats near Lyons, Colorado for limestone mining and related uses.

B. Southdown has agreed to donate, and the County has agreed to accept, subject to the terms of this Agreement, certain lands near Dowe Flats after Southdown has commenced mining and related activities on Dowe Flats.

C. As part of the development of Dowe Flats, Southdown has agreed to relocate a portion of County Road 47 and the County has agreed to accept the Relocated Road and vacate and abandon a corresponding portion of the existing road.

D. Pursuant to the terms and conditions set forth in the Development Agreement, Southdown and the County desire to appoint an escrow agent to hold the documents and funds described below until such time as the conditions precedent to the land donations and road vacation described above have been fulfilled.

Agreement

IN CONSIDERATION of the foregoing and the transactions, mutual covenants, and considerations set forth in the Development Agreement, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

1. General Provisions. The provisions of Exhibit 1, General Provisions, attached hereto, are by this reference incorporated herein.

2. Definitions. Unless this Agreement specifically provides otherwise, the meaning of terms used herein shall be defined by the definitions contained in the Development Agreement.

3. Appointment of Escrow Agent. Southdown and the County hereby appoint Security Title Guaranty Co. as their Escrow Agent.

4. Deposit Of Documents And Funds With Escrow Agent.

Southdown hereby deposits with Escrow Agent the following documents and funds to be held, disbursed, recorded and delivered in accordance with the terms hereof:

a. A fully-executed Special Warranty and Quitclaim Donation Deed and a fully-executed Special Warranty Donation Deed and Grant of Easement, conveying the Northwest Dowe Flats Parcel and the West Dowe Flats Donation Parcel, respectively, from Southdown to the County (collectively the "Donation Deeds");

b. Title commitments issued by Escrow Agent in favor of the County (Commitment Nos. G000784A94-1 and G000786A94-2); and

c. Funds in the amount of \$1,820.00, which shall be used to purchase title insurance on the Donated Lands and pay fees, if any, required to record the Donation Deeds.

5. Notice; Actions to be taken by Escrow Agent.

a. Southdown shall furnish the County and the Escrow Agent with a written notice in the form of Exhibit 2 attached hereto and made a part hereof (the "Notice") upon the occurrence of all of the following events: (i) at least 100,000 tons of mined material has been moved from the Permit Property to the Cement Plant Site; (ii) the overland conveyer belt and crusher have been put into regular operation (operation following start-up testing) in connection with the mining of the Permit Property; and (iii) the County has accepted the Relocated Road pursuant to Paragraph 7 of the Development Agreement and completed the vacation of portions of County Roads 47 and 49 pursuant to paragraph 7 of the Development Agreement. Upon receipt of the Notice, Escrow Agent shall take the following actions:

A. If the substance of the Notice has been modified or otherwise includes exceptions to ¶ 3 thereof, Escrow Agent shall immediately notify the undersigned, in

writing, and take no further action until Escrow Agent receives either (i) a written instruction from the County to proceed in accordance with ¶ B below, or (ii) a joint written instruction executed by both Southdown and the County, in which case Escrow Agent shall proceed in accordance with such instruction. If the Notice received by Escrow Agent has not been modified and does not include exceptions to ¶ 3 thereof, Escrow Agent shall proceed in accordance with ¶ B below.

B. After Escrow Agent has complied with the provisions of ¶ A above and when, and only when, Escrow Agent is prepared to and will issue title insurance policies based upon the title commitments described in ¶ 4(b) hereof without any exceptions to title except as shown in such commitments:

1. Record the Donation Deeds in the real property records of Boulder County, Colorado. Escrow Agent may apply the funds deposited pursuant hereto towards the fees, if any, which are required to be paid to Boulder County to record such deeds.

2. Issue policies of title insurance in favor of the County based upon the title commitments described in ¶ 4(b) without any exceptions to title except as shown in such commitments. The cost of such policies shall be paid in full by disbursing the funds deposited by Southdown with Escrow Agent pursuant to ¶ 4(c) hereof.

3. Deliver copies of the recorded documents to Southdown and the County at the addresses set forth below.

4. In the event that Southdown has deposited funds in excess of those required to purchase the title insurance policies and pay the recording fees pursuant hereto, then Escrow Agent is hereby directed to return all such excess funds to Southdown.

5. Deliver the original, recorded Donation Deeds and the title insurance policies, when issued, to the County.

C. If Escrow Agent is not in a position to comply with the instructions in ¶ B above for the reason that it is not prepared to issue title insurance policies based only upon the exceptions to title shown in the title commitments described in ¶ 4(b), Escrow Agent shall immediately notify the undersigned, in writing, accompanied by its revised title commitment(s) setting forth those additional exceptions affecting title, and take no further action until

Escrow Agent receives either (i) a written waiver to any change in the condition of title from the County and notice that the County will accept the Donation Deeds subject to such additional exceptions, in which case Escrow Agent shall proceed in accordance with ¶ B above, or (ii) a joint written instruction executed by both Southdown and the County, in which case Escrow Agent shall proceed in accordance with such instruction. In the event that Escrow Agent is not in a position to comply with the instructions in ¶ B above for any other reason, Escrow Agent shall immediately notify the undersigned in writing, and shall take no further action until Escrow Agent receives a joint instruction executed by Southdown and the County.

D. In the event insufficient funds have been deposited by Southdown pursuant to ¶ 4(b) to cover the full cost of the title insurance policies and recording fees under paragraphs B(1-2) above, then Escrow Agent is instructed to bill Southdown for any such shortfall, which bill shall be promptly paid by Southdown.

b. Southdown shall not unreasonably refuse to provide the Notice required in this paragraph.

6. Destruction Of Documents. If, on July 12, 2001, any documents deposited under this Agreement remain in the possession of Escrow Agent, then Escrow Agent shall promptly destroy all such documents and provide proof of such destruction to Southdown and the County. In the event documents are required to be destroyed under the provisions of this paragraph, any funds deposited under this Agreement which then remain in the possession of Escrow Agent shall be returned to Southdown.

7. Modification. This Agreement may be amended, modified, or revoked only upon the joint written agreement of the parties hereto executed with the same formalities as this Agreement.

8. Escrow Fee. Southdown shall, within 30 days of the execution of this Agreement, deliver to Escrow Agent an escrow fee in the amount of \$200.00, which amount shall be accepted by Escrow Agent in full and complete satisfaction of any and all charges and fees it may impose for services rendered under this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first set forth above.

BOULDER COUNTY

By: Ronald K Stewart
Chair, Boulder County Board of County Commissioners

Attest: Sue Messerschmidt
7-14-94
Clerk of the Board

Address: P.O. Box 471
Boulder, Colorado 80306
SOUTHDOWN, INC., a Louisiana corporation:

By: John W Lohr
John W. Lohr,
Division Vice President

Address: 1200 Smith Street
Suite 2400
Houston, Texas 77002-4486

SECURITY TITLE GUARANTY COMPANY,
a Colorado corporation:

By: _____

Address: 5995 Greenwood Plaza Boulevard
Suite 110
Greenwood Village, Colorado 80111

ACKNOWLEDGMENTS

STATE OF COLORADO)
)
COUNTY OF BOULDER) ss.

The foregoing instrument was acknowledged before me this 6th day of July, 1994, by John W. Lohr, as Division Vice President of Southdown, Inc., a Louisiana corporation, on behalf of such corporation.

Witness my hand and official seal

Deborah A. Osterman
Notary Public

My commission expires: 12-2-96

STATE OF COLORADO)
)
COUNTY OF BOULDER) ss.

The foregoing instrument was acknowledged before me this 14th day of July, 1994, by Ronald H. Stewart as Chair, Board of County Commissioners of Boulder County, Colorado, on behalf of the County.

Witness my hand and official seal

Caren Duffy
Notary Public

My commission expires: 6/17/98

EXHIBIT 1

GENERAL PROVISIONS

1. The instructions may be supplemented, altered, amended, modified or revoked by writing only, signed by all of the parties hereto, and approved by the Escrow Agent, upon payment of all fees, costs and expenses incident thereto.

2. No assignment, transfer, conveyance or hypothecation of any right, title or interest in and to the subject matter of this Escrow shall be binding upon the Escrow Agent unless written notice thereof shall be served upon the Escrow Agent and all fees, costs and expenses incident thereto shall have been paid and then only upon the Escrow Agent's assent thereto in writing.

3. Any notice required or desired to be given by the Escrow Agent to any party to this Escrow may be given by mailing the same addressed to such party at the address given below the signature of such party or the most recent address of such party shown on the records of the Escrow Agent, and notice so mailed shall for all purposes hereof be as effectual as though served upon such party in person at the time of depositing such notice in the mail.

4. The Escrow Agent shall not be personally liable for any act it may do or omit to do hereunder as such agent, while acting in good faith and in the exercise of its own best judgment, and any act done or omitted by it pursuant to the advice of its own attorneys shall be conclusive evidence of such good faith.

5. The Escrow Agent is hereby expressly authorized to disregard any and all notices or warnings given by any of the parties hereto, or by any other person, firm or corporation, excepting only orders or process of court, and is hereby expressly authorized to comply with and obey any and all process, orders, judgments or decrees of any court, and in case the Escrow Agent obeys or complies with any such process, order, judgment or decree of any court it shall not be liable to any of the parties hereto or to any other person, firm or corporation by reason of such compliance, notwithstanding any such process, order, judgment or decree be subsequently reversed, modified, annulled, set aside or vacated or found to have been issued or entered without jurisdiction.

6. In consideration of the acceptance of this escrow by the Escrow Agent, the undersigned agree, jointly and severally, to the extent permitted by law, for themselves, their heirs, legal representatives, successors and assigns, to pay the Escrow Agent its charges hereunder and to indemnify and hold it harmless as to any liability by it incurred to any other person, firm or corporation by reason of its having accepted the same, or its carrying out any of the terms thereof, and to reimburse it for all its expenses, including, among other things, counsel fees and court costs incurred in connection herewith; and that the Escrow Agent shall have a first and prior lien upon all deposits made hereunder to secure the performance of said agreement of indemnity and payment of its charges and expenses, hereby expressly authorizing the Escrow Agent, in the event payment is not received promptly from the undersigned, to deduct such charges and expenses, without previous notice, from any funds deposited hereunder.

7. The Escrow Agent shall be under no duty or obligation to ascertain the identity, authority or rights of the parties executing or delivering or purporting to execute or deliver these instructions or any documents or papers or payments deposited or called for hereunder, and assumes no responsibility or liability for the validity or sufficiency of these instructions or any documents or papers or payments deposited or called for hereunder.

8. The Escrow Agent shall not be liable for the outlawing of any rights under any Statute of Limitations or by reason of laches in respect to the instructions or any documents or papers deposited.

9. In the event of any dispute between the parties hereto as to the facts of default, the validity or meaning of these Instructions or any other fact or matter relating to the transaction between the parties, the Escrow Agent is instructed as follows:

(a) That it shall be under no obligation to act, except under process or order of court, or until it has been adequately indemnified to its full satisfaction, and shall sustain no liability for its failure to act pending such process or court order or indemnification;

(b) That it may in its sole and absolute discretion, deposit the property described herein or so much thereof as remains in its hands with the then Clerk, or acting Clerk of the District Court, State of Colorado in whose jurisdiction the subject property lies, and interplead the parties hereto,

and upon so depositing such property and filing its complaint in interpleader it shall be relieved of all liability under the terms hereof as to the property so deposited, and furthermore, the parties hereto for themselves, their heirs, legal representatives, successors and assigns do hereby submit themselves to the jurisdiction of said court and do hereby appoint the then Clerk, or acting Clerk, of said court as their Agent for the service of all process in connection with such proceedings. The institution of any such interpleader action shall not impair the rights of the Escrow Agent under paragraph number 7 above.

10. If the subject matter of this escrow consists in whole or in part of funds, the same shall not be commingled by the Escrow Agent with its own funds.

EXHIBIT 2

Security Title Guaranty Company
5995 Greenwood Plaza Boulevard
Suite 110
Greenwood Village, Colorado 80111

Board of County Commissioners, Boulder County
Parks Director, Boulder County
County Attorney, Boulder County
P.O. Box 471
Boulder, Colorado 80306

Re: Escrow No. _____

The undersigned hereby confirms that, as of the date hereof:

1. At least 100,000 tons of mined material has been moved from the Permit Property to the Cement Plant Site;

2. The overland conveyor belt and crusher have been constructed and put into regular operation (operation following start-up testing) in connection with the mining of the Permit Property; and

3. In accordance with the Development Agreement, Boulder County has accepted relocated County Road 47, vacated old County Road 47 on the Permit Property, and vacated portions of County Road 49.

4. Based solely upon the undersigned's current knowledge, information and belief, all of the representations and warranties contained in the Certificate, dated July 12, 1994, executed by the undersigned, delivered to Boulder County and relating to the Northwest Dowe Flats Property and the West Dowe Flats Donation Parcel are true and correct as of the date hereof except as noted below.

All capitalized terms used herein shall have the meanings ascribed to such terms in the Development Agreement, Dowe Flats Mine, Docket U-93-14/V-93-8, Southdown, Inc., dated July 12, 1994, between the Board of County Commissioners of Boulder County, Colorado and Southdown, Inc.

EXECUTED this _____ day of _____, ____.

SOUTHDOWN, INC., a Louisiana
corporation

By: _____

SPECIAL WARRANTY AND QUITCLAIM DONATION DEED
(Northwest Dowe Flats Property)

SOUTHDOWN, INC., a Louisiana corporation ("Grantor"), with an address of 1200 Smith Street, Suite 2400, Houston, Texas 77002-4486, for good and valuable consideration, receipt of which is hereby acknowledged, hereby sells and conveys to THE COUNTY OF BOULDER, COLORADO, a body corporate and politic ("Grantee") with an address of P.O. Box 471, Boulder, Colorado 80306, the real property and easement rights described on Exhibit A attached hereto and made a part hereof, with all its appurtenances (collectively, the "Warranted Property"), and warrants the title to the same against all persons claiming under the Grantor subject to the matters described on Exhibit B attached hereto and made a part hereof. Grantor, for good and valuable consideration, receipt of which is hereby acknowledged, hereby sells and quitclaims to Grantee all right, title and interest, if any, of Grantor granted pursuant to instrument recorded at reception no. 409903 in the real property records of Boulder County, Colorado (the "Quitclaimed Property"). The Warranted Property and the Quitclaimed Property are referred to collectively herein as the "Property."

Grantee, by its acceptance hereof, hereby covenants and agrees as follows:

(a) The Property shall be used only for open space and shall be maintained by Grantee as non-developable open space in perpetuity. To the extent possible, Grantee shall protect and preserve the Property's scenic beauty and wildlife habitat and the viewsheds in and around the Property.

(b) Subject to the matters set forth on Exhibit B general public access to the Property shall be prohibited, and shall not be permitted, until at least 2030, except that Grantee may, in its discretion, allow limited access to the Property by third parties for valid educational scientific, or cultural purposes in a manner which does not impair the scenic, archaeological, wildlife or natural environment of the Property.

(c) Except as expressly provided for herein, Grantor does not grant to Grantee any other express or implied right of way, easement, or other means of access to the Property.

(d) Grantee shall not allow access to the Warranted Property through or over the Quitclaimed Property provided, however, that Grantee may use the Quitclaimed Property to allow access to the Warranted Property for firefighting or other public safety purposes or by agents or employees of Grantee acting within the scope of their authority.

SIGNED this 6th day of July, 1994.

SOUTHDOWN, INC., a Louisiana corporation

By: John W. Lohr (Title)
John W. Lohr,
Division Vice President

STATE OF Colorado
Boulder COUNTY _____

)
) ss.
)

The foregoing instrument was acknowledged before me this 6th of July, 1994 by John W. Lohr as Division Vice President of Southdown, Inc., a Louisiana corporation, on behalf of such corporation.

Witness my hand and official seal.

(Notarial Seal)

Deborah A. Osterman
Notary Public

My commission expires: 12-2-96

A PARCEL OF LAND SITUATED IN THE NORTH HALF OF SECTION 9, THE EAST HALF OF THE NORTHEAST QUARTER OF SECTION 8, AND THE WEST HALF OF THE SOUTHWEST QUARTER OF SECTION 4, ALL IN TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH PRINCIPAL MERIDIAN, BOULDER, COUNTY, COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTH QUARTER CORNER OF SECTION 9; THENCE SOUTH 88°14'56" EAST 666.07 FEET TO THE NORTHEAST CORNER OF THE WEST HALF OF THE WEST HALF OF THE NORTHEAST QUARTER OF SECTION 9, WHENCE THE NORTHEAST SECTION CORNER THEREOF BEARS SOUTH 88°14'56" EAST 1,998.21 FEET; THENCE ALONG THE EAST LINE OF THE WEST HALF OF THE WEST HALF OF SAID NORTHEAST QUARTER SOUTH 00°09'52" WEST 323.45 FEET TO A POINT ON THE WESTERLY RIGHT-OF-WAY LINE OF ST. VRAIN SUPPLY CANAL DESCRIBED BY DEED RECORDED IN BOOK 903 AT PAGE 221 OF BOULDER COUNTY RECORDS; THENCE ALONG SAID WESTERLY RIGHT-OF-WAY LINE THE FOLLOWING ELEVEN (11) COURSES:

THENCE ALONG THE ARC OF A CURVE TO THE LEFT (SAID CURVE HAVING A RADIUS OF 299.10 FEET, A CENTRAL ANGLE OF 48°49'06", CHORD OF SAID ARC BEARS SOUTH 44°57'33" WEST 247.21 FEET) A DISTANCE OF 254.85 FEET; THENCE SOUTH 20°33'00" WEST 14.00 FEET; THENCE ALONG THE ARC OF A CURVE TO THE LEFT (SAID CURVE HAVING A RADIUS OF 299.10 FEET, A CENTRAL ANGLE OF 59°16'00", CHORD OF SAID ARC BEARS SOUTH 09°05'00" EAST 295.78 FEET) A DISTANCE OF 309.39 FEET; THENCE SOUTH 38°43'00" EAST 209.52 FEET; THENCE SOUTH 00°09'52" WEST 35.86 FEET; THENCE SOUTH 17°27'00" WEST 520.49 FEET; THENCE ALONG THE ARC OF A CURVE TO THE RIGHT (SAID CURVE HAVING A RADIUS OF 226.50 FEET, A CENTRAL ANGLE OF 22°34'00", CHORD OF SAID ARC BEARS SOUTH 28°44'00" WEST 88.63 FEET) A DISTANCE OF 89.27 FEET; THENCE SOUTH 40°01'00" WEST 464.70 FEET; THENCE SOUTH 49°59'00" EAST 10.00 FEET; THENCE ALONG THE ARC OF A CURVE TO THE RIGHT (SAID CURVE HAVING A RADIUS OF 523.00 FEET, A CENTRAL ANGLE OF 14°06'00", CHORD OF SAID ARC BEARS SOUTH 47°04'00" WEST 128.38 FEET) A DISTANCE OF 128.71 FEET; THENCE SOUTH 54°07'00" WEST 953.87 FEET TO A POINT ON THE EAST-WEST CENTERLINE OF SAID SECTION 9, WHENCE THE CENTER QUARTER CORNER THEREOF BEARS SOUTH 88°00'00" EAST 688.45 FEET; THENCE NORTH 88°00'00" WEST 1,951.50 FEET TO THE WEST QUARTER CORNER OF SECTION 9; THENCE ALONG THE SOUTH LINE OF THE NORTHEAST QUARTER OF SECTION 8, NORTH 89°22'52" WEST 551.74 FEET, WHENCE THE SOUTHWEST CORNER OF THE EAST HALF OF SAID NORTHEAST QUARTER BEARS NORTH 89°22'52" WEST 727.42 FEET; THENCE ALONG THE WESTERLY BOUNDARY LINE OF THAT TRACT OF LAND DESCRIBED BY DEED RECORDED ON FILM 1381 AT RECEPTION NO. 727921 THE FOLLOWING SIX (6) COURSES:
 THENCE NORTH 16°28'38" EAST 301.02 FEET (NORTH 15°35'01" EAST 301.47 FEET, PER DEED AT RECEPTION NO. 727921); THENCE NORTH 04°05'09" EAST 372.34 FEET (NORTH 03°11'32" EAST, PER DEED AT RECEPTION NO. 727921); THENCE NORTH 15°43'41" EAST 471.87 FEET (NORTH 14°50'04" EAST, PER DEED AT RECEPTION NO. 727921); THENCE NORTH 00°31'30" WEST 742.00 FEET NORTH (01°25'07" WEST, PER DEED AT RECEPTION NO. 727921); THENCE NORTH 16°24'05" WEST 414.90 FEET (NORTH 17°17'42" WEST, PER DEED AT RECEPTION NO. 727921); THENCE NORTH 20°12'01" WEST 397.69 FEET (NORTH 21°05'28" WEST PER DEED AT RECEPTION NO. 727921) TO A POINT ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 8, WHENCE THE NORTHWEST CORNER OF THE EAST HALF OF SAID NORTHEAST QUARTER BEARS NORTH 88°29'39" WEST 665.58 FEET; THENCE ALONG SAID NORTH LINE SOUTH 88°29'39" EAST 592.02 FEET TO THE SOUTHWEST CORNER OF SECTION 4; THENCE NORTH 03°52'29" EAST 2,640.53 FEET TO THE WEST QUARTER CORNER OF SECTION 4; THENCE SOUTH 87°23'57" EAST 1,313.73 FEET TO THE NORTHEAST CORNER OF THE WEST HALF OF THE SOUTHWEST QUARTER OF SECTION 4; THENCE SOUTH 03°53'46" WEST 2,620.75 FEET TO THE

SOUTHEAST CORNER OF THE WEST HALF OF THE SOUTHWEST QUARTER OF SECTION 4; THENCE ALONG THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 9 SOUTH 88°15'47" EAST 1,313.32 FEET TO THE TRUE POINT OF BEGINNING;

TOGETHER WITH A 60 FOOT WIDE PRIVATE ROAD AND UTILITY EASEMENT ACROSS THE SOUTHERLY 60 FEET OF THE SOUTH 1/2 OF SECTION 4, FROM THE SOUTHWESTERLY RIGHT OF WAY LINE OF A PUBLIC ROAD KNOWN AS DAKOTA RIDGE ROAD TO THE EASTERLY LINE OF THE WEST 1/2 OF THE SOUTHWEST 1/4 OF SECTION 4, AND A 60 FOOT WIDE PRIVATE ROAD AND UTILITY EASEMENT, AND BEING 30 FEET EITHER SIDE OF THE CENTERLINE OF AN EXISTING ROAD LOCATED IN THE SOUTHWEST 1/4 OF THE SOUTHWEST 1/4 OF SECTION 4, FROM THE SOUTHERLY LINE OF SECTION 4 TO THE EASTERLY LINE OF THE WEST 1/2 OF THE SOUTHWEST 1/4 OF SECTION 4, TOWNSHIP 3 NORTH, RANGE 70 WEST OF THE 6TH P.M.,

COUNTY OF BOULDER,
STATE OF COLORADO.

EXHIBIT B

PERMITTED EXCEPTIONS

NORTHWEST DOWE FLATS PROPERTY

1. REAL PROPERTY TAXES AND ASSESSMENTS FOR 1994 AND SUBSEQUENT YEARS.
2. RESERVATION CONTAINED IN DEED FROM VIRGINIA W. HILL TO ARTHUR H. CARD AND FERN B. CARD, RECORDED MAY 14, 1954 IN BOOK 950 AT PAGE 366, WHICH READS:

RESERVING UNTO THE GRANTOR, AN UNDIVIDED 1/2 OF ALL THE OIL, GAS AND OTHER MINERALS IN, UNDER, OR THAT MAY BE PRODUCED FROM SAID ABOVE DESCRIBED LAND, TOGETHER WITH THE RIGHT OF INGRESS AND EGRESS TO SAME FOR MINING, OPERATING AND PRODUCING OIL, GAS AND OTHER MINERALS, SUBJECT TO PAYMENT BY GRANTOR, HER HEIRS, PERSONAL REPRESENTATIVES OR ASSIGNS TO THE THEN SURFACE OWNERS FOR ANY DAMAGE CAUSED BY EXERCISE OF SAID RIGHT AND OPERATIONS THEREUNDER.
3. EASEMENT FOR THE PURPOSES OF INGRESS AND EGRESS AS GRANTED TO JOEL F. KLEEVES AND JEAN ANN KLEEVES BY ARTHUR H. CARD AND FERN B. CARD IN DEED RECORDED JUNE 9, 1980 ON FILM 1120 AT RECEPTION NO. 398367.
4. THE RIGHT OF A PROPRIETOR OF A VEIN OR LODGE TO EXTRACT OR REMOVE HIS ORE SHOULD THE SAME BE FOUND TO PENETRATE OR INTERSECT THE PREMISES THEREBY GRANTED AS RESERVED IN UNITED STATES PATENT RECORDED DECEMBER 19, 1891, IN BOOK 75, AT PAGE 510 AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.
5. EASEMENT AND RIGHT OF WAY FOR THE RIGHT, PRIVILEGE AND AUTHORITY TO CONSTRUCT, OPERATE AND MAINTAIN OVERHEAD AND/OR UNDERGROUND ELECTRIC LINE OR SYSTEM TOGETHER WITH THE RIGHT TO ENTER UPON SAID PREMISES, AS GRANTED TO POUFRE VALLEY RURAL ELECTRIC ASSOCIATION INC., BY FIRST INTERSTATE BANK OF OF AZ., N.A. AS TRUSTEE, IN INSTRUMENT RECORDED JANUARY 16, 1991, ON FILM 1658 AT RECEPTION NO. 01083543.
6. EASEMENT AND RIGHT OF WAY FOR THE RIGHT, PRIVILEGE AND AUTHORITY TO CONSTRUCT, OPERATE AND MAINTAIN DITCHES, SIPHONS, AND OTHER WORKS AS MAY BE NECESSARY TO CONSTRUCT, OPERATE, AND MAINTAIN ST. VRAIN SUPPLY CANAL

AND TO DIVERT AND CONTROL SURFACE DRAINAGE TOGETHER WITH THE RIGHT TO ENTER UPON SAID PREMISES, AS GRANTED TO THE UNITED STATES OF AMERICA BY CHARLES B. HILL AND VIRGINIA W. HILL, IN INSTRUMENT RECORDED APRIL 1, 1952, IN BOOK 903 AT PAGE 221.

7. TERMS, CONDITIONS, EASEMENTS, RIGHTS OF WAY, STIPULATIONS AND OBLIGATIONS AS CONTAINED IN AND BURDENS IMPOSED BY DEDICATIONS AND GRANTS OF EASEMENTS RECORDED AUGUST 27, 1980 AT RECEPTION NO. 409904 AND SEPTEMBER 24, 1980 AT RECEPTION NO. 414148.

SPECIAL WARRANTY DONATION DEED,
GRANT OF EASEMENT AND RELINQUISHMENT OF RIGHTS
(West Dowe Flats Donation Parcel)

SOUTHDOWN, INC., a Louisiana corporation ("Grantor"), with an address of 1200 Smith Street, Suite 2400, Houston, Texas 77002-4486, for good and valuable consideration, receipt of which is hereby acknowledged, hereby sells and conveys to THE COUNTY OF BOULDER, COLORADO, a body corporate and politic, ("Grantee") with an address of P.O. Box 471, Boulder, Colorado 80306, the real property described on Exhibit A attached hereto and made a part hereof, with all its appurtenances (collectively, the "Property"), and warrants the title to the same against all persons claiming under the Grantor subject to the matters described on Exhibit B attached hereto and made a part hereof. Grantor, for good and valuable consideration, receipt of which is hereby acknowledged, hereby grants, sells and quitclaims to Grantee, without any warranties as to title and subject to the rights of any other person, including Grantor, in or to such real property, a nonexclusive access easement over the real property described on Exhibit C attached hereto and made a part hereof, which real property constitutes a portion of the Lyons Tunnel Access Road, and which easement shall be used solely for access to the Property as such access is restricted herein.

Grantee, by its acceptance hereof, hereby covenants and agrees as follows:

(a) The Property shall be used only for open space and shall be maintained by Grantee as non-developable open space in perpetuity. To the extent possible, Grantee shall protect and preserve the Property's scenic beauty, archaeological resources and wildlife habitat and the viewsheds in and around the Property.

(b) Subject to the matters set forth on Exhibit B, general public access to the Property shall be forever prohibited, and not permitted, provided, however, that Grantee may, in its discretion, allow limited access to the Property by third parties for valid educational, scientific, or cultural purposes in a manner which does not impair the scenic, archaeological, wildlife, or natural environment of the Property.

(c) Grantor does not grant to Grantee any express or implied right of way, easement, or any other means of access to the Property, except any such access to and from Stone Canyon Road (aka Nolan Drive) where said road abuts the northwesterly boundary of the Property and except for the quitclaim grant of a nonexclusive access easement over the real property described on Exhibit C hereto.

(d) Grantee hereby sells and quitclaims to Grantor all of Grantee's right, title and interest in and to the real property described on Exhibit D attached hereto and made a part hereof, excluding, however, the nonexclusive access

easement over the real property described on Exhibit C hereto, to the extent granted herein. Grantor and Grantee hereby terminate the Conservation Easement in Gross, dated July 12, 1994 and affecting the Property and the real property described on Exhibit D hereto and such easement shall no longer burden or affect the Property or such real property.

(e) Grantee shall consult with appropriate Native American tribes in order to promote the cultural interests of Native Americans in the Property, and to protect and preserve the archaeological resources on the Property.

SIGNED this 14 day of July, 1994.

SOUTHDOWN, INC., a Louisiana corporation

By: John W. Lohr
John W. Lohr, Division (Title)
Vice President

THE COUNTY OF BOULDER, COLORADO,
a body corporate and politic

By: Ronald K. Stewart
CHAIR, BOARD OF COUNTY (Title)
COMMISSIONERS

STATE OF Colorado)
)
Boulder COUNTY) ss.

The foregoing instrument was acknowledged before me this 14th of July, 1994 by THE COUNTY OF BOULDER, COLORADO, a body corporate and politic.

Witness my hand and official seal.

(Notarial Seal)

Caren S. Ruffey
Notary Public

My commission expires: 6/17/98

STATE OF Colorado)
)
Boulder COUNTY) ss.

The foregoing instrument was acknowledged before me this 6th of July, 1994 by John W. Lehr as Division's Vice President of Southdown, Inc., a Louisiana corporation, on behalf of such corporation.

Witness my hand and official seal.

(Notarial Seal)

Deborah A. Osterman
Notary Public

My commission expires: 12-2-96

EXHIBIT A

West Dowe Flats Donation Parcel

A tract of land located in the S½, SE¼, of Section 8 and the E½ of Section 17, all in T3N, R70W of the 6th P.M., Boulder County, Colorado, said tract being more particularly described as follows:

Beginning at a point on the East line of the SE¼, Section 17 from whence the Southeast corner of said Section 17 bears S01°12'28"W, 200.35 feet and with all other bearings contained herein relative thereto; thence N85°23'04"W, 1938.09 feet; thence N19°41'19"W, 1341.56 feet; thence N09°54'08"E, 1011.19 feet; thence N37°58'28"E, 393.96 feet; thence N14°15'01"E, 874.06 feet; thence N23°01'22"E, 336.99 feet; thence N09°58'20"E, 610.50 feet; thence N22°12'26"E, 798.07 feet; thence N41°01'26"E, 247.58 feet; thence N24°04'47"E, 686.31 feet; thence N11°11'24"E, 364.99 feet; thence N01°26'22"W, 168.73 feet; thence N88°23'48"W, 600.85 feet; thence N22°42'37"W, 100.29 feet; thence S89°09'55"E, 1481.87 feet along the North line of the S½, SE¼, Section 8 to the Northeast corner of said S½, SE¼; thence S01°07'29"W, 1308.98 feet to the Southeast corner of Section 8 (the Northeast corner of Section 17); thence S01°12'28"W, 2773.48 feet to the East Quarter corner of Section 17; thence S01°12'28"W, 2570.05 feet to the Point of Beginning, except that part conveyed in deed recorded April 1, 1952 in Book 903 at Page 221.

EXHIBIT B

PERMITTED EXCEPTIONS

WEST DOWE FLATS DONATION PARCEL

1. REAL PROPERTY TAXES AND ASSESSMENTS FOR 1994 AND SUBSEQUENT YEARS.
2. AN UNDIVIDED 1/2 INTEREST IN ALL OIL, GAS AND OTHER MINERALS AS RESERVED BY DEED RECORDED MAY 14, 1954 IN BOOK 950 AT PAGE 366, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.
3. RIGHT OF WAY FOR THE SAINT VRAIN SUPPLY CANAL AS SHOWN ON THE COUNTY ASSESSORS MAP AND AS CONTAINED IN INSTRUMENTS RECORDED AUGUST 5, 1953 IN BOOK 932 AT PAGE 590; APRIL 24, 1953 IN BOOK 925 AT PAGE 146; APRIL 24, 1953 IN BOOK 926 AT PAGE 146; SEPTEMBER 15, 1953 IN BOOK 936 AT PAGE 353.
4. LACK OF A RIGHT OF ACCESS FROM THE LAND TO ANY OPEN PUBLIC ROAD, STREET OR HIGHWAY.

NOTE: THIS EXCEPTION IS NECESSARY BECAUSE IT DOES NOT APPEAR FROM THE INSTRUMENTS IN THE OFFICE OF THE CLERK AND RECORDER OF THE COUNTY IN WHICH SUBJECT PROPERTY IS SITUATED THAT ANY RIGHT OF ACCESS EXISTS TO AN OPEN PUBLIC ROADWAY.
5. EASEMENT TO THE CITY OF LONGMONT RECORDED APRIL 23, 1981 ON FILM 1162 AS RECEPTION NO. 443099.
6. EASEMENT TO THE CITY OF LONGMONT RECORDED SEPTEMBER 19, 1978 ON FILM 1029 AS RECEPTION NO. 300147.
7. RIGHT OF WAY FOR LATERALS AND DITCHES AS RESERVED IN DEEDS RECORDED NOVEMBER 14, 1919 IN BOOK 446 AT PAGES 144 AND 145.
8. RESERVATIONS AS CONTAINED IN UNITED STATES PATENT RECORDED DECEMBER 19, 1891 IN BOOK 75 PAGES 513 AND 514 AND MARCH 16, 1892 IN BOOK 100 PAGE 57, AS FOLLOWS: RIGHTS OF WAY FOR DITCHES OR CANALS CONSTRUCTED BY AUTHORITY OF THE UNITED STATES.
9. COVENANTS RECORDED SEPTEMBER 20, 1993 ON FILM 1875 AT RECEPTION NO. 1338986, AND AMENDMENT RECORDED NOVEMBER 5, 1993 ON FILM 1899 AT RECEPTION NO. 1358254.

EXHIBIT C

A parcel of land located in the SE1/4 of the SE1/4 of Section 17, Township 3 North, Range 70 West of the Sixth Principal Meridian, being more particularly described as follows:

Beginning at the southeast corner of Section 17; thence along the south line of said SE1/4SE1/4, North 85°23'04" West 55 feet to a point on said south line; thence North 01°27'40" East 200.35 feet; thence South 85°23'04" East 55 feet to a point on the east line of said SE1/4SE1/4; thence South 01°12'28" West 200.35 feet to the point of beginning.

AND

A portion of the parcel of land located within the east 100 feet of the NE1/4 of Section 20, Township 3 North, Range 70 West of the Sixth Principal Meridian, known as the Lyons Tunnel Access Road.

EXHIBIT D

Stone Canyon Property

A tract of land located in the S½, SE¼, of Section 8 and the E½ of Section 17, all in T3N, R70W of the 6th P.M., Boulder County, Colorado, said tract being more particularly described as follows:

Beginning at the Southeast corner of said Section 17, thence N85°23'04"W, 2621.84 feet to the South Quarter corner of said Section 17 and with all other bearings contained herein relative to this line; thence N01°22'17"E, 2863.61 feet along the North-South centerline of Section 17; thence along the centerline of Stone Canyon Road the following courses and distances:

N14°15'01"E, 920.08 feet; thence N23°01'22"E, 314.38 feet;
thence N09°58'20"E, 806.18 feet; thence N22°12'26"E, 961.80 feet;
thence N41°01'26"E, 257.63 feet; thence N24°04'47"E, 529.16 feet;
thence N11°11'24"E, 230.82 feet; thence N1°26'22"W, 134.23 feet;

thence leaving said road centerline, S88°23'48"E, 600.85 feet;
thence S01°26'22"E, 168.73 feet; thence S11°11'24"W, 364.99 feet;
thence S24°04'47"W, 686.31 feet; thence S41°01'26"W, 247.58 feet;
thence S22°12'26"W, 798.07 feet; thence S09°58'20"W, 610.50 feet;
thence S23°01'22"W, 336.99 feet; thence S14°15'01"W, 874.08 feet;
thence S37°58'28"W, 393.96 feet; thence S09°54'08"W, 1011.19 feet;
thence S19°41'19"E, 1341.56 feet; thence S85°23'04"E, 1938.09 feet to a point on the East line of the SE¼, Section 17; thence S01°12'28"W, 200.35 feet to the Point of Beginning.

CERTIFICATE

SOUTHDOWN, INC. ("Southdown"), based solely upon its current knowledge, information and belief, hereby represents and warrants to the COUNTY OF BOULDER, a body corporate and politic (the "County"), as follows in connection with the contemplated donation to the County of the real property defined as the West Dowe Flats Donation Parcel and the Northwest Dowe Flats Property in the Development Agreement, Dowe Flats Mine, Docket U-93-14/V-93-8, Southdown, Inc. (the "Development Agreement"), dated July 12, 1994, between the Board of County Commissioners of Boulder County, Colorado and Southdown (such real property is referred to collectively herein as the "Property"):

- (a) Southdown has received no notice of, and has no other knowledge of, any litigation, claim or proceeding, pending or currently threatened, which in any manner affects the Property; and
- (b) Southdown has received no notice, and has no other knowledge of, any current, existing violations of any federal, state or local law, code, ordinance, rule, regulation, or requirement affecting the Property; and
- (c) Southdown has the full right, power and authority to transfer and convey the Property to the County as provided in the Development Agreement and to carry out the Grantor's obligations under the Development Agreement; and
- (d) Southdown has not entered into any agreements with any private persons or entity or with any governmental or quasi-governmental entity with respect to the Property that may result in liability or expenses to the County upon the County's acquisition of all or any portion of the Property; and
- (e) Except as disclosed on Exhibits H and I to the Development Agreement, there are no special assessments which now burden or encumber the Property and Southdown has no knowledge of any other special assessments currently proposed as to the Property; and
- (f) The execution and delivery of the Development Agreement and the performance of all of the

obligations of Southdown thereunder will not result in a breach of or constitute a default under any agreement entered into by Southdown or under any covenant or restriction affecting the Property which default may result in liability or expenses to the County; and


- (g) There are no leases, tenancies or rental agreements relating to the Property, or to any part thereof, which cannot be terminated by Southdown on or prior to the date of closing of the transactions provided in the Development Agreement; and
- (h) Southdown has not granted or created, and has no knowledge of any third parties who may have the right to claim or assert any easement, right-of-way or claim of possession not shown by record, visual inspection or survey, whether by grant, prescription, adverse possession or otherwise, as to any part of the Property; and
- (i) To Southdown's knowledge, no part of the Property has ever been used as a landfill, and no materials have ever been stored or deposited upon the Property which would under any applicable governmental law or regulation require that the Property be treated or materials removed from the Property prior to the use of the Property for any purpose which would be permitted by law but for the existence of said materials on the Property; and
- (j) To Southdown's knowledge, no underground storage tank, as that term is defined by federal statute or Colorado statute, is located on the Property which under applicable governmental law or regulation require such underground storage tank to be upgraded, modified, replaced, closed or removed; and
- (k) To Southdown's knowledge, Grantor has not caused or permitted the release of any hazardous substance on the Property. The terms "hazardous substance" and "release" as used herein shall have the same meaning and definition as set forth in Paragraphs (14), (22) and (23), respectively, of Title 42 U.S.C. Section 9601; provided, however, that the term "hazardous

substance" as used herein also shall include "hazardous waste", as defined in Paragraph (5) of 42 U.S.C. Section 6903.

Notwithstanding the foregoing, Southdown has notified and hereby notifies the County that the Property is adjacent to and/or in the vicinity of a former chemical landfill site (formerly known as the Arapahoe Chemical Landfill Site, now known as Syntex).

EXECUTED to be effective on the 12th day of July, 1994.

SOUTHDOWN, INC., a Louisiana corporation

By: 
John W. Lohr, (Title)
Division Vice President

REVOCABLE LICENSE AGREEMENT

THIS AGREEMENT made this 14th day of July, 1994, between Southdown, Inc., a Louisiana corporation, hereinafter called "Licensor" and the County of Boulder, a body corporate and politic, hereinafter called "Licensee."

In consideration of the mutual promises herein contained, and other good and valuable consideration, the receipt and sufficiency of which are acknowledged, the parties agree as follows:

1. Grant of License. Subject to the terms and conditions of this License Agreement, Licensor hereby grants to Licensee a license to use the existing dirt trail across the Stone Canyon Parcel, which is generally shown on Exhibit A, attached hereto and by this reference made a part of this Agreement. (All capitalized terms used in this agreement have the same meanings as in the Development Agreement between the parties.)

2. Purpose of License. The existing dirt trail may be utilized by the County only if the County acquires an interest by lease or patent in the Bureau of Land Management property which is located to the north of the Stone Canyon Parcel and the West Dowe Flats Donation Parcel (the "BLM Parcel"). The BLM Parcel is identified on Exhibit A. The existing dirt trail may be used only as an access road by the County and its agents, for management and maintenance of the BLM Parcel and the West Dowe Flats Donation Parcel.

3. License Not Exclusive. Licensee's exercise of its rights shall not unreasonably interfere with Licensor's operations.

4. Liability. Licensee assumes responsibility for the negligent actions of its employees and agents in the use of the Premises subject to this license. It is agreed that such liability shall not exceed those amounts set forth in the Colorado Governmental Immunity Act, now existing, or as may hereafter be amended, nor confer any benefits to any person not a party to this Agreement. By agreeing to this provision, Licensee does not waive or intend to waive, the limitations on liability which are provided to Licensee under the Colorado Governmental Immunity Act, § 24-10-101 et seq., C.R.S. In assuming responsibility for the negligent acts or omissions of its own agents and employees in the performance or failure to perform work under this Agreement, Licensee in no way assumes responsibility for the actions or omissions of the employees or agents of Licensor or of any third parties. Licensee currently self-insures against public liability and property damage, and shall maintain adequate insurance coverage.

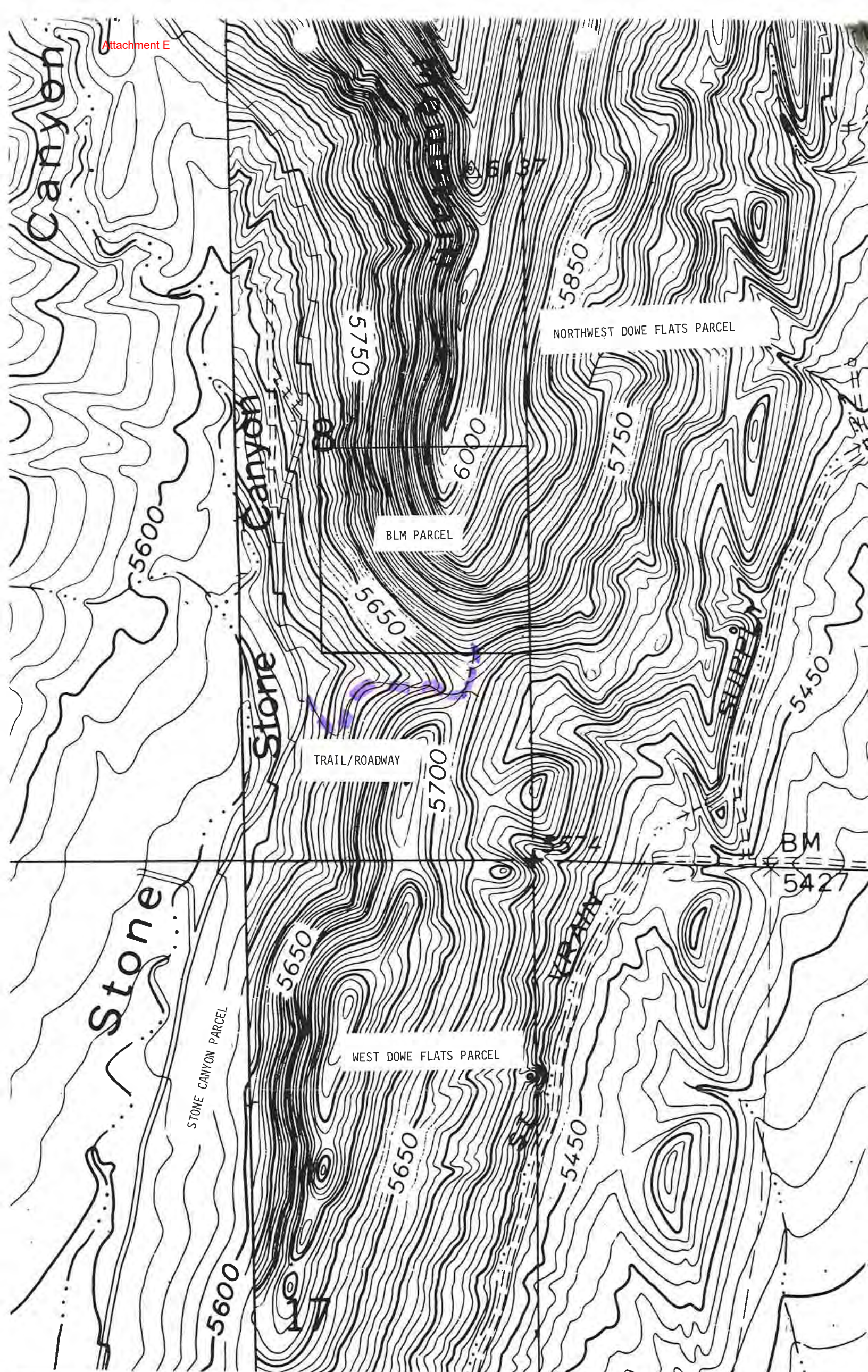
5. Termination. This license shall be terminable, at the discretion of the Licensor, with sixty (60) days notice to the Licensee. Notice shall be provided by hand delivery or certified or registered mail, addressed to the Director of Boulder County

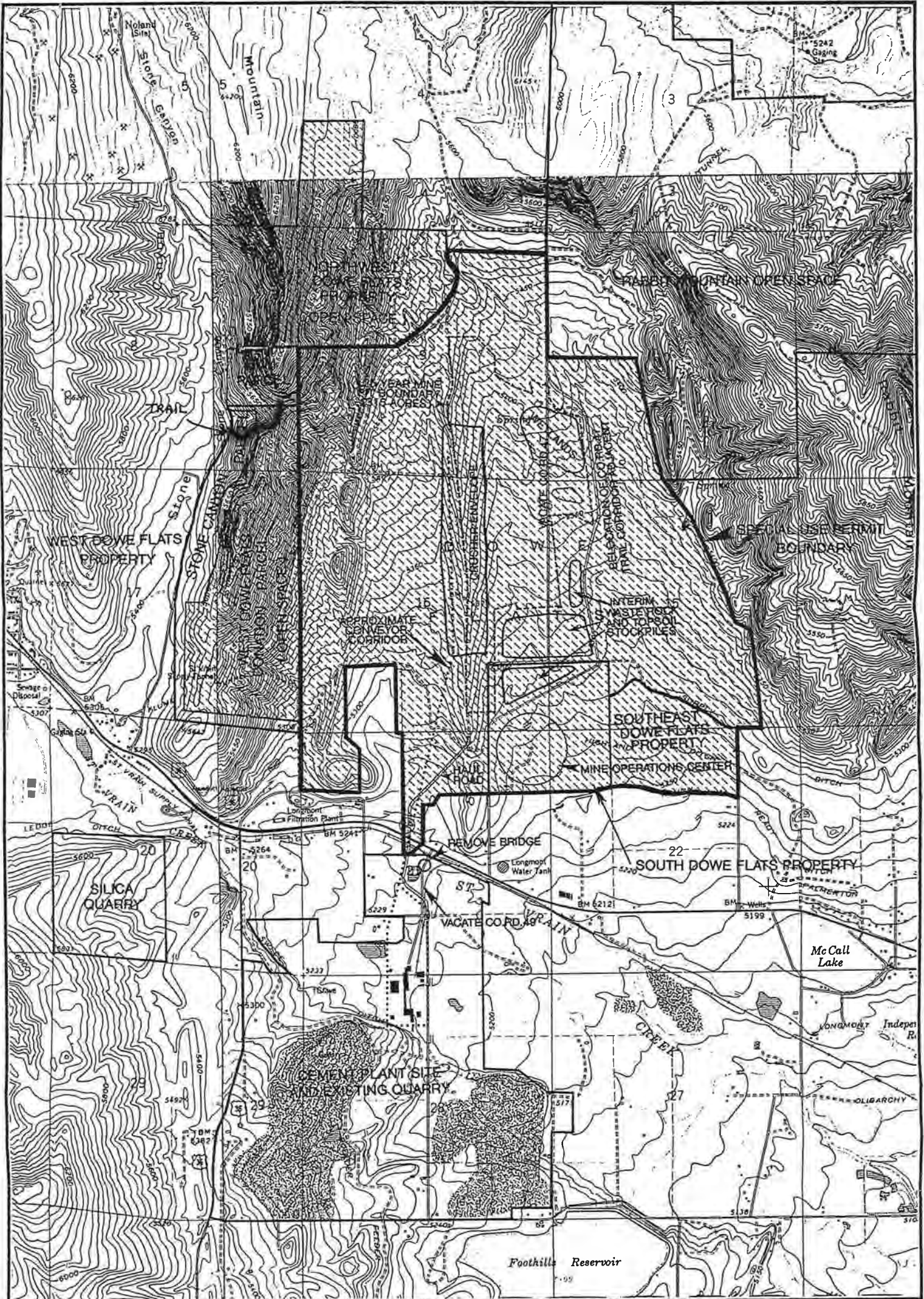
Caren J. Ruff

Notary Public

My Commission Expires: 6/17/98

EXHIBIT A
MAP SHOWING EXISTING ROAD AND BLM PROPERTY






SHB AGRA, INC.
 Engineering & Environmental Services


SPECIAL USE PERMIT
 DOWE FLATS PROJECT
 SOUTHDOWN INC.

 INTERIM NON-DEVELOPMENT COVENANT
 5/13/94

BLACK-FOOTED FERRET SURVEYS ON THE DOWE
FLATS PROJECT AREA, BOULDER COUNTY,
COLORADO

Prepared for:

Southwestern Portland Cement Company
5134 Ute Highway
P.O. Box 529
Lyons, Colorado 80540

Prepared by:

Richard W. Thompson, Certified Wildlife Biologist
Western Ecosystems, Inc.
905 West Coach Road
Boulder, Colorado 80302

November, 1994

ACKNOWLEDGEMENT

Ferret Surveys were Conducted by:

Richard W. Thompson

Jon D. Holst

Michael G. Figgs

Susan Spidle

Sarah Tasse

Jeffrey L. Figgs

Nancy D. Lederer

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1.0 INTRODUCTION

Southdown, Inc., dba Southwestern Portland Cement Company (Southwestern), has obtained permits for a 25 year hard rock mine within 385 acres of a 1911 acre permit area in Dowe Flats, Boulder County, Colorado. Major permits required and issued include a Boulder County Special Use Permit (Southdown 1993a, SU-93-14 and V-93-8) and a Regular Operation Reclamation Permit (Southdown 1993b, M-93-04) from the Colorado Mined Land Reclamation Board (CMLRB). Mine development is scheduled to commence in fall/ winter 1994.

Dowe Flats supports a large black-tailed prairie dog (*Cynomys ludovicianus*) town. Black-footed ferrets (*Mustela nigripes*), a federally-listed endangered species, depend upon prairie dog towns as a source of food and shelter. Section 7 of the Endangered Species Act requires Federal agencies to determine if any action authorized, funded, or carried out by them is likely to jeopardize the continued existence of an endangered species. Although ferrets have not been documented in Colorado since the late 1940's to early 1950's (Cahalane 1954, Lechleitner 1969, Armstrong 1972), such a determination requires an appropriate survey (U.S. Fish and Wildlife Service [USFWS] 1989) in the case of nocturnal black-footed ferrets.

Although there has been no federal involvement in the project requiring the conduct of ferrets surveys, Southwestern voluntarily committed to conduct ferret surveys according to Federal guidelines (USFWS 1989) prior to mine development. Western Ecosystems, Inc., wildlife consultant on the project since 1987, was retained to conduct the ferret surveys. This report documents results the of those surveys.

2.0 EXISTING ENVIRONMENT

Dowe Flats is located in northeastern Boulder County (T 3 N, R 70 W, S 9, 10, 15, 16 20, and 22), north of State Highway 66, and approximately 2.5 miles east of the Town of Lyons (Figure 1). Southwestern's 1911 acre mine permit area encompasses most of the valley

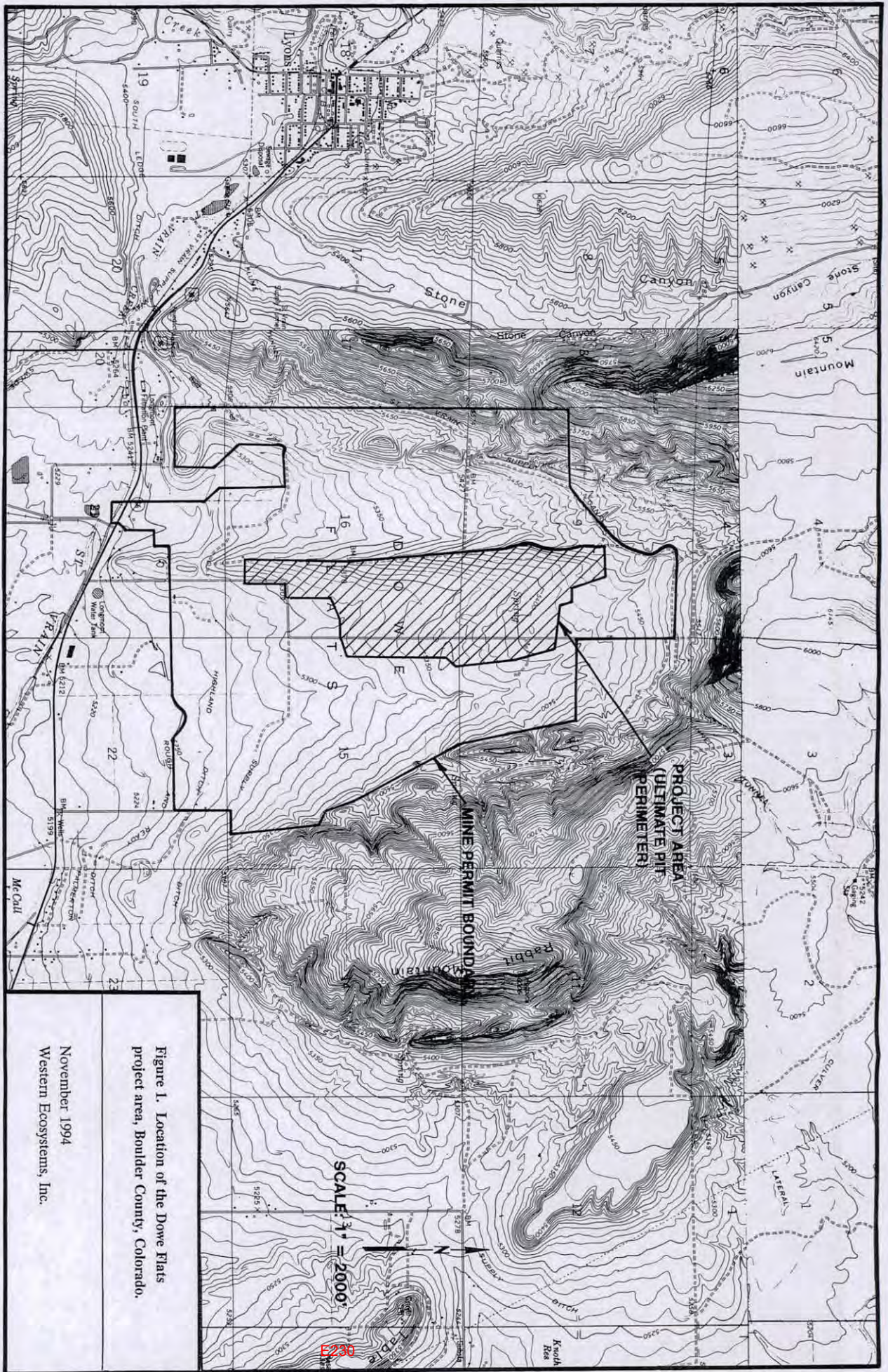


Figure 1. Location of the Dowe Flats project area, Boulder County, Colorado.

November 1994
Western Ecosystems, Inc.

known as Dowe Flats. Local elevations range from approximately 5,230 feet at St. Vrain Creek, on the south, to 5,900 feet on Indian Mountain, to the west.

Dowe Flats lies in the transitional foothills zone of Colorado's Front Range, between grasslands of the Great Plains physiographic province and the mountains of the Southern Rocky Mountains province (Boulder County 1984). This topographic area, which is 2 to 4 miles wide, is characterized by long, parallel, north-south "hogback" ridges separated by valleys.

The Dowe Flats valley bottom has been under various types of agricultural use for the last 120 years. Over 90% of the valley is currently used for cattle grazing and wheat, corn, alfalfa, and other crop production. Dominant surrounding land uses are primarily agricultural, recreational, undeveloped, and low density residential. Rabbit Mountain, a 1,119 acre parcel of Boulder County's Open Space System, is contiguous with a portion of the Permit Area's northeastern flank.

3.0 PROPOSED ACTION

Over the 25 year life of the proposed limestone mine, the mine, its ancillary facilities, and reclamation would disturb a total of 385 acres, centrally located within the 1911 acre permit area. Figure 2 illustrates the mine development plan. Initial mine development would disturb approximately 100 acres. Mine development would start towards the south end of the valley and progress northward. The average annual acreage of disturbance over the life of the mine is less than 65 acres, with a maximum acreage of disturbance of 95 acres (following initial development and reclamation of stockpiles). After initial development, the mine would progress northward disturbing an average of around 10-12 acres per year. A comparable acreage of prairie reclamation would annually occur in the wake of mining.

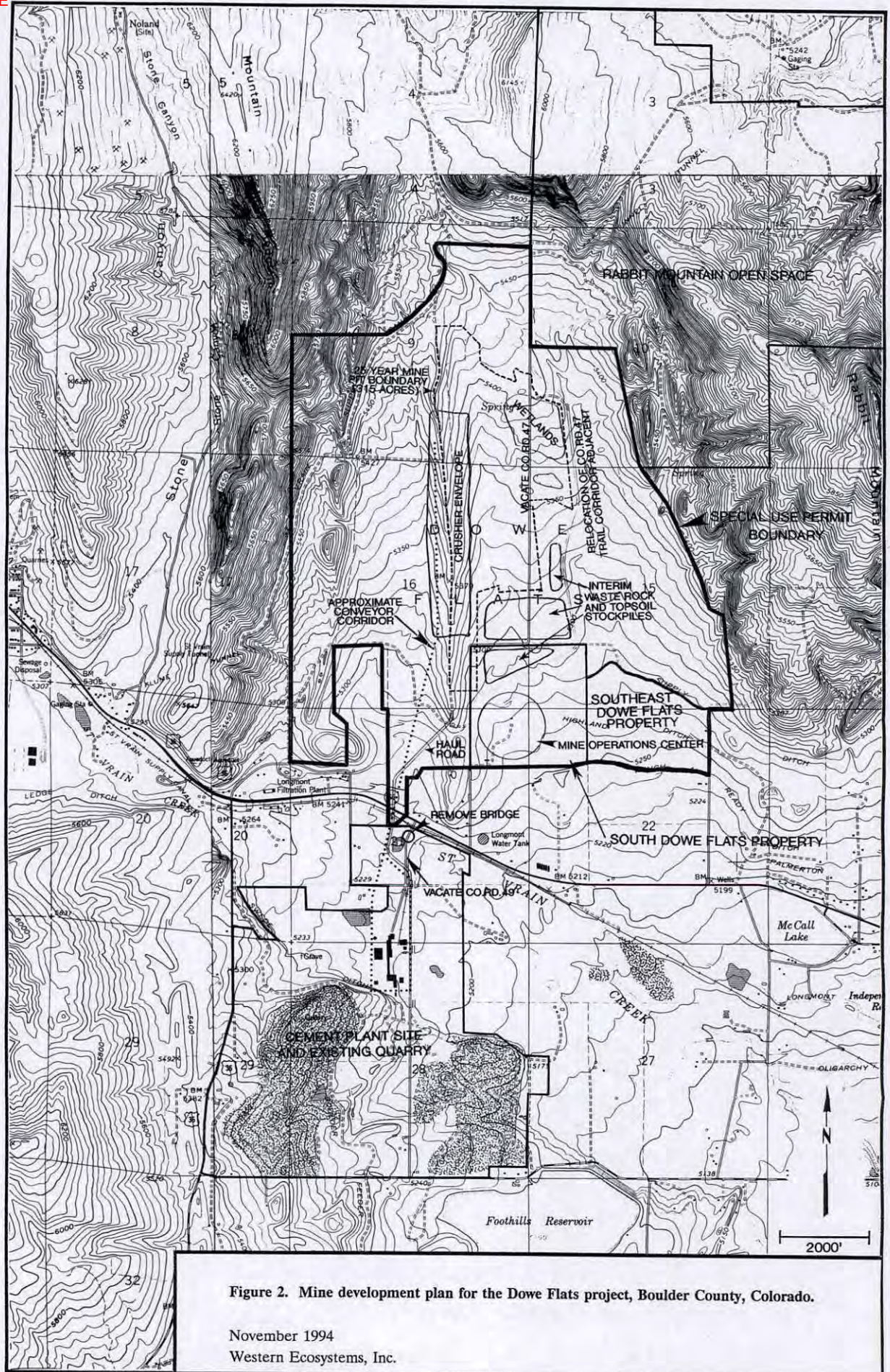


Figure 2. Mine development plan for the Dowe Flats project, Boulder County, Colorado.

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Western Ecosystems, Inc.

4.0 METHODS

Discussions between the author and Mr. Bob Leachman (a USFWS Biologist specializing in black-footed ferrets) were held on December 23, 1993 and April 14, 1994 to develop the clearance survey protocol delineated herein, as well as protocols to be implemented in subsequent phases of the mine project. This protocol was submitted to the USFWS for their concurrence. Verbal concurrence was received during a July 19, 1994 meeting with Mr. Bernardo Garza (USFWS Biologist).

4.1 PRAIRIE DOG TOWN MAPPING

As part of mine permitting studies and ongoing 5-year raptor/ prairie dog monitoring studies, prairie dog distribution in Dowe Flats has been mapped since 1987 (HRM 1987, Thompson 1987, Thompson unpubl. data). Prairie dog mapping is conducted on November 1 and April 1, the start and end of the winter raptor residency period. Mapping is conducted by periodically revising prior maps (scale = 1 in.:400 ft.) during approximately 5 hours of vehicular and pedestrian surveys throughout the valley. Active distribution is based on observed prairie dogs and active burrows. For the attempted 1993/94 diurnal ferret survey protocol, prairie dog distribution mapped on November 1, 1993 was used. Nocturnal ferret surveys were oriented toward a prairie dog distribution mapped on April 1, 1994.

4.2 DIURNAL SURVEYS

Surveys following the diurnal ferret protocol (USFWS 1989) were attempted over the winter of 1993/94 to minimize clearance costs and to avoid nocturnal surveys. This protocol is oriented toward locating sign left by ferrets. During winter months, ferret scats, prairie dog skulls, and ferret diggings are more abundant and observable because prairie dogs are less active and less likely to disturb or destroy ferret sign. Ferret tracks and diggings are also more obvious and detectable when there is snow cover.

Diurnal survey criteria include:

1. Surveys are conducted between December 1 and March 31.

2. Three searches must be made over the entire prairie dog distribution to be surveyed. Each search should be done when fresh snow has been present for at least 24 hours and after 10 or more days have passed since the prior survey period. Ideal survey conditions occur when 3-6 in. of snow has been on the ground for 2-3 days, with no melting or wind to erase or deform deposited sign.

3. Vehicles driven at < 5 mph may be used to search for ferret tracks or diggings, but complete, visually overlapping transects of the survey area are required.

The survey area was delineated by circumscribing a 0.5 mile zone around all impact areas within the permit area. All prairie dog towns within this zone were surveyed by a combination of pedestrian and vehicular transects. Survey routes extended beyond this zone in an attempt to cover all prairie dog habitat in the valley. Vehicular routes were conducted just after dawn along County Road 47 (CR 47), limestone ridge, and along the canal road west of CR 47. Pedestrian transects were conducted by Thompson, Figgs, and Lederer at intervals of ≤ 100 m. Since ferrets will travel up to 4 miles per day, any ferret in the area should be detected with transects of this width. Tentative routes were mapped prior to surveys and each surveyor was issued a map for field use. The entire prairie dog distribution was divided into survey units and each unit was surveyed by the field crew, generally along north-south transects. Transects were mapped as they were conducted. All survey personnel reviewed Clark et al. (1983) and USFWS (1989) prior to surveys. Before surveys, Thompson also lectured other survey crew members on survey procedures, winter ferret life history, and sign of ferrets and other wildlife that might be detected.

4.3 NOCTURNAL SURVEYS

Nocturnal ferret surveys were conducted, following USFWS (1989), on August 7-10, 1994 because winter 1993/94 survey conditions were unsuitable for 3 replicated diurnal surveys. It was considered far too impractical to clear the entire prairie dog complex of which Dowe Flats is a part. Therefore only the towns being affected were surveyed in an attempt to "clear" the entire prairie dog distribution within Dowe Flats. The rationale was that since Dowe Flats contained the largest prairie dog town in the local area, any ferrets present in this general area should have gravitated to this town. If no ferrets are located in Dowe Flats, it is even more unlikely that they would occur in any of the small, fragmented towns in the surrounding area.

The Dowe Flats nocturnal survey area, therefore, included all 385 acres of impact area over the 25 year life of the mine and a surrounding 0.5 mile buffer zone, rather than only the initial mine development area and surrounding buffer zone. The survey area extended beyond the 0.5 mile buffer zone to the southeast, southwest, and north, to the edges and/or bottlenecks of the prairie dog distribution in Dowe Flats. Although the prairie dog distribution covered 1,041 acres on May 23, 1994, the town was in the midst of a plague epizootic that had already reduced prairie dog distribution 171.0 acres from 1,212.0 acres mapped on April 1, 1994. Nevertheless, survey coverage was oriented to the April 1 distribution. This distribution was divided into approximate thirds, with each area surveyed by 2 individuals (a crew) in a vehicle and/or on foot over 3 consecutive nights. Thus, a total of 18 person-nights were required to cover the entire survey area.

Survey personnel were fairly experienced; 4 of the 6 people had prior ferret survey experience (Appendices 9.1 and 9.2). Thompson, a certified ferret surveyor (October 2, 1985), functioned as survey leader and Crew 1 leader. Holst, a professional wildlife biologist with previous nocturnal ferret survey experience, was Crew 2 leader. Figgs, a professional resource planner, with previous ferret survey experience, was Crew 3 leader. Crew personnel included 2 veterinary students (Spidle and Tasse), and Lederer, a professional biologist with The Nature Conservancy who had previous ferret survey experience. Approximately 1 week prior to the surveys, all survey personnel received copies of Clark et al. (1983) and USFWS (1989) and were paid to review them. Before surveys on August 7, Thompson gave a 1-hour lecture to all survey personnel, addressing site orientation, the mine proposal, ferret life history information, survey procedures, what to do if a ferret is spotted, plague, safety, and public relations (Appendix 9.3).

Surveys were conducted from dusk until dawn, systematically covering all prairie dog towns in Dowe Flats in search of ferrets and their eyeshine. At least 3 complete replications of each of the 3 survey areas was conducted each night. Each crew member used a 300,000 (n=2), 400,000 (n=2), or 1,000,000 (n=2) candlepower spotlight connected to a backpack-mounted deep cycle battery (pedestrian surveys) or to a vehicle's cigarette lighter. During pedestrian surveys, crew members walked $\leq 100\text{m}$ apart, depending on the width of the habitat and the number of passes required, slowly sweeping their spotlight approximately 180° in front of them and to the side opposite the other crew member. In tall vegetation (infrequently encountered) or where obscured by topography, transect separation was reduced. For vehicular coverage, the crew drove slowly down marked routes searching 360° around them with spotlights. One member of each vehicular crew stood in the bed of a pickup truck or sat in the passenger window. Areas beyond the spotlight's areas of illumination (150-200m), and/or areas obscured by tall vegetation or topography, were

surveyed on foot.

Each survey crew leader was issued a map outlining their survey area and recommended vehicular and pedestrian routes. Routes were mapped on 1:400 scale maps as they were initially conducted. Slight route variations between replications were not separately mapped. Routes were not flagged prior to surveys because of the relatively flat terrain, linearity of survey areas, abundance of landmarks to orient by, and the familiarity of 2 of 3 survey crew leaders with the study area. Distances of pedestrian and vehicular transect routes were measured from original field maps with a map wheel. Start and finish times of each replication were recorded along with vehicular and pedestrian survey time. Each crew had a portable radio, camera, and pin flags, and all crew members had binoculars and/or spotting scopes. Wildlife detected during surveys were recorded in each survey area each night along with starting and ending times of each replication. Batteries were recharged between nights.

5.0 RESULTS AND DISCUSSION

5.1 DIURNAL SURVEYS

During the December 1 to March 31 window during which diurnal ferret surveys can be conducted (USFWS 1989), survey conditions were suitable for only 1 of 3 required replications. Surveys scheduled following December 16, February 11 and 22, and March 8 and 27 snowfalls were all aborted because by the time 24 hours had passed following the precipitation event, warm ground and/or air temperatures, sunshine, and/or winds had degraded survey conditions to unsuitability. These conditions are common along the Front Range in winter. Unreliable survey conditions make the diurnal protocol problematic in this area.

One diurnal replication was successfully completed on January 27, 1994. Tracking conditions were excellent with 2-4 in. of snow (≥ 24 hrs. old), calm winds, 96% cloud cover, and a 0721 starting temperature of 28°F. Temperatures increased to 39°F, with 100% cloud cover, by the end of the survey and tracking conditions deteriorated slightly, but overall tracking conditions were excellent. Figure 3 illustrates 0721-1535 hours survey coverage by the 3 person crew, totalling 17 hours, 13 minutes. Survey transects totalled 27.01 miles, 7.05 miles by vehicle and 19.96 miles on foot. Occupied prairie dog habitat totalled 1,348.9 acres in the valley, 960.0 acres within the permit area, and 294.6 acres within the entire mine impact area. No evidence of any ferrets or mustelids, other than badger tracks, were detected. If

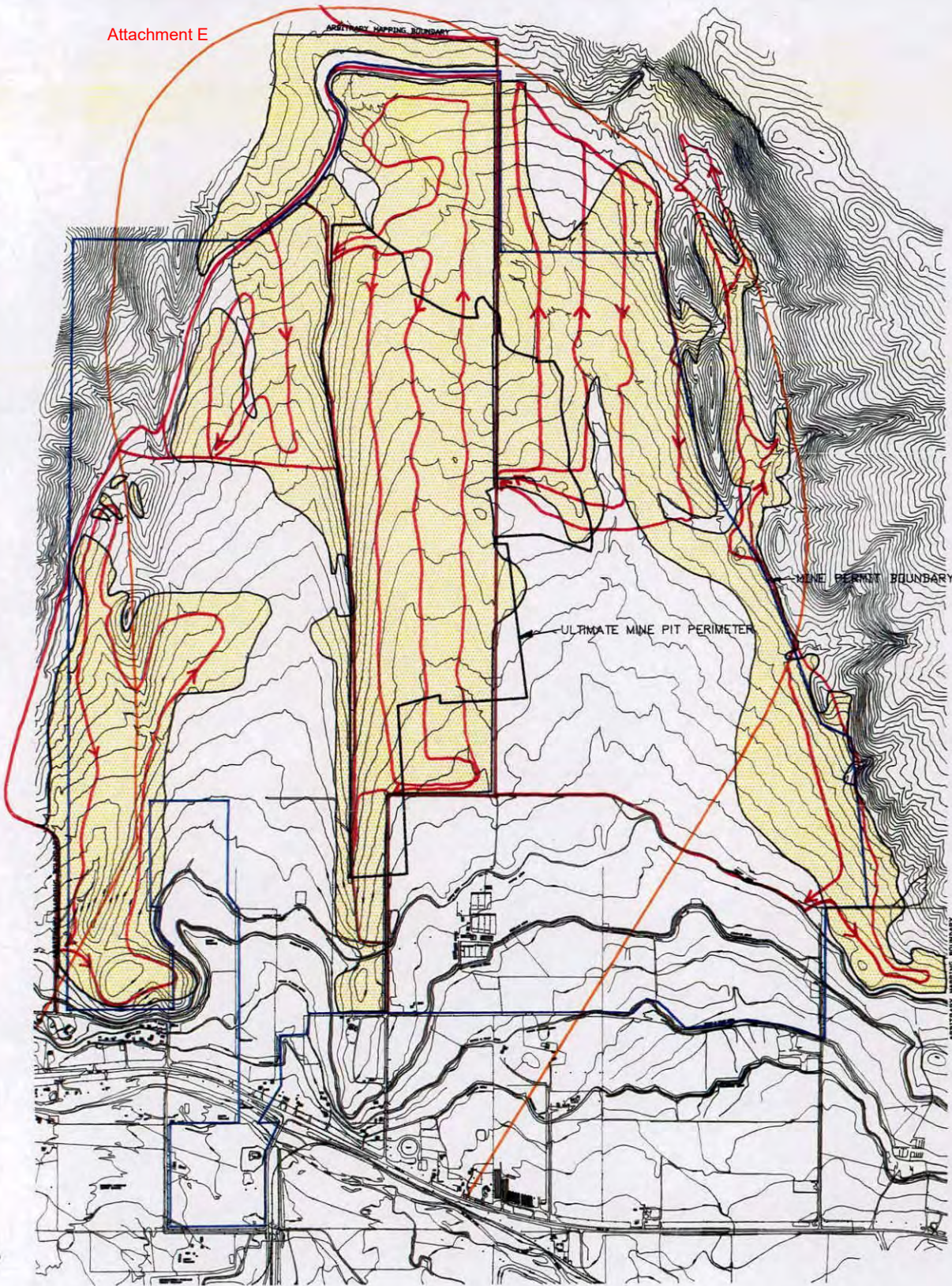


Figure 3. Diurnal black-footed ferret transects (—) surveyed January 27, 1994 on and around the Dowe Flats project area. Survey coverage was based on the ultimate mine pit perimeter and the 1,348.9 acre November 1, 1993 prairie dog distribution (yellow shading). The ultimate mine pit perimeter represented the impact area, around which a 0.5 mile zone (—) was circumscribed. All prairie dog habitat within this zone was surveyed by pedestrian and vehicular transects.

E237

SCALE: 1" = 1200'

a ferret had been present and moving above ground since snowfall terminated, it would have been detected.

5.2 NOCTURNAL SURVEYS

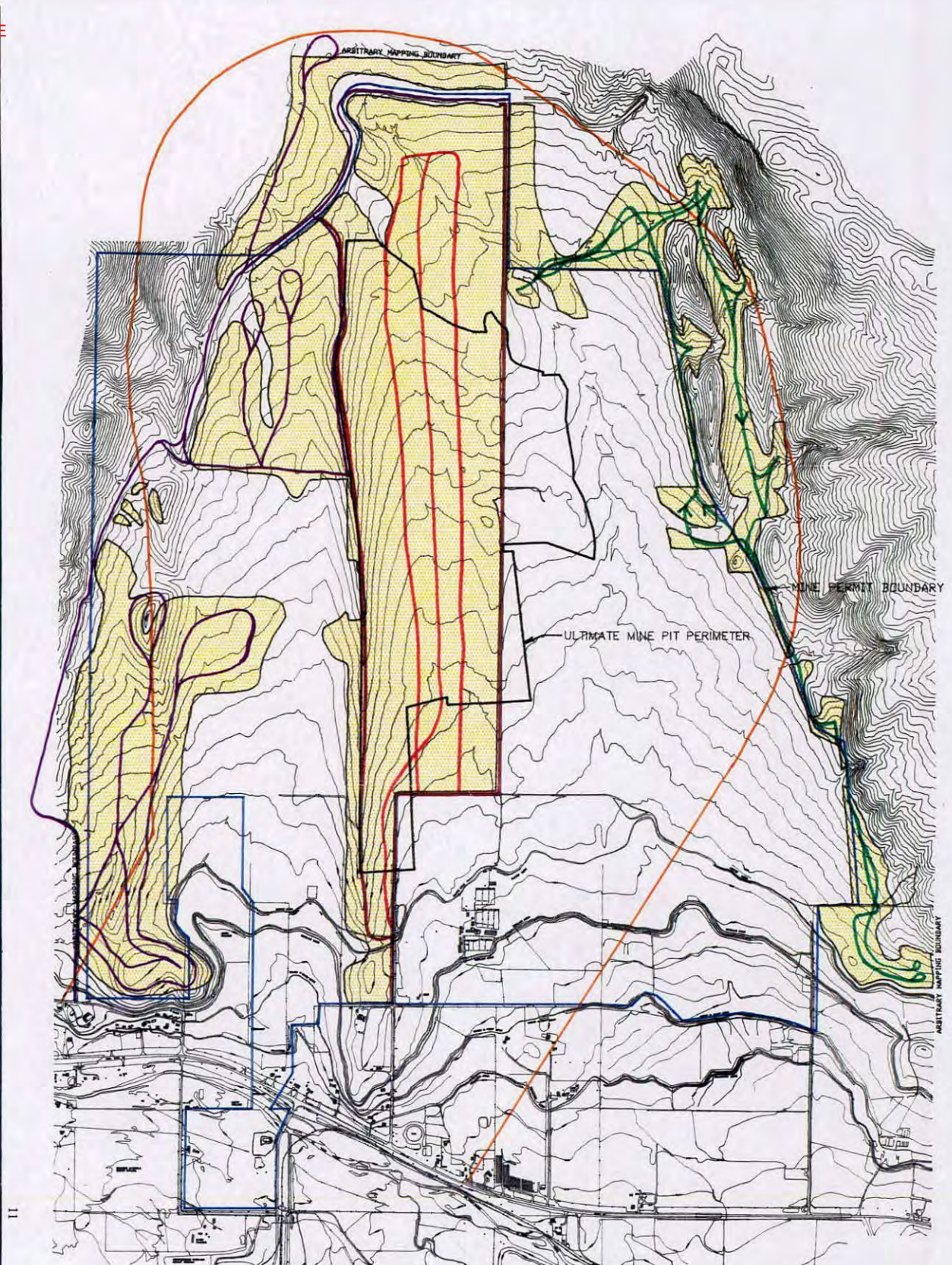
On August 7-10, 1994, survey crews spent 71 hours, 59 minutes (29 hrs., 43 min. in vehicles and 42 hrs., 16 min. on foot) searching 1,212.0 acres of mostly active prairie dog habitat in Dowe Flats for black-footed ferrets. Table 1 summarizes survey coverage. The 3 survey areas, which encompass the entire study area, were each surveyed 12-17 times over the 3 night survey period, totalling 381.59 miles (256.48 miles in vehicles and 125.11 miles on foot). Pedestrian and vehicular transect coverage for survey areas 1, 2, and 3, totalled 87.55 miles, 177.75 miles, and 116.29 miles, respectively. Figure 4 illustrates general survey routes through the prairie dog distribution. No evidence of black-footed ferrets was detected.

Although survey coverage was oriented toward a 1,212 acre prairie dog distribution mapped on April 1, 1994, active towns probably totalled < 800 acres as a result of plague, first detected in the valley in April, 1994. Between April 1 and May 23, the overall prairie dog distribution had been reduced 171.0 acres by plague, with a more drastic reduction of prairie dog numbers. Virtually all prairie dogs in survey area 1 had been killed by plague at the time of the ferret surveys.

A mean survey coverage statistic was derived by dividing total survey time by the acreage of prairie dog habitat surveyed. At 1,212 acres of prairie dog towns, survey coverage averaged 5.9 hours/ 100 acres of prairie dog habitat ((72 hrs./ 1,212 ac.) x 100).

Based on this survey coverage, it is highly probable that if any ferrets were present within Dowe Flats at the time of the surveys, they would have been detected. It is, therefore, concluded that black-footed ferrets were not present in Dowe Flats during August 7-10, 1994. Furthermore, since Dowe Flats represents the largest block of prairie dog habitat in this general area, and since any ferrets present in this general area should have been drawn to this substantial prey base, the apparent absence of ferrets in Dowe Flats suggests that they are also absent in the surrounding area.

