



Initial Study Application

FILING FEE: \$2,000 and ENV HEALTH FEE: \$85

DEPARTMENT OF PLANNING AND BUILDING SERVICES

707 Nevada Street, Suite 5 · Susanville, CA 96130-3912

(530) 251-8269 · (530) 251-8373 (fax)

www.co.lassen.ca.us

Form must be typed or printed clearly in black or blue ink. All sections must be completed in full.

This application consists of three pages; only attach additional sheets if necessary.

FILE NO. _____

Property Owner/s	Property Owner/s
Name: Red River Forests LLC, Attn: Bob Rynearson	Name:
Mailing Address: P.O. Box 990898	Mailing Address:
City, ST, Zip: Redding, CA 96099-0898	City, ST, Zip:
Telephone: 530-243-2783 Fax:	Telephone: Fax:
Email: BobR@wmbeaty.com	Email:

Applicant/Authorized Representative*	Agent (Land Surveyor/Engineer/Consultant)
Same as above: <input type="checkbox"/>	Correspondence also sent to: <input checked="" type="checkbox"/>
Name: Turner Excavating, Inc., Lynne Turner	Name: VESTRA Resources, Inc., Attn: Wendy Johnston
Mailing Address: 3746 Big Springs Road	Mailing Address: 5300 Aviation Drive
City, ST, Zip: Lake Almanor, CA 96137	City, ST, Zip: Redding, CA 96002
Telephone: 530-596-3953 Fax: 530-596-4027	Telephone: 530-223-2585 Fax: 530-223-1145
Email: turnerexcavating@frontier.com	Email: wjohnston@vestra.com License #: N/A

Project Address or Specific Location: Hwy 36, 7 miles west of Susanville. See General Site Location Fig. 1			
Deed Reference: Book:	Page:	Year:	Doc#:
Zoning:		General Plan Designation:	
Parcel Size (acreage): 137	Section: 6 & 7	Township: 29	Range: 11 E MDBM

Assessor's Parcel Number(s):	115 - 200 - 55	115 - 200 - 32	- -
- -	- -	- -	- -

Project Description: See the attached Surface Mine Reclamation Plan Application

SIGNATURE OF PROPERTY OWNER(S): I HEREBY ACKNOWLEDGE THAT: I have read this application and state that the information given is both true and correct to the best of my knowledge. I agree to comply with all County ordinances and State laws concerning this application. Date: 3/12/2021 7B35861C226C410...	*SIGNATURE OF APPLICANT/AUTHORIZED REPRESENTATIVE (Representative may sign application on behalf of the property owner only if Letter of Authorization from the owner/s is provided). DocuSigned by: Date: 3/15/2021 83B09193DBFA411...
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Initial Study Application

ENVIRONMENTAL SETTING:

A. Describe the project site as it exists before the project, including information on size of parcel, topography, soil stability, plants and animals, and any cultural, historic or scenic aspects. Describe any existing structures on the site, and the use of the structure. Attach photographs of the site (optional).

Current vested mine active as SMARA-exempt pit.

B. Describe the surrounding properties, including information on plants and animals and any cultural, historical, or scenic aspects. Indicate the type and intensity of the land use (residential, commercial, agricultural, etc.). Attach photographs of the vicinity (optional).

Agriculture / Timber Production

Slope of Property:

(Approx. percentage of property having following slopes)			(0-8%)
	30		(9-15%)
	30		(16-20%)
	30		(over 20%)

List all county, state, federal, or regional agencies from which a permit or approval is required:

Lassen County, Division of Mine Reclamation (oversight)

Has any form of environmental document been prepared for the project:

Yes _____ If yes, attach. No X

List districts involved:

Are there any natural or man-made drainage channels through or adjacent to the property? No

(Name and/or type of drainage channels)

Are the following items applicable to the project or its effects? Discuss below all items checked 'yes' (attach additional sheets as necessary).

NOTE: Applicant may be required to submit additional data and information if deemed necessary by the Environmental Review Officer or Lead Agency.

YES NO

X X

1. Change in lake, stream, or other body of water or ground water quality, or alteration of existing drainage patterns.

X _____

2. Change in dust, ash, smoke, fumes, or odors in vicinity.

3. Change in existing features of any bodies of water, live or intermittent streams,

Initial Study Application

YES	NO	
<input type="radio"/>	<u>X</u>	4. Substantial change in demand for public services (police, fire, water, sewage, etc.).
<u> </u>	<u>X</u>	5. Significant amounts of solid waste or litter.
<u> </u>	<u>X</u>	6. Will road or access construction involve grade alteration, cut and/or fill?
<u> </u>	<u>X</u>	7. Could the project create a traffic hazard or congestion on the immediate street system or cause excessive vehicular noise?
<u> </u>	<u>X</u>	8. Change in scenic views or vistas from existing residential areas or public lands or roads.
<u> </u>	<u>X</u>	9. Substantial change in existing noise or vibration levels in the vicinity.
<u>X</u>	<u> </u>	10. Use or disposal of potentially hazardous materials, such as toxic substances, flammables, or explosives.
<u> </u>	<u>X</u>	11. Change in pattern, scale, or character of land use in the general area of the project.
<u> </u>	<u>X</u>	12. Substantially increase energy consumption (electricity, heat, fuel, etc.).
<input type="radio"/>	<u>X</u>	13. Relationship to a larger project or series of projects.
<u> </u>	<u>X</u>	14. Would the proposed project vary from standards or plans adopted by any agencies (such as air, water, noise, etc.)?
<u>X</u>	<u> </u>	15. Will the removal or logging of timber be part of the project? Logging was completed under post-fire exemption.

Mitigation Measures proposed by the Property Owner/Applicant:

2 - Increase in dust due to operations proposed to be mitigated with water truck.

8 - The mine is currently visible due to the Hog Fire. Planting of conifer trees following log removal on adjoining lands as well as planting of conifers following reclamation will mitigate long-term visual impacts. Baseline condition is disturbed area due to mining. Planting of conifers outside of the mine area post-fire will also reduce visibility.

11 - Site is a disturbed mine site that is unreclaimed. Following mining, the site will be reclaimed and returned to timber production.

Additional: Planting of forbs for bumblebee mitigation and collection of Penstemon sudans seed for use in reclamation and retention of limited onsite populations (see attached).

LASSEN COUNTY
APPLICATION FOR MINOR AMENDMENT TO SURFACE MINING USE PERMIT,
RECLAMATION PLAN AND/OR FINANCIAL ASSURANCE

1. APPLICANT INFORMATION:

Name Turner Excavating, Inc. / Lynne Turner

Address 3746 Big Springs Road, Lake Almanor, CA 96137

Contact Telephone Number 530-596-3953

Signature: DocuSigned by:
Lynne Turner
83B09193DBFA411... Date: 3/15/2021

2. PROPERTY OWNER INFORMATION: (if different than applicant, original signature of record owner, acknowledging and authorizing this application must appear below)

Name Red River Forests LLC, Attn: Bob Rynearson

Address P.O. Box 990898, Redding, CA 96099-0898

Contact Telephone Number 530-243-2783

Signature: DocuSigned by:
Bob Rynearson
7B35861C226C410... Date: 3/12/2021

3. OWNER OF MINERAL RIGHTS INFORMATION: (If different than the property owner, the record owner of mineral rights must sign below)

Name Red River Forests LLC, Attn: Bob Rynearson

Address P.O. Box 990898, Redding, CA 96099-0898

Contact Telephone Number 530-243-2783

Signature: _____ Date: _____

4. MINE OPERATOR INFORMATION:

Name Turner Excavating, Inc. / Lynne Turner and Brian Turner

Address 3746 Big Springs Road, Lake Almanor, CA 96137

Contact Telephone Number 530-596-3953

5. ASSESSORS PARCEL NUMBER(S) (Contact the County Assessor's office for Parcel Numbers and Maps. Phone (530) 251-8241)

115-200-055 and 115-200-032

6. LEGAL DESCRIPTION OF PROPERTY (attach copy of deed):

Section 6 & 7, Township 29 North, Range 11 East, MDB&M

LASSEN COUNTY
MINOR AMENDMENT APPLICATION
PAGE 2 OF 2

7. **PROPOSED AMENDMENTS TO THE APPROVED MINING OPERATIONS**
(Describe in detail the proposed changes to the mining operation including changes in acreage to be disturbed, new equipment, changes in processing, etc. attach additional pages as needed. Note: Revised site plans, cross sections, etc. must be submitted if the proposed amendment(s) result in changes to the internal layout or footprint of the mine):

See Surface Mine Reclamation Plan Application (attached)

8. **PROPOSED AMENDMENTS TO THE APPROVED RECLAMATION PLAN**
(Describe in detail all changes to the reclamation plan resulting from, or in addition to, the changes proposed in the mining operation, including removal of new equipment, reclamation treatments, monitoring, etc. Attach additional pages and maps as needed):

N/A; site is currently operated as a SMARA-exempt silvicultural pit.

9. **RECLAMATION COST ESTIMATE** Prepare and attach a revised Reclamation Cost Estimate addressing all changes proposed:

See Appendix C of Reclamation Plan (attached)



SURFACE MINE RECLAMATION PLAN APPLICATION

FILING FEE: \$900 + \$150/ac over 5 ac total disturbed area to \$1,800 max.
 With Use Permit: \$1,200 + \$200/ac over 5 ac total disturbed area to \$2,400 max.
 DEPARTMENT OF PLANNING AND BUILDING SERVICES
 707 Nevada Street, Suite 5 · Susanville, CA 96130-3912
 (530) 251-8269 · (530) 251-8373 (fax)
 www.co.lassen.ca.us

Form must be typed or printed clearly in black or blue ink. All sections must be completed in full.

This application consists of one page; only attach additional sheets if necessary.

FILE NO. _____

1) Property Owner/s Name: Red River Forests LLC, Attn: Bob Rynearson Mailing Address: P.O. Box 990898 City, ST, Zip: Redding, CA 96099-0898 Telephone: 530-243-2783 Fax: Email: BobR@wmbeaty.com SIGNATURE OF PROPERTY OWNER(S): I HEREBY ACKNOWLEDGE THAT: I have read this application and state that the information given is both true and correct to the best of my knowledge. I agree to comply with all County ordinances and State laws concerning this application. <div style="text-align: right;"> <i>Bob Rynearson</i> Date: 12/2021 </div>	Property Owner/s Name: Mailing Address: City, ST, Zip: Telephone: Fax: Email: SIGNATURE OF PROPERTY OWNER(S): I HEREBY ACKNOWLEDGE THAT: I have read this application and state that the information given is both true and correct to the best of my knowledge. I agree to comply with all County ordinances and State laws concerning this application. <div style="text-align: right;"> Date: </div>
2) Owner of Mineral Rights (if different than property owner, The record owner of mineral rights must sign below) Same as Property Owner: <input checked="" type="checkbox"/> Name: Mailing Address: City, ST, Zip: Telephone: Fax: Email: SIGNATURE OF MINERAL RIGHTS OWNER(S): I HEREBY ACKNOWLEDGE THAT: I have read this application and state that the information given is both true and correct to the best of my knowledge. I agree to comply with all County ordinances and State laws concerning this application. <div style="text-align: right;"> Date: </div>	3) Mine Operator Same as Applicant: <input checked="" type="checkbox"/> Correspondence also sent to: <input checked="" type="checkbox"/> Name: Turner Excavating, Inc., Lynne Turner & Brian Turner Mailing Address: 3746 Big Springs Road City, ST, Zip: Lake Almanor, CA 96137 Telephone: 530-596-3953 Fax: 530-596-4027 Email: turnerexcavating@frontier.com MINE OPERATOR(S): I HEREBY ACKNOWLEDGE THAT: I have read this application and state that the information given is both true and correct to the best of my knowledge. I agree to comply with all County ordinances and State laws concerning this application. <div style="text-align: right;"> Date: </div>
4) Applicant/Authorized Representative* Same as Property Owner: <input type="checkbox"/> Name: Turner Excavating, Inc., Lynne Turner Mailing Address: 3746 Big Springs Road City, ST, Zip: Lake Almanor, CA 96137 Telephone: 530-596-3953 Fax: 530-596-4027 Email: turnerexcavating@frontier.com *SIGNATURE OF APPLICANT/AUTHORIZED REPRESENTATIVE (Representative may sign application on behalf of the property owner only if Letter of Authorization from the owner/s is provided). HEREBY ACKNOWLEDGE THAT: I have read this application and state that the information given is both true and correct to the best of my knowledge. I agree to comply with all County ordinances and State laws concerning this application. <div style="text-align: right;"> <i>Lynne Turner</i> Date: 3/15/2021 </div>	Agent (Land Surveyor/Engineer/Consultant) None: <input type="checkbox"/> Correspondence also sent to: <input checked="" type="checkbox"/> Name: VESTRA Resources, Inc., Attn: Wendy Johnston Mailing Address: 5300 Aviation Drive City, ST, Zip: Redding, CA 96002 Telephone: 530-223-2585 Fax: 530-223-1145 Email: wjohnston@vestra.com License #: N/A <p style="text-align: center;">This application consists of 9 pages. Both the Applicant and Property Owner (unless the same) shall initial at the bottom of pages 2 through 7 where indicated.</p>

5) Assessor's Parcel Number(s):	115 - 200 - 55	115 - 200 - 32	- -
- -	- -	- -	- -

6) Project address or specific location: Hwy 36, seven miles west of Susanville. See General Site Location Fig. 1

Deed Reference: Book: Page: Year: Doc#:

Zoning: General Plan Designation:

Parcel Size (acreage): 137 Section: 6 & 7 Township: 29 Range: 11 East, MDBM

7) Present use of the site: Timber management with existing quarry

See Zoning Fig. 2

8) Present use of land surrounding the site: Timber production on private lands to the west and public land with recreation (Biz Johnson Trail) to the east and north. Hwy 36 is located just south of the site, across private land under different ownership. Some residential use south of Hwy 36. See Fig. 3

9) Distance and direction to nearest residence (identify the owner and provide the Assessor's Parcel Number):

Nearest known house is 1,700 feet to the southeast - Rena/Dozier Family Trust, APN 115-200-63-11

See Fig. 3

MINE OPERATION INFORMATION

10) Proposed name of mine: 36 Mine/ Devil's Corral Mine

11) Proposed starting date (or date current operation began): Summer 2021; has been operating intermittently since the 1940s.

12) Proposed termination date: 2050 or upon exhaustion of reserves, whichever occurs first

13) List the mineral commodity(ies) to be mined: Construction aggregates.
Site has historically operated to serve public works projects as needed.

14) Maximum quantity of mineral commodity to be mined (in terms of production as defined by the State Mining and Geology Board):

Annually 175,000 cu. yds. / _____ tons Project Total 300,000 cu. yds. / _____ tons

Describe the maximum slopes and erosion controls for stockpiled mined material:

Topsoil will be seeded and strawed each year that material is added.

15) Approximate quantity of overburden to be removed (not including top soil):

Annually 0 cu. yds. Project Total 0 cu. yds.

Describe the use, maximum slopes and erosion controls for stockpiled overburden: Rock is present at the surface in almost all locations. Past mining (pre-SMARA) has removed most surficial material including topsoil and overburden. Similar exposures of the rock formation in the area are mostly devoid of soil or vegetation. Any overburden encountered will be used to deepen the rooting zone for vegetation.

16) When and how will top soil be salvaged and how will it be stored and identified? All salvaged topsoil will be placed in a single pile. The topsoil will be seeded and strawed each year that material is added. The site is an area of low rainfall; potential for erosion is minimal.

17) Approximate quantity of top soil (top surface layering in which plants are growing) to be removed:Annually Varies cu. yds. Project Total 500 cu. yds.

Describe the use, maximum slopes and erosion controls for stockpiled top soil: All salvaged topsoil will be placed in a single pile. The topsoil will be seeded and strawed each year that material is added. The site is an area of low rainfall; potential for erosion is minimal. A Stormwater Pollution Prevention Plan (SWPPP) has been developed for the mine operation and is included as Appendix F.

18) Will supplemental material be imported to the site during mining (such as aggregates, cement, asphalt oil, production or dust control water, etc.)?NOX YES. Please describe the type and quantity of material(s) to be imported: There is currently no water well at the site.

Water needed for dust control and other needs will be brought in on an as-needed basis by truck. A storage tank may be erected if needed. When possible, excess soil from other projects will be received onsite to assist in future reclamation.

19) Explain the mining methods proposed (for example "open pit excavation resulting in a subgrade pit"; or "excavation of a hillside resulting in side and back highwalls with an open floor"; stream dredge, etc.): The hill will be lowered from the top, resulting in three sections of highwall with a long, shallow slope dipping to the east. Methods to be used will include ripping and blasting.
20) Describe the maximum depth of mine pit (for subgrade pit) in relation to a verifiable benchmark or height of walls (for hillside excavation) and maximum pit wall slopes:Depth of Pit (or height of walls) 40 feet Benchmark _____ Max Slope 1.43:1 (horizontal / vertical)

Will pit slopes (walls) be benched? Explain: Highwalls are determined to be stable at the prescribed slope without benching. See the Geotechnical Report in Appendix B. See Fig. 4A-Existing Topography, 4B-Final Topography and 4C-Cross-Sections

21) a) Check all on-site processing proposed:X Excavation X Blasting X LoadingX Crushing X Screening _____ Washing

____ Concrete Production _____ Asphalt Production

X On-site Fuel Storage X StockpilingX On-site Equipment Maintenance, Storage and/or Fueling

____ Other (explain): _____

b) List all equipment to be used on site: Dozer, loader, haul truck, primary crusher, drill for blasting, miscellaneous small equipment, scale. All equipment will be removed following reclamation.

22) Mined material will be used for: Construction aggregate

23) Indicate how much surface area (in acres) will be used for the following activities:

Extraction:	Currently <u>6.7</u>	Annually <u><1</u>	Total <u>6.7</u>
Processing:	Currently <u>1</u>	Annually <u><1</u>	Total <u>1</u>
Stockpiles:	Currently <u>n/a</u>	Annually <u><1</u>	Total <u><1.0</u>
Haul Roads:	Currently <u>1.5</u>	Annually <u>1.5</u>	Total <u>1.5</u>
Equipment Storage:	Currently <u>n/a</u>	Annually <u><0.25</u>	Total <u><0.25</u>
Offices(s):	Currently <u>n/a</u>	Annually <u><0.25</u>	Total <u><0.25</u>
Scale(s):	Currently <u>n/a</u>	Annually <u><0.25</u>	Total <u><0.25</u>

Other (explain): Past mining has already disturbed a significant portion of the site.

Total project area to be used: Currently 6.3 acres Total 9.2 acres

During the vesting process, the mining area was determined to be 5.29 acres with total reclamation area of 8 acres that has been revised to 9.2 acres. Based on a site survey, the currently disturbed acreage including roads is 6.3 acres (see Figure 5).

24) Will any settling ponds be constructed? No**25) Describe any temporary stream and watershed diversions and their construction:**

None onsite

26) Describe the mining time schedule and how it provides for completion of mining on each segment so that reclamation can be concurrent or phased:

The mining schedule will depend upon demand. Because of the small area to be reclaimed, all reclamation will take place when mining is concluded.

27) How much area will be disturbed before reclamation begins?

9.2 acres

28) How will any potential public health and safety concerns that may arise due to exposure of the public to the site be addressed?

The road is gated and locked. There will be no adit or underground work.

29) Describe the geology of the site and vicinity (for geologic maps contact the Department of Conservation Division of Mines and Geology, Geologic Information and Publications Office, 801 K Street, MS 14-33, Sacramento, CA 95814-3532, (916) 445-5716) (attach pages as needed): See attached Geotech Report App. B for geologic description and Geology Fig. 6

The general geology of the region is volcanic and pyroclastic rock ranging from basaltic to andesitic. The quarry is located at the eastern side of Little Fredonyer Peak, west of the Susan River and seven miles west of the City of Susanville, California. The mountains are composed of volcanic flow and pyroclastic rock ranging from basaltic to andesitic in composition. The units at the quarry have been assigned an age of Quarternary on the Westwood sheet of the Geologic Map of California (1960).

30) Describe the following characteristics of the project site (if the site has already been disturbed, you may describe adjoining lands similar to the mine site. Attach additional pages as needed):

- a) Vegetation: Include an inventory of plants found on or near the site. It is strongly suggested that the applicant work with a qualified biologist/botanist in developing the vegetation inventory and the revegetation plan (attach pages as needed):**

Plant Type (common name OK)	Density (% cover for grasses)	Location / Aspect
Ponderosa pine/Jeffrey pine	6.5/acre; 300/acre <75% survival	See Figure 10
Misc. grasses, forbs, antelope bitterbrush	2.5/acre; 75% cover	See Figure 10

- b) Wildlife in and around the site:** Site shows evidence of being visited by wildlife common to the area including deer, rabbits, reptiles, and common birds. See CNDDDB Occurrences Fig. 7

- c) Known rare, endangered and threatened species of plants and animals occurring on or near the site (contact the Department of Fish and Wildlife, Redding Office at (530) 225-2360, or Wendel Office at (530) 254-6808) (show location on site map):** Susanville beardtongue (Penstemon sudans), CRPR "4"; see Fig 8. Western bumblebee, others; see CNDDDB Figure 7; also see the Biological Report in Appendix A.

- d) Wetlands, wet areas and surface drainage system(s), including intermittent drainages (include on site map):** There are no watercourses, wetlands vernal pools or established drainages at the site due to the terrain and high infiltration rate of the soil and underlying rock. See Hydrology Figure 9.

Botanical/biological survey completed on 7/7/20; report attached as Appendix A. Area has since burned.

- e) Include copies of any reports, surveys, or other documents related to the characteristics of the site, used in your description.** Surveys will be re-conducted in spring 2021.

31) How will any sensitive species, wildlife habitat, or wetlands be protected or mitigated? Susanville beardtongue seeds will be collected and stored to be used for reclamation. Flowering species will be planted at reclamation.

32) Describe the proposed use of the mine site after mining has ended and reclamation is complete: Grassy hillside stabilized against erosion and timberland with Eastside pine type.

33) Describe how reclamation of the mine site will affect future mining in the area (consider whether the proposed reclamation plan will allow of preclude future mining on site or in the area. For example, will this operation deplete on-site mineral reserves? Will the proposed end use prevent future mining by construction of houses, other buildings, reservoirs, etc.): The mining on the site is designed to fully utilize the existing resources. The mine has encroached onto adjoining properties. These areas are included in this plan. The site is not suited for other development due to topography and lack of water, and will be returned to timberland or open space following reclamation.

34) Describe any impacts of reclamation on surrounding land uses: None

ATTACH THE FOLLOWING TO THE APPLICATION

35) ATTACH SEPARATE PAGES DESCRIBING HOW THE MINED LANDS WILL BE RECLAIMED. ADDRESS AT LEAST THE FOLLOWING ACTIVITIES (using corresponding numbers), TAKING INTO CONSIDERATION THE RECLAMATION STANDARDS SET FORTH IN THE STATE MINING AND GEOLOGY BOARD RECLAMATION REGULATIONS (California Code of Regulations (CCR) Section 3700 – 3713, available from the Lassen County Planning and Building Department):

A. EARTH WORK

1. How will the pit walls, waste dumps, tailings, haul roads, etc. be regraded and reshaped?
2. What will be the source and disposition of fill materials used for back filling or grading?
3. How will slopes be stabilized?
4. What is the proposed final grade of pit slopes, highwalls, waste piles, etc.?

B. SEEDBED PREPARATION AND REVEGETATION

1. The California Code of Regulations Section 3705(b) requires that test plots be established while the mining operation active, in order to determine the best revegetation species and methods for the site. Describe the location of and methods to be used in test plots.
2. Will top soil be reapplied during reclamation? When? Where? To what depth? Please explain. (Sample: "The top 10 inches, estimated at 10,000 cubic yards, will be scraped, stored and reapplied to regraded slopes and pit floor to a depth of 6 inches" or "crusher fines with organic material added will be redistributed to a depth of 12 inches" or "10,000 c.y. of top soil will be imported (*indicate source of imported material*) and distributed to a depth of 6 inches.")
3. Describe how soil conditioners, mulches, imported topsoil will be used (include plan for soil analysis if required).
4. How will compacted soils (in processing areas, roads, pit floor, benches, etc.) be decompacted in preparation for planting? (Sample: "All compacted surfaces will be ripped to a depth of 12 inches prior to application of top soil")
5. What plant species will be planted on slopes; pit floor; haul roads; etc.?
6. How many pounds of seed (for each species) will be planted per acre; how many seedlings per acre; etc.?
7. What method(s) will be used for planting (e.g broadcast, drill seeding)? What time of year will planting take place?
8. How will new vegetation be protected until it is established and how will weeds be monitored and managed?
9. Will the site be irrigated to help establish plants? For how long?
10. Describe research used in the selection of revegetation methods and species, given the topography, resoiling characteristics, and climate of the areas to be mined.
11. What are the revegetation success standards proposed and how/when will success be monitored? The success standards should include vegetative cover, density and species richness and be based on the vegetation inventory. (For example, if grass cover was 30% and there were 75 bitterbrush plants per acre before mining, you might propose 15% grass cover and 35 bitterbrush plants within five years of reclamation as meeting the success standard)

C. EROSION CONTROLS

1. How will slopes be protected from erosion during and after mining?
2. How will runoff and process water be controlled and treated to prevent sediment and pollution from being discharged off site?
3. Describe site-specific sediment and erosion control criteria and how the site will be monitored for said criteria.
4. What measures will be taken to protect onsite and downstream beneficial uses of water (including groundwater recharge potential)?
5. How will any affected streambeds, banks, channels, or drainages be rehabilitated?
6. How will contaminants (fuel, oil, asphalt oil, process chemicals) be controlled?

D. MONITORING

1. How, and by whom, will the regrading and revegetation effort be monitored?
2. How long will monitoring be needed before the reclamation success standards are expected to be met?
3. Who shall prepare monitoring reports and how often will they be submitted to the lead agency?

E. OTHER:

1. How will mine waste material (if any) be disposed of or treated?
2. What is the anticipated reclamation schedule?
3. What will be done with any equipment and structures left on site when mining and reclamation are complete?
4. What will be done with any on-site water wells after mining and reclamation are complete?
5. How will underground openings be treated to prevent public entry and preserve access for wildlife (e.g. bats)?

MAPS AND DIAGRAMS (ONE SET OF ALL MAPS MUST BE SUBMITTED ON PAPER NO LARGER THAN 11" X 17" TO ALLOW REPRODUCTION) It is strongly suggested that the applicant work with a qualified engineer or surveyor in preparing mine site maps, plans, and diagrams.

36) SUBMIT MAPS DRAWN TO SCALE OF THE FOLLOWING (All maps must include a bar (graphic) scale)

A. VICINITY MAP(S):

1. Vicinity map showing general location of the site, nearest community, major roads, etc. (a Lassen County Road Map Or the USGS Topographic Quad may be used);
2. Assessor's Parcel Map(s) showing the boundaries of the entire parcel(s) and portions(s) thereof involved in mining and related activities.

B. TOPOGRAPHIC MAPS:

1. Topographic map(s) of the site BEFORE mining and AFTER reclamation. Contour intervals should be appropriate for the site, generally in the range of five to twenty feet;
2. Cross-section(s) of mining site, including elevations BEFORE mining and AFTER reclamation.

C. SITE MAP(S) SHOWING:

1. Property lines, setbacks, current and/or pre-SMARA disturbance boundaries (if applicable), and proposed final boundary of mining operation.
2. Location of streams, drainage channels, ponds and lakes, wetlands, roads, railroads, utilities, buildings, etc., on and immediately adjacent to the site.
3. Location of existing and proposed new access/haul roads. Identify the public road(s) that provide access to and from the site and show the proposed route from the site to the public road; identify access roads, temporary roads to be reclaimed and any roads remaining for the end use.

D. SITE PLAN(S) SHOWING:

1. Property lines, setbacks, current and/or pre-SMARA disturbance boundaries (if applicable), and proposed final boundary of mining operation.
2. Excavation/pit area(s);
3. Waste dumps (if any);
4. Processing area(s) including all stockpiles (by type), equipment storage, fuel tanks, crusher, screening area, etc.;
5. Settling ponds (if proposed), drainage channels and sediment control facilities;
6. All structures proposed;
7. Existing or planned utilities;
8. Existing or planned wells serving the site;
9. The site plan should also show areas within the project site that WILL NOT be disturbed, and therefore will not be subject to reclamation. (Unless otherwise shown on the site plan and/or phasing plan, the County will assume that the entire site will be disturbed and subject to reclamation and overage in the financial assurance);
10. Operation phases (if phasing is proposed);
11. Other details as appropriate

*Please Include with Maps the Size and Legal Description of Lands Affected by Surface Mining Operations.

*All maps, diagrams, or calculations that are required to be prepared by a California-licensed professional shall include the preparer's name, license number, signature and seal.

APR 19 2021

Question #35 A-E

LASSEN COUNTY DEPARTMENT OF
PLANNING AND BUILDING SERVICES

35) ATTACH SEPARATE PAGES DESCRIBING HOW THE MINED LANDS WILL BE RECLAIMED. ADDRESS AT LEAST THE FOLLOWING ACTIVITIES (using corresponding numbers), TAKING INTO CONSIDERATION THE RECLAMATION STANDARDS SET FORTH IN THE STATE MINING AND GEOLOGY BOARD RECLAMATION REGULATIONS (California Code of Regulations (CCR) Section 3700 - 3713, available from the Lassen County Planning and Building Department):

A. EARTH WORK**1. How will the pit walls, waste dumps, tailings, haul roads, etc. be regraded and reshaped?**

No waste dumps or tailing piles are proposed. The pit wall will be laid back per the attached Geotechnical Report. Existing roads at the site will be utilized in the operation. The existing roads have gravel road beds. The haul road inside the quarry has a rock foundation. Roads will remain after mining for use of timber production and fire protection. See Figure 5 "Site Layout."

2. What will be the source and disposition of fill materials used for back filling or grading?

If the opportunity presents itself, additional topsoil will be brought in to assist in reclamation. No additional backfilling or grading will be done besides in the stages of the final reclamation after mining is complete.

3. How will slopes be stabilized?

Final slopes are deemed stable at the prescribed angle of 1.43:1 with no benching since all slopes will be less than 40 feet tall. Grasses and forbs will be planted to help with slope stability in areas without pine plugs. See Geotechnical Report, Appendix B.

4. What is the proposed final grade of pit slopes, highwalls, waste piles, etc.?

The highwalls will be a maximum of 1.43 to 1 with no benching and walls no higher than 40 feet. There are no waste piles. See Geotechnical Report in Appendix B and Figures 4A, 4B, and 4C "Topography."

B. SEEDBED PREPARATION AND REVEGETATION

1. The California Code of Regulations Section 3705(b) requires that test plots be established while the mining operation active, in order to determine the best revegetation species and methods for the site. Describe the location of and methods to be used in test plots.

4. How will compacted soils (in processing areas, roads, pit floor, benches, etc.) be decompacted in preparation for planting? (Sample: "All compacted surfaces will be ripped to a depth of 12 inches prior to application of top soil")

All compacted surfaces, except roads that will be left in place, will be ripped to a depth of 6 inches prior to the application of top soil.

5. What plant species will be planted on slopes; pit floor; haul roads; etc.?

Upon completion of mining operations, where forest soils are available in the mosaic shown on Figure 10, one-year-old Styrofoam-container-grown ponderosa pine plugs from a local seed source and elevation shall be planted at approximately 300 trees per acre with an average of 12-foot x 12-foot spacing. All trash, such as plastic bags, will be removed and transported offsite for disposal. Competing vegetation will be controlled via herbicides or hand removal around pine seedlings for the first two years after planting to facilitate successful establishment. If by hand removal, invasive species will be removed, bagged by hand, and transported to a landfill. Tree survival will be 75 percent.

Following tree establishment, herbaceous ground covers will be allowed to reseed the areas of the site where trees are planted. The mosaic approach to reclamation shown on Figure 10 mimics adjoining timber distribution and results in both timber restoration and bee habitat. The success standard fir surface cover outside of the timber planting is 75 percent with species richness of 5 species present.

Table 3 REVEGETATION PALETTE						
Species Common Name	Scientific Name	Flowering Period			California Native (Y/N)	Source
		SPR	SUM	FALL		
Lewis blue flax	<i>Linum lewisii</i>	•	•		Y	Great Basin Seed – Great Basin Wildflower Mix or Custom Mix
California poppy	<i>Eschscholzia californica</i>	•	•	•	Y	
Balsamroot	<i>Balsamorhiza hookeri</i> or <i>B. sagittata</i>	•	•		Y	
Yarrow	<i>Achillea millefolium</i>	•	•	•	Y	
Silvery lupine	<i>Lupinus argenteus</i>		•		Y	Great Basin Seed
Antelope bitterbrush	<i>Purshia tridentata</i>		•	•	Y	
Idaho fescue	<i>Festuca idahoensis</i>		•		Y	Great Basin Seed
Susanville beardtongue*	<i>Penstemon sudans</i>		•		Y	Seed bank existing onsite
Sulphur buckwheat	<i>Eriogonum umbellatum</i>		•	•	Y	
Jeffery pine	<i>Pinus jefferyi</i>	N/A			Y	Plugs
Ponderosa pine	<i>Pinus ponderosa</i>	N/A			Y	Plugs
* Seeds will be collected during appropriate time of year and spread onsite to maintain existing population (seeds are viable for up to 5 years after collection)						

mine boundary, access roads, and surrounding areas that may be impacted by mining activities. The survey found a population of Susanville beardtongue which occurs on rock outcrops and other disturbed soils onsite. This population was previously documented onsite in 2015. No special-status wildlife species were observed onsite during the survey.

The Natural Resources Conservation Service (2019) identified soils within the project boundary as Uhalf-Southpac complex, 2 to 30 percent slopes (NRCS 2020). These soils are colluvium derived from volcanic rock and residuum weathered from volcanic rock. The typical restrictive layer is approximately 40 inches to 60 inches deep and is comprised of paralithic bedrock.

Vegetation at the project site has been identified via the California Department of Fish and Wildlife's (CDFW) Vegetation Classification and Mapping Program (VegCAMP) data and field surveys as Eastside pine and bitterbrush as shown on Figure 11 in the Reclamation Plan.

The site visit found that the site was predominantly an Eastside pine forest pre-fire, with the surrounding area dominated by bitterbrush and other shrub species. Annual grassland comprised the ground cover within this Eastside pine habitat. Antelope bitterbrush (*Purshia tridentata*) comprised the understory and large stands of shrubland surround the forested mine site. The typical structure and composition of habitat types that were observed onsite are described in the Reclamation Plan. The site was burned in a recent fire.

11. What are the revegetation success standards proposed and how/when will success be monitored? The success standards should include vegetative cover, density and species richness and be based on the vegetation inventory. (For example, if grass cover was 30% and there were 75 bitterbrush plants per acre before mining, you might propose 15% grass cover and 35 bitterbrush plants within five years of reclamation as meeting the success standard)

The monitoring of revegetation efforts will occur for up to three years. If the growth of the vegetation does not meet the cover criteria, the operator will replant underperforming areas as necessary. Replanting will occur up to the third year of monitoring. If the success rate of 75 percent survival for ponderosa pine is not achieved after five years of revegetation, replanting can continue until success is met or have the site evaluated by a botanist or qualified individual. At that time a revised plan and monitoring program can be submitted to Lassen County Planning Department for their approval. Forb species will achieve 15 percent cover within one year of revegetation, 45 percent cover within three years, and 75 percent cover within five years of revegetation outside of the pine planting areas. If density drops below these numbers, plants will be replaced the following year in early spring.

- Establish a minimum species richness of three native perennial species in three years;
- Average density of 5 perennial plants within three years as quantified within 30 square meter plots;
- Invasive exotic species will not compose greater than 15 percent of the cover in any year;
- Conifer plug survival of greater than 75 percent (no herbaceous understory monitoring).

Should the evaluation of performance criteria reveal that revegetated areas are significantly behind in their target percentages, the reasons for insufficient plant germination and/or growth will be

5. How will any affected streambeds, banks, channels, or drainages be rehabilitated?

This is not an instream operation.

6. How will contaminants (fuel, oil, asphalt oil, process chemicals) be controlled?

Petroleum products will be stored in a double-walled container or in a secondary containment area onsite. Volumes will not exceed 500 gallons. Materials (oils, grease, hydrocarbons) will be stored onsite in a locked Conex container during operating months. No materials will be stored at the site in the off season.

D. MONITORING

1. How, and by whom, will the regrading and revegetation effort be monitored?

The landowner or consultant will conduct yearly inspections during the post-reclamation period until standards are met. Sample size will be sufficient to provide at least 80 percent confidence level. California Forest Practice Standards will be used for conifer evaluation. Techniques published by the California Division of Mining will be used for herbaceous cover.

2. How long will monitoring be needed before the reclamation success standards are expected to be met?

It is anticipated that success standards will be met within three years of cessation of mining.

3. Who shall prepare monitoring reports and how often will they be submitted to the lead agency?

The lease, landowner, or consultant will prepare a monitoring report that will be submitted annually to the lead agency during the post-reclamation monitoring period.

E. OTHER

1. How will mine waste material (if any) be disposed of or treated?

No mine waste is or will be associated with this project.

2. What is the anticipated reclamation schedule?

Reclamation will be concluded within three years of mine closure.