During surveys, weather was fair and typical for the time of year. Temperatures at the beginning and end of surveys ranged from 70-52°F. Skies were clear or mostly clear on the first and third nights. With the exception of 3 brief (i.e., 1-2 min. each), light showers on



SCALE: 1" = 1200'

Figure 4. Nocturnal black-footed ferret transects (survey area 1 [—], survey area 2 [—], and survey area 3 [—]) surveyed August 7-10, 1994 by 3, 2-person crews on and around the Dowe Flats project area. Surveys totaled 71 hours, 59 minutes along 381.59 miles of transects. Survey coverage was based on the ultimate mine pit perimeter and the 1,212.0 acre April 1, 1994 prairie dog distribution (yellow shading). The ultimate mine pit perimeter represented the impact area, around which a 0.5 mile zone (—) was circumscribed. All prairie dog habitat within this zone was surveyed by pedestrian and vehicular transects.

Table 1. Survey coverage summary for 1,212.0 acres of mostly active Dowe Flats prairie dog towns surveyed for black-footed ferrets by 3, 2 person crews August 7-10, 1994.

DATE SURVEY AREA ^b	SURVEY TIME (Hours:Minutes) ^a					N REPS. ^c
	START	END	TOTAL	VEHICLE	FOOT	
AUGUST 7/8						
SURVEY AREA 1	2102	0547	7:49	0	7:49	6
SURVEY AREA 2	2100	0545	8:15	6:00	2:15	5
SURVEY AREA 3	2056	0545	8:19	3:14	5:05	4
TOTAL			24:23	9:14	15:09	
AUGUST 8/9						
SURVEY AREA 1	2110	0545	6:55	0	6:55	5
SURVEY AREA 2	2104	0540	8:26	1:46	6:40	4
SURVEY AREA 3	2106	0545	8:19	5:05	3:14	4
TOTAL			23:40	6:51	16:49	
AUGUST 9/10						
SURVEY AREA 1	2055	0530	7:08	0	7:08	6
SURVEY AREA 2	2049	0539	8:23	8:23	0	6
SURVEY AREA 3	2055	0545	8:25	5:15	3:10	4
TOTAL			23:56	13:38	10:18	
SURVEY TOTAL			71:59 ^d	29:43	42:16	
SURVEY AREA 1			21:52	0	21:52	17
SURVEY AREA 2			25:04	16:09	8:55	15
SURVEY AREA 3			25:03	13:34	11:29	12
^a Does not include break time. ^b Prairie dog distribution within the Dowe Flats survey area was divided into 3 survey areas, each of which was systematically surveyed from dusk until dawn by a 2 person crew over 3 consecutive nights. ^c Number of replications of each survey area. ^d Total time spent surveying 1,212.0 acres of mostly active prairie dog towns over 3 consecutive nights by 3, 2 person crews.						

the second night, no precipitation occurred. Winds were calm, except for a brief period on the first night when several gusts rose to 15 mph.

Table 2 summarizes wildlife species (1 amphibian, 1 reptile, 12 bird, and 14 mammal) detected during surveys. The listed species are common associates of prairie dog communities. Some species (e.g., blue grosbeak, raccoon, domestic cat) were detected where prairie habitat transitioned into riparian and residential areas. Badgers, coyotes, and great horned owls, predators of prairie dogs and, potentially, ferrets, were detected in the study area on each night.

5.3 EVALUATION OF DOWE FLATS AS A POTENTIAL BLACK-FOOTED FERRET REINTRODUCTION SITE

Prairie dog towns or complexes larger than 1,000 acres, such as Dowe Flats, are potentially important to black-footed ferret recovery and receive special consideration by the USFWS as reintroduction sites. Although Dowe Flats represents one of the largest prairie dog towns in Boulder County, this town and the rest of this prairie dog complex are privately owned, surrounded by increasing urbanization and human use, and relatively small compared to complexes on the Pawnee and Comanche National Grasslands, in the San Luis Valley and the Paonia-Hotchkiss area, and in the northwest part of the state near the Utah border. Following mining the long term availability of Dowe Flats as prairie dog habitat is uncertain due to continued private ownership. These factors depreciate the suitability of Dowe Flats as a ferret reintroduction site.

5.4 MINING AND SUBSEQUENT FERRET SURVEYS

As the mine incrementally progresses north up the valley over the project's 25 year life, approximately 10-12 acres of additional prairie dog acreage would be disturbed each year. Over such a long time period, it is possible, though unlikely, that ferrets could colonize previously cleared prairie dog habitat in Dowe Flats. This suggests the need for additional surveys prior to the small mining advances. However, the intensity of these surveys can probably be reduced from those required for initial clearance surveys based upon (1) the absence of ferret sightings in this part of the state, (2) the proximity of local and extensive urbanization in the Denver Metropolitan Clearance Area (approximately 16 miles south), (3) the absence of ferrets located in Dowe Flats during the 1994 clearance surveys, (4) Dowe

Table 2. Wildlife detected during August 7-19, 1994 surveys for black-footed ferrets in Dowe Flats. Nomenclature follows Armstrong (1972), Hammerson (1982), and Andrews and Righter (1992) .

SPECIES	SURVEY AREA ^a		
	1	2	3
Woodhouse's Toad	•		
Prairie Rattlesnake	•	•	•
Killdeer		•	
Mourning Dove	•	•	•
Great Horned Owl	•	•	•
Common Poorwill	•		•
Common Nighthawk		•	•
Horned Lark		•	
Black-billed Magpie		•	
Northern Mockingbird	•		
Western Meadowlark	•		•
Blue Grosbeak			•
Vesper Sparrow	•	•	•
Lark Sparrow	•	•	
Western Pipistrelle	•		
Big Brown Bat	•		•
Desert Cottontail	•	•	•
White-tailed Jackrabbit		•	•
Black-tailed Jackrabbit	•	•	
Olive-backed Pocket Mouse	•	•	•
Deer Mouse	•	•	•
Coyote	•	•	•
Raccoon			•
Badger		•	•
Striped Skunk			•
Mule Deer	•	•	•
Domestic Cow	•	•	
Domestic Cat		•	•

Flats representing the vast majority of habitat within the local complex where any ferrets should have gravitated, and (5) the lack of any nearby, sizeable prairie dog towns that would likely constitute a ferret emigration source for Dowe Flats. Therefore, prior to any disturbance associated with incremental mining advances, a suitable ferret survey would be conducted on the impact area and within a surrounding 200m buffer area. Protocol for the 2 survey methods are outlined below.

5.4.1 SUMMER SURVEYS

Nocturnal surveys are intensive and would be conducted over 3 consecutive nights. The USFWS will be contacted prior to these surveys and familiarized with the project and Southwestern's ferret survey protocol. The surveys would cover the proposed impact area (e.g., 10 acres) and a surrounding buffer zone of at least 200m. Assuming that the 10 acre mine expansion area is circular (it would actually be rectangular), it would have a radius of 372 feet. Adding the 656 foot (200m) buffer zone would result in a radius of 1,028 feet and a survey area of 76.3 acres. Southwestern proposes that an area this small can be adequately surveyed by 1 certified ferret surveyor (rather than the standard 2 man crew). (Guidelines suggest that a 2 person crew can cover 320 acres per night.)

After 2 of the 3 replications (assuming no ferrets are detected on replications 1 and 2), the USFWS will be contacted for verbal authorization to bulldoze the prairie dogs in the impact area immediately following the third replication with negative results. A report would also be prepared for timely submittal to the USFWS. This would be the most biologically conservative management approach to insure that ferrets would not enter the clearance area between surveys and site disturbance. However, this may, at least initially, be awkward from the USFWS's perspective until a rapport has been developed between the USFWS and Southwestern personnel. The standard approach is to prepare a report following surveys and submit it to the USFWS for their concurrence. This could easily take a month, during which time any ferrets theoretically present in the surrounding area could move into the impact area. If Federal guidelines were applied, mine progression would also be unauthorized during this interval.

5.4.2 WINTER SURVEYS

Subsequent winter ferret clearance surveys are not recommended because of the unreliability of suitable survey conditions at Dowe Flats. An alternative would be to conduct the

nocturnal clearance survey the prior summer, strip topsoil in the impact area, then establish an exclusion barrier around the impact area. Any prairie dogs that entered the exclusion area before site disturbance would be bulldozed during subsequent overburden removal.

If winter surveys are conducted, the buffer zone surrounding the proposed impact area (i.e., 10 acres) would have a 0.5 mile radius. A larger radius can be rationalized because of the extended intervals between surveys and the relative ease (probably totalling only 12 man-hours/replication) of surveying a larger surrounding buffer. The USFWS would be notified and familiarized with the project's ferret protocol before surveys were initiated. This clearance would cover virtually all prairie dog acreage in the valley, depending on the time elapsed since the last plague epizootic. With diurnal surveys there would also be less need to immediately control prairie dogs within the impact area because of theoretical ferret emigration. The USFWS could be contacted following the third replication (with negative results) for verbal authorization to control expansion area prairie dogs, or a report could be prepared and submitted to the USFWS for concurrence before prairie dog control.

5.4.3 TERMINATION OF FERRET SURVEYS

There have been no ferret sightings in this part of the Colorado since at least the early 1950's. Extensive urbanization associated with the Denver Metropolitan Clearance Area, where ferret surveys are no longer required, occurs approximately 16 miles south of the project area. Many of the same development pressures within the clearance area are occurring locally. Dowe Flats represents the vast majority of potential black-footed ferret habitat within the local complex where any ferrets should have gravitated. There are no other nearby, sizeable prairie dog towns that would likely constitute a ferret emigration source for Dowe Flats. The prairie dog towns on reclaimed areas of the existing mine [approximately 2 miles south of the Dowe Flats town] are considered isolated from Dowe Flats by unsuitable habitat, the St. Vrain Creek, and Highway 66. Therefore, since no ferrets were located in Dowe Flats during initial comprehensive clearance surveys, and assuming that no ferrets are located during 2 surveys of mine expansion areas, Southwestern requests that the remainder of the incremental impact areas within their Permit Area containing prairie dogs be considered cleared of the need for further ferret surveys for the remaining life of the mine.

5.4.4 CONTROL OF PRAIRIE DOGS ON RECLAIMED AREAS

Because of the protracted period of mining activity following initial construction clearance surveys, the USFWS (B. Leachman, pers. comm.) has advocated time and site-specific recommendations for ferret surveys on reclaimed lands where prairie dogs are controlled to facilitate vegetative establishment. Two types of reclaimed land will be at issue: (1) reclaimed mined lands and (2) retired and reclaimed agricultural lands. Each land type and recommended protocol is described below.

5.4.4.1 Reclaimed Mining Areas

As mining incrementally advances northward, by approximately 10-12 acres per year, comparable acreages will be reclaimed in a native prairie community behind mining (Southdown 1993a, b). These reclaimed areas, which were just recently active mining areas, will have no prairie dogs on them. However, because of reclamation standards, prairie dogs must be excluded from reclamation until adequate vegetative establishment and bond release. Therefore, immediately following seeding, a visual barrier will be established to exclude prairie dogs to facilitate vegetative establishment. Prairie dogs that cross barriers into reclaimed areas will be routinely controlled by zinc phosphide poisoning or shot without prior ferret surveys (unless ferret surveys for incremental mining advances cover these areas).

5.4.4.2 Retired Agricultural Lands

The Dowe Flats valley bottom has been under various types of agricultural use for the last 120 years. Portions of the Dowe Flats Permit Area are presently in small grain and other agricultural crops. According to Soil Conservation Service (SCS 1975) guidelines, SCS (1985), and Holistic Resource Management (1987 and D. Antonio, HRM, pers. comm.), the soils in these areas should never have been plowed. Southwestern has proposed to retire portions of this agricultural land and restore the native prairie.

Although prairie dogs annually attempt to invade the peripheries of some of these marginal croplands, they are poisoned and plowed under by the lessee several times each year. These areas were covered by summer 1994 construction clearance surveys. However, at present, there is no time frame for retiring these agricultural lands. These lands could be retired the year following clearance surveys, or several years later. No ferret surveys are proposed for

these agricultural lands prior to reclamation efforts. Southwestern proposes that immediately following reclamation seeding, prairie dogs be excluded from these reclaimed agricultural areas with visual barriers. Prairie dogs that cross barriers into reclaimed areas will be controlled by zinc phosphide poisoning or other authorized lethal means at least until the vegetative community can tolerate prairie dog grazing.

5.5 CONCURRENCE

Based on survey intensity over all active and recently active prairie dog habitat in Dowe Flats, on and beyond Southwestern's permit area, it is unlikely that black-footed ferrets were present in the area during the January 27 and August 7-10, 1994 surveys. While the Dowe Flats prairie dog population is part of a larger complex that, theoretically could support a ferret population, other towns in the surrounding complex are relatively small and fragmented. Despite the effects plague may have been having on Dowe Flats prairie dogs at the time of ferret surveys, any ferrets inhabiting this overall complex would most likely have been present in Dowe Flats. Considering the lack of sign during adequately intense surveys when ferrets should have been detectable, and the absence of historic and recent sightings and reports in this portion of Colorado, it is unlikely that black-footed ferrets are present in or around Dowe Flats. Mine development should, therefore, have "no effect" on the black-footed ferret.

Southwestern would also commit to the above prairie dog management/ black-footed ferret survey protocol for the life of the mine. The USFWS is asked for their comments on, and concurrence with, the above surveys and future protocol to insure that Southwestern's mining proposal is not likely to jeopardize the continued existence of the black-footed ferret.

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7.0 APPENDICES

7.1 QUALIFICATIONS OF SURVEY PERSONNEL

RICHARD W. THOMPSON - Survey Leader, Crew 1 Leader Western Ecosystems, Inc.
905 West Coach Road
Boulder, CO 80302
(303) 442-6144

Thompson is a professional wildlife biologist with 17 years of professional experience. He is the president and senior biologist of Western Ecosystems, Inc. and ecological consulting company. He has a B.S. in Wildlife Research (1977) and M.S. in Zoology and Physiology (1981) from the University of Wyoming. He is a Certified Wildlife Biologist through The Wildlife Society. He completed the October 2, 1985 workshop on black-footed ferret survey techniques sponsored by the Wyoming Cooperative Fishery and Wildlife Research Unit, in cooperation with the USFWS. In 1987 he led a nocturnal ferret survey at the Bowles Ave. C-470 Interchange for the Colorado Department of Transportation. Thompson has conducted over 100 ecological studies in Colorado, Wyoming, Arizona, California, Montana, Utah, Washington, Oregon, and Alaska. These investigations were associated with alpine and nordic ski areas, residential and recreational developments, ecotourism, coal, metal, and hard rock mines, synfuel plants, oil shale, oil, and gas developments, reservoirs, transmission lines, pipelines, urban developments, and open space and conservation easements.

JON D. HOLST - Crew 2 Leader 629 S. Whitcomb St.
Fort Collins, CO 80521
(303) 498-0269

Holst is a professional wildlife biologist with a B.S. in Biological Science (1988) and M.S. in Wildlife Biology (1994) from Colorado State University. He is also a graduate of the University of Colorado School of Law. He is currently consulting for Defenders of Wildlife (Washington, D.C.), where he is responsible for implementing a litigation strategy to promote the conservation of biological diversity in the western United States. He is also involved in cooperative efforts with state and federal agencies to promote the conservation and recovery of federally listed threatened and endangered species. He is also consulting for Western Resource Development (Boulder, CO), where he is responsible for coordinating with state and federal wildlife agencies and designing and implementing cost effective sampling methods to detect the presence of rare and sensitive vertebrate species. In July 1994, this work included leading a nocturnal black-footed ferret survey of a project area in Weld County, Colorado.

MICHAEL G. FIGGS - Crew 3 Leader

LREP, Inc.
2635 Mapleton Ave. #77
Boulder, CO 80304
(303) 447-1899

Figgs is the president of Landscape, Resource, Ecosystem Planning, Inc. and has been the environmental coordinator on the Dowe Flats project since 1987. He has extensive ecological experience in Colorado and the western United States, focusing on native prairies and grasslands, old-growth forests, endangered species, raptors, and wetlands. He also participated as a crew member during the diurnal ferret surveys in Dowe Flats.

NANCY LEDERER - Crew Member (Diurnal Surveys)

LREP, Inc. and
The Nature Conservancy
2635 Mapleton Ave. #77
Boulder, CO 80304
(303) 447-1899

Lederer has 16 years of professional experience in the areas of plant ecology, botany, vegetation mapping, wildlife studies, database management, word processing and data entry, and environmental education. She has a B.A. (1973) in Elementary Education from Antioch College and a B.A. (1980) in Environmental Biology from the University of Colorado. She is presently a field botanist/ ecologist with the Colorado Natural Heritage Program, conducting field inventories for rare and sensitive plant species and significant natural communities. She is also co-owner of Landscape, Resource, Ecosystem Planning, Inc., where she conducts botanical and wildlife studies.

SUSAN SPIDLE - Crew Member

1925 Hull St.
Fort Collins, CO 80526
(303) 282-8404

Spidle is a second year veterinary student at Colorado State University, with considerable field experience. She worked as a research technician for the U.S. Forest Service conducting technician surveys, and trapping northern goshawks. She has also worked as an exotics/wildlife assistant at the CSU veterinary hospital.

SARAH TASSE - Crew Member

324 Mapleton Ct.
Fort Collins, CO 80526
(303) 225-9899

Tasse is a Certified Veterinary Technician and a second year veterinary student at Colorado State University. She is presently employed at the Boulder County Humane Society and Wildlife Center. She was an Earthwatch volunteer and studied Przewalski's horse in Holland.

JEFF FIGGS - Crew Member

Figgs is an employee of LREP, Inc. where he has studied falcons and eagles along Colorado's Front Range for 5 years. He has considerable field experience in Colorado, Wyoming, and Utah.

7.2 RESUMES OF SELECTED SURVEY PERSONNEL

RICHARD W. THOMPSON
JON D. HOLST
MICHAEL G. FIGGS
NANCY D. LEDERER

Western Ecosystems, Inc.

Ecological Consultants

905 West Coach Road, Boulder, CO 80302 (303) 442-6144

RESUME

RICHARD W. THOMPSON
February, 1994

CERTIFIED WILDLIFE BIOLOGIST
PRESIDENT

B.S., Wildlife Research, University of Wyoming, Laramie, 1978
M.S., Zoology and Physiology, University of Wyoming, Laramie, 1981

Member: Bat Conservation International
Boulder County Nature Association
Colorado Wildlife Society
International Society of Cryptozoology
The Nature Conservancy
Northern Wild Sheep and Goat Council
Phi Beta Kappa
The Wildlife Society

Mr. Thompson has a strong background in wildlife ecology with related experience in statistics, reclamation, and plant ecology. As principal investigator/ task leader he has provided expert testimony and conducted original wildlife research, baseline and monitoring studies, wildlife impact assessments, biological inventories, threatened and endangered species surveys, wetlands creation, and reclamation and siting projects in Colorado, Wyoming, Arizona, California, Montana, Utah, Washington, Oregon, and Alaska. These investigations were associated with ski area, residential, metal mine, private and municipal, coal, synfuels, oil shale, oil and gas, hard rock, transmission line and urban developments. Methodologies employed have included line and strip transects for songbirds, mist-netting and banding birds and bats, lek counts of grouse, ground and aerial radiotelemetry surveys, small mammal trapping, habitat mapping, pellet transects, nocturnal owl and black-footed ferret surveys, specific surveys for other threatened, endangered, and candidate species, tracking and hair snag surveys, fish electroshocking, benthic macroinvertebrate and periphyton sampling, and aerial surveys for waterfowl, sage grouse, raptors, feral horses, black and grizzly bears, pronghorn, elk, mule and white-tailed deer, moose, caribou, mountain goats, bighorn sheep, and marine mammals. Studies conducted by Mr. Thompson have included taxa in every vertebrate class, in habitats ranging from the low desert to the alpine and arctic tundra.

Mr. Thompson has authored and coauthored 17 peer-reviewed papers on such topics as lynx tracking, mountain goat sodium dynamics, geographic variation in the lambing season of bighorn sheep, coal mine reclamation to enhance fish and wildlife, breeding densities of grasshopper sparrows in Colorado, and the distribution of butterflies and moths in Colorado and Wyoming. He has also prepared several hundred technical reports and wildlife sections of Biological Assessments (BAs), Biological Evaluations (BEs), Environmental Assessments (EAs), Environmental Impact Statements (EISs), and 404 and County Special Use Permits.

Richard W. Thompson - Resume

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Mr. Thompson's broad experience in wildlife ecology was obtained, in part, through work on the following projects:

- o Preparing a BA/BE for an exchange (Jackman) of private lands in San Miguel and Gunnison Counties with the USFS lands outside of Telluride, CO. (1993-present)
- o Preparing a BA for the proposed expansion of Kemmerer Municipal Airport, Kemmerer, WY. (1993-present)
- o Preparing a BA for the proposed expansion of Big Piney-Marbleton Airport, Big Piney, WY. (1993-present)
- o Participating in EEPP, a comprehensive planning project to preserve environmental values around the Town of Eldora, Boulder Co., CO. (1993-present)
- o Addressing wildlife issues and developing a wildlife mitigation plan for the residential replat of Creamery Gulch Ranch, Eagle Co., CO. (1993-present)
- o Developed a mitigation plan and monitored the effects of construction activity around an active Swainson's hawk nest in Thornton, CO. (1993-present)
- o Preparing a BA/BE for a land exchange with the USFS and integrating wildlife values and concerns into a residential development outside Telluride, San Miguel Co., CO. (1993-present)
- o Conducting a fatal flaw assessment for a proposed residential development and ski area in Eagle County, CO. (1992-present)
- o Conducting spring and fall elk migration surveys at Keystone Ski Area, CO. (1992-present)
- o Addressing wildlife issues and preparing a "Living with Wildlife" homeowner's guide and guest's brochure associated with the Keystone Resort Master Plan, Keystone, CO (1992-present)
- o Conducting elk calving surveys and integrating wildlife concerns into the Reservoir at West Buttermilk PUD, Pitkin Co., CO. (1992-present)
- o Conducting wildlife baseline surveys and preparing technical sections for the EIS, BA, and BE on Vail Ski Area's proposed Category 3 expansion. (1992-present)
- o Conducting T&E species and other wildlife baseline surveys and preparing an EIS for Bema Gold Corp.'s proposed gold mine near Yarnell, AZ. (1991-present)
- o Conducting desert tortoise, bat telemetry, and other wildlife surveys, and preparing a BA and BLM EIS for the proposed Oro Cruz Mine, Imperial Co., CA. (1991-present)
- o Conducted a wildlife assessment, prepared a technical report, testified, and prepared a wildlife mitigation plan for the Cottonwood Subdivision near Edwards, Eagle Co., CO. (1991-present)
- o Evaluating big game and other wildlife impacts resulting from subdivision/resort development associated with the Beaver Creek Master Plan, Eagle Co., CO. Representing Vail Associates in the design and implementation of the Beaver Creek Elk Study. (1990-present)
- o Conducting Canada lynx, wolverine, bald eagle, peregrine falcon, and elk monitoring studies associated with the proposed East Fork Ski Area near Pagosa Springs, CO. (1990-present)
- o Representing Pitkin Co. by conducting elk and other wildlife studies, preparing impact assessments, developing and monitoring enhancement and mitigation measures, and testifying regarding proposed residential development on Wildcat Ranch, a 6,500 acre parcel near Snowmass, CO. (1990-present)
- o Conducting annual wildlife monitoring of two wetlands, totalling 20 acres, created as required mitigation by a 404 Permit for the Fairlake Project, Denver and Commerce City, CO. (1988-present)
- o Conducted wildlife fatal flaw analysis and prepared technical wildlife portions of a Special Use Permit and CMLRB application for a proposed minerals mine with wildlife and municipal storage reservoir reclamation options at Dowe Flats, Boulder Co., CO. Ongoing wildlife surveys include burrowing owls, black-footed ferrets, and prairie dogs/ wintering raptors. (1987-present)

1993

- o Conducted baseline wildlife surveys for Monarch Ski Area's proposed expansion and USFS EIS, Chaffee and Gunnison Cos., CO. (1993)

Richard W. Thompson - Resume

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- o Conducted an aerial spring raptor nest survey for the USFS throughout the study area associated with Aspen Highlands Ski Area's proposed, Pitkin County, CO. (1993)
- o Conducted an aerial spring raptor nest survey for the USFS throughout the study area associated with Snowmass Ski Area's proposed Burnt Mountain expansion, Pitkin County, CO. (1993)
- o Incorporated bald eagle habitat values into the design of Gray Ranch, a residential golf course development in Carbondale, Garfield Co., CO. (1993)
- o Prepared wildlife sections of a BA for a hazardous waste remediation project in Riverton, WY. (1993)
- o Conducted a wildlife fatal flaw analysis for a proposed residential development (G-F) in Eagle Co., CO. (1993)
- o Prepared a BA addressing wildlife issues on the Green Mountain Drainage Project for the City of Lakewood, CO. (1993)
- o Evaluated bald eagle and other wildlife values associated with a mining and golf course proposal in Wolcott, Eagle County, CO. (1993)
- o Assessed potential wildlife impacts and integrated elk and deer migration, winter range, and calving concerns into golf course and residential development at Cordillera, Eagle Co., CO. Also prepared wildlife sections of a water augmentation EA, a BA, wildlife sections of 1041 applications for water and sewer pipelines at Cordillera, and a homeowners guide for "Living with Wildlife". (1990-1993)
- o Prepared a BA for the proposed expansion of Dixon Airport, near Baggs, WY. (1993)
- o Integrated wildlife considerations into the design of the Aldasoro Airport Project, residential and light industrial developments around the Telluride Airport, San Miguel Co., CO. (1993)
- o Prepared a BA for the Four Mile Creek property, a proposed subdivision in Boulder, CO. (1993)
- o Integrated wildlife concerns into the design of the Mountain Star PUD, Avon, CO. Conducted a wildlife assessment of Crooked Creek Ranch and prepared a BA/BE for a land trade with the USFS. Also prepared a field guide for Mountain Star residents. (1992-1993)
- o Provided technical wildlife support for the Northern Colorado Water Conservancy District's proposed Southern Water Supply Pipeline, through a number of counties in northeastern Colorado. (1992-1993)
- o Conducted a wildlife impact assessment of Pope John Paul II's 1993 visit to Cherry Creek State Recreation Area, Arapahoe County, CO. (1992-1993)
- o Evaluated the wildlife community and integrated wildlife considerations into the proposed Belle Mead Subdivision, Jefferson CO., CO. (1992-1993)
- o Conducted desert tortoise and bat surveys and prepared a BA for the American Boy Mine, Imperial Co., CA. (1991-93)

1992

- o Evaluated wildlife values of two private parcels in Aspen, CO. (1992)
- o Identified and addressed wildlife issues associated with a proposed club on a private inholding at Vail Ski Area. (1992)
- o Prepared wildlife sections for the proposed Pirnie mine, Eagle Co., CO. (1992)
- o Conducted wildlife surveys and provided BLM permitting guidance for Newsboy's proposed gold mine, Yavapai Co., AZ. (1992)
- o Conducted surveys and documented wildlife use and concerns on the Golden Eagle project area, a proposed gold mine, Mohave Co., AZ. (1992)
- o Prepared a baseline conditions report for the 510 acre Elbert-Austin Ranch, Clear Creek Co., CO, for the donation of a conservation easement to the American Farmland Trust. (1992)
- o Represented Southdown in a lawsuit regarding the Dowe Flats project, a proposed hard rock mine with wildlife and municipal storage reservoir reclamation options, Boulder Co., CO. (1992)
- o Prepared wildlife mitigation plan for Creamery Gulch, a residential development in Edwards, Eagle Co., CO. (1992)

Richard W. Thompson - Resume

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- o Identified and addressed wildlife concerns for the Aspen Glen PUD, Garfield Co., CO and testified in the County planning process. (1992)
- o Conducted the wildlife baseline study and prepared the wildlife impact assessment for the USFS EIS associated with Plexus Inc.'s proposed Bornite mine on the west slope of the Oregon Cascades. (1991-92)
- o Integrated wildlife concerns into, and testified at City hearings for, the proposed Pinnacle subdivision and golf course, Estes Park, CO. (1991-92)
- o Addressed wildlife issues associated with a 404 Permit for residential development of a wetlands in Cherry Creek, CO. (1991-92)
- o Prepared wildlife sections of a BLM EIS for the Sanchez Copper Mine near Safford, Graham Co., AZ. (1991-92)
- o Conducted wildlife surveys for Cypress Minerals' proposed Verdstone gold mine near the Kofa Natl. Wildlife Refuge, AZ. (1991-92)
- o Evaluated wildlife impacts for a Larimer Co. Special Use Permit associated with American Honda's proposed school near Estes Park, CO. (1991-92)
- o Prepared wildlife and fisheries sections of a USFS EIS for Amoco's coal-degas expansion in the H.D. Mountains of southwestern Colorado. (1989-92)
- o Prepared wildlife sections of the Colorado Highway Admin. EA for widening 17 miles of Colorado Highway 85 in Douglas Co. (1989-92)
- o Identified and addressed wildlife issues associated with the Flatiron-Erie transmission line EIS for the Western Power Administration. (1986-92)

1991

- o Conducted wildlife surveys for a conservation easement on the 320 acre Welch property, Boulder Co., CO, to be donated to the Boulder County Nature Assn. (1991)
- o Evaluated wildlife impacts associated with proposed development in a montane wetland adjacent to Grand Lake, Grand Co., CO. (1991)
- o Conducted wildlife assessment for permitting a silver mine on the east slope of California's Sierra Nevada mountains, Alpine Co. (1991)
- o Conducted wildlife baseline study for the USFS EIS associated with the proposed expansion of Breckenridge Ski Area, Summit Co., CO. (1991)
- o Assessed impacts to elk and other wildlife and testified for a proposed subdivision in Castle Pines Village, Douglas Co., CO. (1991)
- o Prepared wildlife analysis and related documents for the proposed American Honda Gold Lake School near Ward, CO, for a Boulder Co. Special Use Permit and a USFS Small Tracts Act Application. (1990-91)
- o Conducted baseline wildlife study for a BLM EA associated with a proposed open-pit gold mine at Hope Butte, Malheur Co., OR. (1990-91)
- o Prepared wildlife portions of the Biological Assessment for the proposed expansion of the Lowry Landfill, Arapahoe Co., CO. (1989-91)
- o Prepared a 404 Permit application for a six acre wetland along Massey Draw, Jefferson Co., CO. (1987-91)

1990

- o Conducted wildlife assessment for private club development near Vail Ski Area, Eagle Co., CO. (1990)
- o Presented seminars on minimizing oil and gas development and operational impacts on wildlife to employees and contractors of Amoco Production Company. (1990)
- o Conducted a small mammal trapping survey on the Allegra-Collister Nature Preserve, a foothills riparian corridor in Boulder Co., CO, donated to the Boulder County Nature Assn. (1990)
- o Evaluated potential wildlife impacts associated with proposed base area and mountain developments at Beaver Creek Ski Area, Eagle Co., CO. (1990)
- o Assessed wildlife impacts associated with the expansion of National Center for Atmospheric Research facilities in Boulder, CO. (1990)
- o Conducted a wildlife assessment for a proposed golf course/ nordic ski area development for the Town of Frisco, CO. (1990)
- o Evaluated wildlife use, assessed impacts, and integrated big game and other wildlife concerns into the proposed 1,550 acre Aldasoro Ranch, Telluride, CO. (1990)

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- o Prepared documentation for the Evans Ranch Preservation Association to donate a conservation easement on the 3,245 acre Evans Ranch, Clear Creek Co., CO, to the American Farmland Trust. (1990)
- o Integrated big game concerns into the proposed Ruedi Shores Subdivision, Eagle Co., CO. (1990)
- o Prepared a threatened and endangered wildlife species assessment for a large, proposed reservoir site in Gunnison Co., CO. (1990)
- o Prepared threatened and endangered species assessments for two proposed gold mines in eastern Oregon. (1990)
- o Delineated and evaluated impacts to wildlife habitats of special concern for the Eas, EIS, and Biological Assessments associated with Western's upgrading of the 115/230 kV Flatirons-Gunbarrel transmission line, Larimer, Boulder, and Weld Counties, CO. (1987-90)

1989

- o Prepared wildlife sections of a 404 Permit for a commercial development in the Denver Tech Center. (1989)
- o Prepared a preliminary assessment of wildlife resources and management strategy for two private ranches totaling approximately 26,000 acres in Eagle Co., CO. (1989)
- o Conducted a Canada lynx survey on existing and future expansion areas of Vail Ski Area, CO. (1989)
- o Conducted the wildlife, aquatic biology, and fisheries baseline surveys for the USFS EIS associated with U.S. Borax's/Noranda's proposed metals mine in the Cabinet Mountains, MT. (1988-89)
- o Created 20 acres of wetlands at two Denver locations for 404 Permit mitigation associated with the Fairlake Project. (1988-89)

1988

- o Assessed big game impacts and incorporated mitigation measures into the design of the Storm-Lipton 200 acre Subdivision near Telluride, CO. (1988)
- o Provided expert testimony on big game impacts associated with Vail Ski Area's 1988 water and sewer expansion. (1988)
- o Conducted the wildlife baseline study and prepared technical sections of the USFS EIS associated with the proposed Quail Mountain Ski Area near Leadville, CO. (1987-88)
- o Provided expert testimony in the proposed Wolf Creek Valley and East Fork Ski Area appeals, Mineral and Archuleta Counties, CO. (1987-88)
- o Prepared the Biological Assessment for the new 230 Kv Public Service Company of Colorado's Ault-St. Vrain transmission line. (1987-88)

1987

- o Prepared the EA, conducted nocturnal black-footed ferret surveys, and prepared the Biological Assessment for the Bowles/C-470 Interchange, Jefferson Co., CO. (1987)
- o Assessed seasonal big game impacts associated with the expansion of base area facilities and the cross country trail system at Lake Eldora Ski Area near Nederland, CO., for a Boulder Co. Special Use Permit Application. (1987)
- o Conducted the wildlife permitting studies and prepared the Eas for two Echo Bay gold mines in northeastern WA. (1987)
- o Evaluated the effects and testified on Vail Ski Area's proposed snowmaking expansion on seasonal elk and deer use. (1987)
- o Prepared a Canada lynx management plan to minimize lynx habitat impacts resulting from the proposed expansion of Vail Ski Area. (1986-87)
- o Prepared the ecological portions of the 404 Permit and incorporated wildlife considerations into the design of a wetlands mitigation area for the Eastbrook Property, Aurora, CO. (1986-87)

1986

- o Prepared wildlife portions of the Cherry Creek Vista 404 Permit for proposed subdivision development adjacent to the Cherry Creek State Recreation Area, Arapahoe Co., CO. (1986)

Richard W. Thompson - Resume

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- o Conducted the wildlife inventory of several six-lane highway corridor alternatives through Cherry Creek State Recreation Area, Arapahoe Co., CO. (1986)
- o Conducted the wildlife portion of an EA in Rocky Mountain National Park to evaluate impacts associated with construction of a dam and penstock ROW to an existing hydroelectric facility in Boulder, Grand, and Larimer Counties, CO. (1986)
- o Evaluated the wildlife impacts from wetlands alterations proposed by the City of Aurora, CO, and incorporated enhancement features into areas reclaimed/established for wetlands mitigation. (1986)
- o Evaluated critical elk and deer winter range on a proposed residential development tract in Pitkin Co., CO. (1986)
- o Prepared the ecological portions of the 404 Permit and designed wetlands/wildlife mitigation areas for the Fairlake Project, Denver, CO. (1986)
- o Conducted a two-year Bobolink research project on Boulder, CO Open Space. (1985-86)
- o Conducted the wildlife baseline study and prepared wildlife sections of the USFS EIS for the proposed East Fork Ski Area near Pagosa Springs, CO. (1985-86)
- o Conducted elk and deer migration and calving/fawning studies on the existing and proposed expansion areas of Vail Ski Area, CO. (1985-86)
- o Conducted the wildlife assessment and prepared wildlife sections of the USFS EA for the proposed expansion of Vail Ski Area. (1985-86)
- o Conducted a three-year breeding bird study for the City of Boulder, CO documenting bird use of habitats in a 15,000 acre Open Space System. (1984-86)

1985

- o Prepared the wildlife portions of the USFS EA for the proposed Piedra River trail realignment, Hinsdale and Archuleta Counties, CO. (1985)
- o Designed and supervised the installation of waterfowl islands, wetlands, fishery structures, and other wildlife enhancement features associated with the Forest Lakes Development, El Paso Co., CO. (1984-85)
- o Conducted the wildlife assessment of the proposed Greenwood Country Club site, Denver, CO. (1984-85)

1984

- o Collected baseline vegetation data at the Eagle Butte Coal Mine, Campbell Co., WY. (1984)
- o Collected baseline breeding bird and big game data for the Two Forks EIS, a proposed dam on the South Platte River, CO. (1984)
- o Prepared the wildlife portion of the Forest Lakes 404 Permit and mitigation Plan and established wetlands in conjunction with the construction and expansion of four reservoirs impounding 2400-acre feet of water in El Paso Co., CO. (1984)
- o Conducted the City of Boulder EA for the development of the McKenzie Property, Boulder, CO. (1984)
- o Participated in an OSM wildlife research project evaluating the efficacy of terrestrial, wildlife-oriented enhancement practices at four surface coal mines in Wyoming and Montana. (1982-84)

1983

- o Prepared the wildlife portion of the EA for Burnt Mountain, the expansion of Snowmass Ski Area, CO. (1982-83)
- o Conducted a sage grouse telemetry study for a proposed synfuels plant in northeastern Wyoming. (1982-83)

1982

- o Conducted wildlife baseline study and prepared portions of the WDEQ Industrial Siting Permit Application for the proposed Hampshire Energy synfuels plant in northeastern Wyoming. (1981-82)

Richard W. Thompson - Resume

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- o Supervised, edited, and coauthored three reclamation handbooks on practices used to protect and enhance fish and wildlife on coal-mined lands in North Dakota, Wyoming, Montana, Colorado and Utah. (1981-82)

1977-1981

- o Developed the wildlife section of a supplemental reclamation plan for a hard rock quarry near Colorado Springs, CO. (1981)
- o Conducted wildlife baseline surveys for a proposed oil shale project in north-eastern Utah. (1981)
- o Investigated 27 areas ecologically sensitive to oil spills along the entire Alaskan Beaufort Sea coast. (1981)
- o Designed supplemental reclamation plan for a coal mine in west central Colorado. (1981)
- o Conducted wildlife feasibility study for a proposed oil shale project in north-western Colorado. (1981)
- o Conducted a four-year study of the ecology and physiological ecology of Rocky Mountain goats in the Eagles Nest Wilderness, CO. (1977-81)

JON DAVID HOLST
629 S. Whitcomb St.
Fort Collins, CO 80521
(303) 498-0269

EDUCATION

Colorado State University

Master of Science in Wildlife Biology, December 1994
Course Concentration: Design and Analysis of Environmental Studies

Honors and Activities:

- * Guest Lecturer on Environmental Law
- * Graduate Research Stipend

University of Colorado School of Law

Juris Doctor, Awarded May 14, 1991
Course Concentration: Natural Resources/Environmental Law

Honors and Activities:

- * Homer H. Clark Academic Scholarship
- * Environmental Law Society

Colorado State University

Bachelor of Science in Biological Science, Awarded *With Distinction* May 14, 1988
Course Concentration: Organismal Biology, Ecology

Honors and Activities:

- * Dean's list
- * Phi Kappa Phi National Honor Society
- * Golden Key National Honor Society
- * Outstanding College Students of America

EXPERIENCE & ACCOMPLISHMENTS

Private Consulting

January 1994-Current

Defenders of Wildlife, Washington, D.C.

Duties:

* I am responsible for implementing a litigation strategy to promote the conservation of biological diversity in the western United States. In addition, I am involved in cooperative efforts with state and federal agencies to promote the conservation and recovery of federally listed threatened and endangered species.

Western Resource Development, Boulder, CO

Duties:

* I am responsible for coordinating with state and federal wildlife agencies and for designing and implementing cost effective sampling methods to detect the presence of rare and sensitive vertebrate species. I have field experience sampling for a variety of birds, mammals, reptiles, and amphibians.

Graduate Research

January 1992-January 1994

Colorado State University, Department of Fisheries and Wildlife Biology, Ft. Collins, CO

Duties:

* For my graduate research, I completed a two-year study on ungulate migrational movements and movement corridors in an area proposed for extensive residential and recreational skiing development. The study arose out of the United States Army Corp of Engineers' §404 permitting process under the Clean Water Act (CWA), which raised concerns regarding the value of several large sub-alpine wetlands (scheduled for development) as movement corridors for wildlife species using the area. I was responsible for all aspects of the study design, data collection, and data analysis. In addition, I was responsible for supervising all field personnel and coordinating with federal and state agencies.

EXPERIENCE & ACCOMPLISHMENTS (continued)

Natural Resources Law Fellow
 Defenders of Wildlife, Washington, DC

May 1991-January 1992

Duties:

* *The Endangered Species Coalition* - I served as a member of the Coalition's steering committee. The steering committee selected and presented policy issues for discussion at the general meetings of member organizations, and guided discussions on the issues presented. In this capacity, I reviewed and drafted legislative proposals for congressional committee staff, including amendments introduced for the reauthorization of the Endangered Species Act (ESA). In addition, I submitted written testimony to Congress on potential strategies to stem the loss of biological resources, and drafted portions of a bill that would amend the National Environmental Policy Act (NEPA) to preemptively require federal land management agencies to address cumulative biological impacts more comprehensively in land-use planning.

* *The Wetlands Coalition* - As an active member of the policy-making group for the Wetlands Coalition, I briefed congressional committee staff on the existing statutory framework designed to protect wetlands, and analyzed the probable legal and biological impacts of new legislative and administrative proposals to amend existing laws and regulations.

* *Litigation* - As a member of Defenders' legal staff, I participated in all phases of litigation to implement unenforced provisions of the ESA, MMPA, NEPA, CWA, NFMA, FLPMA, NPA, and other federal and state statutes protecting wildlife and wildlife habitat. I was directly involved in preparing the briefs and oral argument for *Lujan v. Defenders of Wildlife*, a global endangered species case heard before the United States Supreme Court. Additional suits were brought to promote gray wolf reintroduction to Yellowstone National Park, establish federal protection for the Louisiana black bear, and prevent wide-spread poisoning of prairie dogs in areas identified for black-footed ferret reintroduction.

Wetlands Planning Representative
 Boulder County Audubon Society, Boulder, CO

January 1991-May 1991

Duties:

* I represented Boulder County Audubon at public meetings regarding wetlands planning and classification within the city of Boulder. As a member of the city's wetlands working group, I worked with city planners, private landowners, and local developers to draft, refine, and implement a new city ordinance to protect Boulder's wetlands.

Legal Intern
 The National Wildlife Federation
 Rocky Mountain Natural Resources Law Center, Boulder, CO

September 1991-January 1990

Duties:

* *Wetlands* - At the Natural Resources Law Center, I researched the science of wetland creation and restoration, analyzing the past performance and future potential of creation and restoration projects as a means for preserving native wetland biological resources and overall net wetland acreage. I reviewed both federal and state regulatory schemes, focusing in depth on the state legislation currently in place in North Dakota and new legislation proposed for Colorado.

* *Public Lands* - I participated in litigation on behalf of the National Wildlife Federation to implement (through NEPA) the ESA, NFMA, FLPMA and other public land management laws protecting natural areas and biological resources. Suits were brought to restrict surface mining operations in grizzly bear habitat, reduce grazing levels in sensitive riparian areas, and prevent game-ranching of exotic species.

EXPERIENCE & ACCOMPLISHMENTS (continued)

Biological Field Technician July 1990-September 1990
The Peregrine Fund, Inc.
World Center For Birds of Prey, Boise, ID

Duties:

* While working for the Peregrine Fund, I conducted habitat surveys and biological inventories along riparian areas in western Montana. I also released and monitored captive-bred Peregrine falcons, and presented educational seminars describing the Peregrine Fund and its mission to Forest Service employees, public school teachers, and science students.

Legal Intern May 1990-July 1990
The Center For Marine Conservation, St. Petersburg, FL

Duties:

* I reviewed endangered species habitat surveys and state-wide population densities in correlation with proposed regulations for habitat protection. Much of my work involved coordinating with personnel from Florida's Department of Natural Resources to strengthen boating regulations and waterway restrictions designed to protect the endangered Florida Manatee. Additional work focused on efforts to protect prime sea-turtle nesting habitat.

Student Attorney September 1989-May 1990
Legal Aid and Defender Program, Boulder, CO

Duties:

* As a student attorney, I drafted pleadings, prepared briefs, and argued motions for trial in civil cases involving domestic relations, property, worker's compensation and immigration.

PUBLICATIONS

Holst, J. 1993, *Federal Lands, Managing for Uncertainty, and the Preservation of Biological Diversity*, The Public Land Law Review, 25 pp.

PROFESSIONAL ASSOCIATIONS

The Society for Conservation Biology
The Colorado Wildlife Society
The Colorado Water Congress

RECENT CONFERENCES

The 1992 South Platte Conference - *Defining Ecological and Sociological Integrity Under the Clean Water Act*
The 1992 Colorado Water Law Conference (CLE) - *Moving Water in Colorado*
Colorado Water Congress Workshop (CLE) - *Wetlands Protection and Water Development*

INTERESTS

Outdoor Fitness, Fishing, Mountaineering, Skiing, Scuba, Journalism

MICHAEL G. FIGGS
Ecologist and Planner
LREP, Inc.

Professional Interest

Since 1980 I have developed, from an avocation in natural and cultural history, a professional career in promoting and implementing land and resource planning and management that is consistent with sustainable environmental and ecological practices. I have implemented this interest in both the public and private sectors, and believe that accurate baseline documentation of natural resources and community education are the keys to the successful attainment of this interest.

Qualifications Summary

My natural resource documentation skills were developed during an eleven year period through association and training with professional ecologists, biologists, geologists, and land use planners. These skills include identification of significant natural and historical features, development of preservation and management plans for significant natural and historical features and analysis of impacts of land use and development proposals. These skills have been applied in descending order of emphasis in: Boulder County, Colorado; Northern Front Range in Colorado, State of Colorado, Western United States. Natural features and ecosystems I have worked with include native prairies and grasslands, old growth forests, endangered species, birds of prey, and wetlands.

Experience and Education

I have developed numerous baseline inventories, the results of which have been incorporated into regulatory agency planning processes. Examples include an ongoing eleven year study of nesting golden eagles, prairie falcons, and peregrine falcons in the Colorado Front Range. Information from this study has been incorporated into the Colorado Division of Wildlife RIS mapping, the Environmental Resources Element of the Boulder County Comprehensive Plan, and the City of Boulder planning processes. This study has been a key element in the resolution of conflicts between recreational rock climbing and the protection of nest sites.

I have routinely worked on the organization and evaluation of governmental comprehensive plans, including the update of the Environmental Resources Element of the Boulder County Comprehensive Plan, the Open Space Element of the City of Boulder Comprehensive Plan, and the Land and Resource Management Plan, Arapaho/Roosevelt National Forest.

Representing private interests, I have written numerous referrals on land use proposals, including the City of Boulder Lakewood Water Line to the City of Boulder, and Boulder Reservoir expansion to the City of Boulder and Northern Colorado Water Conservancy District, and Conda Quarry on Eldorado Mountain to the Boulder County Land Use Department.

I have conducted numerous breeding bird censuses in varied habitat types in Colorado, and monitored year-round bird populations in many areas of Boulder County.

Through my work with private land trusts, I have developed viable alternatives to the public acquisition of private lands that have significant natural and cultural history resources in the State of Colorado.

Organizational Affiliations and Leadership Experience

Boulder Audubon Society, Board of Directors
Boulder County Nature Association, Board of Directors, Vice President, President
Boulder County Land Trust, Executive Director, Board of Directors
Colorado Bird Atlas Partnership
Colorado Coalition of Land Trusts, founder
Colorado Field Ornithologists
Foothills Audubon Club
Plan Boulder County
The Nature Conservancy

History

1993. Coordinator of Environmental Studies and Boulder County Governmental Affairs, Southwestern Portland Cement Co.

Field Assistant for Western Ecosystems, Inc. to perform bird studies for Vail Ski Area Expansion Federal Environmental Impact Study.

Member of Boulder County Mountain Ecosystem Planning Enterprise.

Project Planner for the Eldora Civic Association to develop baseline natural and cultural resource inventory suitable for comprehensive planning purposes.

1992. Recognized in Boulder District Court as an expert witness on natural resource and planning affairs.

1991. Appointed by the City of Boulder Open Space Board of Trustees to serve as a member of the Open Space Department Productivity Study Committee.

Field Assistant for Western Ecosystems, Inc. to perform breeding bird study of Breckenridge Ski Area Expansion Federal Environmental Impact Study.

1989. Completed Resource Inventory and Description, At Last Ranch, Archuleta County, Colorado for the purpose of fulfilling the Internal Revenue Service's requirements with respect to charitable donations of property.

Co-founder of the Colorado Coalition of Land Trusts.

1988. Contracted by the Boulder County Nature Association Board of Directors for the position of Executive Director of the Boulder County Land Trust.

1985 to 1988. Participant in the Colorado Bird Atlas Partnership.

1985. Participant in the Boulder County Nature Association Owl Study (included boreal, saw-whet, pygmy and flammulated owls.

1983 to 1986. Designed and conducted breeding bird censuses in "willow carrs", which are special mountain wetlands that provide significant habitat for migrating neotropical bird species.

Organized update of the Environmental Resources Element of the Boulder County Comprehensive Plan.

1982 to present. Co-coordinated and did extensive field work for the Cliff Nesting Birds of Prey Study in the Colorado Northern Front Range, Boulder County Nature Association.

1981 to present. Co-founder of and regular participant in the Indian Peaks Four Season Bird Counts sponsored by the Boulder County Nature Association.

1980 to 1985. Became a regular contributor to the Boulder County Wildlife Inventory, sponsored by Boulder Audubon Society.

1979 to 1981. Conducted breeding and winter censuses of dippers on North St. Vrain Creek.

Publications and Reports

Figs, M. Referral to Robert Henke Engineering-Science, Inc. regarding the status of nesting golden eagles in relation to the City of Boulder Lakewood Pipeline Environmental Impact Statement. 1990.

Figs, M. Referral to Dave Weber, Colorado Division of Wildlife, Department of Natural Resources, regarding a golden eagle nest site in relation to the proposed Goltra quarry in Clear Creek Canyon. 1990.

Figs, M. 1989. Explanation of Designation Boundaries, Proposed Wild and Scenic River, North St. Vrain Coordinating Subcommittee. Unpublished report by North St. Vrain Advisory Committee.

Hallock, D., N. Lederer and M. Figs. Ecology, Status and Avifauna of Willow Carrs in Boulder County. 1986. Boulder County Nature Association Publication No. 4. 38 pp.

Figs, M. and N. Lederer. Wildlife Observations on Eldorado Mountain, 1983-1985, with Special Emphasis on Cliff Nesting Birds of Prey. 1985. Referral to Boulder County Land Use Department in response to the Conda mine land use proposal.

Galatowitsch, S. and W. Baker. Edited by M. Figs and N. Lederer. Boulder Tall Grass Prairies. 1985. Boulder County Nature Association Publication No.3.

Figs, M., and N. Lederer. Status of Nesting Golden Eagles in Boulder County and Adjacent Areas of the Front Range in Colorado. 1985. Boulder County Nature Association Publication No. 2. 16 pp.

NANCY D. LEDERER
BIOLOGIST

Professional Interest

Identification and conservation of native flora, vegetation and wildlife.

Qualifications Summary

Sixteen years of experience in the areas of plant ecology, botany, vegetation mapping, wildlife studies, database management, computer word processing and data entry, and environmental education.

Professional History

Present. Field Botanist/Ecologist with Colorado Natural Heritage Program. Conduct inventory for rare and sensitive plant species, and significant natural communities. Work includes field surveys, data collection and processing, plant taxonomy. 1994 projects were on Arapaho National Forest and U.S. Air Force Academy. Also half owner of consulting company Landscape, Resource, Ecosystem Planning, Inc., conducting botanical and wildlife studies, assisting with report writing, business management, and bookkeeping.

1993, Winter. On contract with Colorado Natural Heritage Program to write descriptions of rare plants for a book to be published on threatened, endangered, and sensitive plant species of Pike and San Isabel National Forests.

1991-1993. Assistant Riparian Ecologist, The Nature Conservancy. Assisted with inventory and classification of riparian plant communities in the San Miguel, Dolores, White, and Colorado river watersheds. Work included researching existing knowledge of vegetation types, mapping plant communities, selecting and sampling representative plots, identifying rare and undisturbed plant communities, entering data, and assisting in the analysis and interpretation of data.

1982-1990. Professional Research Assistant, Institute of Arctic and Alpine Research. Assisted with plant ecology field and laboratory work for ecosystem studies in the Colorado alpine and Alaskan arctic. Work included vegetation mapping, plant cover and productivity sampling, plant taxonomy, soils analysis, data entry, editing manuscripts, obtaining and cataloging the reference collection, digitizing and editing GIS files, and supervising technicians.

1982. Field Assistant, University of Alaska. Assisted a graduate student in her thesis project of studying vegetation characteristics of muskox habitat in the Arctic National Wildlife Refuge. Work included arranging logistics for and maintaining the 3-month field camp, vegetation sampling, plant taxonomy, and muskox behavior observations.

1980-1981. Wildlife and Plant Ecology Technician, Stoecker-Keammerer & Associates Ecological Consultants. Assisted in baseline vegetation and wildlife studies for reclamation of land to be strip-mined. Field work included vegetation productivity studies (clip harvests), bird censuses, small mammal live-trapping, and big game pellet counts.

1979-1980. Wildlife Technician, Denali National Park, Alaska. During the summers between college semesters, I located and monitored critical wildlife habitat such as raptor nests and wolf dens. Assisted in censuses of Dall sheep and ground squirrels, and in moose behavior observations.

1976-1978. Forestry Aide, USDA Forest Service. Worked 10 months during this period in various seasonal positions: backcountry ranger, Youth Conservation Corps crew leader, pine beetle tree marker, and office clerk.

Other Experience

I have been co-coordinating a study of cliff-nesting raptors since 1983 for the Boulder County Nature Association (BCNA). This involves field work locating and monitoring nests, supervising volunteers, compiling data, and participating in formulation of protective management plans. I participate regularly in BCNA's four-season Indian Peaks bird counts and winter raptor censuses, as well as conduct breeding bird censuses for the National Audubon Society's Breeding Bird Census program. I am active in a BCNA project that is experimenting with various methods of establishing native prairie. I have assisted in writing and producing BCNA's newsletter and publication series. I have attended one-day workshops given by the Colorado Native Plant Society on taxonomy of willows, sedges, grasses, gentians, mustards, and composites. In 1989 I served as secretary of the Colorado Native Plant Society, and with other members of the Society, collected and identified the voucher collection of plants from the City of Boulder's Tallgrass Prairie Preserve.

Education

1973 B.A. Elementary Education, Antioch College, Yellow Springs, Ohio
1980 B.A. Environmental Biology, University of Colorado, Boulder
1981 Continuing Education classes in Wildlife Management, Colorado State
 University, Fort Collins.

Publications

Landscape, Resource, Ecosystem Planning, Inc. 1994. Eldora Environmental Preservation Plan: Environmental Study Report. Prepared by Mike Figgs, Robert Ripple, and Nancy Lederer (General Editor, and author of Vegetation and Soils chapter) for Eldora Civic Association and Boulder County Nature Association.

Kittel, G.M. and N.D. Lederer. 1993. A preliminary classification of the riparian vegetation of the Yampa and San Miguel/Dolores river basins. Final report to Colorado Department of Health and Environmental Protection Agency, 96 p. plus appendices.

Walker, D.A., E.F. Binnian, B.M. Evans, N.D. Lederer, and M.D. Walker. 1990. Terrain and vegetation of the DOE R4D research site, Imnavait Creek, Alaska. Holarctic Ecology.

Walker, D.A., P.J. Webber, E.F. Binnian, K.R. Everett, N.D. Lederer, E.A. Nordstrand and M.D. Walker. 1987. Cumulative impacts of oil fields in northern Alaskan landscapes. Science, 238:757-761.

Walker, D.A., P.J. Webber, M.D. Walker, N.D. Lederer, R.H. Meehan, and E. Nordstrand. 1986. Use of geobotanical maps and automated mapping techniques to examine cumulative impacts in the Prudhoe Bay oil field, Alaska. Environmental Conservation, 13:149-160.

Hallock, D., N. Lederer and M. Figgs. 1986. Ecology, status and avifauna of willow carrs in Boulder County. Boulder County Nature Association Publication No. 4, 38 p.

Figgs, M. and N. Lederer. 1985. Status of nesting golden eagles in Boulder County and adjacent areas of the Front Range in Colorado. Boulder County Nature Association Publication No. 2.

7.3 LECTURE HANDOUT TO SURVEY PERSONNEL

Western Ecosystems, Inc.

Ecological Consultants

905 West Coach Road, Boulder, CO 80302 (303) 442-6144

DOWE FLATS - BFF SURVEY PROTOCOL - LECTURE TO FIELD CREWS August 7, 1994

1. Sign up sheet: previous BFF survey exp.?
2. Remuneration
3. Site Orientation
4. Southwestern's Mine Proposal
5. Black-footed ferrets

a. Life History Info

- Fed. & State End. sp.; Nocturnal weasel, 0.65-1.4 lbs., 20-22" w 5" tail. (Photo).
- Close assn. w PDs: food & shelter. Prey 90% PDs, 10% mice et al.
- PDs 1/600 historic distribution; BFF never common anywhere in its distribution.
- Current BFF distribution; last CO specimen 1942, last credible report in CO 1953.
- BFF activity periods:
 - July-Oct.- period of highest activity
 - nightly peaks: 2000-0000 and 0400-0800 hrs.
 - early Oct.-early Dec.-period of relative inactivity-surveys not conducted
 - Feb.-Mar.-winter surveys (trenching)
- What are you looking for?
 - green eyeshine: 2 "emeralds" about 1' apart.
 - other critters also have green, or green/yellow eyeshine that are present in area: badger, cattle, coyotes, deer, skunks, foxes.
 - other sign: trenching, tracks, skulls/skeletal, etc.- unlikely to be encountered/detected

b. Survey Procedures

- Survey types:
 - Diurnal: Dec. 1-March 31
 - Nocturnal: July 1-Oct. 31
- Dowe Flats Protocol- variation of 1989 USFWS guidelines
 - Continuous dusk to dawn surveys by 3, 2 person crews, each crew has a crew leader (Rick Thompson [Survey Leader], Mike Figgs, Jon Holst)
 - Field crews assemble each night 2000 hrs. (8 PM) at Water Tank to assemble and check equipment, etc.
 - We will be "clearing" entire PD dist. in valley.
 - Each survey crew has a defined survey area (Maps). Survey your area only.
 - Surveys conducted by vehicle (\leq 200m) and on foot.
 - Vehicle:
 - 2 ppl. drive slowly down marked routes looking for ferrets and eyeshine.
 - where PD towns on each side of road, each person sweeps 180° to their side.
 - where PD town only on 1 side, passenger stands in bed of PU, sits in passenger window, or in back seat (depends on side rel. to driver)
 - where tall weeds block view - survey area on foot.
 - Pedestrian:
 - crew walks \leq 100m apart, depending on required width of survey area & # of passes required (w 2 ppl 100m apart, survey width=300-500m).
 - each person sweeps 180° to their side.

DOWE FLATS - BFF SURVEY PROTOCOL - LECTURE TO FIELD CREWS
Page 2

- Data recorded by field crew leaders:
 - name of field crew leader and technician
 - survey area (1-3)
 - route of pedestrian surveys (each person); successive replications don't need to be mapped if similar.
 - beginning/ ending times of each replication, each night
 - amount vehicle/ foot time per replication
 - n replications
 - list of species observed each night of survey
 - number of high interest species observed (e.g., badger, fox, coyote, lion, skunk, snakes, GHO, bobcat, etc.)
 - n hours and light (cp) used on each battery (A-F), each night - for recharge
- Terminate surveys @0545 hours and assemble at Water Tank by 0600 to report survey results and drop off batteries, radios, and notes.

- What to do if you see a ferret?
 - Try to ID animals with binocs
 - Crew advances rapidly to within 50m of animal; 1 person walking in light beam sometimes facilitate close approach.
 - If animal descends burrow, wait for it to reappear.
 - If no reappearance in 10 min., mark burrow w pin flag, move further away, and watch for animal to reappear.
 - If a BFF or European ferret is suspected, call Rick Thompson on radio.
 - Survey crew leader photographs and documents with extensive notes, while technician maintains watch.

c. Plague

- background
 - plague has been in CO since 1940's
 - most ppl. contract via flea bite
 - PD fleas obligates to PDs, nonaggressive; vs. rock squirrel fleas - bite anything
 - PDs usually die in burrow, fleas abandon carcass-move to mouth of burrow & wait for new host to walk by
 - daily flea migration within burrows: near mouth at night; down hole during dry, hot day
 - pathogen a bacteria; *Peromyscus* an endizootic host that maintains plague in environment
- prophylaxis
 - wear boots, long pants; tuck pants in socks
 - apply spray insect repellent to legs, esp. below knees (wash hands after application)
 - avoid burrow mouths
 - shower when you get home
- symptoms
 - appear in 1-6 days
 - not subtle: high fever, nausea, malaise, bubo (large swollen lymph node in area draining bite)
 - if symptoms appear and you suspect plague, contact your doctor or go to emergency room immediately. Tell doctor you have been working in a prairie dog town where plague has been confirmed by health authorities. Plague is treatable with antibiotics if caught early.

DOWE FLATS - BFF SURVEY PROTOCOL - LECTURE TO FIELD CREWS
Page 3

d. Safety

- take plague precautions
- work in teams- contact Thompson by radio if there is a problem
- **STAY AWAKE ON RIDE HOME** - the most hazardous part of the work. Roll down windows, drink tea/ coffee, carpool.
- Spotlights - don't vaporize your partner's retinas. Avoid shining in direction of other field crews. Night blindness. Animals-nocturnal, sensitive eyes-illuminate in edge of beam.

e. Public Relations

- The BC Sheriff's Dept., Town of Lyons Police, Boulder County Open Space, and the Colorado Division of Wildlife have all been notified that ferret surveys are being conducted and what they consist of.
- You are working for, and representing, Southwestern. Be courteous.
- If someone stops and asks what you are doing, the Survey Crew Leader should respond that they are part of a field crew conducting wildlife (ferret) surveys for the proposed mine. Volunteer as little information as necessary-be brief, you need to finish your work.
- Spotlights - public vehicles, homes, livestock.

QUESTIONS?



Landscape, Resource, Ecosystem Planning, Inc.
2635 Mapleton Ave., #77 • Boulder, CO 80304
(303) 447-1899 • FAX (303) 545-9415

RECEIVED

NOV 22 1994

LAND USE DEPT.

November 22, 1994

Gary Goodell
Boulder County Building Department
PO Box 471
Boulder, CO 80306

Re: **Building Permit for Demolition, Dowe Flats Project, Permit No. BP-94-2403**

Dear Gary,

Enclosed for your review is one copy of Brenner Place Survey Report, Dowe Flats Vicinity, Boulder County Colorado. The report describes in detail the historic significance of the structures that Southdown, Inc., requests to demolish as a part of the haul road construction for the Dowe Flats Project.

This report was prepared by Dr. Steven F. Mehls, Ph. D., with Western Historical Studies, Inc. Dr. Mehls is the Dowe Flats Project Historian. The report presents the results of a Class III level survey, with the appropriate Colorado Historical Society, Office of Archaeology and Historic Preservation (OAHP) forms completed. We expect to receive eligibility determinations from OAHP within two weeks.

I have delivered copies to all listed below. I have also delivered an additional five copies to Camela Laughlin for distribution to HPAB.

If you have any questions or comments, please call me (at the letterhead number) or John Lohr at the cement plant (823-6685). Dr. Mehls can be reached at 666-6208.

Sincerely,

A handwritten signature in blue ink that reads "Mike".

Michael G. Figgs
Dowe Flats Environmental Studies Coordinator

encl. permit application, report and appendix

cc: **Rosi Koopman**, Dowe Flats Case Manager, Boulder County Land Use Department
Camela Laughlin, Boulder County Land Use Department
Rich Koopman, Boulder County Parks and Open Space Department
John Lohr, Plant Manger, Southdown, Inc.
Paul Banks, AGRA Earth and Environmental, Inc.
Steven Mehls, Western Historic Surveys, Inc.
Laverne Johnson, Lyons Redstone Museum

**BRENNER PLACE
SURVEY REPORT
DOWE FLATS VICINITY
BOULDER COUNTY, COLORADO**

Submitted to
Southdown, Inc.,

November 15, 1994

Submitted by
Western Historical Studies, Inc.

1225 Atlantis Ave.

Lafayette, Colorado

Steven F. Mehls, Ph.D., Principal Investigator

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OBJECTIVES

The objectives of this study were to complete the inventory and evaluation at the Class III level of the Brenner Place. This survey is related to and represents a continuation of previous Dowe Flats Cultural Resource Studies. This survey was undertaken by Western Historical Studies, Inc. (WHS), the consultants that have served as the Dowe Flats Project Historians.

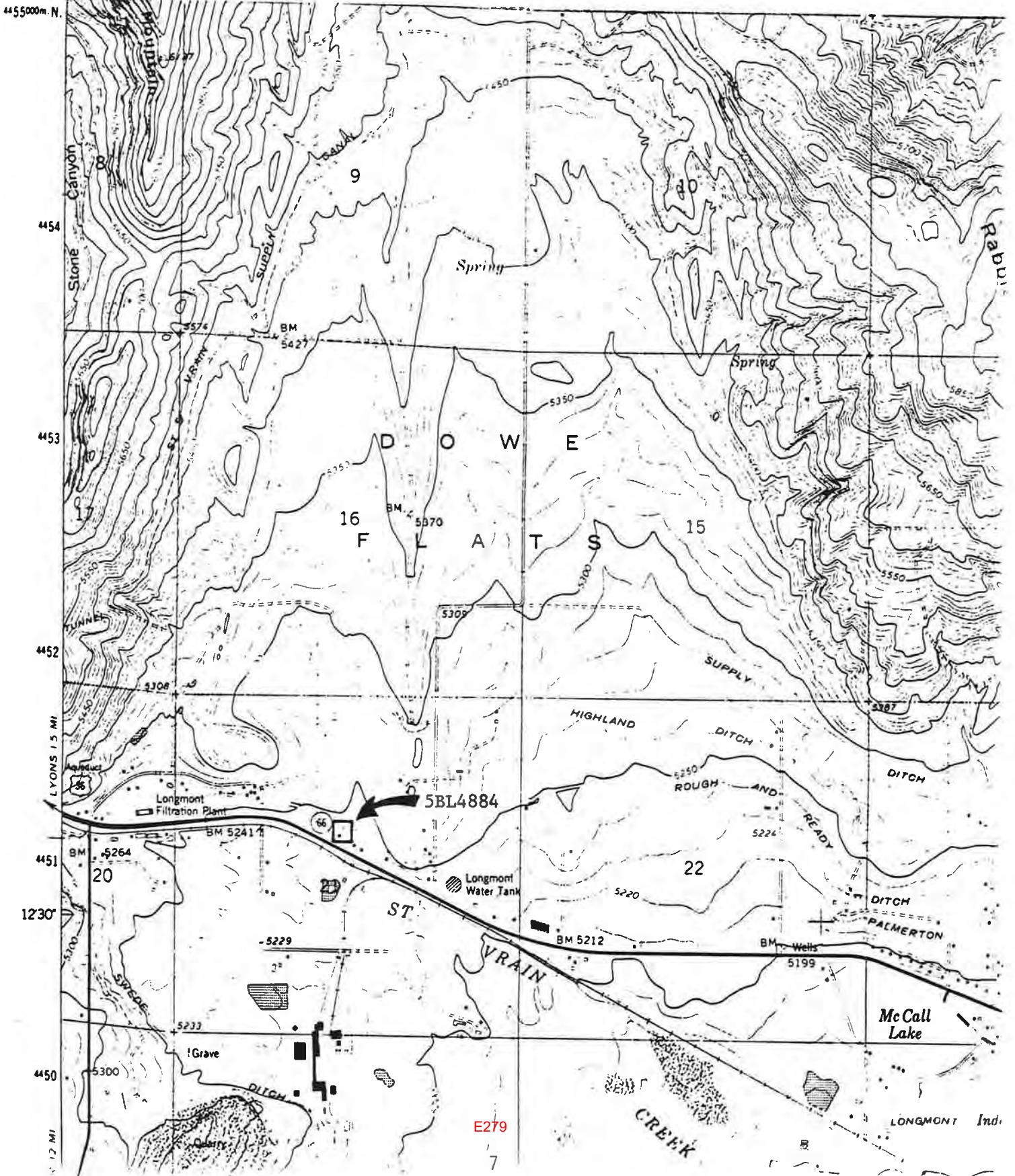
THE SURVEY AREA

The area studied by Western Historic Studies, Inc. (WHS), for this project is a portion of the property owned by Southdown, Inc. in northern Boulder County, Colorado. WHS conducted the survey to support construction of the conveyor and haul road system for Southdown's Dowe Flats quarry. The historical research and contextual background developed earlier (Mehls 1990, 1991) covered the topics of Exploration and Fur Trade, Gold Rush and Early Settlement, Early Agriculture and Ranching Development, Ranching and Farming after 1900, Quarrying and Urban Growth and development and the Great Depression and World War II. The field inventory, completed on November 6, 1994, included five structures on approximately .76 acre contained in Section 21 Township 3N, Range 70W on the Hygiene, Colorado, United States Geological Survey 7.5' map (Figures I and II).

Brenner Place
Lyons Vicinity, Boulder County

5BL4884

Hygiene, Colorado 7.5'



RESEARCH DESIGN

Western Historical Studies, Inc., (WHS), following approved Colorado Office of Archaeology and Historic Preservation procedures, did not prepare a separate research design for this project, but rather used the previously prepared historic context as a study plan for the project. WHS used existing RP3 concerns and previously developed National Register evaluations to assist in preparing the study. These documents identified a number of concerns on the general topic as well as offering guidance for establishing evaluation criteria. This study and its evaluations conform to the principals of the Dowe Flats Cultural Resources Management Plan (Mehls, et al., draft, 1994). It was from those sources that WHS developed the historic context which follows.

METHODOLOGY

Western Historical Studies, Inc., (WHS), approached the project as part of a unified whole, even though the research phase of the project previously was completed. Using research completed on Dowe Flats (Mehls 1990; Mehls, et al., draft, 1994) for the theoretical and contextual background combined with the current survey, the entire package of survey, report and context provided a cohesive whole. Certain procedures were to be taken to reach that point.

This project involved site specific research needed to fulfill the requirements of a Class III level survey under Colorado survey guidelines and applicable Secretary of the Interior standards. Data for documentation and recommendations for the properties was generated. Additional, site specific, information was used during form preparation and survey report writing. Based upon the field inventory and research, recommendations of eligibility were framed.

NUMBER OF RESOURCES RECORDED

The survey recorded five buildings and structures located in the Survey Area. A site file search at the Colorado Office of Archaeology and Historic Preservation found several previously recorded historic resources in the general vicinity of the Survey Area.

THE NATURAL ENVIRONMENT

The region under consideration is approximately .35 acre located east and north of Lyons, Colorado and west of Longmont, Colorado. The survey area is north of County Highway 66. The area is known historically and at the present time as "Dowe Flats." Rabbit Mountain sits east of the Survey Area, to the south is St. Brain Creek, and Indian Mountain sits to the west. The Survey Area is located on the transition from Dowe Flats to the floodplain of St. Brain Creek. The Survey Area has an elevation of approximately 5,240 feet.

The vegetation is primarily lawn grasses and a farm lot of weeds and mud. Pasture lands and shrubs surround the cultivated regions at the margins of the survey Area. South of the survey Area is a riparian zone along St. Vrain Creek.

HISTORIC CONTEXT

The history of the lands that comprise the Dowe Flats Study Area and this Survey Area, is dominated by the evolution of a high plains, rural agricultural lifestyle. Other factors, particularly mining and quarrying, influenced the area's history, but in one way or another the majority of those factors were associated with the area's general rural development. Mining is often viewed as historic Colorado's basic industry. However, agriculture constantly has been the state's most profitable and steady source of income. Within Boulder county, agriculture has been a predominant enterprise despite the variations of altitude and terrain. "No county . . . has so wide a range in altitude within so small an area." (Anon. 1918:78) The eastern part of the county is within the Platte River Valley, is basically level and is excellent agricultural land. The western sections of the county have a rapid rise in elevation to mountain peaks and provides good pasture land. Recent studies identified six historic themes for lands in and near the Survey Area (Mehls, 1990; Mehls et al., 1994). For the Study Area the pertinent historic themes include: 1) Early Agricultural and Ranching Development, 1870-1895 and 2) Ranching and Farming After 1900. These themes are clearly tied to the dominant pattern of land usage for the area (Table I).

Early Agricultural And Ranching Development, 1860-1895

The lands of the St. Vrain valley north of Boulder had, by 1870, already become one of the leading agricultural areas of early Colorado. However, after 1870 that development intensified for a number of reasons including the rapid growth of Denver, Boulder, and the eastern two thirds of Colorado between 1870 and 1893, the

Table I

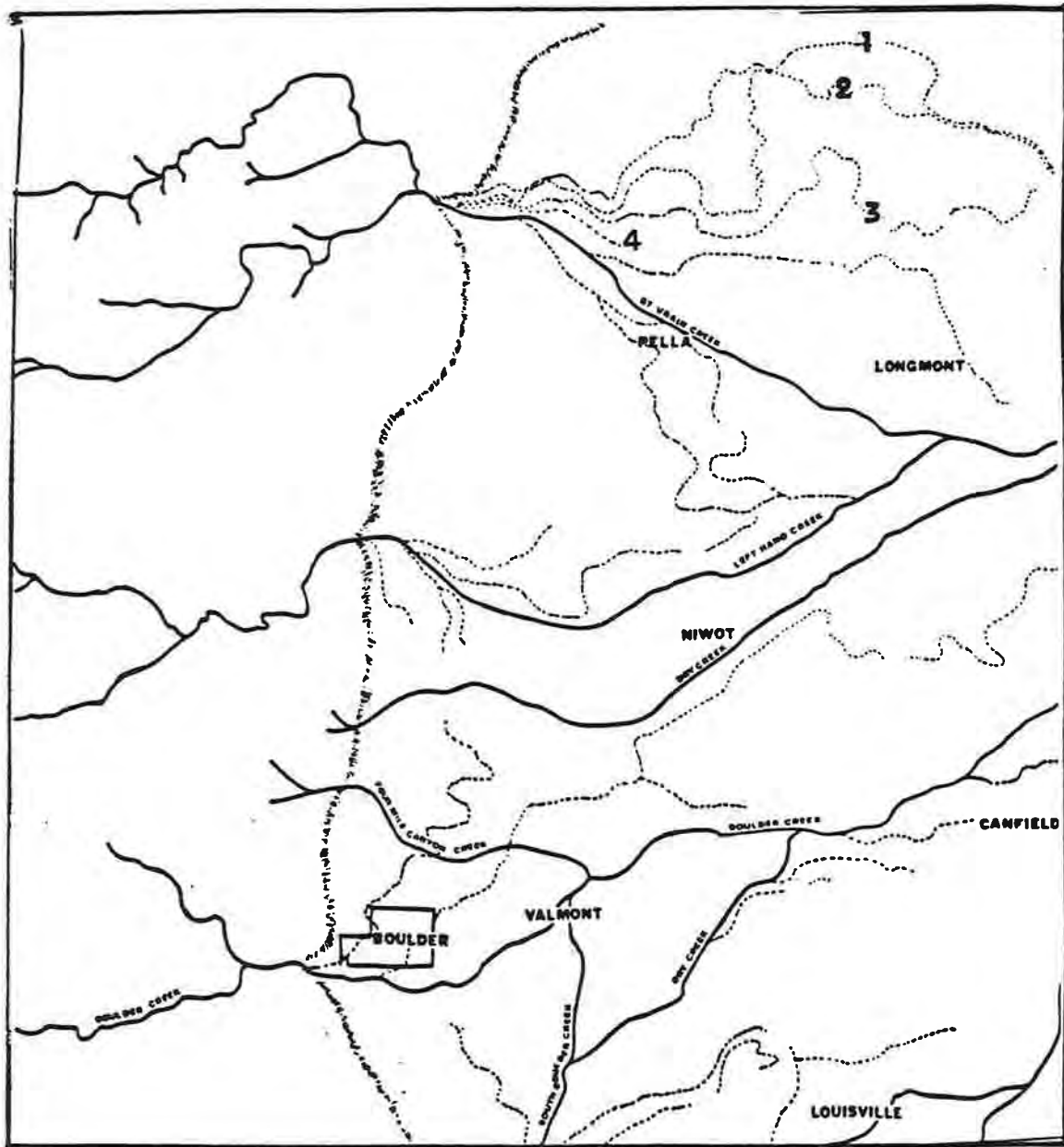
Historic Chronology Applicable to the Dowe Flat Study Area

<u>Tradition</u>	<u>Period/Phase</u>	<u>Date</u>
Euro-American	Exploration & Fur Trade	A.D. 1700 - 1845
	Gold Rush & Early Settlement	A.D. 1858 - 1870
	Early Agriculture & Ranching Development	A.D. 1860 - 1895
	Ranching & Farming After 1900	A.D. 1900 - Present
	Quarrying & Urban Growth & Development	A.D. 1870 - 1900
	Great Depression & World War II	A.D. 1929 - 1945

availability of rail transportation after 1870, and the high food prices being paid by merchants in Colorado's booming mining camps. Those conditions led more and more farmers and ranchers to settle in the region. A final factor, liberal federal land disposal laws, encouraged settlement in Colorado and throughout the West (Athearn 1976:107-119). The area of Dove Flats participated in this agricultural boom of the late nineteenth century with the majority of the land within it passing from federal to private ownership between 1870 and 1900. More specifically, the earliest attempts to homestead land in the general area came during the 1860s but most failed by the end of the decade. Successful settlement did not happen to any large degree until the mid to late 1870s as dozens of cash entry, timber culture and homestead patents were issued between 1885 and the end of 1900 (GLO records v.d.). Much of this reflects spin-off settlement from the Longmont Colony and other group efforts. Also quarrying in the Lyons area stimulated agricultural growth and caused land patenting.

The foregoing brief review of land title activity tends to reinforce previously accepted interpretations of settlement in the region. The first users of the lands were stock raisers who took advantage of the public domain for free grazing lands. They used laws such as the Timber Culture act to claim parcels of land and after a period of time, often once the available forage had been depleted, allowed the claim to revert back to the government. The boom days of open range ranching in northeastern Colorado lasted from the late 1860s until approximately 1888 when severe winters, overgrazing and increased pressures from farmers forced an end to the system and establishment of fenced, more closely managed ranches (Peake 1937:8-27, 271). The stockmen, once the range had been depleted, moved elsewhere and in their wake came the farmers.

Figure III
Irrigation Map of the Study Area



Ditch 1 - Upper Supply

Ditch 4 - Palmerton

Ditch 2 - Highland

Ditch 3 - Rough and Ready

Irrigation Ditches in Boulder County Prior to 1880; From: Dyni, 1989:106,107)

Spurred on by railroad, land company, and even government literature that told of the changes being wrought in the climate, the retreat of the Great American Desert under the plowshare, and easy 10-year credit terms from railroads, hundreds of Midwestern farmers moved to the high plains of Colorado, Nebraska and Kansas. Upon arrival in or near the Study Area would-be settlers found booming markets for their produce, open land to be had for minimal prices and enough moisture to grow crops of corn, wheat and other grains much as they had in Iowa or Illinois. What went unrealized until a few years later was that the Great Plains in general had entered a periodic wet cycle, with above average precipitation which was followed by a dry cycle during the mid 1890s (Mehls 1984b:X:1-2).

One rather unique settlement was Longmont, in the northern section of Boulder county. The Colorado-Chicago Colony, known as the Chicago Colony, was founded in Illinois in 1870. The purpose of the colony was to purchase land and establish a communal living arrangement in the west. The group settled in the St. Vrain Valley near Old Burlington. Longmont was founded by those colonists wanting a temperance society. Longmont and the surrounding area grew quickly. The large number of initial settlers made development of a large irrigation system necessary, (Athearn, 1976:116-228; "Old Burlington interview:253).

The initial success of farmers is also partially attributable to irrigation. Farming using irrigation began almost as soon as the first farmers in southeastern Colorado. It was not until the years after the Civil War that large community irrigation systems began. Until that time short ditches that carried water from streams to low lands were most prevalent. Irrigation on the larger scale was first undertaken near Greeley. Soon, the pattern was successfully

duplicated again and again. By the end of 1860 farmers claimed and appropriated for agriculture South Boulder Creek, Boulder Creek and others, each individual or group building a ditch. These efforts proved to be only the beginning of irrigation along creeks and rivers of Boulder County as future generations built ever larger and more elaborate systems to bring water to the fields, including the Highland Ditch, Palmerton Ditch, Rough and Ready Ditch and the Supply Canal (East Denver Municipal Irrigation District map 1920; Burney 1989:3).

The Supply Ditch, the Highland Ditch, the Rough and Ready Ditch and the Palmerton Ditch were functioning prior to 1870 and the establishment of the Colorado State Water Commission (Figure III). The water appropriation for the four irrigation sources dates to 1862 (Colorado State Water Engineer). These are very early appropriation dates in terms of longevity of claim. In addition, such early dates reflect settlement during the Civil War and almost immediately after the discovery of gold in 1859. By 1889 Colorado ranked second, behind California, among states in irrigation development. For the lands near the Survey Area this meant a series of four canals crossing the lands in the area and farther east, such as those around Longmont or Hygiene.

Other projects have provided water for agricultural and domestic use. In 1905-1906 a planned reservoir near Lyons met with disdain. The project called for flooding the town and moving the inhabitants to the area known as Dow [sic] Flats. Needless to say, nothing came of the plan at the time and the lands remains pastoral. A later water diversion was much more successful. The Colorado-Big Thompson, a trans-montaine water project affected the entire northern section of the state and provided a constant source of water supply. Ideas for the project date to the late nineteenth

century, but the project was undertaken in the 1930s and 1940s. Pasture lands were also available in and around the Dowe Flats Study Area. The lands allowed for cattle and some sheep. Dairy farming to provide milk supplies for the growing Boulder and Denver markets became popular in and around the Dowe Flats Study Area and east toward Longmont.

Much to the chagrin of the farmers, their boom went bust by 1900. Not only did the rains fail to come, but irrigation ditches such as the Highline Canal ran dry and a national depression that proved to be particularly devastating to Colorado's silver mines all but wiped out the farm markets. Those who could afford to abandoned their farms, did so, while others hung on by scratching out a meager living from the parched soil(Mehls 1984a:123-134). The Panic of 1893 and ensuing depression marked the end of Colorado's first boom period and local residents spent the closing years of the nineteenth century trying to adjust to the changed conditions and looking for the next boom.

Ranching and Farming After 1900

The drought of the 1890s marked a watershed in agricultural development for all of the Colorado plains including the areas around Boulder and Longmont. For farmers with irrigation systems the need to build or improve reservoirs became obvious as the ditches ran dry. Those farmers who did not have sources of water other than precipitation found they had to make adjustments in their methods or try to acquire irrigation. Soil studies, rainfall studies, improved windmill pumps to bring up groundwater, and new hybrids of plants all became available to farmers after 1900 and this allowed for more productive farming. These developments followed by abnormally high crop prices during World War I

(1914-1919) led to a boom in dryland farming. During this boom period another factor influenced Boulder County agriculture - the introduction of sugar beets.

Sugar beets had been cultivated in central Europe since the Napoleonic Wars. The crop spread slowly to the United States and in the ten years after the Civil War some experimentation began. In 1871 a committee of Colorado businessmen unsuccessfully tried to raise money to purchase sugar beet processing equipment. Despite early failures the crop eventually became widespread. Sugar factories to process the crop opened in Grand Junction, Windsor, Ft. Lupton and Longmont (Great Western Sugar Co.). The boom brought thousands of acres of land under cultivation and increased demands being placed on the already strained St. Vrain drainage for irrigation water supplies.

Yet, another factor helped revolutionize rural life at the time as well--the introduction of the gasoline tractor which allowed one person to till more land than had been possible previously. Despite these improvements farmers in the area after 1920 found life remained difficult as crop prices fell when European farms returned to production after World War I and a decade later in 1929, the nation began a slide into the Great Depression. By 1937 and 1938, with the Great Depression and another drought at the same time many Boulder County farmers were just able to survive with massive aid from the federal government. World War II led to a complete reversal of that situation and attempts by the federal government since the war to stabilize the farm economy led to a somewhat easier life for the area's farmers until recently (Mehls 1984b: XVI:1-2; Athearn 1976: 253-278).

RESULTS OF THE SURVEY

The Class III survey identified 5 potential historic resources within the survey area. Building 1 is a vernacular domicile. Originally built in the 1920s, the house has been extensively modified. Modifications include a storm porch, a front addition with picture windows, sandstone patio, rear wing to the root cellar, removal of the original wood siding and resheathing of the house in foil-covered foam board and shingle siding. There may have been some door/window changes in the 1960s remodeling but the interior was not inspected. Building 2 is the barn. This post frame barn was originally used for livestock storage and is in very poor condition. The interior stalls and hayloft were removed at an unknown date(s). The cupola is collapsing and the overall integrity is minimal. Building 3 is the garage. Built at an unknown date between 1920 and 1960, the garage has a shed roofed 3-sided addition on the west side. Its exterior shows evidences of substitute wall parts being sued for repair or alteration. Building 4 is a shed/chicken house. This vernacular wood building is beginning to collapse. Parts of the exterior walls have been replaced by plywood. The roof is partially collapsed and the interior is gutted. Building 5 is a cinderblock silo. The roof is missing and the filling mechanisms were removed at an unknown date. The silo was constructed sometime between 1920 and 1970.

These 5 resources are recommended as not eligible for nomination to the National Register of Historic Places because of they do not exhibit the characteristics of a type, period or method of construction. In addition, the resources have limited integrity, and few associations or feelings with the agricultural patterns of

the area. The limited number of buildings and modifications that have taken place to the extant buildings preclude recommending the site as a district.

SOURCES CITED

Colorado Cultural Resource Survey
Management Data Form

Complete this form for each resource in addition to other appropriate forms--see Manual for information

1. State Site Number 5BL4884 2. Temporary Site Number DF HR-1
3. Attachments (check as many as apply)
- | | |
|---|---|
| <input type="checkbox"/> Prehistoric Archaeological Component | <input type="checkbox"/> Determined Eligible |
| <input type="checkbox"/> Historical Archaeological Component | <input type="checkbox"/> Determined Not Eligible |
| <input checked="" type="checkbox"/> Historical Architectural Record/
Building Form | <input type="checkbox"/> Nominated |
| <input checked="" type="checkbox"/> Sketch/Instrument Map (required) | <input type="checkbox"/> Listed |
| <input checked="" type="checkbox"/> U.S.G.S. Map Photocopy (required) | <input type="checkbox"/> Need Data |
| <input checked="" type="checkbox"/> Photograph(s) | <input type="checkbox"/> Contributing to NR Dist. |
| <input type="checkbox"/> Other, specify _____ | <input type="checkbox"/> Not Contributing to NR Dist. |

I. IDENTIFICATION

5. Resource Name Brenner Place
6. Project Name/Number Dowe Flats Haul Road
7. Government Involvement: Local State Federal
Agency Colorado Mined Land Reclamation Division
8. Site Categories: Check as many as apply
- Prehistoric: archaeological site paleontological site
in an existing National Register District? yes no name _____
- Historic: archaeology site building(s) structure(s) object(s)
in an existing National Register District? yes no name _____
9. Owner/Owner's Address Southdown, Inc., 5134 Ute Highway, Lyons, CO
10. Boundary Description and Justification Farmplot as presently fenced
(see site map)
11. Site Dimensions 73 m 70 m Area 5,110 m² (+4047) .76 acres
Area was calculated as Length x Width _____ OR (length X width) X .785
rectangle/square ellipse

II. LOCATION

12. Legal Location
- PM 6th Township 3N Range 70W NE1/4of SW 1/4of SW 1/4of NW 1/4 Section 21
- PM _____ Township _____ Range _____ 1/4of _____ 1/4of _____ 1/4of _____ 1/4 Section _____
- PM _____ Township _____ Range _____ 1/4of _____ 1/4of _____ 1/4of _____ 1/4 Section _____
- if section is irregular, explain alignment method _____
13. USGS Quad Hygiene 7.5' X 15' Date(s) 1968 (1979) (attach photocopy)
14. County Boulder 15. Other Maps _____

State Site # 5BL4884

Temporary # DF HR-1

16. UTM Reference

A. <u>1 3</u> ; <u>4 8 0 0 4</u> 0mE	<u>4 4 5 1 1 0 0</u> mN
B. <u> </u> ; <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> mE	<u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> mN
C. <u> </u> ; <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> mE	<u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> mN
D. <u> </u> ; <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> mE	<u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> <u> </u> mN

17. Address 5151 Ute Highway, Lyons, CO Lot N/A Block N/A Addition N/A

18. Location/Access north into driveway off Colorado 66, east of Lyons, CO.

III. NATURAL ENVIRONMENT

19. Topographic Feature(s)

- | | |
|---|---|
| <input type="checkbox"/> mountain | <input type="checkbox"/> ledge |
| <input type="checkbox"/> playa | <input type="checkbox"/> hill |
| <input type="checkbox"/> terrace/bench | <input type="checkbox"/> talus slope |
| <input type="checkbox"/> tableland/mesa | <input type="checkbox"/> canyon |
| <input type="checkbox"/> alluvial fan | <input type="checkbox"/> ridge |
| <input type="checkbox"/> valley | <input checked="" type="checkbox"/> plain |
| <input type="checkbox"/> saddle/pass | <input type="checkbox"/> basin |
| <input type="checkbox"/> dune | <input type="checkbox"/> alcove/rockshelter |
| <input type="checkbox"/> floodplain | <input type="checkbox"/> cliff |
| <input type="checkbox"/> cutbank | <input type="checkbox"/> slope |
| <input type="checkbox"/> arroyo/gully | <input type="checkbox"/> _____ |

20. Describe on-site topography (mention named landforms) Floodplain of St. Vrain Creek

21. Site Elevation 5240 feet=(x .3048) 1597 meters 22. Aspect 180 degrees

23. Degree of slope on site 0-1% 24. Soil Depth 50+ (estimate) cm

25. Soil description (character and color) light brown, sandy loam, decomposed manure

26. Depositional environment

- | | | |
|---|-----------------------------------|------------------------------------|
| <input type="checkbox"/> aeolian | <input type="checkbox"/> residual | <input type="checkbox"/> colluvial |
| <input checked="" type="checkbox"/> alluvial | <input type="checkbox"/> none | <input type="checkbox"/> moraine |
| <input type="checkbox"/> other, specify _____ | | |

27. Nearest water: name/nature Unnamed Seasonal distance 66 m 200 ft.

28. Nearest permanent water: name St. Vrain Creek distance 98 m 300 ft.

29. Vegetation on site (list predominant species) Bluegrass, weeds, cheat grass, pine and cottonwood trees

30. Vegetation associations/communities surrounding site willow, cottonwoods, short meadow grasses and borrow ditch weeds

State Site # 5BL4884
Temporary # DF HR -1

IV. National Register Eligibility Assessment

31. Colorado Historical Society context (RP3) theme(s) Mountains

Specify Farming and Ranching 1859-1945

32. Applicable National Register Criteria

Does not meet any of the below National Register criteria

A. associated with events that have made a significant contribution to the broad pattern of our history

B. associated with the lives of persons significant in our past

C. embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction

D. has yielded, or may be likely to yield, information important in history or prehistory

Qualifies under exceptions A through G (see Manual)

Level of Significance National State Local

Eligible as a District Yes No

33. Condition

a. Architectural/Structural

Excellent

Good

Fair

Deteriorated

Ruins

b. Archaeological/Paleontological

Undisturbed

Light disturbance

Moderate disturbance

Heavy disturbance

Total disturbance

34. Describe condition fair to poor overall site integrity

3 buildings show signs of failing structural members & are near collapse

35. Is site vandalized? yes no describe _____

36. Eligibility Recommendation: Eligible Not Eligible Need Data

Statement of Significance/N.R.H.P. Justification This farmstead is no longer representative of local farms or livestock operations due to lack of integrity, in particular it appears as if key buildings such as equipment sheds, have been removed. The extant buildings no longer possess the feeling of a historic farm.

37. If in an existing National Register District, is the site

Contributing Non-Contributing

38. Is there National Register District Potential? yes no discuss _____

There is a lack of a significant entity with integrity; some (probably most) of the key buildings have been removed and as a result, the feelings and associations are no longer present.

State Site # 5BL4884
 Temporary # DF HR -1

V. MANAGEMENT AND ADMINISTRATIVE DATA

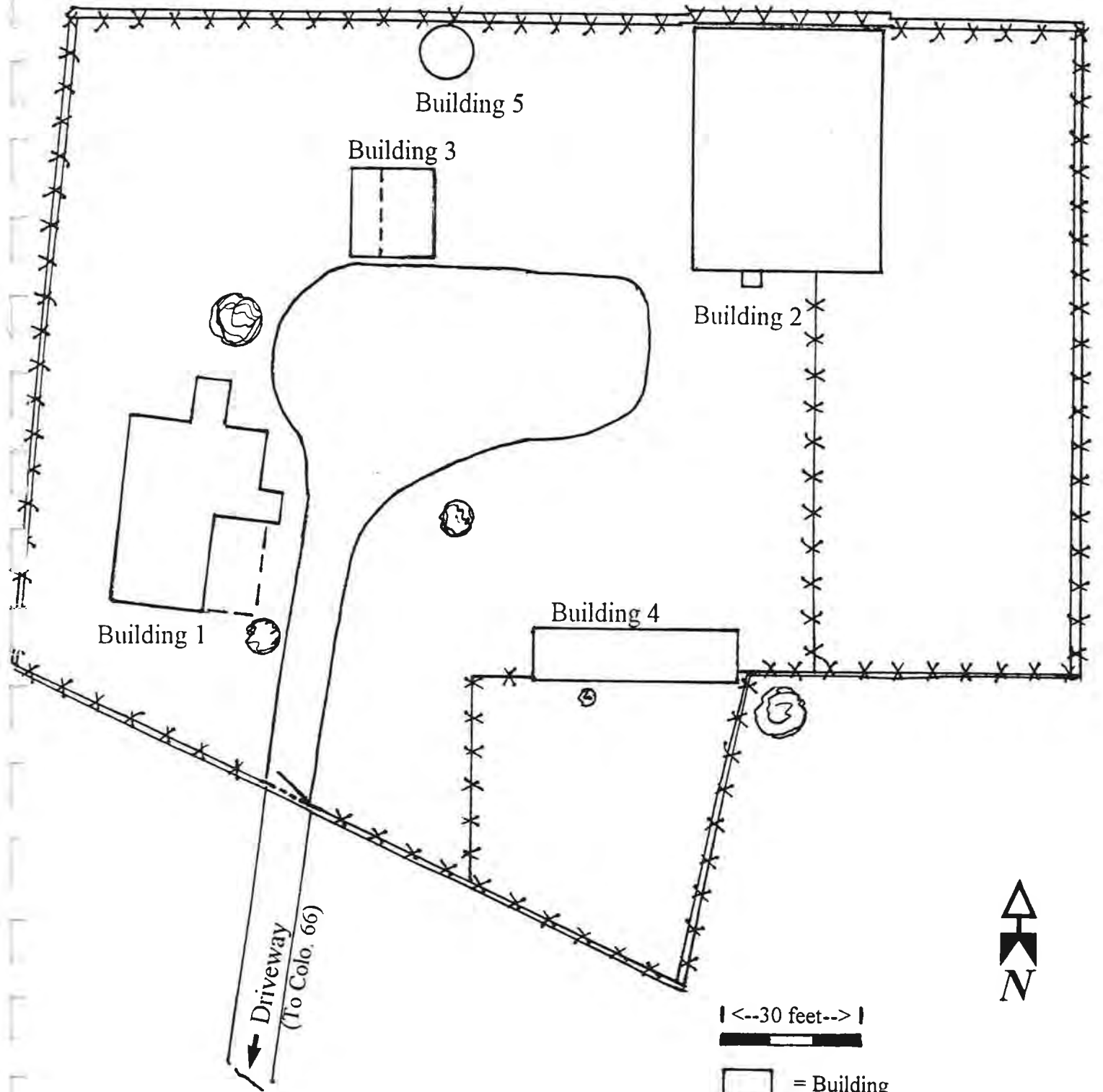
39. Threats to Resource: water erosion___ wind erosion___ animal activity___
 neglect___ vandalism___ recreation___ construction X other(specify)___
 comments _____
40. Existing Protection: none___ marked X fenced X patrolled___
 access controlled___ other (specify)_____
41. Local landmark designation N/A 42. Easement_____
43. Management Recommendations No further work

VI. DOCUMENTATION

44. Previous Actions Accomplished at the site
 a. Excavations: test___ partial___ complete___ Date(s):___
 b. Stabilization: Date(s)___
 c. HABS/HAER Documentation: Date(s) & Numbers___
 d. Other ___
45. Known collections/reports/interviews and other references (list)_____
See attached bibliogrphy of the Dowe Flats project
46. Primary Location of Additional Data Boulder County Courthouse
47. State or Federal Permit No. _____ Collection Authorized: yes___ no___
 Artifact Collection: yes___ no X
 Method: Diagnostics___ grab sample___ random sample___ transect___
 Other (specify)___
 Artifact Repository_____
48. Photograph Nos. DF HR Roll #2 negatives filed at WHS, Inc.
1225 Atlantis Avenue, Lafayette, CO 80026
49. Report Title Brenner Place Survey Report, Dowe Flats Vicinity, Boulder
County, Colorado
50. Recorder(s) S. F. Mehls/ R. F. Mehls Date(s): 11/6/94
51. Affiliation WHS, Inc. Phone Number: (303) 666-6208
 Colorado Historical Society, Office of Archaeology & Historic Preservation,
 1300 Broadway, Denver, CO 80203, (303) 866-3395

Brenner Place
Lyons Vicinity, Boulder County

5BL4884



Building 1

Building 3

Building 5

Building 2

Building 4

Driveway
(To Colo. 66)

- Building 1 - House
- Building 2 - Barn
- Building 3 - Garage (Shed)
- Building 4 - Shed (Chicken House)
- Building 5 - Silo

| <--30 feet--> |

[] = Building

[x] = Site Boundary/Fence

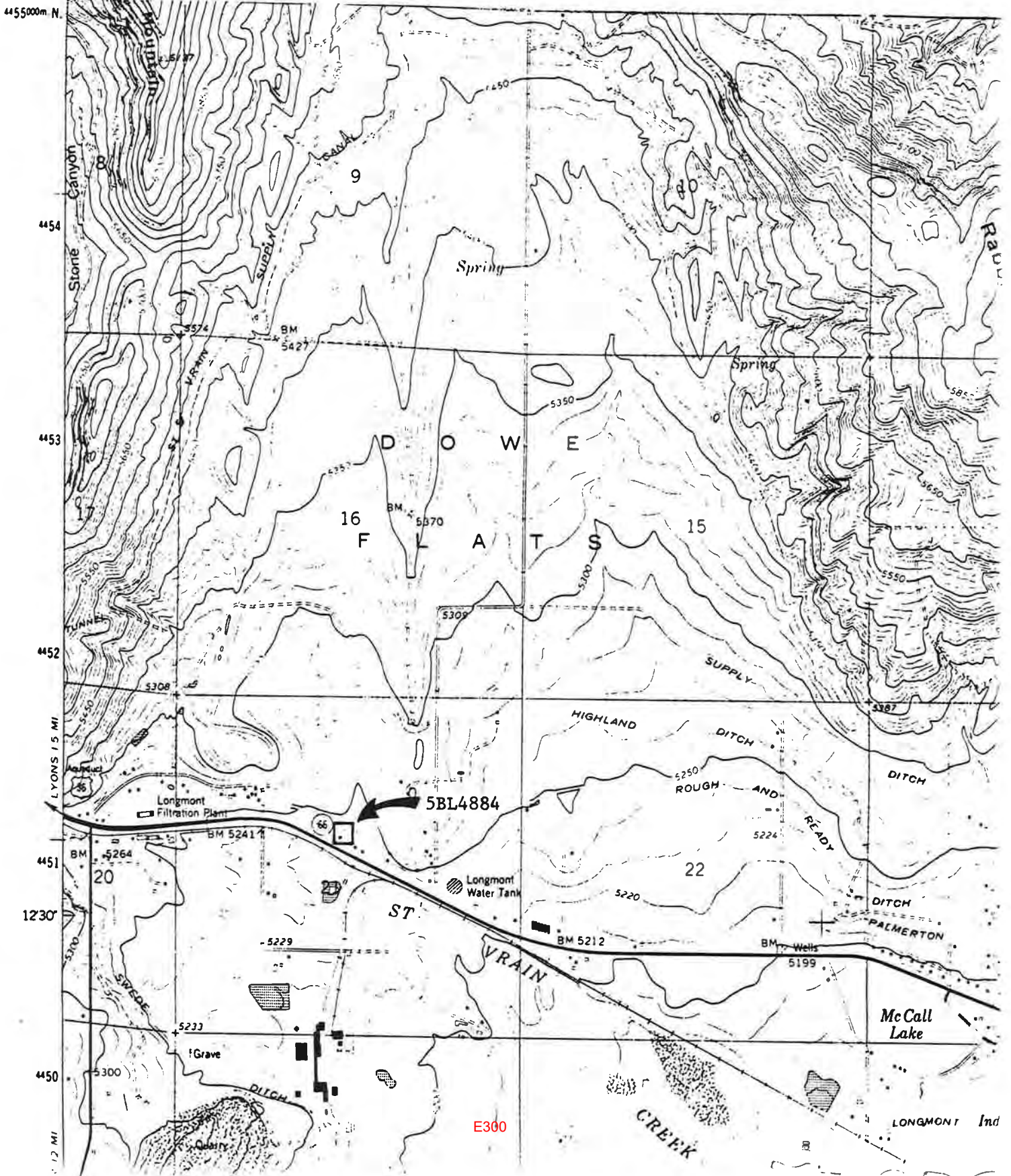
[x] = Fence

[Tree Symbol] = Tree

Brenner Place
Lyons Vicinity, Boulder County

5BL4884

Hygiene, Colorado 7.5'



Colorado Cultural Resource Survey

Historic Architectural Building/Structure form

Use this form in conjunction with the Management Data Form. One of these forms should be completed for each standing historical building or structure. Include a photograph, sketch map, and a photocopy of the quadrangle map showing building location.

1. State Site Number 5BL4884 2. Temporary Number DF HR-1A
3. Map ID Number / Feature Number or Code: Building 1
4. Building or Structure Name Brenner House
5. Complex / Site Name: Brenner Place
6. Photo #: DF-2, #s: 2, 3, 12-18

ARCHITECTURAL DESCRIPTION

7. Complex / Building / Structure Type: House
8. Architectural Style: Vernacular
9. Building Support System: Wood frame
10. Dimensions: L: 45' x W: 25' = Square Feet: 875 square feet (est.)
11. Number of Stories: 1
12. Building Plan (Footprint, shape): Irregular T
13. Landscaping or Special Setting Features: yard (lawn), garden, farm lot, unpaved driveway
14. Associated Buildings, Features, or Objects - Describe material and function (map number / name): Buildings 2, 3, 4, 5 (barn, silo, shed, garage).

For the following categories include materials, techniques and styles in the description as appropriate:

15. Roof: Intersecting gables; wood frame covered with asphalt shingles
16. Walls: Wood frame covered with shake shingles
17. Foundation/Basement: Sandstone covered cement
18. Chimney(s): 1 front corner of sandstone slabs (flat cap); 2- brick and metal stove pipes

State Site # 5BL4884

Historical Architectural Building/Structure Form

Temporary # DF HR-1A

(Page 2 of 3)

19. Windows: 4-6 light casement & hinged; 4-2 over 2 light double hung sash; 2-1 light picture; 3-aluminum sliding

20. Doors: 2-hollow core wood; 2-screen

21. Porches: 1-1 story covered entry; 1-sandstone deck; 1-sandstone root cellar

22. General Architectural Description: Once a cottage with Queen Anne element; now a hodge-pode of additions and styles; most recently a 1960s rustic (shingle) covering

FUNCTION

23. Current Use: Domicile

24. Original Use: Domicile

25. Intermediate Use(s): Domicile

ARCHITECTURAL HISTORY

26. Architect: Unknown

27. Builder: Unknown

28. Date of construction: ca. 1910s

Actual: _____ Assessor: XX

Estimate: XX based on: Assessor's Records

29. MODIFICATIONS: Minor _____ Moderate _____ Major X Moved _____ Date _____
Describe Modifications and Date: 1) covered storm porch; 2) sandstone patio; 3) rear wing to root cellar; dates unknown; Original wood siding removed, house resheathed in foil-covered foam board and then shingle coating added during the 1960s. The County records are extremely vague and no updates/permits were issued for remodellings.

Additions and Date: Former front porch converted to enlarged living room ca. 1960

State Site # 5BL4884

Historical Architectural Building/Structure Form

Temporary # DF HR-1A

(Page 3 of 3)

30. NATIONAL REGISTER CRITERIA/NATIONAL REGISTER ELIGIBILITY

- Does not meet any of the below National Register criteria
- A. Associated with events that have made a significant contribution to the broad pattern of our history
- B. Associated with the lives of persons significant in our past
- C. Embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
- D. Has yielded, or may be likely to yield, information important in history or prehistory
- Qualifies under exceptions A through G (see Manual)

Level of Significance National State Local

31. Justify Assessment: Lack of significance (no longer a farmstead) and lack of associations to a type, period or method of construction.

32. Associated Contexts and Historical Information: House originally built as part of a farm improvement program ca. 1910; property has been rental owned by the owners of Dowe Flats (Ideal Cement, Marigold 41) since 1957.

(use continuation sheets)

33. Other Recording Information

Specific References to the Structure/Building: _____

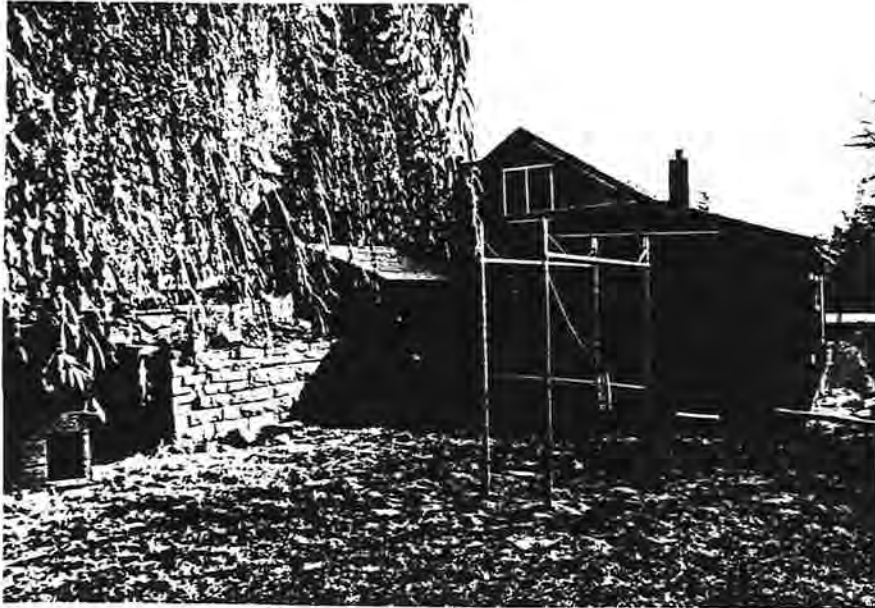
34. Archaeological Potential: N (Y or N) Justify: No observed deposits/artifacts

35. Recorder(s): S. F. Mehls/R. F. Mehls Date(s): 11/06/94

Colorado Historical Society, Office of Archaeology and Historic Preservation, 1300 Broadway, Denver, Colorado 80203, (303) 866-3395



5BL4884 Building 1 House
Front 3/4 to northwest



5BL4884 Building 1 House
Rear 3/4 to southeast

Colorado Cultural Resource Survey

Historic Architectural Building/Structure form

Use this form in conjunction with the Management Data Form. One of these forms should be completed for each standing historical building or structure. Include a photograph, sketch map, and a photocopy of the quadrangle map showing building location.

1. State Site Number 5BL4884 2. Temporary Number DF HR-1B
3. Map ID Number / Feature Number or Code: Building 2
4. Building or Structure Name Brenner Barn
5. Complex / Site Name: Brenner Place
6. Photo #: DF 2, #s: 4, 5

ARCHITECTURAL DESCRIPTION

7. Complex / Building / Structure Type: Barn
8. Architectural Style: Vernacular
9. Building Support System: Wood frame
10. Dimensions: L: 52.5 x W: 40.5 = Square Feet: 2,126.25 square feet
11. Number of Stories: 1.5
12. Building Plan (Footprint, shape): Rectangle
13. Landscaping or Special Setting Features: Rear of farm lot with pasture behind
14. Associated Buildings, Features, or Objects - Describe material and function (map number / name): Buildings 1, 3, 4, 5 (home, silo, garage, shed)

For the following categories include materials, techniques and styles in the description as appropriate:

15. Roof: Corrugated metal over wood planks, gable core; shed wings
16. Walls: Board and batten siding over wood frame
17. Foundation/Basement: Perimeter of sandstone slabs
18. Chimney(s): 1 partially collapsed cupola

State Site # 5BL4884

Historical Architectural Building/Structure Form

Temporary # DF HR-1B

19. Windows: 7 boarded openings; 1-4 light fixed; 2-6 light hopper

20. Doors: 4-wood plank; 2 large openings; 1-5 panel wood; 1-loft opening

21. Porches: None

22. General Architectural Description: Post frame barn used for livestock storage (too small to be multi-purpose farm barn); nearing structural failure.

FUNCTION

23. Current Use: Hay storage

24. Original Use: Animal Tending

25. Intermediate Use(s): Animal Tending

ARCHITECTURAL HISTORY

26. Architect: Unknown

27. Builder: Unknown

28. Date of construction: ca. 1910

Actual: _____ Assessor: _____

Estimate: XX based on: Condition & other buildings

29. MODIFICATIONS: Minor ___ Moderate ___ Major X Moved ___ Date _____

Describe Modifications and Date: Interior stalls removed on one side at unknown date; hay loft removed at unknown date

Additions and Date: 1-loading chute on south side; unknown date.

State Site # 5BL4884

Historical Architectural Building/Structure Form

Temporary # DF HR-1B

(Page 3 of 3)

30. NATIONAL REGISTER CRITERIA/NATIONAL REGISTER ELIGIBILITY

- Does not meet any of the below National Register criteria
- A. Associated with events that have made a significant contribution to the broad pattern of our history
- B. Associated with the lives of persons significant in our past
- C. Embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
- D. Has yielded, or may be likely to yield, information important in history or prehistory
- Qualifies under exceptions A through G (see Manual)

Level of Significance National State Local

31. Justify Assessment: Lack of integrity and not clearly agricultural in nature compared to other barns in the vicinity.

32. Associated Contexts and Historical Information: Barn originally built as part of a farm improvement program ca. 1920; property has been rental owned by the owners of Dowe Flats (Ideal Cement, Marigold 41) since 1957.

(use continuation sheets)

33. Other Recording Information

Specific References to the Structure/Building: _____

34. Archaeological Potential: N (Y or N) Justify: No observed deposits/artifacts; barnyard; heavily animal trampled

35. Recorder(s): S. F. Mehls/R. F. Mehls Date(s): 11/06/94

Colorado Historical Society, Office of Archaeology and Historic Preservation, 1300 Broadway, Denver, Colorado 80203, (303) 866-3395



5BL4884 Building 2 Barn
Front 3/4 to northeast; note list in building to left

State Site # 5BL4884

Historical Architectural Building/Structure Form

Temporary # DF HR-1C

19. Windows: N/A

20. Doors: 1-pair wood hinged garage

21. Porches: 1-covered work area (enclosed on 3 sides only)

22. General Architectural Description: Vernacular wood frame garage ca. 1920-1960

FUNCTION

23. Current Use: Storage

24. Original Use: Auto storage

25. Intermediate Use(s): Same

ARCHITECTURAL HISTORY

26. Architect: Unknown

27. Builder: Unknown

28. Date of construction: ca. 1920-1960

Actual: _____ Assessor: _____

Estimate: XX based on: Oral Informant; not in Assessors

Records

29. MODIFICATIONS: Minor _____ Moderate X Major _____ Moved _____ Date _____

Describe Modifications and Date: Siding replacement ca. 1960 (partial)

Additions and Date: shed roofed, partially enclosed work area on west side at unknown date

State Site # 5BL4884

Historical Architectural Building/Structure Form

Temporary # DF HR-1C

(Page 3 of 3)

30. NATIONAL REGISTER CRITERIA/NATIONAL REGISTER ELIGIBILITY

- Does not meet any of the below National Register criteria
- A. Associated with events that have made a significant contribution to the broad pattern of our history
- B. Associated with the lives of persons significant in our past
- C. Embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
- D. Has yielded, or may be likely to yield, information important in history or prehistory
- Qualifies under exceptions A through G (see Manual)

Level of Significance National State Local

31. Justify Assessment: Not characteristic of type, period or method of construction and not significantly associated with farming or transportation.

32. Associated Contexts and Historical Information: Garage built between 1920 and 1960; property has been rental owned by owners of Dowe Flats (Ideal Cement, Marigold 41) since 1957.

(use continuation sheets)

33. Other Recording Information

Specific References to the Structure/Building: _____

34. Archaeological Potential: N (Y or N) Justify: Only recent materials observed

35. Recorder(s): S. F. Mehls/R. F. Mehls Date(s): 11/06/94

Colorado Historical Society, Office of Archaeology and Historic Preservation, 1300 Broadway, Denver, Colorado 80203, (303) 866-3395



5BL4884 Building 3 Garage
Front 3/4 overview to northwest



5BL4884 Building 3 Garage
West side showing shed roofed addition

Colorado Cultural Resource Survey

Historic Architectural Building/Structure form

Use this form in conjunction with the Management Data Form. One of these forms should be completed for each standing historical building or structure. Include a photograph, sketch map, and a photocopy of the quadrangle map showing building location.

1. State Site Number 5BL4884 2. Temporary Number DF HR-1D
3. Map ID Number / Feature Number or Code: Building 4
4. Building or Structure Name Brenner Shed/Chicken House
5. Complex / Site Name: Brenner Place
6. Photo #: _____

ARCHITECTURAL DESCRIPTION

7. Complex / Building / Structure Type: Shed (probable chicken coop)
8. Architectural Style: Vernacular
9. Building Support System: Wood
10. Dimensions: L: 45' x W: 12' = Square Feet: 540 square feet
11. Number of Stories: 1
12. Building Plan (Footprint, shape): Rectangle
13. Landscaping or Special Setting Features: Farm lot
14. Associated Buildings, Features, or Objects - Describe material and function (map number / name): Buildings 1, 2, 3, 5 (house, barn, garage, silo).

For the following categories include materials, techniques and styles in the description as appropriate:

15. Roof: Gable; wood frame and plank covered with asphalt and wood shingles
16. Walls: Plywood and batten and wood plank
17. Foundation/Basement: Sandstone slabs on perimeter
18. Chimney(s): 2-small, gabled cupolas

State Site # 5BL4884

Historical Architectural Building/Structure Form

Temporary # DF HR-1D

(Page 2 of 3)

19. Windows: 4-large openings; 2 with 6-light fixed panels; other 5 broken; 1-small 4 light (broken)

20. Doors: 1-wood plank

21. Porches: N/A

22. General Architectural Description: Vernacular chicken house/shed

FUNCTION

23. Current Use: Storage

24. Original Use: Chicken house

25. Intermediate Use(s): Storage

ARCHITECTURAL HISTORY

26. Architect: Unknown

27. Builder: Unknown

28. Date of construction: ca. 1940s

Actual: _____ Assessor: _____

Estimate: XX based on: Oral Informant

29. MODIFICATIONS: Minor ___ Moderate ___ Major X Moved ___ Date _____

Describe Modifications and Date: roof beginning to collapse; interior gutted; parts of wall sheathing replaced by plywood.

Additions and Date: None

State Site # 5BL4884

Historical Architectural Building/Structure Form

Temporary # DF HR-1D

(Page 3 of 3)

30. NATIONAL REGISTER CRITERIA/NATIONAL REGISTER ELIGIBILITY

- Does not meet any of the below National Register criteria
- A. Associated with events that have made a significant contribution to the broad pattern of our history
- B. Associated with the lives of persons significant in our past
- C. Embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
- D. Has yielded, or may be likely to yield, information important in history or prehistory
- Qualifies under exceptions A through G (see Manual)

Level of Significance National___ State___ Local___

31. Justify Assessment: Lack of significant associations and lack of integrity; has only limited associations to a type, period or method of construction

32. Associated Contexts and Historical Information: A chicken coop/shed built ca. 1940s.

(use continuation sheets)

33. Other Recording Information

Specific References to the Structure/Building: _____

34. Archaeological Potential: N (Y or N) Justify: Only modern material observed

35. Recorder(s): S. F. Mehls/R. F. Mehls Date(s): 11/06/94

Colorado Historical Society, Office of Archaeology and Historic Preservation, 1300 Broadway, Denver, Colorado 80203, (303) 866-3395



5BL4884 Building 4 Chicken House
Front 3/4 to northeast



5BL4884 Building 4 Chicken House
Rear 3/4 to southeast

Colorado Cultural Resource Survey

Historic Architectural Building/Structure form

Use this form in conjunction with the Management Data Form. One of these forms should be completed for each standing historical building or structure. Include a photograph, sketch map, and a photocopy of the quadrangle map showing building location.

1. State Site Number 5BL4884 2. Temporary Number DF HR-1E
3. Map ID Number / Feature Number or Code: Building 5
4. Building or Structure Name Brenner Silo
5. Complex / Site Name: Brenner Place
6. Photo #: _____

ARCHITECTURAL DESCRIPTION

7. Complex / Building / Structure Type: Silo
8. Architectural Style: Vernacular
9. Building Support System: Bearing wall
10. Dimensions: L: _____ x W: _____ = Square Feet: 12' diameter; 37 sq. ft. approx.
11. Number of Stories: 3 (approximately)
12. Building Plan (Footprint, shape): Round
13. Landscaping or Special Setting Features: Farm lot to south; pasture to north
14. Associated Buildings, Features, or Objects - Describe material and function (map number / name): Buildings 1, 2, 3, 4 (house, sheds, barn)

For the following categories include materials, techniques and styles in the description as appropriate:

15. Roof: None
16. Walls: Cinderblock and iron tie bands
17. Foundation/Basement: Poured concrete slab
18. Chimney(s): N/A

State Site # 5BL4884

Historical Architectural Building/Structure Form

Temporary # DF HR-1E

19. Windows: N/A

20. Doors: 3-hatch openings

21. Porches: N/A

22. General Architectural Description: Vernacular 1920-1970s cinderblock silo

FUNCTION

23. Current Use: Abandoned

24. Original Use: Silage storage

25. Intermediate Use(s): Silage storage

ARCHITECTURAL HISTORY

26. Architect: Unknown

27. Builder: Unknown

28. Date of construction: ca. 1920-1960s

Actual: _____ Assessor: _____

Estimate: XX based on: Oral Informant

29. MODIFICATIONS: Minor ___ Moderate ___ Major X Moved ___ Date _____

Describe Modifications and Date: roof is gone; filling mechanisms removed at unknown date.

Additions and Date: N/A

State Site # 5BL4884

Historical Architectural Building/Structure Form

Temporary # DF HR-1E

(Page 3 of 3)

30. NATIONAL REGISTER CRITERIA/NATIONAL REGISTER ELIGIBILITY

- Does not meet any of the below National Register criteria
- A. Associated with events that have made a significant contribution to the broad pattern of our history
- B. Associated with the lives of persons significant in our past
- C. Embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
- D. Has yielded, or may be likely to yield, information important in history or prehistory
- Qualifies under exceptions A through G (see Manual)

Level of Significance National State Local

31. Justify Assessment: No significant associations to local agriculture or architectural styles.

32. Associated Contexts and Historical Information: _____

(use continuation sheets)

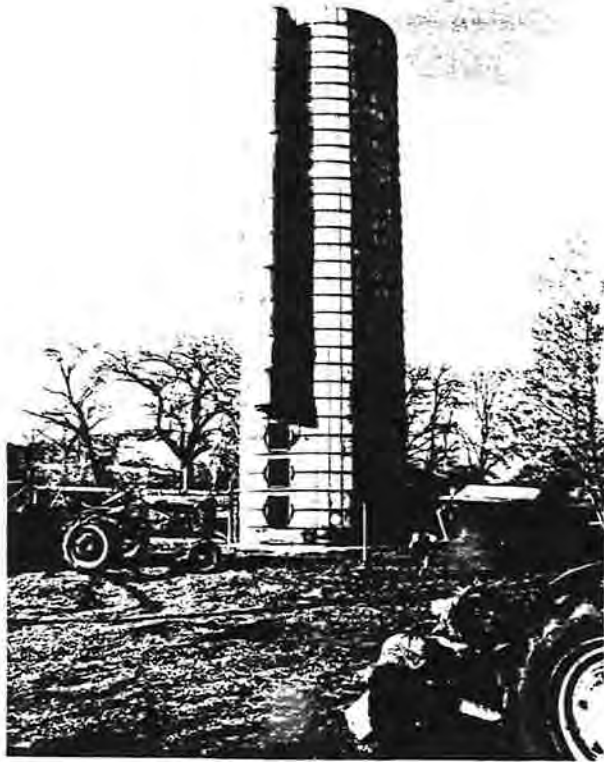
33. Other Recording Information

Specific References to the Structure/Building: _____

34. Archaeological Potential: N (Y or N) Justify: No observed deposits/artifacts

35. Recorder(s): S. F. Mehls/R. F. Mehls Date(s): 11/06/94

Colorado Historical Society, Office of Archaeology and Historic Preservation,
1300 Broadway, Denver, Colorado 80203, (303) 866-3395



5BL4884 Building 5 Silo
Overview to northwest

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DOWE FLATS WATER STORAGE PROJECT

GEOTECHNICAL ENGINEERING APPENDIX

- Introduction by Steve Vick, P.E.

- Addendum to Introduction

- "Report on Geotechnical Feasibility and Preliminary Embankment Design Proposed Dowe Flats Dam and Reservoir Near Lyons, Colorado", Fox Consultants, Inc., January 22, 1985

- "Mining Assessment Report, Dowe Flats Project, Lyons, Colorado", Morrison Knudsen Corp., February, 1993

- Expert Opinion Letter, Danielson and Associates, September 23, 1992

GEOTECHNICAL STUDIES - DOWE FLATS RESERVOIR

Various geotechnical studies have been conducted since 1984 that pertain to constructing a dam and reservoir in Dowe Flats. The description of these investigations provided below is to better document the chronology and development of the information contained in the permit application. However, this description is not intended to supplant the studies themselves or to adequately summarize their contents; for this the reader is directed to the individual documents.

The earliest such investigation was the January 22, 1985 Fox Consultants report entitled, "Report on Geotechnical Feasibility and Preliminary Embankment Design, Proposed Dowe Flats Dam and Reservoir, near Lyons, Colorado." In it, the southeastern portion of Dowe Flats was identified as the most favorable reservoir site. Of the various reservoir sizes evaluated, a reservoir elevation of 5400 ft. providing about 28,000 Ac ft of storage and covering about 600 acres, was determined to be the most economically efficient. On the basis of a limited geotechnical investigation, the dam was judged to be technically feasible on a preliminary basis.

Since mining plans in Dowe Flats were not sufficiently developed at that time, neither the investigation nor the preliminary dam design took into account any effects of mining on the dam or reservoir, and the study was based on pre-mining topographic and foundation conditions.

Later in 1985, Southwestern Portland Cement undertook an extensive program of geologic mapping, air-rotary drilling, and coring in the eastern portion of Dowe Flats. Although this program was intended to develop mining-related information on the nature and extent of limestone reserves, it also provided the opportunity to glean additional geotechnical information. To this end, samples were taken from many of the 183 borings drilled, and geotechnical logs of 11 cored borings were prepared. These data are contained in the December 20, 1985 report entitled, "Geotechnical Data, 1985 Dowe Flats Drilling Program, near Lyons, Colorado," by Steven G. Vick. No specific attempt was made to relate these data to the previous preliminary dam and reservoir study, but it was noted that complex geologic structure indicated to be present in the southeast corner of Dowe Flats would require further investigation in relation to future dam-related geotechnical studies.

Subsequent attention turned to the possibility of dam and reservoir construction in the western portion of Dowe Flats. The August 28, 1986 investigation by Steven G. Vick entitled, "Report on Preliminary Geologic and Geotechnical Data, Western Dowe Flats, near Lyons, Colorado," was intended to bring the geologic and geotechnical database in the western portion of Dowe Flats to a level commensurate with that in the eastern portion. Review of available drillhole and oil well logs, geologic mapping, information from other studies and projects, and a limited program of drilling and in-situ testing were performed. Relatively adverse geologic conditions

with respect to reservoir seepage losses and/or dam foundation stability were found to be associated with specific geologic units at or near the contact between the Benton and Dakota formations in western Dowe Flats. While these conditions were not intended to pertain to any specific dam or reservoir layout, it was noted that further investigations would be necessary to evaluate the possible occurrence and geotechnical characteristics of these same geologic formations on the flanks of Rabbit Mountain in eastern Dowe Flats.

By 1989, a number of possible dam and reservoir configurations in eastern Dowe Flats were being evaluated, and these studies required supplemental information on the nature and distribution of fill materials available for dam construction. The report by Empire Laboratories dated October 30, 1989 provided the results of drilling, sampling, and laboratory index testing from 48 borings in east Dowe Flats.

Most recently, geologic mapping of the flank of Rabbit Mountain has been prepared by WT Environmental for purposes of this permit application. This mapping has been directed specifically toward establishing the presence and structure in east Dowe Flats of geologic units identified as being of potential geotechnical concern in west Dowe Flats in the previously-discussed report of August 28, 1986. Although these same units are present, the complexity of their structure is such that extensive additional exploration and in-situ testing would be necessary to establish their effect on reservoir seepage and geotechnical characteristics of the dam foundation. Any such assessment would be sensitive to specific details of dam location and crest elevation.

From this history of dam-related investigations in Dowe Flats, it is clear that substantial supplementary geotechnical data have been obtained since the 1985 Fox Consultants report was issued. This information may have the potential to materially affect the preliminary conclusions advanced in the Fox report in relation to such factors as fill availability, dam foundation characteristics, preliminary dam design, and the potential for dam raising. At the present time, no attempt has been made to modify or supplement the findings of the report in light of the more recent data, because this would require accounting for specific features of dam location and sizing and its scheduling in relation to mining activities that remain as yet undetermined. It is anticipated, however, that when these factors become better defined, the available geotechnical information will constitute a substantial database for further dam-related evaluations.

PREPARED BY: STEVE VICK 2/14/91



**ADDENDUM TO STEVE VICKS' INTRODUCTION
TO THE TECHNICAL APPENDIX CONTAINING
GEOTECHNICAL AND ENGINEERING DATA (VOL. 1)**

Reports by Morrison-Knudsen (February 1993) and Danielson and Associates (September 23, 1992) are included in this Technical Appendix. These reports modify and supplement previous data and reports by accounting for specific features of dam location, sizing and scheduling in relation to mining activities. The reports address the engineering feasibility and permissibility of the proposed dam, specifically in relation to the proposed mining plan.

water\addm-vic.int



FOX CONSULTANTS, INC.

DENVER OFFICE
710 KIPLING STREET, SUITE 400
DENVER, COLORADO 80215
(303) 233-7799


REPORT ON
GEOTECHNICAL FEASIBILITY AND
PRELIMINARY EMBANKMENT DESIGN
PROPOSED DÔWE FLATS DAM AND RESERVOIR
NEAR LYONS, COLORADO

Prepared for:

St. Vrain Mutual Reservoir
and Water Company
7348 Ute Highway (Highway 66)
Longmont, Colorado 80501

Prepared by:

Fox Consultants, Inc.
710 Kipling Street, Suite 400
Denver, Colorado 80215



FOX CONSULTANTS, INC.

DENVER OFFICE
710 KIPLING STREET, SUITE 400
DENVER, COLORADO 80215
(303) 233-7799

January 22, 1985

St. Vrain Mutual Reservoir
and Water Company
7348 Ute Highway (Highway 66)
Longmont, Colorado 80501

Attention: Mr. Michael Dollaghan

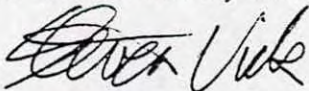
Dear Mr. Dollaghan:

Transmitted herewith is our report entitled "Report on Geotechnical Feasibility and Preliminary Embankment Design, Proposed Dowe Flats Dam and Reservoir, Near Lyons, Colorado." It provides geologic and subsurface data for the damsite and establishes the geotechnical feasibility of the proposed embankment. A brief introduction to the report is provided on Page 1 of the text, and a summary of its findings can be found on Page 3.

We appreciate the opportunity of working with you in preparing this study. If you should have any questions or require further information, please do not hesitate to contact us.

Very truly yours,

FOX CONSULTANTS, INC.



Steven G. Vick
Geotechnical Section Head
Professional Engineer No. 16738
State of Colorado

SGV:cw

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Note: All Oversized Maps/Figures
Scanned to Other File

"Geo Technical Engineering Appendix"
1993



1.0 INTRODUCTION

This report presents the results of sizing studies, geotechnical and geologic feasibility investigations, and preliminary embankment design for the proposed Dowe Flats Dam and Reservoir. The site is located immediately east of Lyons in Boulder County, Colorado. Studies summarized herein have included subsurface investigations and preliminary design layouts for a proposed earth-fill dam. Detailed flood routing, sedimentation studies, and hydraulic design of spillways or outlet works are not addressed in this report.

In October, 1983 the Marigold 41 Partnership acquired to the Dowe Flats property and initiated studies to evaluate the most effective use of the land among options including residential/commercial development, mining, and reservoir water storage. Dowe Flats is quite unique in this respect; few other well-defined land units offer such a variety of feasible land-use opportunities or present the possibility of achieving an optimal mix among them. The preliminary dam and reservoir design reflects an attempt to realize the advantages of the site for off-stream water storage while at the same time reserving potential for complementary land uses in adjacent areas.

Potential sizes for the Dow Flats reservoir ranging from 5900 to 68,000 acre feet have been evaluated. The present proposal contemplates approximately 28,000 acre-feet of storage. The reservoir can be expanded at any time in stages to approximately 68,000 acre-feet, and the preliminary dam design incorporates specific features to accommodate raising without the need to drain the reservoir. As an off-stream basin, no diversion during dam construction is required. By virtue of the small drainage area, spillway

requirements will be minimal and sedimentation should be negligible. No significant relocation of transportation facilities or utilities will be required in Dowe Flats.

A commercial limestone deposit underlies portions of the site. While exploiting the volume created by potential mining for reservoir storage creates obvious attractive possibilities, the preliminary design is independent of any potential limestone mining. Thus, the feasibility and economics of reservoir development do not depend on any future mining of the resource, the mine plan, or the schedule for mining. On the other hand, the reservoir layout does not preclude extraction of the limestone except beneath that portion of the site actually occupied by the dam. If properly integrated with reservoir operation from technical, scheduling, and dam-safety standpoints, any future limestone mining might significantly augment reservoir storage volume while obviating the need for reclamation of the mined-out area.

2.0 EXECUTIVE SUMMARY

Studies reported herein have evaluated the layout, geologic, and geotechnical aspects of a proposed dam and reservoir in Dowe Flats near Lyons, Colorado. Investigations beginning with siting and layout analyses have been supplemented with subsurface explorations in the form of borings and test pits. These data have been used to assess the geotechnical feasibility of the dam and reservoir and to prepare a preliminary design for the embankment.

Analyses performed to evaluate the preferred reservoir location, layout, and size have identified the southeastern portion of Dowe Flats as the most favorable reservoir site. Potential reservoir sizes ranging from 5900 to 68,000 acre-feet of storage have been investigated. Taking into account both efficiency considerations and constraints on available materials, a preferred reservoir to elevation 5400 has been selected. Such a reservoir will provide approximately 28,000 acre-feet of storage, cover almost 600 acres, and require an earthfill dam of 110 feet maximum height to contain it. The site could allow for future reservoir expansion to as much as approximately 68,000 acre-feet.

The preliminary embankment design consists of a central-core earthfill structure incorporating internal chimney and blanket drainage. This internal zoning will maximize the use of on-site fill materials within the reservoir area, while at the same time accommodating potential future raises of the embankment. Total embankment fill requirements are estimated to be approximately 6.0 million cubic yards of which 5.4 million cubic yards is on-site borrow. Potential sources for both on-site and off-site materials have been

identified, and sufficient quantities appear to be available based on present data. However, further subsurface exploration will be required, as well as pre-drainage within borrow areas to reduce saturation and moisture levels.

Borings and test pits drilled and excavated to date indicate satisfactory foundation conditions. Foundation soils extending to depths of about 3 to 20 feet appear to be competent for support of the structure and are underlain by principally shales, limestones and sandstones within a geologically simple, synclinal structure. Field testing shows the bedrock permeability to be very low, except for local, near-surface zones of moderate permeability which can be treated by a modest grouting program. The nature of the foundation materials and expected levels of seismic activity are such that the potential for seismic liquefaction of foundation materials is low.

Data collected and analyses performed to date have shown no geologic or geotechnical flaws within the proposed site which would preclude reservoir construction or which should restrain further investigation. In our opinion, the available data are sufficient to demonstrate that the preliminary embankment design is technically feasible from a geologic, geotechnical, and construction standpoint.

This summary is intended only to provide a brief overview of this study, and more comprehensive discussions in the remainder of the text are necessary for a complete understanding of its findings. A comprehensive geology report is included in its entirety as Appendix A of this report, and complete documentation of all subsurface investigations and laboratory testing completed to date at the reservoir site is incorporated as Appendix B.

3.0 PURPOSE AND SCOPE

The objectives of the studies summarized herein have been twofold: to determine the most effective dam/reservoir layout in Dowe Flats, and to establish the geotechnical feasibility of constructing the dam. The latter objective, initially oriented toward a "fatal-flaw" type geologic feasibility analysis, has been expanded as further subsurface data and geotechnical analyses have advanced the concept to a preliminary design stage.

This report presents a summary of several separate studies carried out by Fox Consultants, in addition to the results of recently-completed preliminary foundation explorations. The scope of work performed has included the following:

1. Compilation of reservoir sizing analyses.
2. Evaluation of geologic conditions and suitability.
3. Evaluation of foundation soil and bedrock conditions by means of a subsurface exploration program of borings and test pits.
4. Preliminary seismotectonic and liquefaction evaluation.
5. Development of a preliminary embankment design including consideration of foundation treatment, internal zoning, and availability of fill materials.

The scope of work addresses primarily geologic, geotechnical, and embankment design issues. Detailed hydrologic/flood routing studies; sedimentation studies; or design related to spillways, outlet works, or other appurtenant facilities have not been included.

4.0 PHYSIOGRAPHIC SETTING

Dowe Flats is a three-sided basin comprising some 1500 acres located immediately east of Lyons, Colorado and just north of St. Vrain Creek. As indicated on Figure 4.1, Dowe Flats lies on the eastern margin of the foothills of the Colorado Front Range about 15 miles north of Boulder and 10 miles northwest of Longmont.

Dowe Flats is so named because of the wide, flat, and uniformly-sloping floor of the valley. The area is flanked by the slopes of Rabbit Mountain to the east and Indian Mountain to the west as shown on Figure 4.2. The drainage basin is comparatively small. Figure 4.3 shows the proposed initial reservoir and potential expansion together with the contributing drainage area. The total drainage area shown is 2100 acres, of which nearly 600 acres and 900 acres would be occupied by the proposed and expanded stages of the reservoir, respectively.

Closer inspection of Figure 4.3 shows a topographic element of Dowe Flats which is significant to the reservoir development. A spine-like ridge rises 30 to 40 feet above the valley floor and trends due north to separate Dowe Flats into eastern and western portions. As illustrated on Figure 4.3, this drainage divide separates the eastern and western portion of Dowe Flats into two individual sub-basins. The ridge owes its presence to a comparatively erosion-resistant limestone stratum. Upwarped to form a "hogback" ridge, this limestone outcrop replicates in miniature the similar but larger feature well-known along the entire Front Range. This similarity in outward appearance also reflects a similarity in underlying form. The spoon-shaped topography of Dowe Flats is caused by the synclinal structure of the sedimentary

strata, folded like a bowl on three sides with progressively steepening upward slopes. Thus, outcrops of the formations form a horseshoe pattern, and certain strata such as the cliff-forming Dakota sandstone can be easily traced around the entire perimeter of the valley.

The St. Vrain Supply Canal enters Dowe Flats on its extreme north end through a tunnel and flows around its north and west edge. At roughly elevation 5470, the canal lies about 70 feet above the proposed initial reservoir. As shown on Figures 4.2 and 4.3, the southern margin of Dowe Flats is traversed by four ditches: Supply, Highland, Rough and Ready, and Palmerton. An unpaved county road runs northward through Dowe Flats, and a powerline traverses the dam axis; with these two comparatively minor exceptions, no facility relocation will be required for the reservoir. The presence of the St. Vrain Supply Canal upstream from the reservoir, together with the four supply ditches plus St. Vrain Creek immediately downstream, suggest that requirements for additional distribution systems to and from the reservoir may be minimal.

5.0 RESERVOIR SIZING ANALYSIS

5.1 OBJECTIVES AND METHODOLOGY

Reservoir sizing analyses were performed to establish the preferred dam layout, the optimum size of the reservoir, and the extent to which Dowe Flats can be efficiently devoted to reservoir storage compared to other potential land uses.

Sizing analyses for the Dowe Flats Reservoir are somewhat unusual insofar as they do not proceed from the conventional steps of first defining storage needs, and then determining the optimum reservoir site, size and layout to meet these needs. The analysis does not begin from the assumption that storage volume requirements are a fixed constant. Instead, water storage is viewed as one of several potential land uses for Dowe Flats, and determining the range of efficient and cost-effective reservoir sizes is the main objective of the analysis. Water storage volume is defined as a variable, and the methodology of the analysis has allowed the most cost-effective reservoir size to be identified, along with a range of other sizes which lie within reasonable physical and economic constraints.

Reservoir sizing was carried out according to principles of marginal economic analysis. In a classic microeconomic sense, the term "marginal" refers to evaluating both price and cost of a production unit at the margin, or next incremental unit, of production capacity. "Marginal cost" and "marginal price" define the fundamental terms of the analysis. While marginal economic analysis is most often used to determine the optimum level of production, it has been applied in the reservoir sizing analysis as a systematic framework for estimating the optimum reservoir size.

In this analyses, about 20 separate reservoir size/location combinations were defined, each consisting of a certain reservoir site within Dowe Flats and a particular dam alignment and height. Each of these combinations can be considered for economic purposes as unit of storage. In effect, the analysis first identified the most efficient, or cost-effective, unit of storage. This provided a benchmark against which additional incremental storage units could be compared on the basis of their marginal cost of storage. Once having identified the most efficient storage unit, other alternatives providing greater or lesser storage volumes can be compared to each other on the basis of the marginal cost of the incremental storage they provide. For example, deciding whether to raise a dam by a certain amount or to extend its alignment in order to gain a given increment of reservoir storage depends on which option has the lower marginal cost of obtaining the additional storage unit.

This type of analysis also provides insight into the maximum extent to which Dowe Flats should be devoted to water storage compared to other potential land uses. When the marginal cost of reservoir storage exceeds the cost of putting the next increment of land area to other uses, a tradeoff point is defined which identifies a desirable maximum size of the reservoir area. In reality this tradeoff point is not clearly defined because marginal prices are not constant: different revenues will accrue from different land uses. Nevertheless, marginal analysis is useful in identifying the general range of reservoir sizes where "diminishing returns" begin to dominate for incremental storage units, and also in showing how fast marginal costs rise for larger or smaller reservoirs.

Physical constraints also govern reservoir sizing, principally the quantity of fill material available. Theoretically, the availability of embankment fill can be reviewed as purely an economic matter: unlimited quantities of fill can always be obtained from any haul distance, it is only a matter of cost. However, for this analysis it is desired to obtain dam fill only from within the area inundated by the reservoir (except, of course, for select materials which may have to be obtained from other areas). The physical constraint of obtaining fill within the reservoir area has been applied to the sizing analyses because to do otherwise would distort comparison of alternatives requiring imported fill at widely different costs. Moreover, obtaining major quantities of fill outside the reservoir area could require turning the remaining portion of Dowe Flats into a borrow pit, an option not considered to represent a particularly prudent or productive use of the land.

Factors related to limestone mining have not been incorporated into the reservoir sizing evaluation or marginal analysis, principally because the desired intent is to identify a water-storage land use in Dowe Flats which is economically efficient on its own merits. Limestone mining would provide a certain amount of storage volume which could be considered "free" to the extent that it exacts no price in dam fill required to obtain it. However, any potential volume created by limestone mining has been neglected. This has been done to avoid biasing the comparative analysis by subsidizing certain reservoir sizes or layouts which might not otherwise be economically optimal.

5.2 MEASURE OF EFFECTIVENESS

Any comparison of alternatives must define the criteria by which they are to be judged. Monetary cost is usually a measure of effectiveness in any

evaluation, and is sometimes supplemented by consideration of other attributes (for example various environmental considerations), which requires more sophisticated multiple-objective systems analysis techniques for proper evaluation.

For the Dowe Flats sizing analysis, a single measure of effectiveness is defined: fill efficiency ratio (FER), and the purpose of the analysis is to determine the optimum fill efficiency ratio and how it varies for the alternative reservoirs considered. Fill efficiency ratio is defined as the volume of embankment fill required to achieve a unit volume of reservoir storage. It is expressed for, example, in units of cubic yards of dam fill per acre-foot of reservoir volume. As an indirect index of uncapitalized facility cost, FER is a simple but powerful tool particularly useful in comparing reservoirs of dissimilar size, and has been used in multiple-objective reservoir comparisons (Vick; 1983, 1984). FER is well suited to evaluations where the cost of the embankment itself constitutes the principal element of the total facility cost, and where costs for such items as spillways and facility relocation are either comparatively minor or relatively invariant from alternative to alternative. Dowe Flats satisfies these criteria well since the small drainage basin will not require a large spillway, and relocation requirements are minor. Furthermore, since the bulk of the fill material is intended to be derived from within the reservoir area, unit fill costs will be relatively constant. Variations in unit fill cost due to different haul distances (a factor essentially dependent on the size of the reservoir) are second-order and do not have a major influence on results. Similarly, to the extent that requirements for more expensive select fill (i.e., processed sands and gravels

or riprap) are more-or-less proportional to the total volume of dam fill, they do not greatly affect relative comparisons made on the basis of fill efficiency ratio.

5.3 SITING OPTIONS

A considerable number of reservoir siting possibilities within Dowe Flats were studied using the concept of fill efficiency ratio. These included reservoirs on both the east and west side of the limestone ridge which divides the property. In general, it was found that topographic factors tend to penalize the western portion of Dowe Flats. It is less deeply incised and narrower, so that greater dam fill is required for unit storage volume. Also, multiple reservoirs laid out in stairstep fashion one below the other were evaluated and found to be generally less favorable than one larger facility. On the other hand, a single large dam spanning the entire south end of Dowe Flats from Indian Mountain to Rabbit Mountain was shown to have comparatively low fill efficiency, and on the basis of preliminary subsurface data would likely be constrained by the quantity of available borrow soils within Dowe Flats.

Siting therefore focused on the eastern portion of Dowe Flats, with Rabbit Mountain forming the eastern abutment of the dam. The limestone ridge forms the western abutment, with deeper reservoirs made possible by raising the dam and extending a wing dike northward along the crest of the limestone ridge. For this site, a number of reservoir sizes is possible, spanning the range generally depicted on Figure 4.3. Subsequent analyses were directed toward defining the optimum reservoir size at this site and identifying any physical constraints on its maximum size.

Reservoir volumes were computed on the basis of existing ground surface topography with the maximum water elevation for active storage taken at the dam crest. The minimum freeboard requirement of five feet (State of Colorado, 1983) has not been accounted for, but volumes of fill material excavated from within the reservoir will tend to offset this requirement. Further flood routing and spillway design studies will be necessary to more accurately define reservoir surcharge and freeboard requirements, but assuming the dam crest and storage level at equal elevations is sufficiently accurate for purposes of comparing alternatives.

5.4 SIZE OPTIMIZATION

Determination of optimum reservoir size has been carried out by varying the height of the dam according to the alignment and reservoir site shown on Figure 4.3. In general terms, dam fill volume increases exponentially as a function of height. Similarly, reservoir capacity also often increases exponentially as the depth of the reservoir increases. The rates of increase of the respective curves are governed by topographic factors, but for typical reservoir configurations, a height is often found where the most storage can be gained for the least fill volume. For higher dams, the exponential increase in dam fill begins to dominate, while lower dams do not produce sufficient volume storage to justify their fill requirements. In terms of fill efficiency ratio, the optimum dam height/reservoir size corresponds to the minimum value of fill efficiency ratio (Vick, 1983). For the Dowe Flats site, a curve of FER versus dam height has been constructed to identify this point.

Fundamental topographic characteristics on the site are expressed by stage-volume and stage-area curves shown on Figure 5.1. Topographic data up to elevation 5400 were determined by planimeter from the two-foot contour interval mapping; topography above this elevation is from 1:24,000 USGS quad-range sheets and is more approximate. The upper and lower curves on Figure 5.1 illustrate the variation in reservoir volume and reservoir surface area as a function of elevation.

The variation in dam fill requirements according to crest elevation is shown on the upper curve on Figure 5.2 together with four discrete points for which fill volume calculations were performed. It should be noted that assumed sideslopes and other details differ slightly from the preliminary embankment configuration subsequently presented. As a result, the actual dam fill quantities on Figure 5.2 are not precise but are adequate for comparative purposes.

The dam fill curve on Figure 5.2 and the reservoir volume curve on Figure 5.1 have been combined to derive the fill efficiency curve shown on the lower portion of Figure 5.2. As indicated, the minimum FER value occurs for a dam crest at roughly elevation 5380. For lower elevations and smaller reservoirs the curve rises steeply, illustrating reduced efficiency. The curve also rises steadily for larger reservoirs above the 5380-5400 elevation range. However, the absolute values of FER do not differ greatly over the size range evaluated, varying from a minimum of 220 at elevation 5380 to a value of 258 at elevation 5450. In this case, trends are better defined by examining marginal FER values obtained for incremental units of storage.

Given that elevation 5480 defines the optimum size, marginal FER for larger reservoirs can be calculated as the change in dam fill volume divided

5380

by the change in reservoir volume for the increment unit of storage produced. This calculation is shown in tabular form below:

TABLE 5.1
MARGINAL FILL EFFICIENCY RATIO

<u>ELEVATION</u>	<u>FILL VOLUME</u> ($\text{yd}^3 \times 10^6$)	<u>Δ FILL</u>	<u>RESERVOIR</u> <u>VOLUME (A-ft)</u>	<u>Δ VOLUME</u>	<u>FER</u>	<u>MARGINAL</u> <u>FER</u>
5380	3.8	-	17,300	-	220	-
5400	6.3	2.5	27,800	10,500	227	238
5450	17.5	11.2	67,700	39,900	258	280

Table 5.1 more clearly illustrates diminishing marginal efficiency for larger reservoirs by showing that marginal FER for incremental storage units rises more quickly than FER for the reservoir as a whole. This comparison can be seen from the last two columns of Table 5.1. Starting from the optimum FER of 220 for elevation 5380, the storage unit from elevation 5380-5400 has a marginal FER of 238, or an 8 percent increase. The next storage unit from elevation 5400 to 5450 shows marginal FER of 280, or a 27 percent increase from the optimum storage unit.

The result of this analysis is to suggest that a reservoir elevation of 5400 providing about 28,000 A-ft of storage is most advantageous for the Dowe Flats site. This size is slightly greater than optimum, but the increase in storage volume is significant for a comparatively small reduction in efficiency. On the other hand, reservoirs larger than elevation 5400 become increasingly less efficient. The increase in marginal FER for higher elevations does not necessarily suggest that larger dams and reservoirs would be uneconomical, only that an increasingly greater fill price must be paid to obtain the storage. Similar comments can be applied to substantially smaller reservoirs.

Recognizing that the quantity of soils available within the reservoir area for potential dam fill borrow may be limited by soil depth and/or moisture content, dam fill constraints were evaluated as shown on Figure 5.3. These curves relate fill volume and reservoir area, assuming that the area within the reservoir defines the limits of the primary borrow pits. The curve depicting required dam fill volume is derived from data shown on the upper portion of Figure 5.2 and the stage-area curve on Figure 5.1. This relationship shows the exponentially increasing quantity of dam fill necessary to confine reservoirs of increasing size, while the linear relationships show the volume of dam fill which would be available if excavation were carried to various average depths over the entire reservoir area.

The intersection of the required fill volume and available fill volume curves defines the physical constraint on reservoir size due to borrow availability, assuming that no common fill is excavated outside the reservoir. Preliminary subsurface data discussed subsequently shows that suitable borrow soils are present within the reservoir area to depths which vary generally from about 5 to 15 feet. Thus, it is reasonable to assume that suitable fill could be obtained to an average depth of 7 feet over the entire reservoir. The intersection of this line with the required fill curve defines a feasible reservoir size of about 600 acres, which corresponds to a dam/reservoir elevation of about 5400. Average fill depths greater than 7 feet would allow for larger reservoirs. While detailed subsurface exploration is required to accurately define the limiting quantity of available borrow within various portions of the Dowe Flats reservoir site, the available data suggest that an average depth of suitable borrow much greater than about 10 feet would be unlikely. If this is taken as a limiting average value, then a dam at 5450

(58,000 acre-feet capacity) would approximately reach or slightly exceed the maximum feasible size, requiring an average borrow depth of about 12 feet over its 880 acre reservoir area.

A second physical constraint on maximum reservoir size is the St. Vrain Supply Canal. At approximately elevation 5470, the canal borders the reservoir site on the north. To relocate the canal or otherwise mitigate the effects of the proposed reservoir on it would require significant engineering modifications.

Taken together, the results of reservoir sizing analyses suggest that dam/reservoir elevation of about 5400 provides the most efficient reservoir size and is probably not severely constrained by fill availability within the reservoir area. Such a reservoir would provide approximately 28,000 acre-feet of storage. Larger or smaller reservoirs are less efficient but still feasible, ranging from 5900 acre-feet at elevation 5350 up to a maximum elevation of about 5450 which would provide approximately 68,000 acre-feet of storage. Reservoirs much in excess of this size would be considerably less efficient, could interfere with the St. Vrain Supply Canal, and would likely be constrained by shortage of available on-site fill.

6.0 EMBANKMENT FOUNDATION CONDITIONS

6.1 SUBSURFACE DATA

Preliminary subsurface data for the reservoir site has been compiled on the basis of geologic mapping, borings, and test pits. Geologic assessment has included review and compilation of geologic literature on the Dowe Flats vicinity supplemented by airphoto interpretation. The subsurface exploration program has included a total of 18 borings and 12 test pits drilled and excavated to date in and near the proposed reservoir site. Some of these explorations were conducted specifically for the proposed dam, while others were conducted for other purposes and provide useful background information. A comprehensive geologic report on Dowe Flats and vicinity is included as Appendix A of this report. Boring and test pit data is presented in detail in Appendix B, including logs. Of this available data, interpretations pertaining to foundation conditions are discussed below while information pertaining primarily to borrow explorations is reserved for subsequent sections.

6.2 FOUNDATION GEOLOGY

Geology of the Dowe Flats area is described in detail in Appendix A. As it pertains to the proposed reservoir site, geologic interpretation provides a great deal of useful information. From a regional standpoint, the Dowe Flats area lies in a transition zone between the Denver Basin and the Front Range physiographic provinces. Intense folding and faulting along the upthrust Front Range results in complex structure of the sedimentary beds in the vicinity which include predominantly shales, limestones and sandstones of the

Pierre, Niobrara, Benton, and Dakota formations. Regionally and locally there is a considerable amount of experience with the engineering characteristics and behavior of these formations.

Within the immediate reservoir site, geologic structure is notable by virtue of its comparative simplicity. The central interior portion of Dowe Flats lies within a southward-plunging syncline formed by warping of sedimentary strata between Indian Mountain to the west and Rabbit Mountain to the east. Figure 6.1 shows a detailed geologic map of the reservoir site. The synclinal structure produces formation contacts which generally parallel the outline of the reservoir. The central portion of the site is dominated by Pierre Shale, which is ringed by limestones, shales and sandstones of the Niobrara formation. Geologically the Niobrara formation is subdivided into the Smoky Hill and the Fort Hays members, with the former predominating in terms of thickness and area covered within the reservoir. The Benton shale underlying the Niobrara encircles the reservoir rim.

A geologic profile along the axis of the main dam is shown on Figure 6.2. Pierre Shale is the dominant formation within the middle of the the axis, extending about 1000 feet in either direction from the intermittent stream channel which bisects the reservoir site in its lowest portion. The highest section of the dam will be underlain by these shales. Adjacent portions of the main dam will be underlain by limestones, shales and sandstones of the Niobrara formation extending about 2000 and 1000 feet from the west and east abutments, respectively. The northward-extending wing dike and the eastern abutment of the main dam are underlain by limestones of the Fort Hays member of the Niobrara formation (which form the erosion-resistant ridge in the central portion of Dowe Flats) and the Benton shale.

Geologic characterization of formations beneath the damsite, particularly the Niobrara, has been supplemented by classification related to limestone utilization. According to this nomenclature, the Niobrara formation is divided into beds designated the "A-band" through "E-band" according to calcium content and chemical composition. These beds are shown on both Figure 6.1 and 6.2. While the origin of these beds lies in their differing depositional modes, it remains to be seen whether significant and consistent differences in engineering characteristics result. The most probable difference may be in rates of weathering. To this extent, effects on the dam may be reflected more in borrow depths and ground water conditions within the reservoir area than in dam foundation characteristics.

Extensive exposures of the Pierre Shale and shales of the upper members of the Niobrara formation are present in limestone mine pits about two miles south of the damsite. Excavated faces in unweathered material are generally competent and free standing at near-vertical inclinations to heights approaching 100 feet. On a very general level, this would tend to indicate a general lack of intense fracturing, major shearing, or weak discontinuities oriented adversely to the pit walls.

Where mapped in and around Dowe Flats, the Niobrara formation is described as generally sound. The Fort Hays member underlying the foundation of the wing dike has a reported joint spacing of one to three feet (Lowman, 1977), and a principal joint orientation parallel to bedding planes is anticipated. Along the wing dike, such joints will dip in an upstream direction, and as such should not pose foundation stability problems. Available information does not indicate that limestones in the Niobrara are vugular or contain solution cavities.

Portions of the Fort Hays member contain bentonite layers (Lowman, 1977) which may crop out at the bedrock surface over a zone of about 20 feet in width. Also, the Benton formation, which immediately underlies the Fort Hayes member, contains thin but laterally continuous bentonite seams. Where present near the east abutment, these beds strike perpendicular to the axis of the main dam, and should not occur over an extensive lateral distance; boring AH-10 cored into the Benton at this location did not encounter bentonite seams. Along the wing dike, however, the beds strike northward along the dam axis and outcrop near its downstream toe. More detailed future subsurface investigations should target these areas to identify the possible presence and distribution of bentonite seams, and to account for any influence they may have on the final design.

Geologic mapping of the Dowe Flats area summarized in Appendix A shows a major north-striking fault in the Dowe Pass area to the north of the reservoir site. However, this fault is not projected southward to the reservoir site, and neither available geologic mapping nor airphoto reconnaissance indicate that significant faulting should be anticipated within the reservoir or dam foundation. A small anticlinal fold is superimposed on the Dowe Flats syncline through the Niobrara and into the Pierre shale formation at the north end of the reservoir site. Distortion and folding of the beds may have produced some degree of bedding plane shearing and local fracturing, but available data provide no evidence to indicate that any such features are pervasive or should have a significant influence on dam foundation conditions.

General geologic conditions beyond the immediate foundation area are also significant to the extent that they influence stability of the reservoir rim. The slopes of Rabbit Mountain on the eastern margin of the reservoir steepen

at higher elevations becoming subparallel to bedding planes, but show no indication of large-scale instability in the recent geologic past. Intermittent shallow-seated colluvial instability and mudflow activity during flash floods are possible, but geologic evidence does not indicate that overall stability of the reservoir rim poses a threat to reservoir integrity or should be considered a potential dam safety concern.

6.3 FOUNDATION SOIL CONDITIONS

Four borings and six test pits drilled and excavated along the alignment of the main dam provide information on foundation soil conditions. The locations of borings AH-10 through AH-13 and test pits 1-6 are shown on Figure 6.1. Detailed logs are presented in Appendix B, along with the results of laboratory index tests. This preliminary field data and laboratory testing provide the basis for estimating the depth of foundation soils, classifying them, and estimating their general engineering properties and behavior according to correlations with soils of similar type.

Foundation soils consist principally of sandy clays of low to moderate plasticity classifying as CL according to the Unified Soil Classification System. High-plasticity soils were not encountered. Blowcounts measured in the borings and inspection in test pits indicate that the soils are generally stiff to very stiff.

Soil depths interpolated from boring and test pit logs are shown in profile along the main dam axis on Figure 6.2. Along the western portion of the axis, soils are thin, ranging from about two to five feet in depth. In this western area, soils tend to have higher sand content, lower plasticity,

and a considerable proportion of coarse sand to gravel-sized, angular limestone and shale fragments as illustrated by the logs of test pits 5 and 6 and borings AH-12 and AH-13. Along the eastern portion of the dam alignment soils are uniformly clayey and range in depth from 15 to 19 feet in borings drilled in this area. Test pits 1 through 3 excavated to depths of 10 to 12.5 feet did not encounter bedrock.

Test pits 3 and 4 excavated in the central portion of the dam alignment encountered coarse sands and gravels beneath the clay at depths of 7.5 and 9.5 feet, respectively. The composition of these gravelly soils indicates that they owe their origin to intermittent high-velocity runoff in former stream channels originating from canyon mouths on Rabbit Mountain to the east and northeast. This interpretation suggests that other such buried stream-channel deposits may be present in the foundation, and that the existing pattern of shallow drainages originating from Rabbit Mountain may provide an indicator of their locations.

6.4 BEDROCK FOUNDATION CONDITIONS

Boreholes AH-10 through AH-13 along the alignment of the main dam were drilled to depths ranging from 37 to 81 feet. Interpretation of bedrock engineering characteristics is based on data from these borings, which were continuously NX cored and continuously packer tested in bedrock. Detailed logs and packer permeability test data are provided in Appendix B.

The borings are portrayed in profile on Figure 6.2 together with the geologic formations penetrated. Bedrock of the various formations has been logged for engineering purposes primarily as claystone and shale, with the Fort Hays member logged as limestone. Much of the shale and claystone is

moderately to highly weathered. The weathering is manifested by a general reduction in hardness of the rock and a tendency for joint faces to assume a crumbly texture, sometimes with a soil-like infilling of a clayey nature. However, even the weathered rock retains its basic integrity, and weathering does not result in materials which would classify as "clay-shales." The soil/bedrock interface is reasonably distinct, and there is no saprolitic weathering profile. These observations are significant to the extent that they indicate the bedrock, although weathered, to be largely free from extensive zones of low-strength, high plasticity clays or slickensided shears with the possible exception of local zones in the Benton and Fort Hays formation as previously discussed.

The degree of rock fracturing is generally low to moderate. RQD (Rock Quality Designation) values classify as fair to excellent according to the nomenclature of Deere, et al. (1967). RQD values less than 50 are encountered generally only within the upper 10 feet. Average RQD over the entire cored length of each borehole ranges from 68 percent in borings AH-12 and AH-13, to 83 percent in boring AH-11, to 90 percent in boring AH-10. RQD values are portrayed on Figure 6.2 and on the logs in Appendix B for the individual core runs. As expected, fracture orientation with few exceptions generally parallels the bedding.

So-called "packer" or pressurized borehole permeability tests are useful in assessing the perviousness of the bedrock. With only two exceptions all of the packer tests performed resulted in no water take, indicating that jointed bedrock zones are generally tight and that the foundation as a whole is of very low permeability. The highest permeabilities included values of approximately 10^{-5} cm/sec in the uppermost 10 feet of rock in boring AH-11, and of

10^{-3} cm/sec in the uppermost 20 feet of boring AH-12. The latter value is moderately high and correlates with a surficial zone of low RQD. Higher permeability in this near-surface zone can be explained by observations made during excavation of the nearby Test Pit 5, where slabby limestone blocks excavated by a backhoe revealed the presence of open joints which were only partly infilled with a calcareous precipitate. This surface effect from joint opening due to stress relief is not unexpected and does not detract from the overall soundness and low permeability of the bedrock that available data suggest.

6.5 GROUND WATER

Ground water was encountered in a number of borings and test pits as indicated on the logs in Appendix B. Only shallow near-surface ground water is of concern from a dam design and construction standpoint; the presence or characteristics of any deeper aquifers beneath the site are not addressed.