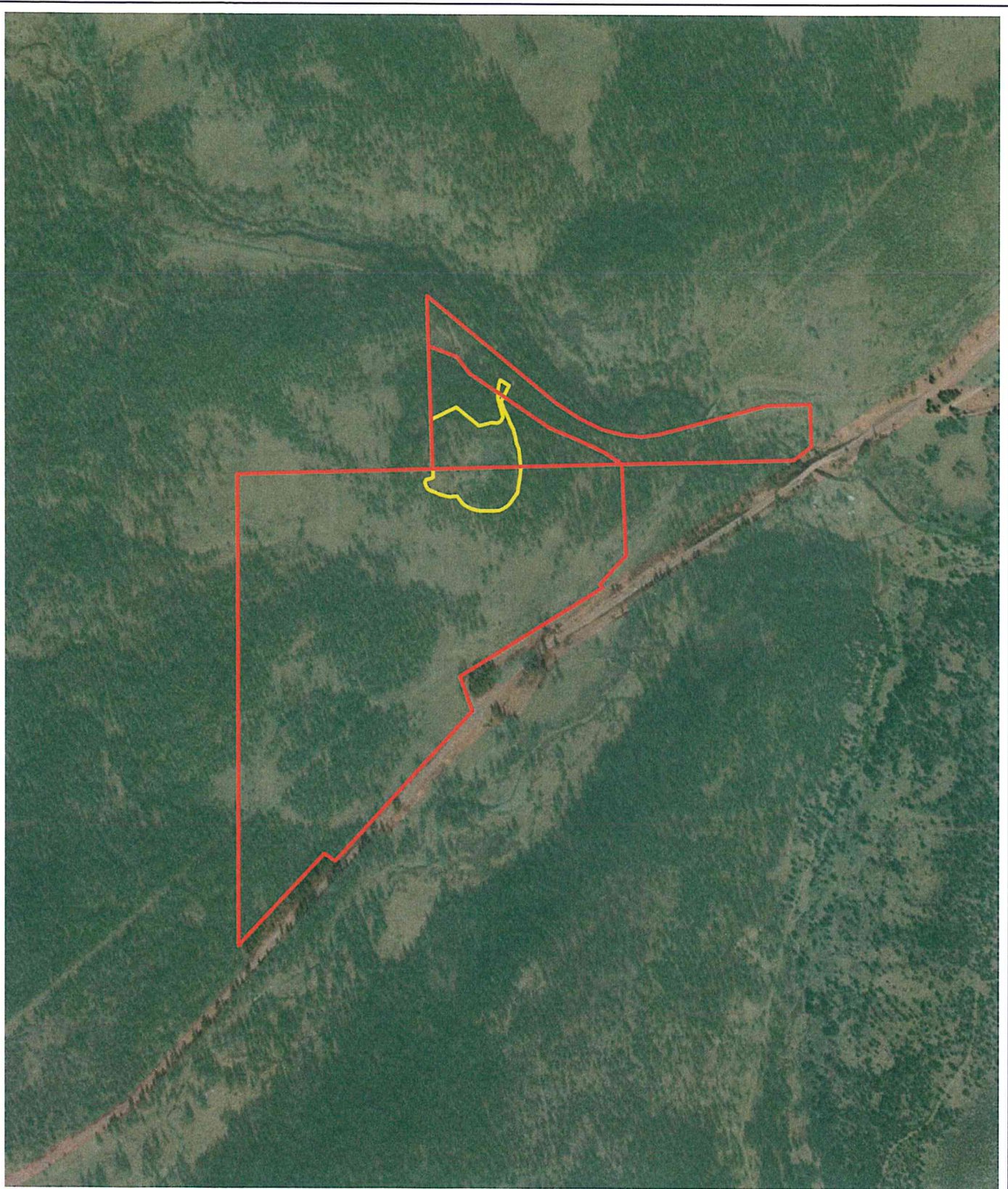
 Reclamation Boundary




0 2.5 5 10 Miles

SOURCE: MAXAR 2018 AERIAL PHOTOGRAPH; LASSEN COUNTY 2014

FIGURE 1
GENERAL SITE LOCATION
DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA



-  Approximate Parcel Boundary
-  Reclamation Boundary
-  U-C-2 (Upland Conservation/Resource Management District)

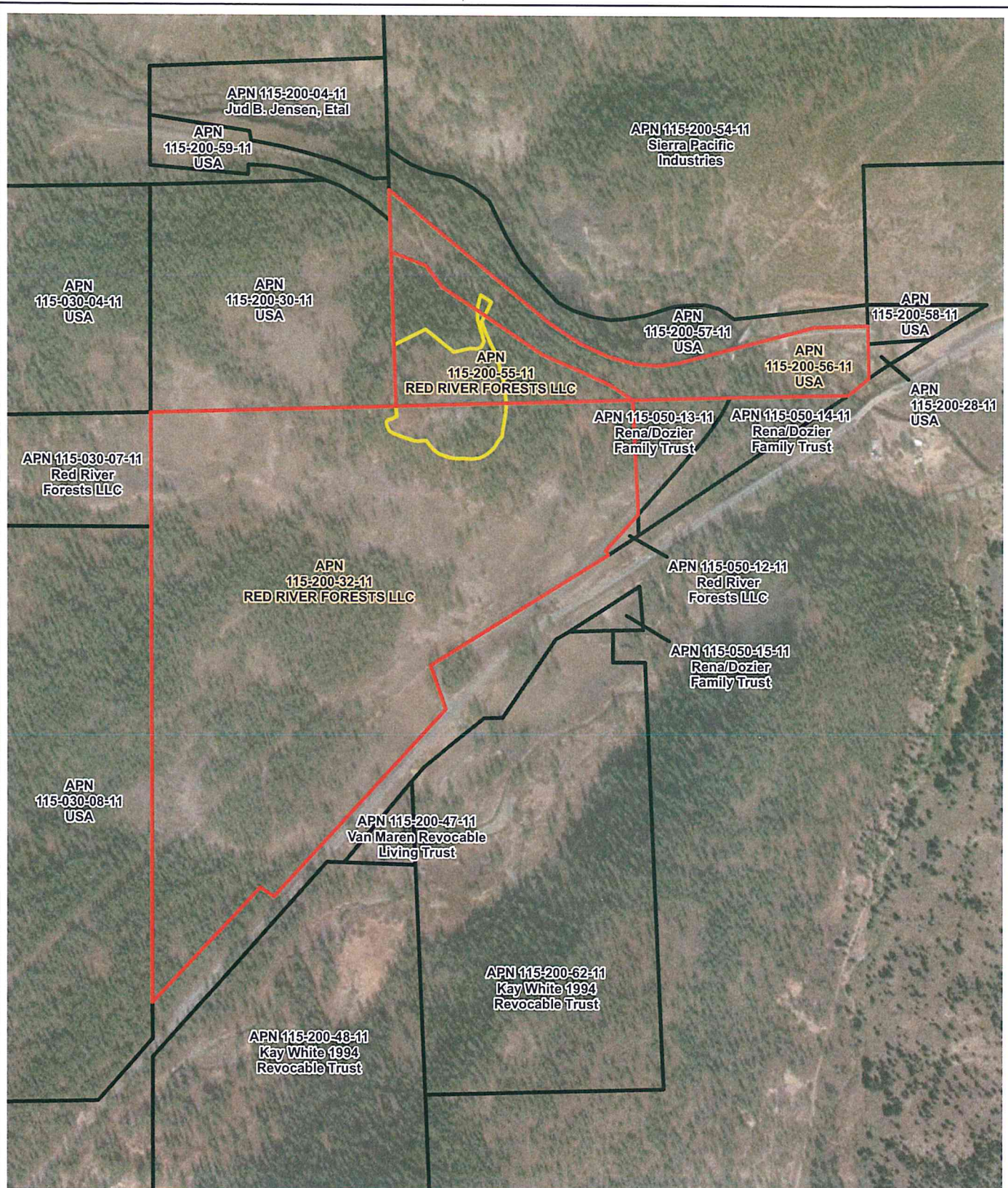


0 500 1,000 2,000 Feet



SOURCE: MAXAR 2018 AERIAL PHOTOGRAPH; LASSEN COUNTY 2012

FIGURE 2
ZONING
DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA



- Approximate Parcel Boundary
- Reclamation Boundary
- Surrounding Parcel Boundary

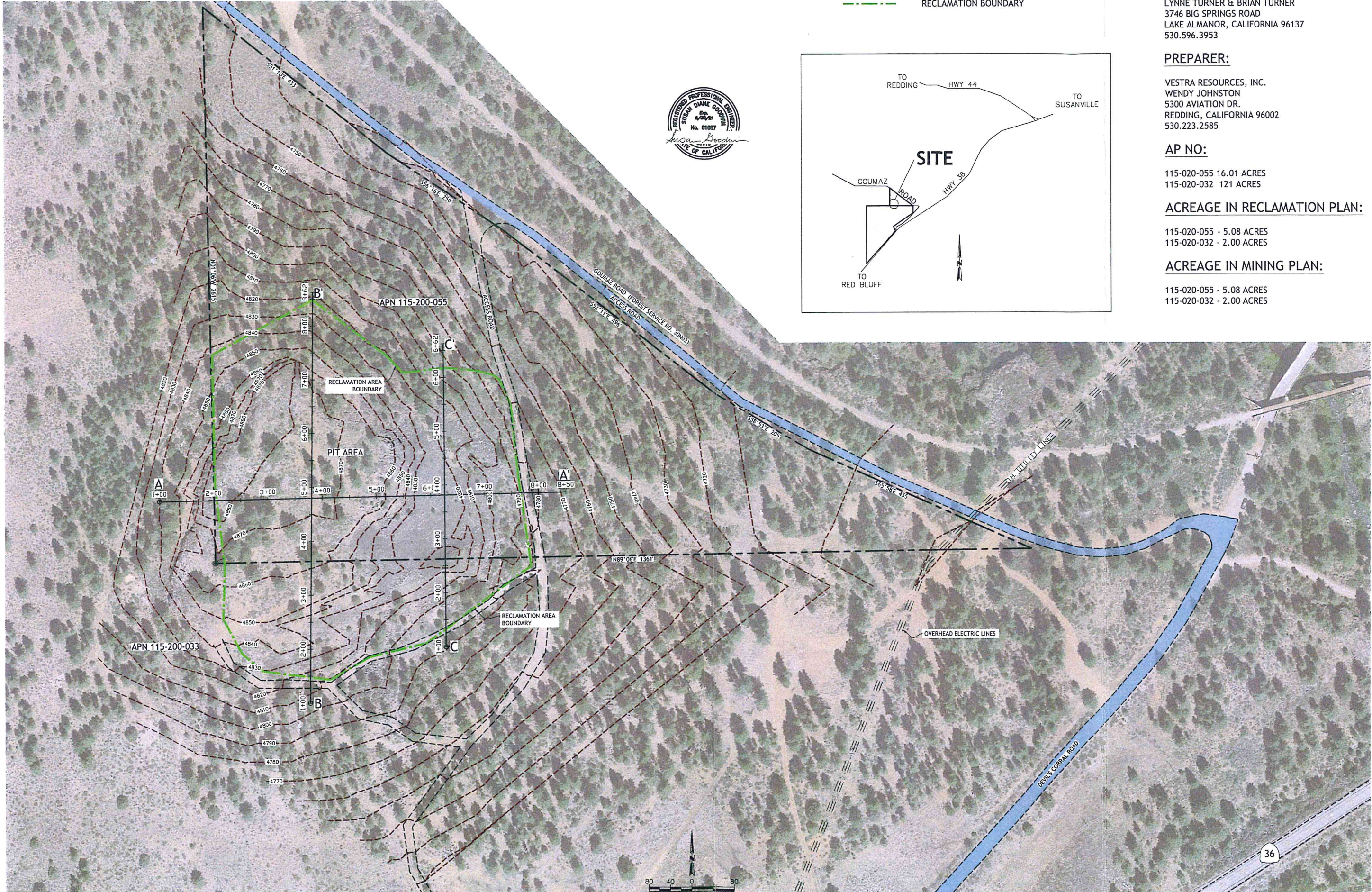


0 400 800 1,600 Feet



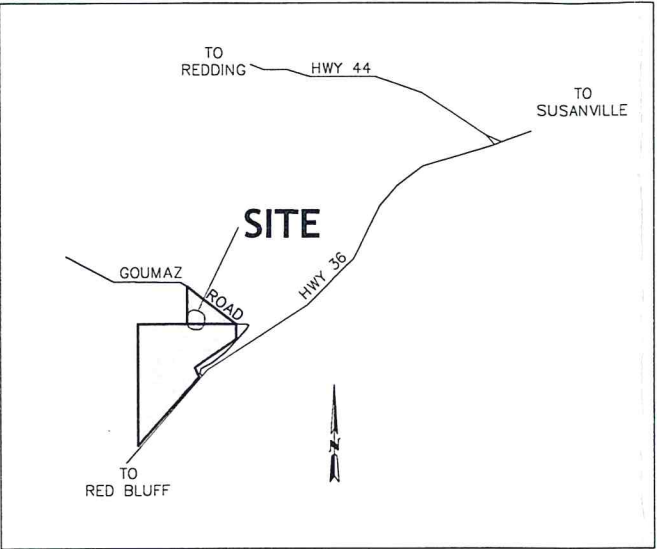
SOURCE: MAXAR 2018 AERIAL PHOTOGRAPH; LASSEN COUNTY 2014

FIGURE 3
ASSESSOR'S PARCEL MAP
DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA



LEGEND:

RECLAMATION BOUNDARY



OWNER/APPLICANT:
TURNER EXCAVATING INC.
LYNNE TURNER & BRIAN TURNER
3746 BIG SPRINGS ROAD
LAKE ALMANOR, CALIFORNIA 96137
530.596.3953

PREPARER:

VESTRA RESOURCES, INC.
WENDY JOHNSTON
5300 AVIATION DR.
REDDING, CALIFORNIA 96002
530.223.2585

AP NO:

115-020-055 16.01 ACRES
115-020-032 121 ACRES

ACREAGE IN RECLAMATION PLAN:

115-020-055 - 5.08 ACRES
115-020-032 - 2.00 ACRES

ACREAGE IN MINING PLAN:

115-020-055 - 5.08 ACRES
115-020-032 - 2.00 ACRES

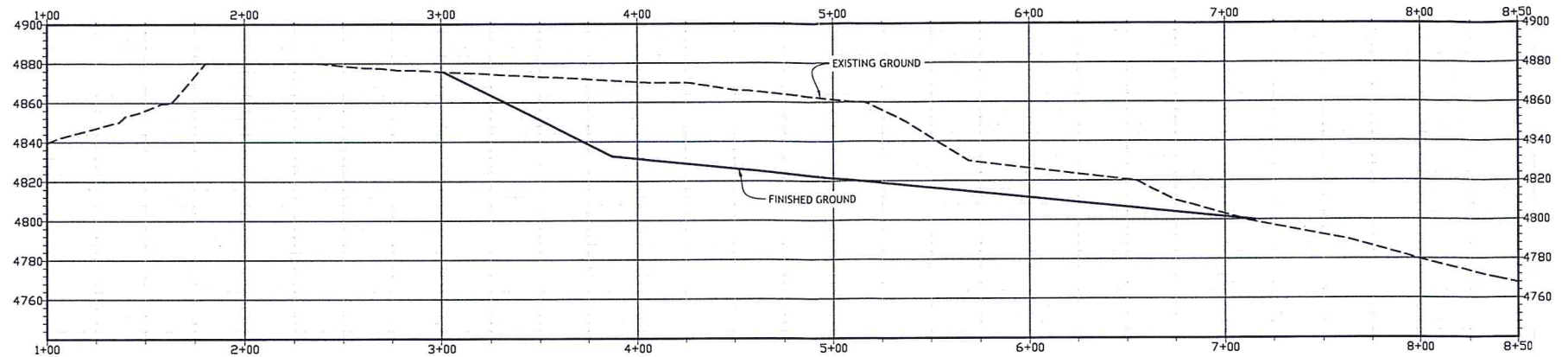
www.vestra.com		VERIFY SCALES	
(530) 223-2585		BAR IS ONE INCH ON ORIGINAL DRAWING	
FAX (530) 223-1145		IF NOT ONE INCH ON THIS SHEET, INDICATE SCALES ACCORDINGLY	
VESTRA		5300 AVIATION DRIVE - REDDING, CA 96002	
DSGN: CS	DR: CS	CHK: SG	APPD: SG
FIGURE 4A		NO.	DATE
EXISTING TOPOGRAPHY		REVISION	BY
DEVILS' CORRAL MINE			
LASSEN COUNTY, CALIFORNIA			
SHEET		OF	



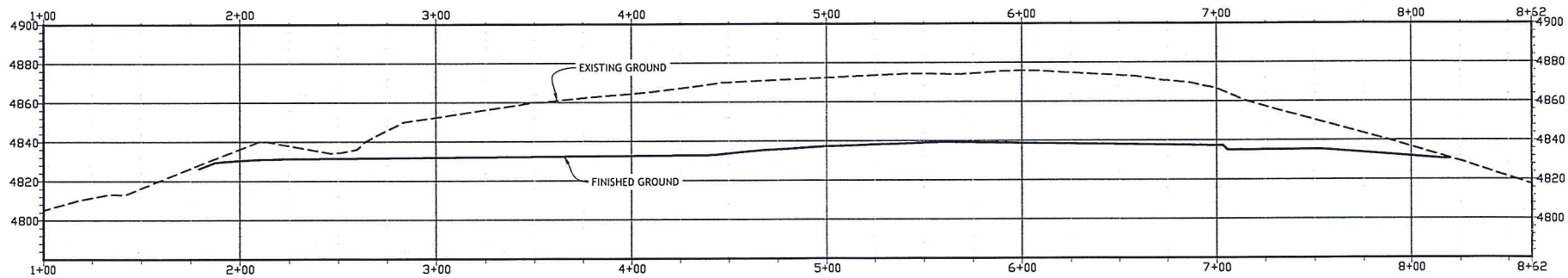
FIGURE 4B
FINAL TOPOGRAPHY
DEVILS' CORRAL MINE
LASSEN COUNTY, CALIFORNIA

DESIGN: CS
DRAWN: CS
CHECK: SG
APPROVED: SG

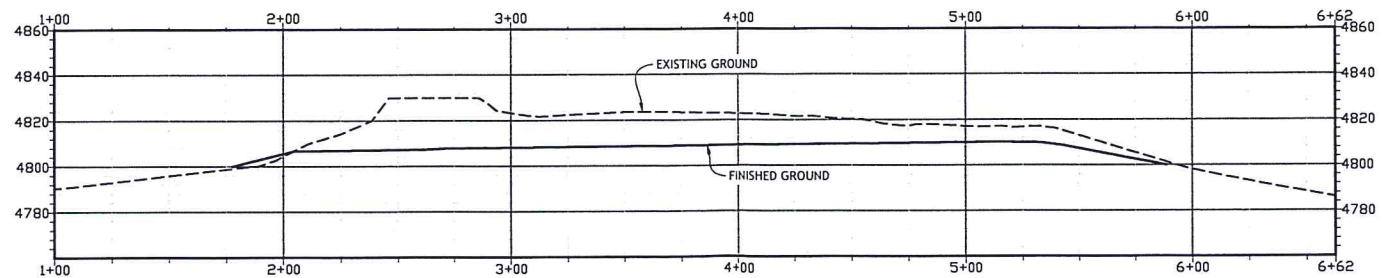
NO.	DATE	REVISION	BY



PROFILE A-A'
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 40'



PROFILE B-B'
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 40'



PROFILE C-C'
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 40'



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(530) 223-2585
FAX (530) 223-1145

VESTRA

5300 AVIATION DRIVE - REDDING, CA 96002

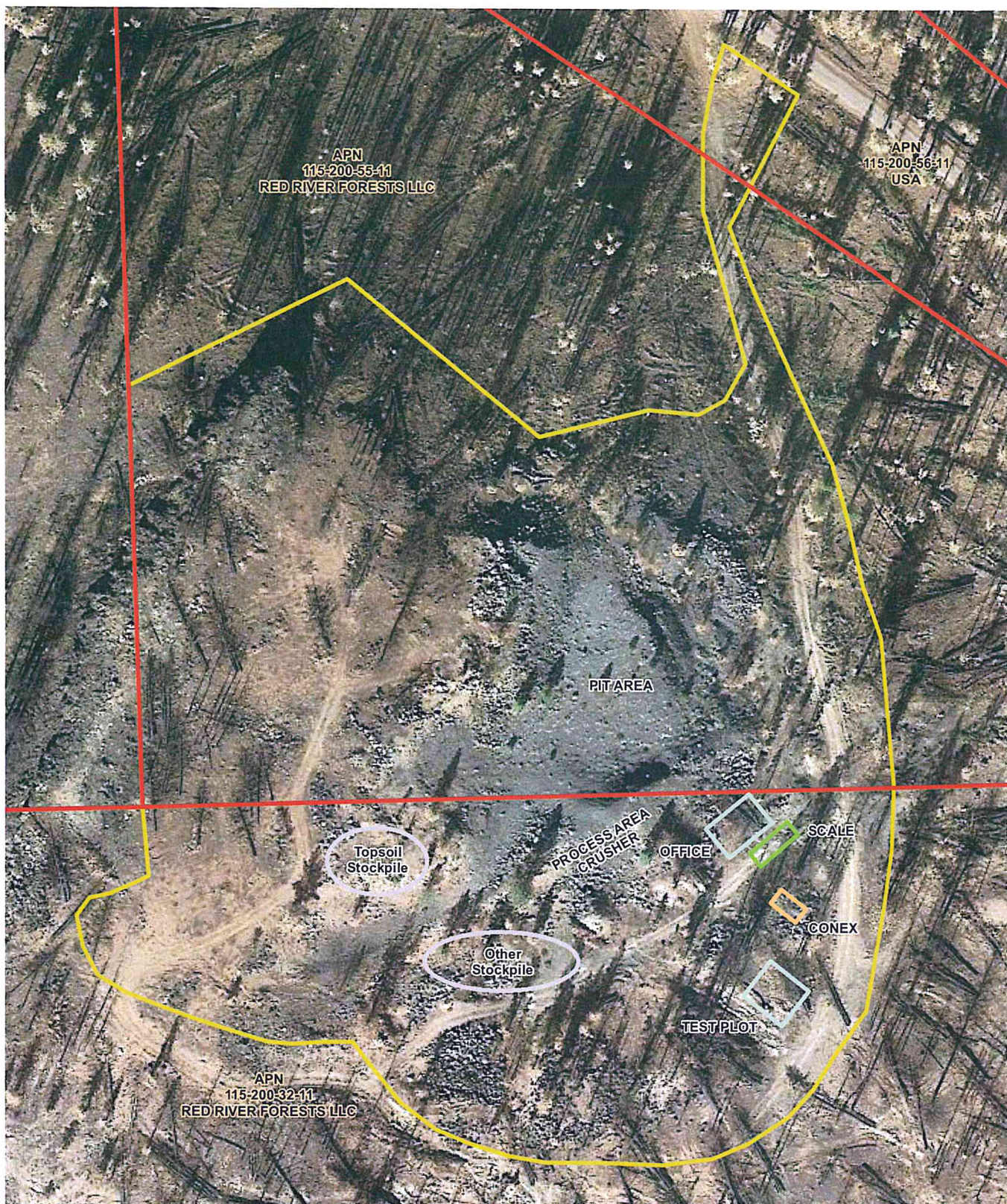
NO.	DATE	REVISION	BY

DESIGN	CS	DR	CS	CHECK	SG	APPROVE	SG

FIGURE 4C
CROSS SECTIONS
DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA

SHEET
OF

VERIFY SCALES
BAR IS ONE INCH ON
ORIGINAL DRAWING
IF NOT ONE INCH ON
THIS DRAWING, USE
SCALES ACCORDINGLY

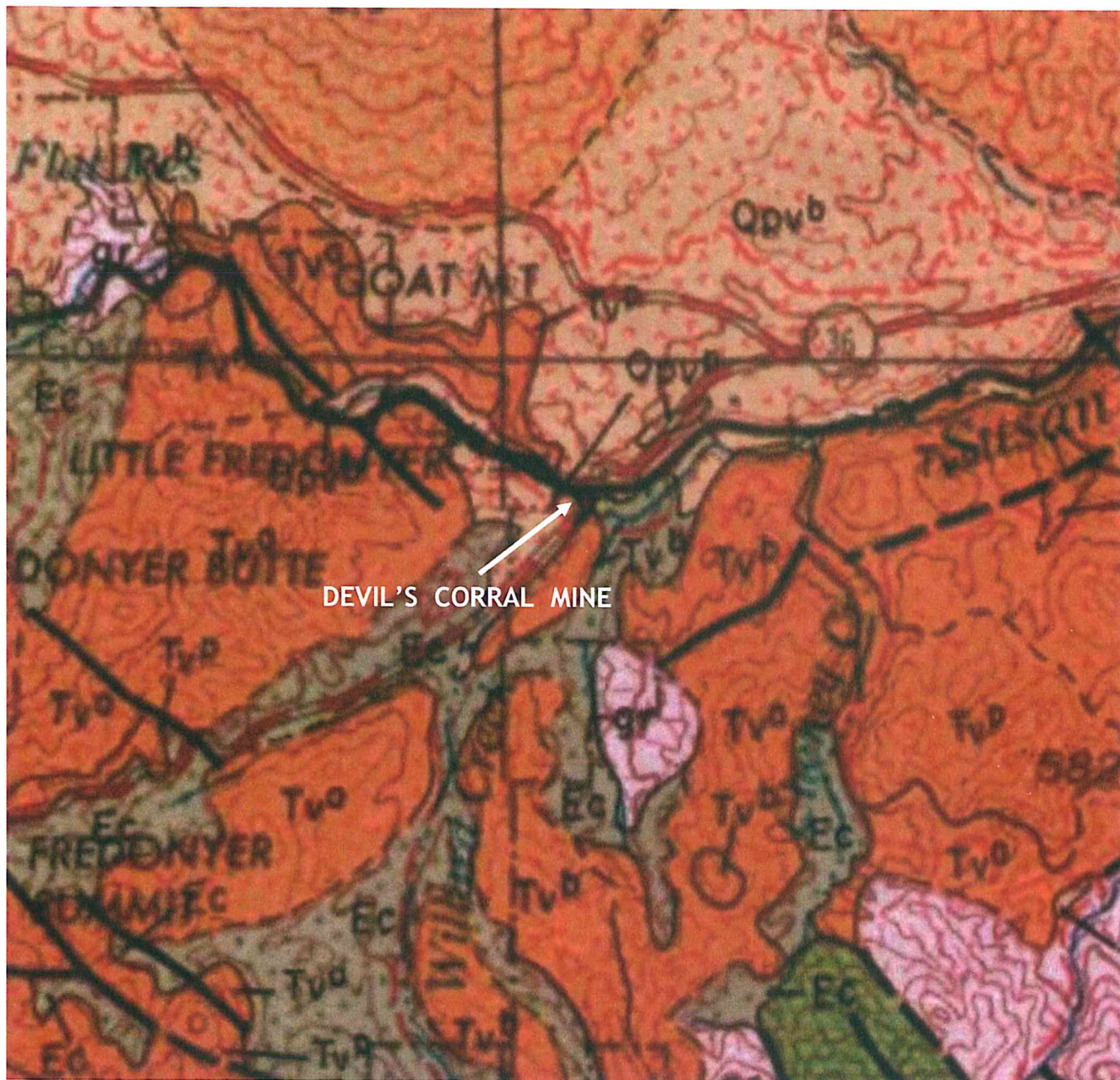


- Approximate Parcel Boundary
- Reclamation Boundary



FIGURE 5
SITE LAYOUT
DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA

SOURCE: GOOGLE EARTH 2020 AERIAL PHOTOGRAPH; LASSEN COUNTY 2014



Eocene nonmarine



Cenozoic volcanic: QTV'—rhyolite;
QTV^a—andesite; QTV^b—basalt;
QTV^p—pyroclastic rocks



Pleistocene volcanic: Qpv'—rhyolite;
Qpv^a—andesite; Qpv^b—basalt;
Qpv^p—pyroclastic rocks



Tertiary volcanic: Tv'—rhyolite;
Tv^a—andesite; Tv^b—basalt;
Tv^p—pyroclastic rocks

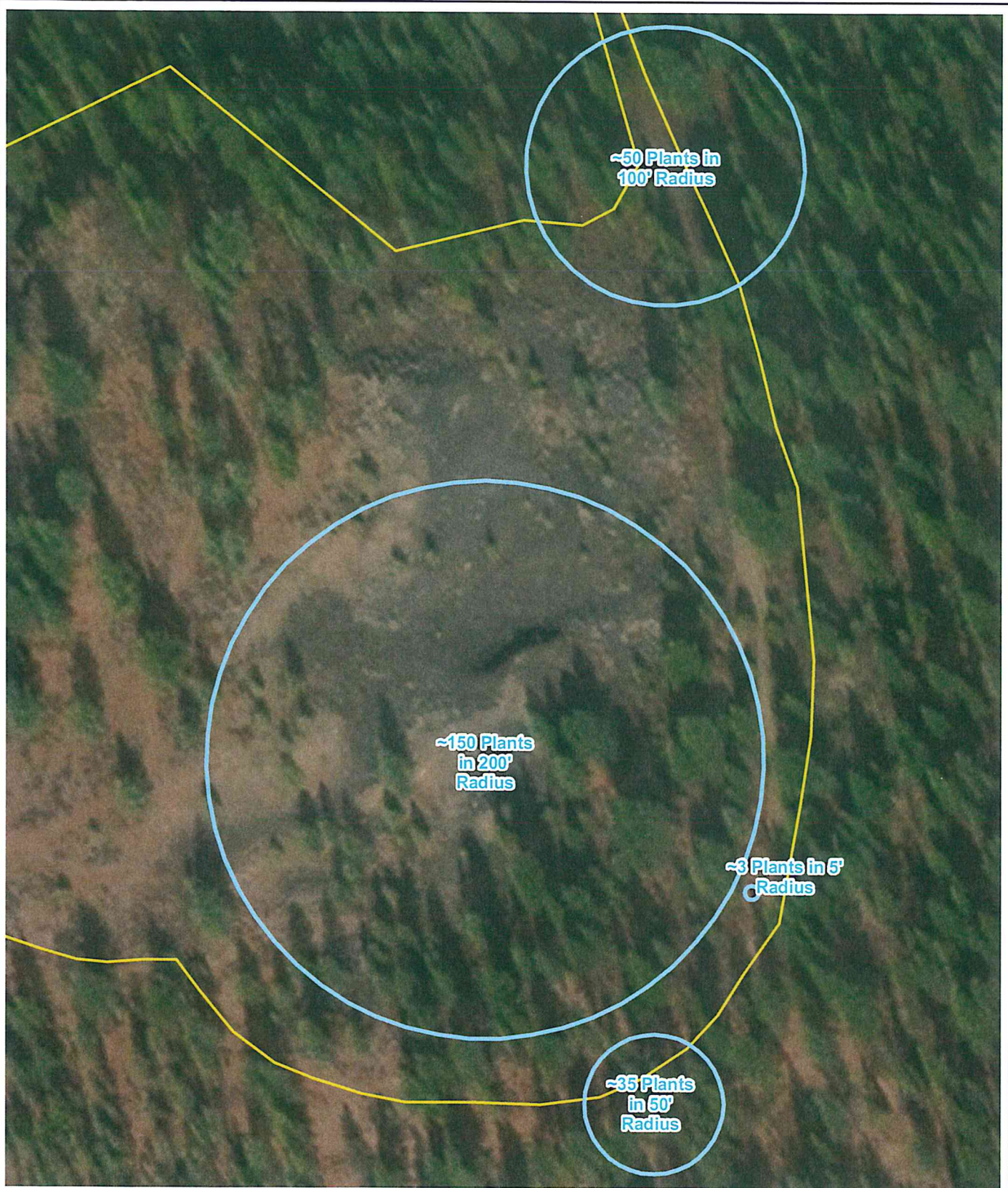


SOURCE: STATE OF CALIFORNIA DIVISION OF MINES, 1960

FIGURE 6
GEOLOGY
DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA



SOURCE: MAXAR 2018 AERIAL PHOTOGRAPH; FEMA 2020



- Susanville Beardtongue Occurrence
- Reclamation Boundary

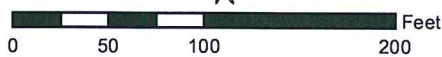
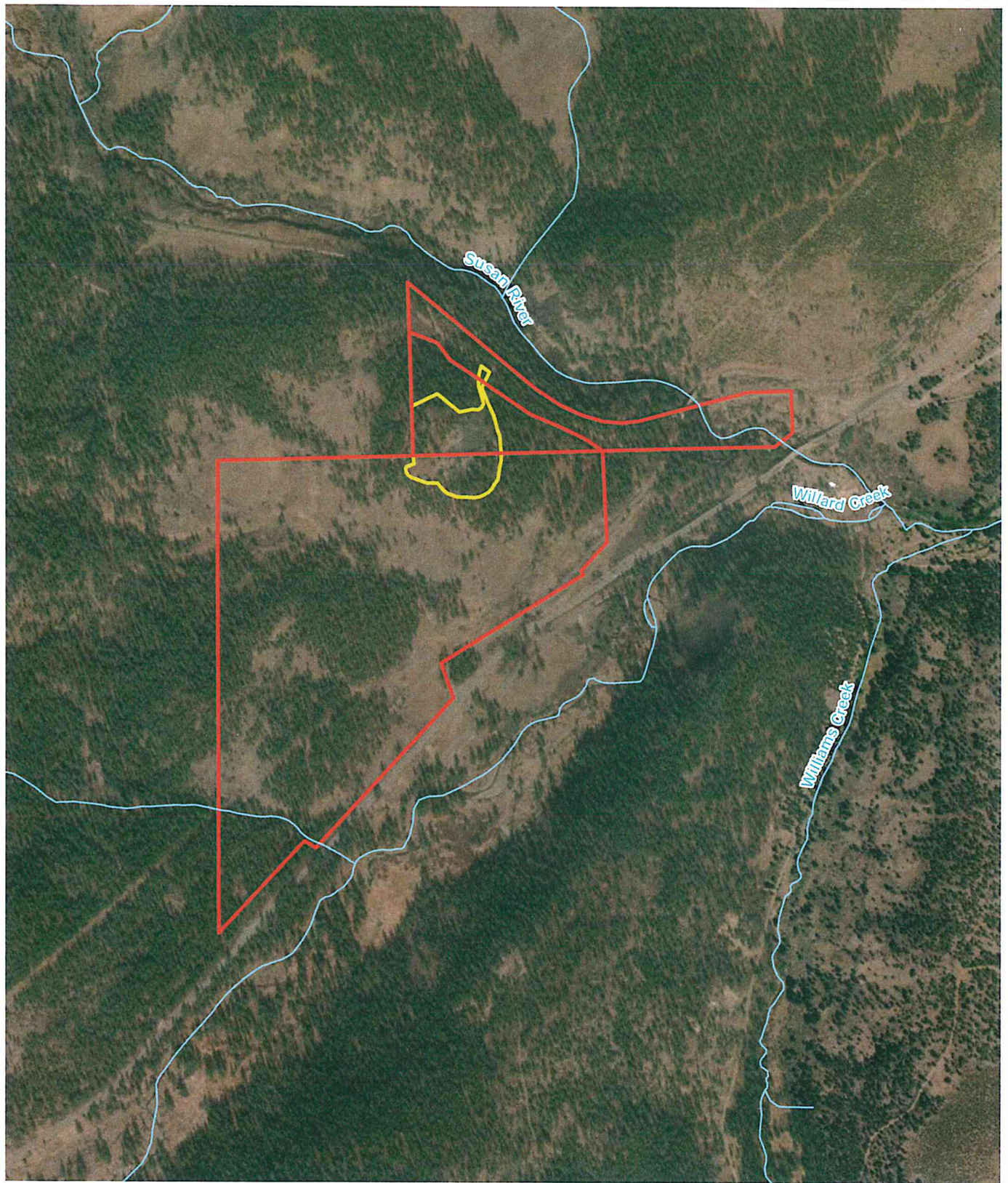


FIGURE 8
 SUSANVILLE BEARDTONGUE
 OCCURRENCES AND DENSITY PREFIRE
 DEVIL'S CORRAL MINE
 LASSEN COUNTY, CALIFORNIA

SOURCE: MAXAR 2018 AERIAL PHOTOGRAPH; FEMA 2020



- Stream
- Approximate Parcel Boundary
- Reclamation Boundary







0 500 1,000 2,000 Feet



SOURCE: MAXAR 2018 AERIAL PHOTOGRAPH; FEMA 2020

FIGURE 9
HYDROLOGY
DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA



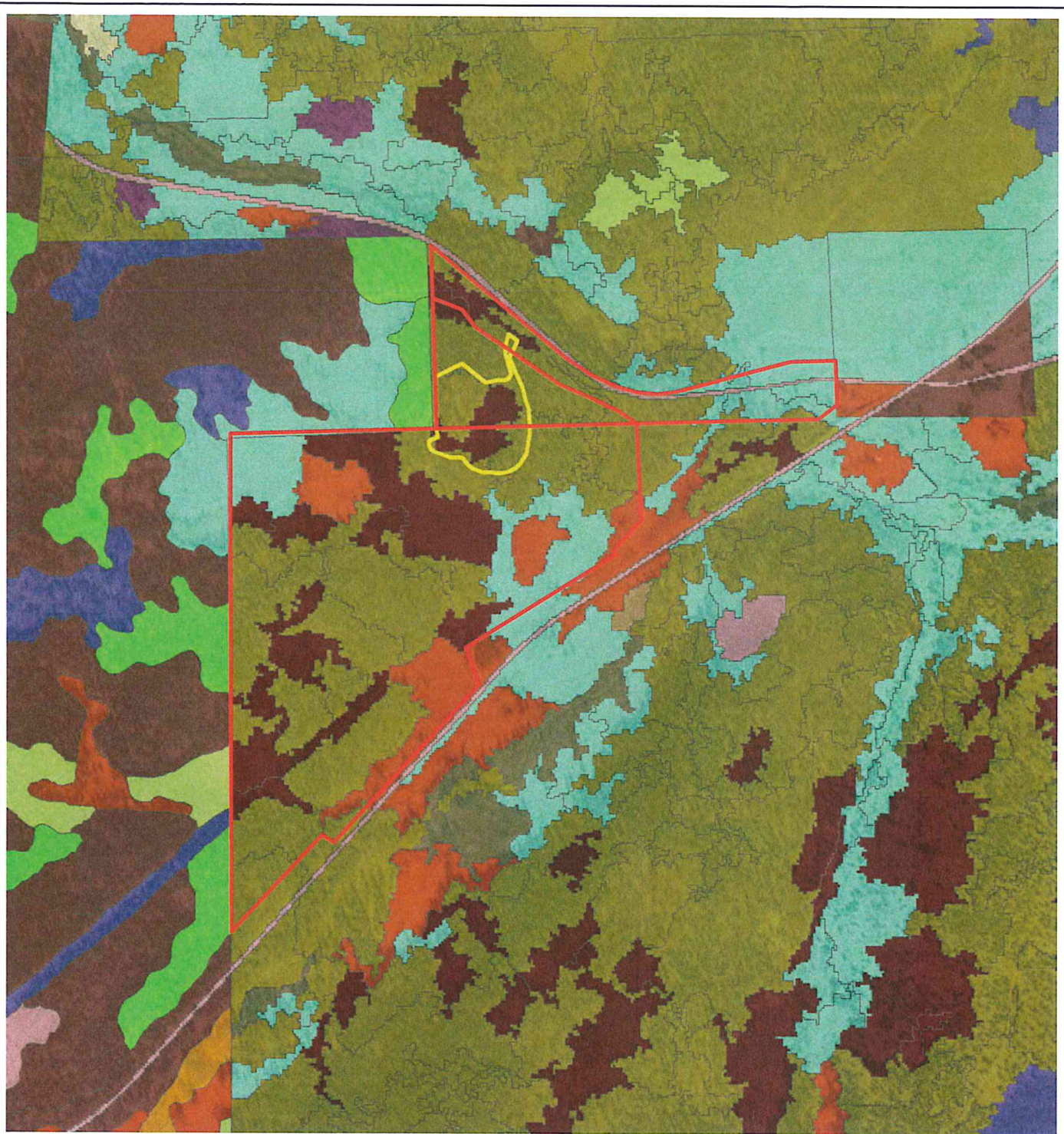
- | | |
|---|---|
|  Herbs and Grass (2.5 acres) |  Reclamation Boundary |
|  Ponderosa Pine/Jeffrey Pine (6.5 acres) |  Approximate Parcel Boundary |



SOURCE: MAXAR 2018 AERIAL PHOTOGRAPH; LASSEN COUNTY 2014

FIGURE 10
REVEGETATION PLAN
DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA





- | | | |
|-----------------------------|-------------------|-----------------------|
| Approximate Parcel Boundary | Eastside Pine | Perennial Grassland |
| Reclamation Boundary | Jeffrey Pine | Ponderosa Pine |
| Annual Grassland | Juniper | Sagebrush |
| Aspen | Low Sage | Sierran Mixed Conifer |
| Barren | Montane Chaparral | Wet Meadow |
| Bitterbrush | Montane Riparian | |



0 375 750 1,500 Feet












FIGURE 11
PRE-FIRE HABITAT CLASSIFICATIONS
DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA

SOURCE: MAXAR 2018 AERIAL PHOTOGRAPH; USFS 2019

T29N R10E R11E

HOG FIRE SALVAGE RRF LLC / SLM, Inc. Logging Agreement

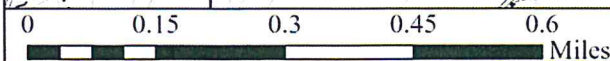
Map Equivalent of Roop Mountain 1980 7.5 Minute Quadrangle

- | | |
|---|---|
|  Agreement Area |  Seasonal Private Road |
|  Springs |  Class I Watercourse |
|  Permanent Public Road |  Class II Watercourse |
|  Seasonal Public Road |  Class III Watercourse |
| |  No Class Swale |

Mount Diablo Base & Meridian 40' Contour Interval

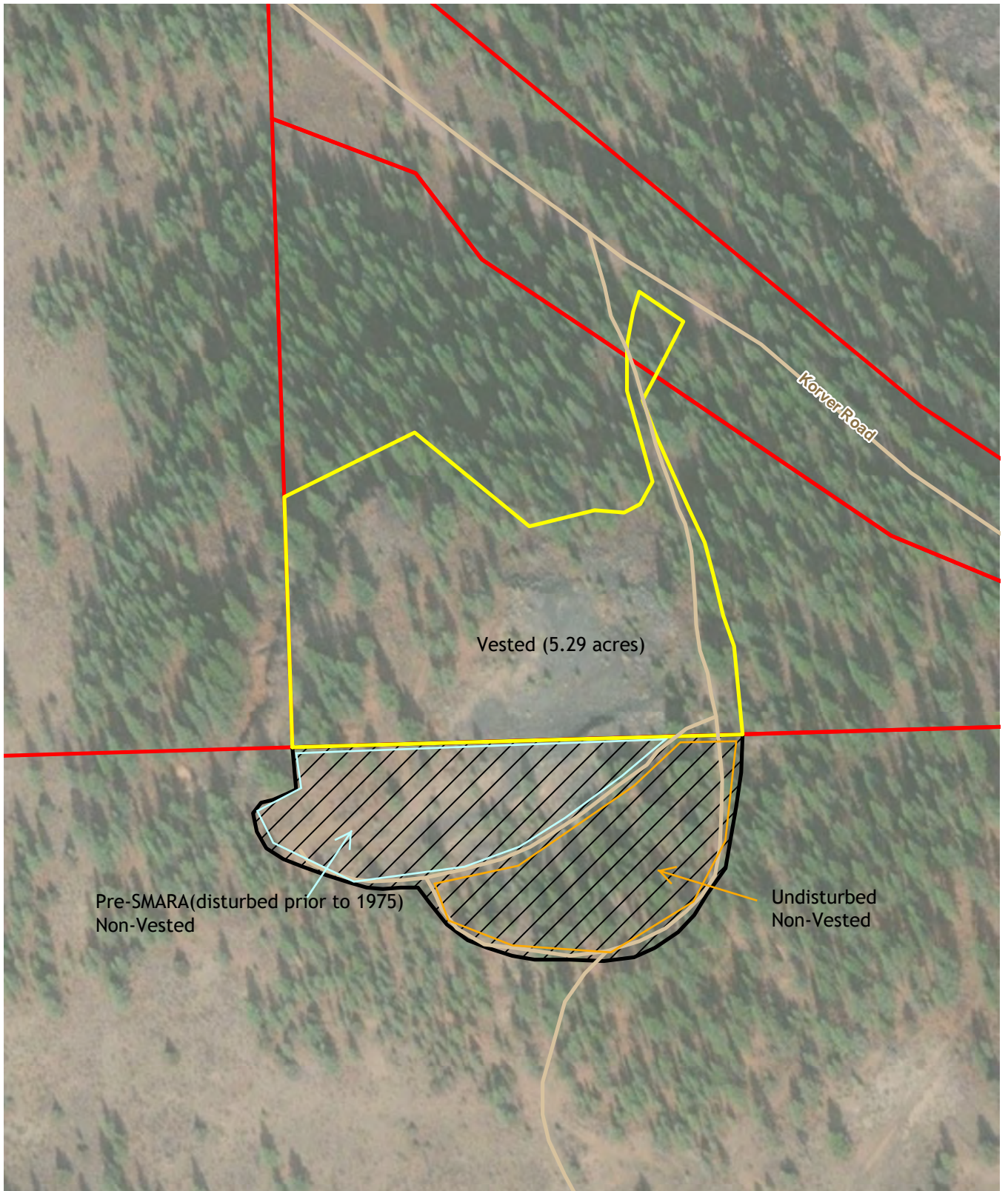
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Z:\HPS\TIP 2020 HogFire Salvage HogFireSalvage.aprx

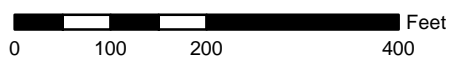


SOURCE: BEATY & ASSOCIATES

**FIGURE A
TRAFFIC ROUTE
DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA**



- Access Road
- SMARA Vested Area
- Approximate Parcel Boundary
- Non-Vested Area



Vested/Non-Vested Areas
DEVIL'S CORRAL MINE LASSEN
COUNTY, CALIFORNIA



SOURCE: MAXAR 2018 AERIAL PHOTOGRAPH; LASSEN COUNTY 2014

P:\GIS\72028\Figures\LassenCounty\72028_SMARA_Road.mxd

BIOLOGICAL RESOURCES ASSESSMENT

DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA

Prepared for

Turner Excavating

Prepared by



VESTRA Resources Inc.
5300 Aviation Drive
Redding, California 96002

72028

**JULY 2020
REVISED FEBRUARY 2021**

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1	General Site Location
2	Hydrology
3	Habitat Classifications Pre-Fire
4	CNDDDB Occurrences
5	Susanville Beardtongue Occurrences and Density Pre-Fire
6	Post-Fire Vegetation

APPENDICES

A	U.S. Fish and Wildlife Service iPAC Species List
B	California Rare Plant Rank (CRPR) Query Results

1.0 INTRODUCTION & PROJECT DESCRIPTION

The Devil's Corral Mine (also known as the 36 Mine) is a vested operation in Lassen County which has existed since the 1920s. The quarry site is located at the eastern side of Little Fredonyer Peak, west of the Susan River and seven miles west of the City of Susanville, California. The site is located in Section 6, T29N, R11E, MDBM (Lassen County APNs 115-200-55-11 and 115-200-32-11). The general site location is shown on Figure 1.