Along the dam alignment, shallow ground water was encountered generally in the vicinity of the intermittent stream channel which flows down the central portion of the site. Specifically, previously-described buried stream channel gravels in the Test Pits 3 and 4 were water-bearing, with inflows encountered at depths of 7.5 and 9.5 feet. Water was measured at depths ranging from 5.4 to 14 feet in borings along the eastern half of the alignment. Irrigation occurs throughout much of the site and may affect measured ground water levels.

Elsewhere within the reservoir, ground water is known to emerge as springs. Two are shown on Figure 4.3, one at the extreme north edge of the reservoir in the central portion of the site, and the other at the mouth of a

side canyon on Rabbit Mountain just within the reservoir margin. In addition, a closed surface depression near the location of boring AH-1 intermittently ponds water. Near-surface ground water present in the northern portion of the western half of Dowe Flats is believed to originate as seepage from the St. Vrain Canal, which may also enter the reservoir site.

An overall pattern is suggested by these observations together with geologic inferences. Recharge to the shallow surface aquifer probably is derived mostly from seasonal runoff from the side canyons of Rabbit Mountain to east, infiltration from irrigation, and from surface drainage and possible canal seepage to the north. Vertical infiltration is likely retarded by the low-permeability bedrock which forms a perching layer, with buried subsurface alluvium such as that encountered in Test Pits 3 and 4 providing major conduction zones, possibly under locally-confined (artesian) flow conditions.

These interpretations suggest that ground-water depths in the dam foundation and throughout the reservoir area are bedrock-dependent, recharge-dependent, and influenced by the local presence of streamchannel alluvium. This, in turn, indicates that ground-water depths may be erratic throughout the dam foundation and reservoir area. To the extent that the bedrock surface may be variable and "wavy" due to differential erosion of the various beds, ground water following the erosional surface may vary in depth over relatively short distances, emerging as springs or areas of saturation where soil cover is shallow. Also, higher ground water levels in the local vicinity of runoff sources, principally near and downstream from the larger side canyons on Rabbit Mountain, can be expected. Finally, irrigation diversions probably have a significant influence on ground water and soil saturation conditions, and ground-water levels may undergo seasonal variations of as much as several feet as a result.

These conditions indicate that dewatering will be required during excavation of the dam cutoff, at least over the central to eastern portion of the main dam alignment. Further ground water implications related to borrow areas are discussed subsequently.

7.0 SEISMICITY AND LIQUEFACTION

7.1 SEISMIC HISTORY

Figure 7.1 shows a plot of historic earthquakes recorded within a 100-mile radius of the site obtained from the National Oceanic and Atmospheric Administration (NOAA) earthquake data file. Only events greater than magnitude (M) 4.0 or Modified Mercalli Intensity (MMI) 5 are shown. The largest recorded event was the 1965 earthquake of M 5.3 and MMI 7 near Denver. This earthquake, along with the remainder of the epicentral cluster shown southeast of Dowe Flats on Figure 7.1, was produced by deep fluid injection at Rocky Mountain Arsenal from 1962 to 1967 (Kirkham and Rogers, 1981). Other historic events outside this cluster are M 4.7 or less. Possibly the most significant but least understood earthquake believed to have affected the vicinity is not illustrated. The earthquake of November 7, 1882 was felt in Denver with local MMI of 7, with other felt reports in much of Colorado as well as Wyoming and Utah. Magnitude estimates range from 5.0 to 6.7, but neither magnitude nor epicentral location have been reliably established, and discussion of this event in the technical community continues.

7.2 SEISMOTECTONIC SETTING

Dowe Flats lies on the boundary between the Eastern Mountain and the Plains seismotectonic provinces defined by Kirkham and Rogers (1981). This seismotectonic boundary generally follows the boundary between the Front Range and Denver Basin physiographic provinces discussed in Appendix A. The Plains province to the east is free of known Quaternary faulting, generally free of historic seismicity except that induced artificially, and generally considered

to be of low seismic potential. The Eastern Mountain province contains considerable Laramide and late Paleozoic faulting. However, there is scant evidence for Quaternary movement on any of the faults in the province. The Golden fault extending along the Front Range from Turkey Creek to Coal Creek was formerly believed to show Quaternary movement (Kirkham and Rogers, 1981), but subsequent studies have shown it to be much older (Darrow and Kruse, 1981). In fact, the only well-documented Quaternary faulting in Colorado is that related to the Rio Grande rift, which extends into central Colorado as far northward as Buena Vista and clearly displays associated historic seismicity. However, this seismic source zone is too distant from Dowe Flats to have a controlling or even significant influence on its seismic risk. In the Dowe Flats vicinity and elsewhere in most of Colorado earthquakes do not appear to be generally associated with known active faulting or well-recognized geologic structures.

The lack of active faulting and low historic seismicity, however, does not necessarily imply absence of seismic risk at the Dowe Flats site or elsewhere in the state. Significant earthquakes are considered possible, although their location is difficult to predict and attenuation of ground motion (which controls the rate at which earthquake effects diminish with distance) is poorly understood for this region. Algermissen et al., (1982) have assigned a maximum magnitude of 6.1 to seismic source zones adjacent to Dowe Flats. The likelihood of occurrence of such a seismic event and its spatial location are best accounted for using a site-specific probabilistic seismic risk model (McGuire, 1976) during more detailed design studies.

7.3 LIQUEFACTION POTENTIAL

Seismic liquefaction is a phenomenon whereby pore pressures may be generated during seismic shaking in loose, saturated, cohesionless sands and silts. These pore pressures, in turn, may lead to loss of strength or excessive deformation of the soil during or shortly after an earthquake of sufficient magnitude, duration, and proximity. Clayey soils such as those present within most of the dam foundation are not susceptible to liquefaction. However, liquefaction may be a possible concern to the extent that cohesionless layers may be encountered in subsequent explorations.

Figure 7.2 provides a plot of observed occurrences of liquefaction on level ground which has been used as a screening device to evaluate the potential for liquefaction in dam foundations (Smart and von Thun, 1983). It indicates that for liquefaction to be possible in any cohesionless materials which might be present in the foundation, a M 5.5 earthquake would have to occur directly beneath the site, or a maximum magnitude 6.1 event within about 6 miles. Both possibilities are considered extremely unlikely given the fact that no faults or recognized features of tectonic significance within this radius show evidence of movement since the late Cretaceous period. Even with the occurrence of such seismic events, liquefaction could be precluded by sufficient in-place density of the materials. Considering these factors, the possibility of foundation liquefaction is considered extremely remote. This should be confirmed by simplified liquefaction analyses such as those proposed by Seed and Idriss (1983) for any cohesionless sands or silts which may be identified in the foundation during future investigations.

8.0 PRELIMINARY EMBANKMENT DESIGN

8.1 EMBANKMENT CONFIGURATION

The approximate embankment geometry and the internal arrangement of different soil types within it have been designed based on the available preliminary data. Detailed embankment design depends a great deal on engineering properties of both fill and foundation materials measured in the laboratory (such as strength and permeability) together with design analyses which incorporate these properties. Preliminary design for the embankment has been based on the results of field explorations performed to date, engineering properties estimated using correlations with generally similar soils, simplified analyses, and engineering judgement. All of these elements remain to be confirmed and supplemented by more detailed investigations in order to refine and modify the design. Recognizing the requirements for further investigations, the intent of the preliminary design evaluation is to help identify any critical design or construction problems as early as possible in the investigation process, and to provide a guide for further evaluations. Also, the preliminary evaluation is intended to establish the technical feasibility of the design concept.

As detailed in Section 5.4 of this report, the preliminary design is based on an embankment crest elevation of 5400. Design provisions have been incorporated to allow the embankment to be raised to elevation 5450, estimated to be the maximum elevation desirable on the basis of marginal fill efficiency and constraints on on-site fill availability. Three principal criteria for future raising have been anticipated by the preliminary design. First, the alignment of the initial proposed embankment has been offset a sufficient

distance from the site boundary to allow for placement of additional embankment fill as the base of the higher embankment widens. Second, the internal zoning of the initial embankment has been established such that fill added to raise the embankment would be needed only downstream of the original centerline. This would allow future raises of the embankment to be constructed without lowering the reservoir or taking it out of service during the construction period. Third, drainage zones within the original embankment have been sized to handle the increased quantity of internal seepage which would come about due to potential future raising. This factor has required seepage analyses which exceed the scope ordinarily addressed in the context of preliminary design.

The proposed embankment is shown in relation to the maximum embankment on the uppermost portion of Figure 8.1. Upstream and downstream slope inclinations of 3:1 and 2.3:1, respectively, have been selected based on preliminary analyses and experience. Also shown on Figure 8.1 is the most significant feature of the preliminary design: an internal drainage system consisting of an inclined chimney drain and a horizontal blanket drain. The function of the chimney drain is to protect downstream portions of the embankment from saturation, while the blanket drain carries seepage discharge from the chimney drain safely along the base of the embankment outward to its downstream toe while also providing an additional defense against pore pressures induced by foundation seepage. The absence of saturation in the downstream shell materials reduces restrictions necessary in their specifications; subject to minimum strength and compaction requirements, they may consist of nearly any available

soil type. The net affect is to greatly increase the flexibility and utilization of available soils in the embankment, a factor expected to become more important as fill quantity requirements increase along with greater embankment height.

The proposed embankment at crest elevation 5400 is shown in plan view on Figure 8.4. The maximum height is approximately 110 feet. The wing dike on the west abutment extends about 40 feet above the crest of the limestone ridge, becoming lower as the ridge rises to the north.

8.2 INTERNAL ZONING

Against the background of this design concept, preliminary internal zoning established for the proposed embankment is depicted on Figure 8.2. Again, the intent of the zoning is to maximize flexibility in use of available on-site fill soils. This is accomplished with a central vertical core of Zone 1 clays and sandy clays. The core is flanked by Zone 2 upstream and downstream shells of generally unrestricted soils found within the reservoir including clay, clayey sand, silty sand and silty gravel, with the distribution of these materials governed by their respective proportions encountered in borrow pits.

Upstream slope protection is provided by Zone 6 riprap, consisting of sound rock fragments grading from approximately 3 to 18 inches. Riprap suitability and sources will be governed by hardness and durability requirements, as well as fragmentation characteristics usually determined by test quarrying. The riprap is underlain by Zone 5 bedding of sand and gravel to prevent erosion undermining of the coarser riprap. Bedding specifications are often not restrictive and can frequently be met using pitrun materials with selective

excavation if necessary. Soil-cement could be considered as an alternative method of upstream slope protection if demonstrated to be technically and economically feasible by more detailed investigations.

Special consideration has been devoted to estimating the approximate thickness and permeability requirements of the Zone 3 chimney drain and Zone 4 blanket drain. A flow net analysis has been performed for the maximum raised dam section as shown on Figure 8.3. The application of flow net seepage analysis to drain sizing is well documented in the technical literature (Cedergren; 1967, 1973) and is not explained herein. Assumed boundary conditions and permeabilities are shown on the uppermost portion of Figure 8.3. Based on correlations with soil types similar to those encountered in the preliminary field explorations (Bureau of Reclamation, 1973) the permeability of Zone 1 core materials and foundation materials to the depth of zero packer take in the field is assumed to be 10^{-6} cm/sec. Headloss within the upstream Zone 2 shell is conservatively neglected by assuming infinite permeability.

A flow net drawn to transformed scale for these conditions is shown on the lower portion of Figure 8.3. By allocating total seepage inflow to the chimney drain according to the number of flow channels it intercepts, the calculations show that a Zone 3 chimney drain thickness of about 0.5 feet is required assuming a permeability of 10^{-3} cm/sec for this material, corresponding generally to that for a clean, well-graded sand. The significance of the computed thickness is that the width of Zone 3 will be governed by practical construction considerations rather than theoretical requirements. On this basis the minimum Zone 3 width is estimated as 6.0 feet as shown on Figure 8.2.

Calculations on Figure 8.3 also show a required blanket drain thickness of 2.8 feet assuming a permeability of 10^{-2} cm/sec. To obtain this permeability will probably require a more gravelly material likely needing filter protection above and below. To account for the combined thickness of the drain and associated filters, a Zone 4 thickness of 5.0 feet is estimated as shown on Figure 8.2.

8.3 FOUNDATION TREATMENT

Available subsurface data for the dam foundation discussed in Sections 6.0 and 7.0 suggest that the foundation soils overlying bedrock are generally firm and of low potential liquefaction susceptibility. These materials are considered competent to support the embankment, and extensive required foundation excavation in excess of routine stripping is not anticipated at this time.

A cutoff beneath the Zone 1 core excavated to ripping depth into weathered bedrock is shown on Figure 8.2. The excavation depth is presently anticipated to range from about 3 to 20 feet. Filter protection using Zone 3 graded materials will be required locally on the downstream side of the cutoff where it penetrates buried alluvial channel deposits of coarse, gravelly materials.

Data from permeability testing in foundation bedrock is discussed in Section 5.4. While further field testing will clarify relationships between permeability, stratigraphy, fracturing, and weathering, the present data suggest that semipervious to pervious bedrock conditions will be encountered only locally and to relatively shallow depth. The preliminary design incorporates a modest confirmation grouting program to identify and grout these more pervious zones. A preliminary grouting depth to approximately 30 feet

below the bedrock surface is estimated on the basis of available data. Actual depth and hole spacing requirements will depend on grout take during grouting operations, but a single-row grout curtain with primary holes on 20-foot centers is generally consistent with the intent of the preliminary design.

8.4 FILL MATERIALS AND AVAILABILITY

Fill quantities have been calculated for the proposed embankment to crest elevation 5400 using slope geometry, crest width, and internal zoning shown on Figure 8.2. Material types, quantities, and sources are tabulated below.

TABLE 8.1
EMBANKMENT FILL QUANTITIES

<u>ZONE</u>	<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>QUANTITY (yd³)</u>	<u>SOURCE</u>
1	core	clay, sandy clay	2,595,000	Borrow areas A-D
2	upstream and downstream shell	clay, clayey sand, silty sand, silty gravel	2,815,000	Borrow areas A-D
3	chimney drain	processed sand	101,000	off-site
4	blanket drain	processed sand and gravel	190,000	off-site
5	riprap bedding	pitrun sand and gravel	127,000	off-site
6	riprap	shot rock	<u>127,000</u>	off-site
	TOTAL		5,955,000	

The source of Zone 1 and Zone 2 materials is intended to be reservoir area below elevation 5400. Borrow areas designated A through D have been defined in this area as shown on Figure 8.4, which also indicates the locations of borings and test pits upon which borrow calculations are based.

Available fill quantities depend not only on the depth of soil, but also on its moisture content. At excessive moisture contents compaction of fill to adequate densities is precluded and mobility of excavating equipment is reduced. Based on laboratory compaction test data in Appendix B, a moisture content of 18 percent has been selected to define the limiting value for suitable borrow materials. Preliminary data in the potential borrow areas consists of widely-spaced borings and test pits together with limited moisture content data, and interpretation of this limited data has necessarily involved interpolation over wide distances and the exercise of considerable judgement. Within these confines, Table 8.2 below shows approximate estimated quantities of suitable material in borrow areas A through D.

TABLE 8.2
APPROXIMATE ESTIMATED ON-SITE BORROW QUANTITIES

<u>BORROW AREA</u>	<u>AREA (acres)</u>	<u>ESTIMATED AVERAGE DEPTH (feet)</u>	<u>QUANTITY (yd³)</u>
A	77	9.0	1,100,000
B	31	5.0	300,000
C	145	5.0	1,200,000
D	<u>97</u>	8.0	<u>1,300,000</u>
TOTAL	350		3,900,000

While considerably more investigation is required to accurately define available borrow quantities, interpretation of present data shows a shortfall of 1.5 million cubic yards in available material compared to the combined Zone 1 and Zone 2 requirements of 5.4 million cubic yards. However, the depth of soil considerably exceeds the depths shown on Table 8.2, which are constrained largely by moisture content. Particularly in the central portion of the site

near the existing stream channel and at higher elevations throughout the eastern half of the site, considerably greater depths of soil are present but their usefulness as borrow is restricted by high moisture content and/or high ground water levels.

As discussed in Section 6.5, shallow ground water and soil moisture conditions may be erratic throughout the site, and are probably influenced to a considerable degree by irrigation and seasonal runoff from the northern and eastern slopes around Dowe Flats. This situation suggests that a drainage system to intercept runoff and shallow ground water could be effective in reducing overall moisture content and increasing the quantity of available Zone 1 and Zone 2 fill. Such a system, implemented several seasons in advance of construction, could consist of open trenches excavated to bedrock and the termination of irrigation. Trenching and deepening the intermittent stream channel in the central portion of the site could be particularly effective in reducing saturation levels in this area. Also, trenches extending to the canyon mouths on Rabbit Mountain could, by intercepting seasonal surface runoff and dewatering spring discharges, increase the depth of potentially usable soils in the eastern half of the site which are indicated to extend up to 20 feet deep in many areas. It is believed that predrainage measures can effectively resolve the shortfall in Zone 1 - Zone 2 borrow predicted by preliminary data. More extensive subsurface investigation in the borrow areas both prior to and after site drainage will be required to confirm this conclusion.

Sand and gravel deposits potentially suitable for Zone 3, 4, and 5 materials are present along St. Vrain Creek within two miles of the damsite. Gradation specifications for these zones will be governed by filter compatibility

with adjacent soils, and - in the case of Zone 3 and Zone 4 - permeability considerations. Washing and screening of pitrun materials for Zone 3 and 4 would probably be required to meet typical specifications.

Suitability of materials for riprap is subject to two criteria: acceptable gradation and size distribution of rock fragments from blasting operations, and suitable soundness and durability. The former must be determined from test quarrying, and the latter from a combination of geologic factors, laboratory test data, and experience. Likely sources for riprap are available near the site. Sound, igneous rock is available from commercial quarries about two miles southwest of Lyons. Also, sandstone of the Lyons formation has been used for riprap and has performed well on Soldier Canyon Dam (Esmiol, 1968). It outcrops extensively on the west side of Indian Mountain adjacent to Dowe Flats. Either of these materials would provide likely sources for suitable Zone 6 riprap subject to acceptable fragmentation and gradation.

It may be of significant economic advantage to obtain riprap on-site, even if the properties of the rock are marginal and require periodic maintenance of the riprap layer. To this end, laboratory abrasion and soundness tests were performed on a sample of Fort Hays limestone as reported in Appendix B. The test results are not conclusive, but suggest that detrimental clay partings may be present. Further evaluation of Fort Hays limestone is warranted, however, including petrographic analysis, laboratory absorption testing, and freeze-thaw testing. Similar evaluations should be conducted for Dakota sandstone if there is potential for development of riprap quarries along outcrops of this formation at higher elevations on Rabbit Mountain. Facies of the Dakota sandstone have been used for riprap for Kanopolis Dam in Kansas, although some maintenance and repairs have been necessary (Lutton, et al., 1981).

9.0 SUMMARY AND CONCLUSIONS

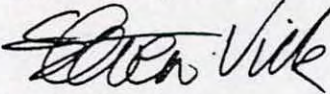
Sizing studies for the Dowe Flats Reservoir indicate that the eastern portion of Dowe Flats provides the most efficient reservoir site. Reservoir sizes providing 5900 to 68,000 acre-feet of storage capacity have been investigated. A dam and reservoir to approximately elevation 5400 and providing about 28,000 acre-feet of storage best suits efficiency and fill availability characteristics of the site. The preliminary embankment design prepared on this basis incorporates provisions to increase reservoir storage to approximately 68,000 acre-feet, the maximum size likely to be technically feasible at this site without importing large quantities of off-site embankment fill.

Preliminary subsurface explorations and geologic evaluations indicate dam foundation conditions to be generally favorable and suitable for an earthfill embankment of the proposed size. Foundation soils and bedrock are both generally competent and of low permeability, as indicated by present data. Extensive required foundation excavation is not anticipated, and a modest foundation grouting program is indicated for treating local areas of moderate bedrock permeability.

The preliminary embankment design consists of a zoned, central-core earthfill structure incorporating chimney and blanket drainage. Based on interpretation of available data, it is believed that adequate quantities of suitable fill soils are present within the reservoir area, but predrainage by trenching to channelize and divert runoff and springs will be necessary to augment estimated borrow quantities presently constrained by moisture content. Lesser quantities of sand, gravel, and riprap from off-site but nearby sources will be required.

Because designs for earthfill dams are based on detailed geologic conditions and local availability of materials for construction, they usually go through several stages as exploration, testing, and analyses yield more definitive data. Considerable further subsurface exploration, laboratory testing, and analyses will be necessary prior to final design to refine and modify the preliminary embankment design presented herein. Surface-water hydrology, flood-routing, and investigations for hydraulic structures will also be necessary. However, the available data do not indicate the presence of geologic flaws within the proposed site which would preclude reservoir construction or safe design of the embankment. In our opinion, the available data are sufficient to demonstrate that the preliminary embankment design is technically feasible from a geologic, geotechnical, and construction standpoint.

Respectfully submitted,



Steven G. Vick
Geotechnical Section Head
Professional Engineer 16738
State of Colorado

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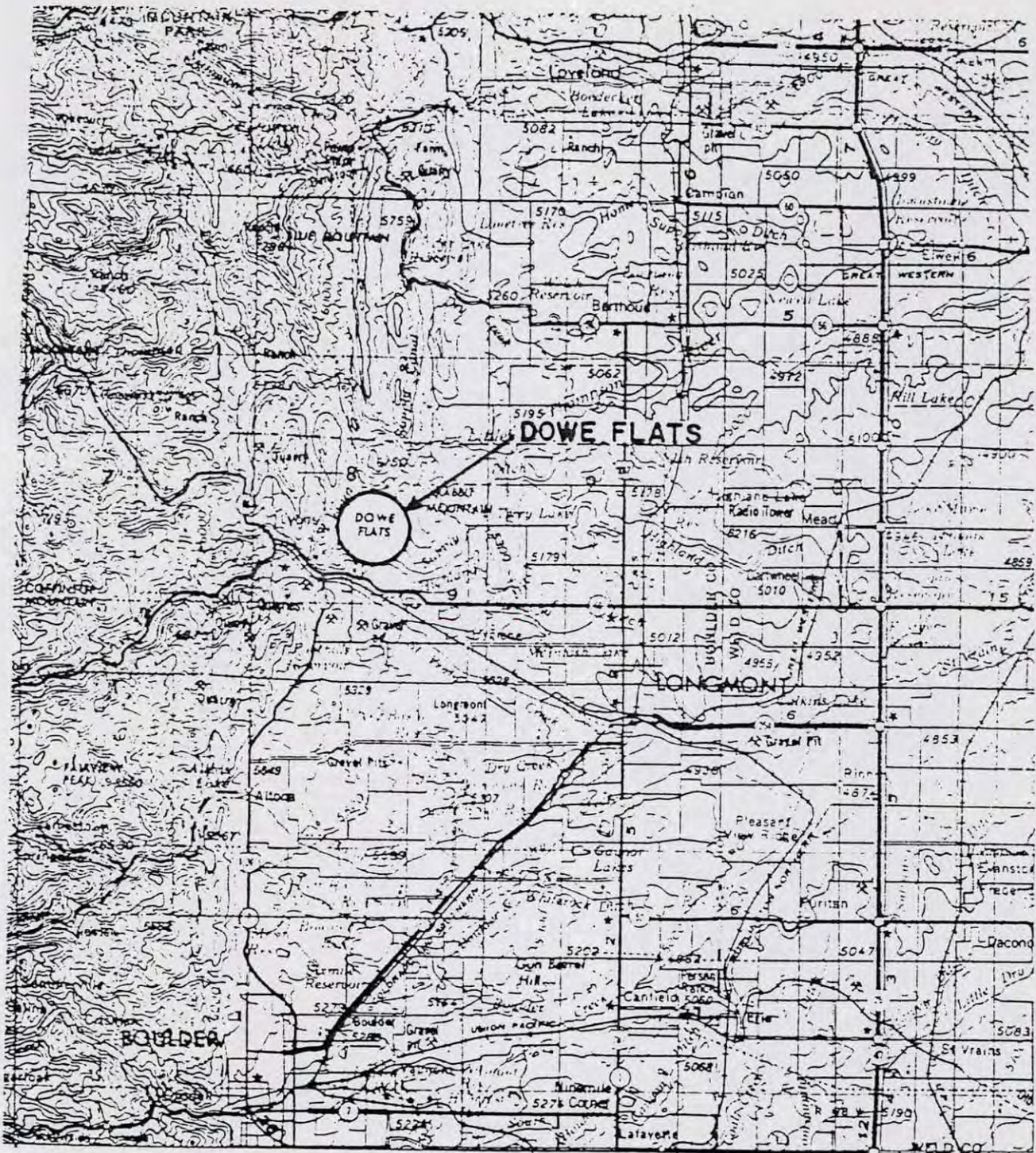
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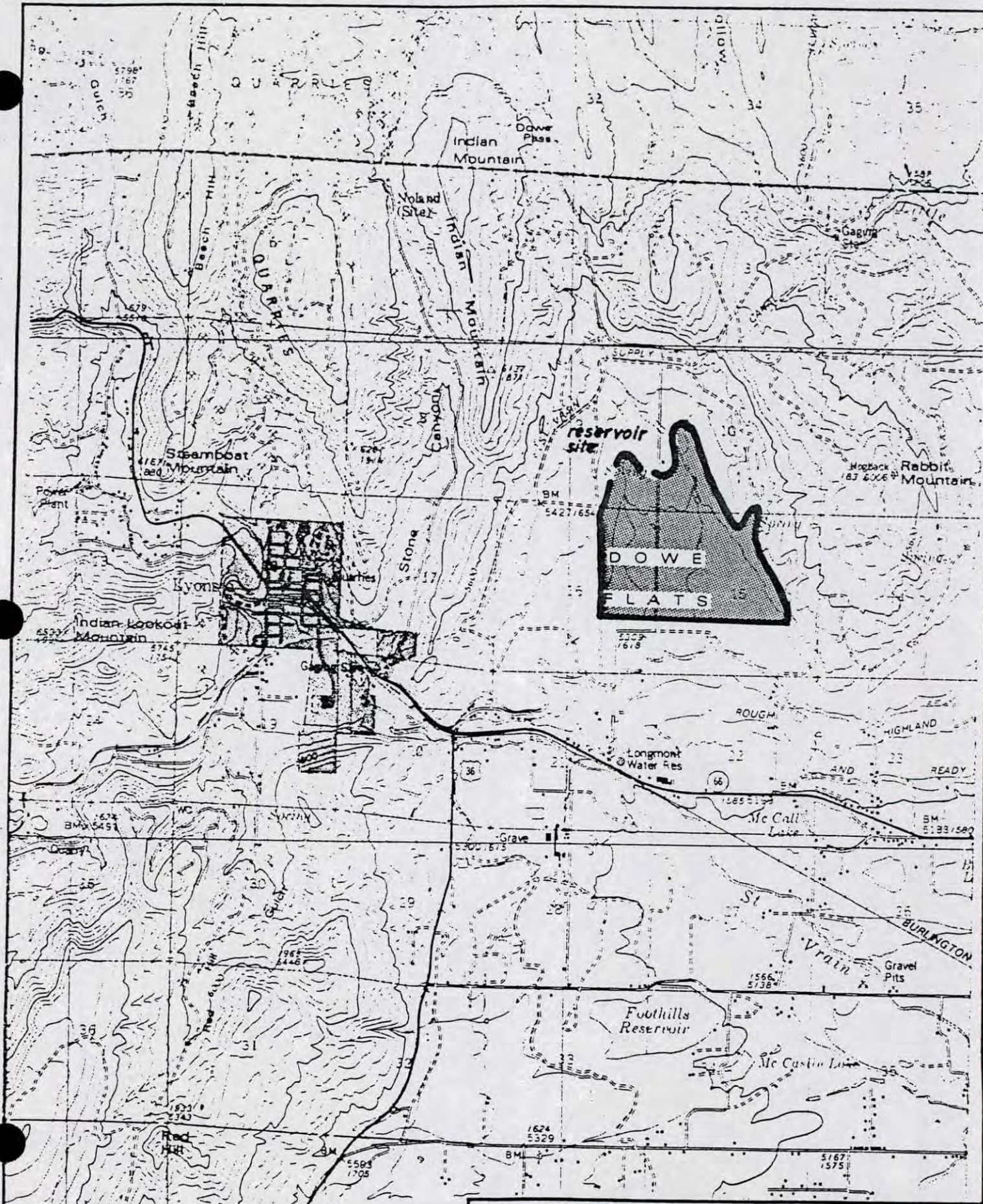
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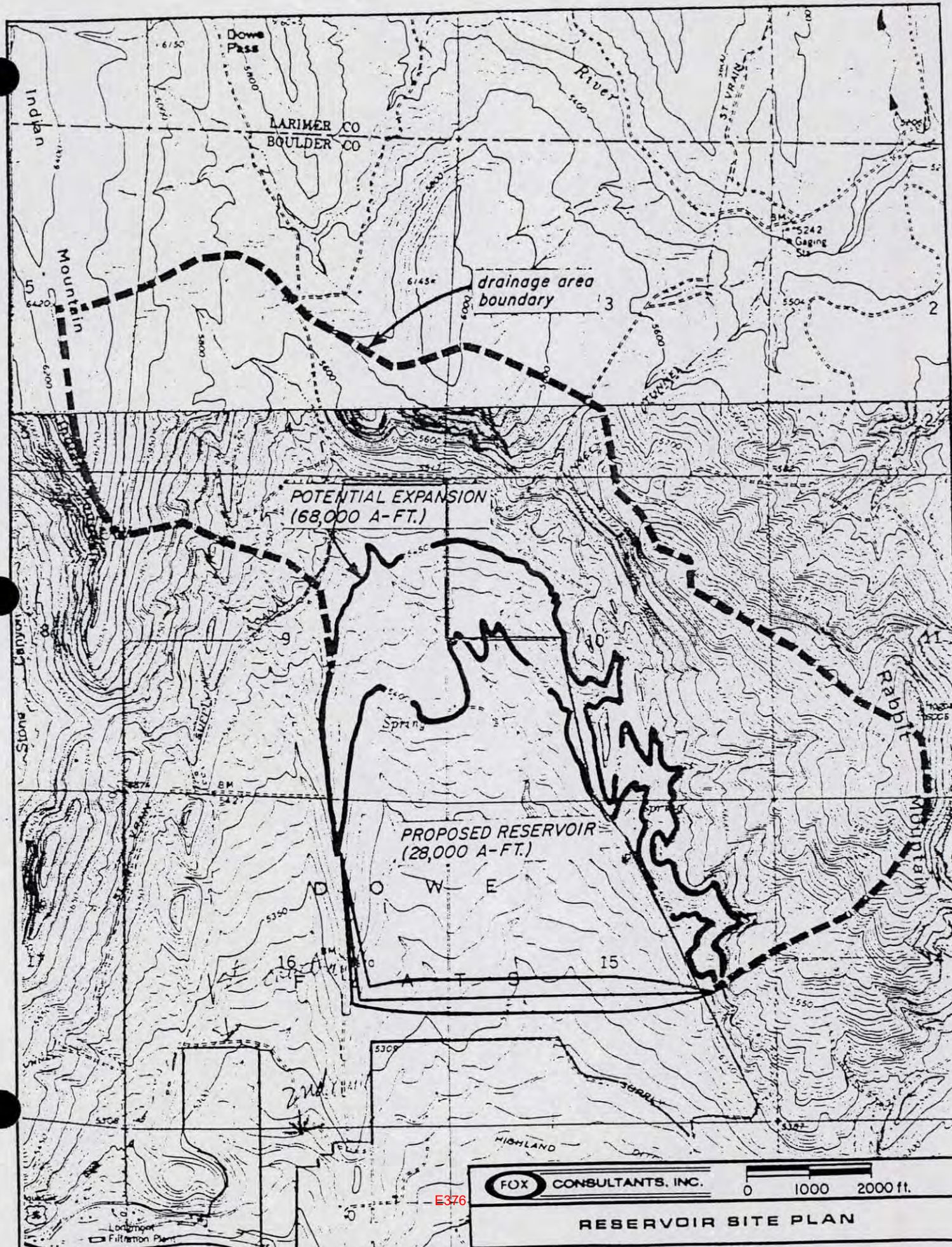
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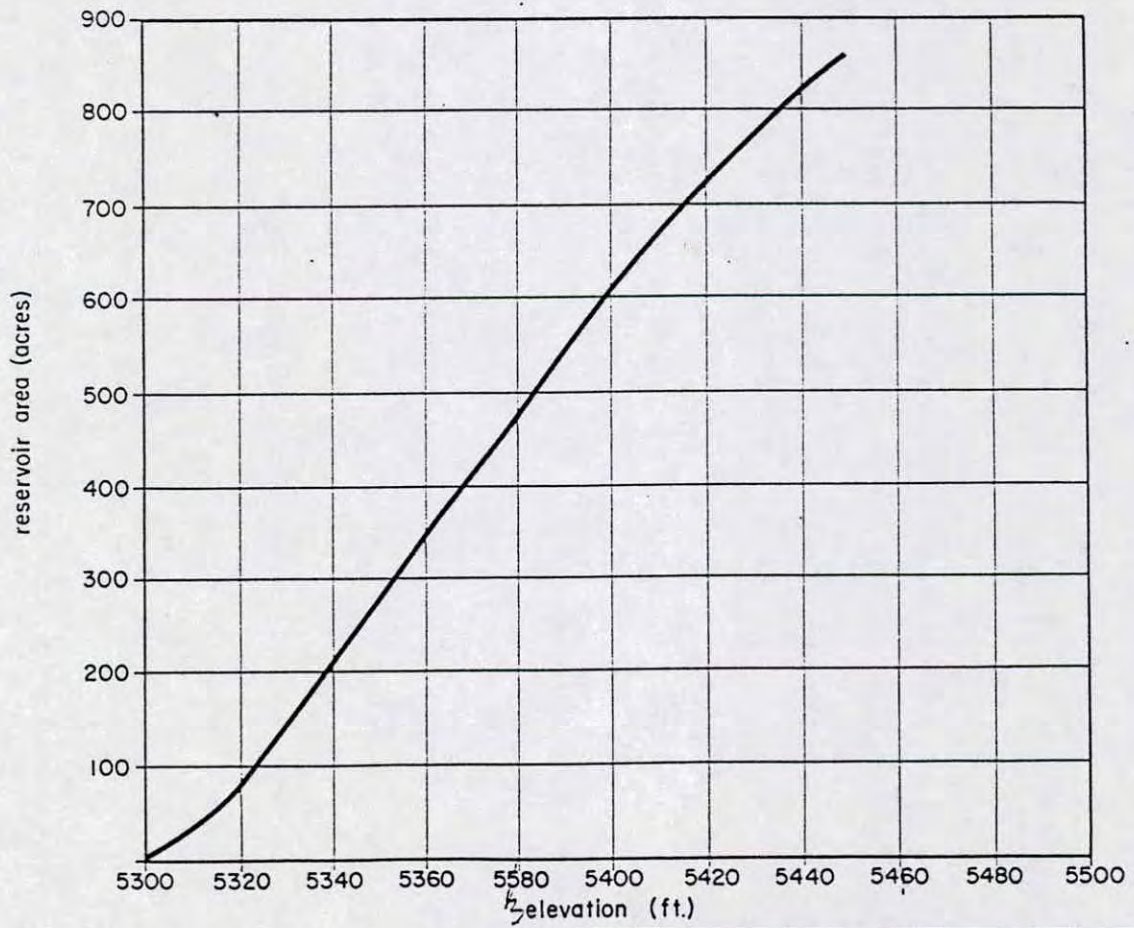
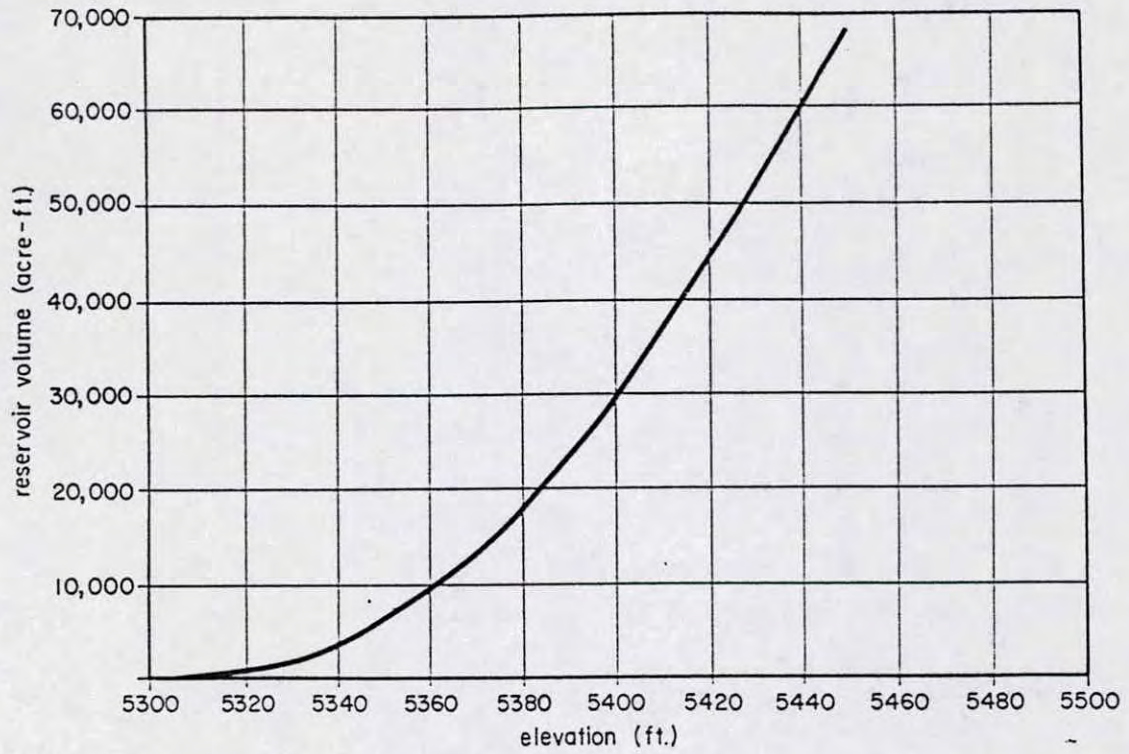


FOX CONSULTANTS, INC.

0 1000 2000 ft.

RESERVOIR SITE PLAN

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RESERVOIR AREA-CAPACITY CURVES

FIGURE 5.1

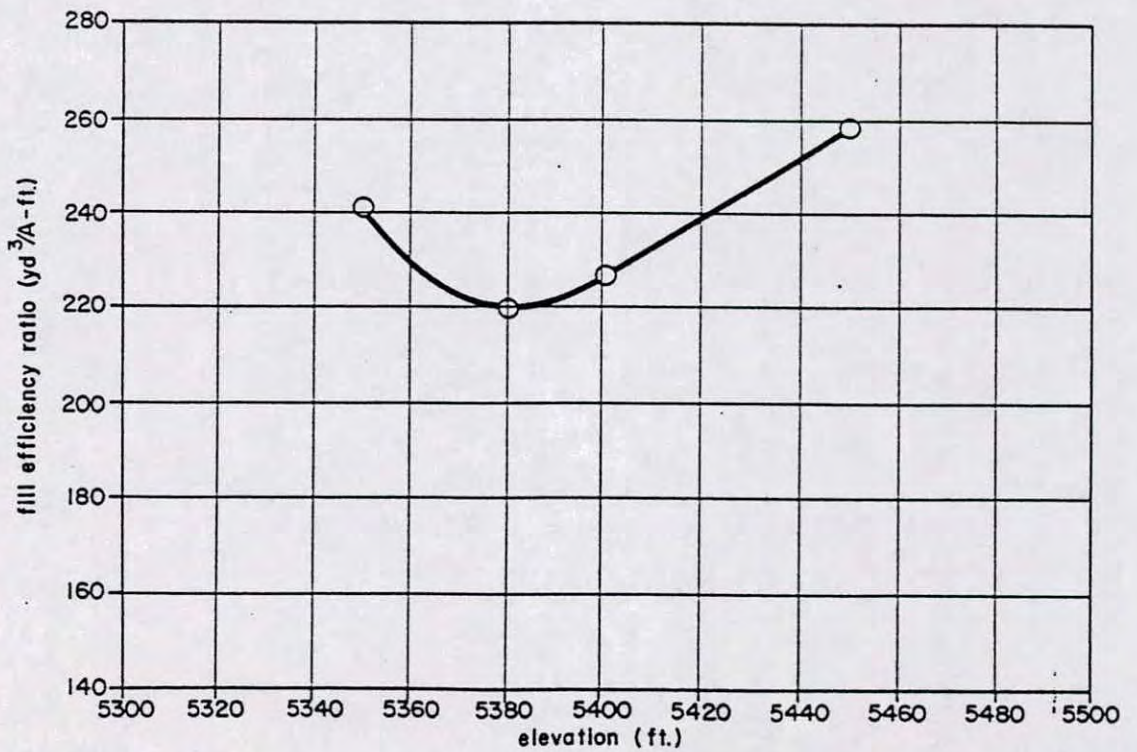
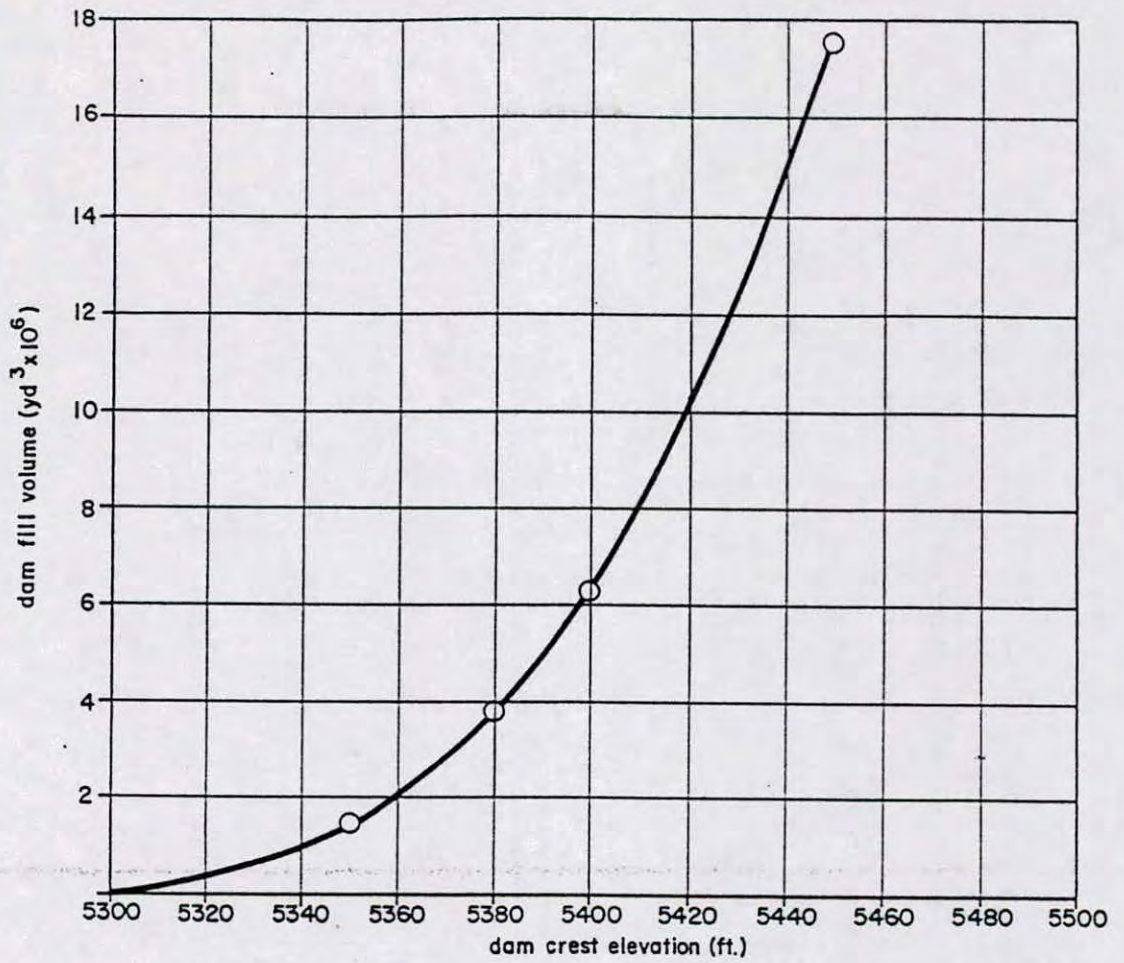


Fig 5.2 E378

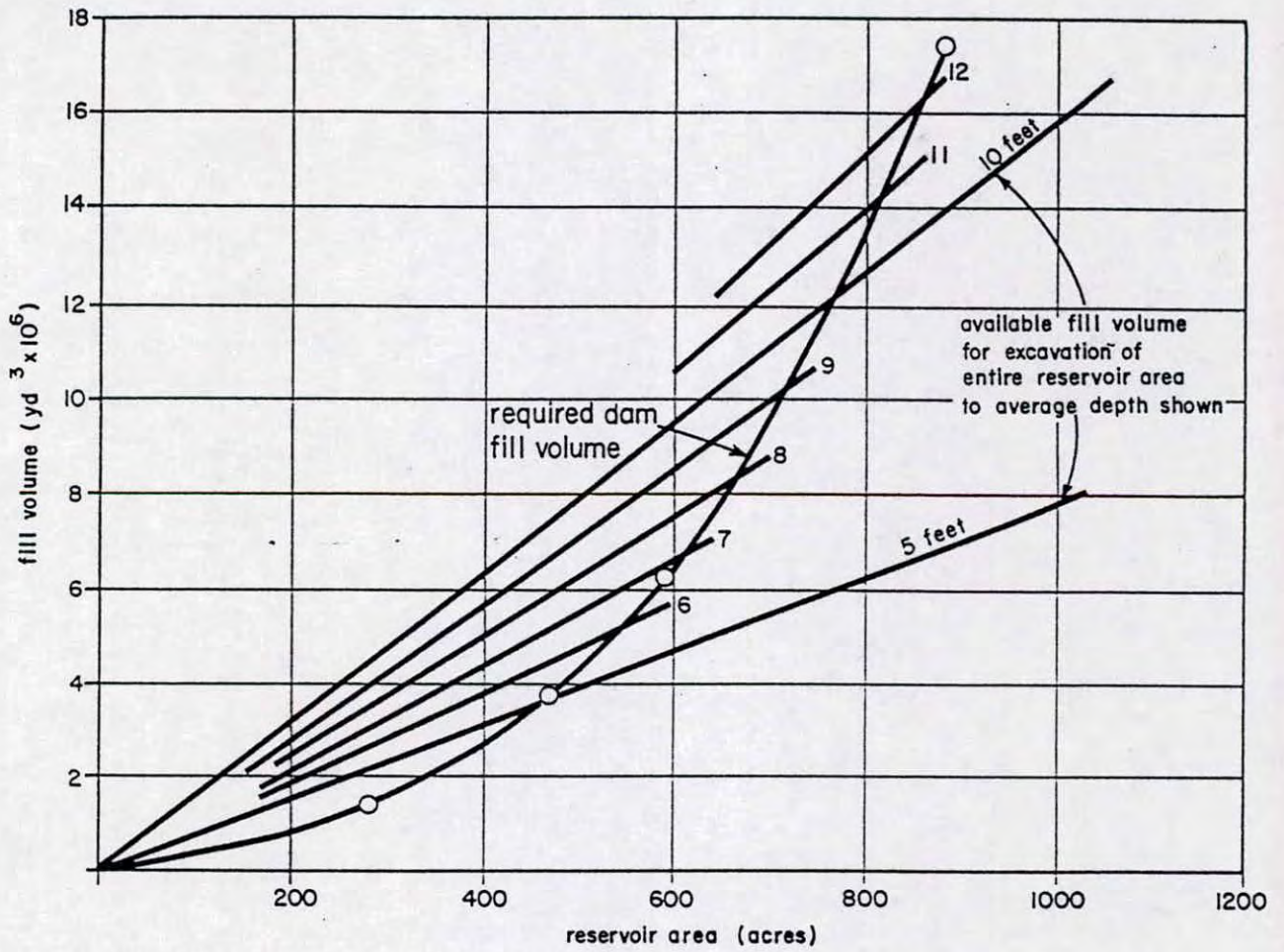
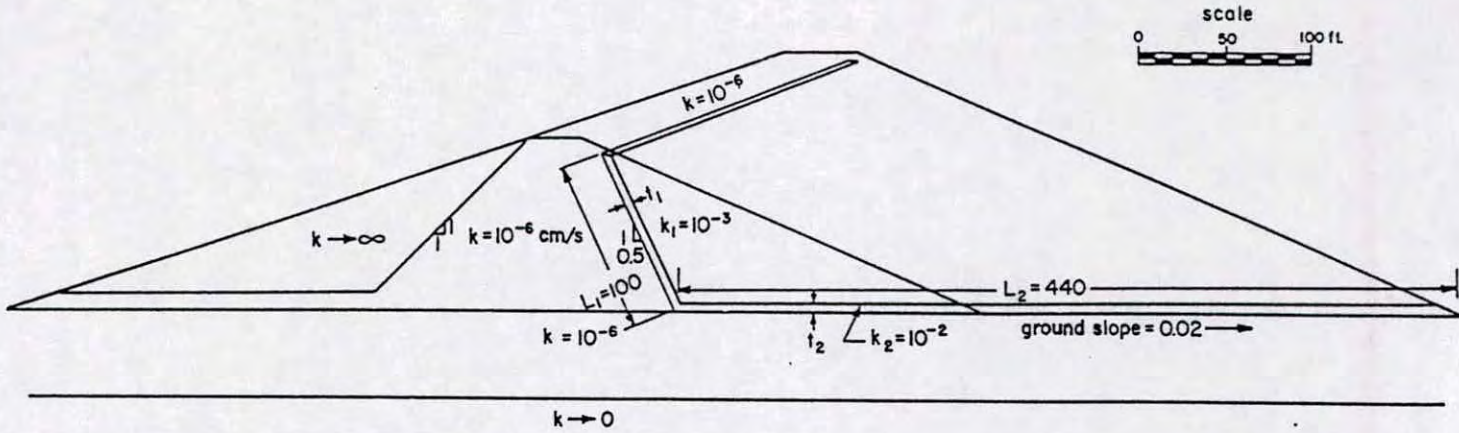


Fig. 5.3

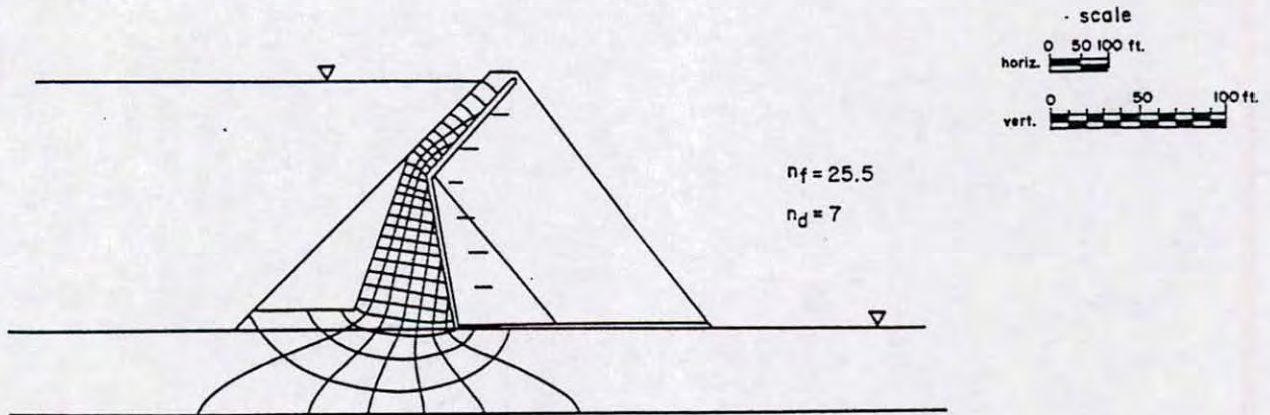


Maps
6.1 6.2
7.1, 8.1
8.2, 8.4

ASSUMED PERMEABILITY AND BOUNDARY CONDITIONS



FLOW NET
TRANSFORMED SECTION ($k_h/k_v = 9$)



DRAIN ZONE SIZING

from flow net: $Q_{total} = (H)(k)(n_f/n_d) = (150 \text{ ft})(1 \text{ ft/yr})(25.5/7) = 550 \text{ ft}^3/\text{yr per L.F.}$

chimney drain: $n_f = 22$; $Q_1 = (550)(22/25.5) = 475 \text{ ft}^3/\text{yr}$; $k_1 = 1000 \text{ ft/yr}$; $i = \frac{90}{100} = 0.9$
 $t_1 = \frac{Q_1}{k_1 i} = \frac{475}{(1000)(0.9)} = 0.5 \text{ ft}$

blanket drain: $Q_2 = 550 \text{ ft}^3/\text{yr}$; $k_2 = 10,000 \text{ ft/yr}$; $i = 0.02$
 $t_2 = \frac{Q_2}{k_2 i} = \frac{550}{(10,000)(0.02)} = 2.8 \text{ ft}$

Fig. 8.5

APPENDIX A
GEOLOGY OF THE DOWE FLATS AREA
BOULDER COUNTY, COLORADO

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<u>FIGURE NO.</u>	<u>TITLE</u>
3.1	Generalized Stratigraphic Column for Lyons Area (from Lowman, 1977)
3.2	Geological Map of the Dowe Flats Area
3.3	Dowe Flats Area Cross Sections

1.0 INTRODUCTION

This report summarizes the geologic setting in the vicinity of Dowe Flats, Boulder County, Colorado. The area has been included in several published regional geologic studies. Portions of the site have been studied by graduate geology students from local universities, and several unpublished commercial reports with limited scopes and boundaries are available. While none of these documents alone provides a suitably concise and complete summary of the area's geologic setting, together they contain a reasonably comprehensive background for compilation of stratigraphy and structure of Dowe Flats and adjacent areas.

Dowe Flats is located about 2 miles east of Lyons, Colorado approximately 2 miles north of State Highway 66. Dowe Flats is located in parts of Sections 9, 10, 15, 16, 21, and 22, Township 3 North, Range 70 West, Sixth Principal Meridian (Figure 3.2). The 2-mile long triangular-shaped valley has a 0.5-mile wide northern apex that broadens to two miles at its southern base. As referenced herein, Dowe Flats is considered to be that portion of the valley bottom bounded by the St. Vrain Supply Canal and lying generally below elevation 5450.

2.0 PURPOSE AND SCOPE

This study has been performed to provide a detailed summary of the geologic setting of the Dowe Flats area to assist in the planning and execution of subsurface explorations and engineering investigations in this area. To the extent that these efforts will be centered on the interior region of Dowe Flats, this area provides the focal point of the present study. The scope of work has included compilation of existing geologic data through August 1984 and interpretation of these data aided by aerial photography interpretation and site reconnaissance. A complete bibliography for the site is included in Section 6.0.

This study addresses regional and local bedrock stratigraphy and structural geology. Topics such as sedimentology, tectonics, and soils are outside the scope of this report.

3.0 REGIONAL GEOLOGIC SETTING

3.1 REGIONAL STRATIGRAPHY

A maximum of approximately 12,700 feet of sediments is found in the vicinity of Dowe Flats. A general stratigraphic column for the Lyons area is included as Figure 3.1. Only those formations beneath the lower Pierre Shale are present at Dowe Flats. A brief lithologic description is included on Figure 3.1 for each unit in the column, and more detailed descriptions of important formations at the site are included in Section 4.0.

In general, the geologic section is composed of alternating sandstone and shale layers with some limestones. Beginning at the bottom of the section and working upward in both depth and time, the individual units display a variety of depositional origins. Precambrian basement rock is exposed in the mountains west of Lyons. Both plutonic and metamorphic rocks are present. These rocks are generally massive, hard, and tough when fresh, but coarser-grained materials can weather to grus. The basal Fountain Formation was deposited during erosion of the ancestral Rocky Mountains. The Lyons Formation above it is a beach deposit. The overlying Lykins Formation is a marine shale and the Entrada is an eolian deposit. The Morrison Formation and the Lytle Formation of the Dakota Group are both continental deposits, while all units between the South Platte Formation of the Dakota Group and the Pierre Shale were deposited in various marine environments as the seas transgressed and receded through the area. The overlying Fox Hills Sandstone is a transitional beach type sandstone formed as the seas regressed from the area for the last time, and the uppermost Laramie Formation is a series of interbedded nonmarine claystones and shales with an occasional coal seam. During the Tertiary period,

Precambrian, Paleozoic and Mesozoic rocks were invaded by igneous intrusives. One such large intrusive body is present about 2 miles southwest of Lyons and is currently being developed for commercial aggregate and riprap.

Mineral utilization near Dowe Flats includes production of cement from the Fort Hays limestone in a pit south of Dowe Flats, and quarrying of Lyons sandstone for building blocks west of the site. Existing and former gravel pits are present along St. Vrain Creek just south of Dowe Flats from Lyons to Longmont. Farther to the east are several oil fields that produce from sandstones and limestones at depth. Coal mining occurred in the early part of the century from the Laramie Formation, but is presently inactive in the local area.

3.2 GEOLOGIC STRUCTURE

The Dowe Flats area is in the Foothills Belt, a transition zone between two regional structural features - the Front Range physiographic province to the west and the Denver Basin physiographic province to the east. The Front Range, the easternmost range of the Southern Rocky Mountains, begins on the northern side of the Arkansas River in southern Colorado and extends northward for approximately 185 miles to the Wyoming border. The range varies from 25 to 45 miles in width (Boos and Boos, 1957), and was formed by vertical uplift and subsequent erosion of the sedimentary strata to expose the Precambrian core. Remnants of the original sedimentary cover, now present as truncated sedimentary rocks along the uplift flank, are tilted from drag along the uplift boundaries. The more resistant tilted rocks, generally sandstones and some carbonates, form linear hogbacks that parallel the mountain front. The

less resistant shales have been eroded away to form linear valleys between the hogbacks. This linear system of valleys and ridges is present along most of the eastern Front Range boundary.

The Denver Basin is a major structural basin east of the Rocky Mountains beginning south of Pueblo, Colorado and extending northward to the vicinity of Torrington, Wyoming. It spans approximately 180 miles at its widest point just south of the Colorado border. The basin is highly asymmetric with an axis that is subparallel to the mountain front and about 10 to 30 miles east of it. The proximity of the axis to the mountains results in a steep western limb and a gently sloped eastern limb.

The Foothills Belt is a transitional area about 5 to 10 miles wide between these two major physiographic provinces. The sedimentary beds adjacent to the Precambrian mountain front are steeply dipping and occasionally overturned. The dip progressively decreases in the younger formations as they outcrop at greater distances from the mountain front. Between Lyons and the northern Colorado border a series of northwest-trending high-angle bedrock faults offset the sedimentary beds. Draping of sediments over these faults produces a series of en-echelon folds and faults. Taken together, these intermediate-scale structural deformations, regional deformations produced by the Front Range and the Denver Basin, and more localized small-scale folding and faulting, result in a generally complex geologic setting throughout the Foothills Belt.

4.0 DOWE FLATS SITE GEOLOGY

4.1 GEOGRAPHY

Dowe Flats is a triangular valley that resulted from erosion of less-resistant beds in the interior of a plunging syncline. Ridges of more resistant beds surround the valley on three sides. The valley floor has low topographic relief and slopes toward the south at an average two percent gradient. There is a maximum of approximately 700 feet of topographic relief between the valley floor and the top of the ridges, and a 40-foot high longitudinal limestone ridge transects the western half of the valley. The valley is drained by small intermittent streams and ephemeral gullies.

Natural vegetation is limited to xerophytes. Some dry land wheat farming is found in the eastern half of the valley. In addition, irrigated fields are present in the east-central portion of the valley and immediately west of the limestone ridge.

4.2 SURFICIAL DEPOSITS

Prior to the summer of 1984, a limited amount of work was done to survey the soils of Dowe Flats. The available information indicates that the soils range from about 5 to 15 feet thick in the area. They generally contain subequal amounts of clay and fine sand, and are often mixed with angular platy fragments of calcareous shale, limestone and sandstone. Most of the soils appear to be of predominantly colluvial and alluvial origin. They display a well-defined contact with the underlying rocks and a deep, mature residual profile is generally absent.

4.3 LOCAL STRATIGRAPHY

The important formations in this area are all Upper Cretaceous in age and are limited to the middle of the regional stratigraphic column (Figure 3.2). They include the Dakota Group, the Benton Formation, the Niobrara Formation and the Pierre Shale. The general stratigraphic descriptions in this section are summarized from three graduate theses completed in the area that contained detailed lithologic descriptions compiled during field mapping and section measurement activities (Quam, 1932; Hunter, 1948; Masters, 1957). These documents provide the best specific lithologic information on Dowe Flats.

4.3.1 Dakota Group

The Dakota Group contains the upper beds on the cuestas surrounding Dowe Flats. It has an average thickness in this area of 330 feet, and is subdivided into the lower Lytle and upper South Platte Formations.

The Lytle Formation consists of nonmarine fluvial deposits. The lowest part is a fine to coarse-grained massive brown sandstone intercalated with a basal conglomerate containing quarter to half-inch diameter chert pebbles and granite fragments mixed with finer materials in a secondary silica cement. This bed is approximately 40 feet thick. The upper portion of the Lytle Formation consists of a series of variegated red and yellow claystones that, on exposure, weather to a reddish surface soil. This deposit varies in thickness from 30 to 60 feet.

The South Platte Formation comprises the upper part of the Dakota Group. Deposits in this interval are marine and near-marine in origin. The Plainview Member is a platy, fine-grained, hematite-stained quartzose sandstone. It varies in thickness from 20 to 30 feet through differential incising of the

underlying claystones. The middle part of the South Platte Formation is a 125 to 175-foot thick gray to black carbonaceous shale interbedded with thin, buff-colored siltstones and sandstones. The uppermost part of this formation is the Muddy member, a massive, ridge-forming tan quartzose sandstone 20 to 30 feet thick that is slightly cross-bedded and distinctly jointed.

4.3.2 The Benton Formation

The Benton Formation is a 500-foot thick layer of fine-grained marine deposits. The lowest part is composed of dark grey to black fossiliferous sandy shales. The middle portion is a zone of light to dark gray argillaceous limestone and dark gray to black calcareous shales. The upper part is calcareous dark gray sandy shales. Numerous thin but laterally continuous bentonite layers are found throughout the formation. The lower, middle, and upper parts are often referred to as the Graneros Shale, the Greenhorn Limestone, and the Carlile Shale, respectively.

The Codell Sandstone is the uppermost unit in the Benton Formation. In the Dowe Flats area, it has a 15-foot total thickness and can be divided into a 7-foot thick gray siltstone beneath an 8-foot thick silty sandstone. This silty sandstone directly underlies the Niobrara Formation.

4.3.3 The Niobrara Formation

The Niobrara Formation is traditionally separated into two units, the Fort Hays and Smoky Hill Members. The Fort Hays Member is an extremely fine-grained, light grey limestone with thin interbedded shales. A section of Fort Hays Member at the south end of Dowe Flats, was measured as 16.5 feet thick (Lowman, 1977). Limestone accounted for 13.6 feet or 82 % of the outcrop

thickness. The limestone is distributed as blocks ranging in thickness from 0.5 to 3.1 feet and vertical joints spaced on 1 to 3 foot centers. The remaining 2.9 feet of material is distributed as 11 thin bentonite layers having an average thickness of six inches. Drilling in other areas within the Dowe Flats valley has indicated an average limestone thickness of 20 feet (Malette, 1962).

The overlying Smoky Hill Member of the Niobrara Formation is generally described as a dark grey, calcareous, fossiliferous marine shale. However, characterization of the Smoky Hill Member as shale on a regional scale does not account for several separate limestone beds present in the Dowe Flats vicinity. At Dowe Flats, limestones within the Smoky Hill Member have been described at an outcrop along the Little Thompson River (Quam, 1932) and mapped in the Dowe Flats valley (Malette, 1962). An 11-foot thick limestone unit 100 feet above the base of the Smoky Hill Member was mapped by Malette in Dowe Flats, but was not described by Quam in the Little Thompson River outcrop. All the other materials in the bottom 200 feet of the Smoky Hill Member are dark gray to black, pyritiferous, calcareous, marine shales. A second 20-foot thick limestone bed was mapped at Dowe Flats and measured in the Little Thompson outcrop at the interval from 200 to approximately 220 feet above the bottom of the Smoky Hill. A final limestone bed, with a base about 256 feet above the Smoky Hill Member was also located in both field efforts; however, its thickness was measured as 12 feet by Malette (1962) and 43 feet by Quam (1932). The 43-foot value appears to be more realistic based upon interpretation of geophysical logs from oil exploration wells drilled 10 to 15 miles south and east of the site (Lowman, 1977).

The fact that the limestones in the Smoky Hill Member are not discussed in regional geologic summary papers indicates that they are local in nature and probably disappear to the north and south.

4.3.4 The Pierre Shale

The lower Pierre Shale is the uppermost unit considered in this report. Only the lower 500 feet of the Pierre Shale is found in Dowe Flats; the remainder has been eroded away. The lower 2500 feet of Pierre Shale is a homogeneous dark brown to gray-black marine shale that weathers to a buff color. The basal portion of the Pierre Shale, immediately above the Niobrara Formation, is sandy; however, the sand content decreases in the main portion of the shale.

4.4 LOCAL STRUCTURE

The area surrounding Dowe Flats is structurally complex with several types of structural features of differing scales overprinted upon each other. The structure in the area has been closely examined and interpreted by three generations of graduate students. The area immediately north of Dowe Flats near Dowe Pass is so complex that it has been included as a major stop in most of the geologic field trips and road logs through the region. Despite detailed studies, interpretations, and reinterpretations, the origin and exact relationship between all of the structural features remains unclear. This section briefly introduces the major structural components of the Dowe Flats area. In addition, an intermediate-scale geologic map and two cross sections have been included (Figure 3.2, 3.3). The Lower Santanka and Ingleside Formations are included on Figure 3.2 for completeness. They are only present in a

very small area north of the major northwest-trending fault, are not important to this report, and will not be discussed further. More detailed and more localized descriptions can be found in Quam (1932), Masters (1957) and Matthews et al. (1976).

The regional Dakota hogback that parallels the eastern side of the Front Range through central and northern Colorado forms the ridge that separates Dowe Flats from the town of Lyons. The hogback ridge is normally a monocline formed by the uplift of the Front Range. In this area, however, the hogback is the eastern limb of a doubly-plunging anticline with an axis approximately located on the eastern edge of the Lyons town limits as shown on Figure 3.2.

On the northern side of Dowe Flats in the vicinity of Dowe Pass, the regional hogback has been offset approximately 2 miles by a major northwest-trending high-angle fault with a trace along the Little Thompson River. This fault is one of the many large faults that have offset the hogback. The southwest side containing Dowe Flats is the downthrown block, with displacement estimated at 600 feet (Hunter, 1948).

Rabbit Mountain is a large, southward-plunging anticline that forms the ridge east of Dowe Flats. It has a steeply-dipping eastern limb and a gently-dipping western limb, a structural style opposite to the general trend of folding along the Front Range. In addition, several smaller faults and canoe folds overprinted on this anticline distort and disrupt the bedding to produce further structural complexity.

Dowe Flats itself is underlain by a southward-plunging syncline. This syncline is nearly symmetrical with no significant folding and faulting at the south end of Dowe Flats (Figure 3.3, Section B-B') but with increasing asymmetry toward the north (Figure 3-3, Section A-A') as the structural complexity

increases. Its northern boundary is the extremely complex Dowe Pass area, an intensely folded area containing numerous anticlines and synclines along with some faulting.

Two faults are shown within the eastern portion of Dowe Flats by Mallette (1962). One high angle northeast-trending fault is located in the northwestern quadrant of Section 15. The other fault is located in the eastern half of Section 15 and trends northwest. Both faults are inferred and shown with very small offsets. However, documentation of evidence for these faults is not provided by Mallette's report, and they were not mapped by the several other major investigators of the Dowe Flats area. In addition, examination of large-scale aerial photography in connection with this study did not reveal any evidence for the northeast-trending fault and only limited evidence for the northwest-trending fault. Therefore, the northeast-trending fault is not believed to be present, and the northwest trending fault, if present, is only a localized small-scale feature.

5.0 SUMMARY

Dowe Flats is located in a transition region between two major physiographic provinces, the Denver Basin and the Front Range. As such, the area shares both the sedimentary stratigraphy of the former and the characteristic structural complexity of the latter. Dowe Flats itself is a synclinal structure which mirrors on a small scale the upwarped, hogback-forming beds of the Denver Basin.

Dowe Flats is underlain by sedimentary shales, limestones, and sandstones together with their various mineralogical combinations, textural variations, and gradational transitions. The most important stratigraphic units in Dowe Flats are, in descending order: the Pierre Shale; the Niobrara Formation containing the Smoky Hill and Fort Hayes Members; the Benton Formation; and the South Platte and Lytle Formations of the Dakota Group. All of these units are Upper Cretaceous in age. The synclinal structure of the central Dowe Flats basin is such that the youngest (Pierre Shale) formation is exposed over much of the eastern portion of the valley bottom with the older strata forming concentric horseshoe-like rings as they outcrop around the valley perimeter on the east and west margins.

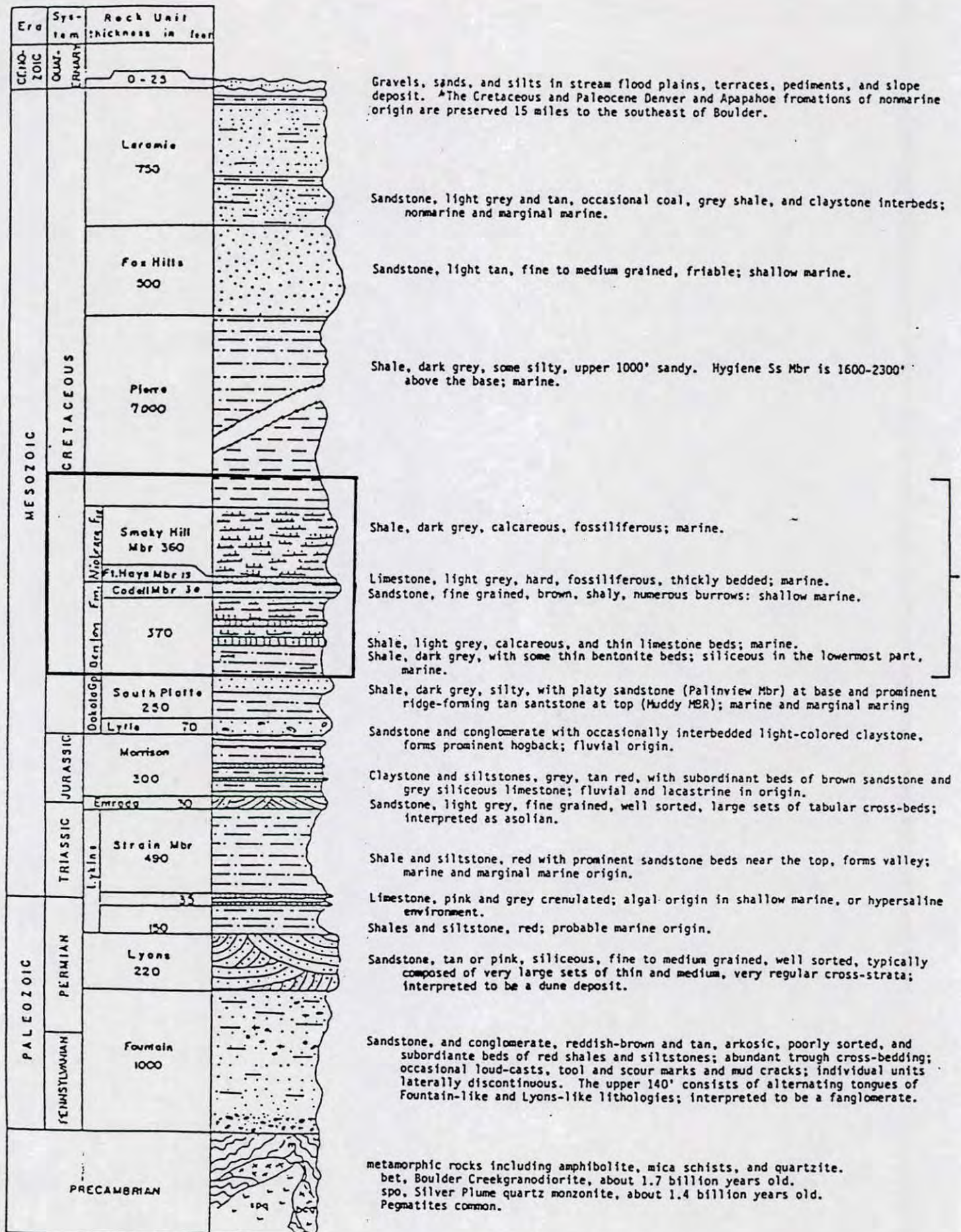
Structurally, the region surrounding Dowe Flats is extremely complex with both intense and sometimes superimposed folding as well as Post-Cretaceous faulting. In this context, the simplicity of the central interior portion of Dowe Flats is almost anomalous. Interpretation of available information does not indicate the presence of major faulting, shearing, or significant folding in the interior portion of Dowe Flats.

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UNITS EXPOSED AT DOME FLATS

APPENDIX B
FIELD EXPLORATION AND LABORATORY TESTING

FIELD EXPLORATIONGENERAL

Three separate exploratory programs with progressively increasing scope and level of detail were conducted at Dowe Flats during 1984. Initially in July, 1984 12 borings were drilled within what is now the reservoir site. In August, an additional 9 borings were drilled throughout Dowe Flats, 3 of which are in or near the reservoir site. These programs were completed prior to layout or planning of the preliminary embankment design presented in the text of this report; hence, they are not intended to address specific features of the dam. They do, however, provide valuable supplementary data to the primary exploration program.

In October, 1984 the third and final phase of the 1984 Dowe Flats explorations was completed, consisting of the drilling of 5 borings, bedrock coring, in-situ permeability testing in bedrock, and the excavation of 12 test pits. The purpose of this program was to provide data specific to the foundation and borrow areas of the proposed embankment.

Data from these field programs are described individually in the following sections.

JULY, 1984 PROGRAM^{1/}

Twelve borings were drilled within the east-central portion of the reservoir site at the locations shown on Figures 6.1 and 8.4 in the text of the

^{1/} "Verification Drilling of a Limestone Body, East Central Dowe Flats Area, Boulder County, Colorado," Fox Consultants, Inc. report dated August 31, 1984.

report. The borings were drilled using CME 55 and 75 drillrigs using rotary-wash techniques. Because the purpose of the drilling was to locate and intercept particular geologic strata, soils were not sampled, nor was bedrock cored. Generalized logs were constructed from inspection of drill cuttings and are shown on the attached Figure B-1.0. Depths at which bedrock was encountered in individual borings are tabulated below:

TABLE B-1
BEDROCK DEPTHS, JULY 1984 PROGRAM

<u>BORING NO.</u>	<u>TOTAL BORING DEPTH (ft)</u>	<u>DEPTH TO BEDROCK (ft)</u>	<u>DEPTH TO WATER (ft)</u>	<u>APPROXIMATE GROUND SURFACE ELEV. (ft)</u>
BH-1	79	12	11.5	5349
BH-2	76	10	17.5	5356
BH-3	69	16	NA	5371
BH-4	66	20	34	5378
BH-5	9	9	dry	5371
BH-6	69	11	27	5375
BH-7	44	20	30	5355
BH-8	20	20	dry	5354
BH-9	15	15	dry	5353
BH-10	20	20	dry	5351
BH-11	19	19	dry	5349
BH-12	30	-	25	5346

These data should be taken as very approximate outside the context of the original intent of the program.

AUGUST, 1984 PROGRAM^{2/}

The second field program was conducted in July and reported in August, 1984. Laboratory investigations were also included, as subsequently discussed. This program was oriented toward soil conditions throughout the Dowe

^{2/} "Results of Preliminary Construction Feasibility Investigation, Dowe Flats Area, Boulder County, Colorado," Fox Consultants, Inc. report dated August 1, 1984.

Flats area and its purpose was to provide preliminary soil data of a general nature not necessarily specific to the proposed dam.

A total of nine borings was drilled in three separate locations throughout Dowe Flats. Three of the borings, AH-1 through AH-3, are in or near the proposed reservoir, as shown on Figures 6.1 and 8.4 in the text of the report. The remainder of the borings lie outside the limits of the reservoir site and are not discussed herein.

The borings were drilled using 4-inch flight augers with a CME 55 drill rig. Penetration resistance was measured and relatively undisturbed samples were obtained using a 2.0-inch I.D. California barrel sampler. Logs of borings AH-1 through AH-3 are shown on the attached Figure B-2.0.

OCTOBER 1984 PROGRAM

The October 1984 program was performed specifically to investigate the proposed dam foundation and borrow areas and included both borings and test pits. The locations of borings and test pits are shown in relation to site geology on Figure 6.1 in the text of the report, and in relation to potential borrow areas on Figure 8.4.

Borings AH-10 through AH-13 were drilled with a CME 55 drill rig. The borings were advanced through soils using 6-inch hollow stem augers generally to the depth of refusal, and then extended into bedrock by continuous NX-size coring. Only water was used as a drilling fluid during coring. In soils, relatively undisturbed samples were obtained and penetration values recorded using a 2.0-inch I.D. California barrel sampler. Soils were classified in the field based on visual and textural examination according to the Unified Soil Classification System. These classifications were later supplemented by

laboratory testing. Recovered rock cores were visually logged, and percent recovery and RQD values were recorded. Logs for borings AH-10 through AH-13 showing the soil and rock data collected are shown on the attached Figures B-3.0 through B-3.5.

During drilling of the borings, pressurized borehole permeability ("packer") tests were also conducted according to U.S. Bureau of Reclamation specification E-18. Details of individual tests and permeability calculations are presented on Figures B-4.0 through B-4.7. The permeability results and tested intervals are also shown graphically on the boring logs.

Twelve test pits were excavated with a tractor-mounted IH 3600 backhoe. Disturbed samples were obtained by hand-sampling techniques, and a complete log of each pit was maintained based on field soil classifications later supplemented by laboratory testing. Logs of the test pits are included as Figures 5.0 through 5.11.

LABORATORY TESTINGGENERAL

Laboratory testing was performed for both the July 1984 and October 1984 site investigations on soil samples obtained from the respective subsurface exploration programs. Laboratory data from both studies are grouped together in this section for purposes of presentation. The types of tests performed included moisture and density, Atterberg limits, gradation, compaction, and consolidation (one-dimensional compression). Also, laboratory testing was performed on a specimen of Fort Hays limestone. Results are reported below.

MOISTURE AND DENSITY

Moisture and density determinations were performed to establish physical characteristics of the soils sampled. Moisture and density data from the October 1984 investigation are portrayed on the logs of the borings and test pits on Figure B-3.0 through B-3.5 and B-5.0 through B-5.11. Complete data are tabulated below.

TABLE B.2
MOISTURE AND DENSITY DATA

<u>BORING OR TEST PIT</u>	<u>DEPTH (ft)</u>	<u>MOISTURE (%)</u>	<u>DRY DENSITY (pcf)</u>
AH-1	4.0	13.5	110.4
AH-2	9.0	11.2	100.2
AH-2	14.0	9.2	110.0
AH-10	9.0	16.2	95.0
AH-10	14.0	20.5	100.0
TP-1	3.0	12.1	-
TP-1	5.0	9.7	-
TP-1	10.0	14.9	-
TP-3	3.5	19.1	-
TP-3	7.0	18.2	-

TABLE B.2
(Continued)

<u>BORING OR TEST PIT</u>	<u>DEPTH (ft)</u>	<u>MOISTURE (%)</u>	<u>DRY DENSITY (pcf)</u>
TP-4	6.0	22.7	-
TP-7	5.0	16.3	-
TP-8	8.0	17.4	-
TP-9	4.0	18.2	-
TP-11	7.0	18.1	-
TP-12	9.0	14.9	-

ATTERBERG UNITS

Atterberg limits were determined to aid in classifying soils encountered. Results are shown on the boring and test pit logs for data obtained in the October 1984 program. Complete data are tabulated below:

TABLE B-3
ATTERBERG LIMITS DATA

<u>BORING OR TEST PIT</u>	<u>DEPTH (ft)</u>	<u>LIQUID LIMIT (%)</u>	<u>PLASTICITY INDEX (%)</u>	<u>UNIFIED SOIL CLASSIFICATION</u>
AH-1	4.0	36	16	CL
AH-2	9.0	30	12	CL
AH-2	14.0	29	13	CL
TP-2	5.0	25	13	CL
TP-2	7.0	27	13	CL
TP-3	3.5	35	19	CL
TP-4	6.0	38	19	CL
TP-8	8.0	35	20	CL

GRADATION

Sieve analyses were performed to help classify and to determine the particle size distribution of selected samples. Gradation test results are shown on attached Figures B-6.0 through B-6.2.

COMPACTION

A compaction test was performed on a selected disturbed sample from Test Pit 2 in order to provide data on the compaction characteristics of potential fill material. Test results are shown on Figure B-7.0, Compaction Test Data.

CONSOLIDATION

Consolidation (one-dimensional compression) tests were performed on samples within the proposed reservoir area in conjunction with the August 1984 study. Pertinent test results are included as Figures B-8.0 and B-8.1.

ROCK TESTING

Testing was performed on a specimen of Fort Hays limestone obtained from a man-made cut just west of the reservoir site. Testing which included specific gravity, Los Angeles abrasion, and sodium sulfate soundness, is reported below:

Specific Gravity - 2.564

Los Angeles Abrasion (ASTM C-535)

31.5% wear after 1000 revolutions

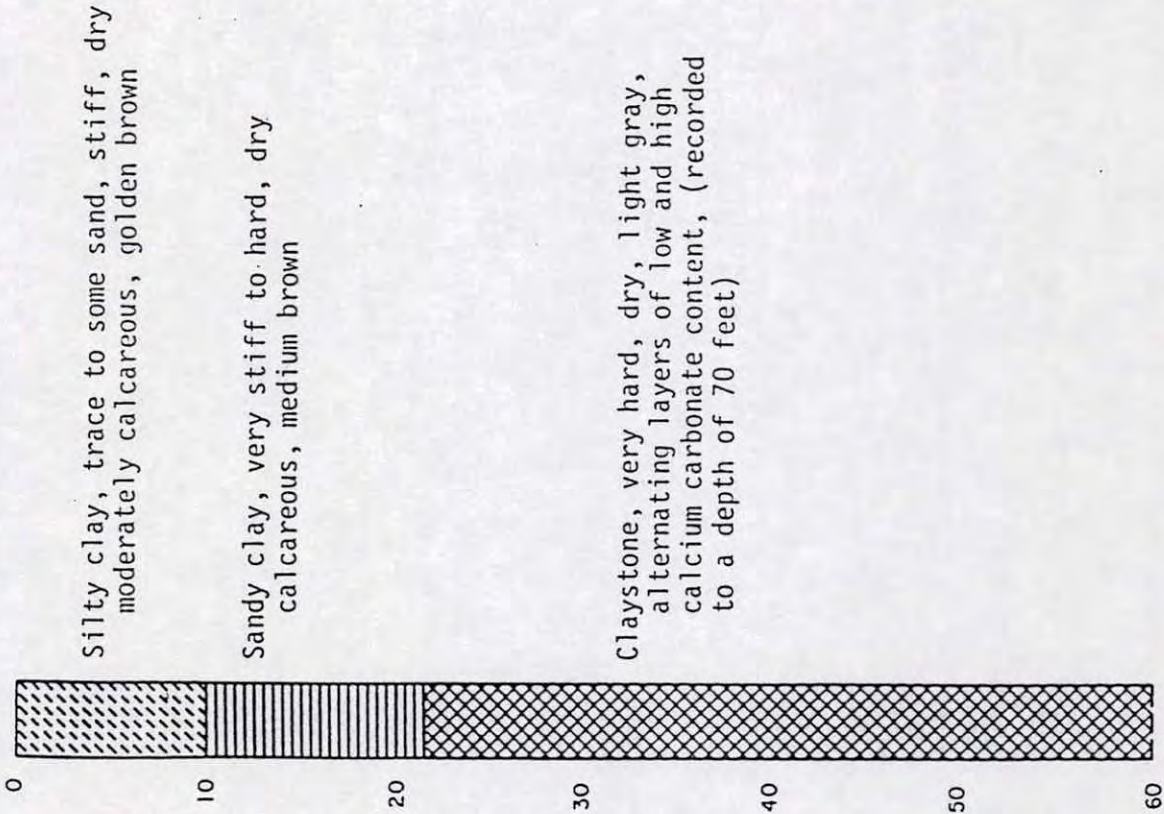
Sodium Sulfate Soundness (ASTM C-88 55-T)

84.7% loss; fissile cracking of all pieces

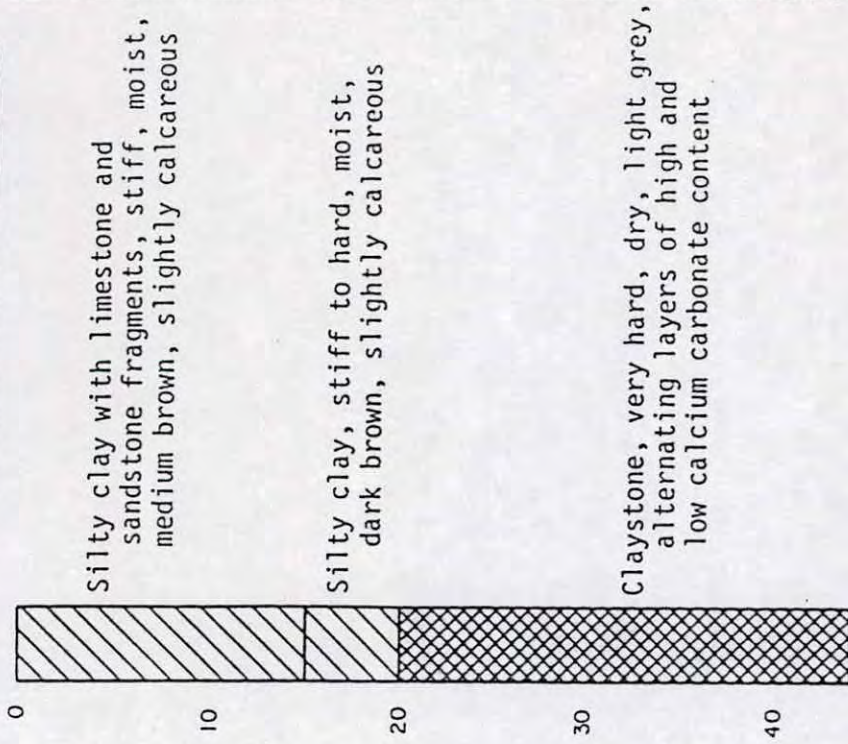
The following figures are attached and complete this appendix:

B-1.0	Generalized Stratigraphic Sections, Limestone Definition Drilling Sites, East Central Dowe Flats
B-2.0	Preliminary Soils Investigation Boring Logs, Dowe Flats Area
B-3.0 through B-3.5	Logs of Borings
B-4.0 through B-4.7	Packer Permeability Data Sheet
B-5.0 through B-5.11	Logs of Test Pits
B-6.0 through B-6.2	Gradation Tests
B-7.0	Compaction Test Data
B-8.0 through B-8.1	Consolidation Test Data

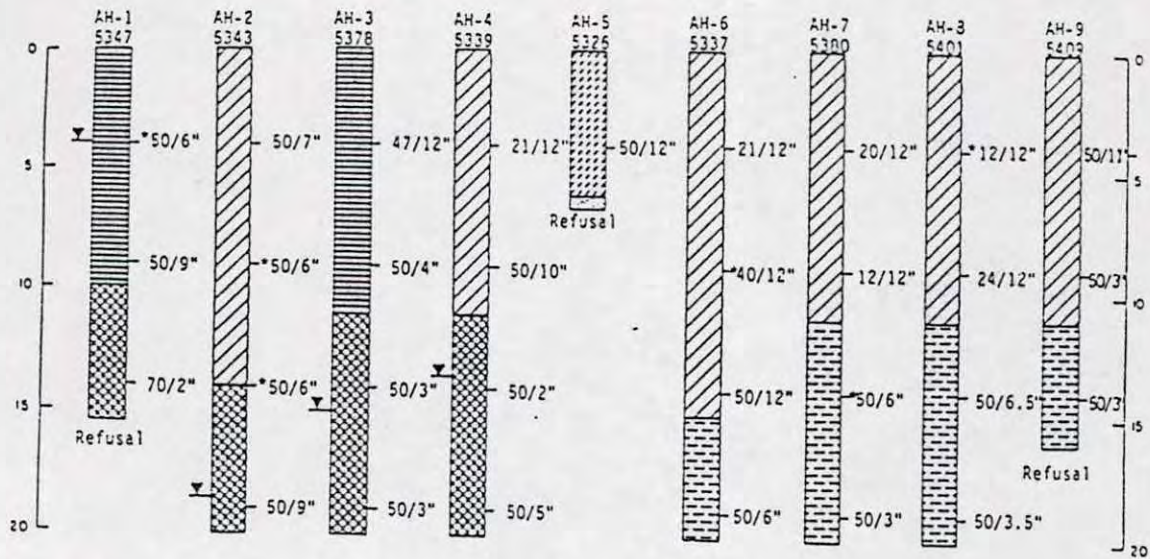
a) Northern Site (BH-1 to BH-6)



b) Southern Site (BH-7 and BH 12)



Note: Holes BH-8 to BH-11 encountered limestones at depths shown on Table 1. Materials above the limestone are similar to those shown in the above section.



LEGEND

- Silty CLAY, stiff to very hard, dry to moist, light to medium brown (CL)
- Silty CLAY, stiff to very hard, dry, tan (CL)
- SILT, with sand, stiff, dry, reddish brown (ML)
- Claystone, very hard, dry, medium brown to dark brown to black, calcareous infilling of fractures, alternating layers from 0.5 to 1.0 feet thick of very hard and stiff materials from 15 to 19 feet
- Claystone, very hard, dry, dark brown to black, thin iron oxide laminations
- Sandstone
- Depth of water 24 hours after drilling (note: boreholes AH-6 to AH-9 were dry from one to three hours after drilling)

50/2" Location of standard penetration test; indicates that 11 blows with a 140 pound hammer, falling 30 inches, were required to drive a 2-inch diameter sampler 2 inches. Samples preceded by an asterisk () were submitted for laboratory testing.

Notes

- 1) All holes were drilled between 7/12/84 and 7/17/84 with 4-inch diameter continuous flight auger
- 2) The stratification lines represent the approximate boundary between soil types and the transition may be gradual
- 3) Locations shown on Plate 1 are approximate and were determined by pacing and triangulation with a Brunton Compass. The locations should be considered accurate only to the degree implied by the method used.

FIGURE B-2.0

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

PROJECT Dove Flats Dam PROJECT NO. 11326.0 BORING NO. AH-10
 ELEVATION Approx. 5,356 ft. TOTAL DEPTH 39 ft.
 DATE BEGUN 10/30/84 DATE FINISHED 10/30/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	PENETRATION RESISTANCE	R Q D (x)	CORE RECOVERY (%)	SAMPLE LOCATION UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	PERM. TEST SITES	NOTES
HA 6 in.	5		0.0-17.0 ft. Sandy CLAY, about 40% angular limestone fragments up to 0.5 in diameter, medium stiff to very stiff, reddish brown, moist, (CL-SC)	16*			CL-SC							Minor losses of drilling fluid (water) noted. Water level measured at 13.6 ft. on 11/1/84 at 1200 hrs. Hole was caved-in below 17.5 ft. Hole located approximately 100 ft. south of corner fence post.
	10			7*			CL-SC	16			95			
	15			23*			CL	21			100			
	20			17*			CL							
C (NX)	25		17.0-20.0 ft. Sandy CLAY, very stiff, grey, moist, (CL) 20.0-39.0 ft. CLAYSTONE, light brown to black, highly fractured and weathered, about 10 to 20% of column is relatively unweathered claystone, fractures infilled with soft calcareous materials, hydrated iron oxides and soft clays.											
	30			91	99									
	35			89	98									
	40		39.0 End of Hole											Zero Flow J=0

- HOLE TYPES**
- SA - SOLID AUGER
 - HA - HOLLOW AUGER
 - C - CORE HOLE
 - R - ROTARY HOLE
 - HAC - HOLLOW AUGER WITH CONTINUOUS SAMPLER

- EXPLANATION**
- CORE RECOVERY
 - CORE LOSS
 - LOCATION OF SAMPLE ANALYZED IN LABORATORY
 - LOCATION OF SAMPLE NOT ANALYZED IN LABORATORY

STANDARD PENETRATION TEST

RECORDED AS NUMBER OF BLOWS WITH A 140 POUND HAMMER FALLING 30 INCHES REQUIRED TO DRIVE A STANDARD SAMPLER 12 INCHES

* USED 2" DIAMETER CALIFORNIA SAMPLER

E413

** POCKET PENETROMETER

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

PROJECT Dove Flats Dam PROJECT NO. 11326.0 BORING NO. AH-11
 ELEVATION Approx. 5,312 ft TOTAL DEPTH 52 ft.
 DATE BEGUN 10/29/84 DATE FINISHED 10/29/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	PENETRATION RESISTANCE	R Q D (%)	CORE RECOVERY (%)	SAMPLE LOCATION UNIFIED SOIL CLASSIFICATION MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	PERM. TEST SITES	NOTES
HA 5 in.	5		0.0-6.0 ft. Silty CLAY, some fine sand, stiff, brown, moist, (CL)	13*			CL						Water used as drilling fluid. Some circulation loss to 29 ft. minor losses to 52 ft. Penetration rate slowed at 14 ft. Water noted at about 7 ft. Water level measured at 5.4 ft. on 11/1/84 at 1200 hrs.
	10		6.0-19.0 ft. Silty CLAY, some fine sand, occasional gravelly layers, very stiff to hard, light brown, wet (CL)	28*			GC						
	15			32*			CL-SC						
C (NX)	20		9.0-52.0 ft. CLAYSTONE, black, heavily fractured, fracture density decreases below 35 ft., fractures are weathered to a black medium plasticity clay, about 50% of column is weathered typically in 2 ft. layers near top of hole, about 30% of column is weathered near bottom of hole.	100/7.5 in.*		100	CL						Q=0.2 gpm k=1.1x10 ⁻⁵ cm/sec Zero Flow Q=0
	25			67	67								
	30			82	100								
	35			87	93								
	40			90	100								
45				72	94								
50													

HOLE TYPES
 SA - SOLID AUGER
 HA - HOLLOW AUGER
 C - CORE HOLE
 R - ROTARY HOLE
 HAC - HOLLOW AUGER WITH CONTINUOUS SAMPLER

EXPLANATION
 CORE RECOVERY
 CORE LOSS
 LOCATION OF SAMPLE ANALYZED IN LABORATORY
 LOCATION OF SAMPLE NOT ANALYZED IN LABORATORY

STANDARD PENETRATION TEST
 RECORDED AS NUMBER OF BLOWS WITH A 140 POUND HAMMER FALLING 30 INCHES REQUIRED TO DRIVE A STANDARD SAMPLER 12 INCHES

• USED 2" DIAMETER CALIFORNIA SAMPLER
 • POCKET PENETROMETER

E414

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

PROJECT Dowe Flats Dam PROJECT NO. 11326.0 BORING NO. AH-11
 ELEVATION Approx. 5.312 ft. TOTAL DEPTH 52 ft.
 DATE BEGUN 10/29/84 DATE FINISHED 10/29/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	PENETRATION RESISTANCE	R Q D (x)	CORE RECOVERY (x)	SAMPLE LOCATION UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (x)	LIQUID LIMIT (x)	DRY DENSITY (pcf)	PERM. TEST SITES	NOTES
	52.0													

- HOLE TYPES**
- SA - SOLID AUGER
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 - C - CORE HOLE
 - R - ROTARY HOLE
 - HAC - HOLLOW AUGER WITH CONTINUOUS SAMPLER

- EXPLANATION**
- CORE RECOVERY
 - CORE LOSS

- LOCATION OF SAMPLE ANALYZED IN LABORATORY
- LOCATION OF SAMPLE NOT ANALYZED IN LABORATORY

E415

STANDARD PENETRATION TEST

RECORDED AS NUMBER OF BLOWS WITH A 140 POUND HAMMER FALLING 30 INCHES REQUIRED TO DRIVE A STANDARD SAMPLER 12 INCHES

• USED 2" DIAMETER CALIFORNIA SAMPLER

• POCKET PENETROMETER

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

PROJECT Dove Flats Dam PROJECT NO. 11326.0 BORING NO. AH-12
 ELEVATION Approx. 5,294 ft. TOTAL DEPTH 81 ft.
 DATE BEGUN 10/25/84 DATE FINISHED 10/26/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	PENETRATION RESISTANCE	R	Q	D (%)	CORE RECOVERY (%)	SAMPLE LOCATION UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	PERM. TEST SITES	NOTES
HA 6 in	5	0.0-2.0 ft. Sandy CLAY, very stiff, dark brown, moist. (CL)		100/11.5 in.*					SC						Water used as drilling fluid. Poor circulation to 25 ft., minor losses below 25 ft.	
		2.0-6.0 ft. Clayey SAND, some angular limestone fragments from sand to cobble sizes, very hard, whitish brown, dry. (SC)														
		6.0-9.0 ft. Clayey SAND, some angular limestone fragments, very hard, brown, dry. (SC)														
C (NX)	10 15 20 25 30 35 40 45 50	9.0-81.0 ft. SHALE, black, calcareous, fissile in weathered zones, heavily weathered near fracture zones to black low plasticity clay, calcareous in-filling noted in small (0.1 in.) horizontal and vertical fractures and vugs but not in large fractures, pyrite and calcareous materials noted in small cavities and veins (1/4 to 3/8 in.) at 1 ft. intervals below 27 ft., heavily fractured on 6 in. centers from 21 to 30 ft., 1 to 2 ft. centers below 30 ft., fractured and weathered zones noted at 36 to 41 ft. and 65 to 71 ft.			0		70									Hole caved below 3 ft. when checked on 11/1/84 at 2200 hrs. No water above B ft. Q=20 gpm k=1.2 x 10 ⁻³ cm/sec Zero Flow Q=0
			4		69											
			81		98											
			78		100											
			90		100											
			96		96											
			91		100											

HOLE TYPES
 SA - SOLID AUGER
 HA - HOLLOW AUGER
 C - CORE HOLE
 R - ROTARY HOLE
 HAC - HOLLOW AUGER WITH CONTINUOUS SAMPLER

EXPLANATION
 CORE RECOVERY
 CORE LOSS
 LOCATION OF SAMPLE ANALYZED IN LABORATORY
 LOCATION OF SAMPLE NOT ANALYZED IN LABORATORY

STANDARD PENETRATION TEST
 RECORDED AS NUMBER OF BLOWS WITH A 140 POUND HAMMER FALLING 30 INCHES REQUIRED TO DRIVE A STANDARD SAMPLER 12 INCHES

* USED 2" DIAMETER CALIFORNIA SAMPLER
 ** POCKET PENETROMETER



E416

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

PROJECT Dove Flats Dam PROJECT NO. 11326.0 BORING NO. AH-12
 ELEVATION Approx. 5.294 ft. TOTAL DEPTH 81 ft.
 DATE BEGUN 10/25/84 DATE FINISHED 10/26/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	PENETRATION RESISTANCE	R Q D (%)	CORE RECOVERY (%)	SAMPLE LOCATION UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	PERM. TEST SITES	NOTES
	55				92	92								
	60				94	100								
	65				65	100								
	70													
	75				60	30								
	80													
	81.0		End of Hole											Zero Flow Q=0

HOLE TYPES
 SA - SOLID AUGER
 HA - HOLLOW AUGER
 C - CORE HOLE
 R - ROTARY HOLE
 HAC - HOLLOW AUGER WITH CONTINUOUS SAMPLER

EXPLANATION
 CORE RECOVERY
 CORE LOSS

STANDARD PENETRATION TEST
 RECORDED AS NUMBER OF BLOWS WITH A 140 POUND HAMMER FALLING 30 INCHES REQUIRED TO DRIVE A STANDARD SAMPLER 12 INCHES

• USED 2" DIAMETER CALIFORNIA SAMPLER **E417** • POCKET PENETROMETER

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

PROJECT Dove Flats Dam PROJECT NO. 11325.0 BORING NO. AH-13
 ELEVATION Approx. 5,353 ft. TOTAL DEPTH 37 ft.
 DATE BEGUN 10/24/84 DATE FINISHED 10/24/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	PENETRATION RESISTANCE	R Q D (%)	CORE RECOVERY (%)	SAMPLE LOCATION UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	PERM. TEST SITES	NOTES
HA 6 in.	0-5		0.0-2.0 ft. Silty CLAY, some fine sand, very stiff, brown, wet. (CL)											
	5		2.0-5.0 ft. CLAY, limestone powder and fragments, hard, whitish brown, dry. (CL)	100/111*			⊗ Limestone fragments							Water used as drilling fluid except for thin mud used from 15 to 20 ft.
C (NX)	5-17		5.0-17.0 ft. LIMESTONE, mottled light and dark grey, fractured on 6 in. centers to 15ft., fewer fractures below 15 ft., very little fracture in-filling, very hard		25	61								
	17-20		17.0-37.0 ft. SHALE, black, calcareous in seams, some thin (1/4 in.) pyrite seams below 21 ft.		77	100								Zero Flow Q=0
	20-25				89	93								
	25-30				60	100								Zero Flow Q=0
	30-35				85	100								
	35-37				75	95								
	37.0		End of Hole											

- HOLE TYPES**
- SA - SOLID AUGER
 - HA - HOLLOW AUGER
 - C - CORE HOLE
 - R - ROTARY HOLE
 - HAC - HOLLOW AUGER WITH CONTINUOUS SAMPLER

- EXPLANATION**
- CORE RECOVERY
 - CORE LOSS
 - LOCATION OF SAMPLE ANALYZED IN LABORATORY
 - LOCATION OF SAMPLE NOT ANALYZED IN LABORATORY

STANDARD PENETRATION TEST

RECORDED AS NUMBER OF BLOWS WITH A 140 POUND HAMMER FALLING 30 INCHES REQUIRED TO DRIVE A STANDARD SAMPLER 12 INCHES

* USED 2" DIAMETER CALIFORNIA SAMPLER

E418

** POCKET PENETROMETER

F. M. FOX & ASSOCIATES, INC.
 Consulting Engineers and Geologists

PACKER PERMEABILITY - DATA SHEET

Boring No. AH-10 Job No. 01-1326.0
 Boring Radius (r) .125 (ft) Engineer M. Stewart
 Depth of Boring (d) 39 (ft) Date 10/30/84
 Depth to Static Water (A) 13.6 (ft)
 Depth to Center of Packer (B) 26.1 (ft) Height of Gauge above
 Gauge Pressure (P) 30 (psi) Ground Surface (C) 1.80 (ft)

<u>Flow Data</u>				<u>Notes</u>
<u>Time</u>	<u>Gallons</u>	<u>Cubic Feet</u>	<u>Flow Rate</u>	
0 min.	9239.7		0	
1	9239.7		0	
2	9239.7		0	
3	9239.7		0	
4	9239.7		0	
5	9239.7		0	
Released pressure on packer and produced flow to ensure no blockage in the water line.				
Average Q = NO FLOW				ft ³ /min

$$K = \frac{Q}{2\pi r L H} \ln \frac{L}{r} : L \geq 10r$$

$$K = \frac{Q}{2\pi r L H} \sinh^{-1} \frac{L}{2r} : 10r > L \geq r$$

CALCULATIONS

$$L = d - B$$

$$H = B + C + (L/2) + (P)(2.31) - S$$

$$\text{where } S = B + L/2 - A$$

Note: If no free water is encountered,
 $S = 0$

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PACKER PERMEABILITY - DATA SHEET

Boring No. AH-11 Job No. 01-1326.0
 Boring Radius (r) .125 (ft) Engineer M. Stewart
 Depth of Boring (d) 32 (ft) Date 10/29/84
 Depth to Static Water (A) 5.4 (ft)
 Depth to Center of Packer (B) 19.9 (ft) Height of Gauge above
 Gauge Pressure (P) 27.5 (psi) Ground Surface (C) 2.35 (ft)

<u>Flow Data</u>				<u>Notes</u>
<u>Time</u>	<u>Gallons</u>	<u>Cubic Feet</u>	<u>Flow Rate (Gallons)</u>	
0	9226.0		0.2	
1	9220.8		0.2	
2	9221.0		0.18	
3	9221.18		0.22	
4	9221.40			
5	9221.7			Line pressure increasing
7	9223.0			Bypass line blockage, pressure transient to 50 psi
8	9224.75			Formation hydrofractured, flow rates not included in average
8.5	9225.10			

Average Q = .2 gallons = 2.67×10^{-2} ft³/min

$$K = \frac{Q}{2rLH} \ln \frac{L}{r} : L \geq 10r$$

$$K = \frac{Q}{2rLH} \sinh^{-1} \frac{L}{2r} : 10r > L \geq r$$

$$L = 32 - 19.9 = 12.1$$

$$H = 19.9 + 2.35 + 12.1/2 + 27.5(2.31) - (19.9 + 12.1/2 - 5.4) = 71.28$$

$$K = \frac{2.67 \times 10^{-2}}{2(3.14)(12.1)(71.23)} \ln \frac{12.1}{.125} = 2.26 \times 10^{-5} \text{ ft./min.} = 1.15 \times 10^{-5} \text{ cm./sec.}$$

CALCULATIONS

$$L = d - B$$

$$H = B + C + (L/2) + (P)(2.31) - S$$

$$\text{where } S = B + L/2 - A$$

Note: If no free water is encountered, S = 0

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PACKER PERMEABILITY - DATA SHEET

Boring No. AH-11 Job No. 01-1326.0
 Boring Radius (r) .125 (ft) Engineer M. Stewart
 Depth of Boring (d) 52 (ft) Date 10/29/84
 Depth to Static Water (A) 5.4 (ft)
 Depth to Center of Packer (B) 29.9 (ft) Height of Gauge above
 Gauge Pressure (P) 30 and 40 (psi) Ground Surface (C) 2.0 (ft)

<u>Flow Data</u>				<u>Notes</u>
<u>Time</u>	<u>Gallons</u>	<u>Cubic Feet</u>	<u>Flow Rate</u>	
0	9225.9			
1	9225.9(2)			
2	9225.95			
3	9225.95			
4	9225.95			
5	9225.95			
Reset packer and raised pressure to 40 psi				
0	9228.1			
1	9228.1			
2	9228.0			
3	9228.0			
4	9228.0			
5	9228.0			
Release pressure on packer and produced flow to ensure no blockage in the water line.				

Average Q = NO FLOW

ft³/min

$$K = \frac{Q}{2\pi LH} \ln \frac{L}{r} : L \geq 10r$$

$$K = \frac{Q}{2\pi LH} \sinh^{-1} \frac{L}{2r} : 10r > L \geq r$$

CALCULATIONS

$$L = d - B$$

$$H = B + C + (L/2) + (P)(2.31) - S$$

$$\text{where } S = B + L/2 - A$$

Note: If no free water is encountered,
 $S = 0$

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PACKER PERMEABILITY - DATA SHEET

Boring No. AH-12 Job No. 01-1326.0
 Boring Radius (r) .0125 (ft) Engineer M. Stewart
 Depth of Boring (d) 31 (ft) Date 10/25/84
 Depth to Static Water (A) ~20 (ft)
 Depth to Center of Packer (B) 11 (ft) Height of Gauge above
 Gauge Pressure (P) 10 (psi) Ground Surface (C) 2.5 (ft)

<u>Flow Data</u>				<u>Notes</u>
<u>Time (min)</u>	<u>Gallons</u>	<u>Cubic Feet</u>	<u>Flow Rate</u> (ft ³)	
0	8783.0			
1.0	8796.9		1.9 ft ³	
2.0	8812.5		2.1 ft ³	
3.0	8838.1		1.0 ft ³	
Restart test, pressure has fallen, restart @ 10 psi				Pressure fluctuations @ 8 & 9 min.
0	8890.0	1188.5		
1	8908.4	1191.0	2.5	
2	8927.3	1193.5	2.5	
3	8946.3	1196.0	2.5	
4	8965.6	1198.6	2.6	
5	8985.7	1201.3	2.7	
6	9006.1	1204.0	2.7	
7	9027.1	1206.8	2.8	
10	9090.9	1215.4	2.9	
11	9112.1	1218.2	2.8	
12	9133.9	1221.1	2.9	
13	9155.0	1223.9	2.8	
14	9173.5	1226.4	2.5	
			Average Q = 2.68	ft ³ /min

$$K = \frac{Q}{2\pi LH} \ln \frac{L}{r} \quad ; L \geq 10r$$

$$K = \frac{Q}{2\pi LH} \sinh^{-1} \frac{L}{2r} \quad ; 10r > L \geq r$$

$$L = 31 - 11 = 20'$$

$$H = 11 + 2.5 - 20/2 + (10)(2.31) - s = 46.6 - s$$

$$10r = 1.25 \quad L \geq 10r$$

$$K = \frac{2.68}{2(3.14)(20)(45.6)} \ln \frac{20}{1.25} = 2.37 \times 10^{-3} \text{ Ft/min}$$

$$= 1.16 \times 10^{-3} \text{ cm/sec}$$

CALCULATIONS Standard deviation = .16 (5.9%)

$$L = d - B$$

$$H = B + C + (L/2) + (P)(2.31) - S$$

$$\text{where } S = B + L/2 - A$$

Note: If no free water is encountered,
S = 0

$$S = 11 + 20/2 - 20 = 1.0, \quad H = 45.6$$

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PACKER PERMEABILITY - DATA SHEET

Boring No. AH-12 Job No. 01-1326.0
 Boring Radius (r) 0.125 (ft) Engineer M. Stewart
 Depth of Boring (d) 51 (ft) Date 10/26/84
 Depth to Static Water (A) ~20 (ft)
 Depth to Center of Packer (B) 29.7 (ft) Height of Gauge above
 Gauge Pressure (P) 30 and 40 (psi) Ground Surface (C) 2.8 (ft)

<u>Flow Data</u>				<u>Notes</u>
<u>Time</u>	<u>Gallons</u>	<u>Cubic Feet</u>	<u>Flow Rate</u>	
0	9187.0			
1	9187.0			
2	9187.0			
3.5	9187.0			
5.0	9186.8		0.2 gallons	
No flow, pressure increased to 40 psi				
0	9186.8		0 gallons	
1	9186.6		0.2 gallons	
2	9186.4		0.2 gallons	
3	9186.2		0.2 gallons	
Released pressure on the packer and produced flow to ensure no blockage in the water line.				
Average Q = NO FLOW				ft ³ /min

$$K = \frac{Q}{2\pi r L H} \ln \frac{L}{r} : L \geq 10r$$

$$K = \frac{Q}{2\pi r L H} \sinh^{-1} \frac{L}{2r} : 10r > L \geq r$$

CALCULATIONS

$$L = d - B$$

$$H = B + C + (L/2) + (P)(2.31) - S$$

$$\text{where } S = B + L/2 - A$$

Note: If no free water is encountered,
 $S = 0$

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PACKER PERMEABILITY - DATA SHEET

Boring No. AH-12 Job No. 01-1326.0
 Boring Radius (r) .125 (ft) Engineer M. Stewart
 Depth of Boring (d) 81 (ft) Date 10/25/84
 Depth to Static Water (A) ~20 (ft)
 Depth to Center of Packer (B) 49.6 (ft) Height of Gauge above
 Gauge Pressure (P) 40 and 50 (psi) Ground Surface (C) 2.45 (ft)

<u>Flow Data</u>				<u>Notes</u>
<u>Time</u>	<u>Gallons</u>	<u>Cubic Feet</u>	<u>Flow Rate</u>	
0	9196.8			
1	9196.8		0	
2	9196.8		0	
3.5	9196.7		.1 gallon	
5.0	9196.7		.1 gallon	
No flow, increased pressure to 50 psi, reset packer				
0	9208.5			
1	9208.5		0	
2	9208.5		0	
3.5	9208.5		0	
5.0	9208.5		0	
Released pressure on the packer and produced flow to ensure no blockage in the water line				
Average Q = NO FLOW				ft ³ /min

$$K = \frac{Q}{2\pi LH} \ln \frac{L}{r} : L \geq 10r$$

$$K = \frac{Q}{2\pi LH} \sinh^{-1} \frac{L}{2r} : 10r > L \geq r$$

CALCULATIONS

$$L = d - B$$

$$H = B + C + (L/2) + (P)(2.31) - S$$

$$\text{where } S = B + L/2 - A$$

Note: If no free water is encountered,
 $S = 0$

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PACKER PERMEABILITY - DATA SHEET

Boring No. AH-13 Job No. 01-1326.0
 Boring Radius (r) 1.5" 0.125 (ft) Engineer M. Stewart
 Depth of Boring (d) 20 (ft) Date 10/24/84
 Depth to Static Water (A) unknown (ft)
 Depth to Center of Packer (B) 10 (ft) Height of Gauge above
 Gauge Pressure (P) 30 and 40 (psi) Ground Surface (C) 2.45 (ft)

<u>Flow Data</u>				<u>Notes</u>
<u>Time</u>	<u>Gallons</u>	<u>Cubic Feet</u>	<u>Flow Rate</u>	
0	17,676.1			Packer length is 3.2'
5 min	17,676.1		0	
increased pressure to 40 psi				
0	17,676.1			
5 min	17,676.1		0	
Released pressure on the packer and produced flow to ensure no blockage in the water line.				

Average Q = NO FLOW ft³/min

$$K = \frac{Q}{2\pi r L H} \ln \frac{L}{r} : L \geq 10r$$

$$K = \frac{Q}{2\pi r L H} \sinh^{-1} \frac{L}{2r} : 10r > L \geq r$$

CALCULATIONS

$$L = d - B$$

$$H = B + C + (L/2) + (P)(2.31) - S$$

where $S = B + L/2 - A$

Note: If no free water is encountered, S = 0

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PACKER PERMEABILITY - DATA SHEET

Boring No. AH-13 Job No. 01-1326.0
 Boring Radius (r) 3.0" 0.125 (ft) Engineer M. Stewart
 Depth of Boring (d) 35 (ft) Date 10/24/84
 Depth to Static Water (A) unknown (ft)
 Depth to Center of Packer (B) 20 (ft) Height of Gauge above
 Gauge Pressure (P) 40 and 50 (psi) Ground Surface (C) 2.40 (ft)

<u>Flow Data</u>				<u>Notes</u>
<u>Time</u>	<u>Gallons</u>	<u>Cubic Feet</u>	<u>Flow Rate</u>	
0	8753.9			
5 min	8753.5		0.4 gallons	
Increased pressure to 50 psi				
0	8753.5			
5 min	8753.1		0.4 gallons	
Released pressure on the packer and produced flow to ensure no blockage in the water line.				
Average Q = NO FLOW				ft ³ /min

$$K = \frac{Q}{2\pi LH} \ln \frac{L}{r} : L \geq 10r$$

$$K = \frac{Q}{2\pi LH} \sinh^{-1} \frac{L}{2r} : 10r > L \geq r$$

CALCULATIONS

$$L = d - B$$

$$H = B + C + (L/2) + (P)(2.31) - S$$

$$\text{where } S = B + L/2 - A$$

Note: If no free water is encountered,
 $S = 0$

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

SHEET 1 OF 1

PROJECT Dowe Flats Dam PROJECT NO. 11326.0 Test Pit TP-1
 ELEVATION _____ TOTAL DEPTH 11 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY S. Vick REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	X PASSING 200	PLASTIC LIMIT (X)	LIQUID LIMIT (X)	DRY DENSITY (pcf)	NOTES
Test Pit	1		0.0-1.5 ft. TOPSOIL, classifies as organic clayey silt, dark brown to black. (ML-OL)								Test pit excavated with 1H 3600 backhoe. Walls of pit stood vertical. No water encountered.
	2		1.5-4.5 ft. Silty CLAY, some fine sand, stiff, light brown, medium moist. (CL)								
	3										
	4										
	5		4.5-6.0 ft. Clayey SAND, light brown, moist. (SC)	CL	12						
	6										
	7		6.0-11.0 ft. Silty CLAY, some fine sand, some gravel-sized limestone fragments below 9.5 ft., stiff becoming very stiff below 9.5 ft., light brown, medium moist. (CL)								
	8										
	9										
	10										
	11		11.0 End of Test Pit								
12											

FIGURE B-5.0

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SUBSURFACE EXPLORATION LOG

SHEET 1 OF 1

PROJECT Dowe Flats Dam PROJECT NO. 11326.0 Test Pit TP-2
 ELEVATION _____ TOTAL DEPTH 10.0 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY S. Vick REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	NOTES
Test Pit	0.0-0.5		0.0-0.5 ft. TOPSOIL. Classifies as (ML-OL)								Test pit excavated with IH 3600 backhoe. Walls of pit stood vertical. No water encountered.
	0.5-10.0		Sandy CLAY, stiff, light brown, medium moist, (CL)								
	5			CL	60	12	25				
	7			CL	64	13	27				
	10.0		End of Test Pit								
	11										
	12										

FIGURE B-5.1

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

SHEET 1 OF 1

PROJECT Dowe Flats Dam PROJECT NO. 11326.0 Test Pit TP-3
 ELEVATION _____ TOTAL DEPTH 12.5 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY S. Vick REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	NOTES	
Test Pit	0.0-0.5	[Hatched pattern]	TOPSOIL, classifies as (ML-CL)								Test pit excavated with IH 560C backhoe. Walls of pit stood vertical above 8 ft., sloughed below 8 ft. Heavy water inflow from 7.5 to 9.0 ft. Heavy water inflow from 10.0 to 12.5 ft.	
	0.0-1.5	[Hatched pattern]	Silty CLAY, some organics, stiff, black, (CL)									
	1.5-7.5	[Hatched pattern]	CLAY, some fine sand, stiff, greenish brown, moist, (CL)									
	7.5-10.0	[Dotted pattern]	Clayey GRAVEL, some cobbles up to 5 in., some sand-sized limestone fragments, loose, brown, wet, (GC)		CL	19	16	35				
	10.0-12.5	[Dotted pattern]	Poorly Graded GRAVEL, some cobbles up to 4 in., some sand, angular limestone and sandstone fragments, loose, brown, wet, (GP)		CL	18	80					
	12.5	[Dotted pattern]	End of Test Pit		GP	7						

FIGURE B-5.2

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SUBSURFACE EXPLORATION LOG

PROJECT Dowe Flats Dam PROJECT NO. 11326.0 Test Pit TP-4
 ELEVATION _____ TOTAL DEPTH 11 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY S. Vick REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	NOTES						
Test Pit	1		0.0-9.5 ft. CLAY, some fine sand grading to sandy below 2.5 ft., stiff, light brown, moist. (CL)								Test pit excavated with IH 3600 backhoe. Walls of pit stood vertical. Water inflow below 9.5 ft.						
	2																
	3																
	4																
	5																
	6											CL	23	19	38		
	7																
	8																
	9																
	10											9.5-11.0 ft. Poorly Graded GRAVEL, some sand and clay, medium dense, brown, wet. (GP-GC)					
	11											11.0					
	12											End of Test Pit					

FIGURE B-5.3

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

PROJECT Dowe Flats Dam PROJECT NO. 11326.0 Test Pit TP-5
 ELEVATION _____ TOTAL DEPTH 3.5 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson





TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	NOTES
Test Pit	1		0.0-3.0 ft. Clayey SAND, shale and limestone fragments, whitish brown, slightly moist. (SC)								Test pit excavated with IH 3600 backhoe. No water encountered.
	2										
	3		3.0-3.5 ft. LIMESTONE, breaks out into 1.5 in. angular slabs of 3 in x 8 in. dimensions, a 1/8 in. horizontal fracture noted with about 35% infilling.								
	4		End of Test Pit								

FIGURE B-5.4

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SUBSURFACE EXPLORATION LOG

SHEET 1 OF 1

PROJECT Dowe Flats Dam PROJECT NO. 11326.0 Test Pit TP-6
 ELEVATION _____ TOTAL DEPTH 5.0 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson




TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	x PASSING 200	PLASTIC LIMIT (x)	LIQUID LIMIT (x)	DRY DENSITY (pcf)	NOTES
Test Pit	1		0.0-1.5 ft. Silty SAND, fine, whitish brown, dry, (SM) (weathered limestone)								Test Pit excavated with IH 3600 backhoes. No water encountered.
	2		1.5-5.0 ft. LIMESTONE, shaley, breaks out into 1/2 in. thick slaty fragments, some interbedded weathered shale layers with iron oxide stains, refusal at 5 ft.								
	5		5.0 End of Test Pit								

FIGURE B-5.5

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SUBSURFACE EXPLORATION LOG

SHEET 1 OF 1

PROJECT Dowe Flats Dam PROJECT NO. 11326.0 Test Pit TP-7
 ELEVATION _____ TOTAL DEPTH 10.0 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	NOTES
Test Pit	1		0.0-1.0 ft. TOPSOIL, classifies as (CL), stiff, dark brown, slightly moist								Test pit excavated with IH 3600 backhoe. No water encountered.
	2		1.0-3.0 ft. CLAY, some fine sand, stiff, slightly moist, (CL)								
	3		3.0-7.0 ft. Sandy CLAY, stiff, light reddish brown, moist, (CL-ML)								
	4			CL-ML	16	72					
	5		7.0-10.0 ft. Very silty, Sandy CLAY, stiff, whitish brown, moist, (CL-ML)								
	10.0		End of Test Pit								
	11										
	12										

FIGURE B-5.6

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

SHEET 1 OF 1

PROJECT Dowe Flats Dam PROJECT NO. 11326.0 Test Pit TP-8
 ELEVATION _____ TOTAL DEPTH 10.0 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	NOTES
Test Pit	1	[Hatched pattern]	0.0-1.0 ft. TOPSOIL, classifies as (CL), dark brown, moist								Test pit excavated with IH 3600 backhoe. No water encountered. Test pit walls stood vertical.
	2	[Hatched pattern]	1.0-7.0 ft. CLAY, some fine sand varying to sandy in places, trace of organics, stiff, light brown, medium moist, (CL)								
	3	[Hatched pattern]									
	4	[Hatched pattern]									
	5	[Hatched pattern]									
	6	[Hatched pattern]									
	7	[Hatched pattern]			CL						
	8	[Hatched pattern]		7.0-8.5 ft. CLAY, some organics, some fine sand, stiff, dark brown, medium moist to moist, (CL)							
	9	[Hatched pattern]		8.5-10.0 ft. CLAY, some fine sand, stiff, light brown, moist, (CL)	CL	18		15	35		
	10	[Dashed pattern]		10.0 End of Test Pit							

FIGURE B-5.7

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SUBSURFACE EXPLORATION LOG

SHEET 1 OF 1

PROJECT Dove Flats Dam PROJECT NO. 11326.0 Test Pit TP-9
 ELEVATION _____ TOTAL DEPTH 10.0 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson

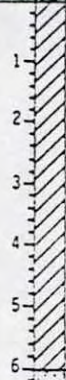
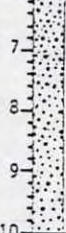
TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	NOTES
Test Pit	1		0.0-6.0 ft. Sandy CLAY, some limestone fragments up to 1/4 in., stiff, greenish brown, moist, (CL)		CL	18					Test pit excavated with IH 3600 backhoe. No water encountered. Test pit walls stood vertical.
	2										
3											
4											
5											
6											
	7		6.0-10.0 ft. Clayey GRAVEL, angular limestone and sandstone fragments up to 6 in., sand and clay matrix surrounds gravel particles, light brown, moist, (GC)								
	8										
	9										
	10										
			10.0								End of Test Pit

FIGURE B-5.8

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

SHEET 1 OF 1

PROJECT Dowe Flats Dam PROJECT NO. 11326.0 Test Pit TP-10
 ELEVATION _____ TOTAL DEPTH 3 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson





TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	NOTES
Test Pit	1		0.0-2.0 ft. Sandy CLAY, stiff, brown, moist, (CL)								Test pit excavated with 1H 3600 backhoe. No water encountered.
	2		2.0-3.0 ft. SHALE, limy, weathered, brown with white stains on joints, breaks out into 1/2 in. thick, 6 in. angular fragments, refusal at 3 ft.								
	3		3.0 End of Test Pit								
	4										

FIGURE B-5.9

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

SHEET 1 OF 1

PROJECT Dowe Flats Dam PROJECT NO. 11326.0 Test Pit TP-11
 ELEVATION _____ TOTAL DEPTH 9 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson



TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	X PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	NOTES
Test Pit	1 2 3 4 5 6 7 8 9		0.0-9.0 ft. Sandy CLAY, some shale fragments up to 1/4 in., stiff, light brown, moist, (CL)		CL	18					Test Pit excavated with 1H 3600 backhoe. No water encountered.
											

FIGURE B-5.10

FOX CONSULTANTS
SUBSURFACE EXPLORATION LOG

SHEET 1 OF 1

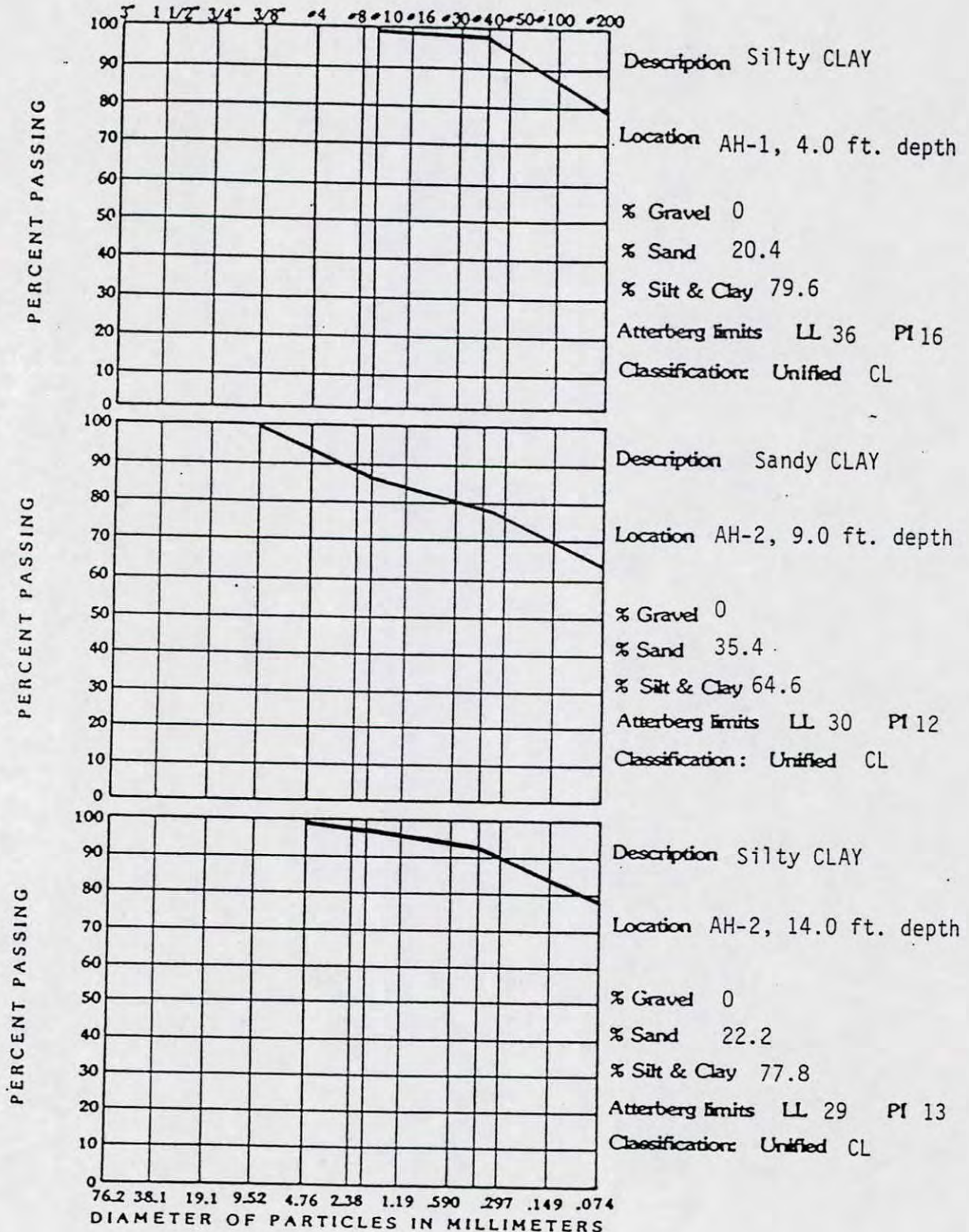
PROJECT Dove Flats Dam PROJECT NO. 11326.0 Test Pit TP-12
 ELEVATION _____ TOTAL DEPTH 10 ft.
 DATE BEGUN 11/1/84 DATE FINISHED 11/1/84 LOGGED BY M. Stewart REVIEWED BY J. Johnson

TYPE AND SIZE OF HOLE	DEPTH (feet)	GRAPHIC LOG	LITHOLOGY AND PHYSICAL CONDITION	SAMPLE LOCATION	UNIFIED SOIL CLASSIFICATION	MOISTURE CONTENT	% PASSING 200	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	DRY DENSITY (pcf)	NOTES	
Test Pit	1		0.0-6.0 ft. Sandy CLAY, stiff, greenish brown, slightly moist, (CL)								Test pit excavated with IH 3600 backhoe. No water encountered.	
	2											
	3											
	4											
	5											
	6					⊗	CL					
	7		6.0-8.0 ft. Clayey SAND, some gravel, angular limestone and shale fragments up to 3/4 in., brown, (SC-GC)									
	8											
	9		8.0-10.0 ft. CLAY, trace organics, some calcareous inclusions, very stiff, mottled brown and black, medium moist, (CL)									
	10		10.0 End of Test Pit			■	CL	15				

FIGURE B-5.11

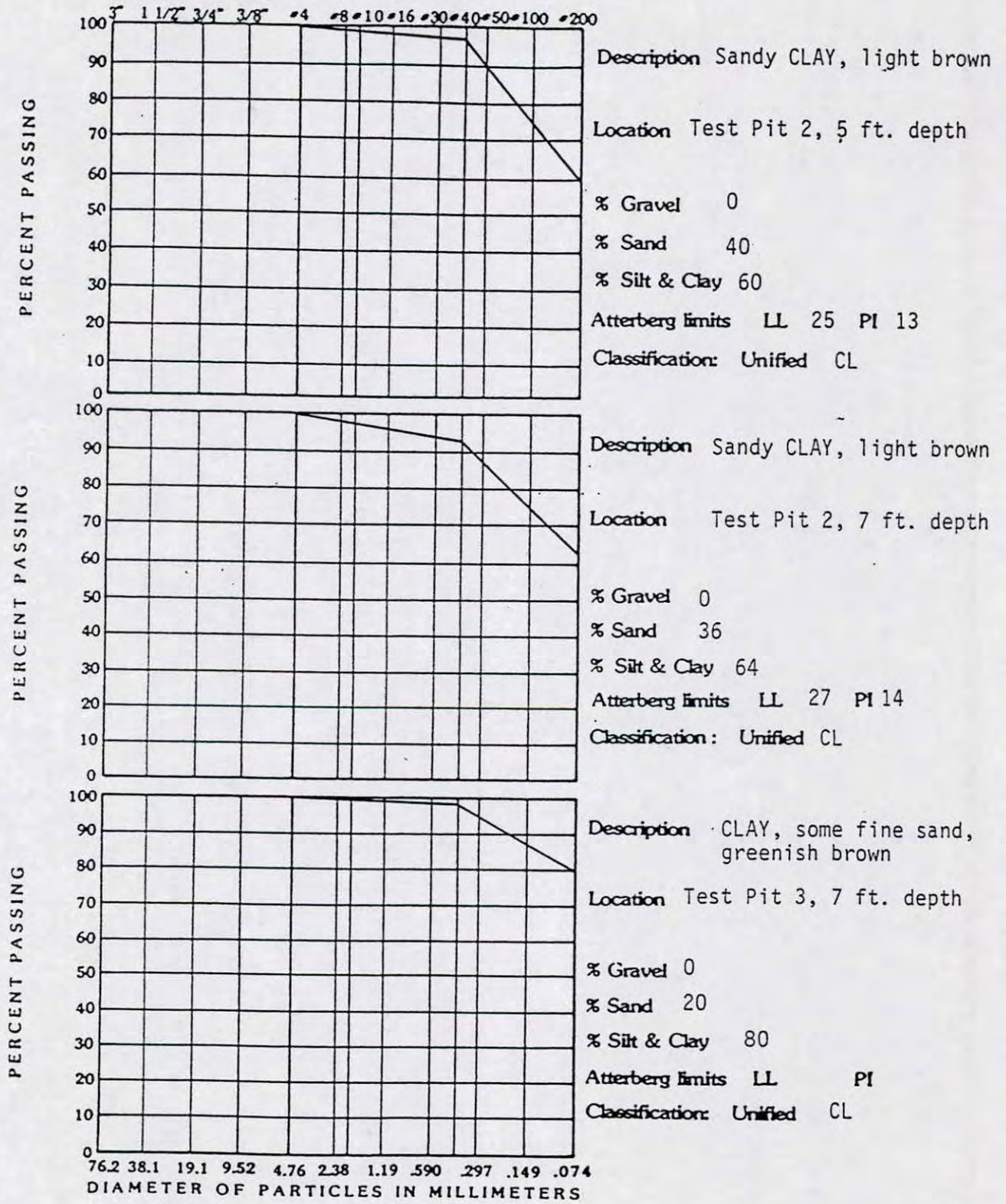
PARTICLE SIZE ANALYSIS CHART

SIEVE ANALYSIS							
GRAVEL			SAND				
coarse	med.	fine	coarse	med.	fine	v. L.	
CLEAR SQ. OPENINGS			U. S. STANDARD SERIES				



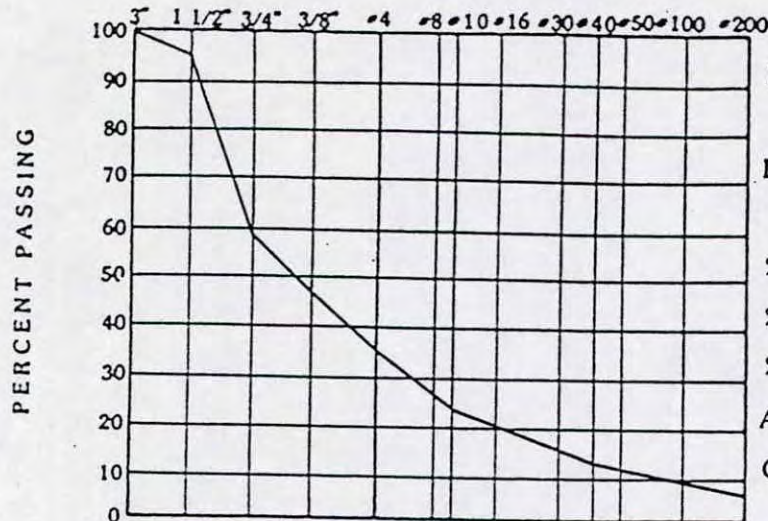
PARTICLE SIZE ANALYSIS CHART

SIEVE ANALYSIS						
GRAVEL			SAND			
coarse	med.	fine	coarse	med.	fine	v. f.
CLEAR SQ. OPENINGS			U. S. STANDARD SERIES			

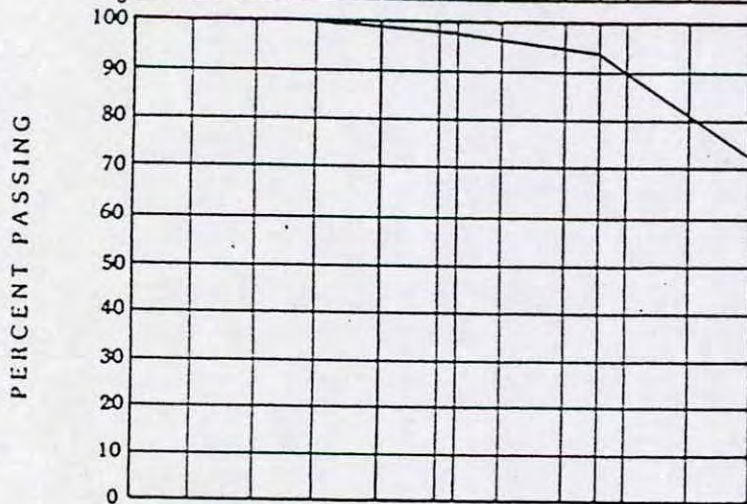


PARTICLE SIZE ANALYSIS CHART

SIEVE ANALYSIS							
GRAVEL			SAND				
course	med.	fine	course	med.	fine	v. L.	
CLEAR SQ. OPENINGS			U. S. STANDARD SERIES				

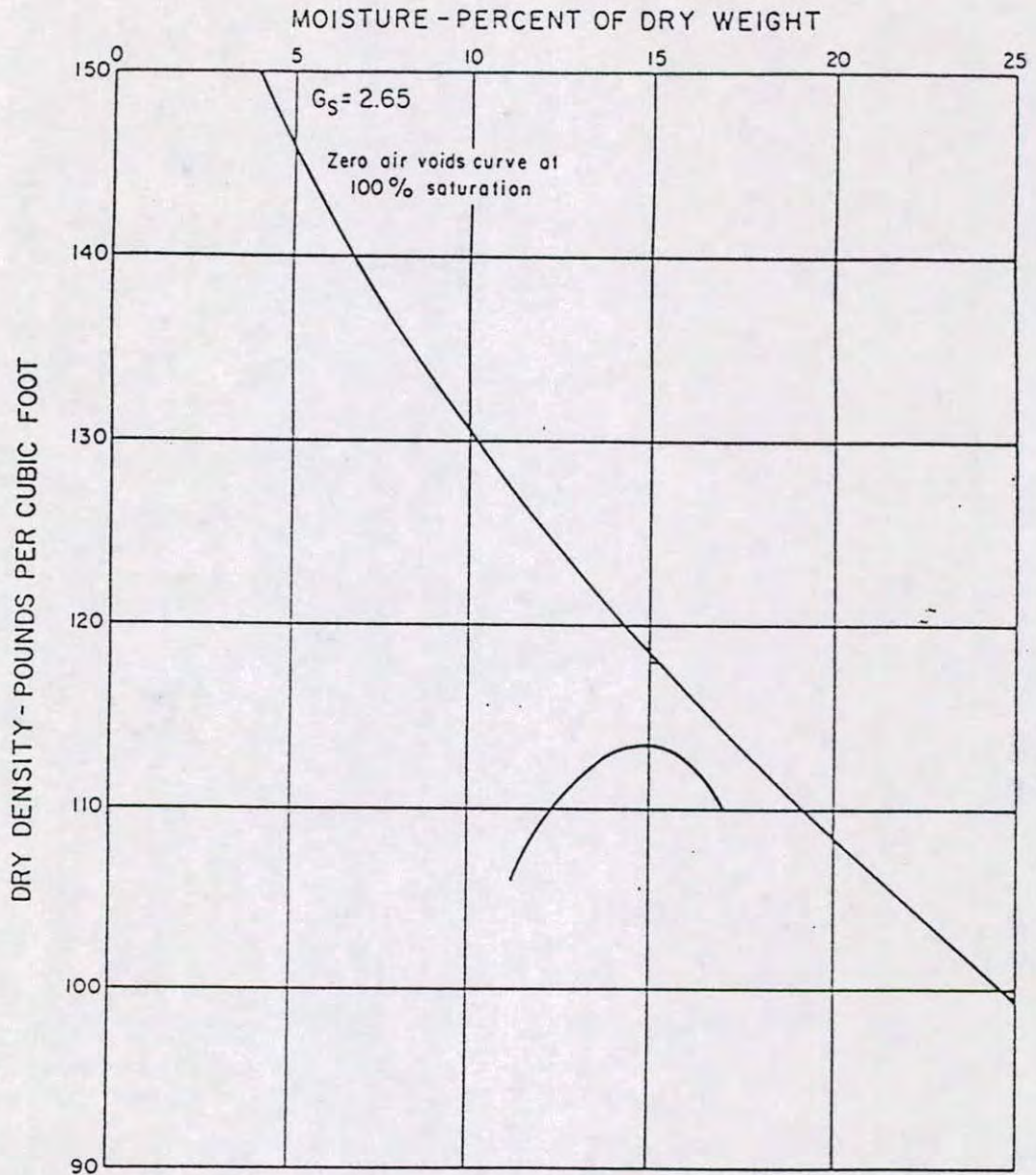


Description: Poorly Graded GRAVEL, brown
 Location: Test Pit 3, 12 ft. depth
 % Gravel: 67
 % Sand: 26
 % Silt & Clay: 7
 Atterberg limits: LL PI
 Classification: Unified GP

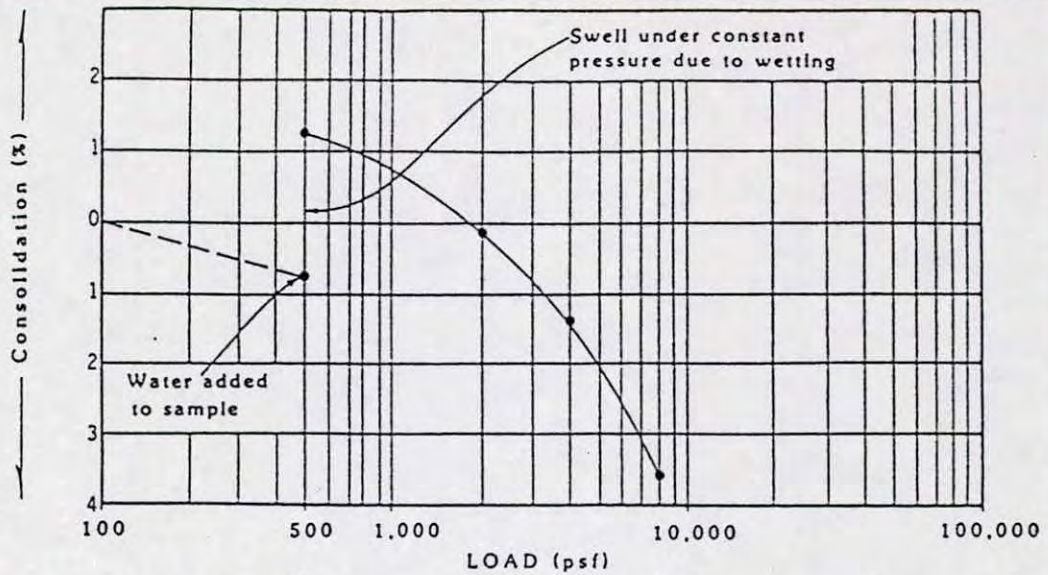


Description: Sandy CLAY, light reddish brown
 Location: Test Pit 7, 5 ft. depth
 % Gravel: 1
 % Sand: 27
 % Silt & Clay: 72
 Atterberg limits: LL PI
 Classification: Unified CL

COMPACTION TEST DATA

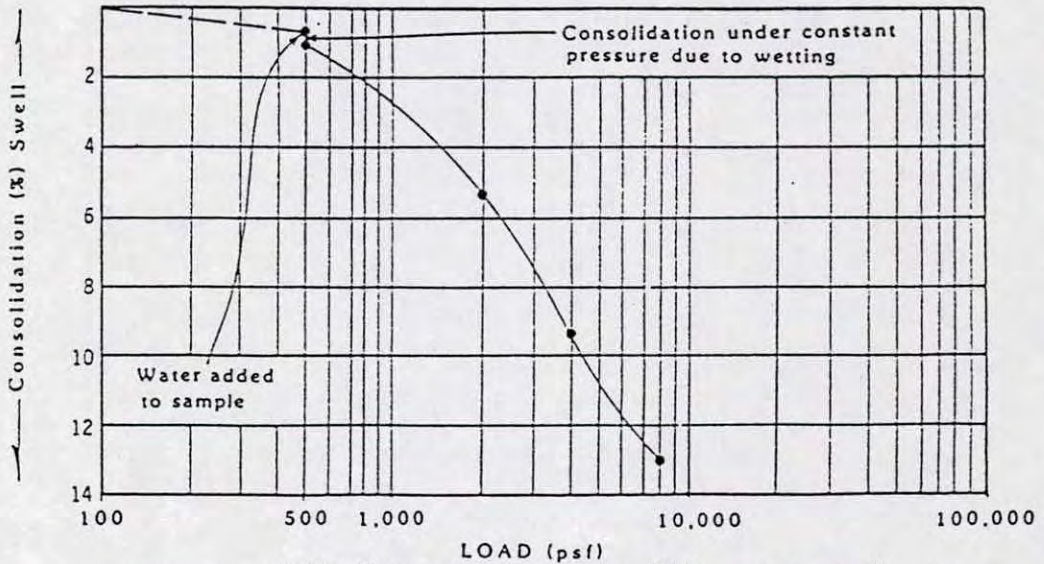


Client St. Vrain Mutual Reservoir and Water Company
 Project Dowe Flats Dam
 Sample No. Test Pit 2 Soil Sandy Clay, light brown
 Location 7 ft. depth Percent Passing # 200 64
 Optimum Moisture Content 15% Maximum Dry Density 114 pcf.
 Method of Compaction ASTM D-698, Method A
 Liquid Limit 27 Plasticity Index 14



Sample of Clay from test hole AH-1 at depth 4 feet.

Natural Moisture Content 13.5 % Natural Dry Density 110.0 pcf.



Sample of Silty Clay from test hole AH-2 at depth 9 feet.

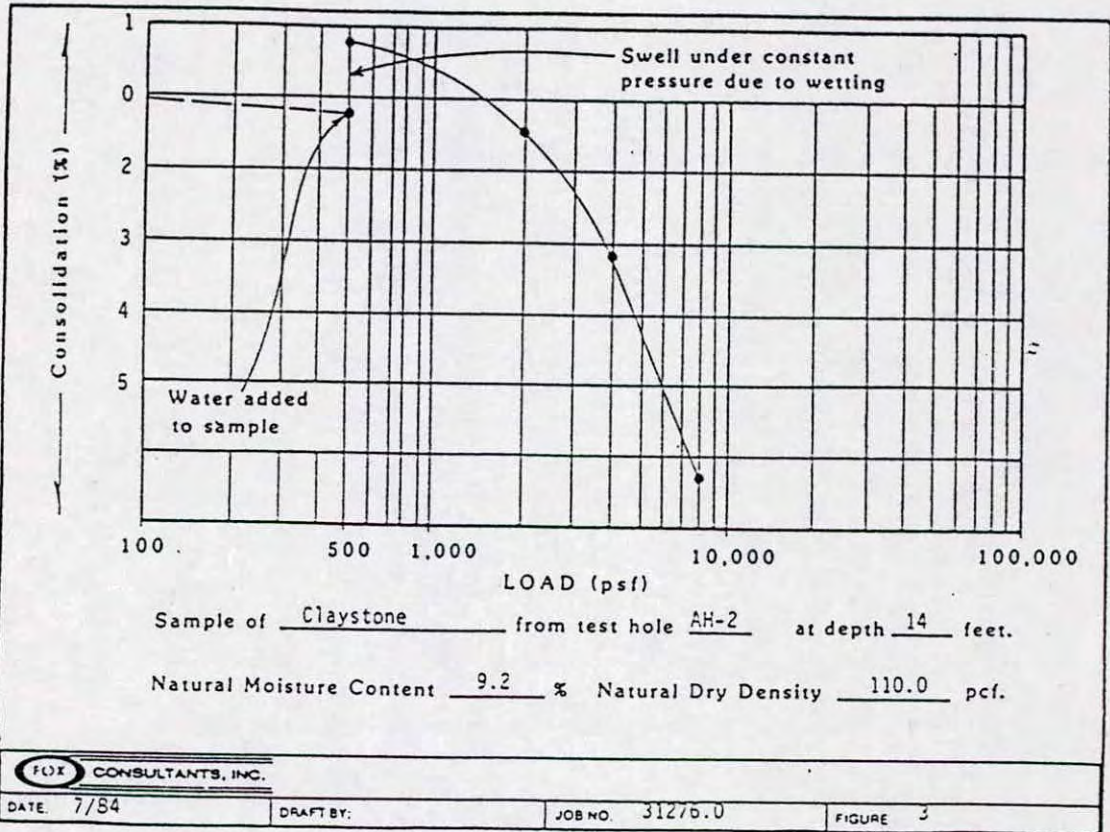
Natural Moisture Content 11.2 % Natural Dry Density 100.2 pcf.

Swell Consolidation Results, Dowe Flats Area			
DATE: 7/84	DRAFT BY:	JOB NO. 31276.0	FIGURE 2

CONSULTANTS, INC.

CONSOLIDATION TEST DATA

FIGURE B-8.0



E444

SOUTHWESTERN PORTLAND CEMENT

**Mining Assessment Report
Dowe Flats Project
Lyons, Colorado**

February 1993



MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES DIVISION

**DOWE FLATS PROJECT
MINING ASSESSMENT REPORT**

Prepared for
Southwestern Portland Cement
16888 North "E" Street
Victorville, California 92392

Prepared by
Morrison Knudsen Corporation
Environmental Services Division
180 Howard Street
San Francisco, California 94105

February 1993

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MINING ASSESSMENT REPORT
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APPENDIX A

Borehole Logs and Water Pressure Test Data

DOWE FLATS PROJECT MINING ASSESSMENT REPORT

1. PURPOSE

The Dowe Flats valley is located about one mile east of Lyons, Colorado (Figure 1). A commercial limestone deposit underlies portions of the valley. In addition, the valley is a potential site for an off-stream water reservoir. Southwestern Portland Cement Company has retained MK-Environmental Services Division (MK) to define and evaluate the possible geotechnical impacts of limestone mining on the planned reservoir.

2. EXECUTIVE SUMMARY

Mining would not render the proposed reservoir site unsuitable for future dam construction. An evaluation of the potential impacts of mining on the reservoir is summarized below.

In the areas proposed for mining, the fresh rock that underlies the planned reservoir is practically impervious; therefore, it is anticipated that the mine excavations would have little or no impact on seepage from the reservoir.

The net gain in reservoir storage volume resulting from limestone extraction would be about 3,000 acre-feet. Based on a fill efficiency ratio (FER) of about 238 cubic yards per acre foot, this gain in storage volume translates into a benefit to the reservoir of about 0.7 million cubic yards of embankment volume.

The 3,000-acre-foot net gain in reservoir storage volume is based on the final post-reclamation contours of the mined land as shown on the current reclamation plan. A greater gain, up to 8,000 acre-feet, would be possible if the reservoir were developed during the mine life and the mine reclamation plan were revised with the express purpose of maximizing reservoir storage.

Mining the Hi Cal limestone through the dam foundation would deepen the foundation and increase the dam volume by about 0.9 million cubic yards. Given that the net gain in reservoir storage volume translates into a benefit to the reservoir of 0.7 million cubic yards of embankment, the net impact on the dam volume resulting from mining would be an increase of about 0.2 million cubic yards.

No damage to the dam foundation is anticipated to result from the blasting and stress relief associated with the excavation of limestone and overburden materials. However, mining would have the following impact on the dam foundation in the mined-out area:

- An excavation of about 125,000 cubic yards would be necessary to lay back the pit highwall to a 2(H):1(V) slope within the limits of the dam. The additional dam embankment required to fill this excavation is included in the 0.9 million cubic yards given above.
- Since mining would remove the soils and most of the weathered, pervious rock from the foundation, the need for soil stripping would be minimized and the planned depth of the grout curtain could be reduced from 30 feet to 20 feet.
- As a result of the deepening of the dam foundation, the surface area of the rock foundation under the core would increase by about 23,000 square yards. This area would require detailed treatment prior to placing the core fill.

Mining the Hi Cal limestone downstream of the dam as shown on the proposed mine plan would have no material impact on the planned reservoir.

The mine operation would excavate approximately 3.5 million cubic yards of potential embankment soil material. If, during mining, the suitable soils were stockpiled adjacent to the dam site, the subsequent dam construction would be more efficient as a result

of (1) more efficient moisture-conditioning of the soils, (2) more efficient loading, (3) shorter haul, and (4) less stripping than if the soils were obtained from the unmined borrow areas. It is estimated that at least 2.1 million fill cubic yards of embankment soil could be stockpiled near the dam site.

Use of shale waste rock in the downstream shell of the dam would be efficient for dam construction. It is estimated that approximately 1.6 million fill cubic yards of waste rock could be stockpiled along the downstream toe of the dam for subsequent placement in the dam.

3. PLANNED FACILITIES

Facilities planned for the Dowe Flats area include a limestone mine and a water reservoir. These are described below.

3.1 Mine

The mining plan is shown on Figure 2, and a schematic cross-section of the mine pits, superimposed on a geologic section, is shown on Figure 3. Four rock layers would be mined over a period of 25 years. The westernmost layer to be mined would be the Fort Hays Limestone, locally referred to as the Hi-Cal layer. The 15-foot-thick stratum would be mined within an 1,100-foot-wide pit. Pit depth would range from zero at the outcrop along the west side of the pit to a maximum of about 125 feet along the east side. The pit width would be about 575 feet, with a maximum depth of about 65 feet, from approximately 300 feet north of the upstream toe of the dam to the southern end of the pit.

Three limey shale strata, referred to as the 2nd, 3rd and 4th Ridges, would also be mined. Approximate thickness of the strata would be 10, 30 and 12 feet, respectively. Maximum pit depths would be about 70, 65 and 60 feet, respectively (Ref. 1).

Figure 2 shows the approximate outline of the four pits. The Hi-Cal layer would be mined over a strike length of about 7970 feet, beginning at the southernmost end of the pit along coordinate line N7,500, approximately. The 2nd, 3rd and 4th layers would be mined over lengths of about 5,000, 4,730 and 1,900 feet, respectively. Mining of these three layers also would begin at the southern end of the proposed pits, which is now planned at about coordinate line N9,700.

Mining would begin by stripping and stockpiling topsoil from (1) the four starter pits and (2) the waste and stockpile areas. Following topsoil stripping, overburden materials would be removed from the starter pits and placed in the waste or stockpile areas. Limestone extraction would then begin. After the pits were enlarged so that equipment could move freely, all waste material removed from the advancing face of each of the four pits would be placed in accordance with an approved reclamation plan. The final ground surface would be graded, topsoiled and revegetated in accordance with the reclamation plan.

3.2 Reservoir

An off-stream water reservoir is being considered for the Dowe Flats area. Development of the reservoir would require the construction of an embankment dam.

The dam for the reservoir, called the "Fox" dam, is shown on Figure 2. The dam would run east-west along coordinate N9,200, approximately, and would include a wing dike running north-south along the Hi-Cal ridge, at about coordinate W4,600. The elevation of the dam crest has not been determined exactly but is anticipated to be about El. 5400, resulting in a maximum dam height of about 110 feet.

With the exception of processed filter and drain materials, and possibly riprap, construction materials for the dam embankment would be obtained from the reservoir inundation area upstream of the dam. Preliminary field explorations of this area has

been made to delineate the limits of potential borrow sources and to determine the engineering characteristics and volumes of available materials.

3.3 Interface Between Mine and Reservoir

The outline of the mine pits and dam is shown on Figure 2. The reservoir probably would not be constructed until 20 or 25 years after mining begins.

The limestone mining operations could affect the reservoir in several ways, as outlined below:

- Reservoir Area: Portions of the limestone strata and overlying materials would be excavated from the reservoir floor. Some of the excavated materials would be returned to the pit as backfill. The final ground surface of the mined and reclaimed area would, on the average, be slightly lower than the pre-mining ground. Therefore, the reservoir volume would be increased. In addition, the effect of mining on the watertightness of the reservoir floor needs to be evaluated.
- Dam: Excavation of the Hi-Cal ridge would be carried through the foundation of the main and wing embankments. The dam height and volume would increase and the dam foundation conditions in the mined area would change.
- Construction Materials: A portion of the borrow areas identified for construction of the dam would be excavated during mining. Suitable earth materials could be stockpiled for use in the dam. Also, mining would generate a large volume of waste rock, some of which could be incorporated into the dam embankment.

The mine reclamation plan would include the following features pertinent to the reservoir:

- The area of the dam footprint within the mined-out pit would not be backfilled with waste rock so as to minimize the excavation required for dam construction. For the purposes of interim reclamation, the pit floor within the dam footprint would be covered with a one-foot-thick layer of topsoil and vegetated.
- Stockpiles of suitable embankment materials would be provided east of the mine pit along the north and south toes of the dam. The stockpile surface would be revegetated. The stockpiles would be located outside the dam footprint; ample space would be left for equipment traffic between the stockpiles and the dam.

The possible impacts of the mine on the reservoir are developed and evaluated in Section 5 of this report.

4. SITE GEOLOGY

4.1 Summary of Previous Studies

The geology of the Dowe Flats valley has been studied previously by several investigators; a detailed summary is contained in Ref. 2. A geologic map of the site is shown on Figure 4, obtained from Ref. 3. The valley owes its origin to ancient tectonic forces that gently warped and folded the sedimentary strata into a southward-plunging syncline during a period of burial, then exhumed the strata through differential erosion to form the present-day valley. As a result of the downward warping, the younger rocks occupy the central portion of the valley and the older rocks outcrop on the adjacent mountain slopes. The youngest rock formation, which is

masked by overburden soils, is the Pierre Shale. This formation would be the major host rock for the dam foundation, but would be unaffected by the mining operations.

Underlying the Pierre is the Niobrara Formation, which is subdivided into the Smoky Hill and Fort Hays members. The Smoky Hill Member consists mainly of shale and marl. It attains a thickness of some 252 feet. Portions of this member contain high enough calcium to be mined and are known as the 2nd, 3rd, and 4th ridges.

The lower member of the Niobrara Formation is the Fort Hays Limestone, which is only about 15 feet thick but is of commercial value. The erosion-resistant limestone outcrops along the center of Dowe Flats in a north-south direction, forming a ridge that separates the valley into western and eastern portions. The Fort Hays is locally known as the Hi Cal limestone due to its high calcium content. The Hi Cal limestone also outcrops on the eastern edge of the valley due to warping, but mining of only the western limb is currently contemplated. The limestone has a reported joint spacing of one to three feet and a principal joint orientation parallel to bedding planes. Available information indicates that limestones in the Niobrara are not vugular and do not contain solution cavities (Ref. 2).

Thin but laterally continuous layers of bentonitic clay are known to exist in the Pierre and Niobrara formations.

The Hi Cal limestone rests on the Codell Sandstone, which is described as about 24 feet thick, fine grained, silty and weakly cemented. Other rock formations underlie the site but are not affected by the mining operation.

Extensive exposures of the Pierre Shale, the Niobrara Formation and the top of the Codell Sandstone are present at the Southwestern Portland Cement Lyons quarry, about two miles south of the site. Excavated vertical faces are generally competent and free standing to heights approaching 100 feet.

Dam site field data presented in Ref. 2 indicate the existence of a superficial bedrock zone, 10 to 20 feet in depth, where open joints are present in the bedrock, resulting in a moderately high bedrock permeability. The permeability of the underlying rock is very low.

A thin soil mantle overlies the bedrock in the project area. The soils generally consist of stiff to very stiff sandy clays of low to moderate plasticity and extend to depths of up to about 20 feet (Ref. 2). However, in the vicinity of the Hi Cal ridge, the soils range from zero to about five feet in depth and tend to have a higher content of sand- and gravel-size rock fragments.

4.2 MK Field Investigation

Additional field studies were conducted by MK in April of 1991 to assess reservoir watertightness under post mining conditions. Four NQ wireline borings were made, and pressure tests were performed in the borings to determine the permeability of the rock. Approximate boring locations are shown on Figure 4. The core was logged in detail, photographed, and stored on site. The geologic data from each boring, including water pressure test data, are presented in Appendix A.

The borings, numbered MK-1 through MK-4, range from 40 to 140 feet deep and were drilled from 10 degrees to 30 degrees off vertical on bearings parallel and normal to the dip of the strata to intersect as many natural joints as possible. Depths referred to herein are as measured parallel to the borings.

The permeability of the in situ-rock was investigated to permit evaluation of two conditions that will result from mining:

- 1) Removal of the Hi Cal limestone would expose the underlying Codell sandstone to the full reservoir hydrostatic head. An assessment must be made of the

permeability of the sandstone and whether the sandstone layer will form a satisfactory reservoir floor (and not contribute to reservoir leakage).

- 2) Removal of the Hi Cal limestone and of the 2nd, 3rd and 4th ridges would expose the highwalls, which are excavated in the Niobrara Formation upstream of the dam, to the reservoir water. An assessment must be made of whether the presence of the highwalls may significantly increase the seepage under the dam or require a deeper, more expensive cutoff to minimize seepage.

To investigate the first condition, borings MK-1 and MK-2 were located about 1,000 feet apart along the Hi Cal ridge. Both borings penetrated about 9 feet of Hi Cal limestone and over 30 feet of underlying Codell sandstone. One bentonite seam was found to exist in the Hi Cal limestone. The sandstone is marbled with shale and is well cemented, sparsely jointed and sound except along the near surface where it is weathered. Weathering has affected the ridge to depths of approximately 21 to 28 feet which includes all of the limestone and the upper 12 to 15 feet of the Codell sandstone.