The planned mine will cover an approximately 9.2-acre area. Reclamation being proposed would occur over the entire site. Reclamation methods, including topsoil replacement and revegetation, would be completed in all disturbed areas by methods described in the Surface Mine Reclamation Plan Application prepared for Lassen County.

The facility mines construction-grade aggregates, primarily for road construction and maintenance. A portable crushing and screening plant will be used at the quarry in the future but there is currently no equipment at the site. The site does not operate full time. The mine has historically operated to serve public works as needed, and only operates during spring, summer and fall months as the site is inaccessible during winter months.

Reclamation will occur at the cessation of the mining operation. All activities to remove rock debris and stabilize slopes, rip to reduce compaction, and revegetate will occur within one year following cessation of mining at the site. Reclamation will include revegetation of the site including planting ponderosa/Jeffrey pine (*Pinus ponderosa*/*Pinus jeffreyi*) plugs along with broadcasting native shrub and non-native herbaceous plants and grass seed. In areas where ponderosa pine and shrubs are not supported due to shallow soils, naturalized revegetation will include only the seeding of native perennial grasses and forbs.

2.0 REGULATORY FRAMEWORK FOR BIOLOGICAL RESOURCES

This section describes the federal and state regulation of special-status species, waters of the United States, and other sensitive biological resources.

2.1 Federal Regulations

2.1.1 Federal Endangered Species Act

Section 9 of the federal Endangered Species Act of 1973 (ESA) prohibits acts that result in the “take” of threatened or endangered species. As defined by the federal ESA, “endangered” refers to any species that is in danger of extinction throughout all or a significant portion of its current range. The term “threatened” is applied to any species likely to become endangered within the foreseeable future throughout all or a significant portion of its current range. “Take” is defined as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.” Sections 7 and 10 of the federal ESA provide methods for permitting otherwise lawful actions that may result in “incidental take” of a federally listed species. Incidental take refers to take of a listed species that is incidental to, but not the primary purpose of, an otherwise lawful activity. Incidental take is permitted under Section 7 for projects on federal land or involving a federal action; Section 10 provides a process for non-federal actions. The act is administered by the U.S. Fish and Wildlife Service (USFWS) for terrestrial species.

2.1.2 Clean Water Act

The objective of the Clean Water Act (1977, as amended) is to restore and maintain the chemical, physical, and biological integrity of the nation’s waters. Discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands, is regulated by the Corps under Section 404 of the Clean Water Act (33 USC 1251-1376) under a permitting process. Applicants for Section 404 permits are also required to obtain water quality certification or waiver through the local Regional Water Quality Control Board under Section 401 of the Clean Water Act (33 USC 1341).

Corps regulations implementing Section 404 define waters of the United States to include intrastate waters, including lakes, rivers, streams, wetlands, and natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce. Wetlands are defined for regulatory purposes as “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR 328.3; 40 CFR 230.3). To comply with the Corps policy of “no net loss” of wetlands, discharge into wetlands must be avoided and minimized to the extent practicable. For unavoidable impacts, compensatory mitigation is typically required to replace the loss of wetland functions in the watershed.

2.1.3 Migratory Bird Treaty Act

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any

migratory bird listed in 50 CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). Mitigation measures can be identified to avoid or minimize adverse effects on migratory birds.

2.2 State Regulatory Requirements

2.2.1 California Endangered Species Act

The California Endangered Species Act (CESA) lists species of plants and animals as threatened or endangered. Projects that may have adverse effects on state-listed species require formal consultation with CDFW. “Take” of protected species incidental to otherwise lawful activities may be authorized under Section 2081 of the California Fish and Game Code. Authorization from the CDFW is in the form of an Incidental Take Permit, and measures can be identified to minimize take. CDFW Species of Special Concern are considered under the California Endangered Species Act.

2.2.2 Streambed Alteration Agreement

A Lake or Streambed Alteration Agreement (Sections 1600-1616 of the California Fish and Game Code) requires an entity to notify CDFW prior to commencing any activity that may substantially obstruct the natural flow or use any material from a river, stream, or lake, or deposit or dispose of debris where it may pass into any river, stream, or lake. The notification requirement applies to any ephemeral or perennial river, stream, or lake in California.

2.2.3 Birds of Prey

Under Section 3503.5 of the California Fish and Game Code, it is unlawful to take, possess, or destroy any birds in the orders of Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird, except as otherwise provided by this code or any regulation adopted pursuant thereto. Project features will be implemented to protect nesting migratory birds and birds of prey to comply with this code.

2.2.4 Migratory Birds

The California Fish and Game Code, Section 3513, states that it is unlawful to take or possess any migratory nongame bird as designated in the MBTA or any part of such migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the MBTA. Project features will be implemented to protect nesting migratory birds and birds of prey to comply with this code.

2.2.5 Surface Mining and Reclamation Act of 1975 (SMARA)

SMARA Chapter 9, Division 2 of the Public Resources Code, requires the State Mining and Geology Board to adopt State policy for the reclamation of mined lands and the conservation of mineral resources. These policies are prepared in accordance with the Administrative Procedures Act, (Government Code) and are found in California Code of Regulations, Title 14, Division 2, Chapter 8, Subchapter 1. The Surface Mining and Reclamation Act of 1975 (SMARA, Public

Resources Code, Sections 2710-2796) provides a comprehensive surface mining and reclamation policy with the regulation of surface mining operations to assure that adverse environmental impacts are minimized and mined lands are reclaimed to a usable condition. The reclamation plan for this site has been prepared to satisfy SMARA requirements.

3.0 AFFECTED ENVIRONMENT/NATURAL RESOURCES

3.1 Soils

The Natural Resources Conservation Service (2019) identified soils within the project boundary as Uhalf-Southpac complex, 2 to 30 percent slopes (NRCS 2020). These soils are colluvium derived from volcanic rock and residuum weathered from volcanic rock. The typical restrictive layer is approximately 40 to 60 inches deep and is comprised of paralithic bedrock.

3.2 Hydrology

No streambeds, banks, channels, or drainages are located in the reclamation plan area or in the immediate vicinity of the mine. The nearest waterways are the Susan River (0.15 miles east) and Willard Creek (0.35 miles south). No groundwater delivery is required onsite. No impact to aquatic habitats will occur. Hydrology of the mine site and surrounding area is shown on Figure 2.

3.3 Vegetation Communities

Vegetation at the project site has been identified via the California Department of Fish and Wildlife's (CDFW) Vegetation Classification and Mapping Program (VegCAMP) data and field surveys as eastside pine and bitterbrush as shown on Figure 3.

The site visit found that the site was predominantly an eastside pine forest pre-fire, with the surrounding area dominated by bitterbrush and other shrub species. Annual grassland comprises the ground cover within eastside pine habitat. Antelope bitterbrush (*Purshia tridentata*) comprises the understory of the eastside pine habitat and large stands of shrubland surround the forested mine site. The typical structure and composition of habitat types that were observed onsite are described below.

Eastside Pine

Eastside pine habitat can occur as a pure pine stand or as a mixed forest that includes an oak or juniper understory. Ponderosa pine (*Pinus ponderosa*) is often the dominant pine species with less representation by Jeffrey pine (*Pinus jeffreyi*), lodgepole pine (*Pinus contorta*), and western juniper (*Juniperus occidentalis*). An open stand of low shrubs and a grassy herb layer are typical. The pine canopy within this habitat is open which allows for light, wind, and rain to reach the understory. The understory composition includes Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and bottlebrush squirreltail (*Elymus elymoides*). This habitat covers the entire mining area.

Bitterbrush

Bitterbrush habitat is a shrub dominant habitat, with antelope bitterbrush (*Purshia tridentata*) comprising most of the shrub community. Other species present in this habitat include low sagebrush (*Artemisia arbuscula*), annual grasses, and forbs such as lupine (*Lupinus* ssp.), mule ears (*Wyethia* sp.), and Penstemon species. Bitterbrush habitat covers the area south of the mine boundary. No further disturbance will occur within this habitat. One existing access road is located in this habitat, and leads to the eastside pine habitat where the mine is located.

4.0 BIOLOGICAL SITE SURVEY

4.1 Pre-Survey Review

Special-status plant and animal species and sensitive habitats that have the potential to occur within the project area were determined, in part, by reviewing agency databases, literature, and other relevant sources. The CNDDB map of nearby special-status species occurrences is included as Figure 4. The following information sources were also reviewed to aid this determination:

- Roop Mountain, California, USGS 7.5-minute quadrangle;
- Aerial photography of the project area and vicinity;
- The U.S. Fish and Wildlife Service (USFWS) official list of endangered and threatened species that may occur, or be affected by projects, as provided by the Sacramento and Reno Fish and Wildlife Offices (Consultation Codes 08ESMF00-2020-SLI-2361 and 08ENV000-2020-SLI-0508);
- The California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) (California Department of Fish and Wildlife 2015a) records for the Roop Mountain, California USGS 7.5-minute quadrangle and the eight surrounding quadrangles;
- The California Native Plant Society (CNPS) online Inventory of Rare and Endangered Plants (California Native Plant Society 2015) records for the Roop Mountain, California USGS 7.5-minute quadrangle and the eight surrounding quadrangles;
- California Wildlife Habitat Relationships (CWHR) System (California Department of Fish and Game 2020).
- GIS shapefiles of designated critical habitat from the USFWS Critical Habitat Portal website;
- CDFW publications including State and Federally Listed Endangered, Threatened and Rare Plants of California (California Department of Fish and Wildlife 2015b); State and Federally Listed and Threatened Animals of California (California Department of Fish and Wildlife 2015d); and Special Animals List (California Department of Fish and Wildlife 2015e); and
- Pertinent biological literature including Bird Species of Special Concern in California (Shuford and Gardali 2008).

4.2 Survey Methods

A site visit was conducted on July 8, 2020, to characterize the habitat types onsite as well as to document any observations of special-status species or their habitat within the mine area. A Trimble Geo XT Explorer 6000, Nikon P530 camera, and binoculars were used during the survey to observe and document site characteristics and species presence. Biological resources within these areas were documented, including all wildlife species and plant species observed during the survey.

A special-status botanical survey was completed according to methods outline in CDFW's "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities" published March 20, 2018. The survey covered all areas within the mine boundary, access roads, and surrounding areas that may be impacted by mining activities. The survey found a population of Susanville Beardtongue which occurs on rock outcrops and other disturbed soils onsite. This population was previously documented onsite in 2015.

4.3 Survey Results

No special-status wildlife species were observed onsite during the survey. Wildlife observed onsite includes black tailed deer (*Odocoileus hemionus*), Stellar's jay (*Cyanocitta stelleri*), Great Basin fence lizard (*Sceloporus occidentalis longipes*), and common passerines (song birds). A black-tailed deer doe and fawn were observed bedded down within the mine boundary. Evidence of rodent activity was observed throughout the site including scat and active burrows, likely belonging to ground squirrels (*Citellus* sp.).

The following plant species were observed within the project area:

- Ponderosa pine (*Pinus ponderosa*)
- Jeffery pine (*Pinus jeffreyi*)
- Low sagebrush (*Artemisia arbuscula*)
- Downy chess (*Bromus tectorum*)
- Antelope bitterbrush (*Purshia tridentata*)
- Mahala mats (*Ceanothus prostratus*)
- Pursh's milk vetch (*Astragalus purshii*)
- Susanville beardtongue (*Penstemon sudans*)
- Sulphur-flower buckwheat (*Eriogonum umbellatum*)
- Hawksbeard (*Crepis* ssp.)
- Lupine (*Lupinus* ssp.)
- Rubber rabbitbrush (*Ericameria nauseosa*)
- Western juniper (*Juniperus occidentalis*)
- Chokecherry (*Prunus virginiana*)
- Woolly mullein (*Verbascum Thapsus*)
- Narrow-leaved mule ears (*Wyethia angustifolia*)
- Woolly mule's ears (*Wyethia mollis*)
- Deltoid balsam root (*Balsamorhiza deltoidea*)
- Hooker's balsam root (*Balsamorhiza hookeri*)
- Twin arnica (*Arnica sororia*)
- Regel's mountain Penstemon (*Penstemon roezlii*)
- Diamond clarkia (*Clarckia rhomboidea*)
- Varileaf phacelia (*Phacelia heterophylla*)
- Spreading dogbane (*Apocynum androsaemifolium*)

- Bottlebrush squirreltail (*Elymus elymoides*)
- Medusahead (*Elymus caput medusa*)
- One spiked oatgrass (*Danthonia unispicata*)

The survey found a population of Susanville beardtongue which occurs on rock outcrops and other disturbed soils onsite. This population was previously documented onsite in 2015. The locations of each rare plant occurrence are shown on Figure 5. The characterizations of each observed “patch” is described in Table 1.

Table 1 OBSERVATIONS OF SUSANVILLE BEARDTONGUE JULY 8, 2020		
Observation #	Coordinates	Description
1	40.39596444, -120.78805556	50 plants within 100’ radius next to access rd.
2	40.39404583, -120.78888889	35 plants in 50’ radius, disturbed rocky soils
3	40.39505139, -120.78916667	100 plants within 200’ radius in quarry area
4	40.39503500, -120.78833333	3 plants in sandy soils below quarry (undisturbed)

5.0 POTENTIAL IMPACTS TO BIOLOGICAL RESOURCES

5.1 Special-Status Species

The regionally occurring species identified during the pre-s455 survey consultation were assessed based on the potential for their habitat to occur within the project area. The habitat of each species and determination of whether the species is likely to occur in the project area is summarized in Table 2. Species that are determined to potentially occur in the project area were included in the scope of a biological resources survey.

Table 2 POTENTIALLY OCCURRING SPECIAL STATUS SPECIES							
Scientific Name	Common Name	Fed Status	State Status	CRPR Status	Habitat	Habitat Present	Project Impact
Birds							
<i>Accipiter gentilis</i>	northern goshawk	--	CDFW SSC	N/A	Nest in mature and old-growth forest stands	No	No impact
<i>Falco mexicanus</i>	prairie falcon	USFWS BCC	CDFW WL	N/A	Nest on cliff ledge overlooking open meadows in grasslands and forests	No	No impact
<i>Haliaeetus leucocephalus</i>	bald eagle	FDR	--	N/A	Nest in forested areas adjacent to large bodies of water in large, super-canopy trees	No	No impact
<i>Strix occidentalis occidentalis</i>	California spotted owl	--	CDFW SSC	N/A	Nest in mature, multi-layered forest stands in tree or snag cavities, or in broken top of large trees.	No	No impact
Mammals							
<i>Myotis evotis</i>	long-eared myotis	--	CDFW SSC	N/A	Coniferous woodland and forests; roosts in tree crevices, snags, and behind bark	Yes	Less than significant impact
<i>Antrozous pallidus</i>	pallid bat	--	CDFW SSC	N/A	Forages over many habitats; primarily roosts in buildings, mines and caves; also in oak and pine forested areas, usually near a source of water	No Bridge ¼ mile from site	No impact
<i>Aplodontia rufa californica</i>	Sierra Nevada mountain beaver	--	CDFW SSC	N/A	Dense riparian-deciduous and open, brushy stages of most forest types	No	No impact
<i>Erethizon dorsatum</i>	North American porcupine	--	--	N/A	Montane conifer and wet meadow habitats	No	No impact
<i>Gulo gulo luscus</i>	North American wolverine	FPT	ST	N/A	Mixed conifer, red fir, and lodgepole pine habitats	No	No impact

<p style="text-align: center;">Table 2 POTENTIALLY OCCURRING SPECIAL STATUS SPECIES</p>							
Scientific Name	Common Name	Fed Status	State Status	CRPR Status	Habitat	Habitat Present	Project Impact
<i>Vulpes vulpes necator</i>	Sierra Nevada red fox	FC	ST	N/A	Open conifer woodlands and mountain meadows near tree line in high mountain elevations	Yes	Less than significant impact
Reptiles							
<i>Ambystoma macrodactylum sigillatum</i>	Southern long-toed salamander	--	CDFW SSC	N/A	Ponderosa pine, montane hardwood-conifer, mixed conifer, montane riparian, red fir, and wet meadows	No	No impact
Invertebrates							
<i>Bombus occidentalis</i>	western bumble bee	--	SC	N/A	Meadows and grasslands with abundant floral resources	Yes	Less than significant impact with mitigation proposed
Plants							
<i>Astragalus pulsiferae</i> var. <i>pulsiferae</i>	Pulsifer's milk-vetch	--	--	1B.2	Sandy or rocky soils in pine or sagebrush communities	Yes	No impact
<i>Penstemon sudans</i>	Susanville beardtongue	--	--	4.3	Open, rocky soils in pine or sagebrush communities	Yes	Less than significant impact with reclamation proposed
<i>Phlox muscoides</i>	squarestem phlox	--	--	2B.3	Open, rocky areas	Yes	No impact
<i>Botrychium ascendens</i>	upswept moonwort	--	--	2B.3	Moist meadows, open woodlands near streams or seeps	No	No impact
<i>Botrychium crenulatum</i>	scalloped moonwort	--	--	2B.2	Saturated hard water seeps and stream margins	No	No impact
<i>Botrychium minganense</i>	Mingan moonwort	--	--	2B.2	Meadows, open forest along streams or around seeps	No	No impact
<i>Botrychium montanum</i>	western goblin	--	--	2B.1	Shady conifer woodland, especially under <i>Calocedrus</i> along streams	No	No impact
<i>Juncus dudleyi</i>	Dudley's rush	--	--	2B.3	Wet areas in montane conifer forests	No	No impact
FED – FPT: Federally proposed (threatened); FC: Federal candidate for listing; FDR: Federally delisted (recovery); USFWS BCC: US Fish and Wildlife bird species of special concern; STATE – SE: State listed (endangered); ST: State listed (threatened); SC: Candidate for listing (endangered); CDFW SSC: California Department of Fish and Wildlife Species of Special Concern; CDFW WL: watch list; CRPR - 1B: rare, threatened, or endangered in California and elsewhere; 2B: rare, threatened, or endangered in California, but more common elsewhere.							

Based on the above assessment of the presence of potential habitat for species that are known to occur in the region, the following species were found to have the potential to occur onsite:

- Long-eared myotis (*Myotis evotis*)
- Sierra Nevada red fox (*Vulpes vulpes necator*)
- Western bumble bee (*Bombus occidentalis*)
- Pulsifer's milk-vetch (*Astragalus pulsiferae* var. *pulsiferae*)
- Susanville beardtongue (*Penstemon sudans*)
- Squarestem phlox (*Phlox muscoides*)

Long-eared myotis

Myotis evotis

Ecological requirements for bat roosts, including maternity roosts, include an appropriate thermal gradient, shelter from predators, and close proximity to foraging sites near open water. Trees near riparian areas have the potential to meet these requirements; the roost can occur in small hollows or even underneath exfoliating tree bark (Johnston 2004). During the summer when bats are most active and raising their young, they frequently use one roost during the day where they sleep and keep their young, and another roost at night for resting and digesting food.

Long-eared bats roost in tree cavities and beneath exfoliating bark in both living trees and dead snags. Pregnant long-eared myotis often roost at ground level in rock crevices, fallen logs, and even in the crevices of sawed-off stumps, but they cannot rear young in such vulnerable locations. A recent study found that lactating females selected rock crevices as maternity roosts more frequently than tree cavities, whereas males used tree roosts and rock roosts more evenly. Trees were selected for maternal roosts at sites where rock crevices were relatively less abundant. Proximity to at least one perennial water source was found to be a priority for long-eared bat roost selection; bats were found to select roosts that were an average of 600 feet from a water source (Snider 2013).

Rock outcrops and boulder fields were observed onsite. According to CNDDDB, these provide “low” and “medium” quality habitat occupying the mine area (Gogol-Prokurat 2017). This quality rank represents the average likelihood that the species will utilize the area for breeding, foraging, and roosting. The relatively low quality of the rock outcrops onsite is likely due to the low elevation and the shade cover, which inhibit the required thermal gradient and shelter from predators. The surrounding area, occupied by thousands of acres of land managed by the U.S. Forest Service, is shown as “high” quality habitat for long-eared myotis. This “high” quality habitat exists within large-diameter snags and vast exposed rock outcrops that provide numerous roosting opportunities. Bats in the area likely select roost habitat in these areas rather than the mine site.

Sierra Nevada red fox

Vulpes vulpes necator

The Sierra Nevada red fox (SNRF) historically occupied alpine and subalpine habitats in the Sierra Nevada and Cascade Mountains of California and Oregon. Inhabiting remote, high elevation habitats, Sierra Nevada red fox was historically widespread but occurred at low population densities throughout its range. Estimates of Sierra Nevada red fox home ranges vary from 160 to 17,150 acres. Sierra Nevada red fox diet consists of mammals, reptiles, arthropods, fruit and manmade items, in that order of abundance. Dens have been recorded as occurring in a variety of habitats from tallus slopes to woodland habitat. While not many dens have been

observed, characteristics of the few observed dens include multiple entry/exit holes and a close proximity to water.

The known range of Sierra Nevada red fox today is limited to two small populations in California; one is near Lassen Peak, and a second lives near Sonora Pass on the Humboldt-Toiyabe and Stanislaus National Forests (Center for Biological Diversity 2021). The Lassen population is limited to a small area that includes portions of the Lassen Volcanic National Park and Lassen National Forest. Surveys completed in 1981 found a SNRF den located approximately two miles northwest of the project area. Data collected since the den was discovered suggests that populations of SNRF have declined in recent decades. Data collected near Lassen Peak found that the total population of SNRF may be between 50 and 15 foxes.

The Center for Biological Diversity mapped the approximate historical and known current ranges of Sierra Nevada red fox using a conservative interpretation of historical range maps and information about the fox's current known range. While this map should be considered a very rough estimate of both ranges, it depicts a 96 percent reduction from approximate historical range (12,454,124 acres) to approximate current known range (566,197 acres).

The prevailing long-term potential impact to SNRF from development and grazing is the loss of foraging habitat. Residential development generally results in the loss of acreage of native vegetation and open space. Grazing of non-native livestock presents competition for SNRF herbivorous prey species such as voles because they rely on the same grasses that are grazed by cattle and sheep. While the presence of SNRF is not anticipated to occur due to dramatic population declines, the potential remains for the mine area to overlap with the home range of one or more SNRF. Due to the large home range of an individual Sierra Nevada red fox, if any foxes occur in the area they will likely select foraging habitat outside of the proposed development.

Due to the potential for SNRF to be present based on historic data, and the critical need for conserving the few remaining SNRF individuals in the area, the site survey considered SNRF dens and den habitat. The survey found that there are no dens or habitat for denning within the proposed mine and reclamation boundary. Due to the low population numbers in the area, no SNRF is anticipated to occur onsite. If this species is determined to inhabit the project site at any time during mining or reclamation, impacts would be avoided through consultation with the U.S. Fish and Wildlife Service which would occur to determine appropriate measures to avoid or minimize impacts to SNRF. The project will have no impact of SNRF.

Western bumble bee ***Bombus occidentalis***

Historically, the western bumble bee one of the most broadly distributed bumble bee species in North America. Currently, the western bumble bee is experiencing severe declines in distribution and abundance due to a variety of factors including diseases and loss of genetic diversity. Exposure to certain insecticides has recently been identified as another major contributor to the decline of many pollinating bees, including honey bees and bumble bees. In the absence of fire, native conifers encroach upon a meadow, which also decreases foraging and nesting habitat available for bumble bees (Jepsen 2014).

The western bumble bee has three basic habitat requirements: suitable nesting sites for the colonies, suitable overwintering sites for the queens, and nectar and pollen from floral resources available throughout spring, summer and fall (Jepsen 2014). Nests occur primarily in

underground cavities such as old squirrel or other animal nests and in open west-southwest slopes bordered by trees. Queens overwinter in the ground in abandoned rodent nests in the ground and typically emerge about mid-March. The queen then lays fertilized eggs underground and nurtures a new generation. The workers that emerge will begin foraging and provisioning to accommodate additional recruits to the colony. Individuals emerging from fertilized eggs will become workers that reach peak abundance during July and August. Foraging individuals are largely absent by the end of September.

The nearest documented occurrence of western bumble bee to the mine site is approximately 4.5 miles northwest near Hog Flat Reservoir. These occurrences were recorded in 2013 during a targeted survey on USFS land.

The site was burned during the Hog Fire in July 2020. The fire burned severely and resulted in the loss of majority of the canopy onsite as is visible in Google Earth aerial imagery (Figure 6). The direct impacts from wildfire are unknown but mortalities likely affected bees in the area given that the fire occurred during the time of year when individuals are foraging above ground in greatest abundance (Ecological Society of America 2020). However, the loss of conifers from the site and surrounding area due to fire may have created an open meadow-like landscape which may improve nesting and foraging habitats for western bumble bees in future years.

The three habitat requirements of western bumble bees are assessed herein individually for potential impacts from the proposed activities onsite. The first two requirements, suitable nesting sites and suitable overwintering sites for the queens, would not be significantly impacted by the mine activities. Burrowing rodents commonly adapt to inhabiting areas with high human disturbance. Rock crevices and disturbed soils onsite have facilitated many rodent burrows. These burrows demonstrate that the mine site provides potential habitat for western bumble bee in the quarry and surrounding areas. Therefore, nesting sites will be preserved throughout the life of the mine.

The third requirement, proximity to nectar and pollen resources, may be temporarily impacted by the proposed mine activities due to the associated removal of vegetation within the mine area. During reclamation, native wildflowers and native grasses will be planted to improve foraging habitat for western bumble bees and other bee species. The revegetation palette has been selected to achieve a continuous availability of pollen and/or nectar between spring and fall when foraging habitat is most critical for bees. These areas will be monitored for invasive plants species which, if encountered, will be removed by hand. Additional overwintering opportunities would be created by placing small leaf and brush piles in the wildflower meadow during mine reclamation in addition to planting bunch grasses.

The proposed seed mix to be spread onsite during reclamation is shown in the revegetation palette (Table 3). This mix was selected to improve habitat quality for *Bombus occidentalis* upon reclamation. The seed mix will create a vegetative community onsite that provides wildflowers from spring through autumn annually to benefit bumblebees and other pollinators throughout all stages of their life history. The mix is composed of native shrub, grass, and forb species as well as non-native forb species that are naturalized in the wild in California. These naturalized species are included in the seed mix because of their positive contribution to the bumblebee habitat during the fall season, when few natives remain. CDFW will be asked to approve the use of naturalized species for this site. None of the proposed species are listed by the California Invasive Plant Council (Cal-IPC).

Table 3 REVEGETATION PALETTE						
Species Common Name	Scientific Name	Flowering Period			California Native (Y/N)	Source
		SPR	SUM	FALL		
Lewis blue flax	<i>Linum lewisii</i>				Y	Great Basin Seed – Great Basin Wildflower Mix or Custom Mix
Blanketflower	<i>Gaillardia aristata</i>				Y	
California poppy	<i>Eschscholzia californica</i>				Y	
Clarkia	<i>Clarkia sp.</i>				Y	
Palmer penstemon	<i>Penstemon palmeri</i>				Y	
Plains coreopsis	<i>Coreopsis tinctoria</i>				Y	
Rocky Mountain beeplant	<i>Cleome serrulata</i>				Y	
Showy goldeneye	<i>Heliomeris multiflora</i>				Y	
Globemallow	<i>Sphaeralcea sp.</i>				Y	
Balsamroot	<i>Balsamorhiza bookeri</i> or <i>B. sagittata</i>				Y	
Yarrow	<i>Achillea millefolium</i>				N	
Phacelia	<i>Phacelia sp.</i>				Y	
Gilia	<i>Gilia sp.</i>				TBD	
Indian blanket	<i>Gaillardia pulchella</i>				N	
Silvery lupine	<i>Lupinus argenteus</i>				Y	
Cosmos	<i>Cosmos bipinnatus</i>				N	
Prairie Aster	<i>Symphyotrichum spp</i>				N	
Prairie coneflower	<i>Echinacea</i>				N	
Penstemon	<i>Penstemon sp.</i>				Y	
Antelope bitterbrush	<i>Purshia tridentata</i>				Y	Great Basin Seed
Idaho fescue	<i>Festuca idahoensis</i>				Y	Great Basin Seed
Balsamroot	<i>Balsamorhiza sp.</i>				Y	Seed bank existing onsite
Susanville beardtongue*	<i>Penstemon sudans</i>				Y	
Sulphur buckwheat	<i>Eriogonum umbellatum</i>				Y	
Jeffery pine	<i>Pinus jefferyi</i>	N/A			Y	Plugs
Ponderosa pine	<i>Pinus ponderosa</i>	N/A			Y	Plugs
* Seeds will be collected during appropriate time of year and spread onsite to maintain existing population (seeds are viable for up to 5 years after collection)						

Mine activities generate opportunistic burrowing habitat for rodents, which in turn benefits bees onsite that utilize these rodent burrows. Reclamation activities will improve all three of the aforementioned habitat requirements for western bumble bee by providing overwintering habitat, retaining burrow sites, and propagating a biodiverse and high quality foraging habitat for the species. Therefore, the project may have a positive impact on western bumble bees.

Pulsifer's milk vetch (*Astragalus pulsiferaw* var. *pulsiferae*)

Federal Status: None

State Status: None

California Rare Plant Rank: 1B.2

Pulsifer's milk vetch is a native perennial herb endemic to California and Nevada. This species inhabits sandy or rocky soil areas within sagebrush scrub, yellow pine forest, and northern juniper woodland habitats between elevations of 1300 and 1900 meters. This species flowers annually between May and August (Calflora 2020).

Because of the proximity of special-status species to the study area and the presence of potential habitat, surveys were conducted on July 8, 2020, for the potentially occurring Pulsifer's milk vetch. The pedestrian survey covered the entire Reclamation Plan area. No Pulsifer's milk vetch was observed.

Susanville beardtongue (*Penstemon sudans*)

Federal Status: None

State Status: None

California Rare Plant Rank: 4.3

Susanville beardtongue is a native perennial herb/sub-shrub that occurs throughout the western United States but is rare in California. This species inhabits sandy to rocky substrates in open areas within sagebrush and forested habitats (Calflora 2020). The status of Susanville beardtongue was recently reduced from 1.2 (Threatened) to 4.2 (Watch List) due to reported additional populations. According to the CNDDB, Susanville beardtongue is prevalent in the area surrounding the mine site. One previous observation from 2015 is located at the southern mine boundary. Due to the presence of habitat for this species, and the known nearby occurrences, a pedestrian survey was completed onsite. The survey was completed on July 8, 2020, and covered the site area. Several occurrences of Susanville beardtongue were observed onsite. All occurrences are considered a single population based on their close proximity to one another.

Lassen County commented that *‘The proposed mine site burned in the Hog Fire in July of 2020. Salvage logging was witnessed onsite as of October 30, 2020. Despite this burn, native vegetation is growing back including Susanville beardtongue (P. sudans), as seen on a series of site visits, the first being on October 8, 2020’*. The California Natural Diversity Database (CNDDB) shows that the plant occurred onsite in 2015. Susanville beardtongue was observed by VESTRA on July 8, 2020, about one week prior to the Hog Fire reaching the site. On July 8, 2020, prior to burning, the population onsite was observed growing in areas where mine-related ground disturbance had occurred, which indicates that the activities onsite have created habitat for the species. Further disturbance occurred during the fire and the current status of Susanville beardtongue onsite is unknown.

Penstemon species generally do best in well-drained soils and most ecotypes do well on infertile, disturbed soils. They are usually found in open areas, but will tolerate semi-shaded conditions. They are somewhat fire-resistant due to leaves staying green with relatively high moisture content during the fire season (USDA 2021). Therefore, the anticipated response to recent project-related ground disturbance and wildfire impacts is an increase in the number of plants onsite as well as in the surrounding area where logging has caused ground-disturbance. Proposed activities that could indirectly impact Susanville beardtongue are rocking roads and dust generation during processing and hauling. The magnitude of these indirect impacts would be less than significant because of the intermittent operation schedule of the mine. Additionally, dust would be controlled using a water truck during dry, dust-prone periods.

Lassen County also stated that the Initial Study should be based on the *“realized physical conditions on the ground”*. A survey will be completed in late spring 2021 to determine current conditions with regards to the population of Susanville beardtongue. If increased baseline population numbers are observed, the potential project impacts would be reduced compared to the pre-fire conditions.

Mining activities could remove individual plants from the site. Reclamation would preserve the Penstemon population and characteristics onsite that provide its habitat. Seed collection during the appropriate time of year could support future attempts to plant Susanville Beardtongue onsite. Seeds can be collected from plants onsite within five years prior to reclamation (APS 2006-2020). Seed will be collected from the site (depending on the availability of plants onsite following the Hog Fire). If seeds are found and collected, they will be spread in the suitable habitat areas onsite during reclamation. Therefore, mine activities and reclamation will result in improved habitat quality and population health of Susanville beardtongue. In addition, areas of the Susanville beardtongue population will be preserved onsite to ensure population survival. These areas will be marked with exclusion fencing. Impacts will be less than significant.

Squarestem phlox (*Phlox muscoides*)

Federal Status: None

State Status: None

California Rare Plant Rank: 2B.3

Squarestem phlox, also referred to as “moss phlox,” is a rare native perennial herb that grows in Central and Northern California, primarily in the Warner Mountains, the High Cascade Range and Modoc Plateau regions. The plant grows in mat-like clumps resembling pin moss. This species inhabits rocky soils within forested areas (Calflora 2020).

Because of the proximity of special-status species to the study area and the presence of potential habitat, surveys were conducted on July 8, 2020, for the potentially occurring squarestem phlox. The pedestrian survey covered the entire Reclamation Plan area. No squarestem phlox was observed onsite.

5.2 Raptors and Migratory Birds

Raptor species (birds of prey) and migratory birds may nest in trees and other vegetation located within or in the immediate vicinity of the study area. All raptors and migratory birds, including common species and their nests, are protected from “take” under the California Fish and Game Code Section 3503 and 3503.5, and federal Migratory Bird Treaty Act. Large trees onsite and in the surrounding forest provide potential nesting habitat for raptors and migratory birds.