The measured permeability of the weathered portion of the Codell sandstone along the ridge is about 10^{-4} cm/sec, which is considered somewhat permeable and, for a dam foundation, would require either removal along a cutoff trench or grouting to render it watertight. The permeability of the fresh unweathered Codell sandstone measured in holes MK-1 and MK-2 ranges from 5×10^{-5} to 2×10^{-6} cm/sec, which is considered too impermeable to seal with cement grout. The Codell sandstone was also encountered in boring MK-3 at a depth of 119 feet, well below the zone of weathering. The permeability of the sandstone was measured to be 6×10^{-6} cm/sec, which is very low and correlates well with results in borings MK-1 and MK-2 below the zone of weathering.

These results indicate that the fresh unweathered portion of the Codell sandstone is essentially impermeable and would form a suitable floor for the planned reservoir. The

more permeable shallow and weathered portion, which occurs under the Hi Cal ridge, would need to be sealed by a cutoff under the wing dike and under a short portion of the main dam.

Regardless of whether the limestone is removed or not, the cutoff would have to extend through the weathered portion of the sandstone. If the near-surface weathered portion of the sandstone is sealed at the dam, exposing the sandstone directly to reservoir conditions is expected to have no material effect on reservoir watertightness.

To investigate the second condition, borings MK-3 and MK-4 were drilled to depths as deep or deeper than the anticipated mining depth at the highwalls. Boring MK-3 penetrated about 100 feet of shales overlying the Hi Cal limestone, then penetrated the limestone and 30 feet of the underlying Codell sandstone. Boring MK-4 penetrated the shales overlying the 3rd ridge materials and was carried below the planned depth of excavation.

The shales overlying the Hi Cal layer were found to contain pyrite nodules and a few thin pyrite beds. Some slaking or deterioration of the weathered rock core was noted, but exposure to the atmosphere had no immediate visible effect on the fresh, unweathered rock. No gypsum was encountered in either the weathered or unweathered portions of the rock. Few open joints were encountered in the rock mass, and the core generally parted along bedding planes during handling. Ancient jointing is present, but the openings have since been healed or cemented with calcite which has rendered them tight and impermeable. A 2-foot thick crushed, faulted and fractured zone was encountered near the bottom of MK-4. It is also an ancient feature and has been thoroughly cemented with calcite to a tight impermeable condition.

Bentonite seams are common in the rock overlying the Hi Cal limestone. Fifteen seams with an average thickness of about $\frac{1}{2}$ inch were identified in MK-3 and seven in MK-4. Maximum seam thickness was about 2 inches. A single bentonite seam was found about 6 feet from the bottom of the Hi Cal layer in MK-1, MK-2 and MK-3

and, as the other bentonite seams, is probably continuous across the site. The bentonite seams dip slightly downstream and towards the east so as to underlie the main dam at depth. Their presence forms effective barriers to vertical groundwater seepage and the lack of open and permeable joints in the fresh unweathered rock prevents any significant lateral seepage.

The permeability of the fresh unweathered rock below a depth of 25 to 30 feet, whether shale, limestone or sandstone, was measured to range from 2×10^{-5} to 6×10^{-6} cm/sec and is considered impermeable. The permeability of the rock in the weathered zone at depths of about 10 feet to 30 feet was measured to range from 2×10^{-4} to 6×10^{-3} cm/sec. The weathered rock is considered moderately pervious, and would need to be sealed in the dam foundation.

The top 10 to 15 feet of each boring consisted of overburden and severely weathered shale or clay which required casing and where some drill water return was lost during drilling, indicating a high permeability. This material would have to be removed along a cutoff trench under the dam core, prior to grouting and sealing of the underlying weathered zone.

These results indicate that the rock in the highwalls of the mine is pervious only in the weathered zone which extends to a depth of about 30 feet. Below this zone, regardless of the rock type in the mine area, the rock mass is practically impervious. Therefore, the opening of the mine pits upstream of the dam is expected to have no material effect on reservoir leakage.

5. IMPACTS OF MINING ON PLANNED RESERVOIR

5.1 Reservoir Watertightness

The MK field investigation addressed the potential impact of mining on the watertightness of the planned reservoir and concluded that there will be no material effect on reservoir leakage. The findings of the investigation have been presented in Section 4.2.

5.2 Reservoir Volume

The proposed mine would extract about 9,500,000 cubic yards of limestone and limey shale from the Fox reservoir. Waste rock would be returned to the pits and graded in accordance with the approved reclamation plan. In the reclaimed pit, the waste rock would exist as a rockfill, with a density lower than that of the original rock prior to disturbance by excavation. Because of the "bulking" of the waste rock, the volume of extracted limestone would not accrue to the available reservoir storage in its entirety. Studies performed by WT Environmental Consultants (Ref. 4) indicate that the net gain in storage volume resulting from limestone extraction would be about 4.8 million cubic yards or, in storage units, 3,000 acre-feet. (If no mine waste were returned to the reservoir inundation area, the potential maximum increase in storage volume due to mining would be about 8,000 acre-feet, raising the storage capacity of the Fox reservoir from 28,000 to 36,000 acre-feet.)

The gain in storage volume would translate into a significant benefit for the reservoir. This benefit can be expressed in terms of volume of embankment dam by using the concept of marginal fill efficiency ratio (FER) introduced in Ref. 2. The FER is defined as the volume of embankment fill required to achieve a unit volume of reservoir storage. For the original Fox dam, the storage volume from elevation 5380 to elevation 5400 has a marginal FER of 238 cubic yards per acre-foot (Ref. 2). This means that between elevations 5380 and 5400 each acre-foot of storage would be

developed at the cost of constructing 238 cubic yards of embankment. Based on an FER of 238 cubic yards per acre-foot, the 3,000 acre-foot gain in storage volume translates into a benefit to the reservoir of 714,000 cubic yards of embankment.

5.3 Dam Foundation Conditions

Potential impacts of the mine on the dam foundation conditions include the following:

- Potential damage by blasting and from stress relief as a result of the excavation and removal of limestone and overburden materials.
- Impact of highwall geometry on dam performance.
- Changes in scope and quantity of preparatory work for the dam foundation, including (1) foundation excavation, (2) grout curtain and (3) foundation treatment.

These possible impacts are evaluated below.

A. Blasting and Stress Relief

The effect of mining on the underlying Codell sandstone can be evaluated based on field observations at the existing Lyons quarry approximately two miles south of Dowe Flats. Blast holes are drilled down to the bottom of the Hi Cal limestone. Since the limestone drills differently than the sandstone, the drillers easily detect the top of the sandstone, where they complete the blast holes. Because of the difference in rock hardness and formational characteristics, the blast cleanly separates the limestone from the sandstone without damage to the latter. Observation of the floor of the existing pit indicates that a smooth rock surface, with no significant damage, is achieved at the top of the Codell sandstone.

Exploratory borings indicate that similar conditions exist at the Dowe Flats site. It can therefore be concluded that if similar mining practices are used at Dowe Flats there will be no significant blast damage to the underlying Codell sandstone.

The magnitude of the stress relief induced by removal of limestone and overburden should not cause significant damage to the underlying rock. This conclusion is based on the following observations of field conditions and geologic history:

- The MK field investigation did not reveal any adverse condition indicative of high locked-in lateral stresses, such as core diking or closing-in of the drillhole walls. Likewise, no such indications were noted in previous investigations (Ref. 2).
- Geologic evidence indicates that, prior to reaching its current condition, the bedrock at the site was subjected to lateral stress and deformation while presumably deeply buried. Erosion of the rock mass to its present surface has probably unbalanced the stress in the vertical direction which has resulted in some stress relief opening of bedding planes in the upper weathered portion of the rock. Mining will further unbalance the stress in the vertical direction. However, within the dam foundation, the maximum pit depth of 65 feet is relatively shallow. Due to the topography and configuration of the mine (see Figures 2 and 3), the pit is no deeper than about 40 feet except for a 100-foot strip adjacent to the highwall. Additionally, the weaker weathered rock would be removed by mining, exposing the stronger, massively bedded, sparsely jointed, sandstone. As a result, vertical deformation of the beds due to mining is considered very unlikely.

If the construction of a reservoir were to take place concurrently with mining activities, it would be advisable to monitor vibrations at the dam during the closest blasts. Sensitive structures such as buildings can safely withstand vibrations with peak particle velocities of 2 inches per second without damage; higher velocities would be permissible for a well-compacted earthen structure. Restricting the blasting to a minimum distance of 500 feet from the dam toe would likely limit the vibrations at the dam to within safe levels.

B. Highwall Geometry

In the dam foundation, the Hi-Cal limestone would be mined in a dip-slope pit to a depth of about 65 feet. The east side of the pit would be a vertical or near-vertical highwall. At the location of the highwall, the dam would rise roughly 85 feet above the existing ground surface, or about 150 feet above the bottom of the pit. As indicated in previous studies (Ref. 5), if the dam embankment were constructed against the vertical highwall, unacceptable differential strains, shearing and cracking would be likely to occur in the fill along and above the highwall. To avoid damaging differential strains and cracking, flattening the highwall to a slope of 5(H):1(V) has been previously suggested by S. Vick. This slope has been considered to be a probably conservative but reasonable estimate pending detailed stress analyses of the dam (Ref. 6).

A review of dam design and construction practice suggests that the 5(H):1(V) slope is overly conservative. The U.S. Corps of Engineers recommends, if economically possible, to flatten nearly vertical rock abutments so they have a slope of 0.5(H):1(V) or 1(H):1(V), thereby minimizing the possibility of cracking (Ref. 7). The U.S. Bureau of Reclamation recommends that all rock foundation surfaces be 0.5(H):1(V) or flatter (Ref. 8). A review of practice by leading dam-design organizations concluded that the maximum permissible abutment

slopes specified by those organizations range from 0.1(H):1(V) to 1(H):1(V) (Ref. 9).

Because the highwall would occur in the central portion of the embankment rather than in an abutment, it is prudent for preliminary evaluations to adopt a cutback slope at the low (flat) end of the ranges mentioned above. Based on current practice, it appears that a slope in the range of 1(H):1(V) to 2(H):1(V) would suitably reduce the potential for differential settlement and cracking. For conservatism, a slope of 2(H):1(V) has been adopted hereinafter for computation of excavation and dam volumes. The cutback slope would have to be confirmed or modified during final design of the dam based on a detailed stress analysis of the embankment, as it may be possible to adopt a steeper slope with the consequent savings in excavation and fill.

The volume of excavation required to flatten the 65-foot highwall from vertical to a slope of 2(H):1(V) along the entire 800-foot-width at the base of the dam would be about 125,000 cubic yards. Excavation to the final 2(H):1(V) slope would have to be made by controlled blasting techniques to obtain an acceptable surface and to minimize blast damage to the underlying rock. Excavation should be postponed until the time of dam construction to avoid long-term weathering and slaking of the shales at final grade.

On the upstream side of the dam, the highwalls of the 2nd, 3rd, and 4th ridges should not affect the stability of the dam foundation providing they are no closer to the dam than the projected 3H:1V dam slope in an upstream direction, i.e., the 65-foot-high 3rd-ridge highwall should be no closer from the upstream toe of the dam than $3 \times 65 = 195$ feet. This also applies to the Hi Cal ridge highwall in the area where the pit is widened eastward to a maximum depth of 125 feet.

C. Preparatory Work for Dam Foundation

Foundation work contemplated in the preliminary (Fox) design includes the following:

- A cutoff trench would be excavated to ripping depth into weathered bedrock, with an anticipated depth ranging from about 3 to 20 feet.
- A single-row grout curtain would be installed to a depth of about 30 feet below the bedrock surface, with primary hole spacing of 20 feet.
- Outside the cutoff trench, organic and soft soils would be stripped to a depth of about 2 feet. The foundation soils overlying bedrock are generally firm and considered competent to support the embankment, so that extensive foundation excavation in excess of routine stripping is not anticipated (Ref. 2).

In addition, although not described in the Fox design, surface treatment of the rock foundation under the core would also be required. Also, review of the MK field data suggests that the bentonite layer within the Hi Cal ridge and the overlying limestone would have to be removed from a portion of the wing dike foundation to improve dike stability, especially for rapid reservoir-drawdown conditions. However, the excavation involved would be relatively small.

The impacts of mining on cutoff trench excavation, grout curtain, and surface treatment of the foundation (both soil and rock) are evaluated below. As indicated earlier, the area mined under the dam would be left open. When the dam is constructed, removal of waste rock therefore would not be necessary under the dam footprint.

1. **Foundation Cutoff Excavation and Grouting** - Mining the Hi Cal layer through the main dam foundation would effectively eliminate the weathered pervious zone from that section of the dam. A minimal grouting effort to confirm the watertightness of the remaining rock would still be advisable but the effort should not be extensive and is expected to involve shallow grout holes (say 20 feet deep) at wide primary spacing (say 20 feet apart). The weathered sandstone under the wing dike and a short section of the main dike would need to be grouted to form a cutoff. The depth of grouting could be reduced to about 20 feet if the overlying Hi Cal limestone is first removed by mining. Reducing the grout curtain depth in the mine area from 30 feet (in the Fox design) to 20 feet (as proposed above) would reduce the total area of grout curtain by about 31,000 square feet.

Assuming the Hi Cal excavation through the dam lies open for a number of years (or fills with water at some point), some minor air slaking or weathering of the Codell sandstone is possible, but unlikely to affect more than a few inches of depth. For planning purposes it should be assumed that up to 2 feet of new excavation may be necessary to restore a fresh unweathered surface under the core section of the dam prior to any check grouting. Because this excavation would probably be performed over the entire base width of the core, the excavation volume would be approximately the same as the volume of the Fox cutoff trench, which, while deeper, is narrower.

Any water in the pit would be pumped in preparation for construction. Pit dewatering during dam construction is not considered a significant item, as the low bedrock permeability suggests that large inflows into the pit are unlikely.

Flattening of the highwall would not occur until the dam is actually constructed, so that any damaged rock resulting from decomposition or slaking in the area of the core would be automatically removed to a sound surface.

Elsewhere under the main dam, including downstream of the 2nd, 3rd and 4th ridges, the foundation preparation would be no different than if mining was not done and would probably involve excavation of a cutoff trench to sound rock and grouting through the weathered pervious zone.

2. **Surface Treatment of Foundation** - The type of foundation surface treatment depends on the nature of the foundation material (soil or rock) and the type of embankment zone which would come in contact with the foundation. Three types of foundation preparation work would be applicable to the Dowe Flats dam:

- **Soil Foundation:** Preparation would involve (1) stripping and removing topsoil and soft/loose soils, and (2) scarifying, moisture-conditioning and compacting the soil foundation surface to the same requirements as specified for the overlying embankment fill.
- **Rock Foundation Under Shell Zones:** Rock foundation preparation under the shells would consist of the mechanized excavation of loose soils, sediment, debris, and superficial highly weathered and jointed rock that is observed to be altered to a soil-like condition with shear strength lower than that of the compacted embankment.
- **Rock Foundation Under Core:** Under the core, additional efforts would be made to prevent the seepage that may occur through ungrouted cracks and joints in the rock from eroding the core material, and to shape the foundation so as to obtain a smooth

surface suitable for thorough compaction of the core fill. The rock surface under the core would be sealed by thoroughly cleaning out all joints and cracks and filling them with a fluid cement mortar. In addition, dental concrete would be placed in depressions and irregularities in the rock surface.

If no mining were to take place, the foundation preparation for the dam would consist mainly of soil foundation preparation, except for the core cutoff trench which would extend into rock. Available information suggests that the existing overburden soils are generally firm and competent to support the embankment.

In the mine area, the mine operation would have stripped all soils and deepened the dam foundation. Foundation preparation quantities would therefore change as a result of mining. Quantities, estimated for the portion of the dam on the mine area, are shown in the table below.

**FOUNDATION PREPARATION QUANTITIES
FOR PORTION OF DAM ON MINE AREA**

	<u>Fox Dam (No Mine)</u>	<u>Fox Dam on Mined-Out Area</u>	<u>Change Due to Mining^a</u>
Foundation Area:			
Soil Foundation (yd ²)	101,000	0	-101,000
Rock Foundation Under Shells (yd ²)	0	103,000	103,000
Rock Foundation Under Core (yd ²)	8,000	31,000	23,000
Total Foundation Area (yd²)	109,000	134,000	25,000
Treatment Quantities^b:			
Soil Foundation:			
• Stripping, 2 ft. avg. (yd ³)	67,000	0	-67,000
• Surface Preparation (yd ²)	101,000	0	-101,000
Rock Foundation Under Shells:			
• Excavation, 1 ft. avg. (yd ³)	0	34,000	34,000
Rock Foundation Under Core:			
• Detailed Cleanup and Dental Work (yd ²)	8,000	31,000	23,000

Notes:

- a. Negative values reflect quantity savings due to mining, and positive values reflect additional quantities due to mining.

5.4 Dam Embankment

Dam volume computations performed by Sergent, Hauskins & Beckwith (Ref. 10) indicate that the additional volume of Fox dam embankment in the mined-out area, due to the deeper foundation, would be on the order of 0.9 million cubic yards. This estimate is based on a 2(H):1(V) highwall cutback and on the assumption that the 2nd, 3rd and 4th ridges are not mined under the dam.

The embankment to be constructed on the mined-out portion of the valley would retain almost all the design features of the Fox design. A sketch of the maximum embankment section is presented in Figure 5. The modifications to the Fox design are as follows:

- The clay blanket under the upstream shell would not be needed over the rock foundation.
- The grout curtain and the cutoff excavation under the core would both be shallower.
- Shale waste rock from the mine operation could be placed and compacted in the downstream shell instead of using soils from the reservoir area. The proposed shale zone would be protected from saturation by the internal drainage system. The shale zone could extend for the full dam length (rather than only in the portion of the dam in the mined-out pit). The estimated volume of this zone is 1.6 million cubic yards.

5.5 Availability of Fill Materials

A. Soils

Construction of the original Fox dam to a crest elevation of 5400 would require approximately 2.6 million fill cubic yards (FCY) of core material and 2.8 million FCY of shell material (Ref. 2). Core and shell materials would be obtained from the reservoir area upstream of the dam. Previous studies (Ref. 11) indicate that soils in the reservoir area include about 10 million bank cubic yards (BCY) of fine-grained soils potentially suitable for both core and shell zones. The soils exist in roughly a 600-acre area, in depths ranging from zero to about 20 feet and averaging about 12 feet. However, data indicate that the soils have an excessive moisture content at average depths greater than 5 to 9 feet,

depending on specific locations (Ref. 2). Pre-drainage of the borrow areas and/or soil rehandling would likely be necessary if borrow operations were to extend into the wetter soils.

It is estimated that the mine operation would excavate approximately 3.5 million BCY of soils from the mine area (Ref. 12). During mining, the soils suitable for subsequent dam construction should be stockpiled near the dam site.

- Loading from a stockpile and hauling to the dam would be more efficient than if the soils were obtained from the borrow area.
- Only minimal additional topsoil removal would be necessary when developing the stockpiles for dam construction.
- Long-term stockpiling of wet soils would promote drainage and reduce the need for drying prior to dam construction.

As a result of these considerations, the mine reclamation plan will contain provisions to identify and stockpile potential embankment soils so as to accommodate dam construction. Based on an evaluation of soil types and reclamation requirements, the following breakdown of the mine area soils has been estimated.

- About 60% of the total volume, or 2.1 million BCY would consist of clay, sandy clay and clayey sand suitable for both the core and shell of the dam. These soils would be placed in stockpiles adjacent to the damsite.
- About 10% of the total volume, or 0.4 million BCY, would consist of topsoil and organic soil. These materials would be placed in separate topsoil stockpiles.

- About 30% of the total volume, or 1.0 million BCY would consist of miscellaneous soils and would be used in the backfilling and reclamation of the mine pits.

The clayey soils in stockpile would not be adversely affected by weathering over the 25-year period prior to dam construction, as the clayey soils are a stable product of the weathering of other materials.

B. Waste Rock

Most of the mine shale waste rock would be used to backfill and reclaim the pits. However, approximately 1.6 million FCY of the shale waste rock could be placed in the downstream shell of the dam as shown on Figure 5. Stockpiling of the shale waste rock along the downstream toe of the dam would further enhance dam construction for the same reasons as described in the previous subsection. Therefore, a shale waste rock stockpile will be included in the reclamation plan. Stockpile volume will be approximately 2 million CY to allow for compaction shrinkage and necessary stripping of surficial weathered materials.

6. REFERENCES

1. Western Technologies Inc., "Exhibit D-Mining Plan," undated.
2. Fox Consultants, Inc., "Report on Geotechnical Feasibility and Preliminary Embankment Design, Proposed Dowe Flats Dam and Reservoir Near Lyons, Colorado," 22 January 1985.
3. Western Technologies Inc., Drawings Showing Geologic Map and Cross-Sections of Dowe Flats Site.

4. WT Environmental Consultants, Letter to Morrison Knudsen Transmitting Estimate of Reservoir Volume, 5 May 1991.
5. Vick, S.G., Letter to Reservoir Cotenancy Venture on Potential Effects of Limestone Mining on Dam Foundation, Dowe Flats Dam, 15 November 1985.
6. Vick, S.G., Letter to Reservoir Cotenancy Venture on Preliminary Cost Analysis, Dam Foundation Limestone Mining, Dowe Flats Dam, 23 May 1989.
7. U.S. Department of the Army, Corps of Engineers, "Earth and Rockfill Dams, General Design and Construction Considerations," EM 1110-2-2300, 1 March 1971.
8. U.S. Department of the Interior, Bureau of Reclamation, Design Standards No. 13 Embankment Dams, Chapter 3 Foundation Surface Treatment, Draft, 1 September 1984.
9. Committee on Embankment Dams and Slopes of the ASCE Soil Mechanics and Foundations Division, "Foundation and Abutment Treatment for High Embankment Dams on Rock," Journal of the Soil Mechanics and Foundations Division, Vol. 98, No. SM10, October 1972.
10. Sergent, Hauskins & Beckwith, Letter to MK-Environmental Services, 24 June 1991.
11. Vick, S.G., Letter to M. Dollaghan on Core Fill Availability, Dowe Flats Dam, 14 November 1989.
12. Sergent, Hauskins & Beckwith, Soil Volumes by Unit, Ridge and Phase, Dowe Flats Project, 3 July 1991.

13. Vick, S.G., Letter to M. Dollaghan on Cost Sensitivity Analysis, Dowe Flats Dam, 14 March 1986.

FIGURES

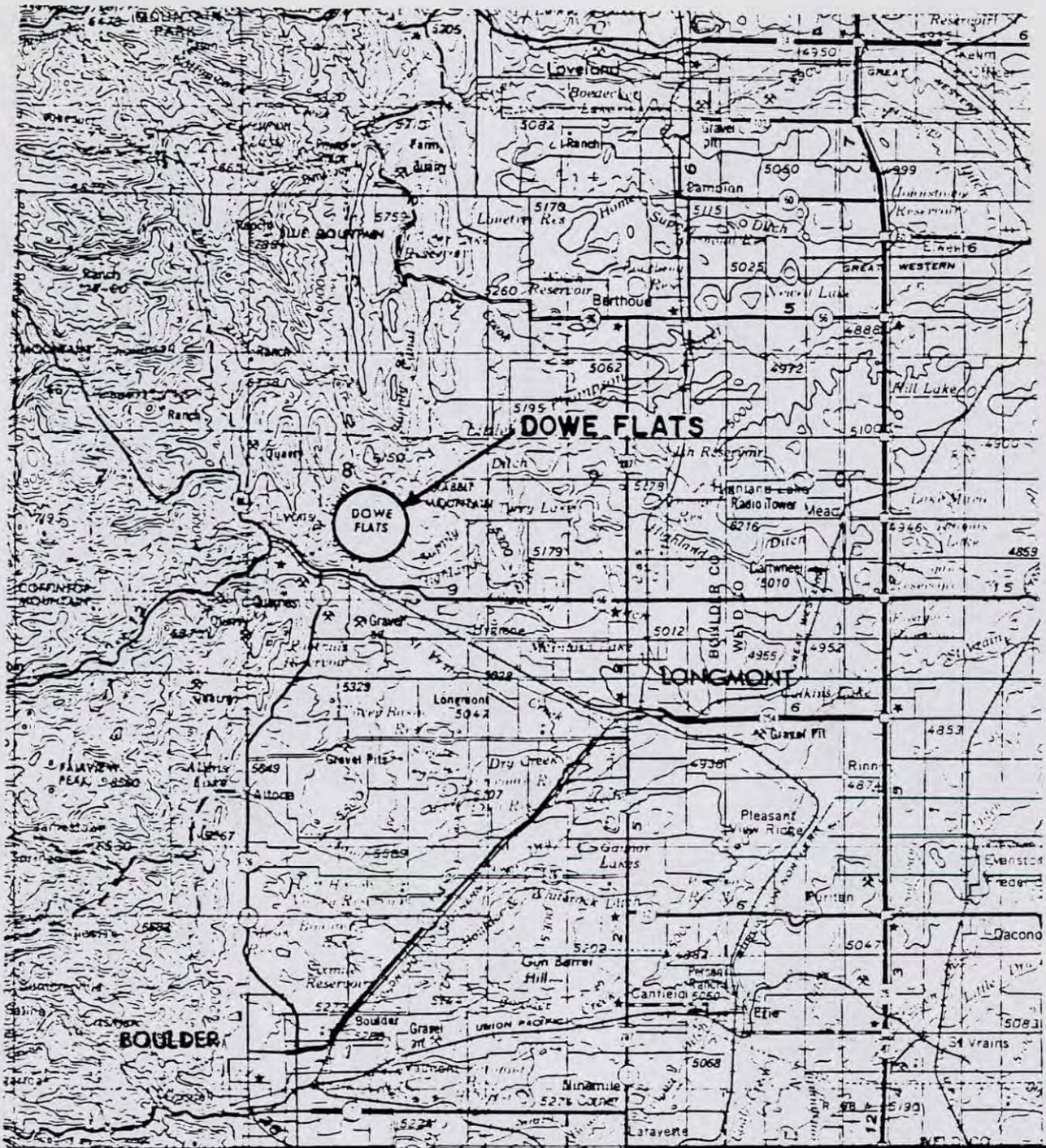


FIGURE I
SITE LOCATION

Figure 2-5

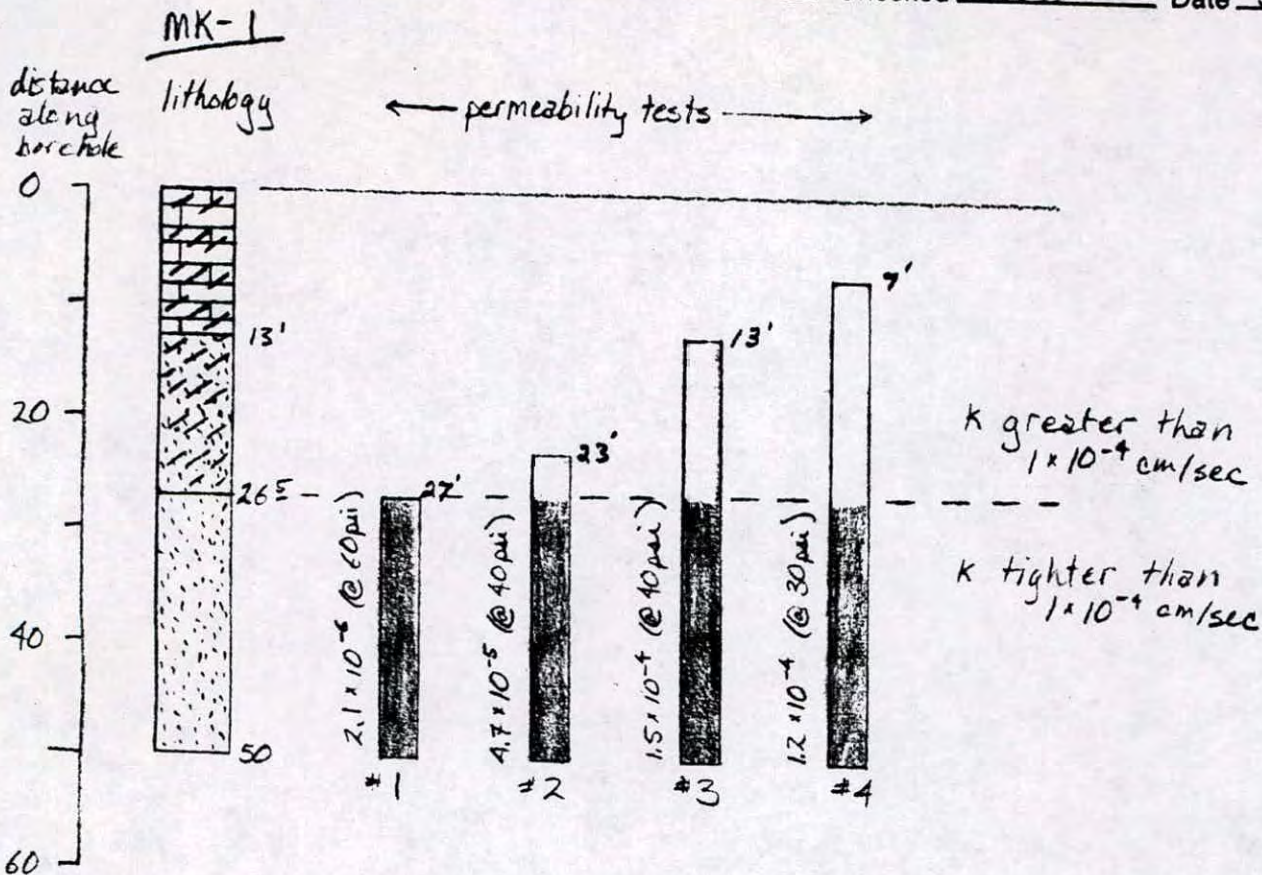
APPENDIX A

**Water Pressure Test Data
Borehole Logs
Photographs of Rock Core Samples**

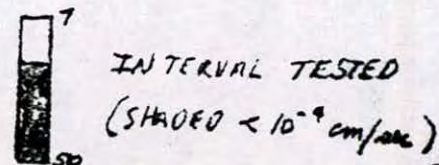
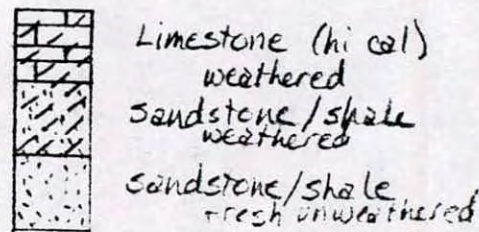
Project DOWE Flats
Feature _____
Item _____

Contract No. 3991
Designed CFS
Checked RCP

Sheet _____
File No. _____
Date 5/6/91
Date 5/6/91



k is measured in cm/sec



Project Dawe Flots
Feature _____
Item _____

Contract No. 3991
Designed OFS
Checked ECO

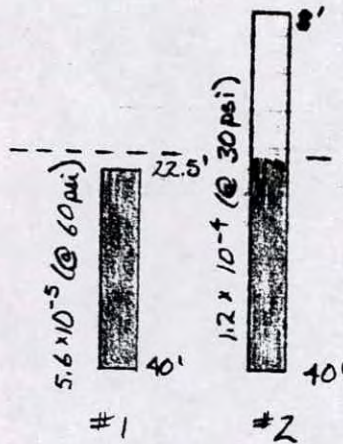
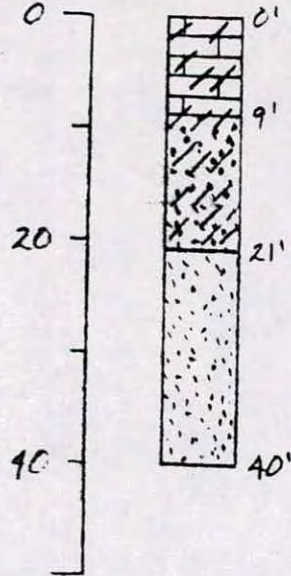
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Date 5/6/91
Date 5/6/91

MK-2

distance along borehole

lithology

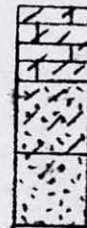
← permeability tests →



k greater than 1×10^{-4} cm/sec

k tighter than 1×10^{-4} cm/sec

k is measured in cm/sec



Limestone (hical) weathered

sandstone/shale weathered

sandstone/shale fresh, unweathered



INTERVAL TESTED
(SHADED < 10^{-4} cm/sec)



Project Dorse Flats

Contract No. 3991

Sheet _____

Feature _____

Designed OFS

File No. _____

Item _____

Checked RCD

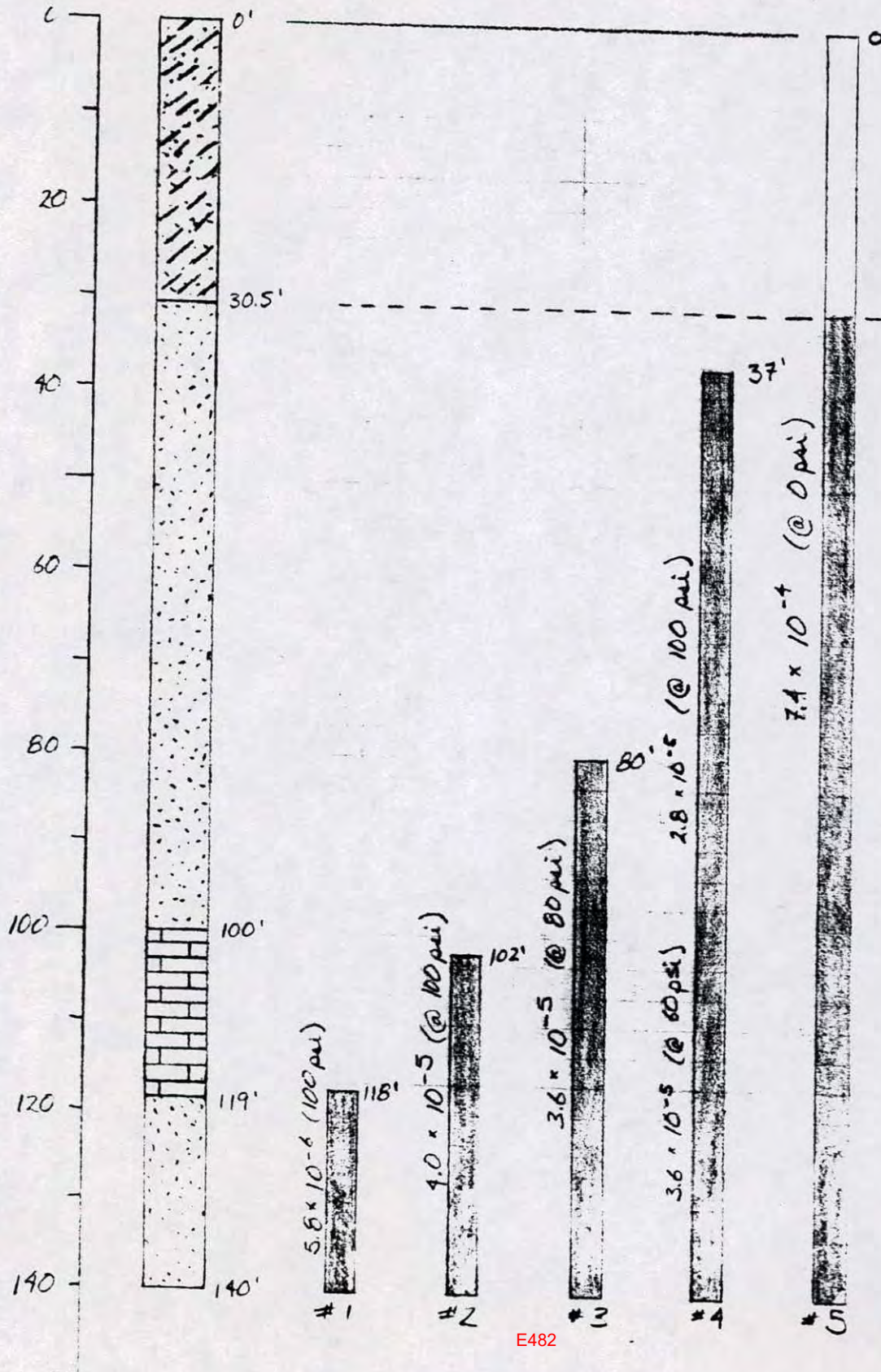
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Date 5/6/91

distance along borehole

lithology




← permeability tests →




k greater than 1×10^{-4} cm/sec

k tighter than 1×10^{-4} cm/sec

k is measured in cm/sec

 Sandstone/shale weather
 Sandstone/shale fresh/unweathered
 limestone (heal) fresh/unweathered

 INTERNAL TESTED (SMB)

Project Dowe Flats

Contract No. 3991

Sheet

Feature

Designed CFS

File No.

Item

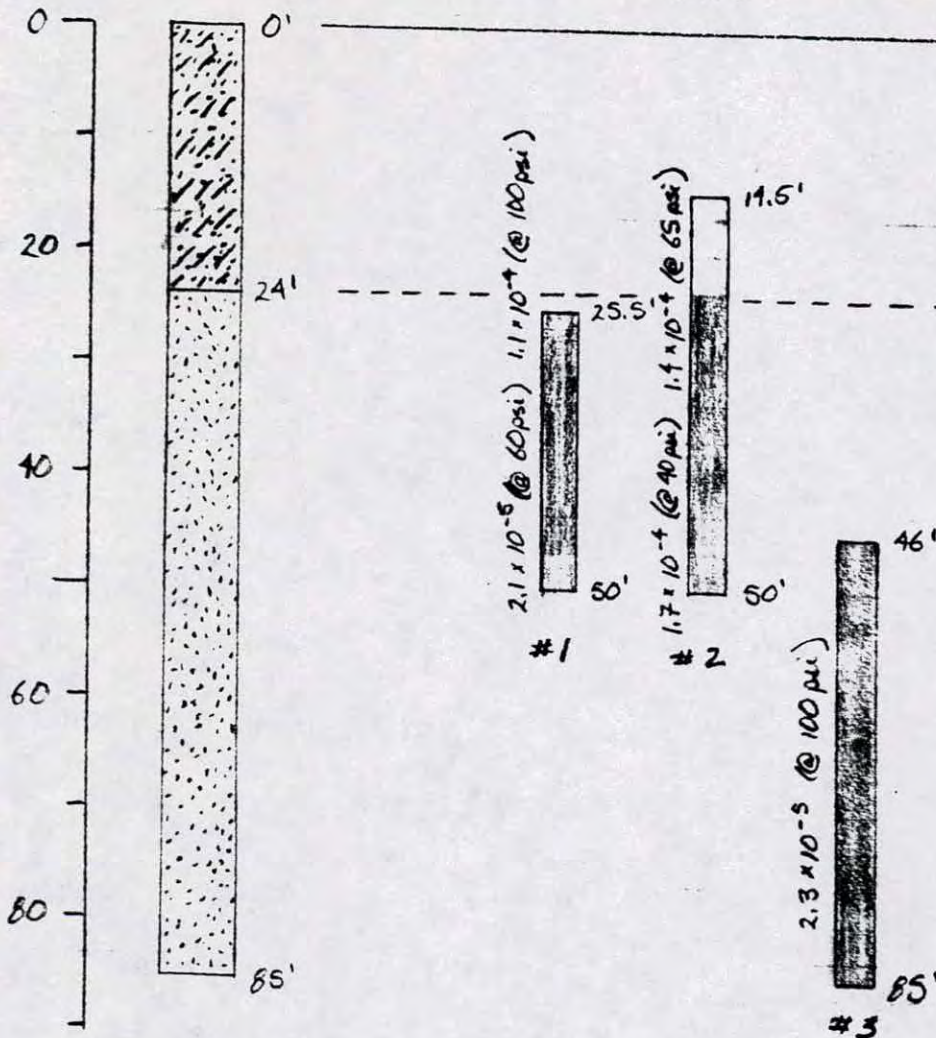
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Date 8/6/91

Date 5/6/91

Distance along borehole MK-4
lithology

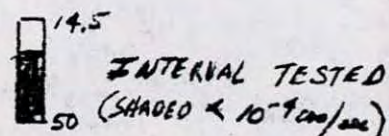
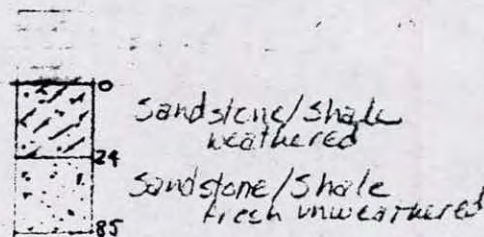
← permeability tests →



K greater than 1×10^{-4} cm/sec

K tighter than 1×10^{-4} cm/sec

K is measured in cm/sec



PROJECT DOWE FLATS
SITE HI CAL RIDGE
LOCATION ~ N 8500
DRILLING CONTRACTOR AM. MINING SERV.
DRILL MAKE - MODEL LONGYEAR 38
DATE - STARTED 4-15-91
FINISHED
ELEVATION ~ 5390
SAMPLES -
DEPTH TO WATER 29' 4/12/91
CORE BOXES 5
LOGGED BY P.C. Dowd
REVIEWED BY
JOB NO. 3991
HOLE NO. MK-1
HOLE SIZE NQ
ORIENTATION 615° W / 20° S
DEPTH TO ROCK 4.0'
DEPTH OF HOLE 50.0'

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS SAMPLING DRILL ACTION WATER LOSS CORE LOSS STANDARD PENETRATION TEST WATER PRESSURE TEST LAB CLASSIFICATION PIEZOMETERS
						TYPE	DIP				
ABOUT 5390	0		N CASING						0-1' MOSTLY TAN SANDY GRAVEL/SILT ORGANIC. 1-4' SIMILAR - LESS ORGANIC		ALL φ MEASURED FROM AXIS OF HOLE (S 15° W / 20° SOUTH)
	5				100%				TOP OF ROCK @ 40"		CASED w/ N CASING TO 5.0' - TOP OF ROCK @ 4.0' BEGAN CORING @ 5.0'
	5				0			J 15°	4'-13.0' - HI CAL LIMESTONE LIGHT GRAY, MOTTLED DENSE, NEAR FRESH BUT CALCAREOUS w/ FRACTURE COATINGS To 13' MOD. HARD BUT CAN BE SCRATCHED w/ KNIFE. BROKEN TO SHORT PIECES (2" TO 10 FEET)		WPT 7'-50' K = 1.2 x 10 ⁻⁴ cm/sec
	10				0			J 25°			
	10				0			J 30°			
	10				0			J 50°			
	12.5				0				4' - 5' 8 PIECES, BROKEN		AREA OF CORE LOSS NOT DETERMINED. SOME CORE GROUND.
	13.0				0			J V	5'-10' 15+ PIECES, 2" BENTONITE SEAM @ 6.5' MAY BE THICKER w/ CORE LOSS. TAN, PLASTIC, WET.		FULL DRILL WATER RTN TO 10', MILKY WHITE DRILL RATE 7 min/ft.
	15				0			J 70°	10'-12.5' 3+ PIECES		DRILL RATE 2 min/ft FULL DRILL WATER RTN CHANGED TO TAN @ 13.0'
	20				0				@ 13.0' APPROX. TOP OF SANDSTONE (CODELL?) MEDIUM GRAY SILTY FINE GR. SANDSTONE, HARD, NEARLY FRESH w/ SOME TAN DISCOLORATION DUE TO WEATHERING, BROKEN BUT FEW DEFINIBLE JOINTS. SANDIER & MORE BROKEN TO 25'. FRESH BELOW 26.5. NO CLAY SEAMS TO BOTTOM.		
					0				12.5'-15.0' 5 PIECES, 1" LONG MAX.		
					0				15.0'-20.0' 13+ PIECES 3" LONG MAX SOME GRINDING, FLAT BREAKS.		

SITE		DATE - STARTED FINISHED		JOB NO.	HOLE NO. MK-1
LOCATION		ELEVATION		HOLE SIZE	ORIENTATION
DRILLING CONTRACTOR See SH-1		DEPTH TO WATER		DEPTH TO ROCK	
DRILL MAKE - MODEL		SAMPLES		DEPTH OF HOLE	
LOGGED BY			REVIEWED BY		

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS	
						TYPE	DIP				SAMPLING DRILL ACTION WATER LOSS CORE LOSS	STANDARD PENETRATION WATER PRESSURE TEST LAB CLASSIFICATION PIEZOMETERS
	20								SANDSTONE (COLELL?) (CONT.) 20-25' 1" TO 2" PARTINGS ON ABOUT 15°-20° LONGEST PIECE 3"; NO GRINDING SANDY-NO SHALEY MARBLING		FULL DRILL WATER LOSS TAN, MUDDY DRILL RATE 2 MIN/FT. WPT 23'-50' K = 4.7 x 10 ⁻⁵ cm/sec	
	25			0	44"/60" = 73%	J	V		SILTIER BELOW 25' BELOW 25' SILTSTONE IS MARBLED w/ SHALE.		PARTIAL WATER LOSS SINCE ABOUT 20' DRILL RATE 3 MIN/FT.	
	30			25/60 = 41	59/60 = 90%	J	10		25-30 19 PIECES, LONGEST IS 10" SOME GRINDING. PARTINGS TO ABOUT 20° SLIGHT DISCOLORATION @ 26 & 26.5. SOME SHALEY PARTINGS BELOW 27'		WPT 27'-50' K = 2.1 x 10 ⁻⁶ cm/sec.	
	35			0	60/60 = 100	J	20		30'-35' 33 pieces, longest is 3" FAINT 20° BEDDING w/ SOME CROSS-BEDDING Break on partings - some shaley MARBLING. 1" DK GRAY SHALE BED @ 32.5'		some small water loss	
	40			0	60/60 = 100%				35'-40' 29 pieces, longest is 3 1/2" MOTTLED & CROSS-BEDDED, 1 1/2" SHALE BED @ 37' SLIGHT DIP TO ~ 20° - NO JOINTS		SOME SMALL WATER LOSS	

SITE		DATE - STARTED FINISHED		JOB NO.	HOLE NO. MK-1
LOCATION		ELEVATION	DEPTH TO WATER	HOLE SIZE	ORIENTATION
DRILLING CONTRACTOR		SAMPLES		DEPTH TO ROCK	DEPTH OF HOLE
DRILL MAKE - MODEL		LOGGED BY		REVIEWED BY	

SEE SH-1

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS	
						TYPE	DIP				SAMPLING	STANDARD PENETRATION
40									40-45' 27 PIECES, LONGEST IS 4"		DRILL RATE 2mm/ft.	
				8"/60" = 13	60"/60" = 100%				1" SHALE BED @ 42.2 MORE SHALEY BELOW 42.1 MARBLED w/ SILTSTONE, PARTINGS TO ~ 20° - NO JOINTS		SOME MINOR WATER LOSS	
45				18"/60" = 30	60"/60" = 100%				45-50' 22 Pieces, Longest is 13" VERY SHALEY BELOW 45' BUT HAS LIGHT GRAY SANDSTONE MARBLING TO BOTTOM @ 50'			
50									BOTTOM OF HOLE 50'			
55												
60												

PROJECT DOWE FLATS
SITE HI CAL RIDGE
LOCATION N 9500
DRILLING CONTRACTOR AM. MINING SERV.
DRILL MAKE - MODEL LONGYEAR 38

JOB NO. 3991
DATE - STARTED 4/21/91 **FINISHED** 4/21/91
ELEVATION
DEPTH TO WATER
SAMPLES
LOGGED BY R.C. Dow

HOLE NO. MK-2
HOLE SIZE NQ
ORIENTATION N15°E/10°N
DEPTH TO ROCK 4"
CORE BOXES 4
DEPTH OF HOLE 70'
REVIEWED BY

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONT. INJURIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS	
						TYPE	DIP				SAMPLING DRILL ACTION WATER LOSS CORE LOSS	STANDARD PENETRATION WATER PRESSURE TEST LAB CLASSIFICATION PIEZOMETERS
	0								HI CAL LIMESTONE @ 4" DEPTH			MILKY WATER RAN.
	5								CASED HOLE TO 5' - NO CORE			
	8.8'			19/36 =				J V	HI CAL LIMESTONE TO 8.8' & SANDY LIMESTONE TO 9.0' - Lgt GRAY, MOD. HAKD, SLIGHTLY WEATHERED ON BREAKS. IRON STAIN & CLAY ON 10° PARTING @ 6.5'. Vent JOINT REHEALED W/ALCITE @ 7.0'			WPT 8'-40' K = 1.2 x 10 ⁻⁴ cm/sec
	9.0'			6/24 =	18/24 =			J 60°	SANDSTONE (COLELL?) @ 9.0' MEDIUM GRAY FINE GRAINED, MARBLED W/ DARKER SHALEY MAT. HARD BUT MOD WEATHERED ALONG 10° PARTINGS. MOSTLY SHORT CORES (1"-2"). DARKER GRAY & LONGER PIECES BELOW 19'. MORE SLTSTONE THAN SANDSTONE. FRESH ROCK BELOW 21'			SOME CORE GROUND DRILL RATE ABOUT 2min/ft.
	10							J 35°				
	15				76/60 =							DARK GRAY TAN WALL
	20				56/60 =							

PROJECT		JOB NO.		HOLE NO. MK-2	
SITE		DATE - STARTED FINISHED		HOLE SIZE	
LOCATION		ELEVATION		DEPTH TO WATER	
DRILLING CONTRACTOR		SAMPLES		CORE BOXES	
DRILL MAKE - MODEL		LOGGED BY		REVIEWED BY	

SEE SH 1

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS SAMPLING DRILL ACTION WATER LOSS CORE LOSS STANDARD PENETRATION WATER PRESSURE TEST LAB CLASSIFICATION PIEZOMETERS
						TYPE	DIP				
20				36/60 =	59/60 =			J 10°	SANDSTONE (cont.) DISCOLORED TO TAN FOR 6" FROM 20.5-21.0 ALONG WEATHERED BEDDING PLANE JOINT. FRESH ROCK BELOW.		NEAR 100% DRILL WATER RETURN TO BOTTOM. WPT 22.5'-40' K = 5.6 x 10 ⁻⁵ cm/sec
25				49/60 =	62/60 =			J 80°	JOINT		
30				24/60	60/60 =			J 75°	JOINT		
35				5/24	29/29			J V	JOINT		
40				22/29 =	24/24 = 100%			J 80°	JOINT		
									Bottom of hole @ 40.0'		

SITE		DATE - STARTED FINISHED		JOB NO.	HOLE NO. MK-3
LOCATION		ELEVATION		HOLE SIZE	ORIENTATION
DRILLING CONTRACTOR <i>See S111</i>		DEPTH TO WATER		DEPTH TO ROCK	
DRILL MAKE - MODEL		SAMPLES		CORE BOXES	
		LOGGED BY		REVIEWED BY	

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS	
						TYPE	DIP				SAMPLING	STANDARD PENETRATION
20					48/54 =				20.1 - 30.3 MOSTLY DR. GRAY SHALE, WEATHERED & WITH CLAY SEAMS. AIR SLAKES. BEDDING @ ~ 25°			
					30"/60 = 50%		70°		1" CLAY SEAM @ 22.1' & 22.3'			
25									FRESH - UNWEATHERED ROCK BELOW ~ 30'			W.L. on 4/18/91 w/ HOLE BOTTOM @ 44'
30					54/54 = 100%				30.3 To 100.5 BK GRAY TO BLACK SHALE, UNWEATHERED, MOD HARD, CAN BE CARRIED. OCCASIONAL RE-HEALED SEAM BREAKS AMONG PARTINGS @ ~ 25°			DARK GRAY DRILL WATER - RTN. MINOR LOSS
					76/63 = 100%				OLD HAIRLINE FRACTURES RECEMENTED w/ CALCITE @ 33.5, 36, 38.5, 40, & 44' @ VARIOUS INTERVALS BELOW.			
35									SHALE BECOMES MARbled w/ CALCAREOUS MATERIAL BELOW 50'			
40									TAN SANDY, CLAYEY SEAM, 1/2" THICK			
									TAN BENTONITE SEAM 1/2" THICK			WPT 37.5' - 140' K = 2.8 x 10 ⁻⁵ cm/sec.

SITE		DATE - STARTED FINISHED		JOB NO.	HOLE NO. MK-3
LOCATION		ELEVATION	DEPTH TO WATER	HOLE SIZE	ORIENTATION
DRILLING CONTRACTOR SEE SH 1		SAMPLES	CORE BOXES	DEPTH TO ROCK	
DRILL MAKE - MODEL		LOGGED BY		REVIEWED BY	
DEPTH OF HOLE					

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONT. INT. ITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS SAMPLING DRILL ACTION WATER LOSS CORE LOSS STANDARD PENETRATION WATER PRESSURE TEST LAB CLASSIFICATION PIEZOMETERS
						TYPE	DIP				
40				98/63 = 76	63/63 = 100%				DK GRAY TO BLACK SHALE (cont.) FRESH ROCK		MINOR
				94/63 = 77	63/63 = 100%				GRAY CLAY SEAM 1/2" THICK		
45				94/63 = 77	63/63 = 100%						MINOR DRILL WATER LOSS
				94/63 = 70	63/63 = 100%				SHALE SLIGHTLY MARBLED W/ LIGHT GRAY CALCAREOUS MAT. FROM 50.4' TO		
				94/63 = 70	63/63 = 100%				1/2" THICK SOFT, WET, BENTONITE SEAM, TAN.		
50				86/63 = 86	63/63 = 100%				2" THICK GRAY BENTONITE SEAM FIRM, DRY.		
				83/63 = 100%							
55											
60											

PROJECT

SITE		DATE - STARTED FINISHED		JOB NO.	HOLE NO. MK-3
LOCATION		ELEVATION	DEPTH TO WATER	HOLE SIZE	ORIENTATION
DRILLING CONTRACTOR <i>See SH. 1</i>		SAMPLES	CORE BOXES	DEPTH TO ROCK	
DRILL MAKE - MODEL		LOGGED BY		REVIEWED BY	
DEPTH OF HOLE					

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS	
						TYPE	DIP				SAMPLING	STANDARD PENETRATION
60				54/60 = 90	60/60 = 100%				DK GRAY TO BLACK SHALE (cont.) FRESH ROCK			
65				58/60 = 96	60/60 = 100%	J	V		1/4" THICK BENTONITE SEAM, FIRM.			
70				53/60 = 88	60/60 = 100%				1/8" CALCITE SEAM, PARTIALLY OPEN - REHEALED			MINOR DRILL WATER LOSS DRILL RATE ~ 2 MIN/4'
75				52/60 = 87	60/60 = 100%				1/4" BENTONITE SEAM, GREEN TINGE TO UPPER SURFACE			
80				52/60 = 87	60/60 = 100%	J	V		4" BENTONITE SEAM, FIRM			

PROJECT		JOB NO.	HOLE NO. MK-3
SITE		DATE - STARTED	FINISHED
LOCATION		ELEVATION	DEPTH TO WATER
DRILLING CONTRACTOR SEE SH 1		SAMPLES	DEPTH TO ROCK
DRILL MAKE - MODEL		CORE BOXES	DEPTH OF HOLE
		LOGGED BY	REVIEWED BY

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS SAMPLING DRILL ACTION WATER LOSS CORE LOSS STANDARD PENETRATION WATER PRESSURE TEST LAB CLASSIFICATION PIEZOMETERS
						TYPE	DIP				
80				57/60 = 95	100%				(SEE DISCRIPTION PAGE 2) OCCASIONAL PYRITE CLUSTER FROM 80-90'		WPT 80.5'-140' K = 3.6 x 10 ⁻⁵ cm/sec.
85				60/60 = 100	100%						← LOST ALL WATER RETURN @ 83' BUT LOSS PROBABLY HIGHER IN HOLE AS INDICATED BY HIGHER LEVEL IN-BETWEEN CORE RUNS. RUNNING PUMP AT FULL SPEED IN HIGH GEN CAN JUST GET RETURN WATER. 35 GPM IS MAX. PUMP CAPACITY.
90				60/60 = 100	100%			XXX	1/4" BENTONITE SEAM		
95				47/60 = 78	100%			XXX	2" BENTONITE SEAM		
100								XXX	2" BENTONITE SEAM		

PROJECT		JOB NO.		HOLE NO. MK-3	
SITE		DATE - STARTED		FINISHED	
LOCATION		ELEVATION		DEPTH TO WATER	
DRILLING CONTRACTOR SEE SHEET 5/11/1		SAMPLES		CORE BOXES	
DRILL MAKE - MODEL		LOGGED BY		REVIEWED BY	
				DEPTH TO ROCK	
				DEPTH OF HOLE	
				ORIENTATION	

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONT. INT.ITIES		SYMBOL	MATERIAL DESCRIPTION	WATER DATA	REMARKS	
						TYPE	DIP				SAMPLING	STANDARD PENETRATION
100				49/60 = 82	100%				100.5'		TOTAL WATER LOSS SINCE 83' BUT LOSS PROBABLY NEARER TOP OF HOLE	
				56/60 = 93	100%			X	TOP OF HI CAL LIMESTONE LIGHT GRAY LIMESTONE W/ MINOR SHALE MARBLING & OCCASIONAL SHALE PARTINGS TO 2". MOD. HARD, FRESH. PARTS ON BEDDING PLANES BUT NO OTHER JOINTS IN CORE. LONGEST PIECE IS 14".		WPT 102.5' - 140'	
				49/60 = 81	100%				101.3 IS GREEN TINGED SANDY BENTONITE SEAM TO 1/2"		K = 4.0 x 10 ⁻⁵ cm/sec	
				60/60 = 100	100%				3" WHITE TO CLEAR CALCITE SEAM @ 109'			
								X	1/2" BENTONITE SEAM @ 112'			
									118' 8"			
									TOP OF SANDSTONE (COHELL?) (SEE DISCONT. INT. NEXT PAGE)		WPT 118' - 140'	
											K = 5.8 x 10 ⁻⁶ cm/sec	

SITE		DATE - STARTED	FINISHED	JOB NO.	HOLE NO. MK-3
LOCATION		ELEVATION	DEPTH TO WATER	DEPTH TO ROCK	ORIENTATION
DRILLING CONTRACTOR <i>SEE SH-1</i>		SAMPLES	CORE BOXES	DEPTH OF HOLE	
DRILL MAKE - MODEL		LOGGED BY		REVIEWED BY	

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONT. INCLINATIONS		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS	
						TYPE	DIP				SAMPLING	STANDARD PENETRATION
120				100	100%				<p><u>SANDSTONE (CODEL? CONT.)</u> MEDIUM GRAY & MARBLED VERY FINE SANDSTONE TO SILTSTONE. HARD, DIFFICULT TO SCRATCH W/ KNIFE. FRESH. FEW JOINTS. LOOKS IMPERMEABLE</p> <p>120-125 3 Pieces, MAX 30" LONG</p> <p>125-130 5 Pieces, MAX 19" LONG</p>		<p>NO RETURN WATER (SEE PAGE 5)</p>	
125			100	100%								
130			48/60 = 80	100%								
135			77/60 = 78	100%							<p>1" ϕ PVC SET IN HOLE TO 120'. BOTTOM 10' SLOTTED CEMENTED 120'-190'</p>	
140												

Bottom of HOLE @ 140'

PROJECT POWE FLATS		JOB NO. 3991	HOLE NO. MK-9
SITE 38ND IN G. RD	DATE - STARTED 9/22/91	FINISHED 9/23/91	HOLE SIZE NQ
LOCATION N 8.500	ELEVATION	DEPTH TO WATER -25'	DEPTH TO ROCK ~10'
DRILLING CONTRACTOR AM MINING SERV.	SAMPLES	CORE BOXES	DEPTH OF HOLE 80'
DRILL MAKE - MODEL LONGYEAR 38	LOGGED BY R.C. Du	REVIEWED BY	

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS SAMPLING DRILL ACTION WATER LOSS CORE LOSS STANDARD PENETRATION WATER PRESSURE TEST LAB CLASSIFICATION PIEZOMETERS
						TYPE	DIP				
0	0										
	5										
	10										
	15										
	20										

MOSTLY OVERBURDEN &
SOME WEATHERED ROCK
TO 10' - NO SAMPLES

10' - 24'
MED GRAY TO TAN MODERATELY
WEATHERED SHALE. CORE
BROKEN ON PARTINGS IN DISCS
OF 1/4" - 2". SHALE CAN BE
CARVED W/ KNIFE & UPPER
WEATHERED SECTION AIR SCORES
1800 STAINED PIECE @ 10'

START CORING @ 10.0'
LOSING SOME WATER
RETURN.

WPT 14.5' - 50'
K = 1.7×10^{-4} cm/sec

NQ CASING TO 10' SUNK TO 11

98/60 = 80%

32/60 =

PROJECT		JOB NO.	HOLE NO. MK-9
SITE		DATE - STARTED FINISHED	HOLE SIZE
LOCATION		ELEVATION	DEPTH TO WATER
DRILLING CONTRACTOR		SAMPLES	DEPTH TO ROCK
DRILL MAKE - MODEL		LOGGED BY	DEPTH OF HOLE
			REVIEWED BY

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS SAMPLING DRILL ACTION WATER LOSS CORE LOSS	STANDARD PENETRATION WATER PRESSURE TEST LAB CLASSIFICATION PIEZOMETERS
						TYPE	DIP					
	20			0	32 36 = 89							LOSSING ~ 30" DRILL WATER RTW TO 27'
	25			5/36 = 14	30/36 = 83%				24'-85' OR GRAY SHALE, FRESH, MOD. HARD BUT CAN BE EASILY SCRATCHED, LONGER CORES AVE 8-10 INCHES. OCCASIONAL WHITE FOSSILIFEROUS BED TO 1" THICK. MOST PARTINGS ALONG BEDDING PLANES, NEARLY FLAT. NO JOINTS TO 61'			WPT 22.5'-50' K = 2.1 x 10 ⁻⁵ cm/sec.
				40/48 = 83	78/48 = 100%							LOST MOST OF RETURN @ 27' BUT POSSIBLY HIGHER IN HOLE
	30			73/60 = 72	60/60 = 100%							
	35			60/60 = 100	60/60 = 100%							
	40											



Project E

SITE		DATE - STARTED FINISHED		JOB NO.	HOLE NO. MK-4
LOCATION		ELEVATION	DEPTH TO WATER	HOLE SIZE	ORIENTATION
DRILLING CONTRACTOR		SAMPLES	CORE BOXES	DEPTH TO ROCK	
DRILL MAKE - MODEL		LOGGED BY		REVIEWED BY	
DRILLING CONTRACTOR		CORE BOXES		DEPTH OF HOLE	

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS SAMPLING DRILL ACTION WATER LOSS CORE LOSS STANDARD PENETRATION WATER PRESSURE TEST LAB CLASSIFICATION PIEZOMETERS
						TYPE	DIP				
70				47/60 = 78	100 %						
75				58/60 = 97	100 %			XXX	1/4" BENTONITE SEAM @ 46'		
								XXX	1/8" " " @ 47'		
50				45/60 = 75	100 %			XXX	1/4" BENTONITE SEAM @ 49.5'		
55				53/60 = 88	100 %			XXX	1" BENTONITE SEAM @ 55.5'		
								XXX	1/8" " " @ 56.2' & 56.8'		
								XXX	1/8" " " @ 59'		
60											

WPT 46'-85'
K = 2.3 x 10⁻⁵ cm/sec.

RETURN WATER COMES BACK w/ Pump WIDE OPEN IN HIGH GEAR ~35 GPM

PROJECT		JOB NO.		HOLE NO. MK-4	
SITE		DATE - STARTED FINISHED		HOLE SIZE	
LOCATION		ELEVATION		DEPTH TO ROCK	
DRILLING CONTRACTOR		SAMPLES		CORE BOXES	
DRILL MAKE - MODEL		LOGGED BY		REVIEWED BY	

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS SAMPLING DRILL ACTION WATER LOSS CORE LOSS STANDARD PENETRATION WATER PRESSURE TEST LAB CLASSIFICATION PIEZOMETERS
						TYPE	DIP				
60				56/60 = 93	100%			J ✓	SEE DESCRIPTION ABOVE		RETURN WATER CAN BE HAD BY PUMPING 35 GPM
65				60/60 = 100	100%			XXX	1/4" THICK PYRITE SEAM @ 63' AND @ 66'		
70				60/60 = 100	100%				1 1/2" BENTONITE SEAM @ 67.2 w/ NODULE OF PYRITE		
75				50/60 = 83	100%				1/4" PYRITE SEAM @ 69.8'		
80				0	100%			F ~V	1" PYRITE & CLAY SEAM @ 73.5'		
									76.5-78.5 CRUSHED SHALE w/ WHITE CALCAREOUS RE-CEMENT. CRUMBLY ROCK, SOME IRON STAINING. SHARP TO VERT OFFSET		
									PYRITE SEAM @ 80' 1/4" THICK		



PROJECT E

SITE		DATE - STARTED FINISHED		JOB NO.	HOLE NO. MK-4
LOCATION		ELEVATION	DEPTH TO WATER	HOLE SIZE	ORIENTATION
DRILLING CONTRACTOR		SAMPLES	CORE BOXES	DEPTH TO ROCK	
DRILL MAKE - MODEL		LOGGED BY		REVIEWED BY	

See SH-1

ELEV.	DEPTH	SAMPLER	CASING	SPT/ROD	RECOVERY	DISCONTINUITIES		SYMBOL	MATERIAL DESCRIPTION NAME, COLOR, CONSISTENCY, GRAIN SIZE, PLASTICITY, CLASSIFICATION, WEATHERING, HARDNESS, STRUCTURE	WATER DATA	REMARKS	
						TYPE	DIP				SAMPLING DRILL ACTION WATER LOSS CORE LOSS	STANDARD PENETRATION WATER PRESSURE TEST LAB CLASSIFICATION PIEZOMETERS
80				46/60 = 77	100%				1/8" PYRITE SEAM @ 81.5			
85									Bottom of hole 85' 3" ridge limestone not visually obvious in core. would require chemical testing.			1" φ PVC PIPE SET TO BOTTOM OF HOLE. LOWER 20 FEET SLOTTED.
90												
95												
100												

BORING MK-1
(ANGLED 20° FROM VERT.)



— HI CAL LIMESTONE
To ~13 FEET

— CODELL SANDSTONE —
WEATHERED AND SANDY
To ~25', MARBLED
w/ SHALE BELOW

BOTTOM OF HOLE 50'

BORING MK-2
(ANGLED 10° FROM VERT.)



HI CAL LIMESTONE
To ~9 FEET

CODELL SANDSTONE
WEATHERED AND
SANDY To ~19 FEET,
MARBLED w/ SHALE
BELOW

Bottom of HOLE 90'



BORING MK-3
(ANGLED 30° FROM VERT.)

0-15' OVERBURDEN

15'-30' WEATHERED
SHALE

30-100.5 FRESH
SHALE

2" BENTONITE
SEAM @ 55'

TYPICAL RECEMENTED
JOINT

BORING MK-3

(CONT.)

2 of 3



SHALE TO
100.5'



— TOP
OF HI CAL
LIMESTONE
@ 100.5'



— BOTTOM OF
HI CAL @
118.7'

BORING MK-3
(CONT.)
3 of 3

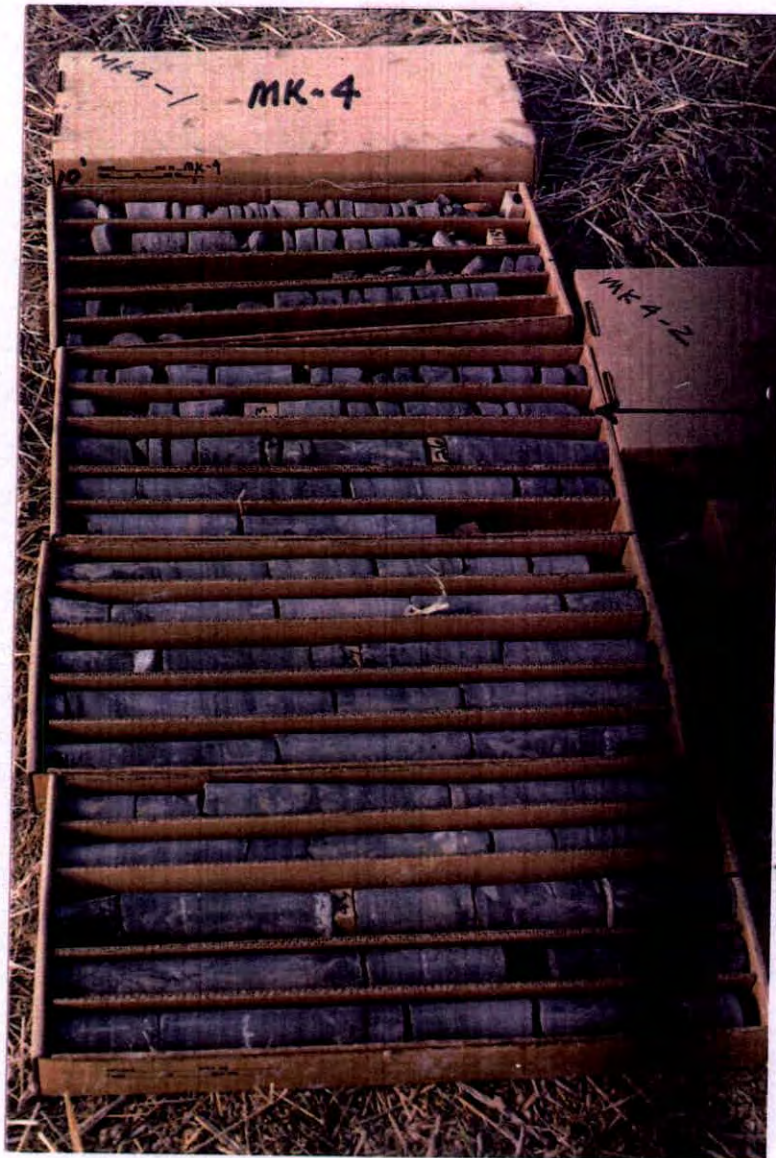


Bottom of
HI CAL LIMESTONE
@ 118.7'

CODELL
SANDSTONE,
SILTY TO ~129,
MARBLED w/
SHALE BELOW.

BOTTOM OF
HOLE @ 140'

BORING MK-4
(ANGLED 16° FROM VERT.)



0-10' OVERBURDEN

10'-24' WEATHERED
SHALE

— 24'

24'-85' FRESH
SHALE

— Note THIN BENTONITE
LAYER @ 46',
SEVERAL OTHERS OCCUR
BELOW TO ~ 73 FEET

50'-85'
PHOTO MISSING
(NOT ON NEGATIVE)

BOTTOM OF HOLE 85'

Attachment E

DANIELSON & ASSOCIATES
CONSULTING ENGINEERS
6805 WEST FOURTH AVENUE
LAKEWOOD, COLORADO 80226
(303) 237-5146

10888-00170.

P. 17. a

September 23, 1992

Raymond L. Petros, Jr., Esq.
Holme Roberts & Owen
1700 Lincoln Street, Suite 4100
Denver, CO 80203

Re: Expert Opinion in Case No. 91CV1655-2

Dear Mr. Petros:

Based upon your request, I submit the following information pertaining to my role as an expert witness in the above referenced case.

1. Area of Expertise

Based upon my employment as State Engineer for the State of Colorado from December 1979 to February 1992, with the exclusive statutory authority to review and approve all proposed modifications to existing dams and construction of new dams within the state, and based upon my over 20 years of experience as a professional engineer engaged in the field of dam safety, my role is to comment on the likelihood of approval of the plans for construction of the Eastern Dowe Flats Dam and Reservoir and whether, in my opinion, a safe structure can be built as contemplated by Southdown Inc. in its August 2, 1991, approval document, reference 2.e. below.

2. References Reviewed

- a. Letter, subject: "Potential Effects of Limestone Mining on Dam Foundation, Dowe Flats Dam," dated November 15, 1985, from Steve Vick to Reservoir Cotenancy Venture.
- b. Letter, subject: "Preliminary Cost Analysis, Dam Foundation Limestone Mining, Dowe Flats Dams," dated May 23, 1989, from Steve Vick to Reservoir Cotenancy Venture.
- c. Letter (draft), subject: "Dowe Flats Reservoir Feasibility" from E. S. Smith to Holme Roberts & Owen.
- d. Dowe Flats Project Mining Assessment Report da Morrison-Knudsen Corporation Environmental Service
- e. "Approval Document, Dowe Flats Reclamation Plan" submitted to Marigold 41 by Southwestern Portland Cement Company on August 2, 1991.

Raymond L. Petros, Jr.
September 23, 1992

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- f. "Application for Boulder County Special Use Permit for Dowe Flats Water Storage Project" consisting of three 3-ring binders containing the application and two technical appendices. Included specifically was a report entitled, "Report on Geotechnical Feasibility and Preliminary Embankment Design Proposed Dowe Flats Dam and Reservoir Near Lyons, Colorado," prepared by Fox Consultants, Inc. dated January 22, 1985.
- g. Letter, subject: "Dowe Flats Project," dated August 16, 1991, from Alberto Pujol to Southwestern Portland Cement Company.
- h. Letter, subject: "Dowe Flats Project," dated August 28, 1991, from Alberto Pujol to Southwestern Portland Cement Company.
- i. Letter, subject: "Dowe Flats Project," dated September 13, 1991, from Alberto Pujol to Southwestern Portland Cement Company.
- j. Letter, subject: "Dowe Flats Project," dated August 29, 1991, from Alberto Pujol to Southwestern Portland Cement Company.

3. Summary Opinion

Based upon my review of the documents referenced in paragraph 2 above without conducting an independent engineering analysis, and based upon my professional experience, it is my professional opinion that,

- a. The proposed design for the Eastern Dowe Flats Dam will allow the construction of a safe water impoundment structure assuming no unusual circumstances are encountered during actual construction.
- b. The construction of the Eastern Dowe Flats Dam, as proposed, across the mined area does not involve any particular hazard to public safety that would hinder approval of the final design by the State Engineer of Colorado. The utilization of a 2(H):1(V) cutback of the mined highwall beneath the dam axis appears reasonable and does not pose design considerations different from those often encountered in natural stream valleys. Excavation of the mined material may, in fact, be beneficial in arriving at a final dam design by exposing the foundation material to observation and testing rather than relying on soil borings for in-situ foundation parameters.
- c. Preparation of detailed design plans is not economically justified nor possible until further details are known about the sources of water that will be utilized to fill the reservoir and who will be the ultimate user of the water. Additionally, the mining process may make further information available needed to complete a final design.

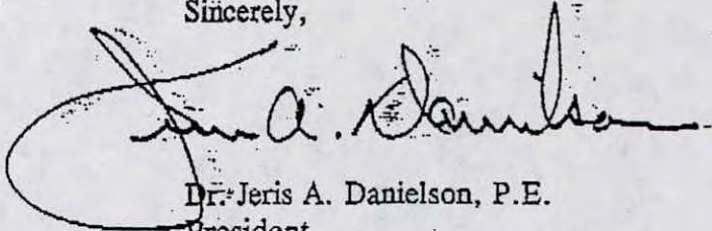
Attachment E

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- d. Given the current value of reservoir capacity, it is likely that the reservoir volume gained by mining will more than offset the additional embankment construction costs.

Sincerely,



Dr. Jeris A. Danielson, P.E.
President

BOULDER

SEP 23 1992

RAYMOND L. PETROS, JR.

DOWE FLATS PROJECT SUMMARY
MINING, RECLAMATION AND WATER STORAGE

Southdown, Inc.
(Southwestern Portland Cement)

May 3, 1993

THE PROPONENT (Permit Applicant)

Southdown, Inc., which does business in Colorado under the name Southwestern Portland Cement (Southwestern), owns and operates a cement plant and related limestone quarries in unincorporated Boulder County near Lyons, Colorado. They are seeking approval for limestone mining near the plant in an area called Dowe Flats, which also is in unincorporated Boulder County. A dam and reservoir is also being proposed in Dowe Flats as a companion land use to mining and reclamation, and potentially as the permanent, post-mining land use.

The cement plant was built in 1969 and was purchased by Southwestern from Martin Marietta Cement in 1984. Southwestern owns or controls approximately 3,375 acres in this area and, accordingly, their future land use plans are an important part of comprehensive planning for this part of northern Boulder County. The vicinity map included in this summary shows the land owned or controlled by Southwestern. The map in the pocket of this summary shows the location of Dowe Flats in relation to Lyons, Longmont and the surrounding area.

Southwestern employs 90 men and women and has an annual payroll of \$3.5 million. The company helps support the local economy, not only with jobs, but through the purchase of over \$10.5 million worth of goods and services each year. Also, Southwestern pays approximately \$850,000 in property taxes annually, while placing less of a demand on government services than residential development. Southwestern's payroll, purchasing and property tax dollars multiply as they pass through the local and regional economy to the point where the cement plant contributes about \$30 million annually to the prosperity of the area.

MINING AND RECLAMATION PLANS

Limestone and shale are mined and processed at the plant to make cement. Limestone mining currently takes place on the cement plant property and at a quarry in Larimer County. About 800,000 tons of limestone and shale are needed every year for cement manufacture. Mining at Dowe Flats would eventually replace the other mining operations.

Some facts about the proposed Dowe Flats limestone mine are:

- Mining and reclamation is proposed for 25 years.
- Annual production is 760,000 tons.
- The deepest part of the mine will be about 100 feet.
- 15 million cubic yards of soil and rock will be used to reclaim the land and create the final land surface.

Reclamation will start immediately and will take place concurrently with mining for the life of the operation. The reclamation goals are to enhance both the esthetic and ecosystem values of the valley by creating hills, valleys, ponds, wetlands, cliffs and grasslands. Diverse topography,

vegetation and water features will greatly improve wildlife habitat over what is now there.

Mining will involve the removal and salvage of topsoil, excavation and blasting of overburden (overburden is rock and soil material overlying the limestone which must be removed in order to mine the limestone) and blasting and excavation of the limestone. The mine will advance from south to north at the rate of about 300 feet per year. Topsoil and overburden will be placed in Dowe Flats according to the reclamation plan to start creating the final land surface. This will be accomplished by scrapers, dozers, and haul trucks. Limestone will be loaded into 25 ton dump trucks and hauled to the cement plant.

The haul trucks will leave the mining property onto County Road 47, then turn on Colorado Highway 66 (Ute Highway) and then turn into County Road 49 (the entrance to the cement plant). This is a total distance of 4,450 feet from the mining property to the cement plant property. All necessary permits will be obtained and all required improvements to public roads will be performed for the hauling on public roads.

County Road 47 goes through the mining area and it is proposed to be relocated to insure public safety and continued access. The proposed relocation is shown on the vicinity map.

Two computer designed color photographs are included in this summary to show the existing valley and the concept of the final reclamation plan.

WATER STORAGE PLANS

Dowe Flats has long been recognized as a potential reservoir site. Southwestern wishes to identify and preserve this off-channel water storage site by obtaining zoning approval for a dam and reservoir. Southwestern does not propose to construct the reservoir at this time and the eventual builder of the reservoir and user(s) of the water are currently unknown. The mining and reclamation plans have been designed to fully accommodate dam construction at any time during or after mining. In fact, the mining and reclamation plans add more water storage capacity (because of the mine pits) and make dam construction material available at low cost. Water studies indicate that a reservoir at Dowe Flats may become viable in about 25 years. It is important to note that Southwestern will guarantee (and post a substantial bond) that mining and reclamation will happen as planned. However, Southwestern can not guarantee that a reservoir will ever be built. When and if dam construction occurs, additional County and State permits will have to be obtained, and this process will include public review and comment opportunities.

A computer designed color photograph is included in this report to show how a reservoir might look after mining and reclamation was completed.

ENVIRONMENTAL, LAND USE, AND COMMUNITY ISSUES

Southwestern recognizes that the economic development associated with cement manufacture and water storage must be balanced with environmental, land use, and community values. Southwestern is an integral part of the community, and their land ownership and land use is, in large part, responsible for the open, rural character of the area. The proposed plans will maintain that character and will be compatible with existing and zoned land uses in the vicinity.

Extensive environmental and land use studies have been and are being performed. These include:

- air quality analysis, including an on-site meteorological station and over two years of air quality baseline data,
- surface and groundwater quality studies and monitoring, including one year of water quality monitoring,
- vegetation and soils studies, sampling and analysis,
- threatened and endangered species studies,
- over 200 drill holes with associated sampling and testing of the soil and bedrock,
- wetlands mapping and analysis,
- mine engineering and reclamation planning studies and analysis,
- detailed wildlife analysis and mapping,
- extensive archaeological and historic surveys, reports and sampling,
- geotechnical and engineering studies,
- noise analysis, and
- transportation planning and traffic impact analysis.

All of this data is available for public review. Southwestern has assembled a highly qualified team of expert consultants, many of whom live in Boulder County and are personally committed to maintaining the quality of the local environment.

An extensive public and government agency review process is planned whereby all comments

and concerns will be made available to Southwestern. After Southwestern reviews public comments, detailed mitigation plans will be developed to eliminate or minimize project impacts. Necessary or desired modifications to the project will also be carefully evaluated at this time.

PERMITS/APPROVALS REQUIRED

Mining & Reclamation

Boulder County

- Special Use Permit
- Site Specific Development Plan
- Development Agreement/Vesting
- Vacate Existing County Rd. 47
- Approve Relocated County Rd. 47
- Building & Grading Permits

Colorado

- Air Quality Permit
- Mining and Reclamation Permit
- State Highway Access Permit

Federal

- U.S. Army Corp of Engineers
Nationwide Permit

Reservoir

Boulder County

- Special Use Permit

Colorado

- None (presently)

Federal

- U.S. Army Corp of Engineers
Nationwide Permit

PUBLIC REVIEW PROCESS

Southwestern is proposing an extensive public review process in order to give all interested parties adequate time, information and opportunity to provide input into the project.

The main features of the public review process are an extended County referral time and an on-going community information program sponsored by Southwestern. The community information program has started and will continue throughout the permit process. Community and agency review will generate comments over a period of time (probably 3-4 months). After Southwestern has received the comments and has had time to synthesize them, impact mitigation plans will be finalized, project modifications will be made (if appropriate), and additional data collection and analyses will be performed if necessary. The flow chart included in this report shows the public and agency review process.

PROJECT TEAM / CONTACT PEOPLE

APPLICANT

Southdown, Inc. (dba Southwestern Portland Cement)

John Lohr, Plant Manager
Gerald Anderson, Project Coordinator
P.O. Box 529
Lyons, CO 80540
(303) 823-6685

Mike Yannone, Project Manager
16888 North "E" St.
Victorville, CA 92392-2928
(619) 245-1681

CONSULTANTS

Permitting, Hydrology, Geology, Blasting, Land Use and Zoning

Paul Banks, Darrel Buffington, P.E., Susan Harrison
SHB AGRA, Inc.
165 So. Union Blvd., Suite 516
Lakewood, CO 80228
(303) 763-8432

Environmental Coordinator, Boulder County Planning

Mike Figgs
LREP, Inc.
2635 Mapleton Avenue, #77
Boulder, CO 80304
(303) 447-1899

Geotechnical and Dam Engineering

Alberto Pujol-Ruis, P.E., G.E.
Morrison-Knudsen
180 Howard St.
San Francisco, CA 94105

Mine Engineering

Marv Berg
1409 South Coffman
Longmont, CO 80501

Transportation

Bob Felsburg, P.E.
Felsburg, Holt, and Ullevig
5299 DTC Boulevard, Suite 400
Englewood, CO 80111

Wetlands

Laurie Rink
Aquatic and Wetland Consultants, Inc.
Siera Square
2060 Broadway, Suite 255
Boulder, CO 80302

Reclamation, Soils, and Vegetation

David L. Buckner, PhD
ESCO Associates, Inc.
P.O. Box 18775
Boulder, CO 80308

Archaeology

Michael Burney
Burney and Associates, Inc.
P.O. Box 7063
Boulder, CO 80306

Cultural History

Steve Mehls, PhD
Western Historical Studies, Inc.
1225 Atlantis Avenue
Lafayette, CO 80026

Wildlife

Rick Thompson
Western Ecosystems, Inc.
905 West Coach Road
Boulder, CO 80302

Air Quality

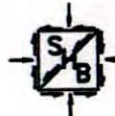
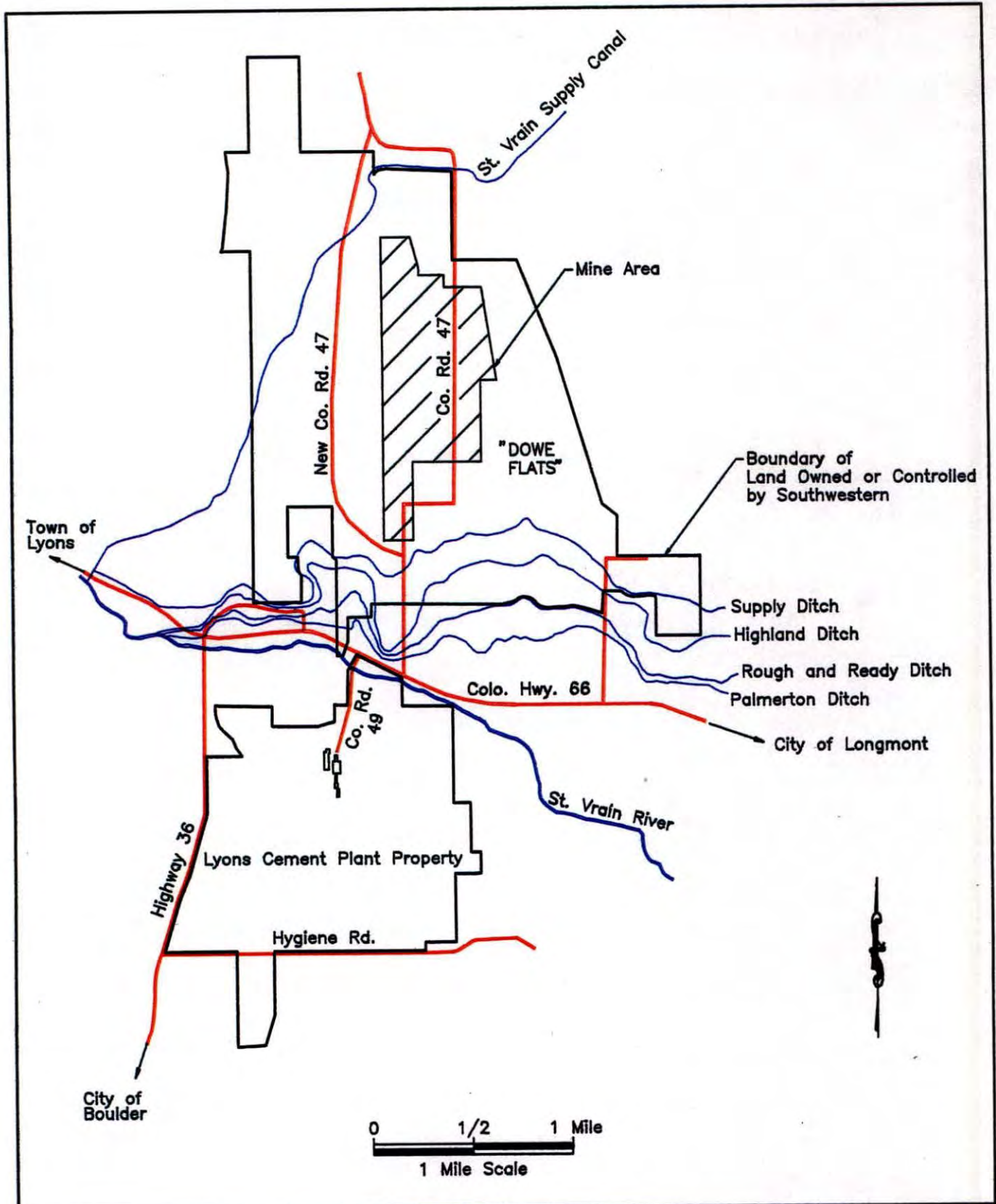
Bill Monnett
McVehil-Monnett Associates, Inc.
Fairway at Inverness
44 Inverness Drive East
Building C, Suite B
Englewood, CO 80112

Water Issues

Lee Rozaklis
Hydrosphere
1002 Walnut, Suite 200
Boulder, CO 80302

Noise

Howard McGregor, P.E.
Engineering Dynamics, Inc.
3925 South Kalamath St.
Englewood, CO 80110



SHB AGRA, INC.

Engineering & Environmental Services

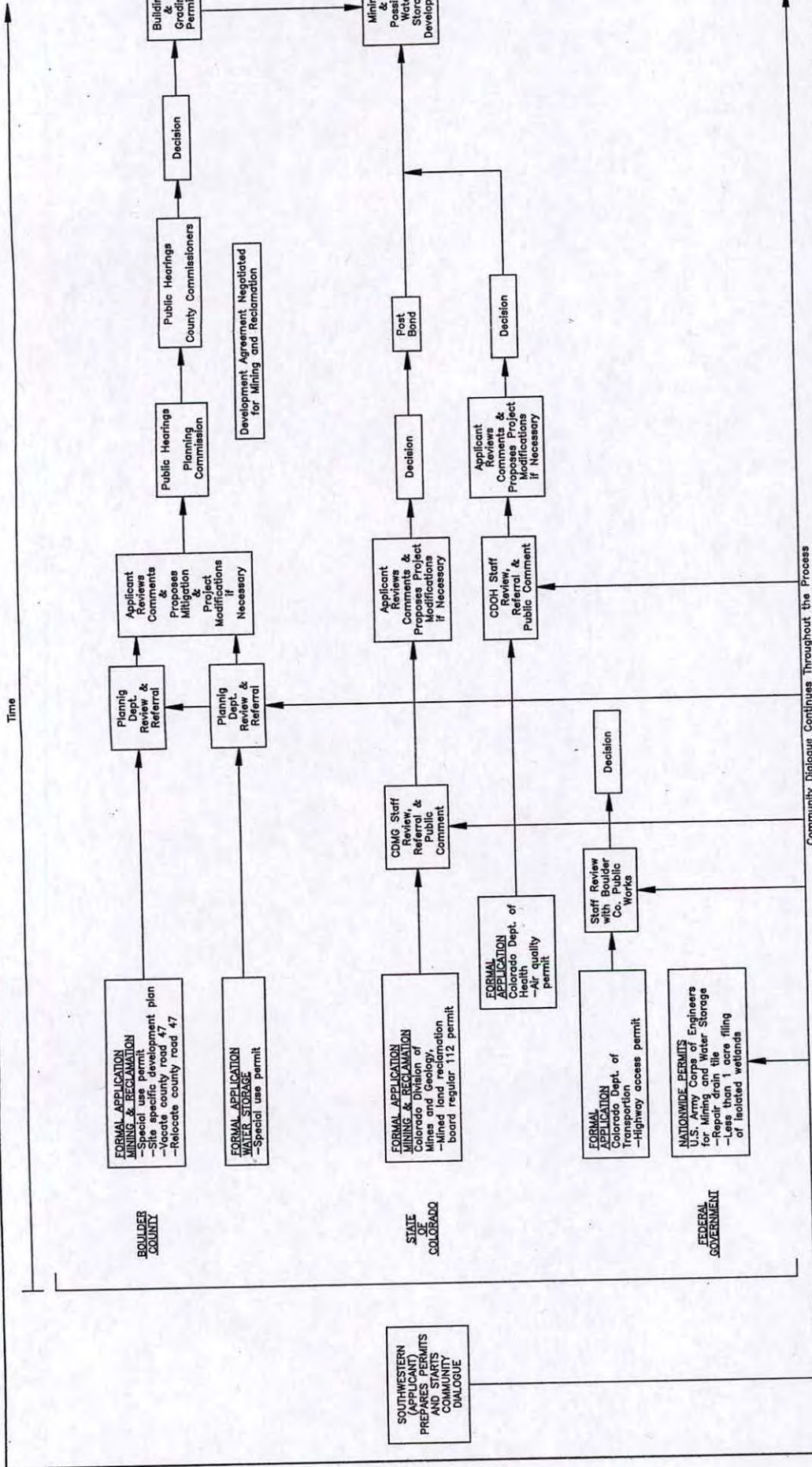


SHB AGRA PROJ. NO. E92-7075

FILE - E92-7075.DWG

DOWE FLATS PROJECT
Vicinity Map

Southdown, Inc.
(Southwestern Portland Cement)



Community Dialogue Continues Throughout the Process

FILE - 891-7008.DWG

SHB AGRA, INC.
 Engineering & Environmental Services
 **AGRA**
 Earth & Environmental Design

Dowe Flats Project
 Public & Agency Review Process
 (Southwestern Portland Cement)

SHB AGRA PROJ. NO. E92-7075

Existing Valley



Mining and reclamation complete - 25 years +



Reservoir Built on Reclaimed Surface



4D Imaging

**TRAFFIC IMPACT ANALYSIS
DOWE FLATS PROJECT**

Prepared for:

Southdown, Inc.
(Southwestern Portland Cement)
P.O. Box 529
Lyons, Colorado 80540

Prepared by:

Felsburg Holt & Ullevig
5299 DTC Boulevard, Suite 400
Englewood, CO 80111
303/721-1440

May, 1993
FHU Reference No. 93-051

I. INTRODUCTION

Southdown, Inc. (Southwestern Portland Cement) currently operates the cement plant located east of Lyons in Boulder County (see Figure 1). The plant is presently supplied with rock material which is being hauled by truck either from pits located south of the plant across Hygiene Road or from a Larimer County quarry, requiring a haul of approximately 11 miles on county roads and on SH 66.

To ensure a sufficient future supply of rock to allow the plant to maintain its current production level, Southdown proposes to open the Dowe Flats area for mining. It is proposed to produce about 760,000 tons of rock per year in this area. The rock would be hauled from the mine site to the cement plant by truck, requiring trucks to travel on or across Highway 66. When the new area reaches full capacity production, operations at the Larimer County quarry will cease, thereby eliminating the long distance haul on public roadways.

The purpose of this report is to estimate the traffic to be generated by rock hauling from the mine to the cement plant, to evaluate several alternative routes for the haul traffic, to identify the impacts associated with the haul trucks, and to recommend measures to mitigate these impacts.

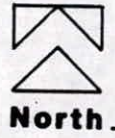
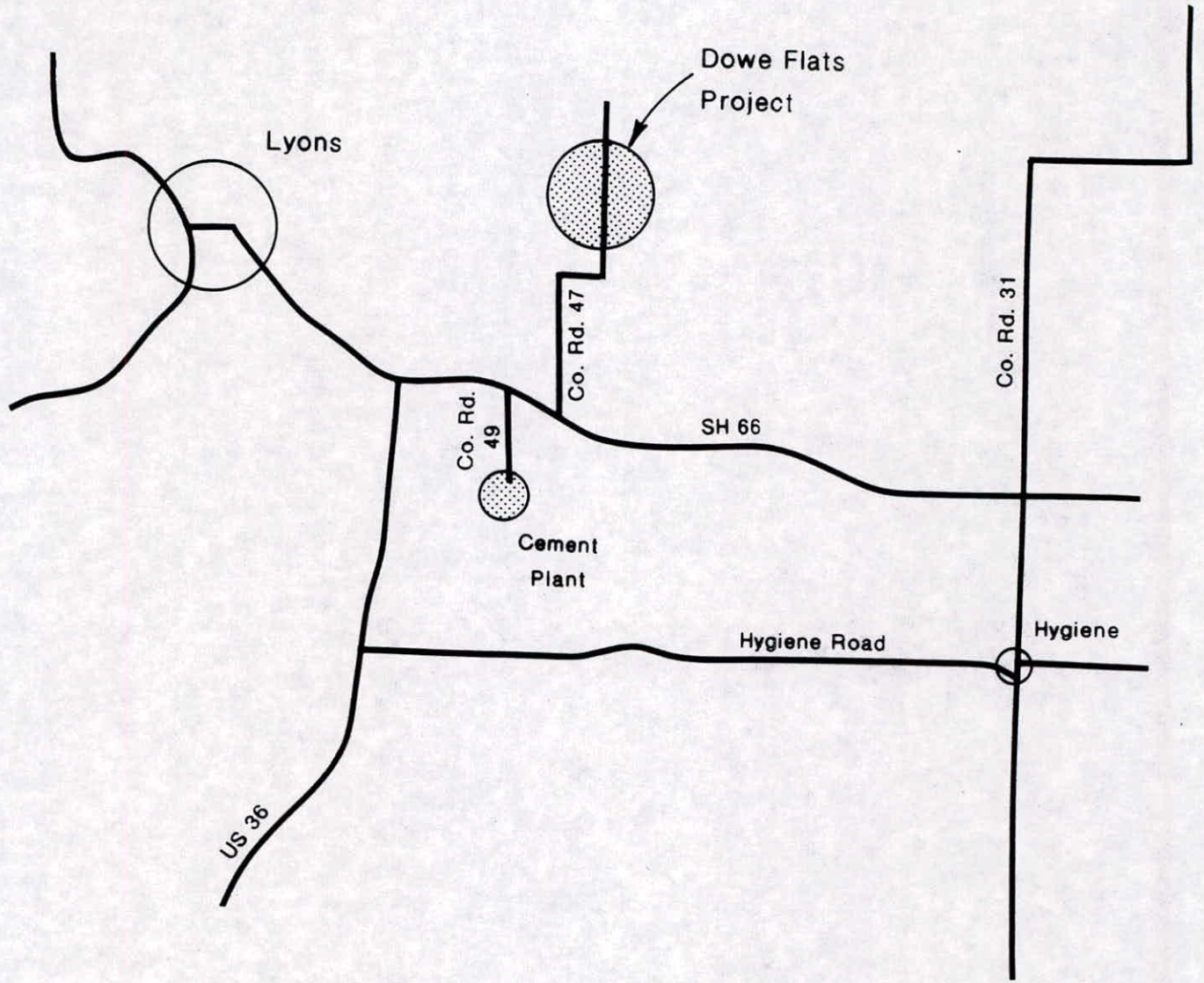


Figure 1
Vicinity Map

II. EXISTING CONDITIONS

A. ROADWAYS

As illustrated by Figure 1, there are three key roadways in the vicinity of the project:

State Highway 66 - This road provides access through the area in an east/west direction, running from Longmont to Lyons. The road is a two-lane highway with wide paved shoulders. In the vicinity of the project, the posted speed limit is 55 MPH. This road not only serves commuter traffic between communities, but it also carries significant recreational traffic during the tourist season.

County Road 47 - CR 47 is a narrow, gravel road running north from SH 66. It currently runs through the area proposed for mining. The road provides access to the Indian Mountain area and to the Rabbit Mountain open space area. It has a posted speed limit of 25 MPH.

CR 47 intersects with SH 66 at a "T" intersection, with STOP sign control on CR 47. There are no turn lanes in any direction provided at this intersection.

County Road 49 - This is a concrete paved roadway providing access from SH 66 to the entrance to the cement plant. The road crosses the Burlington Northern Railroad tracks at an at-grade crossing and then has a bridge over the St. Vrain River. When the road reaches the entrance to the plant, it turns to the west at a 90-degree angle and continues as an unpaved road.

CR 49 intersects SH 66 at a point about 1,300 feet west of the CR 47 intersection. It too is a STOP sign controlled "T" intersection. However, this intersection has been improved with a westbound left turn lane and eastbound right turn acceleration and deceleration lanes.

B. EXISTING TRAFFIC CONDITIONS

Figure 2 depicts both daily and peak hour traffic data for the roadways in the vicinity of the project. The daily data obtained from the Colorado Department of Transportation (CDOT) indicates that the annual average daily traffic (AADT) volume on SH 66 is about 6,400 vehicles per day (vpd). Historical data since 1982 reveal that traffic on SH 66 has increased at a rate of approximately 2 percent per year.

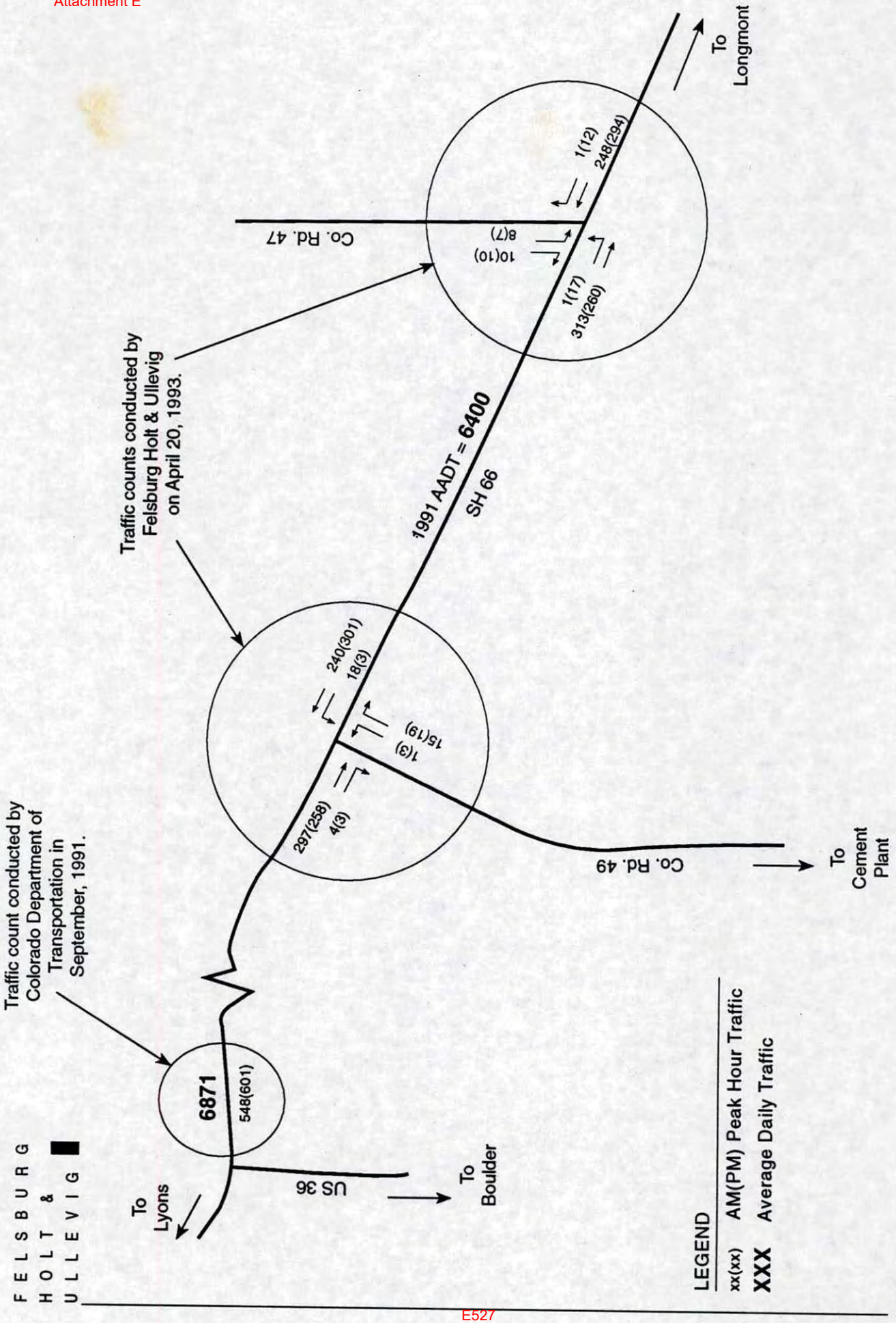


Figure 2
Existing Traffic Volumes

F E L S B U R G
H O L T &
U L L E V I G

It should be noted that this volume represents an average condition throughout the year. Because this road provides access to the mountains, tourist traffic increases the volumes during the tourist season. Based on data provided by CDOT for SH 66 and other similar roadways, the following estimate of the monthly variation of average traffic volumes has been determined for SH 66:

<u>Month</u>	<u>As % of Average Month</u>
January	0.90
February	0.89
March	0.91
April	0.94
May	1.00
June	1.09
July	1.18
August	1.18
September	1.08
October	0.97
November	0.92
December	0.92

Thus, it can be seen that July and August are the months of heaviest travel, with daily volumes 18 percent greater than average conditions.

The peak hour turning movement counts illustrated on Figure 2 were recorded by Felsburg Holt & Ullevig in April 1993. The peak hours were found to be 7:15 - 8:15 AM and 4:45 - 5:45 PM. The counts revealed that the volumes on SH 66 are very similar in each of the peak hours at slightly less than 600 vehicles per hour (vph). The data also highlight the low traffic volumes on each of the county roads.

These volumes were used to determine existing levels of service on SH 66 and at the two county road intersections utilizing techniques published in the Highway Capacity Manual (see Appendix A for worksheets). Level of service (LOS) is a measure of the quality of traffic operations, ranging from LOS A (free flow) to LOS F (severe congestion). More detailed definitions of the levels of service are also provided in Appendix A. The two-way LOS on SH 66 is calculated to be LOS B for each peak hour. The levels of service at unsignalized intersections is measured for each critical movement at the intersection. Table 1 summarizes the results of these analyses. These results indicate that all movements at these intersections operate at good levels of service.

TABLE 1
SUMMARY OF INTERSECTION LOS ANALYSES - EXISTING TRAFFIC VOLUMES

Intersection	Movement	LOS (AM/PM)
CR 47/SH 66	SB Left	B/C
	SB Right	A/A
	EB Left	A/A
CR 49/SH 66	NB Left	B/B
	NB Right	A/A
	WB Left	A/A

Table 2 summarizes the accident history of SH 66 between the US 36 intersection and the Hygiene intersection (CR 31), as available from CDOT's annual report. These data are for the most recent five years for which data are available from CDOT. The data reveal that there have been 51 accidents on this 3.9 mile stretch of road over these five years; there have been two fatal accidents. Most importantly, with the exception of 1990, the total accident rate on this section of roadway has been less than the average rate experienced statewide on rural state highways of a similar nature.

TABLE 2
ACCIDENT HISTORY - SH 66

Year	Number of Accidents				Total Accident Rate (1)	Total Rural State Primary Highway Average Accident Rate
	Property Damage	Injury	Fatal	Total		
1991	4	3	0	7	0.77	1.20
1990	10	6	0	16	2.25	1.17
1989	3	4	0	7	0.77	1.18
1988	3	7	1	11	1.29	1.35
1987	6	3	1	10	1.10	1.42

(1) Accidents per million vehicle-miles of travel.

III. PROJECT GENERATED TRAFFIC

A. ROCK HAUL TRAFFIC

The amount of truck traffic generated by rock hauling activity is dependent on production quantities, size of the vehicles, and hours of hauling. Table 3 summarizes the projections for this activity. In producing these estimates the following assumptions were used:

- o The total annual rock production will be 760,000 tons.
- o The monthly production estimates were prepared by the applicant on the basis of historical trends.
- o Hauling would occur only four days per week. No hauling would occur on weekends.
- o Hauling would occur during 8.5 hours per day.

As shown on the table, estimates were made for the use of two alternative rock haul vehicle types. The first estimates assumed the use of standard highway vehicles with a payload capacity of 25-tons. The second set of estimates assumed use of a vehicle capable of hauling 85 tons of rock. The applicant wishes to pursue the possibility of using the larger vehicles because they are more efficient and would result in fewer than one-third the number of truck trips impacting the roadways. Such 85-ton trucks are currently hauling rock across Hygiene Road from the south to the plant.

The results shown in Table 3 indicate that during peak production months, the total number of truck trips (empty plus loaded) would be 45 per hour if the 25-ton vehicles were used or a maximum of 14 per hour if the 85-ton vehicles were used.

B. OTHER PROJECT TRAFFIC

Because this proposal does not represent an increase in the production capacity of the plant, other types of traffic will not be significantly affected by the proposal. Activity from vendors supplying material to the plant and customers hauling cement from the plant will remain essentially the same.

The crew operating the new mine site is expected to consist of approximately 10 employees. They will stage at a site at the south end of the mine area and will utilize County Road 47 to access the site. Therefore, one could estimate a worst case of 10 additional vehicle trips on CR 47 during each peak hour attributed to employee traffic. It should be noted that these employees will be shifted from other locations at the plant and will, therefore, represent a reduction in traffic elsewhere.

The one significant change which would be experienced is the elimination of the trucks which currently make the 11-mile haul trip from the Larimer County quarry along SH 66 and county roads. This traffic currently amounts to 12,000 truck trips per year (6,000 loaded, 6,000 empty). This equates to 132,000 vehicle-miles of truck travel per year, of which about 36,000 vehicle-miles is on the state highway.

**TABLE 3
HAULING ACTIVITY PROJECTIONS - DOWE FLATS**

Month	Monthly Production (1) (Tons of Material)	Typical Daily Production (2)	25-Ton Trucks		85-Ton Trucks	
			Truck Loads Per Day	Truck Trips Per Day (3)	Truck Loads Per Day	Truck Trips Per Day (3)
January	64,000	4,000	160	320	47	94
February	49,500	3,095	124	248	36	72
March	46,700	2,920	117	234	34	68
April	64,890	4,055	162	324	48	96
May	62,850	3,930	157	314	46	92
June	64,920	4,060	162	324	48	96
July	69,110	4,320	173	346	51	102
August	64,930	4,060	162	324	48	96
September	75,110	4,695	188	376	55	110
October	54,930	3,435	137	274	40	80
November	67,220	4,200	168	336	49	98
December	75,840	4,740	190	380	56	112
	760,000					

(1) Based on information provided by the applicant.

(2) Assumes 4 weeks per month and hauling on 4 days per week. It should be noted that these assumptions will result in estimates that are somewhat high for the typical day.

(3) Each truck load of material generates two truck-trips, one loaded and one empty.

(4) Assumes hauling 8.5 hours per day.

IV. ALTERNATIVE HAUL ROUTES

Throughout the planning process, a number of alternative routes for the haul trucks to travel between the mine site and the cement plant have been considered. These evolved through a logical sequence and are schematically illustrated on Figure 3. Each of the alternatives is discussed below.

It should be noted that inherent to each of these alternatives is the relocation of the portion of CR 47 which runs through the proposed mine area. This section of the road will be relocated to the west and will be constructed to county standards in an environmentally sensitive manner. This relocation does not effect the section between the mine site and SH 66; nor does it relocate the intersection with SH 66.

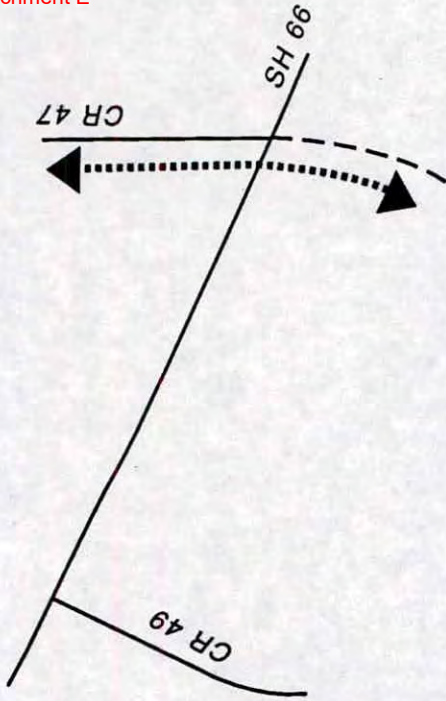
Alternative 1 - Use of Existing Roads

The most simple alternative to implement, and the first considered, was the use of existing CR 47, SH 66, and CR 49 for the haul route. This would require improvement of CR 47 from SH 66 to the mine entrance and would require turn lane additions at the intersection of CR 47/SH 66. Furthermore, the required length of acceleration/deceleration lanes (to be consistent with the State Highway Access Code) would essentially result in widening SH 66 for the entire length between CR 47 and CR 49.

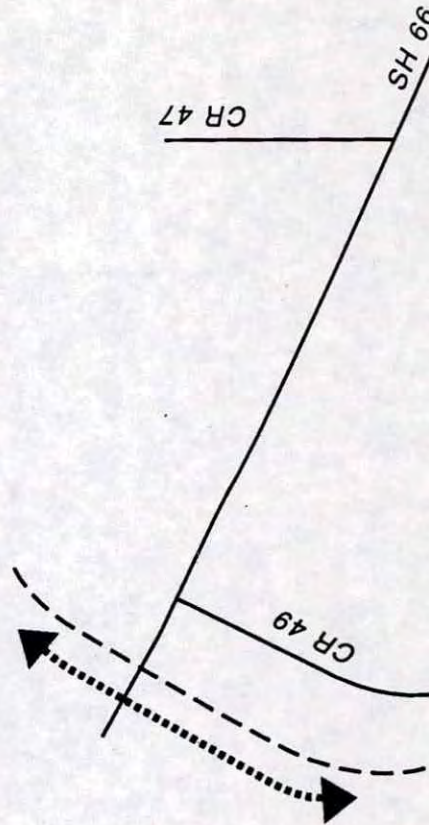
While these improvements could be reasonably implemented, several very significant difficulties with this alternative were recognized after preliminary analysis. First, this alternative mixed the heavy haul truck traffic with residential and recreational traffic on CR 47 and also routed the heavy trucks near several residences along CR 47.

The second primary concern was related to traffic operations along SH 66. This routing would require that a truck turn right from CR 47, accelerate and merge with traffic on SH 66, and then move into a left turn lane for deceleration to CR 49 (this type of movement is often referred to as a "Z" movement). The difficulty with this movement in this situation is that these two intersections are spaced only 1,300 feet apart. Therefore, trucks would be unable to reach highway speeds by the time they would have to merge with highway traffic in order to move into the left turn lane. Based on the acceleration capabilities of such heavy trucks, it is estimated that they could only reach a speed of about 30 MPH in the available distance. With a speed limit of 55 MPH on SH 66, this speed differential could be a significant safety hazard. Therefore, this alternative was not considered desirable.

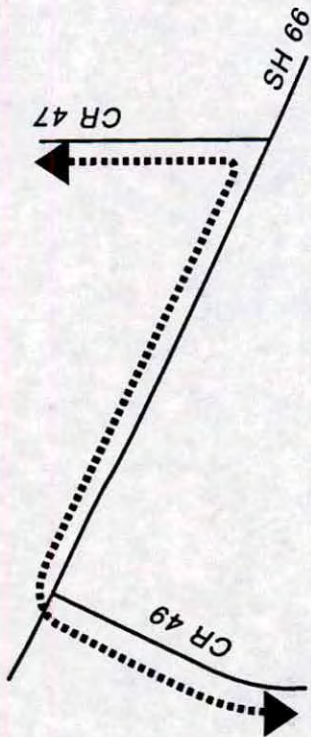
FELSBURG
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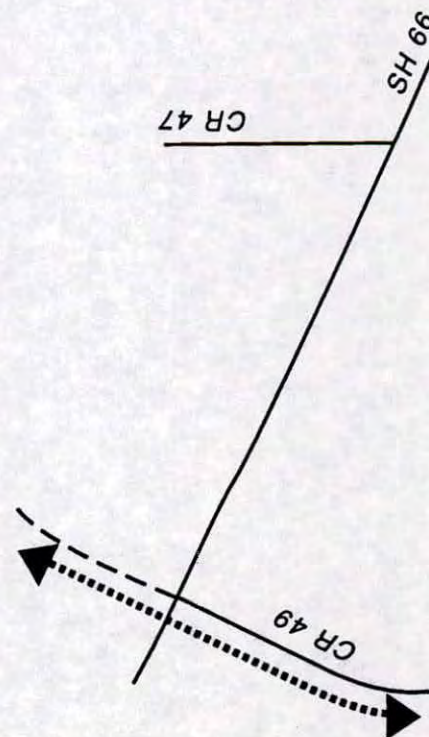
Alternative 2 - Highway Crossing at CR 47



Alternative 4 - Western Highway Crossing



Alternative 1 - Use of Existing Roads



Alternative 3 - Highway Crossing at CR 49



North

Figure 3
Haul Route Alternatives

Alternative 2 - Highway Crossing at CR 47

The next logical alternative considered was a direct crossing of SH 66 at the CR 47 intersection. This alternative would entail the construction of a new haul road from SH 66 to the cement plant, including a railroad crossing and a bridge over the river. Physically, this presented some difficulties because of the elevation difference between SH 66 and the railroad in this area. This difference (approximately 8 - 9 feet) is not nearly sufficient to allow grade separation of the haul road and the railroad, yet it is too great to allow a design to provide an at-grade railroad crossing.

Alternative 3 - Highway Crossing at CR 49

The corollary to Alternative 2 would be to construct a new haul route from the mine site to the CR 49 intersection with SH 66 and to allow a direct crossing of the highway at this point. This option would remove the haul trucks from CR 47 and would utilize the existing crossings of the railroad tracks and the river on the south side of the highway. However, this would mix haul traffic with other traffic using CR 49.

The most difficult hurdle associated with this alternative is that the applicant does not own the properties through which this haul route would run. Therefore, while this may be a viable alternative in the long term future, it is not feasible at this time.

Alternative 4 - Western Highway Crossing

The applicant does own properties which would allow him to construct a separate haul route from the mine to the plant with a crossing of SH 66 approximately 500 - 550 feet west of the CR 49 intersection. This road would be limited to use by haul trucks only; employee, supplier, customer and other traffic would still use CR 47 and CR 49. Thus, one advantage that this alternative offers is that the haul trucks would not mix with other traffic on any of these roadways.

The haul route would cross SH 66 at a location where sight distance is good and the road is only two lanes wide (no turn lanes) and, thus, shorter to cross. Furthermore, the elevations of the highway and of the railroad in this area are such that at-grade crossings of both could be achieved. However, at the north end of the haul route near the mine entrance, it is proposed to grade separate the haul route and the relocated CR 47.

Because of these characteristics, Alternative 4 is the preferred haul route.

V. TRAFFIC IMPACTS

A. METHODOLOGY

In this section, both the immediate impacts and the long-term impacts of the traffic associated with the proposal are assessed. The immediate impacts are based on full production activity and existing background traffic levels on the highways. All analyses assess conditions for the peak summer season (the month of July is used for analysis purposes) because this represents the time when rock hauling and background traffic are both at high levels.

The long-term impacts are assessed on projected traffic volumes twenty years into the future. To estimate these volumes, existing traffic volumes on SH 66 were increased by a factor of 1.4. This determination was made through several approaches. Primarily, the Colorado Department of Transportation uses this 20-year growth factor for SH 66 in their planning process. It is further substantiated by the historical trend which has shown a two percent annual growth for the past ten years. Discussions with Boulder County Public Works Department staff have also indicated that this is a reasonable estimate.

The primary focus of the impact analysis is on the highway crossing of the haul trucks. To assess the operation at the crossing, two different techniques were used. The first of these was the standard unsignalized intersection capacity analysis technique published in the Highway Capacity Manual, Special Report 209, Transportation Research Board, 1985 which calculates a level of service for, in this case, the crossing movement. The second approach was also based on an analysis of available gaps in SH 66 traffic to allow these trucks to cross the highway, utilizing a methodology published in "The Potential Capacity of Unsignalized Intersections", Karsten Baass, ITE Journal, October 1987. While both techniques are based on gap availability, the two methods treat trucks differently. The first approach converts trucks to passenger car equivalencies and then determines the level of service on this basis. The second approach allows one to actually estimate the required gap for a particular vehicle and then determine the number of available gaps of at least that length. We believe that the latter approach is more reflective of the actual conditions, although this method does not offer a clear correlation to a LOS definition.

For this analysis, the acceleration capabilities of both 25-ton and 85-ton trucks were field tested. The length of time necessary for a vehicle (both loaded and empty) to clear a length of 100 feet from a stop condition was measured. Although 100 feet is longer than the distance to be cleared at the proposed crossing, use of this distance results in a conservatively high estimate of the required gap. Because of the relative acceleration capabilities of the two vehicles and because the 85-ton trucks are only about half the length of the 25-ton trucks, the time to clear this distance for both types of vehicles was very similar, averaging about 12 seconds for loaded conditions. Although the time was less when the trucks were empty, the 12-second gap requirement was used for both directions of travel in the analysis. Thus, once again a conservative factor was built into the approach.

Although the increase in traffic on SH 66 and at the intersections with the county roads due to the proposal will not be substantial (as noted earlier), levels of service for the two-way operation of SH 66 and the unsignalized intersections were also determined for the projected traffic volumes using the techniques published in the Highway Capacity Manual.

B. IMMEDIATE IMPACTS

The traffic volumes used for this assessment are illustrated on Figure 4. These volumes represent the existing volumes illustrated on Figure 2 adjusted to reflect the peak season (July). The peak hour turning movement counts conducted in April were increased by approximately 20 percent to account for this seasonality. The worksheets of the level of service analyses are included in Appendix B.

Haul Route/Highway Crossing

The unsignalized intersection analysis revealed a LOS C for the crossing movement in both the AM peak hour and the PM peak hour. The more detailed gap analysis yielded the following results:

<u>Period</u>	<u>Gap Available</u>
AM Peak Hour	102
PM Peak Hour	96

With a maximum peak hour demand of 45 movements for the 25-ton trucks and 14 movements if the 85-ton trucks are used, there are more than adequate gaps available.

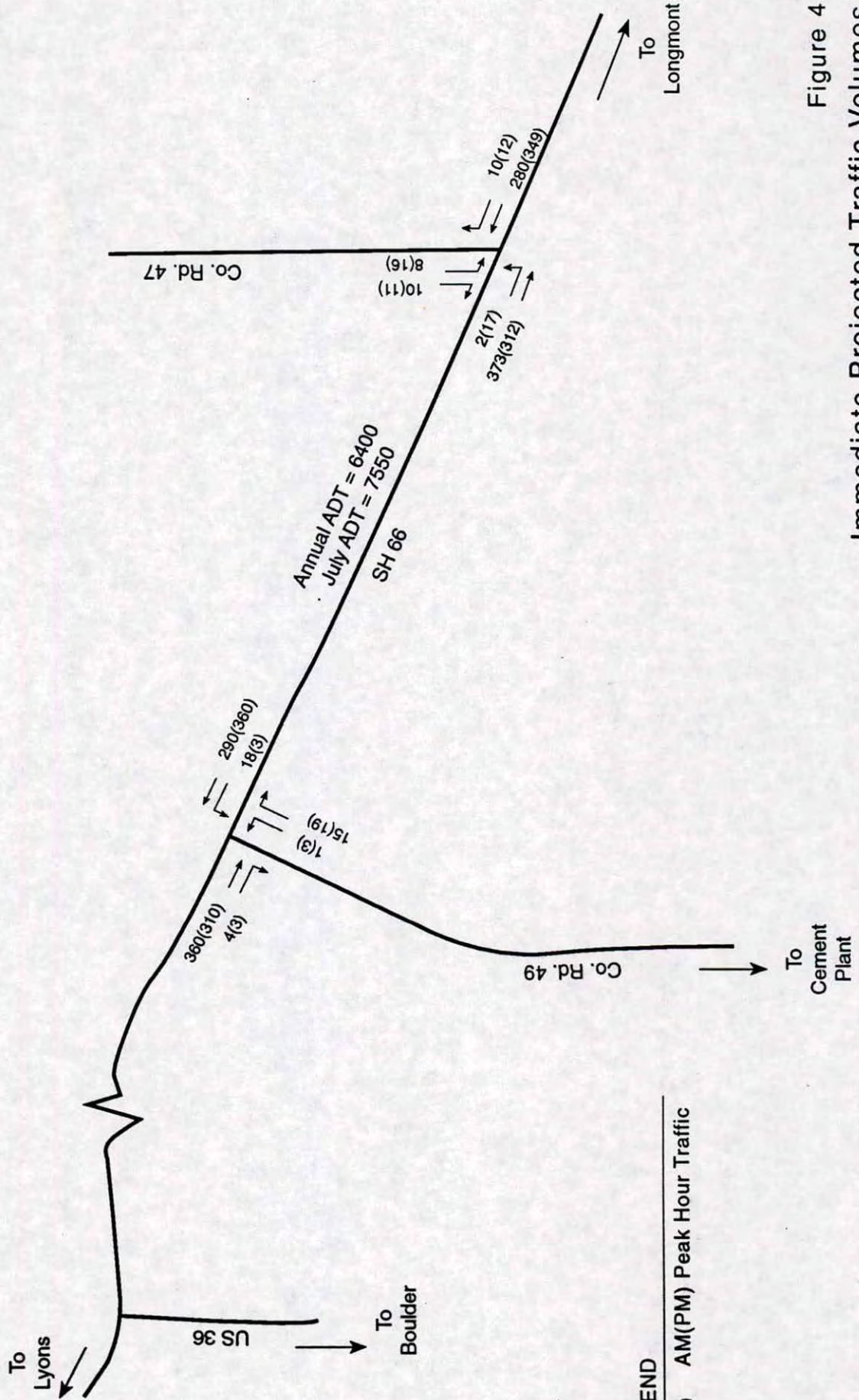
SH 66

The two-lane level of service analysis indicates no change in the operations on SH 66, with LOS B projected for both peak hours.

County Road Intersections

Table 4 summarizes the results of the level of service determinations at the two county road intersections. Because of the higher levels of traffic on SH 66, left turn movements out of the intersections will experience slightly longer delays during the peak season, but these are all still very acceptable levels of service.

FELSBURG
HOLT &
ULLEVIG



LEGEND

xx(xx) AM(PM) Peak Hour Traffic

Figure 4
Immediate Projected Traffic Volumes
(Peak Season Estimates)



**TABLE 4
SUMMARY OF INTERSECTION LOS ANALYSES
IMMEDIATE PROJECTED VOLUMES - PEAK SEASON**

Intersection	Movement	LOS (AM/PM)
CR 47/SH 66	SB Left	C/C
	SB Right	A/A
	EB Left	A/A
CR 49/SH 66	NB Left	C/C
	NB Right	A/A
	WB Left	A/A

C. LONG TERM (20 YEAR) IMPACTS

Figure 5 illustrates the traffic volumes projected for twenty years into the future. These too represent the peak summer season and were determined by factoring current volumes by a factor of 1.4. The results of the analyses are summarized below and the LOS worksheets are included in Appendix C.

Haul Route/Highway Crossing

Utilizing the unsignalized intersection technique, LOS D is calculated for both the AM and the PM peak hour. The gap analysis approach yielded the following results:

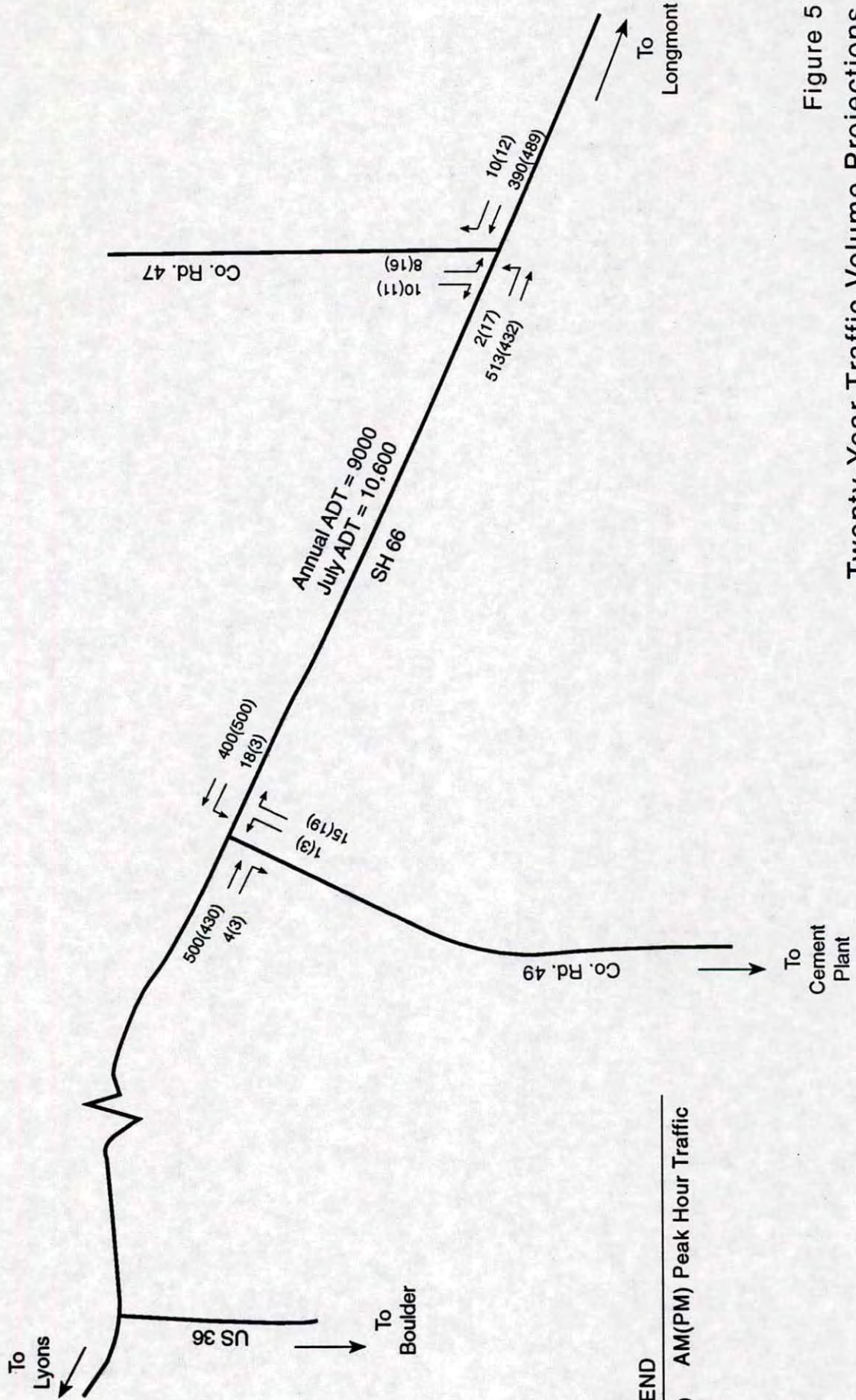
<u>Period</u>	<u>Gap Available</u>
AM Peak Hour	51
PM Peak Hour	46

These results indicate that in the long range future, the number of sufficient gaps available will still be adequate, but nearly all of the gaps will be utilized to accommodate the crossing maneuver if 25-ton trucks are used. If the larger trucks are used, more than adequate gaps would be available.

SH 66

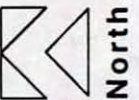
Even with the increased traffic volumes projected on SH 66 in this time frame, the two-lane LOS analysis indicates a LOS C for both peak periods. Thus, widening of the roadway to four lanes is not projected to be necessary.

F E L S B U R G
H O L T &
U L L E V I G



LEGEND
xx(xx) AM(PM) Peak Hour Traffic

Figure 5
Twenty-Year Traffic Volume Projections
(Peak Season)



County Road Intersections

The intersection level of service analyses for the twenty-year projections are summarized in Table 5. These results indicate that these intersections would still operate at acceptable levels of service as unsignalized intersections.

**TABLE 5
SUMMARY OF INTERSECTION LOS ANALYSES
20-YEAR PROJECTED VOLUMES - PEAK SEASON**

Intersection	Movement	LOS (AM/PM)
CR 47/SH 66	SB Left	D/D
	SB Right	A/A
	EB Left	A/A
CR 49/SH 66	NB Left	D/D
	NB Right	A/A
	WB Left	A/A

VI. SUMMARY OF FINDINGS AND RECOMMENDATIONS

The following points represent a summary of the findings of the analyses which have been conducted and recommendations to help mitigate the traffic impacts of the proposal:

- o The primary increased traffic associated with the proposal would be traffic related to the rock hauling activity. Because this proposal only replaces the rock supply and does not increase the capacity of the plant, traffic related to other material suppliers and product customers will not change. Employee traffic to the mine site will consist of only about ten employees and these employees will only be shifted from other locations at the project.
- o Opening of the Dowe Flats area will eliminate 12,000 truck trips per year which currently haul rock for 11 miles on county roads and SH 66 from a quarry in Larimer County. This equates to 132,000 vehicle-miles of truck travel per year.
- o If 25-ton trucks are used to haul rock from the Dowe Flats mine to the current plant, the annual average number of truck trips (total of loaded and empty) per hour would be approximately 38 vph . During the peak season, this number could be as high as 45 vph.
- o If 85-ton trucks are used for the haul operation, the annual average truck trips per hour would be about 11 vph. During the peak season, this estimate could reach 14 vph.
- o It is recommended that a separate haul route be constructed from the mine site to the current plant on the proposed "western" alignment. This would allow separation of the haul trucks from other traffic using CR 47 or CR 49. Furthermore, this would allow a crossing of SH 66 at a point where it is only two lanes wide. This route location could be constructed on land owned by the applicant.
- o The analyses indicate that even during the peak season there will be sufficient gaps in traffic to allow trucks to cross the highway at-grade.
- o This crossing would not meet signal warrants according to the Manual on Uniform Traffic Control Devices within the time frame of this analysis.
- o Because the crossing would represent a somewhat unique situation, consideration should be given to the following measures to enhance its operations and safety:
 - The haul route should be restricted to haul trucks only. This could be done with signage and could be more effectively controlled with gates that could be activated by the truck drivers.
 - Advance warning signs with flashing beacons should be installed on SH 66 to advise motorists of side road truck traffic.

- Illumination of the crossing should be considered. Although rock would not be hauled during hours of darkness during the peak season, darkness comes in late afternoon during the winter months.
- o The twenty-year projections indicate that the number of crossing maneuvers and the number of available gaps in SH 66 traffic will be nearly equal. If this becomes reality and traffic continues to grow beyond this point, it may be necessary to consider the following methods of overcoming a capacity problem:
 - Limitation of hauling hours to avoid the peak hours of traffic on SH 66.
 - Signalization of the crossing.

LEVEL OF SERVICE QUALITATIVE DESCRIPTIONS

A. UNSIGNALIZED INTERSECTION LEVEL OF SERVICE

Unsignalized intersections base the level of service on the amount of delay experienced by vehicles turning out of or into the minor, stop sign-controlled street. There are no agreed upon quantitative measure of levels of service for unsignalized intersections, but some brief qualitative measures are given below:

LOS A - Little or no delay to vehicles. A very high level of service usually found only in rural areas or during off-peak hours.

LOS B - Short delays to vehicles. Still a very good level of service.

LOS C - Average delays to vehicles. Waiting time becomes noticeable. Freedom to enter major street traffic is slightly restricted.

LOS D - Long delays to vehicles. Due to heavy volumes on major street, vehicles on minor street are restricted in their ability to enter traffic stream.

LOS E - Very long delays to vehicles. Tolerable for short periods of time. If the level of service is present for long period, queue buildup on minor street becomes noticeable.

LOS F - Represents jammed conditions. Back-ups from locations down-stream or on the cross street may restrict or prevent movement of vehicles out of the approach under consideration; hence, volumes carried are not predictable.

B. TWO-LANE HIGHWAY LEVEL OF SERVICE

The concept of level of service (LOS) is defined as a measure quantifying the traffic operational conditions within a traffic stream. A LOS definition describes these conditions in terms of speed and freedom to maneuver for two-lane highways. There are six defined levels of LOS given letter designations ranging from A to F, with LOS A representing the best operating conditions and LOS F the worst. The 1985 Highway Capacity Manual defines the various levels of service as follows:

LOS A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger or pedestrian is excellent.

LOS B is the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

APPENDIX A

**LOS CALCULATIONS
EXISTING VOLUMES**

LOS C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

LOS D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

LOS E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

LOS F is used to defined forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go waves and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. LOS F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow which causes the queue to form, and LOS F is an appropriate designation for such points.

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... S.H.66 (west of Co. Rd. 49)
 ANALYST..... L.LANG
 TIME OF ANALYSIS..... AM PEAK HOUR
 DATE OF ANALYSIS..... 05/17/93
 OTHER INFORMATION.... EXISTING TRAFFIC

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	1
PERCENTAGE OF BUSES.....	1
PERCENTAGE OF RECREATIONAL VEHICLES.....	1
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.98
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	55 / 45
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	10
PERCENT NO PASSING ZONES.....	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.97	.97
B	2.2	2	2.5	1	.97	.96
C	2.2	2	2.5	1	.97	.96
D	2	1.6	1.6	1	.97	.98
E	2	1.6	1.6	1	.97	.98

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME (vph): 537
 ACTUAL FLOW RATE: 548

LOS	SERVICE FLOW RATE	V/C
A	396	.15
B	707	.27
C	1126	.43
D	1701	.64
E	2658	1

LOS FOR GIVEN CONDITIONS: B E546

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... S.H.66 (west of Co. Rd. 49)
 ANALYST..... L.LANG
 TIME OF ANALYSIS..... PM PEAK HOUR
 DATE OF ANALYSIS..... 05/17/93
 OTHER INFORMATION.... EXISTING TRAFFIC

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	1
PERCENTAGE OF BUSES.....	1
PERCENTAGE OF RECREATIONAL VEHICLES.....	1
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.98
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	54 / 46
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	10
PERCENT NO PASSING ZONES.....	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.98	.97
B	2.2	2	2.5	1	.98	.96
C	2.2	2	2.5	1	.98	.96
D	2	1.6	1.6	1	.98	.98
E	2	1.6	1.6	1	.98	.98

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME (vph): 559
 ACTUAL FLOW RATE: 570

LOS	SERVICE FLOW RATE	V/C
A	398	.15
B	712	.27
C	1133	.43
D	1711	.64
E	2674	1

LOS FOR GIVEN CONDITIONS: B

1985 HCM: UNSIGNALIZED INTERSECTIONS

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... .98

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.H. 66

NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 47

NAME OF THE ANALYST..... L.LANG

DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993

TIME PERIOD ANALYZED..... AM PEAK HOUR

OTHER INFORMATION.... 1993 EXISTING TRAFFIC

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	1	0	--	8
THRU	313	248	--	0
RIGHT	0	1	--	10

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	--	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	-----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
SB	6.50	6.50	0.00	6.50
MAJOR LEFTS				
EB	5.50	5.50	0.00	5.50
MINOR LEFTS				
SB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
 OTHER INFORMATION..... 1993 EXISTING TRAFFIC

CAPACITY AND LEVEL-OF-SERVICE

Page-3

MOVEMENT	FLOW- RATE v(pcph)	POTEN- TIAL CAPACITY	ACTUAL MOVEMENT CAPACITY		SHARED CAPACITY	RESERVE CAPACITY	LOS
		c (pcph) p	c (pcph) M		c (pcph) SH	c = c - v R SH	
MINOR STREET							
SB LEFT	9	311	310	>	310	>	301 > B
				>	443	>	423 >A
RIGHT	11	674	674	>	674	>	663 > A
MAJOR STREET							
EB LEFT	1	836	836		836		835 A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
OTHER INFORMATION..... 1993 EXISTING TRAFFIC

1985 HCM: UNSIGNALIZED INTERSECTIONS

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... .98

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.H. 66

NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 47

NAME OF THE ANALYST..... L.LANG

DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993

TIME PERIOD ANALYZED..... PM PEAK HOUR

OTHER INFORMATION.... 1993 EXISTING TRAFFIC

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	17	0	--	7
THRU	260	294	--	0
RIGHT	0	12	--	10

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	--	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	-----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
SB	6.50	6.50	0.00	6.50
MAJOR LEFTS				
EB	5.50	5.50	0.00	5.50
MINOR LEFTS				
SB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
 OTHER INFORMATION.... 1993 EXISTING TRAFFIC

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
SB LEFT	8	302	297	> 297	> 289	> C
				> 431	> 412	> A
RIGHT	11	630	630	> 630	> 619	> A
MAJOR STREET						
EB LEFT	19	779	779	779	760	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
 OTHER INFORMATION..... 1993 EXISTING TRAFFIC

1985 HCM: UNSIGNALIZED INTERSECTIONS

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... .98

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.H. 66

NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 49

NAME OF THE ANALYST..... L.LANG

DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993

TIME PERIOD ANALYZED..... AM PEAK HOUR

OTHER INFORMATION.... 1993 EXISTING TRAFFIC

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
	----	----	----	----
LEFT		18	1	--
THRU	297	240	0	--
RIGHT	4		15	--

NUMBER OF LANES

	EB	WB	NB	SB
	----	----	----	----
LANES	1	1	1	--

ADJUSTMENT FACTORS

Page-2

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	25	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
NB	6.50	6.50	0.00	6.50
MAJOR LEFTS				
WB	5.50	5.50	0.00	5.50
MINOR LEFTS				
NB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 49
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
 OTHER INFORMATION.... 1993 EXISTING TRAFFIC

CAPACITY AND LEVEL-OF-SERVICE

Page-3

MOVEMENT	FLOW- RATE v (pcph)	POTEN-	ACTUAL		SHARED	RESERVE	LOS
		TIAL CAPACITY c (pcph) p	MOVEMENT CAPACITY c (pcph) M		CAPACITY c (pcph) SH	CAPACITY c = c - v R SH	
MINOR STREET							
NB LEFT	1	314	310	>	310	>	308 > B
				>	593	>	572 >A
RIGHT	19	631	631	>	631	>	612 > A
MAJOR STREET							
WB LEFT	18	784	784		784		765 A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 49
DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
OTHER INFORMATION.... 1993 EXISTING TRAFFIC

1985 HCM: UNSIGNALIZED INTERSECTIONS

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55
 PEAK HOUR FACTOR..... .98
 AREA POPULATION..... 150000
 NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 49
 NAME OF THE ANALYST..... L.LANG
 DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993
 TIME PERIOD ANALYZED..... PM PEAK HOUR
 OTHER INFORMATION.... 1993 EXISTING TRAFFIC

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION
 MAJOR STREET DIRECTION: EAST/WEST
 CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT		3	3	--
THRU	258	301	0	--
RIGHT	3		19	--

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	1	--

ADJUSTMENT FACTORS

Page-2

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	25	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
NB	6.50	6.50	0.00	6.50
MAJOR LEFTS				
WB	5.50	5.50	0.00	5.50
MINOR LEFTS				
NB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 49
DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
OTHER INFORMATION.... 1993 EXISTING TRAFFIC

CAPACITY AND LEVEL-OF-SERVICE

Page-3

MOVEMENT	FLOW-RATE	POTENTIAL CAPACITY	ACTUAL MOVEMENT CAPACITY		SHARED CAPACITY	RESERVE CAPACITY	LOS
	v (pcph)	c (pcph) p	c (pcph) M		c (pcph) SH	c = c - v R SH	
MINOR STREET							
NB LEFT	4	310	309	>	309	>	305 > B
				>	575	>	547 >A
RIGHT	24	665	665	>	665	>	641 > A
MAJOR STREET							
WB LEFT	3	824	824		824		821 A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 49
DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
OTHER INFORMATION.... 1993 EXISTING TRAFFIC

APPENDIX B

**LOS CALCULATIONS
EXISTING VOLUMES - PEAK SEASON**

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... S.H.66 (west of Co. Rd. 49)
 ANALYST..... L.LANG
 TIME OF ANALYSIS..... AM PEAK HOUR
 DATE OF ANALYSIS..... 05/17/93
 OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

A) ADJUSTMENT FACTORS

 PERCENTAGE OF TRUCKS..... 1
 PERCENTAGE OF BUSES..... 1
 PERCENTAGE OF RECREATIONAL VEHICLES..... 2
 DESIGN SPEED (MPH)..... 60
 PEAK HOUR FACTOR..... .98
 DIRECTIONAL DISTRIBUTION (UP/DOWN)..... 55 / 45
 LANE WIDTH (FT)..... 12
 USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)... 10
 PERCENT NO PASSING ZONES..... 0

B) CORRECTION FACTORS

 LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.97	.96
B	2.2	2	2.5	1	.97	.95
C	2.2	2	2.5	1	.97	.95
D	2	1.6	1.6	1	.97	.97
E	2	1.6	1.6	1	.97	.97

C) LEVEL OF SERVICE RESULTS

 INPUT VOLUME (vph): 655
 ACTUAL FLOW RATE: 668

LOS	SERVICE FLOW RATE	V/C
A	391	.15
B	697	.27
C	1110	.43
D	1691	.64
E	2642	1

LOS FOR GIVEN CONDITIONS: B

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... S.H.66 (west of Co. Rd. 49)
 ANALYST..... L.LANG
 TIME OF ANALYSIS..... PM PEAK HOUR
 DATE OF ANALYSIS..... 05/17/93
 OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

A) ADJUSTMENT FACTORS

 PERCENTAGE OF TRUCKS..... 1
 PERCENTAGE OF BUSES..... 1
 PERCENTAGE OF RECREATIONAL VEHICLES..... 2
 DESIGN SPEED (MPH)..... 60
 PEAK HOUR FACTOR..... .98
 DIRECTIONAL DISTRIBUTION (UP/DOWN)..... 46 / 54
 LANE WIDTH (FT)..... 12
 USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)... 10
 PERCENT NO PASSING ZONES..... 0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.98	.96
B	2.2	2	2.5	1	.98	.95
C	2.2	2	2.5	1	.98	.95
D	2	1.6	1.6	1	.98	.97
E	2	1.6	1.6	1	.98	.97

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 676
 ACTUAL FLOW RATE: 690

LOS	SERVICE FLOW RATE	V/C
A	393	.15
B	701	.27
C	1117	.43
D	1701	.64
E	2658	1

LOS FOR GIVEN CONDITIONS: B E582

1985 HCM: UNSIGNALIZED INTERSECTIONS

Page-1

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55
 PEAK HOUR FACTOR..... .98
 AREA POPULATION..... 150000
 NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 47
 NAME OF THE ANALYST..... L. LANG
 DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993
 TIME PERIOD ANALYZED..... AM PEAK HOUR
 OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION
 MAJOR STREET DIRECTION: EAST/WEST
 CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
	-----	-----	-----	-----
LEFT	2	0	--	8
THRU	373	280	--	0
RIGHT	0	10	--	10

NUMBER OF LANES

	EB	WB	NB	SB
	-----	-----	-----	-----
LANES	1	1	--	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
SB	6.50	6.50	0.00	6.50
MAJOR LEFTS				
EB	5.50	5.50	0.00	5.50
MINOR LEFTS				
SB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
 OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

CAPACITY AND LEVEL-OF-SERVICE

Page-3

MOVEMENT	FLOW- RATE v (pcph)	POTEN- TIAL CAPACITY	ACTUAL MOVEMENT CAPACITY	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY		LOS
		c (pcph) p	c (pcph) M		c = c R	- v SH	
MINOR STREET							
SB LEFT	9	262	261	>	261	>	253 > C
				>	390	>	370 > B
RIGHT	11	643	643	>	643	>	632 > A
MAJOR STREET							
EB LEFT	2	794	794		794		792 A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

1985 HCM: UNSIGNALIZED INTERSECTIONS

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... .98

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.H. 66

NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 47

NAME OF THE ANALYST..... L.LANG

DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993

TIME PERIOD ANALYZED..... PM PEAK HOUR

OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	17	0	--	16
THRU	312	349	--	0
RIGHT	0	12	--	11

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	--	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	-----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS SB	6.50	6.50	0.00	6.50
MAJOR LEFTS EB	5.50	5.50	0.00	5.50
MINOR LEFTS SB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
 OTHER INFORMATION..... EXISTING PEAK SEASON TRAFFIC

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v (pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M		SHARED CAPACITY c (pcph) SH		RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET								
SB LEFT	18	251	247	>	247	>	229	> C
				>	323	>	293	> C
RIGHT	12	588	588	>	588	>	576	> A
MAJOR STREET								
EB LEFT	19	728	728		728		709	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
 OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

1985 HCM: UNSIGNALIZED INTERSECTIONS

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... .98

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.H. 66

NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 49

NAME OF THE ANALYST..... L.LANG

DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993

TIME PERIOD ANALYZED..... AM PEAK HOUR

OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
	----	----	----	----
LEFT		18	1	--
THRU	360	290	0	--
RIGHT	4		15	--

NUMBER OF LANES

	EB	WB	NB	SB
	----	----	----	----
LANES	1	1	1	--

ADJUSTMENT FACTORS

Page-2

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	-----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	25	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
NB	6.50	6.50	0.00	6.50
MAJOR LEFTS				
WB	5.50	5.50	0.00	5.50
MINOR LEFTS				
NB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 49
DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

CAPACITY AND LEVEL-OF-SERVICE

Page-3

MOVEMENT	FLOW- RATE v (pcph)	POTEN- TIAL CAPACITY	ACTUAL MOVEMENT CAPACITY	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
		c (pcph) p	c (pcph) M			
MINOR STREET						
NB LEFT	1	257	253	>	253	> C
				> 539	>	519 > A
RIGHT	19	583	583	>	583	> 564 > A
MAJOR STREET						
WB LEFT	18	726	726		726	707 A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 49
DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

1985 HCM: UNSIGNALIZED INTERSECTIONS

Page-1

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... .98

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.H. 66

NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 49

NAME OF THE ANALYST..... L.LANG

DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993

TIME PERIOD ANALYZED..... PM PEAK HOUR

OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
	----	----	----	----
LEFT		3	3	--
THRU	310	360	0	--
RIGHT	3		19	--

NUMBER OF LANES

	EB	WB	NB	SB
	----	----	----	----
LANES	1	1	1	--

ADJUSTMENT FACTORS

Page-2

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	-----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	25	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
NB	6.50	6.50	0.00	6.50
MAJOR LEFTS				
WB	5.50	5.50	0.00	5.50
MINOR LEFTS				
NB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 49
DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v (pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
NB LEFT	4	255	255	> 255	> 491	> C
RIGHT	24	622	622	> 622	> 597	> A
MAJOR STREET						
WB LEFT	3	773	773	773	769	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 49
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
 OTHER INFORMATION.... EXISTING PEAK SEASON TRAFFIC

APPENDIX C

**LOS CALCULATIONS
20-YEAR PROJECTED VOLUMES - PEAK SEASON**

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... S.H.66 (west of Co. Rd. 49)
 ANALYST..... L.LANG
 TIME OF ANALYSIS..... AM PEAK HOUR
 DATE OF ANALYSIS..... 05/17/93
 OTHER INFORMATION.... YEAR 2015 PEAK SEASON TRAFFIC

A) ADJUSTMENT FACTORS

 PERCENTAGE OF TRUCKS..... 1
 PERCENTAGE OF BUSES..... 1
 PERCENTAGE OF RECREATIONAL VEHICLES..... 2
 DESIGN SPEED (MPH)..... 60
 PEAK HOUR FACTOR..... .98
 DIRECTIONAL DISTRIBUTION (UP/DOWN)..... 56 / 44
 LANE WIDTH (FT)..... 12
 USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)... 10
 PERCENT NO PASSING ZONES..... 0

B) CORRECTION FACTORS

 LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.96	.96
B	2.2	2	2.5	1	.96	.95
C	2.2	2	2.5	1	.96	.95
D	2	1.6	1.6	1	.96	.97
E	2	1.6	1.6	1	.96	.97

C) LEVEL OF SERVICE RESULTS

 INPUT VOLUME (vph) : 904
 ACTUAL FLOW RATE: 922

LOS	SERVICE FLOW RATE	V/C
A	389	.15
B	693	.27
C	1103	.43
D	1680	.64
E	2626	1

LOS FOR GIVEN CONDITIONS: C E576

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... S.H.66 (west of Co. Rd. 49)
 ANALYST..... L.LANG
 TIME OF ANALYSIS..... PM PEAK HOUR
 DATE OF ANALYSIS..... 05/17/93
 OTHER INFORMATION.... YEAR 2015 PEAK SEASON TRAFFIC

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	1
PERCENTAGE OF BUSES.....	1
PERCENTAGE OF RECREATIONAL VEHICLES.....	2
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.98
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	46 / 54
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	10
PERCENT NO PASSING ZONES.....	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.98	.96
B	2.2	2	2.5	1	.98	.95
C	2.2	2	2.5	1	.98	.95
D	2	1.6	1.6	1	.98	.97
E	2	1.6	1.6	1	.98	.97

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME (vph): 933
 ACTUAL FLOW RATE: 952

LOS	SERVICE FLOW RATE	V/C
A	393	.15
B	701	.27
C	1117	.43
D	1701	.64
E	2658	1

LOS FOR GIVEN CONDITIONS: C

1985 HCM: UNSIGNALIZED INTERSECTIONS

Page-1

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55
 PEAK HOUR FACTOR..... .98
 AREA POPULATION..... 150000
 NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 47
 NAME OF THE ANALYST..... L.LANG
 DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993
 TIME PERIOD ANALYZED..... AM PEAK HOUR
 OTHER INFORMATION.... YEAR 2015 PEAK SEASON

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION
 MAJOR STREET DIRECTION: EAST/WEST
 CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
	----	----	----	----
LEFT	2	0	--	8
THRU	513	390	--	0
RIGHT	0	10	--	10

NUMBER OF LANES

	EB	WB	NB	SB
	----	----	----	----
LANES	1	1	--	1

ADJUSTMENT FACTORS

Page-2

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
SB	6.50	6.50	0.00	6.50
MAJOR LEFTS				
EB	5.50	5.50	0.00	5.50
MINOR LEFTS				
SB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
 OTHER INFORMATION.... YEAR 2015 PEAK SEASON

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v (pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
SB LEFT	9	160	160	> 160	> 151	> D
RIGHT	11	558	558	> 265	> 244	> C
MAJOR STREET						
EB LEFT	2	694	694	694	692	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
 OTHER INFORMATION.... YEAR 2015 PEAK SEASON

1985 HCM: UNSIGNALIZED INTERSECTIONS

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55
 PEAK HOUR FACTOR..... .98
 AREA POPULATION..... 150000
 NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 47
 NAME OF THE ANALYST..... L.LANG
 DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993
 TIME PERIOD ANALYZED..... PM PEAK HOUR
 OTHER INFORMATION.... YEAR 2015 PEAK SEASON

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION
 MAJOR STREET DIRECTION: EAST/WEST
 CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	17	0	--	16
THRU	432	489	--	0
RIGHT	0	12	--	11

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	--	1

ADJUSTMENT FACTORS

Page-2

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	-----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
SB	6.50	6.50	0.00	6.50
MAJOR LEFTS				
EB	5.50	5.50	0.00	5.50
MINOR LEFTS				
SB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
OTHER INFORMATION..... YEAR 2015 PEAK SEASON

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v (pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
SB LEFT	18	148	145	>	145	> D
RIGHT	12	489	489	>	203 489	> 173 > D > 477 > A
MAJOR STREET						
EB LEFT	19	619	619		619	600 A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 47
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
 OTHER INFORMATION.... YEAR 2015 PEAK SEASON

1985 HCM: UNSIGNALIZED INTERSECTIONS

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... .98

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.H. 66

NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 49

NAME OF THE ANALYST..... L.LANG

DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993

TIME PERIOD ANALYZED..... AM PEAK HOUR

OTHER INFORMATION.... YEAR 2015 PEAK SEASON

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT		18	1	--
THRU	500	400	0	--
RIGHT	4		15	--

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	1	--

ADJUSTMENT FACTORS

Page-2

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	-----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	25	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
NB	6.50	6.50	0.00	6.50
MAJOR LEFTS				
WB	5.50	5.50	0.00	5.50
MINOR LEFTS				
NB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 49
DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
OTHER INFORMATION.... YEAR 2015 PEAK SEASON

CAPACITY AND LEVEL-OF-SERVICE

Page-3

MOVEMENT	FLOW-RATE v (pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M		SHARED CAPACITY c (pcph) SH		RESERVE CAPACITY c = c - v R SH		LOS
MINOR STREET									
NB LEFT	1	156	154	>	154	>	152	>	D
				>	427	>	406	>	A
RIGHT	19	484	484	>	484	>	465	>	A
MAJOR STREET									
WB LEFT	18	617	617		617		599		A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 49
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; AM PEAK HOUR
 OTHER INFORMATION..... YEAR 2015 PEAK SEASON

1985 HCM: UNSIGNALIZED INTERSECTIONS

Page-1

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... .98

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.H. 66

NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 49

NAME OF THE ANALYST..... L.LANG

DATE OF THE ANALYSIS (mm/dd/yy)..... 05-14-1993

TIME PERIOD ANALYZED..... PM PEAK HOUR

OTHER INFORMATION.... YEAR 2015 PEAK SEASON

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
	----	----	----	----
LEFT		3	3	--
THRU	430	500	0	--
RIGHT	3		19	--

NUMBER OF LANES

	EB	WB	NB	SB
	----	----	----	----
LANES	1	1	1	--

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	25	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
NB	6.50	6.50	0.00	6.50
MAJOR LEFTS				
WB	5.50	5.50	0.00	5.50
MINOR LEFTS				
NB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET..... COUNTY RD. 49
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
 OTHER INFORMATION.... YEAR 2015 PEAK SEASON

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v (pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
NB LEFT	4	151	151	> 396	151 > 368	147 > D >B
RIGHT	24	533	533	>	533 >	509 > A
MAJOR STREET						
WB LEFT	3	670	670		670	667 A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.H. 66
 NAME OF THE NORTH/SOUTH STREET.... COUNTY RD. 49
 DATE AND TIME OF THE ANALYSIS..... 05-14-1993 ; PM PEAK HOUR
 OTHER INFORMATION.... YEAR 2015 PEAK SEASON



TECHNICAL APPENDIX
VISUAL IMPACT ANALYSIS
DOWE FLATS MINING AND RECLAMATION PROJECT

Prepared for
Southdown, Inc.
(Southwestern Portland Cement)
P.O. Box 529
Lyons, Colorado 80540
(303) 534-4206

Prepared by:
LREP. INC.
2635 Mapleton Avenue
Suite 77
Boulder, Colorado 80302
(303) 447-1899
and
SHB AGRA, Inc.
165 South Union Boulevard
Suite 516
Lakewood, Colorado 80228
(303) 763-8432

SHB AGRA Project E92-7075
August 2, 1993



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1.0 INTRODUCTION AND SUMMARY

This report addresses the visual impact of Southdown's proposed mining and reclamation project at Dowe Flats. Existing conditions, project impacts and mitigation are discussed.

It is important to note that the proposed Dowe Flats mine is not a mountain-side quarry that will result in a "mountain scar". The mine will be excavated in a valley and not on an east-facing or otherwise highly visible Front Range slope. Southdown's cement plant and existing limestone quarries have been present in the area since 1969 and are part of the landscape. The proposed mine and related transportation plans will have visual impact, but natural and created topography and vegetation will largely mitigate these impacts. The final land form will enhance the visual diversity of the Dowe Flats valley (due to much more diverse topography and vegetation, as well as newly created water bodies). Reclamation will be concurrent with mining.

Portions of the project area are visible from the following locations in the vicinity of Dowe Flats:

- Portions of the Rabbit Mountain Open Space property to the North/Northeast (south and west flanks of Rabbit Mountain)
- Portions of private property on Rabbit Mountain to the east (west flanks)
- Some residences south of Dowe Flats along Colorado Highway 66 (Ute Highway)
- A short stretch of Colorado Highway 66 south of Dowe Flats
- Portions of the existing and relocated (proposed) County Rd. 47
- A short stretch of Colorado Highway 36 southwest of Dowe Flats
- Parts of the Front Range southwest of Dowe Flats, south of Lyons and west of Highway 36
- Portions of Indian Mountain to the west (east flanks and ridgetops)

Visual impacts associated with the project are the mining and reclamation activities, construction and use of the mine operations center (on the Harroun dairy farm), limestone hauling and haul roads, and the proposed bridge over the St. Vrain Creek. The project life is approximately 30 years, assuming about 2 years of preconstruction, 25 years of mining and 3 years to complete reclamation at the site. Over this time approximately 729 acres will be distributed. Disturbance at any given time however, will average approximately 100 acres or less.



Mitigation of visual impacts includes:

- Less than 100 acres of land will be disturbed at any given time, representing only 4% of Southdown's total property ownership.
- The natural topographic setting of the valley, surrounded on three sides by topographic highs and screened from Highway 66 by four irrigation ditches and associated heavy vegetation.
- Southdown's property ownership buffers the project area and provides for significant setbacks.
- The reclamation plan includes construction of landforms that will screen the operation from various viewpoints.
- The reclamation plan requires concurrent revegetation as mining progresses.
- Southdown's existing quarries in Larimer County and south of the cement plant will be largely shut-down and reclaimed.
- The color of buildings and structures, as well as architectural materials, will be designed to blend with the surrounding landscape.
- Landscaped berms will be constructed along portions of the haul road near Highway 66.
- The post-mining appearance of the valley will enhance visual diversity due to greatly increased topographic and vegetative diversity as well as newly created water bodies.
- Strip plowing will be retired (this also results in a decrease in fugitive dust emissions).

2.0 EXISTING CONDITIONS/VISIBILITY OF DOWE FLATS PROJECT

A photographic analysis was performed to display the visibility of Dowe Flats from a variety of key viewpoints in the vicinity. Mr. Mike Figgs took the photographs in the spring and summer of 1993 from selected locations both on- and off-site. Table 1 summarizes the photographic points (many of which include panoramic views) and Appendix A presents the photographs with explanatory subtitles. Six cross-sections were also developed to display line of sight and topographic features from the six key viewpoints selected. These cross-sections are presented in Appendix B and each cross-section location is shown for both pre-mining and post-



Along County Road 47, north of the mine property, there is also visibility of the operation. Photograph Points 11, 12, 13 and 21 show views from the county road south towards Dowe Flats. Cross Section D-D' (pre-mining) shows line of sight from the county road north of Dowe Flats south into Dowe Flats. There is no topographic feature blocking the direct line of sight. Cross Section D-D' (post-reclamation) shows some screening of views to the south are provided by reclaimed topography late in the life of the mine. Cross Section E-E' (pre-mining) shows unobstructed line of sight from the area of the Rabbit Mountain Open Space parking lot into Dowe Flats. The screening effect of the reclaimed topography, based upon the current reclamation phasing schedule, will take place late in the life of the mine.