Blasting and other noise-generating activities that occur during the nesting season (February 1 – August 31) could result in impacts to nesting birds. Impacts to nesting birds can be avoided by completing nest surveys prior to completing activities that could disturb nesting birds (Shuford and Gardali 2008). Should a site survey detect nesting raptors or migratory song birds in close proximity to the project area, appropriate spatial and temporal buffers will be implemented. Therefore, the project is not anticipated to have a direct effect on raptors or migratory birds or their habitat.

5.3 Critical Habitats

The project site is not located within any USFWS-designated critical habitats.

6.0 DISCUSSION

One special-status species, Susanville beardtongue, was observed within the mine area and will be disturbed by mining activities. The impacts to this species will be minimized during operations so that a portion of the population onsite will not be disturbed. Revegetation of this species within the disturbed areas will be supported by seeding efforts using seeds collected from the site. The mine activities will not have any significant impacts on any other special-status species. Habitat for western bumble bee will be improved by reclamation activities.

Impacts to nesting birds can be avoided by completing nest surveys prior to completing activities that could disturb nesting birds. Should a site survey detect nesting raptors or migratory song birds in close proximity to the project area, appropriate spatial and temporal buffers will be implemented.

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Appendix A

U.S. Fish & Wildlife Service iPAC Species List



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713



In Reply Refer To:

July 15, 2020

Consultation Code: 08ESMF00-2020-SLI-2361

Event Code: 08ESMF00-2020-E-07312

Project Name: Devil's Corral BA

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, under the jurisdiction of the U.S. Fish and Wildlife Service (Service) that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Please follow the link below to see if your proposed project has the potential to affect other species or their habitats under the jurisdiction of the National Marine Fisheries Service:

http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

This project's location is within the jurisdiction of multiple offices. Expect additional species list documents from the following office, and expect that the species and critical habitats in each document reflect only those that fall in the office's jurisdiction:

Reno Fish And Wildlife Office

1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
(775) 861-6300

Project Summary

Consultation Code: 08ESMF00-2020-SLI-2361

Event Code: 08ESMF00-2020-E-07312

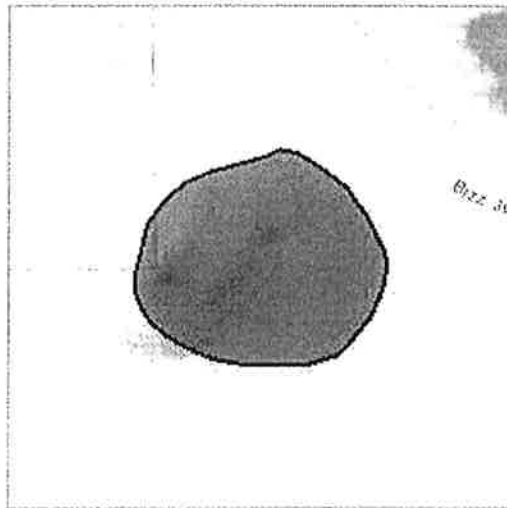
Project Name: Devil's Corral BA

Project Type: MINING

Project Description: SMARA Reclamation Plan

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/40.39577562071554N120.78893984051592W>



Counties: Lassen, CA

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Fishes

NAME	STATUS
Delta Smelt <i>Hypomesus transpacificus</i>	Threatened
There is final critical habitat for this species. Your location is outside the critical habitat.	
Species profile: https://ecos.fws.gov/ecp/species/321	

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Reno Fish And Wildlife Office
1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
Phone: (775) 861-6300 Fax: (775) 861-6301
<http://www.fws.gov/nevada/>



In Reply Refer To:

July 15, 2020

Consultation Code: 08ENV000-2020-SLI-0508

Event Code: 08ENV000-2020-E-01430

Project Name: Devil's Corral BA

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The attached species list indicates threatened, endangered, proposed, and candidate species and designated or proposed critical habitat that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act of 1973, as amended (ESA, 16 U.S.C. 1531 *et seq.*), for projects that are authorized, funded, or carried out by a Federal agency. Candidate species have no protection under the ESA but are included for consideration because they could be listed prior to the completion of your project. Consideration of these species during project planning may assist species conservation efforts and may prevent the need for future listing actions. For additional information regarding species that may be found in the proposed project area, visit <http://www.fws.gov/nevada/es/ipac.html>.

The purpose of the ESA is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the ESA and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or

designated or proposed critical habitat. Guidelines for preparing a Biological Assessment can be found at: http://www.fws.gov/midwest/endangered/section7/ba_guide.html.

If a Federal action agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this species list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally listed, proposed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally, as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation, for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the attached list.

The Nevada Fish and Wildlife Office (NFWO) no longer provides species of concern lists. Most of these species for which we have concern are also on the Animal and Plant At-Risk Tracking List for Nevada (At-Risk list) maintained by the State of Nevada's Natural Heritage Program (Heritage). Instead of maintaining our own list, we adopted Heritage's At-Risk list and are partnering with them to provide distribution data and information on the conservation needs for at-risk species to agencies or project proponents. The mission of Heritage is to continually evaluate the conservation priorities of native plants, animals, and their habitats, particularly those most vulnerable to extinction or in serious decline. In addition, in order to avoid future conflicts, we ask that you consider these at-risk species early in your project planning and explore management alternatives that provide for their long-term conservation.

For a list of at-risk species by county, visit Heritage's website (<http://heritage.nv.gov>). For a specific list of at-risk species that may occur in the project area, you can obtain a data request form from the website (http://heritage.nv.gov/get_data) or by contacting the Administrator of Heritage at 901 South Stewart Street, Suite 5002, Carson City, Nevada 89701-5245, (775) 684-2900. Please indicate on the form that your request is being obtained as part of your coordination with the Service under the ESA. During your project analysis, if you obtain new information or data for any Nevada sensitive species, we request that you provide the information to Heritage at the above address.

Furthermore, certain species of fish and wildlife are classified as protected by the State of Nevada (<http://www.leg.state.nv.us/NAC/NAC-503.html>). You must first obtain the appropriate license, permit, or written authorization from the Nevada Department of Wildlife (NDOW) to take, or possess any parts of protected fish and wildlife species. Please visit <http://www.ndow.org> or contact NDOW in northern Nevada (775) 688-1500, in southern Nevada (702) 486-5127, or in eastern Nevada (775) 777-2300.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the Service's wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

The Service's Pacific Southwest Region developed the *Interim Guidelines for the Development of a Project Specific Avian and Bat Protection Plan for Wind Energy Facilities* (Interim Guidelines). This document provides energy facility developers with a tool for assessing the risk of potential impacts to wildlife resources and delineates how best to design and operate a bird- and bat-friendly wind facility. These Interim Guidelines are available upon request from the NFWO. The intent of a Bird and Bat Conservation Strategy is to conserve wildlife resources while supporting project developers through: (1) establishing project development in an adaptive management framework; (2) identifying proper siting and project design strategies; (3) designing and implementing pre-construction surveys; (4) implementing appropriate conservation measures for each development phase; (5) designing and implementing appropriate post-construction monitoring strategies; (6) using post-construction studies to better understand the dynamics of mortality reduction (*e.g.*, changes in blade cut-in speed, assessments of blade "feathering" success, and studies on the effects of visual and acoustic deterrents) including efforts tied into Before-After/Control-Impact analysis; and (7) conducting a thorough risk assessment and validation leading to adjustments in management and mitigation actions.

The template and recommendations set forth in the Interim Guidelines were based upon the Avian Powerline Interaction Committee's Avian Protection Plan template (<http://www.aplic.org/>) developed for electric utilities and modified accordingly to address the unique concerns of wind energy facilities. These recommendations are also consistent with the Service's wind energy guidelines. We recommend contacting us as early as possible in the planning process to discuss the need and process for developing a site-specific Bird and Bat Conservation Strategy.

The Service has also developed guidance regarding wind power development in relation to prairie grouse leks (sage-grouse are included in this). This document can be found at: http://www.fws.gov/southwest/es/Oklahoma/documents/te_species/wind%20power/prairie%20grouse%20lek%205%20mile%20public.pdf.

Migratory Birds are a Service Trust Resource. Based on the Service's conservation responsibilities and management authority for migratory birds under the Migratory Bird Treaty Act of 1918, as amended (MBTA; 16 U.S.C. 703 *et seq.*), we recommend that any land clearing or other surface disturbance associated with proposed actions within the project area be timed to

avoid potential destruction of bird nests or young, or birds that breed in the area. Such destruction may be in violation of the MBTA. Under the MBTA, nests with eggs or young of migratory birds may not be harmed, nor may migratory birds be killed. Therefore, we recommend land clearing be conducted outside the avian breeding season. If this is not feasible, we recommend a qualified biologist survey the area prior to land clearing. If nests are located, or if other evidence of nesting (*i.e.*, mated pairs, territorial defense, carrying nesting material, transporting food) is observed, a protective buffer (the size depending on the habitat requirements of the species) should be delineated and the entire area avoided to prevent destruction or disturbance to nests until they are no longer active.

Guidance for minimizing impacts to migratory birds for projects involving communications towers (*e.g.*, cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

If wetlands, springs, or streams are known to occur in the project area or are present in the vicinity of the project area, we ask that you be aware of potential impacts project activities may have on these habitats. Discharge of fill material into wetlands or waters of the United States is regulated by the U.S. Army Corps of Engineers (ACOE) pursuant to section 404 of the Clean Water Act of 1972, as amended. We recommend you contact the ACOE's Regulatory Section regarding the possible need for a permit. For projects located in northern Nevada (Carson City, Churchill, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, and Washoe Counties) contact the Reno Regulatory Office at 300 Booth Street, Room 3060, Reno, Nevada 89509, (775) 784-5304; in southern Nevada (Clark, Lincoln, Nye, and White Pine Counties) contact the St. George Regulatory Office at 321 North Mall Drive, Suite L-101, St. George, Utah 84790-7314, (435) 986-3979; or in California along the eastern Sierra contact the Sacramento Regulatory Office at 650 Capitol Mall, Suite 5-200, Sacramento, California 95814, (916) 557-5250.

We appreciate your concern for threatened and endangered species. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

The table below outlines lead FWS field offices by county and land ownership/project type. Please refer to this table when you are ready to coordinate (including requests for section 7 consultation) with the field office corresponding to your project, and send any documentation regarding your project to that corresponding office. Therefore, the lead FWS field office may not be the office listed above in the letterhead.

Lead FWS offices by County and Ownership/Program

County	Ownership/Program	Species	Office Lead*
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Alameda	Tidal wetlands/marsh adjacent to Bays	Salt marsh species, delta smelt	BDFWO
Alameda	All ownerships but tidal/estuarine	All	SFWO
Alpine	Humboldt Toiyabe National Forest	All	RFWO
Alpine	Lake Tahoe Basin Management Unit	All	RFWO
Alpine	Stanislaus National Forest	All	SFWO
Alpine	El Dorado National Forest	All	SFWO
Colusa	Mendocino National Forest	All	AFWO
Colusa	Other	All	By jurisdiction (see map)
Contra Costa	Legal Delta (Excluding ECCHCP)	All	BDFWO
Contra Costa	Antioch Dunes NWR	All	BDFWO
Contra Costa	Tidal wetlands/marsh adjacent to Bays	Salt marsh species, delta smelt	BDFWO
Contra Costa	All ownerships but tidal/estuarine	All	SFWO
Del Norte	All	All	AFWO
El Dorado	El Dorado National Forest	All	SFWO
El Dorado	LakeTahoe Basin Management Unit		RFWO
Glenn	Mendocino National Forest	All	AFWO
Glenn	Other	All	By jurisdiction (see map)
Humboldt	All except Shasta Trinity National Forest	All	AFWO

Humboldt	Shasta Trinity National Forest	All	YFWO
Lake	Mendocino National Forest	All	AFWO
Lake	Other	All	By jurisdiction (see map)
Lassen	Modoc National Forest	All	KFWO
Lassen	Lassen National Forest	All	SFWO
Lassen	Toiyabe National Forest	All	RFWO
Lassen	BLM Surprise and Eagle Lake Resource Areas	All	RFWO
Lassen	BLM Alturas Resource Area	All	KFWO
Lassen	Lassen Volcanic National Park	All (includes Eagle Lake trout on all ownerships)	SFWO
Lassen	All other ownerships	All	By jurisdiction (see map)
Marin	Tidal wetlands/marsh adjacent to Bays	Salt marsh species, delta smelt	BDFWO
Marin	All ownerships but tidal/estuarine	All	SFWO
Mendocino	Russian River watershed	All	SFWO
Mendocino	All except Russian River watershed	All	AFWO
Modoc	Modoc National Forest	All	KFWO
Modoc	BLM Alturas Resource Area	All	KFWO
Modoc	Klamath Basin National Wildlife Refuge Complex	All	KFWO
Modoc	BLM Surprise and Eagle Lake Resource Areas	All	RFWO

Modoc	All other ownerships	All	By jurisdiction (See map)
Mono	Inyo National Forest	All	RFWO
Mono	Humboldt Toiyabe National Forest	All	RFWO
Napa	All ownerships but tidal/estuarine	All	SFWO
Napa	Tidal wetlands/marsh adjacent to San Pablo Bay	Salt marsh species, delta smelt	BDFWO
Nevada	Humboldt Toiyabe National Forest	All	RFWO
Nevada	All other ownerships	All	By jurisdiction (See map)
Placer	Lake Tahoe Basin Management Unit	All	RFWO
Placer	All other ownerships	All	SFWO
Sacramento	Legal Delta	Delta Smelt	BDFWO
Sacramento	Other	All	By jurisdiction (see map)
San Francisco	Tidal wetlands/marsh adjacent to San Francisco Bay	Salt marsh species, delta smelt	BDFWO
San Francisco	All ownerships but tidal/estuarine	All	SFWO
San Mateo	Tidal wetlands/marsh adjacent to San Francisco Bay	Salt marsh species, delta smelt	BDFWO
San Mateo	All ownerships but tidal/estuarine	All	SFWO
San Joaquin	Legal Delta excluding San Joaquin HCP	All	BDFWO

San Joaquin	Other	All	SFWO
Santa Clara	Tidal wetlands/marsh adjacent to San Francisco Bay	Salt marsh species, delta smelt	BDFWO
Santa Clara	All ownerships but tidal/estuarine	All	SFWO
Shasta	Shasta Trinity National Forest except Hat Creek Ranger District (administered by Lassen National Forest)	All	YFWO
Shasta	Hat Creek Ranger District	All	SFWO
Shasta	Bureau of Reclamation (Central Valley Project)	All	BDFWO
Shasta	Whiskeytown National Recreation Area	All	YFWO
Shasta	BLM Alturas Resource Area	All	KFWO
Shasta	Caltrans	By jurisdiction	SFWO/AFWO
Shasta	Ahjumawi Lava Springs State Park	Shasta crayfish	SFWO
Shasta	All other ownerships	All	By jurisdiction (see map)
Shasta	Natural Resource Damage Assessment, all lands	All	SFWO/BDFWO
Sierra	Humboldt Toiyabe National Forest	All	RFWO
Sierra	All other ownerships	All	SFWO
Siskiyou	Klamath National Forest (except Ukonom District)	All	YFWO
Siskiyou	Six Rivers National Forest and Ukonom District	All	AFWO
Siskiyou	Shasta Trinity National Forest	All	YFWO

Siskiyou	Lassen National Forest	All	SFWO
Siskiyou	Modoc National Forest	All	KFWO
Siskiyou	Lava Beds National Volcanic Monument	All	KFWO
Siskiyou	BLM Alturas Resource Area	All	KFWO
Siskiyou	Klamath Basin National Wildlife Refuge Complex	All	KFWO
Siskiyou	All other ownerships	All	By jurisdiction (see map)
Solano	Suisun Marsh	All	BDFWO
Solano	Tidal wetlands/marsh adjacent to San Pablo Bay	Salt marsh species, delta smelt	BDFWO
Solano	All ownerships but tidal/estuarine	All	SFWO
Solano	Other	All	By jurisdiction (see map)
Sonoma	Tidal wetlands/marsh adjacent to San Pablo Bay	Salt marsh species, delta smelt	BDFWO
Sonoma	All ownerships but tidal/estuarine	All	SFWO
Tehama	Mendocino National Forest	All	AFWO
Tehama	Shasta Trinity National Forest except Hat Creek Ranger District (administered by Lassen National Forest)	All	YFWO
Tehama	All other ownerships	All	By jurisdiction (see map)
Trinity	BLM	All	AFWO
Trinity	Six Rivers National Forest	All	AFWO
Trinity	Shasta Trinity National Forest	All	YFWO

Trinity	Mendocino National Forest	All	AFWO
Trinity	BIA (Tribal Trust Lands)	All	AFWO
Trinity	County Government	All	AFWO
Trinity	All other ownerships	All	By jurisdiction (See map)
Yolo	Yolo Bypass	All	BDFWO
Yolo	Other	All	By jurisdiction (see map)
All	FERC-ESA	All	By jurisdiction (see map)
All	FERC-ESA	Shasta crayfish	SFWO
All	FERC-Relicensing (non-ESA)	All	BDFWO

***Office Leads:**

AFWO=Arcata Fish and Wildlife Office

BDFWO=Bay Delta Fish and Wildlife Office

KFWO=Klamath Falls Fish and Wildlife Office

RFWO=Reno Fish and Wildlife Office

YFWO=Yreka Fish and Wildlife Office

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Reno Fish And Wildlife Office

1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
(775) 861-6300

This project's location is within the jurisdiction of multiple offices. Expect additional species list documents from the following office, and expect that the species and critical habitats in each document reflect only those that fall in the office's jurisdiction:

Sacramento Fish And Wildlife Office

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Project Summary

Consultation Code: 08ENV000-2020-SLI-0508

Event Code: 08ENV000-2020-E-01430

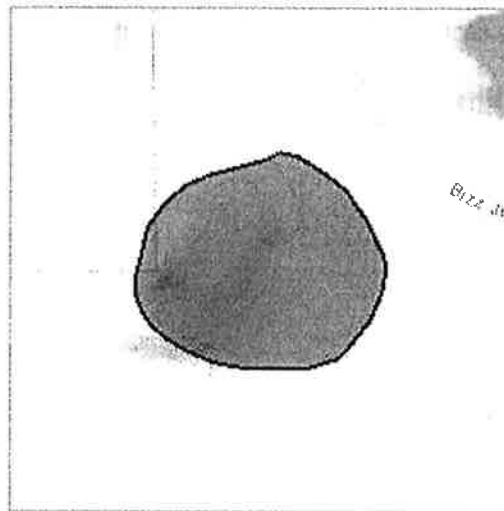
Project Name: Devil's Corral BA

Project Type: MINING

Project Description: SMARA Reclamation Plan

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/40.39577562071554N120.78893984051592W>



Counties: Lassen, CA

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
North American Wolverine <i>Gulo gulo luscus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5123	Proposed Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The Migratory Birds Treaty Act of 1918.
 2. The Bald and Golden Eagle Protection Act of 1940.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Aug 31
Cassin's Finch <i>Carpodacus cassinii</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	Breeds May 15 to Jul 15

NAME	BREEDING SEASON
Olive-sided Flycatcher <i>Contopus cooperi</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Williamson's Sapsucker <i>Sphyrapicus thyroideus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8832	Breeds May 1 to Jul 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (I)

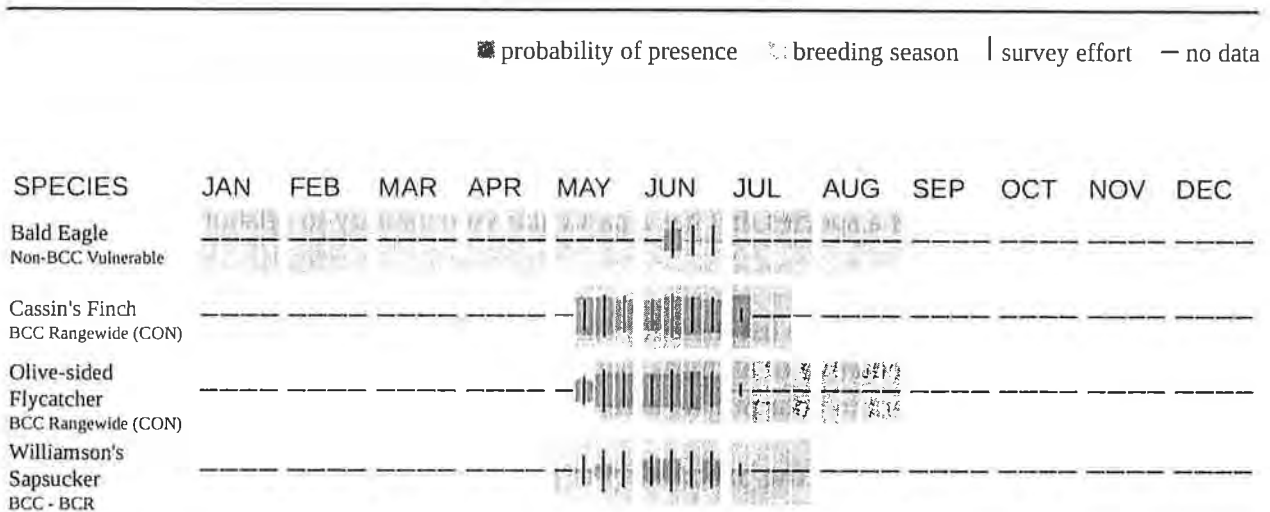
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (—)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of

interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC

use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

Appendix B

California Rare Plant Rank Query Results

Scientific Name	Common Name	CRPR	CESA	FESA	FL Period	Habitat
<i>Artemisia tripartita</i> ssp. <i>tripartita</i>	threetip sagebrush	2B.3	None	None	Aug	Upper montane coniferous forest
<i>Astragalus pulsiferae</i> var. <i>pulsiferae</i>	Pulsifer's milk-vetch	1B.2	None	None	May-Aug(Sep)	Great Basin scrub, Lower montane coniferous forest, PJ woodland
<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i>	Suksdorf's milk-vetch	1B.2	None	None	May-Aug	Great Basin scrub, Lower montane coniferous forest, PJ woodland
<i>Atriplex gardneri</i> var. <i>falcata</i>	falcate saltbush	2B.2	None	None	May-Aug	Chenopod scrub, Great Basin scrub
<i>Betula glandulosa</i>	dwarf resin birch	2B.2	None	None	May-Jul	Bogs and fens, Lower montane coniferous forest, Meadows and seeps
<i>Botrychium ascendens</i>	upswept moonwort	2B.3	None	None	(Jun)Jul-Aug	Lower montane coniferous forest, Meadows and seeps
<i>Botrychium crenulatum</i>	scalloped moonwort	2B.2	None	None	Jun-Sep	Bogs and fens, Lower and upper montane coniferous forest, Meadows
<i>Botrychium minganense</i>	Mingan moonwort	2B.2	None	None	Jul-Sep	Bogs and fens, Lower and upper montane coniferous forest, Meadows
<i>Botrychium montanum</i>	western goblin	2B.1	None	None	Jul-Sep	Bogs and fens, Lower and upper montane coniferous forest, Meadows
<i>Brasenia schreberi</i>	watershield	2B.3	None	None	Jun-Sep	Marshes and swamps (freshwater)
<i>Carex davyi</i>	Davy's sedge	1B.3	None	None	May-Aug	Subalpine coniferous forest, Upper montane coniferous forest
<i>Carex lasiocarpa</i>	woolly-fruited sedge	2B.3	None	None	Jun-Jul	Bogs and fens, Marshes and swamps (freshwater, lake margins)
<i>Carex petasata</i>	Liddon's sedge	2B.3	None	None	May-Jul	Lower montane coniferous forest, Meadows and seeps, PJ woodland
<i>Carex sheldonii</i>	Sheldon's sedge	2B.2	None	None	May-Aug	Lower montane coniferous forest (mesic), Marshes, Riparian scrub
<i>Castilleja lassenensis</i>	Lassen paintbrush	1B.3	None	None	Jun-Sep	Meadows and seeps, Subalpine coniferous forest
<i>Drosera anglica</i>	English sundew	2B.3	None	None	Jun-Sep	Bogs and fens, Meadows and seeps (mesic)
<i>Eriogonum ochrocephalum</i> var. <i>ochrocephalum</i>	ochre-flowered buckwheat	2B.2	None	None	May-Jun	Great Basin scrub, Pinyon and juniper woodland
<i>Geum aleppicum</i>	Aleppo avens	2B.2	None	None	Jun-Aug	Great Basin scrub, Lower montane coniferous forest, Meadows and seeps
<i>Juncus dudleyi</i>	Dudley's rush	2B.3	None	None	Jul-Aug	Lower montane coniferous forest (mesic)
<i>Juncus luciensis</i>	Santa Lucia dwarf rush	1B.2	None	None	Apr-Jul	Meadows and seeps, Vernal pools
<i>Lomatium hendersonii</i>	Henderson's lomatium	2B.3	None	None	Mar-Jun	Great Basin scrub, Lower montane coniferous forest, PJ Woodland
<i>Lomatium roseanum</i>	adobe lomatium	1B.2	None	None	May-Jul	Great Basin scrub, Lower montane coniferous forest
<i>Packera indecora</i>	rayless mountain ragwort	2B.2	None	None	Jul-Aug	Meadows and seeps (mesic)
<i>Penstemon janishiae</i>	Janish's beardtongue	2B.2	None	None	May-Jul	Great Basin scrub, Lower montane coniferous forest, PJ Woodland
<i>Penstemon sudans</i>	Susanville beardtongue	4.3	None	None	Jun-Jul(Aug-Sep)	Great Basin scrub, Lower montane coniferous forest, PJ Woodland
<i>Phacelia inundata</i>	playa phacelia	1B.3	None	None	May-Aug(Sep)	Great Basin scrub, Lower montane coniferous forest, Playas
<i>Phlox muscoides</i>	squarestem phlox	2B.3	None	None	(May)Jun-Aug	Alpine boulder and rock field, Great Basin scrub, Subalpine coniferous forest
<i>Stuckenia filiformis</i> ssp. <i>alpina</i>	slender-leaved pondweed	2B.2	None	None	May-Jul	Marshes and swamps (assorted shallow freshwater)

ROCK SLOPE STABILITY STUDY 36 MINE EXPANSION LASSEN COUNTY, CALIFORNIA

Prepared For:

STEVE MANNING CONSTRUCTION, INC.



**CGI TECHNICAL
SERVICES INC.**



January 14, 2011
CGI: 10-1334.51

Mr. Steve Manning
STEVE MANNING CONSTRUCTION, INC.
5200 Churn Creek Rd. Suite. E
Redding, CA 96002

**Subject: Rock Slope Stability Evaluation
36 Mine
Lassen County, California**

Dear Mr. Manning,


CGI Technical Services, Inc. (CGI), is pleased to submit this rock slope stability study for the proposed 36 Mine expansion project located near Susanville in Lassen County, California. This report presents our findings, opinions, and recommendations regarding cut slope construction at the mine site.

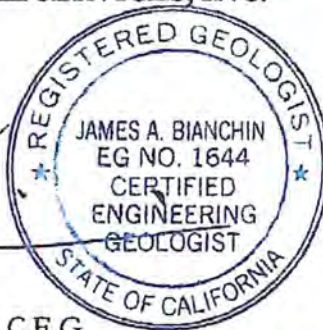
We appreciate the opportunity to perform this study. If you have any questions pertaining to this report, or if we may be of further service, please do not hesitate to contact us.

Regards,

CGI TECHNICAL SERVICES, INC.

1612 Wedding Way
Redding, CA 96003
Ph: 530.244.6277
Fax: 530.244.6276


James A. Bianchin, C.E.G.
Senior Engineering Geologist





Azeddine Bahloul, P.E., G.E.
Senior Geotechnical Engineer



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ROCK SLOPE STABILITY EVALUATION
36 MINE
LASSEN COUNTY, CALIFORNIA

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Plate 10.....	Markland's Test of Kinematic Stability, Massive Basalt Discontinuity Data

1.0 INTRODUCTION

CGI Technical Services, Inc. (CGI), is pleased to submit this rock slope stability report to Steve Manning Construction, Inc. (SMC), for the reclamation plan at the 36 Mine, located in Lassen County, California. The work area is shown on Plate 1 – Site Location Map.

The following report discusses our understanding of the project, observations and measurements within the mine area, discusses our analyses, and presents our opinion regarding slope inclinations and slope stability at the project site.

1.1 STUDY PURPOSE

The purpose of this study was to evaluate geologic site conditions and perform geotechnical evaluations of proposed cut slopes to render an opinion regarding cut slope inclinations and slope stability for the proposed mining plan.

1.2 PROJECT & PROJECT LOCATION

The project, as we understand it, consists of the expansion of an existing, vested, quarry. Currently, the quarry consists of a number of rock faces and benches located at varying elevations across the site. The proposed mining plan, as we understand it, consists of creating a relatively gently inclined cut up to a relatively large bench, as shown on Plate 2 – Proposed Mining Plan. The gently inclined cut is proposed to descend towards the east at about 12 degrees. The bench and a portion of the gently inclined cut would be bordered by steeply inclined cut slopes that descend onto the bench from the south, west, and northwest. Those cuts are anticipated to be up to about 40 feet tall.

The project site is located north of Highway 36 and west of the Susan River, approximately 7 miles west of Susanville, as shown on Plate 1.

1.3 PREVIOUS WORK PERFORMED

Some drilling has been performed at the project site to identify the thicknesses of basaltic rock materials. Those data have not been published but were provided to us for our review and use during this study. No additional geologic or geotechnical studies are known to have been performed at the site.

1.4 SCOPE OF SERVICES

Services performed for this study included:

- Reconnaissance of the site surface conditions;
- Acquisition of selected, existing, available geological data relevant to the subject site conditions;
- Review of pertinent, selected regional geological data;
- Observation of exposed geological conditions at the project site, including measurement of discontinuity (fractures, joints, flow bands, bedding planes, etc.) data at selected locations. Discontinuity data are presented in Appendix A –

Discontinuity Orientations;

- Performance of laboratory testing to estimate rock strength characteristics for use in stability analyses. Those data are presented in Appendix B – Rock Strength Information;
- Performance of rock slope stability analyses for the proposed cut slopes;
- Preparation of this report, which includes:
 - A description of the proposed project;
 - A summary of our field observation and laboratory testing programs;
 - A description of site surface conditions encountered during our field investigation; and
- Our opinion of slope stability and recommendations for cut slope inclinations.

2.0 FINDINGS

2.1 FIELD STUDIES

CGI visited the project site on December 13, 2010 to observe rock slopes, rock quality, and gather discontinuity data and samples from the project area. Our field studies were limited to observations of rock outcrops and slopes. In addition, we obtained discontinuity orientation and rock quality data, and rock samples from selected locations within the study area.

2.2 REGIONAL GEOLOGY

The project site is located southeastern of Mount Lassen in the Cascade Range geomorphic province. The Cascade Range province extends from the northern end of the Sierra Nevada north to the Canadian border. In the project vicinity the Cascade Range province is bounded to the west by the Klamath Mountain province, to the east by the Modoc Plateau province, to the south by the Sierra Nevada province, and to the north by the Cascade Range extending through Oregon and Washington.

The Cascade Range province consists of a north-northwest-trending, relatively linear belt of active and dormant strata and shield volcanoes. The regional geologic conditions are dominated by andesitic, rhyolitic and basaltic volcanic rocks mantled with surficial deposits consisting of pyroclastic rocks, lahar deposits, alluvium, and local lacustrine sediments (Hinds, 1952).

2.2 LOCAL GEOLOGIC SETTING

The project region has been mapped as being underlain by Pleistocene-age volcanic rocks (Lydon et al, 1960). The predominate rock materials underlying the project site are basaltic flow units. The exposed basalt appears to consist of an upper relatively massive cooling unit flow overlying a lower basalt exhibiting somewhat of a columnar texture. For purposes of discussion, we will refer the upper unit as the “massive” unit and the lower unit as the “columnar” unit. The site geology is noted on Plate 3 – Site Geology.

The massive unit consists of a non-vesicular to slightly vesiculated basalt with minor porphoritic inclusions. These materials were observed to range from slightly weathered to fresh and moderately fractured with relatively closely spaced, closed, relatively irregular fractures. The massive unit was estimated to range in thickness up to about 15 to 18 feet; however, much of these materials have previously been mined and the true thickness may be much greater. These materials were mined to inclinations ranging from about 2:1 (horizontal to vertical) to near vertical and all slopes observed appeared to be performing well, with no signs of recent or incipient failure.

The columnar unit consists of moderately weathered to slightly weathered, slightly vesiculated basalt. It is moderately fractured with closed to slightly open fractures having no infilling. Fractures appeared to follow consistent trends and spacing, with numerous near vertical and near horizontal discontinuities. Existing cut slopes indicate this unit to be about 15 to 18 feet thick. It has been mined to create cut slopes at near vertical angles and has performed well except for some localized toppling of individual columns.

Underlying the columnar basalt is an alluvial/lacustrine deposit of unknown thickness. This material is a fine to coarse sand with moderate to abundant clay and subordinate fine angular gravel. As noted on Plate 3, it is exposed in two locations; however, coring information (performed by others) at the site was able to identify the presence of these materials at each exploration location.

The general profile of rock and soil units observed at the site is shown on Plate 4 – Generalized Site Geologic Profile.

3.0 ROCK SLOPE STABILITY

Stability of proposed cut slopes at the mine will be controlled by the geometry of discontinuities (fractures, joints, flowbands, etc.) present in the basalt along with the strength and character of the rock on site. The following sections discuss our evaluation methods and the results of those analyses.

3.1 DISCUSSION CONCERNING FACTORS OF SAFETY

The evaluation of stability of rock slopes generally takes into consideration a number of rock strength parameters, geologic conditions within the slope, orientations of discontinuities (fractures, joints, flow bands, faults, etc.), hydrogeologic conditions, and surcharge and seismic loads that could affect the slope. Those parameters are typically modeled using limit-equilibrium methods (and less commonly using finite element or finite difference modeling) to estimate if the modeled scenario meets or exceeds a target minimum factor of safety (FOS) against failure. The FOS is estimated by calculating the forces resisting slope failure divided by the forces causing slope failure. Thus, a FOS of greater than 1 implies a stable slope, a FOS of less than 1 a slope that is failing, and a FOS of 1, a slope that is on the verge of failure.

Slopes having a minimum FOS of 1.5 for static evaluations are typically considered stable for permanent engineered conditions. For mines in remote areas where there are no improvements

near the base of the slope, the FOS for static conditions is often reduced to 1.15 because the risk to structures, people, and improvements is low.

3.2 ROCK SLOPE STABILITY

The stability of a rock slope is dependent upon the balance of forces driving and resisting slope failure. Those forces are based upon a wide range of geological and physical influences, of which the most significant are:

- Surface slope geometry;
- Subsurface rock profiles;
- Strength of underlying earth materials;
- Orientation of discontinuity planes;
- Surcharge loads; and
- Hydrogeologic conditions within the slope.

The following sections discuss the influences noted above and the results of our stability analyses.

3.2.1 *Surface Slope Geometry*

Topographic information for the site was obtained from Plate 3 and used in our evaluations for slope height and slope orientation.

3.2.2 *Subsurface Profile*

Subsurface geological conditions within the project area are discussed in Section 2.2 and graphically illustrated on Plate 4.

3.2.3 *Engineering Properties of Significant Earth Materials*

Eight rock samples were obtained and tested to estimate the unconfined compressive strength of the basalt materials. Four samples of massive basalt and four samples of columnar basalt were tested. The results of the unconfined compressive tests are as follows:

Unconfined Compressive Strength (psi)	
Massive Basalt	Columnar Basalt
10,023	10,736
10,322	7,232
10,425	9,911
11,113	13,397
Average: 10,470	Average: 10,319

In order to estimate the rock mass strength, we evaluated the Geological Strength Index (GSI; Marinos et al., 2005; Marinos et al., 2000) of the rock materials within the massive and columnar basalts. GSI values for the rock materials were estimated to be the following:

Geologic Strength Index Ranges	
Flow Unit	GSI Estimate
Columnar Basalt	60
Massive Basalt	50

Using those values, we used ROCKLAB! V1.031 (Rocscience, 2007) to estimate the rock mass strength based on the Hoek-Brown failure criterion (Hoek et al., 2002). Rock mass strength estimates the cohesion and angle of internal friction (ϕ) based on the degree of weathering, fracturing, unconfined compressive strength, and rock type to estimate what the overall strength of the rock mass might be. Based on those criteria, the following rock mass strength values were estimated.

Estimated Rock Strength			
Massive Basalt		Columnar Basalt	
Cohesion (tsf)	ϕ	Cohesion (tsf)	ϕ
10.55	44.9°	13.85	49.7°
10.66	45.1°	11.87	46.8°
10.70	45.2°	13.38	49.1°
10.98	45.7°	15.24	51.2°

For the stability analyses, we used the lowest obtained rock strength, having a cohesion of 10.5 tons per square foot (tsf) and a ϕ of 45° for both units.

3.2.4 Discontinuity Data

Measurements of discontinuity orientations were taken at selected locations across the site, as noted on Plate 3. Those measurements were taken with a Brunton compass and the orientations measured during this study are as follows:

Discontinuity Orientations					
Scanline	Discontinuity Number	Strike (°)	Dip Direction (°)	Dip (°)	Domain
1	1	N55E	145	88S	Columnar
1	2	N65W	25	84N	Columnar
1	3	N40E	130	9S	Columnar
1	4	N60W	210	83S	Columnar
1	5	N14E	284	74N	Columnar
1	6	N35W	235	50S	Columnar
1	7	N28W	242	24S	Columnar
2	8	NS	90	89E	Massive
2	9	N30E	300	10N	Massive
2	10	N72W	198	74S	Massive
2	11	N68E	158	84S	Massive
3	12	EW	180	85S	Massive
3	13	N66W	204	76S	Massive

Discontinuity Orientations					
Scanline	Discontinuity Number	Strike (°)	Dip Direction (°)	Dip (°)	Domain
3	14	N58E	328	89N	Massive
3	15	N35E	305	87N	Massive
3	16	N60W	30	88N	Massive
3	17	N55W	35	30N	Massive
3	18	N60W	30	5N	Massive
3	19	N55W	215	88S	Massive
4	20	EW	0	76N	Massive
4	21	N75E	165	12S	Massive
4	22	N65E	335	69N	Massive
4	23	N26E	116	49S	Massive
4	24	N60W	30	87N	Massive
4	25	N82W	8	89N	Massive
4	26	N74W	16	70N	Massive
5	27	N5W	85	45N	Massive
5	28	N33W	57	70N	Massive
5	29	N75W	195	85S	Massive
6	30	N55W	35	85N	Columnar
6	31	N10W	260	89S	Columnar
6	32	N33W	57	34N	Columnar
6	33	N52E	142	85S	Columnar

Stereographic projections of those discontinuity data were performed to evaluate groupings of data and predominate dip directions that could influence rock slope stability. The projections are presented as Plates 5 through 8. As noted on those plates, the discontinuity orientations between the columnar and massive basalts are very similar with mostly steeply dipping fractures having strikes oriented towards the northwest.

3.2.5 Hydrogeologic Conditions

The presence of water within rock fractures can adversely affect the stability of rock planes and wedges. Because the natural slopes behind proposed cuts dip away from the cut slope faces, it is anticipated that the buildup of hydrostatic forces in discontinuities within the slope will have little effect on the gross stability of the proposed cut slope faces.

3.3 Slope Stability Evaluations

A number of slope stability evaluations were performed to estimate the factor of safety (FOS) against slope failure for a number of scenarios. The following sections discuss the kinematic and limit-equilibrium analyses performed for the study, the scenarios modeled in our stability analyses, and the estimated FOS results obtained.

3.3.1 Kinematic Evaluations

Rock discontinuities within the basalt can influence slope stability either through planar failures along individual discontinuities or by wedge failures along intersecting discontinuities. As noted in Section 3.2.4, a total of 33 discontinuity orientations were collected from rock exposures at the site.

The purpose of collecting those data was to evaluate whether potential plane or wedge failures caused by the intersection of discontinuities could cause a potential slope failure.

Dip vectors of discontinuity orientations were plotted on an equal-area stereonet, as shown on Plates 5 through 8. Using Markland's test of kinematic stability, the great circles and dip vectors for the discontinuities for the columnar and massive domains were plotted on a stereonet along with the slope orientations and the θ angle of 45 degrees, as shown on Plates 9 and 10 – Markland's Test of Kinematic Stability, Columnar and Massive Basalt, respectively. As noted on Plate 9, there are no potential planar failures and 2 potential wedge failures for the columnar basalt materials for the proposed mining scheme. Plate 10, however, indicates that there are 2 potential planar failures and 12 potential wedge failures for the massive basalt under the proposed mining plan. The proposed planar failures have the following orientations:

Potential Planar Failures		
Discontinuity Plane ¹	Strike	Dip
23	N26E	49S
27	N5W	45N

¹ – See Section 3.2.4 for orientations and dips of these discontinuity planes

The following table presents information on potential wedge failures:

Potential Wedge Failures				
Domain	Wedge	Trend (degrees)	Plunge (degrees)	Intersecting Discontinuity Planes ¹
Massive Basalt	A	100°	64°	12 & 28
	B ²	116°	49°	13 & 23
	C	55°	65°	20 & 26
	D	58°	63°	20 & 14
	E	5°	69°	22 & 8
	F	3°	58°	8 & 28
	G	5°	70°	8 & 26
	H	114°	50°	23 & 16
	I	112°	56°	28 & 16
	J	92°	66°	28 & 11
	K	80°	50°	26 & 11
	L	58°	64°	26 & 14
Columnar Basalt	M	347°	58°	5 & 31
	N	128°	56°	4 & 30

¹ – See Section 3.2.4 for orientations and dips of these discontinuity planes. ² - Sliding entirely on plane 23

Markland's test of kinematic stability only identifies those potential planes or wedges that have the opportunity to fail. To assess the potential of each of those planes or wedges to fail requires limit-equilibrium analyses of slope stability, which are discussed below.

3.3.2 Stability Analyses

Planar Failures. Potential planar failures were not identified for the columnar basalt materials. Two potential planar failures were identified for the massive basalt materials. Stability analyses of those potential planar failures were performed using a cohesion of 20,000 psf, ϕ of 45 degrees, and no surcharge load. Based on these assumptions, both potential planar failures had FOS exceeding 2.0 and should be stable under the proposed mining scenario.

Wedge Failures. Potential wedges were identified for both the columnar and massive basalt materials. In order to evaluate the FOS of these wedges against failure, we utilized the computer program SWEDGE (Rocscience, 2002). The factors of safety of the 14 potential wedge failures are dependent upon the orientation of the proposed cut slope and were evaluated to be as follows:

Factor of Safety of Potential Wedge Failures			
Wedge	Slope Orientation		
	North-South	East-West	N50E
A	7.1		>20
B	2.6		
C	>20		
D	>20		
E		14.9	
F		7.8	
G		>20	
H	2.6		2.3
I	8.5		11.9
J	8.8		
K	5.4		
L	>20		
M		>20	
N		>20	>20

As noted above, all potential wedges were estimated to have a FOS in excess of 1.5 for the proposed slope orientations assuming the slopes are excavated at an inclination of 70 degrees (between 1/2: and 1/4:1 [horizontal:vertical])

Toppling Failures. The potential for toppling failures to affect the stability of the proposed slopes was evaluated. For this evaluation, it was assumed that massive, vertically inclined basalt slabs, approximately 1 to 2 feet thick and 15 feet tall are supported on a discontinuity inclined at 5 degrees out-of-slope. For this analysis, no cohesion and a ϕ of 45 degrees was used. Based on those

analyses, the FOS against toppling exceeded 2.0, thus implying that toppling should not pose adverse stability issues.

4.0 CONCLUSIONS

Based upon the analyses performed in Section 3.0 of this study, it is our opinion that relatively steep (70 degree) cut slopes can be constructed at the 36 Mine site without adversely affecting the gross stability of those cut slope faces. It should be noted that some raveling and minor rock falls can be expected from the cut slopes for a number of seasons following construction; however, that is a common occurrence for most rock slope cut faces made in this type of geologic terrain.

5.0 CLOSURE

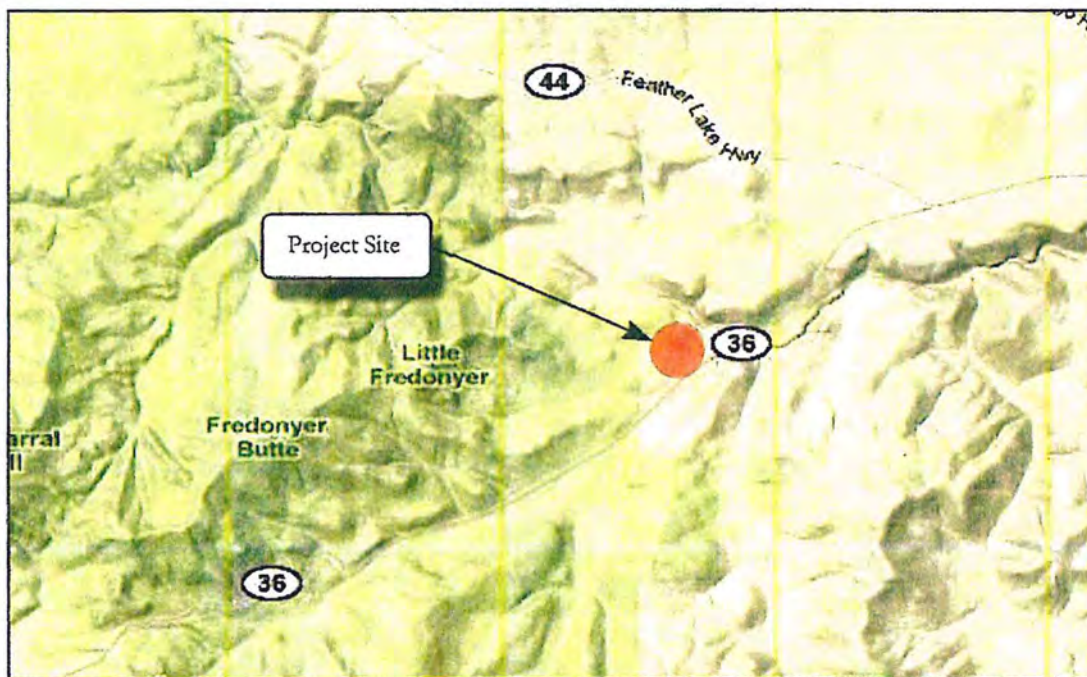
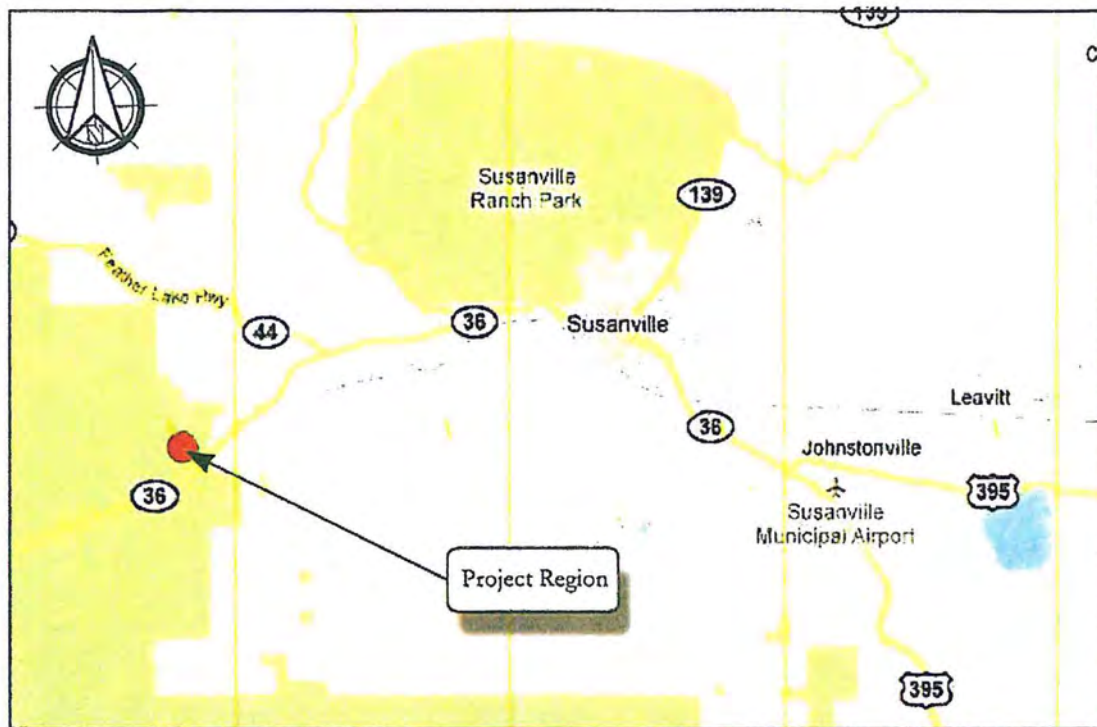
This report has been prepared in substantial accordance with the generally accepted geotechnical engineering and engineering geological practice, as it existed in the site area at the time our services were rendered. No other warranty, either express or implied, is made.

We appreciate the opportunity to assist Steve Manning Construction Company, Inc., with this project. If you have any questions, please do not hesitate to contact our office.

-- ♦ --

7.0 REFERENCES

- Hinds, N.E. (1952), Evolution of the California Landscape, California Division of Mines and Geology Bulletin 158, pp 145-152.
- Hoek, E., Carranza-Torres, C., and Corkum, B. (2002), Hoek-Brown Failure Criterion – 2—2 Edition, *Proc. NARMS-TAC Conference*, Toronto, 2002, 1, 267-273.
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- Rocscience (2002), SWEDGE, Probabilistic Analysis of the Geometry and Stability of Surface Wedges, User's Guide, 86 p.
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- Rocscience (2007), ROCKLAB! 1.031, Rock Strength Analysis Using Generalized Hoek-Borwn Failure Criterion, User's Guide, 24 p.



Base maps obtained from Google Maps



**CGI TECHNICAL
SERVICES INC.**

**SITE LOCATION MAP
36 MINE
LASSEN COUNTY, CALIFORNIA**

Project No.: 10-1334.51

Plate

1



Base maps obtained from Google Maps



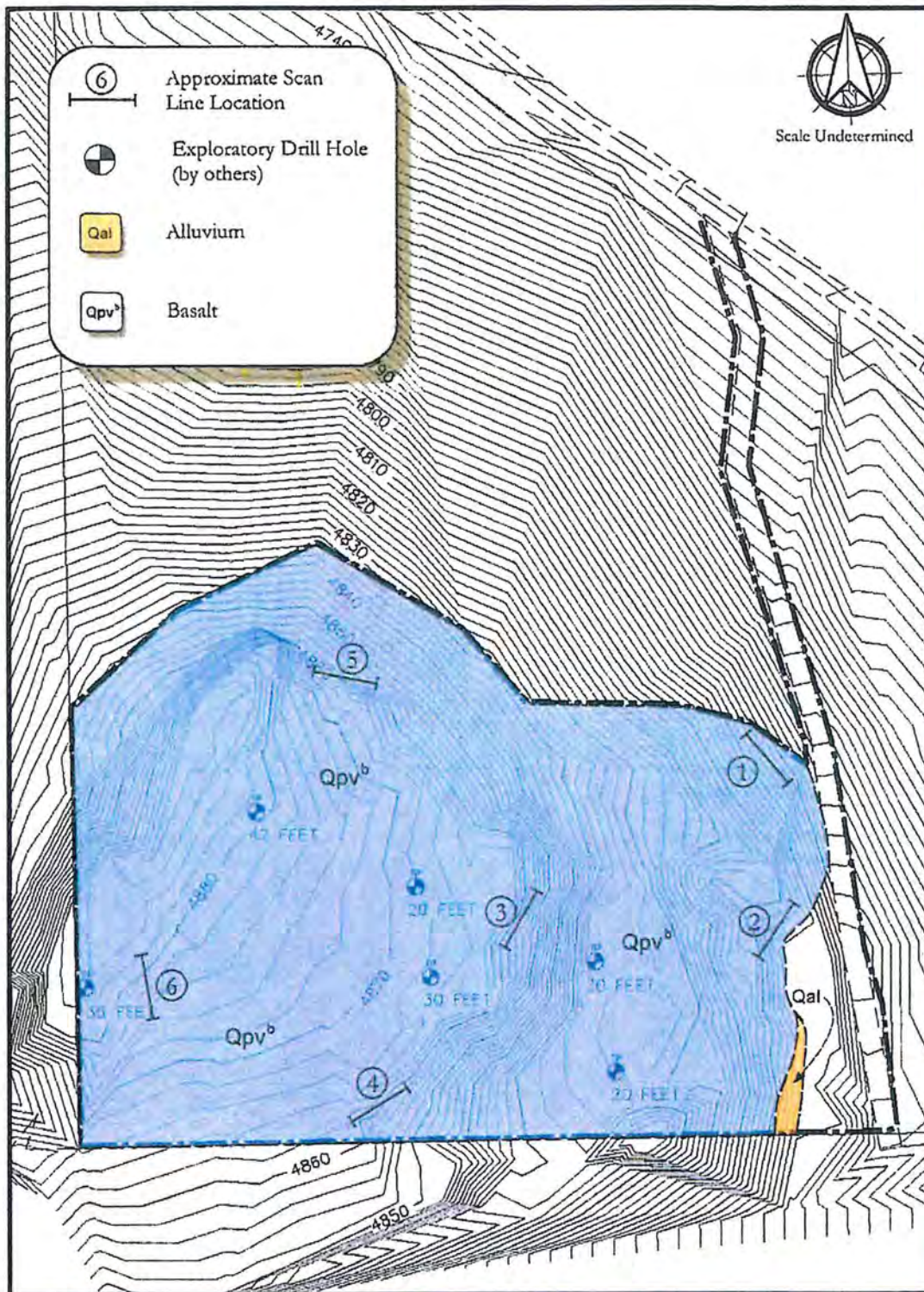
**CGI TECHNICAL
SERVICES INC.**

PROPOSED MINING PLAN
36 MINE
LASSEN COUNTY, CALIFORNIA

Project No.: 10-1334.51

Plate

2



Base maps obtained from Duane K. Miller, P.E.



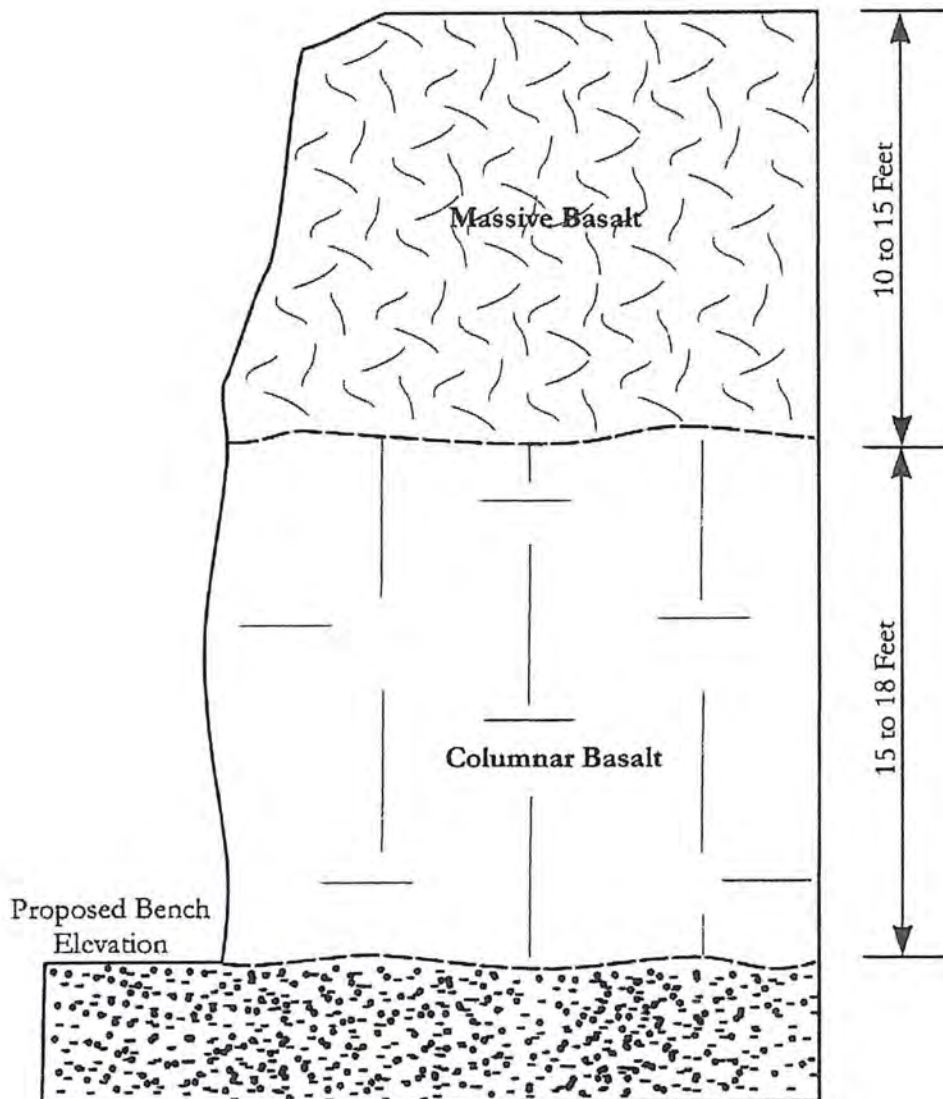
**CGI TECHNICAL
SERVICES INC.**

SITE GEOLOGIC MAP
36 MINE
LASSEN COUNTY, CALIFORNIA

Project No.: 10-1334.51

Plate

3



CGI TECHNICAL
SERVICES INC.

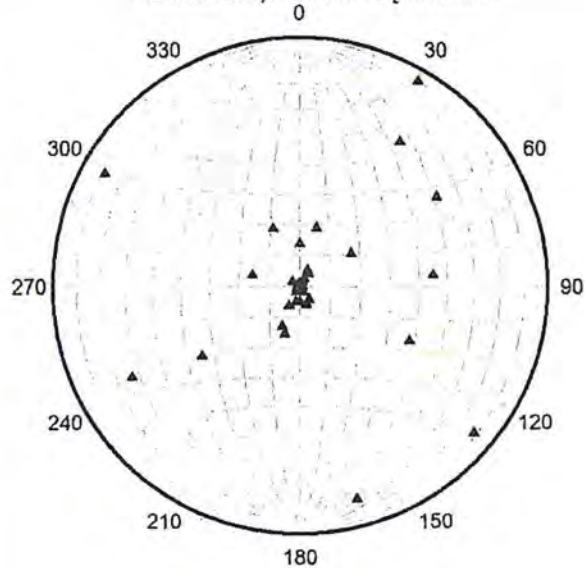
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GENERALIZED SITE GEOLOGIC PROFILE
36 MINE
LASSEN COUNTY, CALIFORNIA

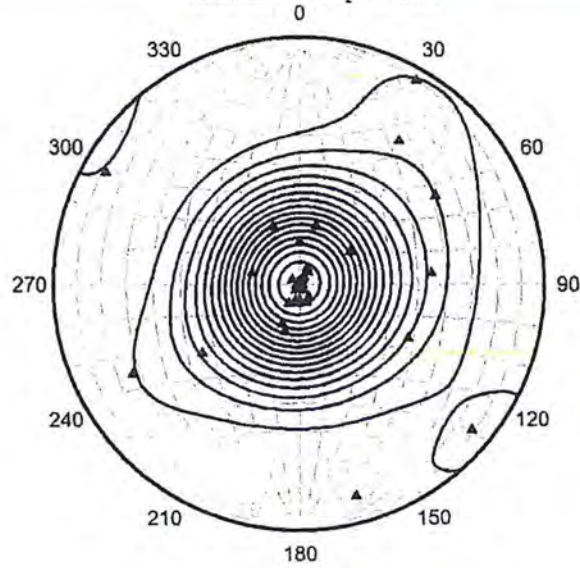
Plate

4

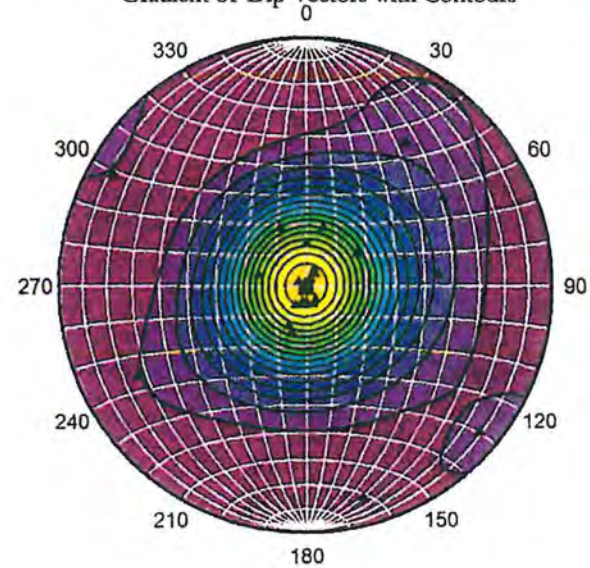
Stereonet Projection of Dip Vectors



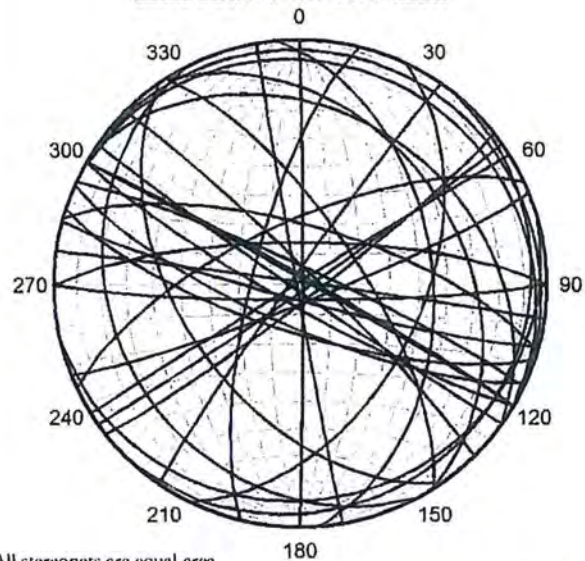
Contours of Dip Vectors



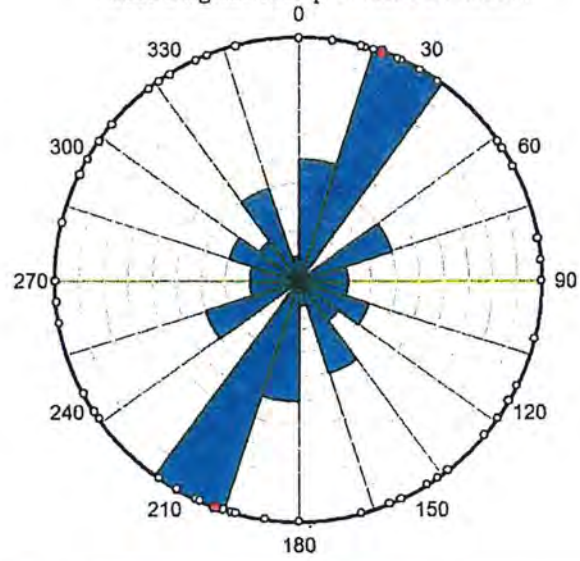
Gradient of Dip Vectors with Contours



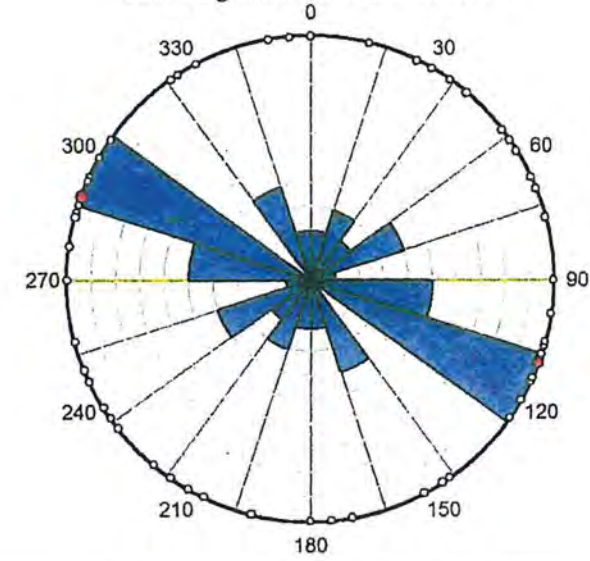
Great Circles of Discontinuities



Rose Diagram of Dip Vector Orientations



Rose Diagram of Strike Orientations



All stereonets are equal-area



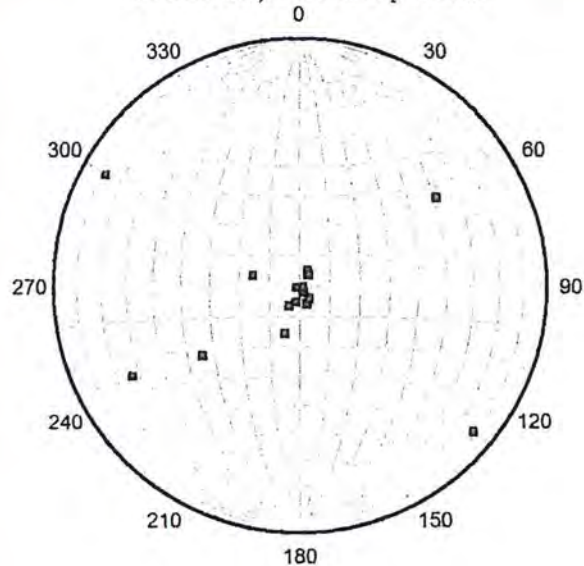
STEREONET AND ROSE DIAGRAM PROJECTIONS
ALL DISCONTINUITIES
36 MINE
LASSEN COUNTY, CALIFORNIA

Plate

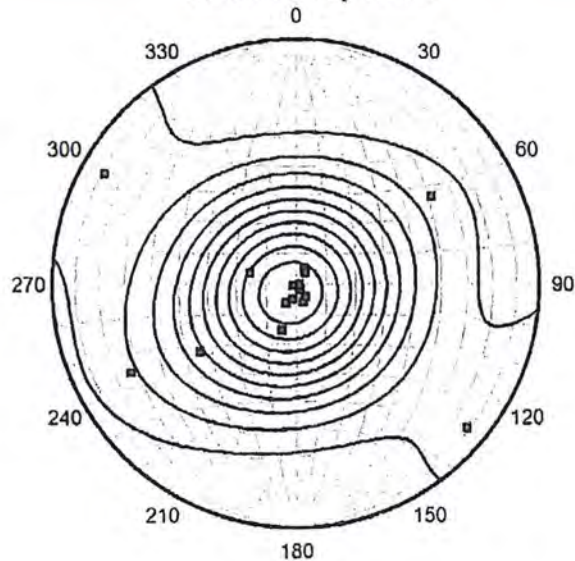
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Project No.: 10-1334.51

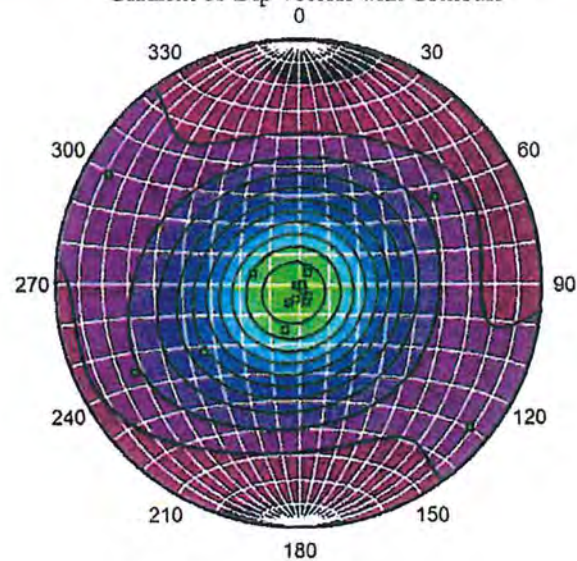
Stereonet Projection of Dip Vectors



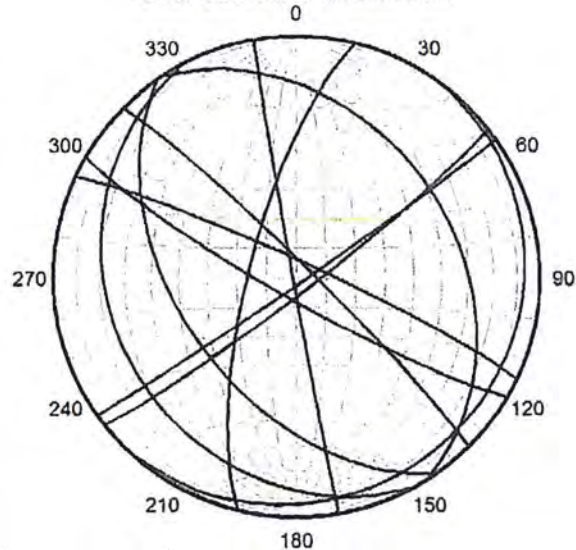
Contours of Dip Vectors



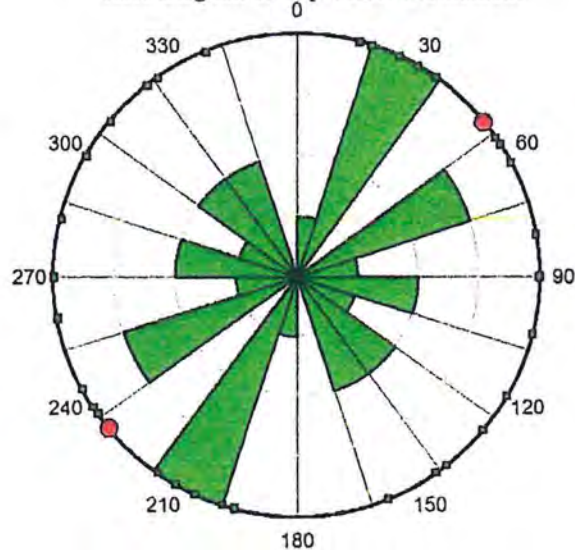
Gradient of Dip Vectors with Contours



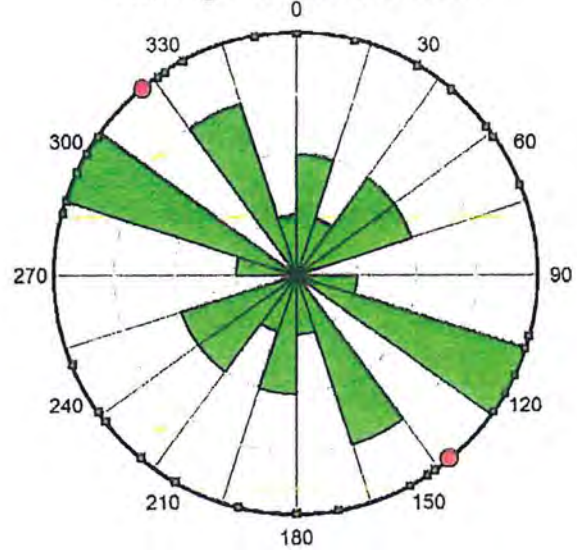
Great Circles of Discontinuities



Rose Diagram of Dip Vector Orientations



Rose Diagram of Strike Orientations



All stereonets are equal-area



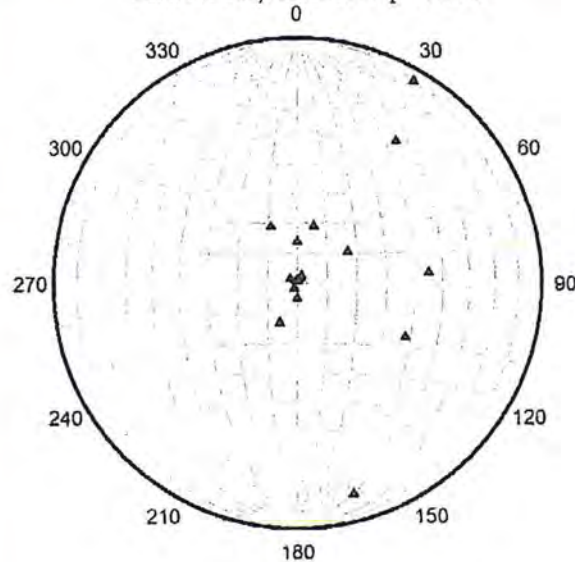
STEREONET AND ROSE DIAGRAM PROJECTIONS
COLUMBAR BASALT
36 MINE
LASSEN COUNTY, CALIFORNIA

Plate

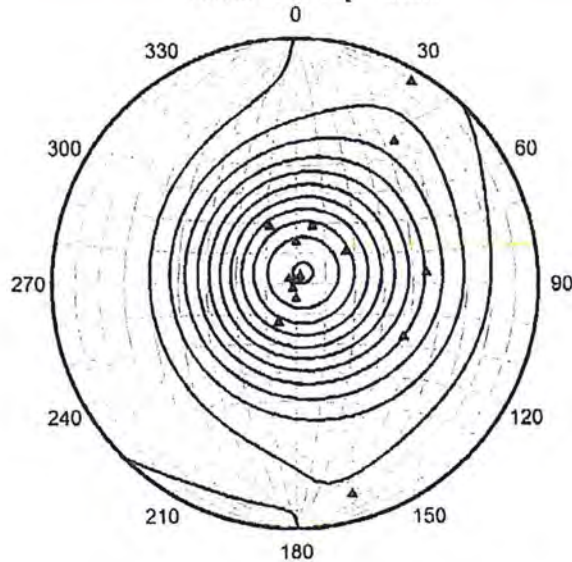
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Project No.: 10-1334.51

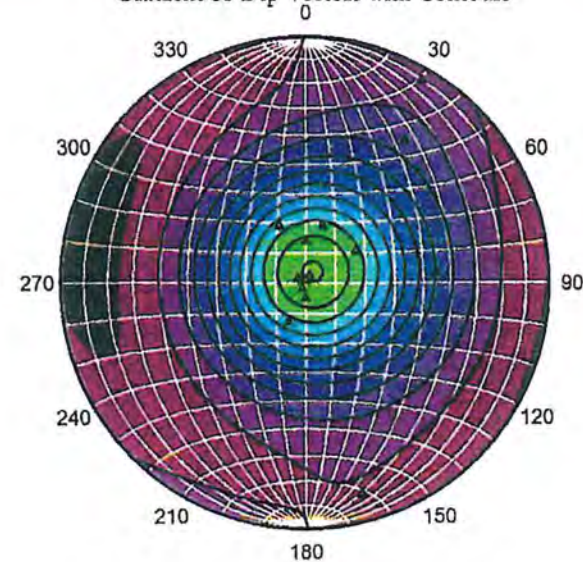
Stereonet Projection of Dip Vectors



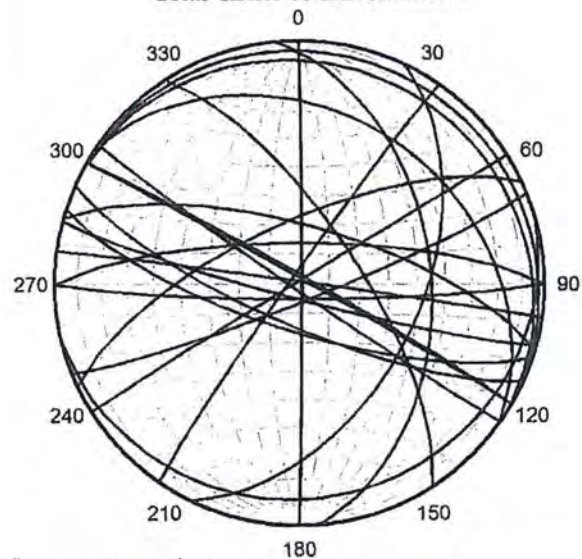
Contours of Dip Vectors



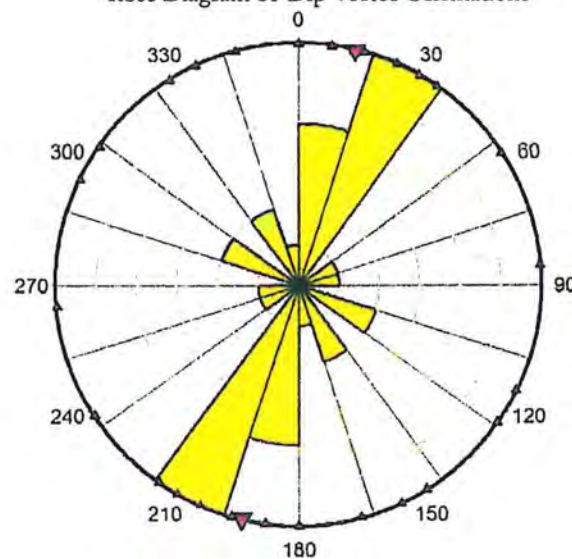
Gradient of Dip Vectors with Contours



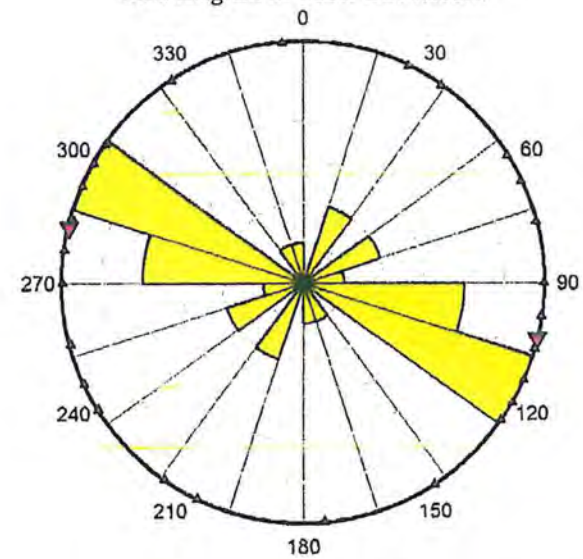
Great Circles of Discontinuities



Rose Diagram of Dip Vector Orientations



Rose Diagram of Strike Orientations



All stereonets are equal-area



STEREONET AND ROSE DIAGRAM PROJECTIONS
MASSIVE BASALT
36 MINE
LASSEN COUNTY, CALIFORNIA

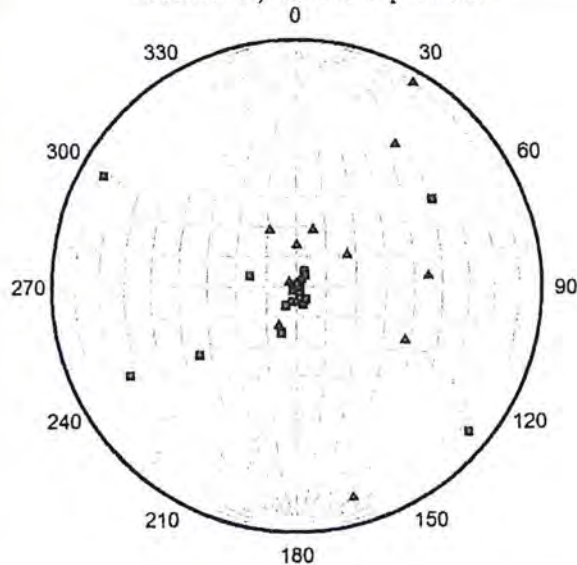
Plate

7

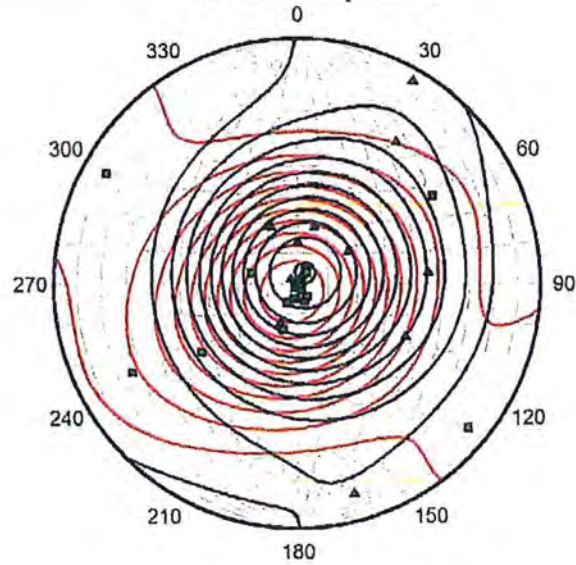
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10-1334.51