2.3 Indian Gap Subdivision

Photograph Points 7, 8 and 9 show views from the mining area in Dowe Flats to the north-northeast (Dowe Pass, Indian Gap Subdivision area). It is estimated that about eight residences will have views of the mining operation, some of which include the whole valley. These views can not be screened because the residences are at a significantly higher elevation than the valley. The proposed mitigation for this visibility is limiting the acreage of disturbance to 100 acres or less and revegetation concurrent with mining. Some mitigation is realized by the distance of the view, which will be over 2 miles in the early stages of mining. There are approximately another 34 residences in the Dowe Pass-Indian Gap area with no visibility of the mining operation.

2.4 Rabbit Mountain Open Space

Photographs 16 through 21 show views from selected locations on Rabbit Mountain Open Space towards Dowe Flats. Cross Section F-F' (pre-mining) and F-F' (post-mining) show the topographically unobstructed line-of-sight due to the elevation difference. Figure 2 shows areas of Rabbit Mountain Open Space with no visibility of Dowe Flats.

Topographic screening is not possible due to elevation differences, except in the area of the parking lot. Distances of mining and reclamation from the photograph points vary between about 2,000 ft to about 11,000 ft. Limiting the acreage of disturbance and concurrent revegetation are mitigating factors. The post-reclamation visual diversity of Dowe Flats will be greatly enhanced from the standpoint of views from Rabbit Mountain Open Space.

2.5 Highway 36

Portions of Highway 36 and some adjacent residences (Photograph Point 10) have distant (3 miles) views of Dowe Flats. The motorist's view of Dowe Flats is very limited in time (less than 70 seconds). Also present are views of the existing cement plant and adjacent quarries.

3.0 MITIGATION AND ESTHETIC IMPROVEMENT

An integral part of the operation throughout the life of the mine will be concurrent reclamation.



Many of the negative impacts to view corridors can be mitigated with berms and landscaping used as natural screening during reclamation. The berms, landscaping, and ponds created through reclamation will serve to create additional features in the landscape. These will be visible from the higher elevations of Rabbit Mountain Open Space hiking trails. The quarry, limited in size, will become less evident as the number of topographic and vegetation features placed during reclamation increases.

3.1 Landscape Screening

The reclaimed landscape outside the active mine pits is designed to screen mine operations from foreground views for approximately one half mile to the east, west and north, and will screen views to the south into the distant background (beyond one half mile) due to the flat relief in this direction. Screening is provided for:

- Relocated County Road 47
- Colorado Highway 66, including residences in this area.
- The parking lot and adjacent low lying areas of the Rabbit Mountain Open Space.

3.2 Buffer and Setback

Through acquiring numerous properties in the Dowe Flats area since 1984, the applicant has been able to provide for extensive buffer and setback from mine operations. The 313-acre mine boundary, developed over the 25-year operation, is centrally located within the 1,911-acre mine and reclamation permit boundary and within Southdown's total 2,600-acre holdings in the vicinity. Setbacks from one quarter mile up to three quarters of a mile are provided, and average in excess of one half mile. Minimum one quarter mile setbacks occur at the north and south ends of the Hi-Cal pit. These locations will receive first priority for development of landscaped features adjacent to the mine.

3.3 Positive Visual Impacts

The Dowe Flats project, as proposed, will result in the following positive visual impacts.

- Enhanced visual resources of the Dowe Flats valley. The opportunity to form a more diverse landscape is made possible. Viable new water features and attractive slopes will result from mining and subsequent reclamation. Vegetation placed during reclamation will blend with currently existing species in and around the valley.
- Retirement and reclamation of the majority of the existing quarry operations south of the Southwestern Portland Cement Plant.



- Retirement and reclamation of Southdown's quarry located in Larimer County.

3.4 Additional Visual Impact Mitigation

The Dowe Flats project also provides for additional mitigation of potential negative visual impacts.

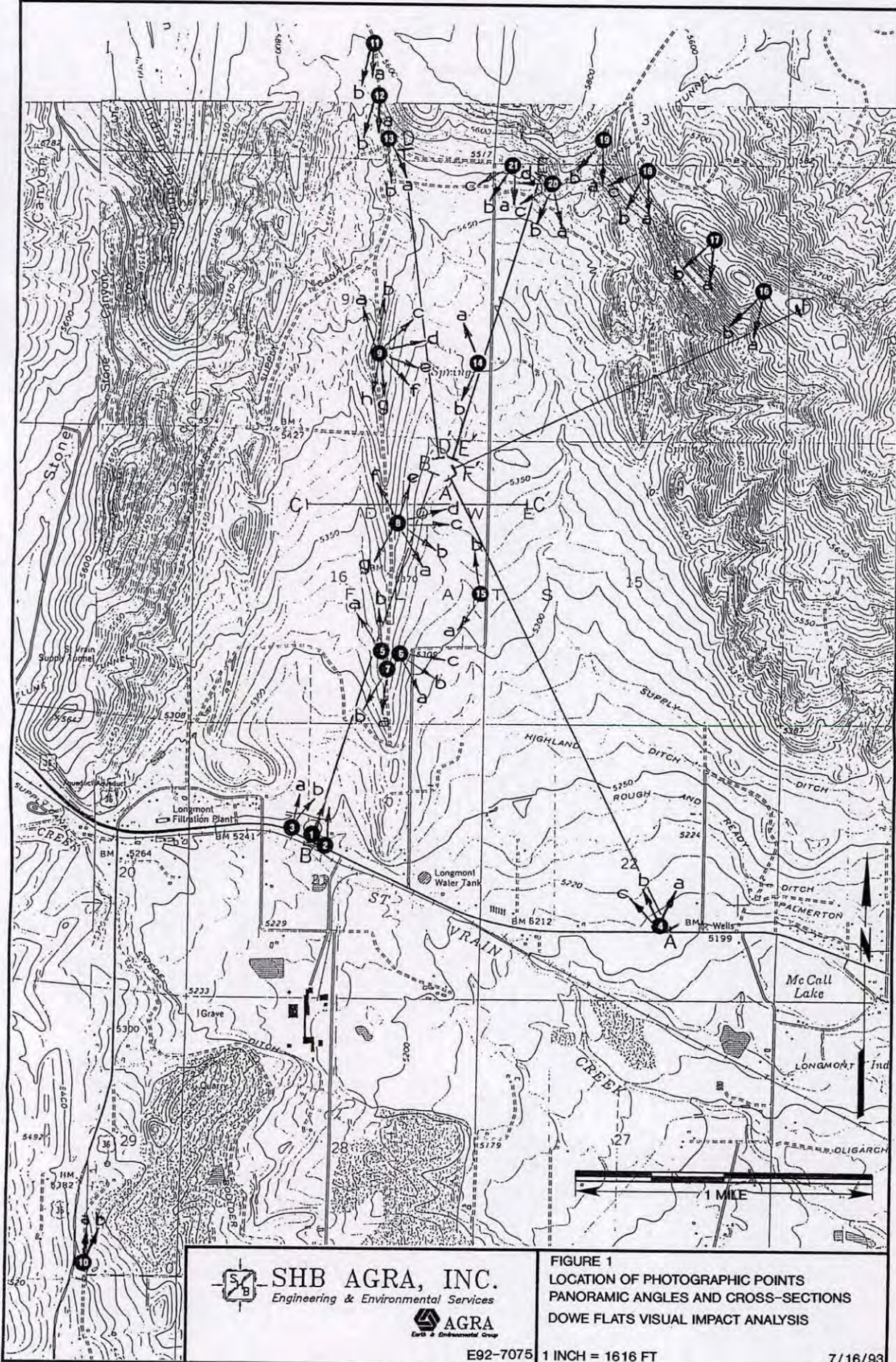
- The reclamation of the Dowe Flats mine is designed and bonded in excess of minimum state requirements.
- The proposed haul road is the least visually intrusive alternative for bringing the mine product to the plant. A conveyor to transport mined material to the plant from the mine area is another alternative. The conveyor would be considerably more visible to more viewers and at a greater distance than a haul road. It would also obstruct views and be difficult to blend with the surrounding natural environment.
- The mine operations center will be located at a currently developed site which is well screened by large trees (see Photograph Point 6B). New structure height will remain consistent with present structures. There will be no change in visual impact to adjoining properties.

TABLE 1: SUMMARY OF PHOTOGRAPHIC POINTS

PHOTO POINT NUMBER	DESCRIPTION OF PHOTO POINT	VIEW DIRECTION
1	Colorado Highway 66 west of County Rd. 47	north
2	"	north
3a	"	north
3b	"	northeast
4a	Colorado Highway 66 east of County Rd. 47	northeast
4b	"	north
4c	"	northwest
	Existing to remain (N.53rd St.) intersection with Colorado Highway 66	north
	Existing to remain (N. 53rd St.) intersection with relocated County Road 47	north
	East toward west flank of Limestone Ridge	
5a	South end of mining on Limestone Ridge	northwest
5b	"	north
6a	"	south, southeast
6b	"	southeast
6c	"	east
7a	"	south
7b	"	southwest
8a	Mid point of mining on Limestone Ridge	south, southeast
8b	"	southeast
8c	"	east
8d	"	northeast
8e	"	north, northeast
8f	"	northwest
8g	"	southwest
9a	North end of mining on Limestone Ridge	north, northwest
9b	"	north
9c	"	north, northeast
9d	"	northeast
9e	"	east
9f	"	southeast

TABLE 1: SUMMARY OF PHOTOGRAPHIC POINTS (cont')

PHOTO POINT NUMBER	DESCRIPTION OF PHOTO POINT	VIEW DIRECTION
9g	"	south
9h	"	south, southwest
10a	Highway 36 1½ miles south of CO Highway 66	north, northeast
10b	"	northeast
11a	Indian Gap junction	south
11b	"	south, southwest
12a	Syntex junction	south
12b	"	southwest
13a	South of Syntex junction	southeast
13b	"	south
14a	North on existing County Road 47 (North 55th St.)	northwest
14b	"	southwest
15a	South on existing County Road 47 (North 55th St.)	southwest
15b	"	northwest
16a	Eagle Wind Trail	south, southwest
16b	"	southwest
17a	"	southwest
17b	"	west
18a	Indian Mesa Trail	south
18b	"	southwest
18c	"	west, southwest
19a	Main Road	south
19b	"	southwest
20a	Trail to parking lot	south
20b	"	south, southwest
20c	"	southwest
20d	"	west
21a	Parking lot	south
21b	"	south, southwest
21c	"	southwest

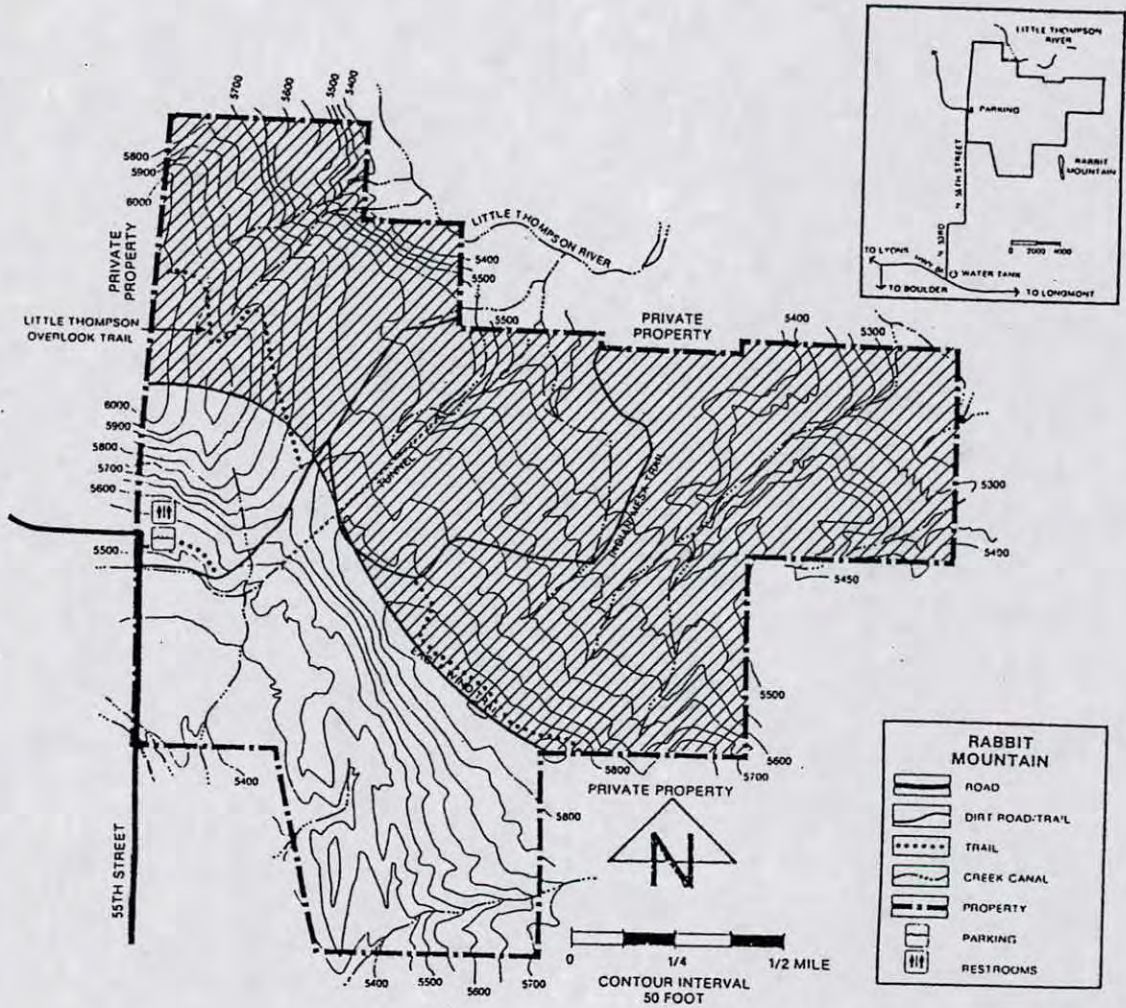


 **SHB AGRA, INC.**
Engineering & Environmental Services
 **AGRA**
Earth & Environmental Group

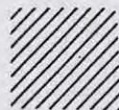
FIGURE 1
LOCATION OF PHOTOGRAPHIC POINTS
PANORAMIC ANGLES AND CROSS-SECTIONS
DOWE FLATS VISUAL IMPACT ANALYSIS

E92-7075 1 INCH = 1616 FT

7/16/93



AREAS WITH NO VISIBILITY OF DOWE FLATS



SHB AGRA, INC.
Engineering & Environmental Services



FIGURE 2

AREAS OF RABBIT MOUNTAIN OPEN SPACE
WITH NO VISIBILITY OF DOWE FLATS



APPENDIX A

Photographs



Photo Point No. 1: Looking northeast towards Dowe Flats from Highway 66 west of County Road 49. Almost none of the mining operation will be visible (mine site is east of Limestone Ridge which is behind row of trees in background).



Photo Point No. 2: Looking north towards Dowe Flats from Highway 66 west of County Road 49. This view includes land proposed for the haul route. Almost none of the mining operation will be visible (mine site is east of Limestone Ridge which is behind row of trees in background).



Photo Point No. 3A:

Photo Point No. 3B:

Looking north-northeast towards Dowe Flats from Highway 66 west of County Road 49. Almost none of the mining operation will be visible (mine site is east of Limestone Ridge which is behind row of trees).



Photo Point No. 4C: **Photo Point No. 4B:** **Photo Point No. 4A:**

Panorama looking northwest to northeast towards Dove Flats from Highway 66 east of County Road 47. Mine site is behind row of trees in background. There will be some limited, although distant (approximately 1 mile), visibility of the mining operation.



Photo Point No. 5A:

Photo Point No. 5B:

Looking north-northwest along Limestone Ridge. Indian Mountain to the left, Dowe Pass at right center. This viewpoint is at the southernmost end of mining on Limestone Ridge, approximately 2 miles from Dowe Pass.



Photo Point No. 6C: **Photo Point No. 6B:** **Photo Point No. 6A:**
Panorama looking east-southeast from the southern end of Limestone Ridge. Harroun dairy property in center of photo. Highway 66 not visible.



Photo Point No. 7B:

Photo Point No. 7A:

Looking south-southwest from southern end of Limestone Ridge. Cement plant in center-background. Some homes on Front Range south of Lyons visible on right side of photo. Highway 66 not visible, Highway 36, on right side of photo, barely visible.



Photo Point No. 8C:

Photo Point No. 8B:

Photo Point No. 8A:

Photo Point No. 8F:

Photo Point No. 8E:

Photo Point No. 8D:

Panorama looking to the southeast (8A) around to the northwest (8F) from about the center of Limestone Ridge (half way up the valley). Highway 66 is barely visible on either side of barn in center of 8A. Rabbit Mountain in 8B & 8C & 8D. Residence in center of 8E. Dowe Pass right side of 8F, with Dakota Ridge Road visible. Syntex facility also shown on right side of 8F. Two residences visible in upper right of photo; part of Indian Gap subdivision.



Photo Point No. 8G: Looking southwest from center of Limestone Ridge. Short stretch of Highway 36 visible in right center of photo.



Photo Point No. 9G: Photo Point No. 9H:

Panorama looking south-southwest from northern end of Limestone Ridge. Short stretch of Highway 36 visible on left side of 9H.

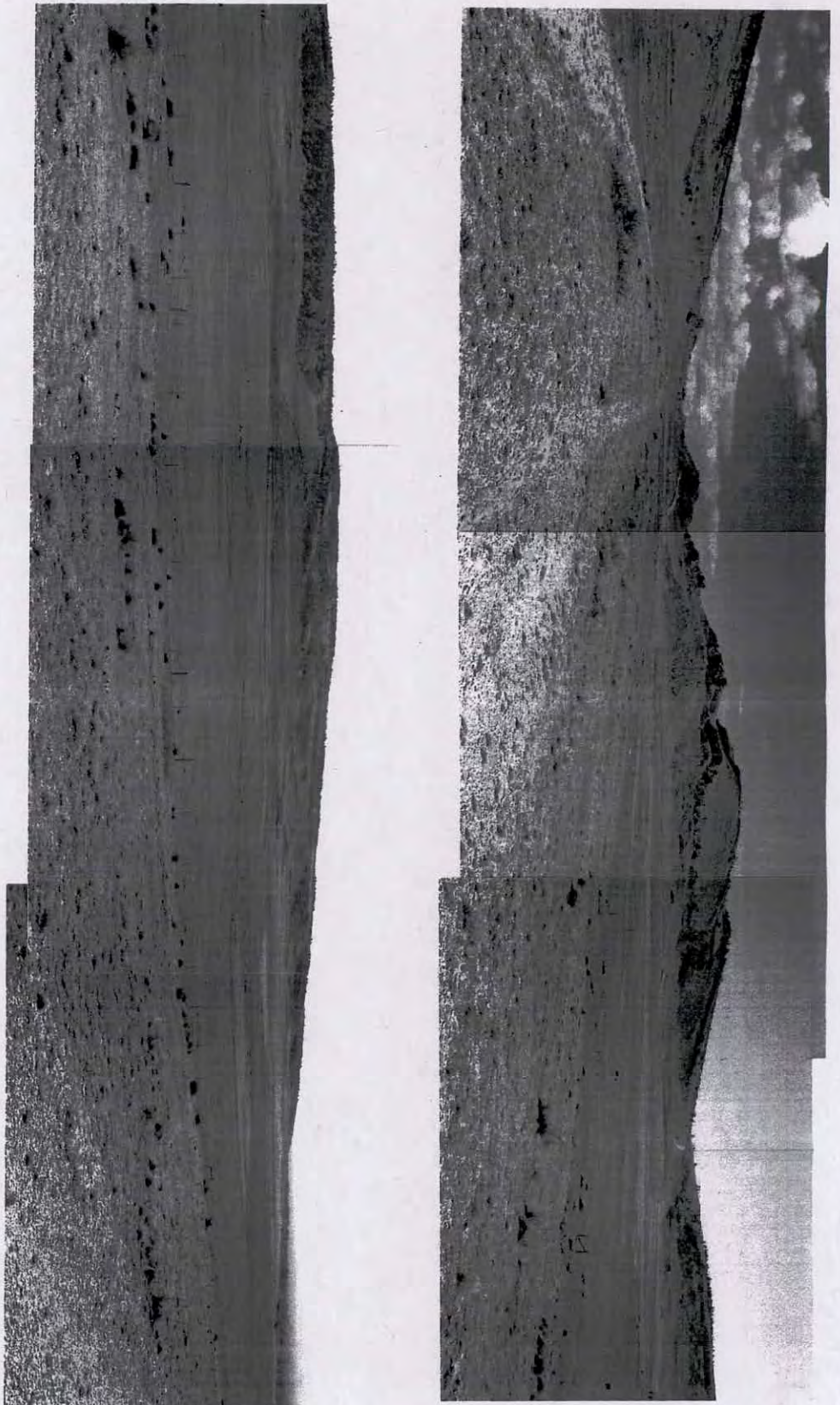


Photo Point No. 9A:

Photo Point No. 9B:

Photo Point No. 9C:

Photo Point No. 9D:

Photo Point No. 9E:

Photo Point No. 9F:

Panorama looking to north (9A) around to southeast (9F) from northern end of Limestone Ridge. Two residences, Dakota Ridge Road, and Syntex facility visible in 9A. Residence visible in 9B. Rabbit Mountain Open Space parking lot and Main Road visible in 9C. Rabbit Mountain and eastern Dove Flats valley in 9D & 9E & 9F.



Photo Point No. 10A:

Photo Point No. 10B:

Panorama looking north-northeast at Dowe Flats from Highway 36 about 3 miles away. Portions of mining operation will be visible in the distance for relatively short travel times (less than 2 minutes), about the same visibility as the current mine operation shown on the right side of photo 10B. This existing mine site will be reclaimed on an accelerated schedule if Dowe Flats is permitted.



Photo Point No. 11A: **Photo Point No. 11B:**

Panorama looking south towards Dowe Flats from Dakota Ridge Road at Moss Rock Drive in Indian Gap Subdivision. Limestone Ridge at left edge of 11A. Syntex facility at lower right.

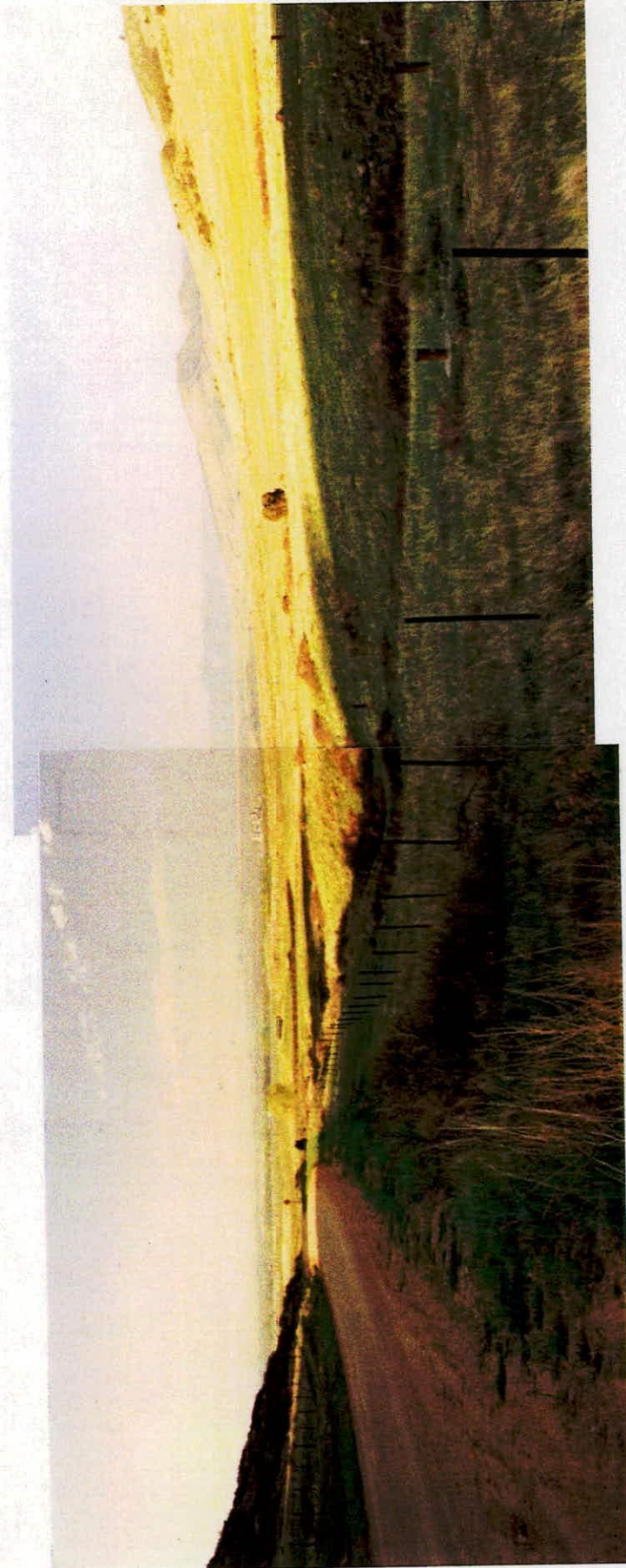


Photo Point No. 12A: **Photo Point No. 12B:**

Panorama looking south towards Dowe Flats from Dakota Ridge Road adjacent to the Syntex facility. Limestone Ridge visible at center of 12A.



Photo Point No. 13A:

Photo Point No. 13B:

Panorama looking southeast from where Dakota Ridge Road turns east coming out of Dowe Pass. Limestone Ridge not visible. Portions of mining operation in east valley will be visible until reclamation landscape features are built during the second half of the mine operation.

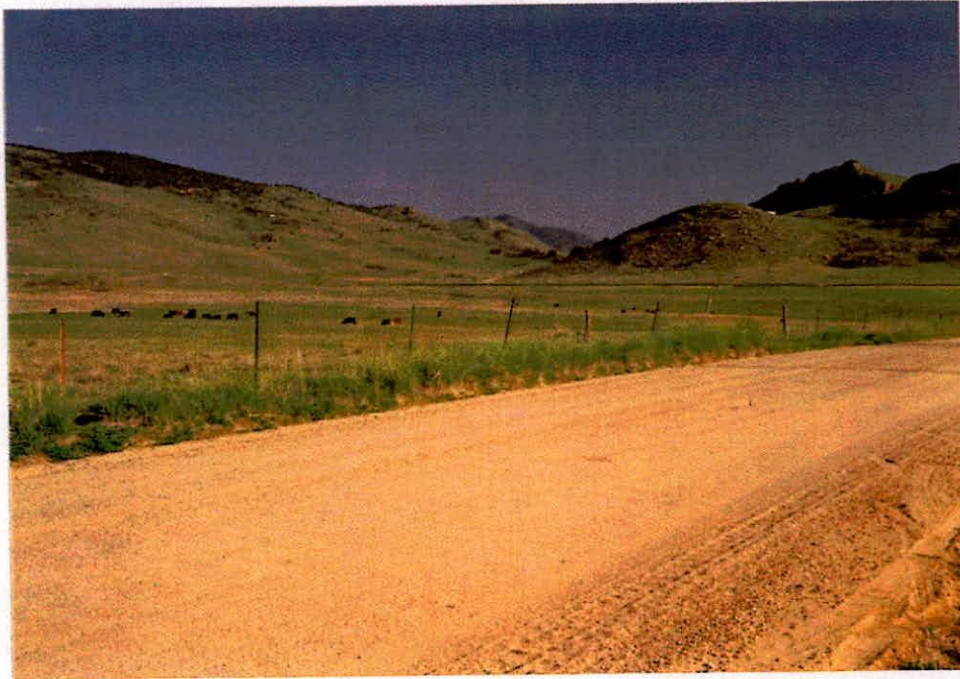


Photo Point No. 14A: Looking northwest from County Road 47 at a point just before it turns to the west. Eight residences in the Indian Gap Subdivision visible.



Photo Point No. 14B: Looking southwest from County Road 47 at northern end of Dowe Flats valley. Some residences on Front Range at left of photo as well as a short stretch of Highway 36 visible.



Photo Point No. 15A: Looking southwest from County Road 47 at a point at the southern end of the proposed mining operation.

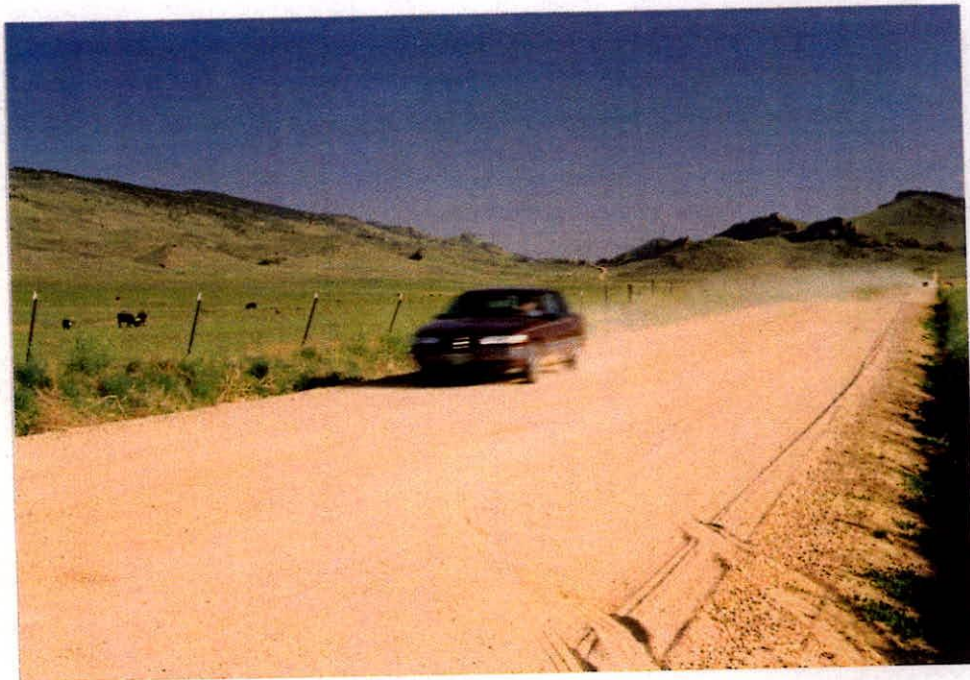
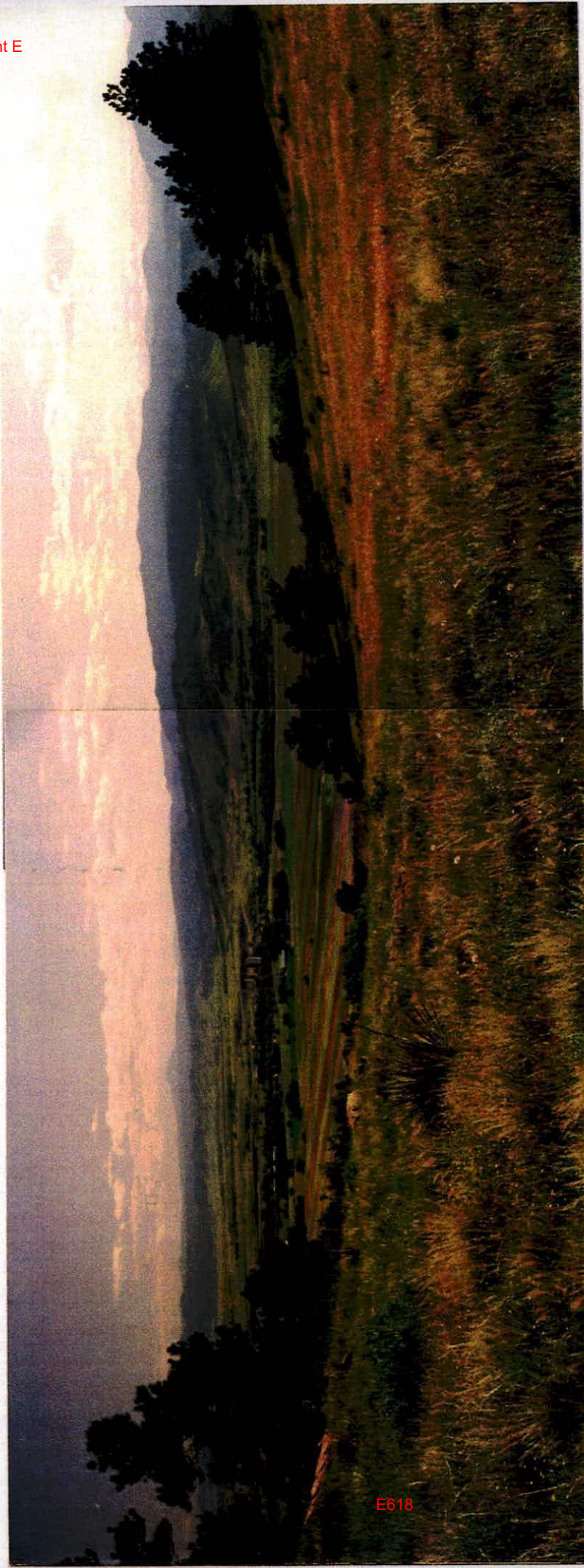


Photo Point No. 15B: Looking northwest from County Road 47 at the southern end of the proposed mining operation.



E618

Photo Point No. 16A: **Photo Point No. 16B:**

Panorama looking southwest from Eagle Wind Trail on Rabbit Mountain Open Space. Portions of the mining operation in the east valley and southern part of Limestone Ridge will be visible. Note existing quarries behind cement plant.



Photo Point No. 17A:

Photo Point No. 17B:

Panorama looking southwest from Eagle Wind Trail on Rabbit Mountain Open Space. Portions of mining operation in Dowe Flats will be visible between the trees.



Photo Point No. 18A: **Photo Point No. 18B:** **Photo Point No. 18C:**
Panorama looking southwest (18A) to west (18C) from Eagle Wind Trail on Rabbit Mountain Open Space. Most of the mining operation will be visible from this view point. Note existing quarries behind cement plant.

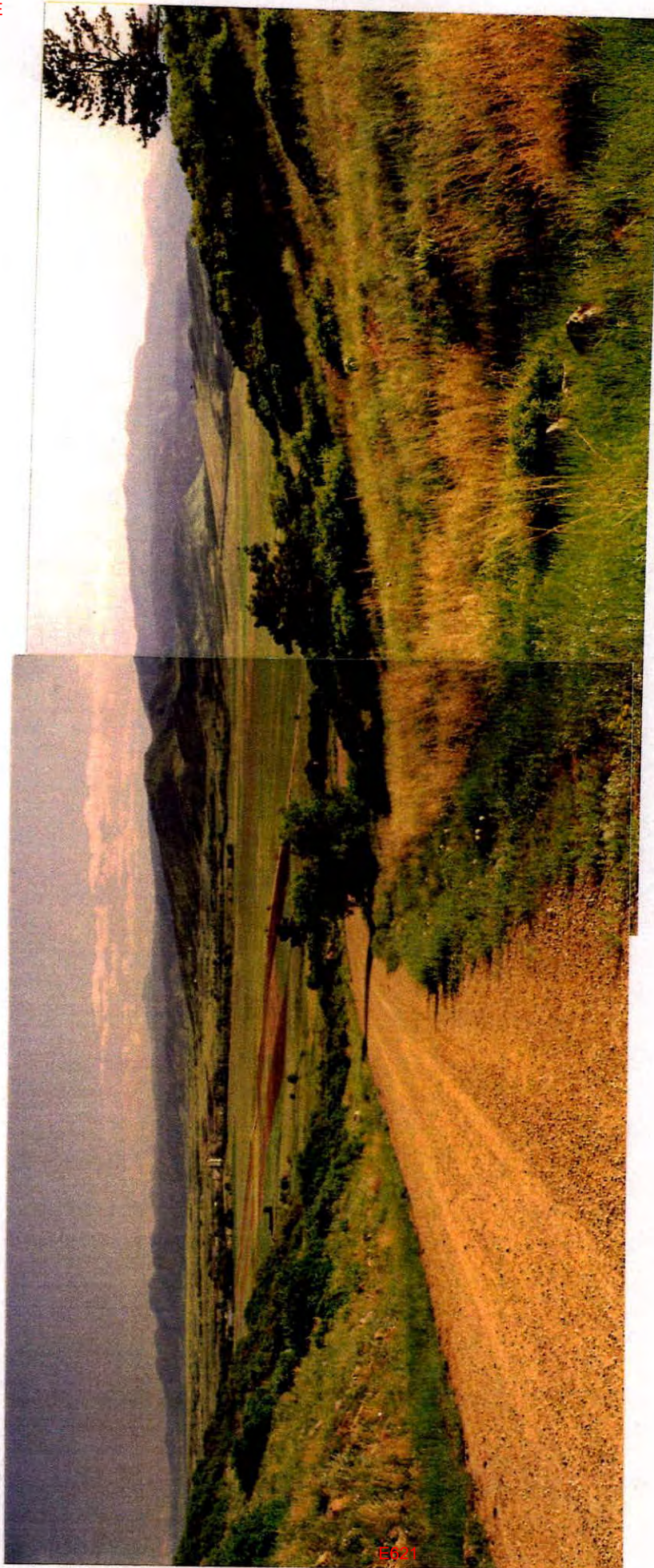


Photo Point No. 19A:

Photo Point No. 19B:

Panorama looking southwest from a point on Main Road on Rabbit Mountain Open Space. Most of the mining operation will be visible from this viewpoint. Note existing quarries behind cement plant.



Photo Point No. 20A:

Photo Point No. 20B:

Photo Point No. 20C:

Photo Point No. 20D:

Panorama looking to the south (20A) around to the west (20D) from a point on Main Road on Rabbit Mountain Open Space. Note existing mine operation on the left side of photo 20B. Most Space parking lot visible on right of photo 20D.

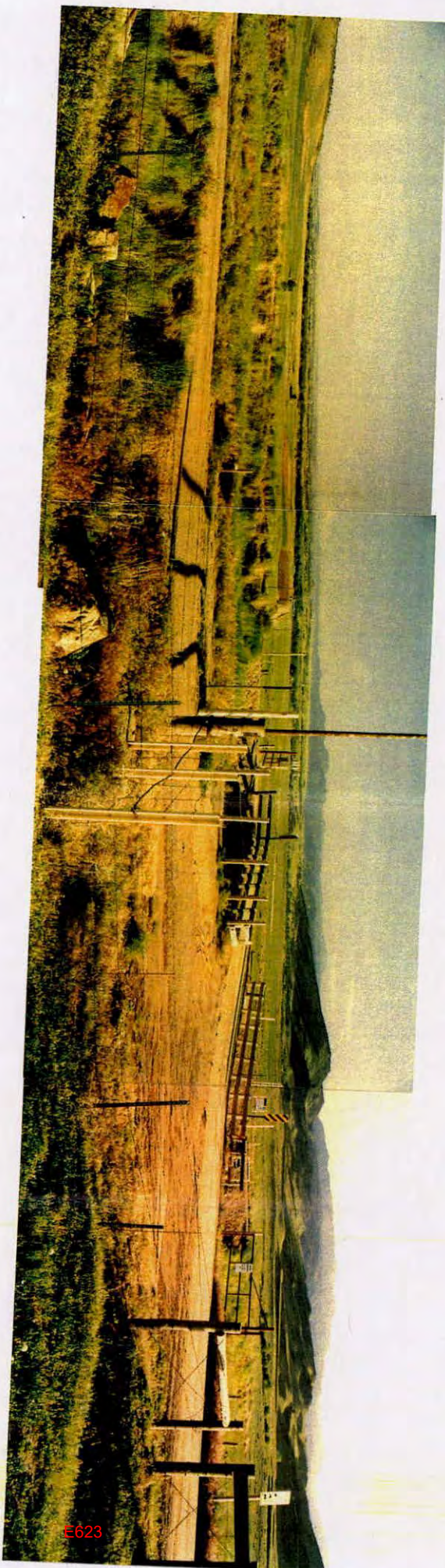


Photo Point No. 21A:

Photo Point No. 21B:

Photo Point No. 21C:

Panorama looking south-southwest from entrance to Rabbit Mountain Open Space parking lot off County Road 47. Most of the mining operation will be visible from this viewpoint. Note the existing mine operation behind the cement plant shown in the center of photo 21B.

DOWE FLATS

UPDATED WETLAND INVENTORY REPORT

AQUATIC AND WETLAND CONSULTANTS, INC.



DOWE FLATS

UPDATED WETLAND INVENTORY REPORT

Prepared For:
Southwestern Portland Cement Company
P.O. Box 529
Lyons, Colorado 80540

Prepared By:
Aquatic and Wetland Consultants, Inc.
Siena Square
2060 Broadway, Suite 255
Boulder, Colorado 80302

12 January 1994

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Figure 1: Boundaries of study area.

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Table 1: Summary of wetland acreages by location.

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Appendix I: Final wetland map at scale 1"=200' (two sheets).

1.0 INTRODUCTION

This report follows a request by Mr. John Lohr, Plant Manager of Southwestern Portland Cement Company, to review and update the wetland inventory for the proposed Dowe Flats mine project. The original wetland inventory was completed in October 1987 and documented in a report titled "Wetland Assessment: Dowe Flats and Foothills Reservoir Properties". A number of additions to the inventory were initiated and completed during the period of 1990 through 1993 to reflect modifications to the mine area boundaries and changes in the wetland boundary configurations. This report intends to update and document the status of the wetland inventory of the entire project area as of January 1994.

2.0 SITE DESCRIPTION

The subject property is located approximately 2.5 miles east of the Town of Lyons north of Colorado State Highway 66. Limits of the wetland study area correspond to the proposed mine permit area boundary plus the linkage of the haul road to the existing Cement Plant site south of Highway 66 (Figure 1). The study area encompass approximately three square miles.

The majority of the site is currently being used for cattle grazing and other agricultural purposes including wheat, corn and alfalfa production. Several small intermittent drainages occur throughout the area and generally drain from north to south. The St. Vrain Supply Canal, a large water delivery conduit, traverses around the project area along the western and northern boundaries. Four large irrigation canals cross the area from west to east near the southern project boundary. St. Vrain Creek crosses through the southernmost extent of the project just north of the Cement Plant. Rabbit Mountain, a 1,119 acre Boulder County open space parcel, abuts the northeastern corner of the project area.

3.0 STUDY PURPOSE

The purpose of conducting and updating the wetland inventory was to identify the current location and extent of existing wetland resources. Since the 1977 enactment of the federal Clean Water Act, Section 404 permit program, the protection of wetlands and waters has become an issue of major national concern. The Section 404 permitting process regulates the discharge of dredged or fill material into all waters of the United States, including streams, lakes and wetlands. The program is jointly administered and enforced by the U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (EPA). The placement of fill in aquatic ecosystems constitutes a direct environmental impact and must be permitted in advance by the Corps.

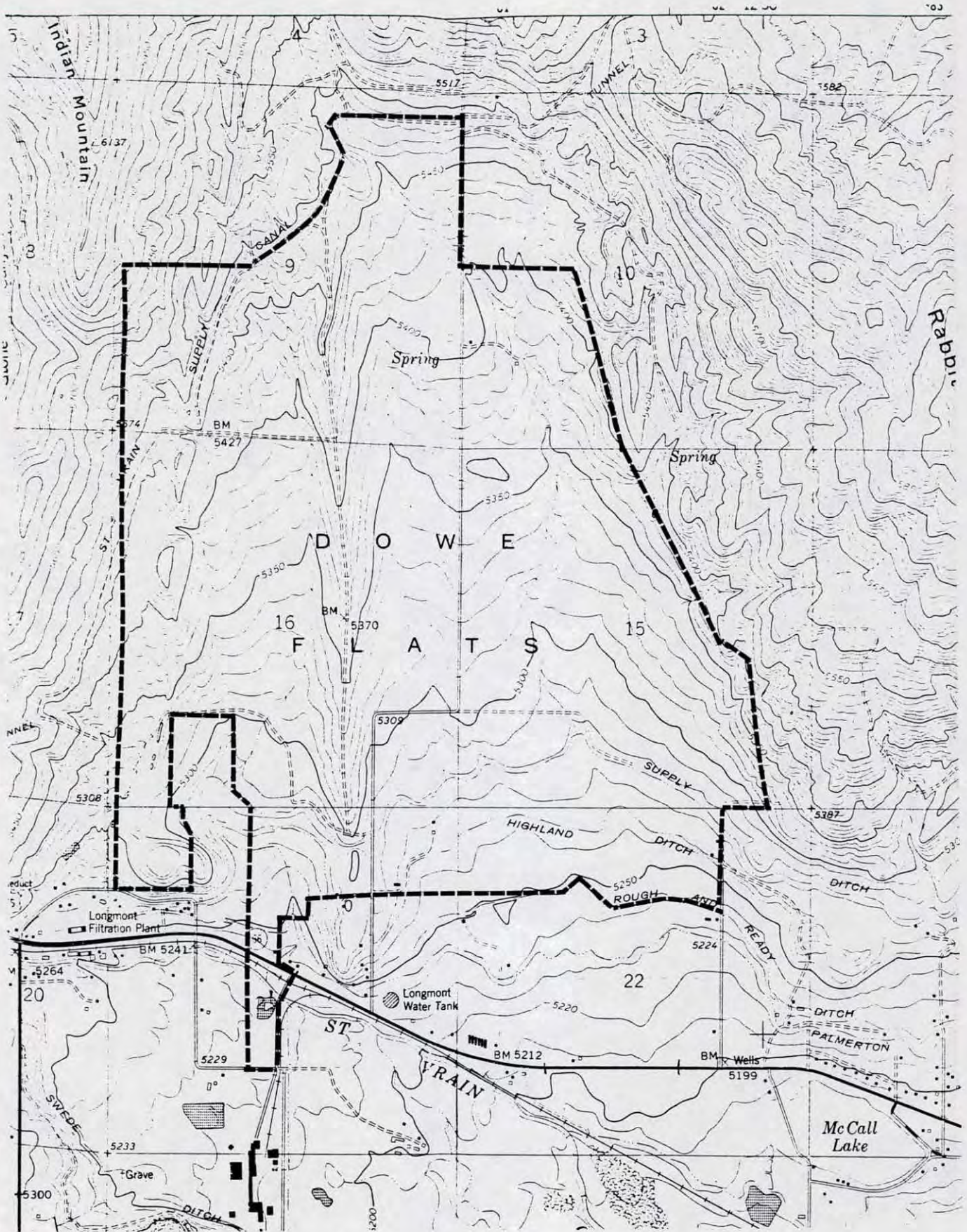


Figure 1: Boundaries of study area (illustrated in dashed line).

Knowledge of the locations of existing wetlands and their regulatory status will: 1) alert mine engineers and planners to specific areas where mine development should be avoided and/or minimized, 2) provide information that would be required for the submittal of a Section 404 permit application if wetlands are to be modified by mine development, and 3) supplement other environmental data collected for the site.

4.0 METHODS

4.1 In-House Data Gathering

Topographic mapping was produced at a scale of 1"=200' for the entire project area and served as the base upon which field identified wetlands were recorded. An aerial overflight was performed on October 23, 1993, yielding a color aerial photograph enlarged to a scale of 1"=500'. This aerial was used in the office to verify and confirm the field collected data.

4.2 Field Identification

The wetland definition that guided this study is published in the Federal Register as part of the Clean Water Act of 1977 (33 CFR Section 323.2), defining wetlands as:

"..those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Methods described in the Corps of Engineers Wetland Delineation Manual (1987) were used to delineate wetland boundaries. This method requires the presence of positive wetland characteristics from each of the three parameters of vegetation, soils and hydrology.

Hydrophytic vegetation, hydric soils, and wetland hydrologic data collected on-site was used to differentiate between wetland and non-wetland areas. For the purpose of this study, vegetation was identified according to Weber (1990) and soil color data was obtained from Munsell (1990). Wetland community descriptions are found in Cowardin et al. (1979).

Areas determined to be wetlands were mapped in the field using prominent landmarks and a measuring wheel, and later confirmed from the October 1993 color aerial photograph.

4.3 Map Production

Field delineated wetlands were illustrated and recorded on the 1"=200' scale topographic maps (Appendix I - 2 sheets). Wetland surface areas were planimetered directly from the maps to determine their size.

4.4 Corps of Engineer Field Verification

Mr. Terry McKee, Environmental Specialist with the U.S. Army Corps of Engineers, visited the site on November 10, 1993, to review the updated wetland boundaries. All of his field observations and revisions have been incorporated into the set of final maps contained in Appendix I. A set of the final maps have been forwarded to the Corps' office with a request for a final letter of concurrence. Upon issuance of the Corps' letter, the inventory will be valid for a period of three years.

5.0 RESULTS

5.1 Wetland Acreage

A total of 70.18 acres of wetlands were inventoried within the limits of the project area (Table 1). A total of 34.06 acres occur in the east valley (east of Limestone Ridge), 22.25 in the west valley (west of Limestone Ridge), 10.05 occur along and between the four irrigation ditches in the southern portion of the project, and 3.82 occur south of Colorado State Highway 66 and north of the Cement Plant.

5.2 Wetland Description

5.2.1 East Valley

The majority of the wetlands found within the east valley are contained within two drainages which flow intermittently from north to south. Wetlands associated with the easternmost drainage originate downslope of the St.Vrain Supply Canal and cross under County Road 47. Another branch of the drainage continues to the north into the Rabbit Mountain open space area. A number of small impoundments occur along the length of the drainage, presumably to encourage water storage for agricultural use.

The second drainage flows west of and parallel to the first. Wetlands associated with the drainage also originate downslope of the St. Vrain Supply Canal. Contribution

Table 1: Summary of Wetland Acreages by Location

LOCATION/NUMBER	SIZE (in acres)
West Valley	
No. 5	0.22
No. 6	2.09
No. 7	0.33
No. 8	3.69
No. 14	0.48
No. 15	0.38
No. 16	0.15
No. 17	6.63
No. 18	3.66
No. 20	1.20
No. 21	0.31
No. 22	1.20
No. 23	1.13
No. 24	0.15
No. 32	0.40
No. 33	0.23
Subtotal:	22.25
East Valley	
No. 1	3.83
No. 2	0.22
No. 3	15.63
No. 4	0.39
No. 9	5.99
No. 10	1.99
No. 11	0.63
No. 12	0.63
No. 13	4.69
No. 19	0.06
Subtotal:	34.06
Irrigation Ditches	
No. 25	0.53
No. 26	2.88
No. 27	0.04
No. 28	0.04
No. 29	2.00
No. 30	1.34
No. 31	3.22
Subtotal:	10.05

(continued) Table 1: Summary of Wetland Acreages by Location

<u>S. of Hwy. 66</u>	<u>S. of Hwy. 66</u>
No. 34	0.29
No. 35	0.56
No. 36	0.19
No. 37	0.13
No. 38	0.09
No. 39	2.56
Subtotal:	3.82
<hr/>	
Grand Total:	70.18

of wetland hydrologic support from the canal has not been determined, although much of the wetland area is not visible or is reduced in size based on 1949 black and white photography taken prior to canal construction.

Both drainages have been historically modified for irrigation conveyance and are currently maintained for that purpose. Lateral ditches connect the drainages and divert surface water into adjacent fields.

Cattail (*Typha spp.*) vegetation occurs in the impounded areas along with bulrush (*Schoenoplectus lacustris*) and other obligate wetland species. Wetland forbs and grasses (*Schoenoplectus pungens*, *Carex spp.*, *Juncus spp.*, *Phalaroides arundinaceae*) dominate the remainder of the drainageway. An occasional peach-leaved willow (*Salix amygdaloides*) and scattered sandbar willow (*Salix exigua*) occur throughout, but are more abundant in the upper portions of the drainageways.

5.2.2 West Valley

Several minor drainageways and swales are located in the west valley. These wetlands either contain an intermittent surface drainage or are supported by subsurface groundwater. Each arises in close proximity to the St. Vrain Supply Canal, suggesting some level of hydrologic support from the canal. Historic existence of these wetlands prior to canal construction is unclear, although many of the wet areas are not visible or are reduced in size based on the 1949 black and white photography. Wetland boundaries in the west valley may be considered dynamic in nature due to the apparent hydrologic influence of the St. Vrain Supply Canal.

Evidence of irrigation modification in the form of small impoundments and lateral ditches is apparent in many of the drainages and swales.

The vegetative composition of the wetlands in the west valley is similar to that described for the east valley.

5.2.3 Irrigation Ditches

Seven isolated wetlands areas are found amongst the four irrigation ditches which flow from west to east across the southern portion of the project. All are grazed quite heavily and exhibit sedge (*Carex spp.*) and three-square (*Schoenoplectus pungens*) as wetland vegetative indicators. The riparian vegetation of cottonwoods (*Populus spp.*) and willows (*Salix spp.*) found immediately adjacent and within the ditch banks does not qualify as jurisdictional wetland.

5.2.4 Wetlands South of Highway 66

Immediately south of the highway in the borrow ditch and in the borrow ditch of the railroad, cattail wetlands are found in long, narrow strips. No wetlands were found in the riparian gallery forest of the St. Vrain River, except within the active channel area where gravel bars have temporarily revegetated with sandbar willow. A few remnant floodplain wetlands dominated by the wetland forb and grass species identified earlier are found immediately north of the plant in an old oxbow feature, and just north of the gravel pit ponds.

5.3 Wetland Classification

Wetlands can be classified for purposes of nationwide inventory, evaluation and management using the U.S. Fish and Wildlife Service (USFWS) classification system (Cowardin et al., 1979). The structure of classification is hierarchical, progressing from systems and subsystems at the general level, through more specific levels of classes, subclasses, and dominance types.

Wetlands within the survey area can be classified within the palustrine wetland system. The palustrine system describes wetlands which are dominated by trees, shrubs, emergent plants, and emergent mosses or lichens. These wetlands can further be categorized within the emergent wetland class. Emergent wetlands include areas dominated by grasses and forbs.

Classification of the project area wetlands can be outlined as follows:

SYSTEM:	Palustrine
SUBSYSTEM:	None
CLASS:	emergent wetland
SUBCLASS:	persistent
DOMINANCE TYPES:	<i>Carex spp.</i> , <i>Juncus spp.</i> , <i>Typha spp.</i> , <i>Schoenoplectus pungens</i> , <i>Phalaroides arundinaceae</i>
WATER REGIME:	seasonally saturated
WATER CHEMISTRY:	fresh
SOIL:	mineral

6.0 DISCUSSION

6.1 Federal Regulations

The Corps will assume regulatory jurisdiction over all areas preliminarily delineated by AWC as wetland. In addition, the St. Vrain River will be regulated as a water of the U.S. The Corps will not extend jurisdiction to the irrigation ditches or the St. Vrain Supply Canal.

A Section 404 permit will be required to place fill in regulated areas.

6.2 Permitting

Under Section 404(b), Congress empowered the Secretary of the U.S. Army, acting through the Corps of Engineers, to issue permits based on the application of guidelines developed by the EPA administrator in conjunction with the Corps. The EPA, under Section 404(c) is vested with veto power for discharges having "an unacceptably adverse effect on municipal water supplies, shellfish beds and fishing areas...wildlife or recreation areas." In addition, the EPA has enforcement authority under Section 309 for discharges without a permit, and often comments on proposed Corps permits, especially the interpretation and application of the Section 404(b)(1) guidelines.

When a development activity involves the discharge of dredged or fill material covered under Section 404, the Corps is required to ensure compliance with the EPA Section 404(b)(1) guidelines. The guidelines are based on the assumption that wetland sites should not be developed if alternative sites are available. This assumption applies even more directly if proposed development activities are not water dependent (i.e., do not require placement in an aquatic site in order to fulfill the basic project purpose).

6.2.1 Practicable Alternatives

The "practicable alternatives" section of the 404(b)(1) guidelines assumes that, if a project is non-water dependent, alternative sites that do not involve disturbance of wetland or other aquatic features, are available unless clearly demonstrated otherwise (40 CFR Section 230.10 (a)(3)). To satisfy the "practicable alternatives" test, the applicant must first prove that alternative sites would not be feasible or achieve their projects' basic purposes. The guidelines state that "what is practicable depends on cost, technical and logistic factors" and that an applicant must "consider those alternatives which are reasonable in terms of the overall scope/cost of the proposed project." However, even though an alternative site does not meet all of the desired specifications, does not maximize profit, or is somehow undesirable to the applicant, it may still be deemed feasible or practicable by the EPA.

6.2.2 Avoidance

Once it has been determined that a project is or is not water-dependent, and that no other practicable alternatives exist, permit approval depends on a determination of whether adverse impacts have been avoided to the extent possible. The process of mitigation of environmental impacts must first address the possibility of total avoidance of impacts. If impacts are deemed by the Corps and the EPA to be unavoidable, the issue of minimization of impacts will be considered and the process of development of mitigation alternatives can begin.

6.2.3 Minimization

Once it has been determined that wetlands have been avoided to the maximum extent possible, the Corps will require that wetland impacts be minimized. This means that roads must be situated in the least damaging alignments, mine excavation and stockpile sites must be placed outside of wetlands, and that other construction activities be located in the least damaging locations.

6.2.4 Mitigation

Compensatory mitigation of unavoidable wetland impacts is required to insure no net loss of wetland resources by project implementation. Mitigation can include wetland creation, restoration, or enhancement. Mitigation to impact ratios of 1.5:1 to 2:1 are common. When reviewing mitigation proposals, the Corps first requires consideration of all on-site mitigation possibilities. If it is deemed that on-site options are not available or feasible, off-site compensation will be considered.

6.2.5 Nationwide Permits

The nationwide permitting program contains thirty-seven permits which pre-authorize routine activities occurring in wetlands or waters of the U.S. Minor road crossings of drainages are authorized by nationwide permit #14. Conditions of this permit include: 1) that the crossing be bridged, culverted, or otherwise designed to avoid restriction of expected high flows, 2) that the associated fill does not extend into wetlands beyond 200 feet combined on either side of the annual high water elevation, and 3) that no more than 1/3 of a surface acre of wetland or water is disturbed by the construction action. Mitigation is suggested for wetland impacts. As with all Section 404 permits, avoidance and minimization must be considered.

A nationwide #14 permit authorization has been issued for the haul road crossing of the St. Vrain River (permit authorization No. 199380521 dated 9 August 1993).

Nationwide permit authorizations are valid for up to five years or until they are modified or revoked by Congress (reviews occur every five years).

6.2.6 Individual Permits

If the project cannot be developed using nationwide permits, then project review will occur through an individual permit application. All individual permit applications are advertised for public comment and are reviewed by federal, state and local agencies. The Corps generally requires that both direct (i.e., wetland filling/excavation) and indirect (i.e., draining, etc.) impacts be disclosed for review. Compensatory mitigation is required to replace all wetlands which are filled.

Individual permits are valid for three to five years.

6.3 Recommendations

Design a mine and reclamation plan which avoids and minimizes wetland impacts to the maximum extent possible. Locate excavation pits, temporary stockpiles and haul roads outside of wetlands wherever practicable. Design reclamation features around and to compliment existing wetlands. Incorporate created wetland habitats into the reclamation plan as possible to increase site diversity and increase wetland resources within the region.

During construction, retain a wetland delineation expert to field stake the limits of wetlands within each discrete area of mining activity. These staked areas should then be reinforced by some mechanism like temporary snowfence to indicate their protection during construction. Phase the staking process concurrent with mining activity.

The location and extent of wetlands may change over the life of the mine project given the dynamic nature of the hydrology with particular reference to the area west of County Road 47. The Corps is willing to field review and reassess any wetland areas that may change substantially during the life of the project.

7.0 LITERATURE CITED

- Corps of Engineers Wetlands Delineation Manual. 1987. Environmental Laboratory, Department of the Army, Waterways Experiment Station, Vicksburg, Mississippi. 100 p.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service. FWS/OBS - 79/31. 107 p.
- Munsell Color. 1990. Munsell Soil Color Charts. Kollmorgen Corporation. Baltimore, MD.
- Weber, W.A. 1990. Colorado flora: eastern slope. Colorado Associated University Press, Boulder, Co. 530 pp.

RESOLUTION 95-239

A RESOLUTION FINDING COMPLIANCE (FIRST-YEAR INTERIM REVIEW) WITH BOULDER COUNTY LAND USE DOCKETS #SU-93-14 ("DOWE FLATS MINING & RECLAMATION PROJECT") AND #V-93-8 ("DOWE FLATS VACATION/RELOCATION OF COUNTY ROAD 47 AND VACATION OF A PORTION OF COUNTY ROAD 49"): A REQUEST FOR A SPECIAL USE PERMIT AND ASSOCIATED SITE SPECIFIC DEVELOPMENT PLAN FOR A LIMESTONE/SHALE OPEN MINING/QUARRYING OPERATION ON 312 ACRES WITHIN A 1911-ACRE PERMIT AREA, AND A REQUEST TO VACATE AND RELOCATE THE EXISTING ALIGNMENT OF COUNTY ROAD 47 AND TO VACATE PORTIONS OF COUNTY ROAD 49, ON PROPERTY LOCATED AT DOWE FLATS, EAST OF THE TOWN OF LYONS, NORTH OF U.S. HIGHWAY 66, WEST OF RABBIT MOUNTAIN, IN SECTIONS 9, 10, 15, 16, 21 & 22, T3N, R70W.

WHEREAS, by Resolution 94-81 of the Board of County Commissioners ("the Board") adopted June 28, 1994, Southdown, Inc., a Louisiana Corporation, through its agent John Lohr ("Applicant"), received approval for a special use permit, with associated site specific development plan (Dockets #SU-93-14/V-93-8 ("the Approval")), to mine limestone and shale on a 312-acre area within a 1911-acre permit area on the property which is generally known as "Dowe Flats" and which is located as described in the caption to this Resolution, above ("the Subject Property"), in the Agricultural Zoning District in unincorporated Boulder County; and

WHEREAS, the Approval required that interim reviews of the mining operation occur (as measured from the date of the Board's adoption of Resolution 94-81) at the end of years one, three, and five, and then occur every five years thereafter; and

WHEREAS, the purpose of the interim review is to review the monitoring/management plans and compliance with the terms, conditions, and commitments of record of the Approval; and

WHEREAS, the first-year interim review period under the Approval ended in the summer of 1995, with a public hearing before the Boulder County Planning Commission ("the Planning Commission") on the Applicant's first-year interim compliance being held on October 18, 1995; and

WHEREAS, the Planning Commission found the Applicant to be in compliance during the first-year review period, subject to imposition of a condition to insure adequate cultural resource monitoring pursuant to Condition #14 of the Approval; and

WHEREAS, on November 21, 1995, the Board a duly noticed public hearing on the Applicant's first-year interim compliance, at which hearing the Board considered the recommendation of the County Land Use Department Planning Staff dated November 21, 1995, with its attachments; the testimony of the County Land Use Department Planning Staff; and the documents and testimony presented by the Applicant; the Applicant's environmental studies consultant; and the President of the Boulder County Audubon Society; and

WHEREAS, based on the Public Hearing, the Board finds that the Applicant is in compliance with the terms, conditions, and commitments of record of the Approval, subject to imposition of the condition stated below to insure adequate compliance with the cultural resource monitoring requirements of Condition #14 of the Approval.

NOW, THEREFORE, BE IT RESOLVED that the Applicant is in compliance with the terms, conditions, and commitments of record of the Approval (Resolution 94-81), based on this first-year interim review, subject to imposition of the following condition on the special use permit to insure compliance with the cultural resource monitoring requirements of Condition #14 of the Approval:

The Applicant shall maintain a catalog recording the cultural resource monitoring operations, which shall be available for view during normal business hours by County staff, the Indian Peaks Chapter of the Colorado State Historical Society, or the State Archaeologist. The catalog should include the dates on which a monitor was present; an associated map of the area covered by the monitor's survey; and documentation of findings including the location of discovery, the graded area which was the source of the findings, and the manner in which the findings were recorded, curated, and reported to the State Archaeologist.

BE IT FURTHER RESOLVED that all of the terms, conditions, and commitments of record of the Approval (Docket #SU-93-14 and Resolution 94-81) remain in full force and effect.

A motion to find the Applicant in compliance with the Approval, based upon the first-year interim review, and subject to the condition stated above to insure adequate cultural resource monitoring under Condition #14 of the Approval, was made by Commissioner Mendez, seconded by Commissioner Danish, and passed by a 3-0 vote of the Board.

ADOPTED this 14th day of December, 1995, nunc pro tunc
the 21st day of November, 1995.

BOARD OF COUNTY COMMISSIONERS
OF BOULDER COUNTY:

Ronald K. Stewart
Ronald K. Stewart, Chair

Jana L. Mendez
Jana L. Mendez, Vice Chair

Paul D. Danish
Paul D. Danish, Commissioner

ATTEST:

Susan M. Ashcraft
Clerk to the Board



RESOLUTION 97-192

A RESOLUTION FINDING COMPLIANCE (THIRD-YEAR INTERIM REVIEW) WITH BOULDER COUNTY LAND USE DOCKETS #SU-93-14 ("DOWE FLATS MINING & RECLAMATION PROJECT") AND #V-93-8 ("DOWE FLATS VACATION/RELOCATION OF COUNTY ROAD 47 AND VACATION OF A PORTION OF COUNTY ROAD 49"): A REQUEST FOR A SPECIAL USE PERMIT AND ASSOCIATED SITE SPECIFIC DEVELOPMENT PLAN FOR A LIMESTONE/SHALE OPEN MINING/QUARRYING OPERATION ON 312 ACRES WITHIN A 1911-ACRE PERMIT AREA, AND A REQUEST TO VACATE AND RELOCATE THE EXISTING ALIGNMENT OF COUNTY ROAD 47 AND TO VACATE PORTIONS OF COUNTY ROAD 49, ON PROPERTY LOCATED AT DOWE FLATS, EAST OF THE TOWN OF LYONS, NORTH OF U.S. HIGHWAY 66, WEST OF RABBIT MOUNTAIN, IN SECTIONS 9, 10, 15, 16, 21 & 22, T3N, R70W.

WHEREAS, by Resolution 94-81 of the Board of County Commissioners ("the Board") adopted June 28, 1994, Southdown, Inc., a Louisiana Corporation, through its agent John Lohr ("Applicant"), received approval for a special use permit, with associated site specific development plan (Dockets #SU-93-14/V-93-8 ("the Approval")), to mine limestone and shale on a 312-acre area within a 1911-acre permit area on the property which is generally known as "Dowe Flats" and which is located as described in the caption to this Resolution, above ("the Subject Property"), in the Agricultural Zoning District in unincorporated Boulder County; and

WHEREAS, the Approval required that interim reviews of the mining operation occur (as measured from the date of the Board's adoption of Resolution 94-81) at the end of years one, three, and five, and then occur every five years thereafter; and

WHEREAS, the purpose of the interim review is to review the monitoring/management plans and compliance with the terms, conditions, and commitments of record of the Approval; and

WHEREAS, the Board approved the first-year interim review by finding the Applicant in compliance with the Approval in the fall of 1995, through Resolution 95-239 adopted at that time; and

WHEREAS, on November 25, 1997, the Board a duly noticed public hearing on the Applicant's third-year interim compliance (the Public Hearing), following an October 15, 1997 public hearing before the County Planning Commission in which the Planning Commission recommended that the Applicant again be found in compliance; and

WHEREAS, at the Public Hearing the Board considered the recommendation of the County Land Use Department Planning Staff dated November 25, 1997, with its attachments; the recommendation of the Planning Commission; the testimony of the County Land Use Department Planning Staff; and the documents and testimony presented by the Applicant, with no members of the public being present to speak to the third-year compliance review; and

WHEREAS, based on the Public Hearing, the Board finds that the Applicant continues to be in compliance with the terms, conditions, and commitments of record of the Approval.

NOW, THEREFORE, BE IT RESOLVED that the Applicant continues to be in compliance with the terms, conditions, and commitments of record of the Approval (Resolution 94-81 and Resolution 95-239), based on this third-year interim review.

BE IT FURTHER RESOLVED that all of the terms, conditions, and commitments of record of the Approval (Docket #SU-93-14, Resolution 94-81, and Resolution 95-239) remain in full force and effect.

A motion to find the Applicant in compliance with the Approval, based upon the third-year interim review, was made by Commissioner Danish, seconded by Commissioner Mendez, and passed by a 3-0 vote of the Board.

ADOPTED this 4th day of December, 1997, nunc pro tunc the 25th day of November, 1997.



BOARD OF COUNTY COMMISSIONERS OF BOULDER COUNTY:

Ronald K. Stewart
Ronald K. Stewart, Chair

Jana L. Mendez
Jana L. Mendez, Vice Chair

Paul D. Danish
Paul D. Danish, Commissioner

ATTEST:

Susan M. Ashcraft
Clerk to the Board

RESOLUTION 2000-72

A RESOLUTION FINDING COMPLIANCE (FIVE-YEAR INTERIM REVIEW) WITH BOULDER COUNTY LAND USE DOCKETS #SU-93-14 ("DOWE FLATS MINING & RECLAMATION PROJECT") AND #V-93-8 ("DOWE FLATS VACATION/RELOCATION OF COUNTY ROAD 47 AND VACATION OF A PORTION OF COUNTY ROAD 49"): A REQUEST FOR A SPECIAL USE PERMIT AND ASSOCIATED SITE SPECIFIC DEVELOPMENT PLAN FOR A LIMESTONE/SHALE OPEN MINING/QUARRYING OPERATION ON 312 ACRES WITHIN A 1911-ACRE PERMIT AREA, AND A REQUEST TO VACATE AND RELOCATE THE EXISTING ALIGNMENT OF COUNTY ROAD 47 AND TO VACATE PORTIONS OF COUNTY ROAD 49, ON PROPERTY LOCATED AT DOWE FLATS, EAST OF THE TOWN OF LYONS, NORTH OF U.S. HIGHWAY 66, WEST OF RABBIT MOUNTAIN, IN SECTIONS 9, 10, 15, 16, 21 & 22, T3N, R70W.

WHEREAS, by Resolution 94-81 of the Board of County Commissioners ("the Board") adopted June 28, 1994, Southdown, Inc., a Louisiana Corporation, through its agent John Lohr ("Applicant"), received approval for a special use permit, with associated site specific development plan (Dockets #SU-93-14/V-93-8 ("the Approval")), to mine limestone and shale on a 312-acre area within a 1911-acre permit area on the property which is generally known as "Dowe Flats" and which is located as described in the caption to this Resolution, above ("the Subject Property"), in the Agricultural Zoning District in unincorporated Boulder County; and

WHEREAS, the Approval required that interim reviews of the mining operation occur (as measured from the date of the Board's adoption of Resolution 94-81) at the end of years one, three, and five, and then occur every five years thereafter; and

WHEREAS, the purpose of the interim review is to review the monitoring/management plans and compliance with the terms, conditions, and commitments of record of the Approval; and

WHEREAS, the Board approved the first-year interim review by finding the Applicant in compliance with the Approval in the fall of 1995, through Resolution 95-239 adopted at that time; and

WHEREAS, the Board approved the third-year interim review by finding the Applicant in compliance with the Approval in the fall of 1997, through Resolution 97-192 adopted at that time (December, 1997); and

WHEREAS, on May 16, 2000, the Board held a duly noticed public hearing on the Applicant's five-year interim compliance review ("the Public Hearing"), following a March 15, 2000 public hearing before the County Planning Commission in which the Planning Commission recommended that the Applicant again be found in compliance; and

WHEREAS, at the Public Hearing the Board considered the recommendation of the County Land Use Department Planning Staff dated May 16, 2000, with its attachments; the recommendation of the Planning Commission; the testimony of the County Land Use Department Planning Staff; and the documents and testimony presented by the Applicant and its environmental consultant, and the Executive Director of St. Vrain Valley Community Watchdogs; and

WHEREAS, based on the Public Hearing, the Board finds that the Applicant continues to be in compliance with the terms, conditions, and commitments of record of the Approval.

NOW, THEREFORE, BE IT RESOLVED that the Applicant continues to be in compliance with the terms, conditions, and commitments of record of the Approval (Docket #SU-93-14, Resolution 94-81, and Resolution 95-239), based on this five-year interim review.

BE IT FURTHER RESOLVED that all of the terms, conditions, and commitments of record of the Approval (Docket #SU-93-14, Resolution 94-81, and Resolution 95-239) remain in full force and effect.

A motion to find the Applicant in compliance with the Approval, based upon the five-year interim review, was made by Commissioner Mendez, seconded by Commissioner Danish, and passed by a 3-0 vote of the Board.

ADOPTED this 20 day of June, 2000, nunc pro tunc the 16th day of May, 2000.



BOARD OF COUNTY COMMISSIONERS OF BOULDER COUNTY:

Ronald K. Stewart
Ronald K. Stewart, Chair

(EXCUSED)
Jana L. Mendez, Vice Chair

Paul D. Danish
Paul D. Danish, Commissioner

ATTEST:

Dorcas M. Ashcraft
Clerk to the Board

RESOLUTION 2006-61

A RESOLUTION FINDING COMPLIANCE (TEN-YEAR INTERIM REVIEW) WITH BOULDER COUNTY LAND USE DOCKET #SU-93-14 ("DOWE FLATS MINING & RECLAMATION PROJECT"): A REQUEST FOR A SPECIAL USE PERMIT AND ASSOCIATED SITE SPECIFIC DEVELOPMENT PLAN FOR A LIMESTONE/SHALE OPEN MINING/QUARRYING OPERATION ON 312 ACRES WITHIN A 1911-ACRE PERMIT AREA, ON PROPERTY LOCATED AT DOWE FLATS, 13301 55TH STREET, EAST OF THE TOWN OF LYONS, NORTH OF U.S. HIGHWAY 66, WEST OF RABBIT MOUNTAIN, IN SECTIONS 9, 10, 15, 16, 21 & 22, T3N, R70W, UNINCORPORATED BOULDER COUNTY

WHEREAS, by Resolution 94-81 of the Board of County Commissioners ("the Board"), adopted June 28, 1994, Southdown, Inc., a Louisiana Corporation ("Applicant") received approval for a special use permit, with associated site specific development plan (Docket #SU-93-14 ("the Approval")), to mine limestone and shale on a 312-acre area within a 1911-acre permit area on the property which is generally known as "Dowe Flats" and which is located as described in the caption to this Resolution, above ("the Subject Property"), in the Agricultural Zoning District in unincorporated Boulder County; and

WHEREAS, the Approval required that interim reviews of the mining operation occur (as measured from the date of the Board's adoption of Resolution 94-81) at the end of years one, three, and five, and then occur every five years thereafter; and

WHEREAS, the purpose of the interim review is to review the monitoring/management plans and compliance with the terms, conditions, and commitments of record of the Approval; and

WHEREAS, the Board approved the first-year interim review by finding the Applicant in compliance with the Approval in the fall of 1995, through Resolution 95-239 adopted on December 14, 1995, which imposed an additional condition to insure compliance with cultural resource monitoring requirements; and

WHEREAS, following the first-year interim review, the Board approved a site plan for a temporary operations center for the mining operation pursuant to Condition #16 of Resolution 94-81, as set forth in Resolution 96-118 adopted by the Board; and

WHEREAS, the Board approved the third-year interim review by finding the Applicant in compliance with the Approval in the fall of 1997, through Resolution 97-192 adopted on December 4, 1997; and

WHEREAS, the Board approved the fifth-year interim review by finding the Applicant in compliance with the Approval in the spring of 2002, through Resolution 2000-72 adopted on June 20, 2000; and

WHEREAS, on April 27, 2006, the Board held a duly noticed public hearing on the Applicant's tenth-year interim compliance review ("the Public Hearing"), following a public hearing held before the County Planning Commission on January 18, 2006, in which the Planning Commission recommended that the Applicant again be found in compliance; and

WHEREAS, at the Public Hearing the Board considered the recommendation of the County Land Use Department Planning Staff dated April 27, 2006, with its attachments; the recommendation of the Planning Commission; the testimony of the County Land Use Department Planning Staff; and the documents and testimony presented by the Applicant and as further reflected on the official record of the Public Hearing; and

WHEREAS, based on the Public Hearing, the Board finds that the Applicant continues to be in compliance with the terms, conditions, and commitments of record of the Approval.

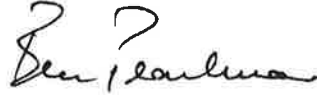
NOW, THEREFORE, BE IT RESOLVED that the Applicant continues to be in compliance with the terms, conditions, and commitments of record of the Approval, based on this tenth-year interim review.

BE IT FURTHER RESOLVED that all of the terms, conditions, and commitments of record of the Approval, as set forth in Docket #SU-93-14, Resolution 94-81, Resolution 95-239, and any other applicable documents and approvals, remain in full force and effect.

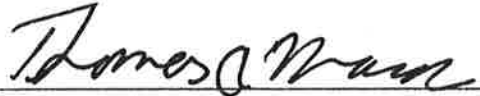
A motion to find the Applicant in compliance with the Approval, based upon the tenth-year interim review, was made by Commissioner Mayer, seconded by Commissioner Toor, and passed by a 3-0 vote of the Board.

ADOPTED this 9th day of May, 2006, nunc pro tunc the
27th day of April, 2006.

BOARD OF COUNTY COMMISSIONERS
OF BOULDER COUNTY:



Ben Pearlman, Chair



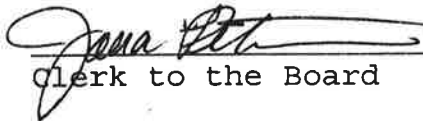
Thomas A. Mayer, Vice Chair



Will Toor, Commissioner



ATTEST:


Clerk to the Board

RESOLUTION 2016-34

A resolution finding compliance with Docket SU-94-14 (Dowe Flats 20 Year Interim Review)

Recitals

A. By Resolution 94-81 of the Board of County Commissioners (the “Board”), adopted June 28, 1994, Southdown, Inc., a Louisiana Corporation (“Applicant”) received approval for a special use permit with associated site specific development plan (Docket SU-93-14 (the “Approval”)) to mine limestone and shale on a 312-acre area within a 1911-acre permit area on the property that is generally known as Dowe Flats and that is located at 13301 55th Street, east of the Town of Lyons, North of U.S. Highway 66, West of Rabbit Mountain, in Sections 9, 10, 15, 16, 21 & 22, T3N, R70W, in the Agricultural zoning district in unincorporated Boulder County (the “Property”).

B. The Approval required that interim reviews of the mining operation occur at the end of years one, three, and five, and then occur at every five years thereafter.

C. The purpose of the interim review is to review the monitoring and management plans and compliance with the terms, conditions, and commitments of record of the Approval.

D. The Board approved the interim reviews for years one (Resolution 95-239), three (Resolution 97-192), five (Resolution 2000-72), and ten (Resolution 2006-61). The Applicant submitted the materials for the fifteenth-year review in 2010, but the Land Use Department did not process the submittal.

E. The twentieth-year interim review was processed and reviewed as Boulder County Land Use Docket SU-93-14g (the “Docket”). A more complete description of the Docket is set forth in the Boulder County Land Use Department Planning Staff’s Memorandum and written recommendation to the Boulder County Board of County Commissioners (the “Board”) dated February 25, 2016, with its attachments (the “Staff Recommendation”).

F. The Staff Recommendation determined that Applicant in large part continues to be in compliance with the terms, conditions, and commitments of record of the Approval.

G. On December 16, 2015, the Boulder County Planning Commission (“the Planning Commission”) held a duly-noticed public hearing on the Docket, and supported the Staff Recommendation.

H. On February 25, 2016, the Board held a public hearing on the Docket to consider the Staff

Recommendation, the Planning Commission's recommendation, and other documents and testimony presented by the Land Use Department and Shane Wilson on behalf of the Applicant. No members of the public spoke.

I. Based on the public hearing, the Board finds that the Applicant is in compliance with the terms, conditions, and commitments of record for the Approval, subject to the conditions stated below.

Therefore, the Board resolves:

The Applicant continues to be in compliance with the terms, conditions, and commitments of record of the approval, based on this twentieth-year review. All of the terms, conditions, and commitments of record of the Approval, as set forth in Docket SU-93-14, Resolution 94-8, Resolution 95-239, Resolution 97-192, Resolution 2000-72, and Resolution 2006-61, and any other applicable documents and approvals, remain in full force and effect, subject to the following conditions:

1. The monitoring of ground disturbing activities shall be restarted and fully implemented during periods of future soil stripping activities as required by the condition.
2. The applicant may remove the blast warning sign located along N. 53rd Street.
3. The applicant shall coordinate with County Parks and Open Space to address issues of mutual concern including associated wetlands and ditch management, weed management, and prairie dog management.

A motion to approve the Docket as set forth above was made by Commissioner Gardner, seconded by Commissioner Jones, and passed by a 2-0 vote. Commissioner Domenico was excused.

[Signature page to follow]

ADOPTED as a final decision of the Board on this 17 day of March, 2016.

**BOARD OF COUNTY COMMISSIONERS
OF BOULDER COUNTY:**

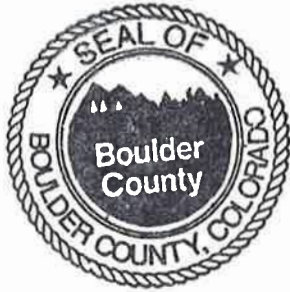


Elise Jones, Chair

Cindy Domenico, Vice Chair



Deb Gardner, Commissioner



ATTEST:



Clerk to the Board