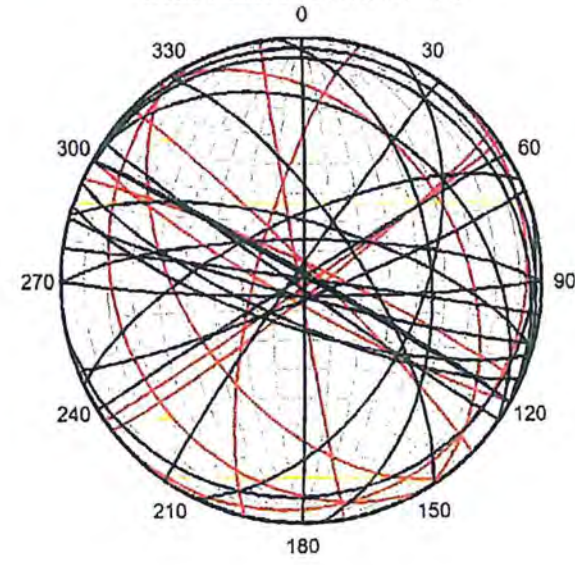
Stereonet Projection of Dip Vectors



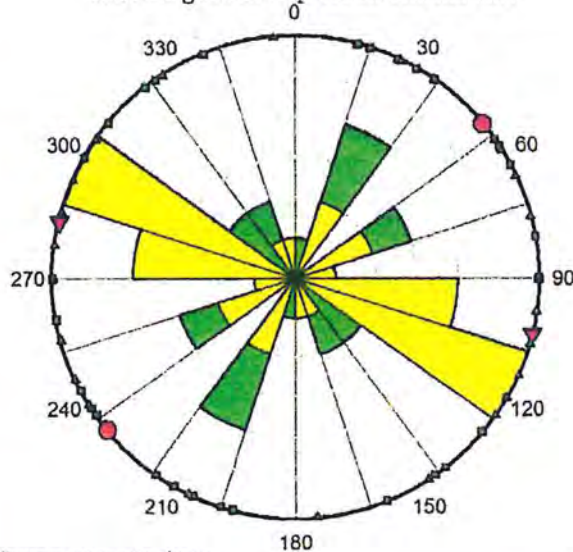
Contours of Dip Vectors



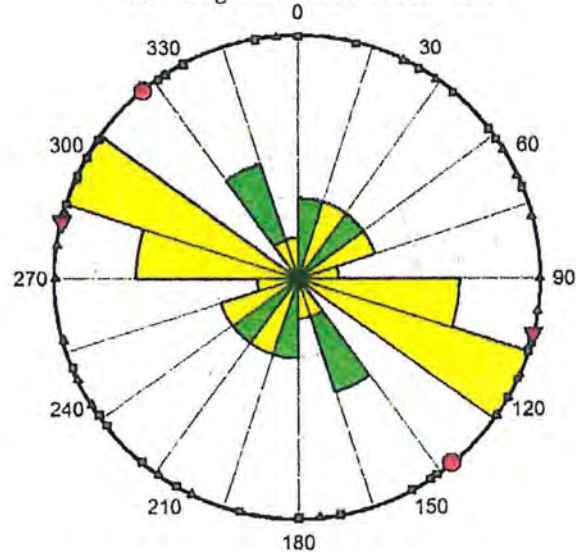
Great Circles of Discontinuities



Rose Diagram of Dip Vector Orientations



Rose Diagram of Strike Orientations



Discontinuity Type

- Columnar Basalt
- ▲ Massive Basalt

Discontinuity Contour & Great Circle Lines

- Columnar Basalt Contours
- Massive Basalt Contours

Rose Diagram Legend

- ▲ Dip or Strike Direction Columnar Basalt
- ▲ Dip or Strike Direction Massive Basalt
- ▲ Predominate Dip or Strike Direction Massive Basalt
- Predominate Dip or Strike Direction Columnar Basalt

All stereonets are equal-area



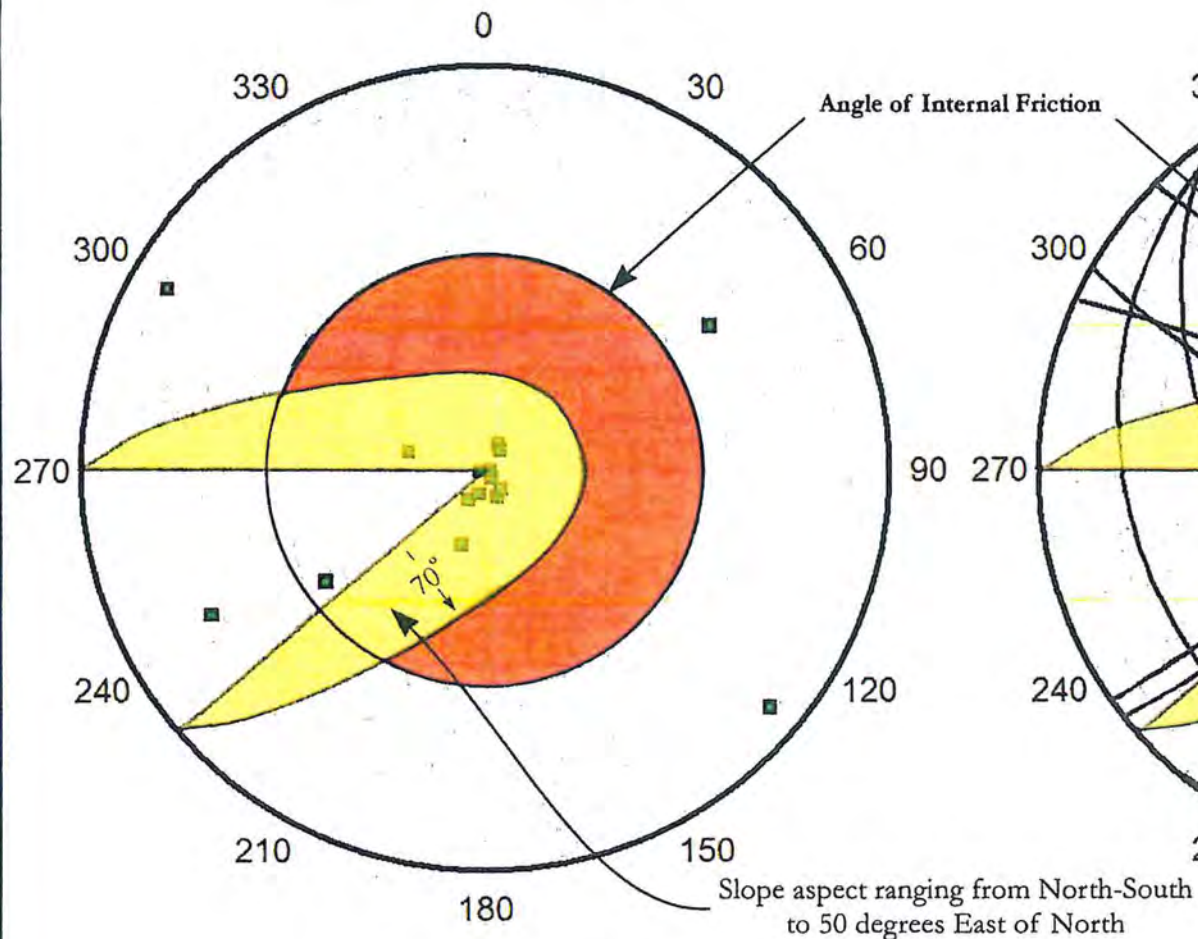
STEREONET AND ROSE DIAGRAM PROJECTIONS
SEGREGATED DISCONTINUITY DATA
36 MINE
LASSEN COUNTY, CALIFORNIA

Plate

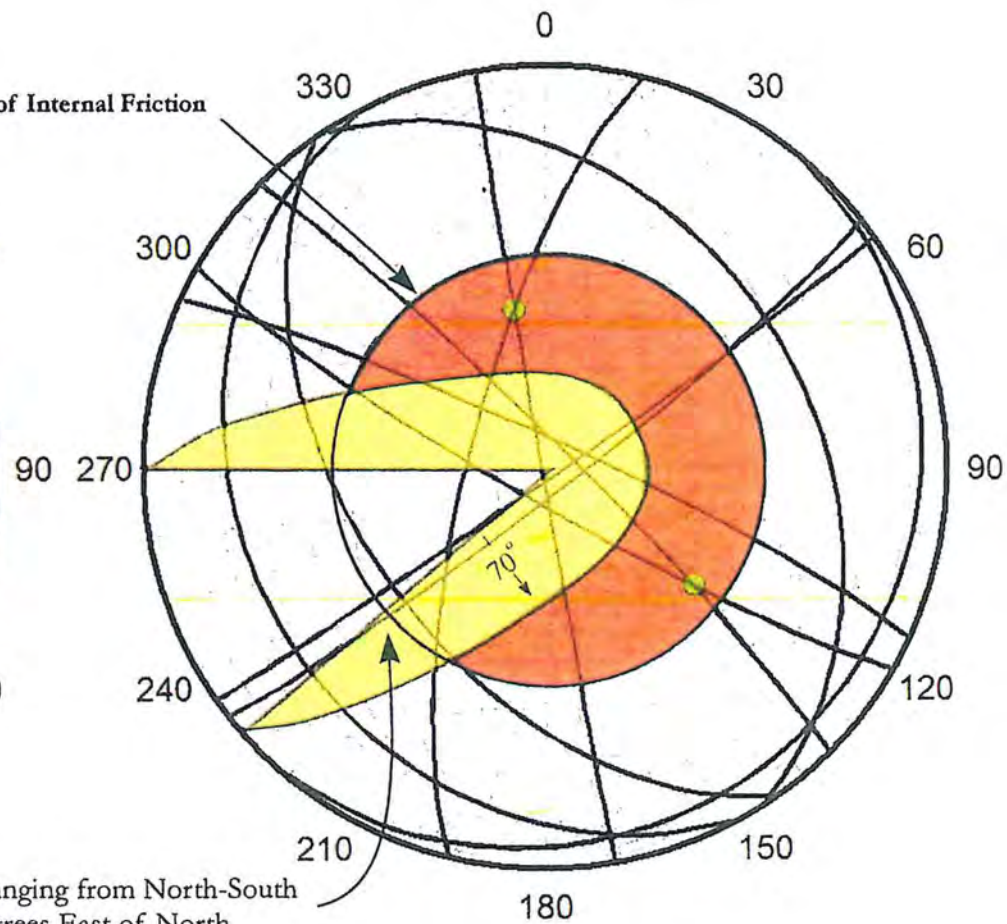
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Project No.: 10-1334.51

Potential Planar Failures



Potential Wedge Failures



● Potential Wedge Failure

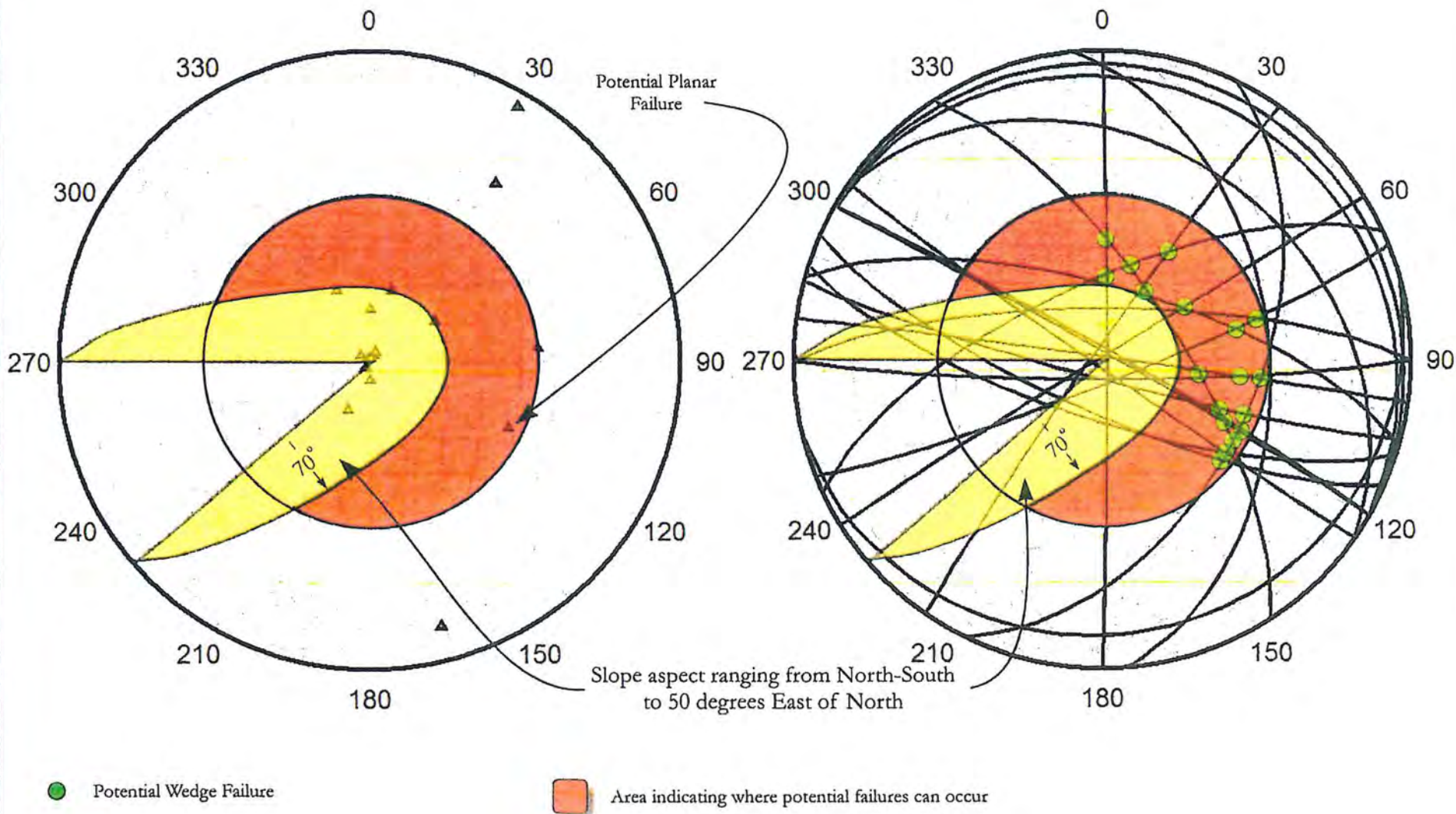
■ Area indicating where potential failures can occur

All stereonets are equal-area



MARKLAND'S TEST OF KINEMATIC STABILITY
COLUMNAR BASALT DISCONTINUITY DATA
36 MINE
LASSEN COUNTY, CALIFORNIA

Project No.: 10-1334.51



Project No.: 10-1334.51

MARKLAND'S TEST OF KINEMATIC STABILITY
MASSIVE BASALT DISCONTINUITY DATA
36 MINE
LASSEN COUNTY, CALIFORNIA

10

Appendix C

Financial Assurance Cost Estimate (Pending)

F O R E S T L A N D
M A N A G E M E N T

August 3, 2020



W. M. BEATY &
ASSOCIATES, INC.

845 BUTTE ST. / P.O. BOX 990898
REDDING, CALIFORNIA 96099-0898
530-243-2783 / FAX 530-243-2900
www.wmbeaty.com

Wendy Johnston, Principal
VESTRA RESOURCES, INC.
5300 Aviation Dr
Redding, CA 96002-9379

Re: Misc. Permit / RRF LLC – Devils Corral Rock Pit

Dear Wendy:

This letter will serve as authorization for VESTRA RESOURCES, INC. ("Vestra"), effective January 1, 2020, to enter onto lands managed by our company to conduct activities necessary to prepare a Reclamation Plan for use by Turner Excavating Inc., or another qualified operator, in the operation of rock quarry mining and processing. Such activities may include, but are not limited to, site and topography evaluations, mapping, archeological, wildlife and/or botanical surveys. The area is located on what is commonly known as the "Devils Corral Rock Pit" in portions of Sections 6 and 7, Township 29 North, Range 11 East, Mt. Diablo Base & Meridian.

Authorization is given subject to the following conditions:

1. Vestra will indemnify, defend, and hold W. M. BEATY & ASSOCIATES, INC. and the landowners, RED RIVER FORESTS LLC, harmless from any actions, demands, costs, claims, liability, attorney's fees, and expenses for injury to or death of any and all persons and destruction of or damage to any and all property caused by or arising out of your use of the premises and/or use by your agents, employees, or independent contractors.

2. Vestra will provide our office with Certificates of Insurance and a copy of the endorsement naming W. M. BEATY & ASSOCIATES, INC., and the landowners, RED RIVER FORESTS LLC, as additional insured under your general liability insurance. The limits of general liability insurance shall have minimum limits of liability for all coverage's of One Million Dollars (\$1,000,000) per occurrence and Two Million Dollars (\$2,000,000) in the aggregate. Receipt of which is hereby acknowledged.

3. W. M. Beaty & Associates, Inc. (WBA) is to receive a copy of any maps, reports and/or data generated as a result of this project. Should any management recommendations result from this study, WBA will be consulted in the development of recommendations which may affect the private property under our management.

Wendy Johnston letter
VESTRA RESOURCES, INC.
August 3, 2020 – Page 2

4. No smoking or open fires of any kind are allowed.

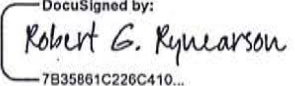
5. Any litter resulting from your use of the premises will be removed upon completion of use.

This authorization will terminate December 31, 2020, and can only be renewed by written consent of both parties.

Also, the parties hereto consent to the execution of this Permit by electronic means pursuant to the Uniform Electronic Transactions Act, California Civil Code Sections 1633.1, et. seq. The parties hereto understand and agree that electronic signatures shall be deemed to constitute original signature upon transmission by DocuSign, or such other commercially available means which results in the electronic transmission of signatures.

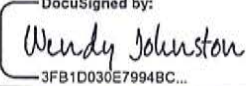
Sincerely,

W. M. BEATY & ASSOCIATES, INC.
Contract Manager for
RED RIVER FORESTS LLC

By:  8/3/2020
Robert G. Ryneearson,
Manager Land Department

Accepted:

VESTRA RESOURCES, INC.

By:  8/7/2020
Wendy Johnston, Principal

RGR:klh
cc: John Van Duyn



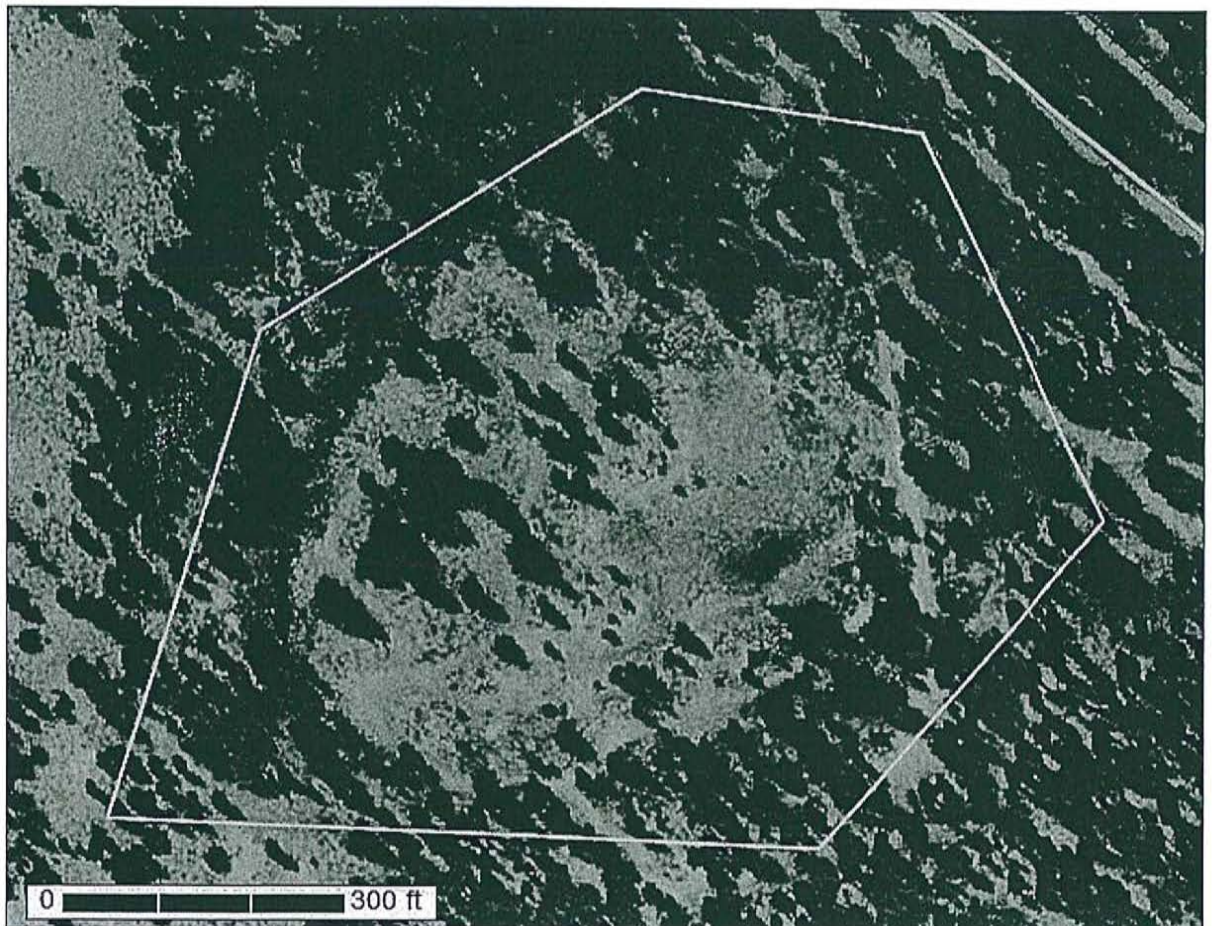
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Susanville Area, Parts of Lassen and Plumas Counties, California



July 17, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units).

Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

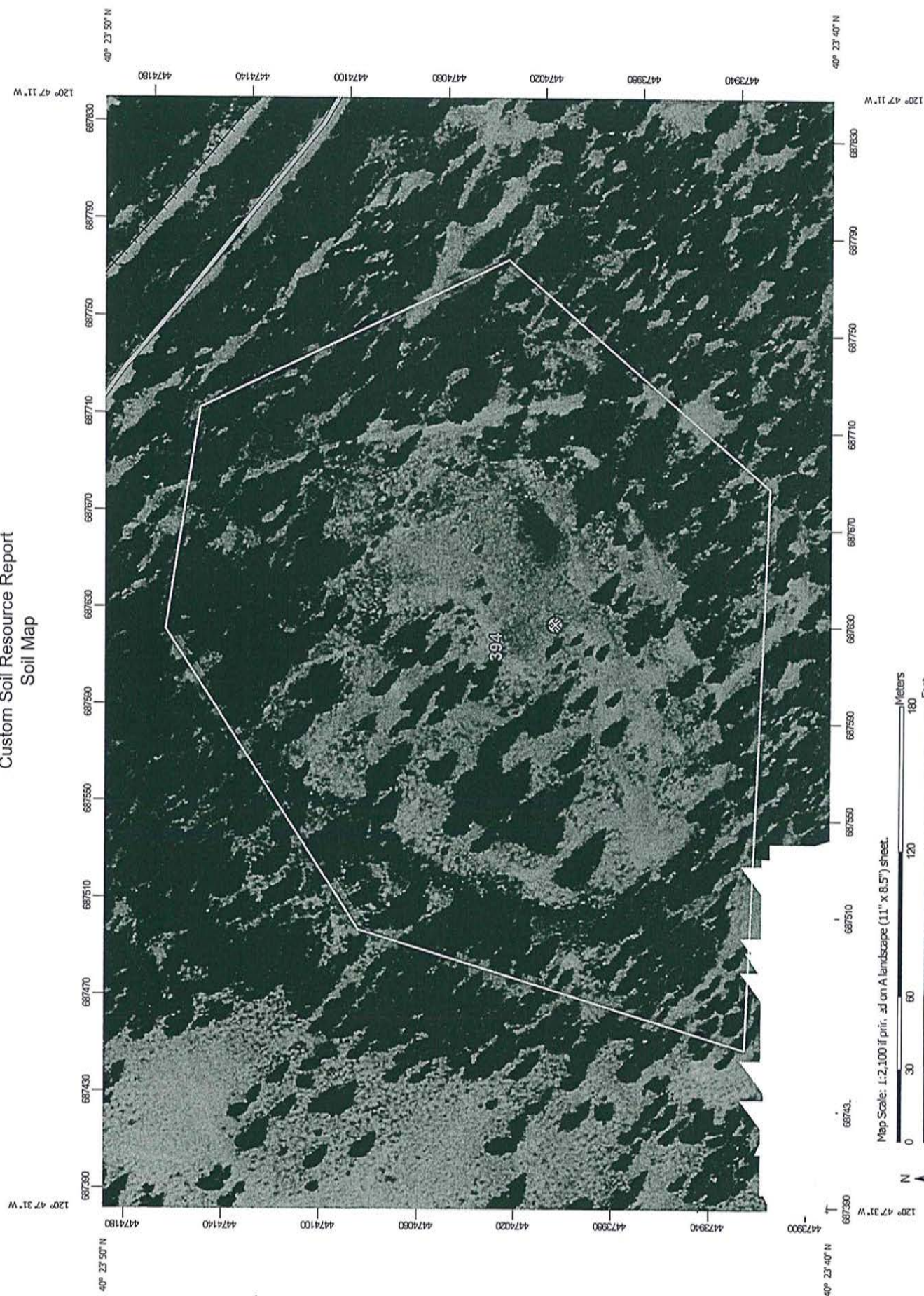
Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



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

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

Soil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: Susanville Area, Parts of Lassen and Plumas Counties, California
Survey Area Data: Version 11, Jun 1, 2020

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

Date(s) aerial images were photographed: Oct 23, 2014—Nov 6, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

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
394	Ulhalf-Southpac complex, 2 to 30 percent slopes	14.0	100.0%
Totals for Area of Interest		14.0	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Susanville Area, Parts of Lassen and Plumas Counties, California

394—Ulhalf-Southpac complex, 2 to 30 percent slopes

Map Unit Setting

National map unit symbol: jck6
Elevation: 4,600 to 5,400 feet
Mean annual precipitation: 20 to 30 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 80 to 100 days
Farmland classification: Not prime farmland

Map Unit Composition

Ulhalf and similar soils: 60 percent
Southpac and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ulhalf

Setting

Landform: Plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Upper third of mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Colluvium derived from volcanic rock and residuum weathered from volcanic rock

Typical profile

H1 - 0 to 4 inches: very gravelly sandy loam
H2 - 4 to 18 inches: gravelly loam
H3 - 18 to 54 inches: gravelly clay loam
H4 - 54 to 64 inches: weathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Hydric soil rating: No

Custom Soil Resource Report

Description of Southpac

Setting

Landform: Plateaus

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Colluvium derived from andesite and residuum weathered from andesite

Typical profile

H1 - 0 to 7 inches: very stony loam

H2 - 7 to 35 inches: very gravelly loam

H3 - 35 to 61 inches: gravelly clay loam

Properties and qualities

Slope: 9 to 30 percent

Percent of area covered with surface fragments: 20.0 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 10 percent

Landform: Plateaus

Landform position (two-dimensional): Shoulder

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

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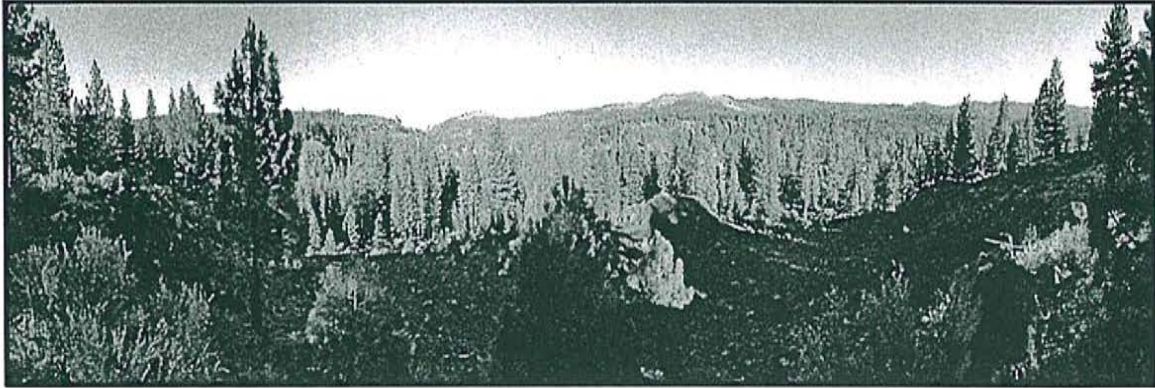
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STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

DEVIL'S CORRAL MINE
LASSEN COUNTY, CALIFORNIA



Prepared for

Turner Excavating

Prepared by



VESTRA Resources, Inc.
5300 Aviation Drive
Redding, California 96002

SEPTEMBER 2020

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72028

SEPTEMBER 2020

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1	General Site Location
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3	Site Layout

APPENDICES

A	Best Management Practices
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C	Example Chain of Custody Form

1.0 INTRODUCTION

1.1 SITE SUMMARY

The Devil's Corral Mine (also known as the 36 Mine) is a vested operation in Lassen County which has existed since the 1920s. The quarry site is located at the eastern side of Little Fredonyer Peak, west of the Susan River and seven miles west of the City of Susanville, California. The site is located in Section 6, T29N, R11E, MDBM (Lassen County APNs 115-200-55-11 and 115-200-32-11). The general site location is shown on Figure 1.

The mine currently covers a 7-acre area, 5 acres in the original vested area and 2 acres of "spillover." Reclamation methods, including topsoil replacement and revegetation, will be completed in all disturbed areas by methods described in the Reclamation Plan that is pending before Lassen County. The mine also operates under the silviculture SMARA exemption for the landowner Red River Forests LLC, managed by Beaty & Associates.

The site is used for construction-grade aggregates, primarily for road construction and maintenance. A portable crushing and screening plant will be used at the quarry in the future but there is currently no equipment at the site. The site does not operate full time. The mine will operate during spring, summer and fall months as the site is, commonly inaccessible during winter months.

Reclamation will occur at the cessation of the mining operation. All activities to remove rock debris and stabilize slopes, rip to reduce compaction, and revegetate will occur within one year following cessation of mining at the site.

FACILITY INFORMATION	
Name of Facility	Devil's Corral
Type of Facility	Gravel Mine
Location of Facility	40° 23' 45.10"N 120° 47' 21.96"W Lassen County, California (also see the General Site Location, Figure 1)
Facility Owner	Red River Forests LLC Attn: Bob Rynearson Beaty & Associates P.O. Box 990898 Redding, California 96099-0898 (530) 243-2783
Facility Operator	Turner Excavating 3746 Big Springs Rd Lake Almanor, California 96137 (530) 596-3953
SWPPP Contact	Lynne Turner (530) 596-3953

1.2 SIC CODES

40 CFR §122.26(b)(14) defines “stormwater discharge associated with industrial activity” and describes the types of facilities subject to permitting (primarily by Standard Industrial Classification (SIC) code). This General Permit provides regulatory coverage for facilities with the industrial activities described in the permit where the covered industrial activity is the Discharger’s primary industrial activity. In some instances, a Discharger may have more than one primary industrial activity occurring at a facility.

The 1987 SIC manual uses the term “establishment” to determine the primary economic activity of a facility. The manual instructs that where distinct and separate economic activities are performed at a single location, each activity should be treated as a separate establishment (and, therefore, as a separate primary activity).

The SIC manual also discusses “auxiliary” functions of establishments. Auxiliary functions provide management or support services to the establishment. Examples of auxiliary functions are warehouses and storage facilities for the establishment’s own materials, maintenance and repair shops of the establishment’s own machinery, automotive repair shops or storage garages of the establishment’s own vehicles, administrative offices, research, development, field-engineering support, and testing conducted for the establishment. When auxiliary functions are performed at physically separate facilities from the establishment they serve, they generally are not subject to General Permit coverage. If auxiliary functions are performed at the same physical location as the establishment, then they are subject to General Permit coverage if they are associated with industrial activities.

In 1997, the North American Industrial Classification System (NAICS) was published, replacing the SIC code system. The U.S. EPA has indicated that it intends to incorporate the NAICS codes into the federal stormwater regulations but has not done so yet. Many Dischargers in newer industries were not included in the 1987 SIC code manual and may have difficulty determining their SIC code information.

Types of discharges not covered by the General Permit:

- Discharges from construction and land disturbance activities that are subject to the *General Permit for Discharges of Stormwater Associated with Construction Activity* (Construction General Permit).
- Discharges covered by an individual stormwater NPDES permit.

Industrial stormwater discharges may be regulated by other individual or general NPDES permits issued by the State Water Board or other Regional Water Board.

The Devil’s Corral Mine falls under SIC Code 1442 – Construction Sand and Gravel. This SIC code applies to establishments primarily engaged in operating sand and gravel pits and dredges, and in washing, screening, or otherwise preparing sand and gravel for construction uses.

1.3 PURPOSE OF THE STORMWATER POLLUTION PREVENTION PLAN

The preparation of a Stormwater Pollution Prevention Plan (SWPPP) is required by federal and state regulation and is administered by the State Water Resources Control Board (SWRCB) through the Regional Water Quality Control Board (RWQCB). This plan has been prepared to comply with the terms of the General Permit for Stormwater Discharges Associated with Industrial Activities (NPDES No. CAS000001, 2014-0057-DWQ). The intent of the order is to protect water quality by controlling pollutants in stormwater runoff. This SWPPP is designed to comply with Best Available Technology (BAT), Best Conventional Pollutant Control Technology (BCT), and Best Management Practices (BMPs) to reduce or eliminate pollution from industrial facilities during storm events.

1.4 AUTHORITY AND APPLICABILITY

1.4.1 General Authority

Regional Water Boards are primarily responsible for enforcement of the Industrial General Permit. The General Permit recognizes that Regional Water Boards have the authority to protect the beneficial uses of receiving waters and prevent degradation of water quality in their region. Dischargers of stormwater associated with industrial activity to waters of the United States are required to meet all applicable requirements of the General Permit. There will not be any waste discharge at this facility.

1.4.2 SIC-Code Specific

Facilities classified as SICs 10XX through 14XX, including active or inactive mining operations and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge stormwater contaminated by contact with or that has come into contact with any overburden, raw material, intermediate products, finished products, by-products, or waste products located on the site of such operations, are subject to stormwater effluent limitation guidelines. Inactive mining operations are mining sites that are not being actively mined but which have an identifiable owner/operator. Inactive mining sites do not include sites where mining claims are being maintained prior to disturbances associated with the extraction, beneficiation, or processing of mined material; or sites where minimal activities are undertaken for the sole purpose of maintaining a mining claim.

1.5 IMPLEMENTATION SCHEDULE/REVISIONS

The BMPs in this SWPPP will be implemented. Additional BMPs will be implemented on an as-needed basis. Any additional, or revised, BMPs found to be necessary will be implemented by the Operator as needed. This SWPPP will be implemented until a Notice of Termination is submitted to the RWQCB. Copies of the SWPPP are maintained at the main office of Turner Excavating in Lake Almanor, California.

A California-licensed professional engineer will review and update the SWPPP if the mine becomes inactive or additional BMPs are needed.

1.5.1 Performance Standards

This SWPPP was prepared to meet the performance standards outlined in the Industrial General Permit. These standards include the following:

- a. Identify and evaluate all sources of pollutants that may affect the quality of industrial stormwater discharges and authorized non-stormwater discharges (NSWD);
- b. Identify and describe the minimum BMPs and any advanced BMPs implemented to reduce or prevent pollutants in industrial stormwater discharges and authorized NSWDs. BMPs shall be selected to achieve compliance with the General Permit; and,
- c. Identify and describe conditions or circumstances which may require future revisions to the SWPPP.

1.5.2 303(d) Applicability

The site has no surface water and receives no offsite run-on since the formation being mined is the highest point in the immediate area. There is no known surface connection between runoff from the site and the Susan River. Numeric water quality objectives for the Susan River and its major tributaries are defined in the Basin Plan. The beneficial uses of the Susan River include Municipal and Domestic Supply (MUN), Agriculture Supply (AGR), Industrial Service Supply (IND), Groundwater Recharge (GWR), Freshwater Replenishment (FRSH), Water Contact Recreation (REC-1), Non-Contact Water Recreation (REC-2), Navigation (NAV), Commercial and Sport Fishing (COMM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Warm Freshwater Habitat (WARM), Migration of Aquatic Organisms (MIGR), Spawning, Reproduction and Development (SPWN). According to the Susan River Toxicity H.U. 637.20 published in May of 2019, Susan River in 1996 was placed on the Federal Clean Water Act Section 303(d) list of impaired waters for toxicity of unknown cause. The Susan River originates from Silver and Caribou Lakes in southern Lassen County and flows east through McCoy and Hog Flat Reservoirs. It continues on to the City of Susanville and into Honey Lake. Susan River also exhibits low to moderate levels of toxicity in some locations. A TMDL has not currently recommended a regulatory response since the pollutant causing toxicity has not been identified. Additional toxicity testing will be needed to determine control measures and regulatory actions for the water quality violations.

The site soil and rock layers have high infiltration by the low amount of annual precipitation and do not exhibit the obvious signs associated with concentrated flow. According to the U.S. climate data website for Susanville, most precipitation is in the form of snow and the average snowfall is about 14 inches per year from November through April. The native rock is highly fractured and most precipitation appears to percolate down into the rock mass instead of running off. The high infiltration combined with the low rainfall in the area make the use of an onsite detention unnecessary. There is no process water since the portable crushing/plant is a dry operation. There is no known surface discharge point from the facility.

2.0 PROJECT INFORMATION

2.1 POLLUTION PREVENTION TEAM

The pollution prevention team consists of the following:

Name	Title	Individual Responsibilities
Lynne Turner	Vice President	General Oversight, Reporting, BMP Implementation Sampling & Visual Observations
Wendy Johnston	QISP	Plan Development/SWPPP

2.2 FACILITY OPERATING HOURS

The facility typically operates 7:00 a.m. to 6:00 p.m., Monday through Friday.

2.3 PROTOCOL ON PUBLIC ACCESS TO THE SWPPP

The SWPPP shall be retained onsite and made available upon request to any representative of the RWQCB. The SWPPP is considered a report that shall be available to the public under Section 308(b) of the Clean Water Act (CWA).

2.4 CERTIFICATION OF THE SWPPP

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Wendy Johnston
QISP #00054
VESTRA Resources, Inc.
5300 Aviation Drive
Redding, California 96002

Date

Lynne Turner, Vice President
Turner Excavating
3746 Big Springs Road
Lake Almanor, California 96137

Date

3.0 SITE INFORMATION

3.1 FACILITY DESCRIPTION

The Devil's Corral Mine (also known as the 36 Mine) is a vested operation in Lassen County which has existed since the 1920s. The quarry site is located at the eastern side of Little Fredonyer Peak, west of the Susan River and seven miles west of the City of Susanville, California. The site is located in Section 6, T29N, R11E, MDBM (Lassen County APNs 115-200-55-11 and 115-200-32-11). The general site location is shown on Figure 1.

3.2 Soils

The Natural Resources Conservation Service (2019) identified soils within the project boundary as Ulhalf-Southpac complex, 2 to 30 percent slopes (NRCS 2020). These soils are colluvium derived from volcanic rock and residuum weathered from volcanic rock. The typical restrictive layer is approximately 40 to 60 inches deep and is comprised of paralithic bedrock.

3.3 Hydrology

No streambeds, banks, channels, or drainages are located in the immediate vicinity of the mine. The nearest waterways are the Susan River (0.15 miles east) and Willard Creek (0.35 miles south). No impact to aquatic habitats will occur. Hydrology of the mine site and surrounding area is shown on Figure 2.

3.4 AREAS OF INDUSTRIAL ACTIVITIES AND MATERIALS HANDLING

A variety of machinery is used in the mining operation to transport overburden to storage piles and to mine the underlying rock. Loaders are used for both excavation and for moving excavated materials on the project site from the quarry area. Loaders are used to feed the material to the storage piles. Blasted rock is sent through the portable crusher system, screened, and sorted according to size; gravel is then stored or shipped offsite. An aboveground petroleum storage container will include one 500-gallon diesel tank, which will be double walled or stored in a secondary containment structure adjacent to the office as shown on Figure 3. Miscellaneous 55-gallon drums containing oils and grease will also be stored within this containment structure or in the Conex container.

3.5 STORM DRAINAGE SYSTEM

There is no engineered storm drainage system onsite. The site has no surface watercourses and receives no offsite run-on since the formation being mined is the highest point in the immediate area. There is no process water since the portable crushing/plant is a dry operation.

3.6 IMPERVIOUS AREAS

There are no impervious areas onsite. The scale and office are will be the only structures on the site. These structures are portable and temporary.

3.7 POTENTIAL AREAS OF SOIL EROSION

A potential area of erosion is from basin water from the active quarry face to the quarry floor. However, the soil is highly permeable and there is minimal soil onsite.

4.0 SOURCE IDENTIFICATION

This section includes the identification of possible sources of pollutants on the site. Potential sources of pollutants are controlled through BMPs.

4.1 INDUSTRIAL ACTIVITIES

Industrial activities include the sorting and crushing. Construction equipment operation, storage, and minor maintenance occur onsite. Figure 2 shows the drainage patterns and sample locations. Possible pollution sources from the inactive site are shown in Table 4-1.

Table 4-1 POSSIBLE POLLUTION SOURCES	
Area/Activity	Pollutant
Quarry area	Sediment, TPH O&G
Roads	Sediment
Fueling Area	TPH O&G

4.2 MATERIAL HANDLING AND STORAGE AREAS

Petroleum products stored onsite will be double walled or within a concrete secondary containment structure. One onsite aboveground 500 gallon storage tank (AST) is located onsite, within the secondary containment structure. ASTs are detailed in Table 4-2. Oil and hydraulic fluid in 55-gallon drums are stored onsite within the secondary containment structure.

4.3 DUST- AND PARTICULATE-GENERATING ACTIVITIES

Dust may be generated by processing of aggregate materials as well as by truck and heavy equipment movement throughout the site. The Lassen County Air Quality Management District (AQMD) manages the requirements for the dust- and particulate-generating activities.

4.4 NON-STORMWATER DISCHARGES

No non-stormwater discharges are associated with the facility.

4.5 FUEL AND OIL CONTAINMENT AREAS

Potential sources for pollution onsite include fuels and oils used in machinery, heavy equipment, and trucks. The vehicles and equipment used in the project operation are maintained to prevent leaks. Minor routine onsite maintenance is conducted within the processing area in such a manner as to minimize the potential for leaks and spills. Major repairs, other than emergency repairs, are conducted at an offsite facility.

Petroleum products stored onsite will be double walled or within a concrete secondary. One onsite aboveground 500 gallon storage tank (AST) is located onsite, within the secondary containment structure. ASTs are detailed in Table 4-2. Oil and hydraulic fluid in 55-gallon drums are stored onsite within the secondary containment structure.

Table 4-2 GENERAL TANK INFORMATION		
Tank Capacity	Contents	Location
500 gallon	Diesel	Conex Container
55 gallon drum	Oil/ grease/hydraulic fluid	Secondary containment inside Conex storage container.

4.6 POTENTIAL SPILL LOCATIONS

Potential spill locations are identified in Table 4-3.

Table 4-3 POTENTIAL SPILL LOCATIONS	
Location	Outfalls
Fuel/Oil Storage Area	If not secondarily contained, spills from this area could sheet flow to the east and be retained by the southern active face of the quarry.
Material Processing Areas	During significant rain events, sediment or other pollutants could potentially leave the site at the access road.

4.7 SPILLS OF SIGNIFICANT MATERIALS

This is a new site, no major spills/leaks have occurred.

5.0 POTENTIAL POLLUTANTS

5.1 SIGNIFICANT MATERIALS THAT MAY COME IN CONTACT WITH SURFACE WATER/TYPES OF POTENTIAL POLLUTANTS BY SOURCE AREA

Potential pollutants that may come into contact with surface water or may be present in stormwater from the facility were identified in Table 4-1.

5.2 TYPES OF POTENTIAL POLLUTANTS BY SOURCE

Potential pollutants that may be present in stormwater from the facility are identified by area in Table 5-1.

Table 5-1 SIGNIFICANT MATERIALS THAT MAY COME IN CONTACT WITH SURFACE WATER BY SOURCE AREA				
Area	Potential Contaminants	Source	Quantity of Material Stored	Frequency of Use
Processing Area	TPH-O&G	Miscellaneous equipment	55-gal	Daily during operations
Excavation and stockpile areas	Sediment and TPH-O&G	Unpaved areas and access roads	n/a	Daily during operations
Fueling area	TPH-O&G	ASTs	500-gal	Daily during operations
Roadways	Sediment	Unpaved roads	n/a	Daily during operations

6.0 STEPS TO REDUCE POLLUTION FROM STORMWATER RUNOFF

This section summarizes the BMPs that will be implemented at the Devil's Corral facility to reduce or limit stormwater pollution from the site. As stated in the regulations, priority is given to those BMPs that control pollution with the greatest cost benefit.

6.1 STORMWATER MANAGEMENT CONTROLS

The facility has no surface water storage and receives no offsite run-on since the formation being mined is the highest point in the immediate area. There is no known surface connection between runoff from the site and the Susan River. The soil and rock layers are easily infiltrated by the low amount of annual precipitation and do not exhibit the obvious signs associated with concentrated flow. The native rock is highly fractured and most precipitation appears to percolate down into the rock mass instead of running off. The discharge point is at the southeast end of the operation. The high infiltration combined with the low rainfall in the area make the use of an onsite detention unnecessary. There is no process water since the portable crushing/plant is a dry operation.

Stormwater controls consist of the following:

6.1.1 Minimize Exposure. The structural controls or practices being implemented to minimize the exposure of industrial activities to a precipitation event follow.

- **Vehicles:** Vehicle and equipment traffic on exposed site areas are minimized during storm events to prevent stirring of sediment.
- **Fuel Containment Areas:** Fuel will be contained in a double wall container or a secondary containment structure will surround the fuel containment area to minimize potential for spills to reach stormwater during a rain event.

6.1.2 Good Housekeeping. Good housekeeping requires the maintenance of clean, orderly facility areas that discharge stormwater.

- Material handling areas are inspected to reduce the potential for pollutants to enter the stormwater conveyance system.
- Minor equipment maintenance are performed onsite. No maintenance shop is located onsite.
- Upon detection of spills or erosion, the impacted areas are cleaned immediately and any necessary repairs are made to minimize the potential for impacting stormwater.
- Small containers of oil, hydraulic fluid and grease are placed within the secondary containment structure.

Source control BMPs used to control and prevent stormwater impacts include:

- SC-10 Non-Stormwater Discharges
- SC-11 Spill Prevention, Control and Cleanup
- SC-20 Vehicle and Equipment Fueling

SC-22	Vehicle and Equipment Repair
SC-30	Outdoor Loading and Unloading
SC-31	Outdoor Liquid Container Storage (portions of)
SC-32	Outdoor Equipment Operations
SC-33	Outdoor Storage of Raw Materials
SC-34	Waste Handling and Disposal
SC-40	Contained or Erodible Areas

- 6.1.3 Preventive Maintenance.** This practice includes inspection and maintenance of the stormwater conveyance system. An annual inspection is performed by the facility supervisor to verify SWPPP implementation and accuracy. This inspection addresses all elements of the SWPPP including the site map, the potential pollutant sources, and structural and non-structural controls to reduce pollutants in stormwater discharges.
- 6.1.4 Spill Prevention and Response.** This includes increasing employee awareness toward minimizing spills and the training to respond if spills occur (BMP SC-11). Each employee is directed to clean up spills as they occur and to report any spill of significant quantity. In general, only small amounts of fuel/oil may spill onto the loading area or facility containments during everyday operations. As previously described herein, facility containments, loading/unloading practices, good housekeeping measures, and maintenance schedules effectively prevent minor spills that may occur during day-to-day operations from having any significant impact on facility stormwater.
- 6.1.5 Material Handling and Storage.** This includes training employees on the proper handling of materials to minimize the potential for spills and to minimize the exposure of hazardous materials and/or sediment to stormwater. Employees are trained to keep the facility clean. BMPs include SC-30, SC-31, SC-32, SC-33 and SC-34.
- 6.1.6 Waste Handling and Recycling.** Employee training includes the proper waste handling procedures that are used with site activities (BMP SC-34).
- 6.1.7 Stormwater Management Practices.** Stormwater runoff will generally flows in a southeastern direction away from the storage and process areas where it is captured against the cut slope of the mine. Figure 3 shows the direction of stormwater runoff.
- 6.1.8 Erosion and Sediment Control.** Inspection and cleaning of drainage systems and access roads is performed on a regular basis. BMPs include those described in Section 6.1.7. Stockpiles are regularly checked for areas of erosion. Special attention is required prior to the beginning of the wet season.
- 6.1.9 Dust- and Particulate-Generating Activities.** Dust may be generated by processing of aggregate materials as well as by truck and heavy equipment movement throughout the site. Turner Excavating complies with MCAQMD requirements. BMP WE-1 Wind Erosion Control is implemented at the facility.
- 6.1.10 Non-Stormwater Discharges.** No non-stormwater discharges are associated with the facility.

- 6.1.11 Discharge Prohibitions.** The discharge of wastewater at a location or in a manner other than that described is prohibited. The discharge of sediment, or any other waste, to surface waters or surface water drainage courses is prohibited. The discharge of hazardous or toxic substances, including petroleum fuel, is prohibited. Bypass or overflow of untreated or partially treated waste, including domestic waste, is prohibited. BMPs described in Section 3 and this section including berms, ditches and sediment basins have been implemented. Discharges of stormwater are directed to one discharge point.
- 6.1.12 Employee Training.** All personnel are required to read and understand this SWPPP as well as other spill response procedures described in site safety materials. Training is required of all employees annually or within 3 months if newly employed. Components of the training session include a SWPPP review with major emphasis on the areas of erosion control, spill response, good housekeeping, inspections, maintenance, and material management practices. Attendees are required to sign a form indicating their understanding of the plan and acknowledgement of attendance.
- 6.1.13 Inspections.** All inspections, visual observations, and sampling, as required, are performed by trained personnel. Lynne Turner is responsible for follow-up to ensure that appropriate measures are taken in response to these activities. An annual inspection is performed by the facility general manager to verify SWPPP implementation and accuracy. This inspection addresses all elements of the SWPPP, including the site map, the potential pollutant sources, and structural and non-structural controls to reduce pollutants in stormwater discharges. Monthly observations are conducted by qualified personnel.
- 6.1.14 Recordkeeping and Internal Reporting.** Records of all inspections, spills, and maintenance activities will be maintained onsite and at Turner Excavating main office in Lake Almanor, California. These are available to agency personnel as necessary.
- 6.1.15 Quality Assurance.** The procedures contained in the SWPPP are conducted under the direction of Lynne Turner, Vice President.

6.2 STRUCTURAL BMPs

BMPs are described below and summarized in Table 6-1.

- 6.2.1 Secondary Containment Structures.** The aboveground tank will be provided with secondary containment. Any containers storing petroleum products are kept in a secondary containment structure (see portions of BMP SC-31).
- 6.2.2 Berms.** Containment berms (BMP EC-9) are located around the ponds and throughout the facility. The highwall of the active quarry face also acts as a berm.

Table 6-1 POTENTIAL POLLUTION SOURCES AND CORRESPONDING BMPs			
Area	Pollutant Source	Pollutant	BMP
Stockpiles	Rainfall or drainage from wet stockpiles	Sediment	<ul style="list-style-type: none"> • Divert/contain runoff from stockpiles with berms and drainage swales or contain in stormwater ponds. • Straw mulch • If necessary, ring with straw wattles or silt fence and/or cover with geotextile mats or plastic
Roadway	Runoff from roadways	Sediment	<ul style="list-style-type: none"> • Divert runoff through drainage channels.
Fueling Area and Equipment Operation	Spills and leaks during delivery Spill caused by topping off fuel tanks Leaking storage tanks	Fuel, oil and lubricants	<ul style="list-style-type: none"> • Divert/contain runoff from area with berms and drainage swales or contain in ponds. • Tanks located within secondary containment. • Designate one area for refueling • Use spill and overflow protection (e.g. spill kits and secondary containment) • Train employees on proper fueling (do not top off, cleanup, and spill response techniques with dry absorbent countermeasures) • Implement preventative maintenance of equipment including visual inspections daily when in use

6.3 PROPOSED ADDITIONAL BMPs

BMPs were described in this section and are described in detail in Appendix A. The BMPs are tailored to the activities and conditions at the project site. Facility operators are required to develop and implement additional BMPs as appropriate and necessary to prevent or reduce pollutants.

In the event of an exceedance of numeric action levels, additional BMPs will be proposed.

7.0 MONITORING PLAN

7.1 CHECKING BMP IMPLEMENTATION

Personnel responsible for implementation of the SWPPP conduct inspections of the facility operations to ensure that BMPs are implemented and meet the objectives of the SWPPP. Inspections are conducted monthly and during storm events.

7.2 EFFLUENT/STORMWATER MONITORING (DISCHARGE)

Visual inspections document the presence of any discoloration, stains, odors, floating materials, etc., as well as the source of any discharges. Stormwater runoff from the active work area may discharge at one location as shown on Figure 2. Samples must be received by the laboratory within 24 hours of collection.

Facilities classified as SICs 144X are required to collect samples for total suspended solids, pH, total petroleum hydrocarbons–oil and grease, and N+N. Sampling parameters, test methods, annual Numeric Action Levels (NALs), and instantaneous NALs are shown in Table 7-1.

Table 7-1 PARAMETER TEST METHODS AND NAL VALUES				
Parameter	Test Method	Reporting Units	Annual NAL	Instantaneous Maximum NAL
pH	Calibrated portable probe	pH units	N/A	Less than 6.0 or greater than 9.0
Total Suspended Solids	SM 2540-D	mg/L	100	400
Oil and Grease	EPA 1664A	mg/L	15	25
N & N	SM 4500-NO3-E	mg/L	0.68	N/A

If sufficient discharge events occur, four samples will be collected each year: two samples between July 1 and December 31, and two samples between January 1 and June 30. It may not be possible to sample four individual discharge events each year. The mine is idle for portions of the year.

Samples will be collected at the start of a discharge event. Samples will be collected within four hours of the start of discharge, or, if discharge begins during the night, at the beginning of daylight operations. The discharge start time will be recorded and included in the sampling event visual observation report. Monitoring and sampling requirements are summarized in Table 7-2.

7.3 SAMPLING PROCEDURES

Sampling and sample preservation procedures are conducted in accordance with the current edition of *Standard Methods for the Examination of Water and Wastewater* by the American Public Health Association, per SWRCB 97-03-DWQ and 40 CFR Part 136.

Table 7-2 MONITORING AND SAMPLING REQUIREMENTS	
Monitoring	Description
Monthly Visual Inspections	Visual observation will be made during daylight hours with no storm discharges, during scheduled hours of operation.
Sampling Event Visual Inspection	Sampling event visual observations shall be conducted at the same time sampling occurs at each discharge location.
Annual Compliance Evaluation	A comprehensive site inspection will be performed once during the reporting period (July 1 to June 30). The evaluation will include an inspection of BMPs, areas of industrial activity as well as an assessment of the effectiveness of all BMPs and a review of all previous inspections during the reporting year.
Sampling	<p>Stormwater samples will be collected at the monitoring points identified on Figure 2. If sufficient discharge events occur, four samples will be collected each year: two samples between July 1 and December 31, and two samples between January 1 and June 30. Samples will be analyzed for:</p> <ul style="list-style-type: none"> • Total Suspended Solids (TSS) – EPA 160.2/ SM 2540-D • pH – EPA9040 and/or Field Test with Calibrated Paper or Portable Instrument • Total Petroleum Hydrocarbons – Oil & Grease (TPH-O&G) – EPA 413.2 or EPA 1664 • Nitrate and Nitrite Nitrogen(N&N) – SM 4500-NO3-E

Sample collection will be conducted in such a way as to ensure samples are representative of the quality and quantity of the facility's stormwater discharge. Samples are collected directly into laboratory-supplied sample bottles using disposable Nitrile gloves. Upon collection, samples are placed directly into laboratory-supplied coolers, on ice, and transferred to Basic Laboratory in Redding, California. A sample chain-of-custody form is included as Appendix C.

The monitoring instrument used to measure pH is calibrated and maintained in accordance with manufacturers' specifications to ensure accuracy. While the facility remains in baseline status, pH strips may also be used.

Laboratory analyses are conducted according to the test procedures described in 40 CFR Part 136 by a laboratory certified for the required analyses by the State Department of Health Services.

Samples are collected at the sample point shown on Figure 2.

7.4 INSPECTIONS

In addition to the maintenance inspection schedule described herein, supplemental inspections of the facility related to the control of pollutants in stormwater discharge may be required.

7.4.1 Monthly Non-Stormwater Inspections

At least once per calendar month, visual observations are made by site personnel during daylight hours, on days with no precipitation, and during scheduled facility operating hours. See Form A in Appendix B. Observations shall include:

- Observations for the presence or indications of prior, current, or potential unauthorized NSWDS and their sources.
- Authorized NSWDS, sources, and associated BMPs.
- Outdoor industrial equipment and storage areas, outdoor industrial activities areas, BMPs, and all other potential source of industrial pollutants.

7.4.2 Sampling Event Visual Observations

Sampling event visual observations are conducted at the same time sampling occurs at a discharge location. A qualifying storm event is one that produces stormwater discharge during daylight-scheduled facility operating hours and is preceded by at least two working days without stormwater discharge as specified in SWRCB 2014-0057-DWQ. See Form B in Appendix B. The presence or absence of suspended materials, oil and grease, discolorations, turbidity, odors, and the source of any observed pollutants is documented. Visual observations are only required during daylight conditions and during scheduled facility operating hours.

7.4.3 Annual Comprehensive Facility Evaluation

Comprehensive facility inspections will be performed at least once every stormwater reporting period (July 1 through June 30). Comprehensive annual facility inspections involve inspection of the entire facility for stormwater damage and adequacy of control features for evidence of or potential for pollutants entering the drainage system during a rain event. A visual inspection of all equipment needed to implement the SWPPP is included. It is recommended that this inspection occur before the first storm of the year. See Form C in Appendix B.

7.5 REPORTING

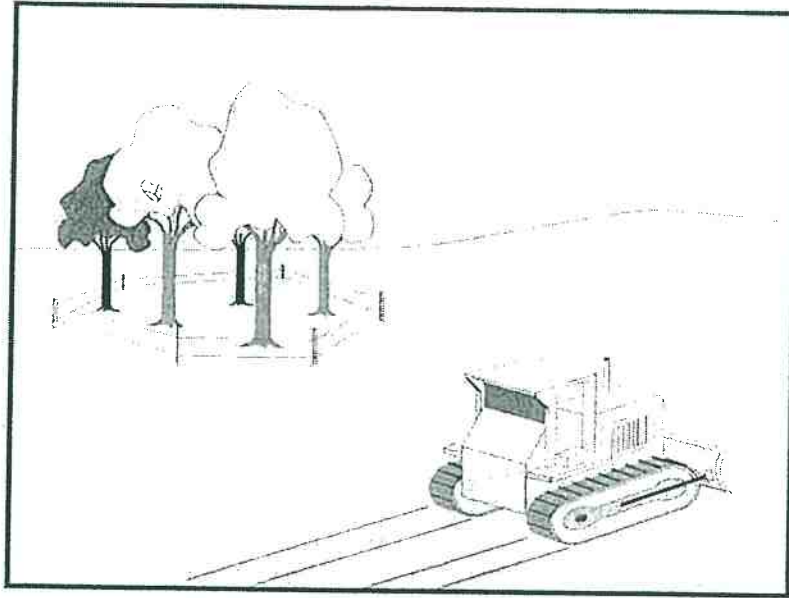
Annual Report will be submitted via the SMARTS system no later than July 15th following each reporting year using the standardized format and checklists in SMARTS. Annual reports will include the following:

- A Compliance Checklist that indicates whether a Discharger complies with, and has addressed all applicable requirements of this General Permit;
- An explanation for any non-compliance of requirements within the reporting year, as indicated in the Compliance Checklist;
- An identification, including page numbers and/or sections, of all revisions made to the SWPPP within the reporting year;
- The date(s) of the Annual Evaluation.

7.6 RECORDKEEPING

All inspections and analytical results are kept in the SWPPP binder onsite.

Preservation Of Existing Vegetation EC-2



Description and Purpose

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Suitable Applications

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs, or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.
- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, watercourse, and building sites in wooded areas.
- Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.
- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.

Limitations

- Requires forward planning by the owner/developer,

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☐ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None



Preservation Of Existing Vegetation EC-2

contractor, and design staff.

- Limited opportunities for use when project plans do not incorporate existing vegetation into the site design.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactory for the planned development.

Implementation

The best way to prevent erosion is to not disturb the land. In order to reduce the impacts of new development and redevelopment, projects may be designed to avoid disturbing land in sensitive areas of the site (e.g., natural watercourses, steep slopes), and to incorporate unique or desirable existing vegetation into the site's landscaping plan. Clearly marking and leaving a buffer area around these unique areas during construction will help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping.

Existing vegetation to be preserved on the site must be protected from mechanical and other injury while the land is being developed. The purpose of protecting existing vegetation is to ensure the survival of desirable vegetation for shade, beautification, and erosion control. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion. In addition, vegetation helps keep soil from drying rapidly and becoming susceptible to erosion. To effectively save existing vegetation, no disturbances of any kind should be allowed within a defined area around the vegetation. For trees, no construction activity should occur within the drip line of the tree.

Timing

- Provide for preservation of existing vegetation prior to the commencement of clearing and grubbing operations or other soil disturbing activities in areas where no construction activity is planned or will occur at a later date.

Design and Layout

- Mark areas to be preserved with temporary fencing. Include sufficient setback to protect roots.
 - Orange colored plastic mesh fencing works well.
 - Use appropriate fence posts and adequate post spacing and depth to completely support the fence in an upright position.
- Locate temporary roadways, stockpiles, and layout areas to avoid stands of trees, shrubs, and grass.
- Consider the impact of grade changes to existing vegetation and the root zone.
- Maintain existing irrigation systems where feasible. Temporary irrigation may be required.
- Instruct employees and subcontractors to honor protective devices. Prohibit heavy equipment, vehicular traffic, or storage of construction materials within the protected area.

Preservation Of Existing Vegetation EC-2

Costs

There is little cost associated with preserving existing vegetation if properly planned during the project design, and these costs may be offset by aesthetic benefits that enhance property values. During construction, the cost for preserving existing vegetation will likely be less than the cost of applying erosion and sediment controls to the disturbed area. Replacing vegetation inadvertently destroyed during construction can be extremely expensive, sometimes in excess of \$10,000 per tree.

Inspection and Maintenance

During construction, the limits of disturbance should remain clearly marked at all times. Irrigation or maintenance of existing vegetation should be described in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below should be followed:

- Verify that protective measures remain in place. Restore damaged protection measures immediately.
- Serious tree injuries shall be attended to by an arborist.
- Damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- Trench as far from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching or tunneling near or under trees to be retained, place tunnels at least 18 in. below the ground surface, and not below the tree center to minimize impact on the roots.
- Do not leave tree roots exposed to air. Cover exposed roots with soil as soon as possible. If soil covering is not practical, protect exposed roots with wet burlap or peat moss until the tunnel or trench is ready for backfill.
- Cleanly remove the ends of damaged roots with a smooth cut.
- Fill trenches and tunnels as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- If bark damage occurs, cut back all loosened bark into the undamaged area, with the cut tapered at the top and bottom and drainage provided at the base of the wood. Limit cutting the undamaged area as much as possible.
- Aerate soil that has been compacted over a tree's root zone by punching holes 12 in. deep with an iron bar, and moving the bar back and forth until the soil is loosened. Place holes 18 in. apart throughout the area of compacted soil under the tree crown.
- Fertilization
 - Fertilize stressed or damaged broadleaf trees to aid recovery.
 - Fertilize trees in the late fall or early spring.

Preservation Of Existing Vegetation EC-2

- Apply fertilizer to the soil over the feeder roots and in accordance with label instructions, but never closer than 3 ft to the trunk. Increase the fertilized area by one-fourth of the crown area for conifers that have extended root systems.
- Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.

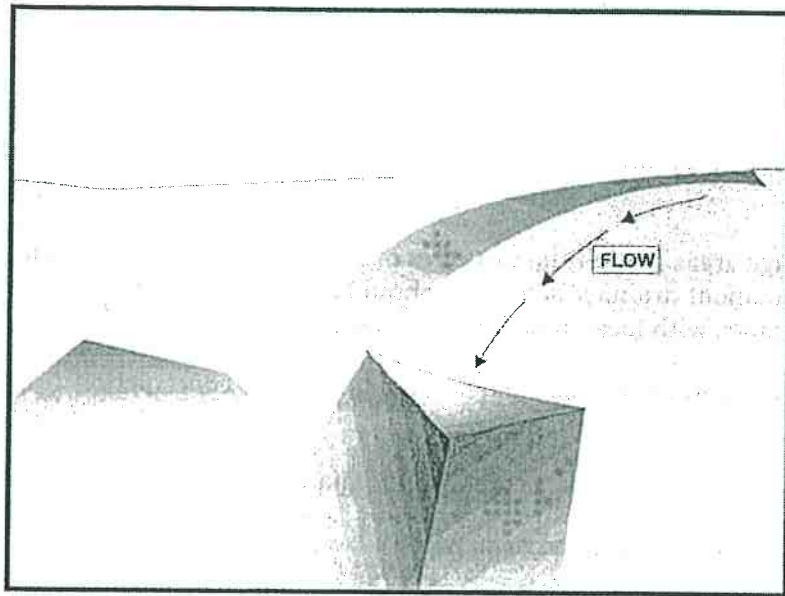
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Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

<input checked="" type="checkbox"/>	Primary Objective
<input type="checkbox"/>	Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Suitable Applications

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

- Earth dikes and drainage swales may be used:
 - To convey surface runoff down sloping land
 - To intercept and divert runoff to avoid sheet flow over sloped surfaces
 - To divert and direct runoff towards a stabilized watercourse, drainage pipe or channel
 - To intercept runoff from paved surfaces
 - Below steep grades where runoff begins to concentrate
 - Along roadways and facility improvements subject to flood drainage



- At the top of slopes to divert runoff from adjacent or undisturbed slopes
- At bottom and mid slope locations to intercept sheet flow and convey concentrated flows
- Divert sediment laden runoff into sediment basins or traps

Limitations

Dikes should not be used for drainage areas greater than 10 acres or along slopes greater than 10 percent. For larger areas more permanent drainage structures should be built. All drainage structures should be built in compliance with local municipal requirements.

- Earth dikes may create more disturbed area on site and become barriers to construction equipment.
- Earth dikes must be stabilized immediately, which adds cost and maintenance concerns.
- Diverted stormwater may cause downstream flood damage.
- Dikes should not be constructed of soils that may be easily eroded.
- Regrading the site to remove the dike may add additional cost.
- Temporary drains and swales or any other diversion of runoff should not adversely impact upstream or downstream properties.
- Temporary drains and swales must conform to local floodplain management requirements.
- Earth dikes/drainage swales are not suitable as sediment trapping devices.
- It may be necessary to use other soil stabilization and sediment controls such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales, and ditches.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in drainage swales.

Implementation

The temporary earth dike is a berm or ridge of compacted soil, located in such a manner as to divert stormwater to a sediment trapping device or a stabilized outlet, thereby reducing the potential for erosion and offsite sedimentation. Earth dikes can also be used to divert runoff from off site and from undisturbed areas away from disturbed areas and to divert sheet flows away from unprotected slopes.

An earth dike does not itself control erosion or remove sediment from runoff. A dike prevents erosion by directing runoff to an erosion control device such as a sediment trap or directing runoff away from an erodible area. Temporary diversion dikes should not adversely impact adjacent properties and must conform to local floodplain management regulations, and should not be used in areas with slopes steeper than 10%.

Slopes that are formed during cut and fill operations should be protected from erosion by runoff. A combination of a temporary drainage swale and an earth dike at the top of a slope can divert

runoff to a location where it can be brought to the bottom of the slope (see EC-11, Slope Drains). A combination dike and swale is easily constructed by a single pass of a bulldozer or grader and compacted by a second pass of the tracks or wheels over the ridge. Diversion structures should be installed when the site is initially graded and remain in place until post construction BMPs are installed and the slopes are stabilized.

Diversion practices concentrate surface runoff, increasing its velocity and erosive force. Thus, the flow out of the drain or swale must be directed onto a stabilized area or into a grade stabilization structure. If significant erosion will occur, a swale should be stabilized using vegetation, chemical treatment, rock rip-rap, matting, or other physical means of stabilization. Any drain or swale that conveys sediment laden runoff must be diverted into a sediment basin or trap before it is discharged from the site.

General

- Care must be applied to correctly size and locate earth dikes, drainage swales. Excessively steep, unlined dikes, and swales are subject to erosion and gully formation.
- Conveyances should be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, overtopping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff onto other property without securing written authorization from the property owner.
- When possible, install and utilize permanent dikes, swales, and ditches early in the construction process.
- Provide stabilized outlets.

Earth Dikes

Temporary earth dikes are a practical, inexpensive BMP used to divert stormwater runoff. Temporary diversion dikes should be installed in the following manner:

- All dikes should be compacted by earth moving equipment.
- All dikes should have positive drainage to an outlet.
- All dikes should have 2:1 or flatter side slopes, 18 in. minimum height, and a minimum top width of 24 in. Wide top widths and flat slopes are usually needed at crossings for construction traffic.
- The outlet from the earth dike must function with a minimum of erosion. Runoff should be conveyed to a sediment trapping device such as a Sediment Trap (SE-3) or Sediment Basin

(SE-2) when either the dike channel or the drainage area above the dike are not adequately stabilized.

- Temporary stabilization may be achieved using seed and mulching for slopes less than 5% and either rip-rap or sod for slopes in excess of 5%. In either case, stabilization of the earth dike should be completed immediately after construction or prior to the first rain.
- If riprap is used to stabilize the channel formed along the toe of the dike, the following typical specifications apply:

Channel Grade	Riprap Stabilization
0.5-1.0%	4 in. Rock
1.1-2.0%	6 in. Rock
2.1-4.0%	8 in. Rock
4.1-5.0%	8 in. -12 in. Riprap

- The stone riprap, recycled concrete, etc. used for stabilization should be pressed into the soil with construction equipment.
- Filter cloth may be used to cover dikes in use for long periods.
- Construction activity on the earth dike should be kept to a minimum.

Drainage Swales

Drainage swales are only effective if they are properly installed. Swales are more effective than dikes because they tend to be more stable. The combination of a swale with a dike on the downhill side is the most cost effective diversion.

Standard engineering design criteria for small open channel and closed conveyance systems should be used (see the local drainage design manual). Unless local drainage design criteria state otherwise, drainage swales should be designed as follows:

- No more than 5 acres may drain to a temporary drainage swale.
- Place drainage swales above or below, not on, a cut or fill slope.
- Swale bottom width should be at least 2 ft
- Depth of the swale should be at least 18 in.
- Side slopes should be 2:1 or flatter.
- Drainage or swales should be laid at a grade of at least 1 percent, but not more than 15 percent.
- The swale must not be overtopped by the peak discharge from a 10-year storm, irrespective of the design criteria stated above.

- Remove all trees, stumps, obstructions, and other objectionable material from the swale when it is built.
- Compact any fill material along the path of the swale.
- Stabilize all swales immediately. Seed and mulch swales at a slope of less than 5 percent, and use rip-rap or sod for swales with a slope between 5 and 15 percent. For temporary swales, geotextiles and mats (EC-7) may provide immediate stabilization.
- Irrigation may be required to establish sufficient vegetation to prevent erosion.
- Do not operate construction vehicles across a swale unless a stabilized crossing is provided.
- Permanent drainage facilities must be designed by a professional engineer (see the local drainage design criteria for proper design).
- At a minimum, the drainage swale should conform to predevelopment drainage patterns and capacities.
- Construct the drainage swale with a positive grade to a stabilized outlet.
- Provide erosion protection or energy dissipation measures if the flow out of the drainage swale can reach an erosive velocity.

Costs

- Cost ranges from \$15 to \$55 per ft for both earthwork and stabilization and depends on availability of material, site location, and access.
- Small dikes: \$2.50 - \$6.50/linear ft; Large dikes: \$2.50/yd³.
- The cost of a drainage swale increases with drainage area and slope. Typical swales for controlling internal erosion are inexpensive, as they are quickly formed during routine earthwork.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.
- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.
- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction

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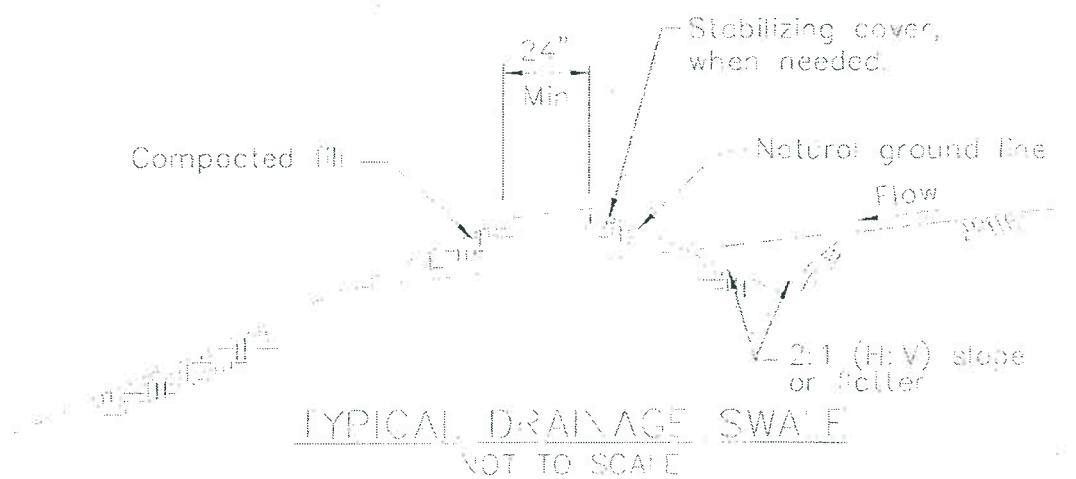
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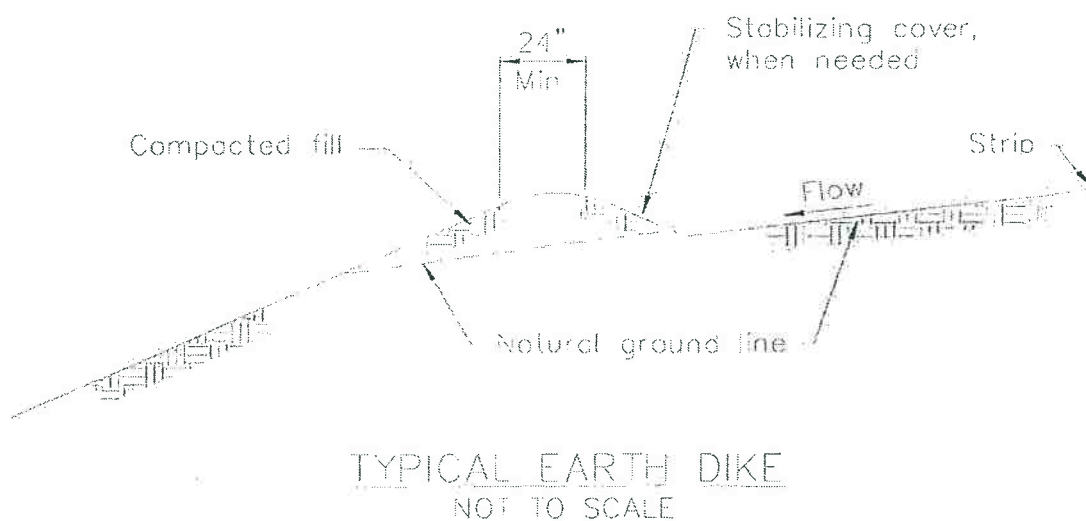
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NOTES:

1. Stabilize inlet, outlets and slopes
2. Properly compact the subgrade.



Description

Non-stormwater discharges (NSWDs) are flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain if local regulations allow. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include: potable water sources, fire hydrant flushing, air conditioner condensate, landscape irrigation drainage and landscape watering, emergency firefighting, etc. as discussed in Section 2.

However there are certain non-stormwater discharges that pose an environmental concern. These discharges may originate from illegal dumping of industrial material or wastes and illegal connections such as internal floor drains, appliances, industrial processes, sinks, and toilets that are illegally connected to the nearby storm drainage system through on-site drainage and piping. These unauthorized discharges (examples of which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains.

Non-stormwater discharges will need to be addressed through a combination of detection and elimination. The ultimate goal is to effectively eliminate unauthorized non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

<i>Sediment</i>	
<i>Nutrients</i>	✓
<i>Trash</i>	
<i>Metals</i>	✓
<i>Bacteria</i>	✓
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

Minimum BMPs Covered

	<i>Good Housekeeping</i>	✓
	<i>Preventative Maintenance</i>	
	<i>Spill and Leak Prevention and Response</i>	✓
	<i>Material Handling & Waste Management</i>	
	<i>Erosion and Sediment Controls</i>	
	<i>Employee Training Program</i>	✓
	<i>Quality Assurance Record Keeping</i>	✓



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pollutants on streets and into the storm drain system and downstream water bodies.

Approach

Initially the Discharger must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is the elimination of unauthorized non-stormwater discharges. See other BMP Fact Sheets for activity-specific pollution prevention procedures.

General Pollution Prevention Protocols

- ☐ Implement waste management controls described in SC-34 Waste Handling and Disposal.
- ☐ Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- ☐ Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” or similar stenciled or demarcated next to them to warn against ignorant or unintentional dumping of pollutants into the storm drainage system.
- ☐ Manage and control sources of water such as hose bibs, faucets, wash racks, irrigation heads, etc. Identify hoses and faucets in the SWPPP, and post signage for appropriate use.

Non-Stormwater Discharge Investigation Protocols

Identifying the sources of non-stormwater discharges requires the Discharger to conduct an investigation of the facility at regular intervals. There are several categories of non-stormwater discharges:

- ☐ Visible, easily identifiable discharges, typically generated as surface runoff, such as uncontained surface runoff from vehicle or equipment washing; and
- ☐ Non-visible, (e.g., subsurface) discharges into the site drainage system through a variety of pathways that are not obvious.

The approach to detecting and eliminating non-stormwater discharges will vary considerably, as discussed below:

Visible and identifiable discharges

- ☐ Conduct routine inspections of the facilities and of each major activity area and identify visible evidence of unauthorized non-stormwater discharges. This may include:
 - ✓ Visual observations of actual discharges occurring;

- ✓ Evidence of surface staining, discoloring etc. that indicates that discharges have occurred;
 - ✓ Pools of water in low lying areas when a rain event has not occurred; and
 - ✓ Discussions with operations personnel to understand practices that may lead to unauthorized discharges.
- If evidence of non-stormwater discharges is discovered:
- ✓ Document the location and circumstances using Worksheets 5 and 6 (Section 2 of the manual), including digital photos;
 - ✓ Identify and implement any quick remedy or corrective action (e.g., moving uncovered containers inside or to a proper location); and
 - ✓ Develop a plan to eliminate the discharge. Consult the appropriate activity-specific BMP Fact Sheet for alternative approaches to manage and eliminate the discharge.
- Consult the appropriate activity-specific BMP Fact Sheet for alternative approaches to manage and eliminate the discharge. Make sure the facility SWPPP is up-to-date and includes applicable BMPs to address the non-stormwater discharge.

Other Illegal Discharges (Non visible)

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of “as-built” piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate discharges to the storm drain system.
- Visual Inspection and Inventory:
 - ✓ Inventory and inspect each discharge point during dry weather.
 - ✓ Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system.
 - ✓ Non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- A review of the “as-built” piping schematic is a way to determine if there are any connections to the stormwater collection system.

- ❑ Inspect the path of loading/unloading area drain inlets and floor drains in older buildings.
- ❑ Never assume storm drains are connected to the sanitary sewer system.

Monitoring for investigation/detection of illegal discharges

- ❑ If a suspected illegal or unknown discharge is detected, monitoring of the discharge may help identify the content and/or suggest the source. This may be done with a field screening analysis, flow meter measurements, or by collecting a sample for laboratory analysis. Section 5 and Appendix D describe the necessary field equipment and procedures for field investigations.
- ❑ Investigative monitoring may be conducted over time. For example if, a discharge is intermittent, then monitoring might be conducted to determine the timing of the discharge to determine the source.
- ❑ Investigative monitoring may be conducted over a spatial area. For example, if a discharge is observed in a pipe, then monitoring might be conducted at accessible upstream locations in order to pinpoint the source of the discharge.
- ❑ Generally, investigative monitoring requiring collection of samples and submittal for lab analysis requires proper planning and specially trained staff.

Smoke Testing

Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two piping systems. Smoke testing is generally performed at a downstream location and the smoke is forced upstream using blowers to create positive pressure. The advantage to smoke testing is that it can potentially identify multiple potential discharge sources at once.

- ❑ Smoke testing uses a harmless, non-toxic smoke cartridges developed specifically for this purpose.
- ❑ Smoke testing requires specialized equipment (e.g., cartridges, blowers) and is generally only appropriate for specially trained staff.
- ❑ A Standard Operating Procedure (SOP) for smoke testing is highly desirable. The SOP should address the following elements:
 - ✓ Proper planning and notification of nearby residents and emergency services is necessary since introducing smoke into the system may result in false alarms;
 - ✓ During dry weather, the stormwater collection system is filled with smoke and then traced back to sources;

- ✓ Temporary isolation of segments of pipe using sand bags is often needed to force the smoke into leaking pipes; and
- ✓ The appearance of smoke in a waste vent pipe, at a sewer manhole, or even the base of a toilet indicates that there may be a connection between the sanitary and storm water systems.
- Most municipal wastewater agencies will have necessary staff and equipment to conduct smoke testing and they should be contacted if cross connections with the sanitary sewer are suspected. See SC-44 Drainage System Maintenance for more information.

Dye Testing

- Dye testing is typically performed when there is a suspected specific pollutant source and location (i.e., leaking sanitary sewer) and there is evidence of dry weather flows in the stormwater collection system.
- Dye is released at a probable upstream source location, either the facility's sanitary or process wastewater system. The dye must be released with a sufficient volume of water to flush the system.
- Operators then visually examine the downstream discharge points from the stormwater collection system for the presence of the dye.
- Dye testing can be performed informally using commercially available products in order to conduct an initial investigation for fairly obvious cross-connections.
- More detailed dye testing should be performed by properly trained staff and follow SOPs. Specialized equipment such as fluorometers may be necessary to detect low concentrations of dye.
- Most municipal wastewater agencies will have necessary staff and equipment to conduct dye testing and they should be contacted if cross connections with the sanitary sewer are suspected.

TV Inspection of Drainage System

- Closed Circuit Television (CCTV) can be employed to visually identify illicit connections to the industrial storm drainage system. Two types of CCTV systems are available: (1) a small specially designed camera that can be manually pushed on a stiff cable through storm drains to observe the interior of the piping, or (2) a larger remote operated video camera on treads or wheels that can be guided through storm drains to view the interior of the pipe.
- CCTV systems often include a high-pressure water jet and camera on a flexible cable. The water jet cleans debris and biofilm off the inside of pipes so the camera can take video images of the pipe condition.

- CCTV units can detect large cracks and other defects such as offsets in pipe ends caused by root intrusions or shifting substrate.
- CCTV can also be used to detect dye introduced into the sanitary sewer.
- CCTV inspections require specialized equipment and properly trained staff and are generally best left to specialized contractors or municipal public works staff.

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks may include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. These wastes can cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- Establish a system for tracking incidents. The system should be designed to identify the following:
 - ✓ Illegal dumping hot spots;
 - ✓ Types and quantities (in some cases) of wastes;
 - ✓ Patterns in time of occurrence (time of day/night, month, or year);
 - ✓ Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills);
 - ✓ An anonymous tip/reporting mechanism; and
 - ✓ Evidence of responsible parties (e.g., tagging, encampments, etc.).
- One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

Once a site has been cleaned:

- Post “No Dumping” signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Inspection

- ❑ Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- ❑ Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- ❑ Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.



Spill and Leak Prevention and Response

- ❑ On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.
- ❑ Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- ❑ Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- ❑ For larger spills, a private spill cleanup company or Hazmat team may be necessary.
- ❑ See SC-11 Spill Prevention Control and Cleanup.



Employee Training Program

- ❑ Training of technical staff in identifying and documenting illegal dumping incidents is required. The frequency of training must be presented in the SWPPP, and depends on site-specific industrial materials and activities.
- ❑ Consider posting a quick reference table near storm drains to reinforce training.
- ❑ Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.
- ❑ Educate employees about spill prevention and cleanup.
- ❑ Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan. Employees should be able to identify work/jobs with high potential for spills and suggest methods to reduce possibility.
- ❑ Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.

- ☐ Conduct spill response drills annually (if no events occurred) in order to evaluate the effectiveness of the plan.
- ☐ When a responsible party is identified, educate the party on the impacts of his or her actions.



Quality Assurance and Record Keeping

Performance Evaluation

- ☐ Annually review internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- ☐ Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.
- ☐ Develop document and data management procedures.
- ☐ A database is useful for defining and tracking the magnitude and location of the problem.
- ☐ Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- ☐ Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- ☐ Annually document and report the results of the program.
- ☐ Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.
- ☐ Document training activities.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended “work-arounds.”

- ☐ Many facilities do not have accurate, up-to-date ‘as-built’ plans or drawings which may be necessary in order to conduct non-stormwater discharge assessments.
 - ✓ Online tools such as Google Earth™ can provide an aerial view of the facility and may be useful in understanding drainage patterns and potential sources of non-stormwater discharges
 - ✓ Local municipal jurisdictions may have useful drainage systems maps.

- Video surveillance cameras are commonly used to secure the perimeter of industrial facilities against break-ins and theft. These surveillance systems may also be useful for capturing illegal dumping activities. Minor, temporary adjustments to the field of view of existing surveillance camera systems to target known or suspected problem areas may be a cost-effective way of capturing illegal dumping activities and identifying the perpetrators.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital facility cost requirements may be minimal unless cross-connections to storm drains are detected.
- Indoor floor drains may require re-plumbing if cross-connections are detected.
- Leaky sanitary sewers will require repair or replacement which can have significant costs depending on the size and industrial activity at the facility.

Maintenance (including administrative and staffing)

- The primary effort is for staff time and depends on how aggressively a program is implemented.
- Costs for containment, and disposal of any leak or discharge is borne by the Discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Permit Requirements

The IGP authorizes certain Non-Storm Water Discharges (NSWDs) provided BMPs are included in the SWPPP and implemented to:

- Reduce or prevent the contact of authorized NSWDs with materials or equipment that are potential sources of pollutants;
- Reduce, to the extent practicable, the flow or volume of authorized NSWDs;
- Ensure that authorized NSWDs do not contain quantities of pollutants that cause or contribute to an exceedance of a water quality standards (WQS); and,

- Reduce or prevent discharges of pollutants in authorized NSWs in a manner that reflects best industry practice considering technological availability and economic practicability and achievability.”

References and Resources

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WEF Press Alexandria, Virginia, 2009. Existing Sewer Evaluation and Rehabilitation: *WEF Manual of Practice No. FD-6 ASCE/EWRI Manuals and Reports on Engineering Practice No. 62, Third Edition*.

Spill Prevention, Control & Cleanup SC-11

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental spills. Preparation for accidental spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify hazardous material storage areas, specify material handling procedures, describe spill response procedures, and provide locations of spill clean-up equipment and materials. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills. An adequate supply of spill clean-up materials must be maintained onsite.

Approach

General Pollution Prevention Protocols

- ☐ Develop procedures to prevent/mitigate spills to storm drain systems.
- ☐ Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- ☐ Establish procedures and/or controls to minimize spills and leaks. The procedures should address:
 - ✓ Description of the facility, owner and address, activities, chemicals, and quantities present;

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment

Nutrients

Trash

Metals ✓

Bacteria

Oil and Grease ✓

Organics ✓

Minimum BMPs Covered



Good Housekeeping



Preventative
Maintenance



Spill and Leak
Prevention and
Response ✓



Material Handling &
Waste Management



Erosion and Sediment
Controls



Employee Training
Program ✓



Quality Assurance
Record Keeping ✓



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- ✓ Facility map of the locations of industrial materials;
 - ✓ Notification and evacuation procedures;
 - ✓ Cleanup instructions;
 - ✓ Identification of responsible departments; and
 - ✓ Identify key spill response personnel.
- ☐ Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.



Spill and Leak Prevention and Response

Spill Prevention

- ☐ Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- ☐ If illegal dumping is observed at the facility:
- ✓ Post “No Dumping” signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
 - ✓ Landscaping and beautification efforts may also discourage illegal dumping.
 - ✓ Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.
- ☐ Store and contain liquid materials in such a manner that if the container is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.
- ☐ If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collects runoff from the storage tank area.



Preventative Maintenance

- ☐ Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
- ☐ Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site’s spill control plan and/or proper spill cleanup procedures.

Spill Prevention, Control & Cleanup SC-11

- ☐ Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain.*
- ☐ Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.
- ☐ Label all containers according to their contents (e.g., solvent, gasoline).
- ☐ Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
- ☐ Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
- ☐ Identify key spill response personnel.

Spill Response

- ☐ Clean up leaks and spills immediately.
- ☐ Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).
- ☐ On paved surfaces, clean up spills with as little water as possible.
 - ✓ Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills.
 - ✓ If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.
 - ✓ If possible use physical methods for the cleanup of dry chemicals (e.g., brooms, shovels, sweepers, or vacuums).
- ☐ Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- ☐ Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- ☐ For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Spill Prevention, Control & Cleanup SC-11

Reporting

- ☐ Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board or local authority as location regulations dictate.
- ☐ Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).
- ☐ Report spills to 911 for dispatch and clean-up assistance when needed. Do not contact fire agencies directly.
- ☐ Establish a system for tracking incidents. The system should be designed to identify the following:
 - ✓ Types and quantities (in some cases) of wastes;
 - ✓ Patterns in time of occurrence (time of day/night, month, or year);
 - ✓ Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills);
 - ✓ Clean-up procedures; and
 - ✓ Responsible parties.



Employee Training Program

- ☐ Educate employees about spill prevention and cleanup.
- ☐ Well-trained employees can reduce human errors that lead to accidental releases or spills:
 - ✓ The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur; and
 - ✓ Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- ☐ Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.
- ☐ Train employees to recognize and report illegal dumping incidents.

Spill Prevention, Control & Cleanup SC-11

Other Considerations (Limitations and Regulations)

- ☐ State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure (SPCC) Plan (Health & Safety Code Chapter 6.67).
- ☐ State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.
- ☐ Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including capital and operation & maintenance)

- ☐ Will vary depending on the size of the facility and the necessary controls.
- ☐ Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including administrative and staffing)

- ☐ Develop spill prevention and control plan, provide and document training, conduct inspections of material storage areas, and supply spill kits.
- ☐ Extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- ☐ Date and time of the incident;
- ☐ Weather conditions;
- ☐ Duration of the spill/leak/discharge;

Spill Prevention, Control & Cleanup SC-11

- ☐ Cause of the spill/leak/discharge;
- ☐ Response procedures implemented;
- ☐ Persons notified; and
- ☐ Environmental problems associated with the spill/leak/discharge.

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- ☐ Date and time the inspection was performed;
- ☐ Name of the inspector;
- ☐ Items inspected;
- ☐ Problems noted;
- ☐ Corrective action required; and
- ☐ Date corrective action was taken.

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- ☐ Installation problems;
- ☐ Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves);
- ☐ External corrosion and structural failure;
- ☐ Spills and overfills due to operator error; and
- ☐ Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa.

Spill Prevention, Control & Cleanup SC-11

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- ☐ Tanks should be placed in a designated area.
- ☐ Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- ☐ Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- ☐ Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- ☐ For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- ☐ All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- ☐ Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- ☐ Check for external corrosion and structural failure.
- ☐ Check for spills and overfills due to operator error.
- ☐ Check for failure of piping system (pipes, pumps, flanges, coupling, hoses, and valves).
- ☐ Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- ☐ Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- ☐ Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- ☐ Frequently relocate accumulated stormwater during the wet season.

- Periodically conduct integrity testing by a qualified professional.

Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use absorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Spill Prevention, Control & Cleanup SC-11

Vehicle and Equipment Fueling

- ☐ Design the fueling area to prevent the run-on of stormwater and the runoff of spills:

Cover fueling area if possible.

Use a perimeter drain or slope pavement inward with drainage to a sump.

Pave fueling area with concrete rather than asphalt.

- ☐ If dead-end sump is not used to collect spills, install an oil/water separator.
- ☐ Install vapor recovery nozzles to help control drips as well as air pollution.
- ☐ Discourage “topping-off” of fuel tanks.
- ☐ Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- ☐ Use absorbent materials on small spills and general cleaning rather than hosing down the area. Remove the absorbent materials promptly.
- ☐ Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- ☐ Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- ☐ Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- ☐ Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities.

The program should:

- ☐ Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department).
- ☐ Develop procedures to prevent/mitigate spills to storm drain systems.
- ☐ Identify responsible departments.

Spill Prevention, Control & Cleanup SC-11

- ☐ Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- ☐ Address spills at municipal facilities, as well as public areas.
- ☐ Provide training concerning spill prevention, response and cleanup to all appropriate personnel.

References and Resources

California's Nonpoint Source Program Plan. <http://www.swrcb.ca.gov/nps/index.html>.

Clark County Storm Water Pollution Control Manual. Available online at:
<http://www.co.clark.wa.us/pubworks/bmpman.pdf>.

King County Storm Water Pollution Control Manual. Available online at:
<http://dnr.metrokc.gov/wlr/dss/spcm.htm>.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at:
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Santa Clara Valley Urban Runoff Pollution Prevention Program.
<http://www.scvurppp.org>.

The Stormwater Managers Resource Center. <http://www.stormwatercenter.net/>.

Vehicle and Equipment Fueling SC-20

Description

Spills and leaks that occur during vehicle and equipment fueling can contribute hydrocarbons, oil and grease, as well as heavy metals, to stormwater runoff. Implementing the following management practices can help prevent fuel spills and leaks.

Approach

- Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- Use properly maintained off-site fueling stations whenever possible. These businesses are better equipped to handle fuel and spills properly.
- Focus pollution prevention activities on containment of spills and leaks, most of which may occur during liquid transfers.



Good Housekeeping

- "Spot clean" leaks and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.
- Manage materials and waste properly (see Material Handling and Waste Management) to reduce adverse impacts on stormwater quality.
- Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- Post signs at sinks to remind employees not to pour wastes down drains.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment

Nutrients

Trash

✓

Metals

✓

Bacteria

Oil and Grease

✓

Organics

✓

Minimum BMPs Covered



Good Housekeeping

✓



Preventative Maintenance

✓



Spill and Leak Prevention and Response

✓



Material Handling & Waste Management

✓



Erosion and Sediment Controls



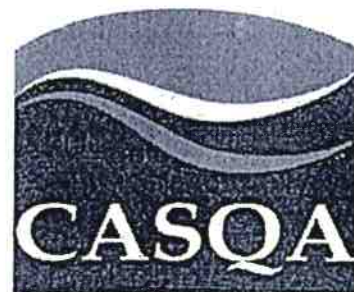
Employee Training Program

✓



Quality Assurance Record Keeping

✓



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Vehicle and Equipment Fueling SC-20

- ☐ Clean yard storm drain inlets(s) regularly and especially after large storms.
- ☐ Do not pour materials down storm drains.
- ☐ Build a shed or temporary roof over fueling area to limit exposure to rain.
- ☐ Post signs to remind employees and customers not to top off the fuel tank when filling and signs that ban customers and employees from changing engine oil or other fluids at that location.
- ☐ Report leaking vehicles to fleet maintenance.
- ☐ Ensure the following safeguards are in place:
 - ✓ Overflow protection devices on tank systems to warn the operator or automatically shut down transfer pumps when the tank reaches full capacity.
 - ✓ Protective guards around tanks and piping to prevent vehicle or forklift damage.
 - ✓ Clear tagging or labeling of all valves to reduce human error.
 - ✓ Emergency shut-off and emergency phone number.



Preventative Maintenance

Fuel Dispensing Areas

- ☐ Inspect vehicles and equipment for leaks regularly and repair immediately.
- ☐ Sweep the fueling area weekly, if it is paved, to collect loose particles, and wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a storm drain.
- ☐ Fit underground storage tanks with spill containment and overfill prevention systems meeting the requirements of Section 2635(b) of Title 23 of the California Code of Regulations.
- ☐ Fit fuel dispensing nozzles with "hold-open latches" (automatic shutoffs) except where prohibited by local fire departments.
- ☐ Post signs at the fuel dispenser or fuel island warning vehicle owners/operators against "topping off" of vehicle fuel tanks.
- ☐ Design fueling area to prevent stormwater runoff and spills. Use a perimeter drain or slope pavement inward with drainage to sump; regularly remove materials accumulated in sump.
- ☐ Pave area with concrete rather than asphalt.

Vehicle and Equipment Fueling SC-20

- Cover fueling area with an overhanging roof structure or canopy so that precipitation cannot come in contact with the fueling area. Where covering is not feasible and the fuel island is surrounded by pavement, apply a suitable sealant that protects the asphalt from spilled fuels.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank. Cover storm drains in the vicinity during transfer.

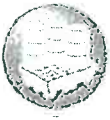
Air/Water Supply Area

- Minimize the possibility of stormwater pollution from air/water supply areas by doing at least one of the following:
 - ✓ Spot clean leaks and drips routinely to prevent runoff of spillage.
 - ✓ Grade and pave the air/water supply area to prevent run-on of stormwater.
 - ✓ Install a roof over the air/water supply area.
 - ✓ Install a low containment berm around the air/water supply area.

Inspection

- Aboveground Tank Leak and Spill Control:
 - ✓ Check for external corrosion and structural failure.
 - ✓ Check for spills and overfills due to operator error.
 - ✓ Check for failure of piping system.
 - ✓ Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
 - ✓ Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
 - ✓ Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
 - ✓ Conduct integrity testing periodically by a qualified professional.
- Inspect and clean, if necessary, storm drain inlets and catch basins within the facility boundary before October 1 each year.

Vehicle and Equipment Fueling SC-20



Spill Response and Prevention Procedures

- ☐ Keep your spill prevention and control plan up-to-date.
- ☐ Maintain an adequate stockpile of spill cleanup materials at locations where it will be readily accessible.
- ☐ Clean leaks, drips, and other spills with as little water as possible.
 - ✓ Use rags for small spills,
 - ✓ Use a damp mop for general cleanup,
 - ✓ Use dry absorbent material for larger spills.
- ☐ Use the following three-step method for cleaning floors:
 - ✓ Clean spills with rags or other absorbent materials
 - ✓ Sweep floor using dry absorbent material
 - ✓ Mop the floor. Mop water may be discharged to the sanitary sewer via a toilet or sink.
- ☐ Remove the adsorbent materials promptly and dispose of properly when using absorbent materials on small spills.
- ☐ Store portable absorbent booms (long flexible shafts or barriers made of absorbent material) in unbermed fueling areas.
- ☐ Report spills promptly.
- ☐ If a dead-end sump is not used to collect spills, install an oil/water separator.



Material Handling and Waste Management

- ☐ Do not pour liquid wastes into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- ☐ Do not put used or leftover cleaning solutions, solvents, and automotive fluids in the sanitary sewer.
- ☐ Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- ☐ Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.

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- ☐ Minimize the possibility of stormwater pollution from outside waste receptacles by doing at least one of the following:
 - ✓ Use only watertight waste receptacle(s) and keep the lid(s) closed.
 - ✓ Grade and pave the waste receptacle area to prevent run-on of stormwater.
 - ✓ Install a roof over the waste receptacle area.
 - ✓ Install a low containment berm around the waste receptacle area.
 - ✓ Use and maintain drip pans under waste receptacles.
- ☐ Post “no littering” signs.



Employee Training Program

- ☐ Educate employees about facility-wide pollution prevention measures and goals.
- ☐ Train designated employees (e.g., those involved with the handling or management of fuels) on proper fueling and cleanup procedures.
- ☐ Train designated employees upon hiring and annually thereafter on proper methods for handling and disposing of waste. Make sure that all employees understand stormwater discharge prohibitions, wastewater discharge requirements, and these best management practices.
- ☐ Ensure that employees are familiar with the site’s spill control plan and/or proper spill cleanup procedures.
- ☐ Use a training log or similar method to document training. The training log should include entries for:
 - ✓ Training topic,
 - ✓ Trainer,
 - ✓ Attendees,
 - ✓ Frequency,
 - ✓ Comments,
 - ✓ Target date for completion of training, and
 - ✓ Date completed.



Quality Assurance and Record Keeping

- ☐ Keep accurate maintenance logs that document minimum BMP activities performed for vehicle and equipment fueling, quantities of materials removed, and improvement actions.
- ☐ Keep accurate logs of spill response actions that document what types of liquids were spilled, how it was cleaned up, and how the waste was disposed.
- ☐ Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- ☐ The retrofitting of existing fueling areas to minimize stormwater exposure or spill runoff can be expensive. Good design must occur during the initial installation. Extruded curb along the “upstream” side of the fueling area to prevent stormwater run-on is of modest cost.
- ☐ Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- ☐ Most of the operations and maintenance activities associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore additional O&M is not required.
- ☐ For facilities responsible for pre-treating their wastewater prior to discharging, the proper functioning of structural treatment system is an important maintenance consideration.
- ☐ Routine cleanout of sumps and oil/water separators is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure pollutants are not washed through the system. Sediment removal is also required on a regular basis to keep the device working efficiently.

Supplemental Information

Designing New Installations

The elements listed below should be included in the design and construction of new or substantially remodeled facilities.

Fuel Dispensing Areas

- ☐ Fuel dispensing areas must be paved with Portland cement concrete (or, equivalent smooth impervious surface), with a 2 to 4% slope to prevent ponding, and must be

Vehicle and Equipment Fueling SC-20

separated from the rest of the site by a grade break that prevents run-on of stormwater to the extent practicable. The fuel dispensing area is defined as extending 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus 1 foot, whichever is less. The paving around the fuel dispensing area may exceed the minimum dimensions of the "fuel dispensing area" stated above.

- The fuel dispensing area must be covered, and the cover's minimum dimensions must be equal to or greater than the area within the grade break or the fuel dispensing area, as defined above. The cover must not drain onto the fuel dispensing area.
- If necessary, install and maintain an oil control device in the appropriate catch basin(s) to treat runoff from the fueling area.

Outdoor Waste Receptacle Area

- Grade and pave the outdoor waste receptacle area to prevent run-on of stormwater to the extent practicable.

Air/Water Supply Area

- Grade and pave the air/water supply area to prevent run-on of stormwater to the extent practicable.

Designated Fueling Area

- If your facility has large numbers of mobile equipment working throughout the site and you currently fuel them with a mobile fuel truck, consider establishing a designated fueling area. With the exception of tracked equipment such as bulldozers and perhaps small forklifts, most vehicles should be able to travel to a designated area with little lost time. Place temporary "caps" over nearby catch basins or manhole covers so that if a spill occurs it is prevented from entering the storm drain.

Examples

The Spill Prevention Control and Countermeasure (SPCC) Plan, which is required by law for some facilities, is an effective program to reduce the number of accidental spills and minimize contamination of stormwater runoff.

The City of Palo Alto has an effective program for commercial vehicle service facilities. Many of the program's elements, including specific BMP guidance and lists of equipment suppliers, are also applicable to industrial facilities.

References and Resources

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at:
<http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessactivities>.

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Oregon Department of Environmental Quality, 2013. *Industrial Stormwater Best Management Practices Manual- BMP 8 Vehicle, Pavement and Building Washing*. Available online at: <http://www.deq.state.or.us/wq/wqpermit/docs/IndBMPO21413.pdf>

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Washington State Department of Ecology, 2012. *Vehicle and Equipment Washwater Discharges Best Management Practices Manual*. Publication no. WQ-R-95-056. Available online at: <https://fortress.wa.gov/ecy/publications/publications/95056.pdf>.

Description

Vehicle or equipment maintenance and repair are potentially significant sources of stormwater pollution, due to use of harmful materials and wastes during maintenance and repair processes. Engine repair and service (e.g., parts cleaning), replacement of fluids (e.g., oil change), and outdoor equipment storage and parking (leaking vehicles) can impact water quality if stormwater runoff from areas with these activities becomes polluted by a variety of contaminants. Implementation of the following activities must be done where applicable to prevent or reduce the discharge of pollutants to stormwater from vehicle and equipment maintenance and repair activities.

Approach

The BMP approach is to reduce the potential for pollutant discharges through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives. General pollution prevention protocols are presented followed by applicable minimum BMPs as required by the Industrial General Permit.

General Pollution Prevention Protocols

- ☐ Designate a vehicle maintenance area designed to prevent stormwater pollution.
- ☐ Minimize contact of stormwater with outside operations through berming and appropriate drainage routing.
- ☐ Keep accurate maintenance logs to evaluate materials removed and improvements made.
- ☐ Switch to non-toxic chemicals for maintenance when possible.
- ☐ Choose cleaning agents that can be recycled.
- ☐ Use drop cloths and drip pans.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment

Nutrients

Trash

Metals ✓

Bacteria

Oil and Grease ✓

Organics ✓

Minimum BMPs Covered

	Good Housekeeping	✓
	Preventative Maintenance	✓
	Spill and Leak Prevention and Response	✓
	Material Handling & Waste Management	✓
	Erosion and Sediment Controls	
	Employee Training Program	✓
	Quality Assurance Record Keeping	✓



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- ☐ Minimize use of solvents. Clean parts without using solvents whenever possible, or use water-based solvents for cleaning.
- ☐ Recycle used motor oil, diesel oil, and other vehicle fluids and parts whenever possible.

Operational Protocols

General

- ☐ Move maintenance and repair activities indoors whenever feasible.
- ☐ Place curbs around the immediate boundaries of process equipment.



Good Housekeeping

- ☐ Store idle equipment under cover
- ☐ Use a vehicle maintenance area designed to prevent stormwater pollution - minimize contact of stormwater with outside operations through berming and appropriate drainage routing.
- ☐ Avoid hosing down your work areas. If work areas are washed, collect and direct wash water to sanitary sewer. Use dry sweeping if possible.
- ☐ Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- ☐ Post signs at sinks to remind employees not to pour wastes down drains.
- ☐ Clean yard storm drain inlets(s) regularly and especially after large storms.
- ☐ Do not pour materials down storm drains.
- ☐ Cover the work area to limit exposure to rain.
- ☐ Place curbs around the immediate boundaries of process equipment.
- ☐ Build a shed or temporary roof over areas where parked cars await repair or salvage, especially wrecked vehicles. Build a roof over vehicles kept for parts.



Preventive Maintenance and Repair Activities

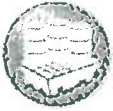
- ☐ Provide a designated area for vehicle maintenance.
- ☐ Inspect vehicles and equipment for leaks regularly and repair immediately.
- ☐ Make sure incoming vehicles are checked for leaking oil and fluids. Do not allow leaking vehicles or equipment on-site without correcting the source of the leak and cleaning up any spill.
- ☐ Keep equipment clean; don't allow excessive build-up of oil and grease.

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- ☐ Perform all vehicle fluid removal or changing inside or under cover if possible to prevent the run-on of stormwater and the runoff of spills.
- ☐ Use a tarp, ground cloth, or drip pans beneath the vehicle or equipment to capture all spills and drips if temporary work is being conducted outside. Collected drips and spills must be disposed, reused, or recycled properly.
- ☐ It is important to sweep the maintenance area weekly, if it is paved, to collect loose particles, and wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a storm drain.
- ☐ Establish standard procedures to prevent spillage/leakage of fluids including:
 - ✓ Keep a drip pan under the vehicle while you unclip hoses, unscrew filters, or remove other parts. Use a drip pan under any vehicle that might leak while working on it to keep splatters or drips off the shop floor.
 - ✓ Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
 - ✓ Keep drip pans or containers under vehicles or equipment that may drip during repairs.
 - ✓ Do not change motor oil or perform equipment maintenance in non-appropriate areas.
- ☐ Drain oil and other fluids first if the vehicle or equipment is to be stored outdoors. Elevate and tarp stored vehicles and equipment.
- ☐ Monitor parked vehicles closely for leaks. Pans should be placed under any leaks to collect the fluids for proper disposal or recycling.
- ☐ Mechanics should clean vehicle parts without using liquid cleaners wherever possible to reduce waste.
- ☐ Steam cleaning and pressure washing may be used instead of solvent parts cleaning. The wastewater generated from steam cleaning must be discharged to an on-site oil water separator that is connected to a sanitary sewer or blind sump. Non-caustic detergents should be used instead of caustic cleaning agents, detergent-based or water-based cleaning systems in place of organic solvent degreasers, and non-chlorinated solvent in place of chlorinated organic solvents for parts cleaning. Refer to SC21 for more information on steam cleaning.
- ☐ Fifth-wheel bearings on trucks require routine lubrication. Typically chassis grease is applied to the fifth-wheel bearing at rates that result in grease dripping off of the bearing into the environment. To address this concern the following options are available:
 - ✓ Use specialized lubricants with good adhesion (e.g., stay in place) properties. Carefully follow manufacturer's label regarding the use of adhesive lubricant for

truck fifth-wheels. Typically this means applying no more than 8 oz. of grease. No visible extrusion of lubricant from the fifth-wheel bearing when truck and trailer are connected should be present.

- ✓ Use on-board truck or on-board trailer automatic lubrication systems. If these systems apply lube thinner than National Grease Lubrication Institute #2, equipment for collection of used lubricant is needed to prevent excess lubricant from dripping off the truck.
- ✓ Use plastic or Teflon plates instead of grease or other lubricants. Carefully follow manufacturer's instructions for installation and operation.
- Use one of the following for lubricating vehicle-trailer coupling:
 - ✓ Specialized adhesive lubricants;
 - ✓ Grease-free fifth wheel slip plates (e.g., plastic or Teflon coatings); and
 - ✓ On-Board automatic lubricating systems.



Spill and Leak Prevention and Response Procedures

- Keep your spill prevention and control plan up-to-date.
- Place an adequate stockpile of spill cleanup materials where it will be readily accessible.
- Clean leaks, drips, and other spills with as little water as possible. Use rags for small spills, a damp mop for general cleanup, and dry absorbent material for larger spills. Use the following three-step method for cleaning floors:
 - ✓ Clean spills with rags or other absorbent materials;
 - ✓ Sweep floor using dry absorbent material; and
 - ✓ Mop the floor.

Mop water may be discharged to the sanitary sewer via a toilet or sink.

- Remove the adsorbent materials promptly and dispose of properly when using adsorbent materials on small spills.



Material Handling and Waste Management

- Designate a special area to drain and replace motor oil, coolant, and other fluids, where there are no connections to the storm drain or the sanitary sewer, and drips and spills can be easily cleaned up.
- Drain all fluids immediately from wrecked vehicles. Ensure that the drain pan or drip pan is large enough to contain drained fluids (e.g., larger pans are needed to contain antifreeze, which may gush from some vehicles).

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- ☐ Do not pour liquid waste to floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- ☐ Do not put used or leftover cleaning solutions, solvents, and automotive fluids and in the sanitary sewer.
- ☐ Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- ☐ Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
- ☐ Place oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal since municipalities prohibit or discourage disposal of these items in solid waste facilities.
- ☐ Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters. Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater.
- ☐ Store cracked batteries in a non-leaking secondary container and dispose of properly at recycling or household hazardous waste facilities.



Employee Training Program

- ☐ Train employees and contractors in the proper handling and disposal of engine fluids and waste materials.
- ☐ Employees should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- ☐ Conduct annual training to ensure that employees are familiar with the facility's spill control plan and/or proper spill cleanup procedures (You can use reusable cloth rags to clean up small drips and spills instead of disposables; these can be washed by a permitted industrial laundry. Do not clean them at home or at a coin-operated laundry business).
- ☐ Use a training log or similar method to document training.



Quality Assurance and Recordkeeping

- ☐ Keep accurate maintenance logs to evaluate materials removed and improvements made.
- ☐ Establish procedures to collect and file maintenance logs in the central office.

Other Facility-Specific Considerations

Parts Cleaning

Vehicle and equipment maintenance facilities often must clean parts as a part of day-to-day operations. The following activities should be considered:

- ☐ Clean vehicle parts without using liquid cleaners wherever possible to reduce waste.
- ☐ Steam cleaning and pressure washing may be used instead of solvent parts cleaning.
- ☐ Wastewater generated from steam cleaning must be discharged to an on-site oil water separator that is connected to a sanitary sewer or blind sump.
- ☐ Use non-caustic detergents instead of caustic cleaning agents, detergent-based or water-based cleaning systems in place of organic solvent degreasers, and non-chlorinated solvent in place of chlorinated organic solvents for parts cleaning. Refer to SC21 for more information on steam cleaning.

Potential Limitations and Work-Arounds

- ☐ Some facilities may have space constraints and time limitations that may preclude all work from being conducted indoors.
 - ✓ Designate specific areas for outdoor activities.
 - ✓ Require employees to understand and follow preventive maintenance and spill and leak prevention BMPs.
- ☐ It may not be possible to contain and clean up spills from vehicles/equipment brought on-site after working hours.
 - ✓ Provide a designated area for afterhours deliveries.
 - ✓ Install spill kits.
- ☐ Drain pans (usually 1 ft. x 1 ft.) are generally too small to contain antifreeze
 - ✓ Purchase or fabricate large drip pans (3 ft. x 3 ft.) with sufficient volume to contain expected quantities of liquids based on equipment/vehicle specifications.
- ☐ Dry floor cleaning methods may not be sufficient for some spills.
 - ✓ Use three-step method instead.
- ☐ Identification of engine leaks may require some use of solvents.
 - ✓ Minimize the use of solvents and use drip pans to collect spills and leaks.
- ☐ Prices for recycled materials and fluids may be higher than those of non-recycled materials.

- Some facilities may be limited by a lack of providers of recycled materials, and by the absence of businesses to provide services such as hazardous waste removal, structural treatment practice maintenance, or solvent equipment and solvent recycling.

Potential Facilities and Maintenance Requirements

Facilities Requirements

- For facilities that already have covered areas where maintenance takes place, have berms or other means to retain spills and leaks, and/ have other appropriate constructed systems for containment, there may not need to be any significant new capital investment. Capital costs will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.



Maintenance Requirements

- Most of the operations and maintenance activity associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore, significant additional operations and maintenance efforts are not likely to be required.
- For facilities responsible for pre-treating their wastewater prior to discharging, the proper functioning of structural treatment system is an important maintenance consideration. Routine cleanout of oil and grease is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the device working efficiently.
- It is important to sweep the maintenance area weekly, if it is paved, to collect loose particles, and wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a storm drain.

Supplemental Information

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, 1,1,1-trichloroethane or methylene chloride. Many of these cleaners are harmful and must be disposed of as a hazardous waste. Cleaning without using liquid cleaners (e.g., wire brush) whenever possible reduces waste. Prevent spills and drips of solvents and cleansers to the shop floor. Do all liquid cleaning at a centralized station so the solvents and residues stay in one area. Locate drip pans, drain boards, and drying racks to direct drips back into a solvent sink or fluid holding tank for reuse. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents.

- Clean parts without using liquid cleaners whenever possible to reduce waste.
- Prevent spills and drips of solvents and cleansers to the shop floor.

- ☐ Do all liquid cleaning at a centralized station so the solvents and residues stay in one area.
- ☐ Locate drip pans, drain boards, and drying racks to direct drips back into a solvent sink or fluid holding tank for reuse.

Recycling

Separating wastes allows for easier recycling and may reduce treatment costs. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents (e.g., 1,1,1-trichloroethane) separate from non-chlorinated solvents (e.g., kerosene and mineral spirits).

Many products made of recycled (i.e., refined or purified) materials are available. Engine oil, transmission fluid, antifreeze, and hydraulic fluid are available in recycled form. Buying recycled products supports the market for recycled materials.

- ☐ Recycling is always preferable to disposal of unwanted materials.
- ☐ Separate wastes for easier recycling. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents separate from non-chlorinated solvents.
- ☐ Label and track the recycling of waste material (e.g., used oil, spent solvents, batteries).
- ☐ Purchase recycled products to support the market for recycled materials.

Safer Alternatives

If possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous material:

- ☐ Use non-caustic detergents instead of caustic cleaning for parts cleaning.
- ☐ Use detergent-based or water-based cleaning systems in place of organic solvent degreasers. Wash water may require treatment before it can be discharged to the sewer.
- ☐ Replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check list of active ingredients to see whether it contains chlorinated solvents.
- ☐ Choose cleaning agents that can be recycled.

References and Resources

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at:

<http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities>.

Vehicle and Equipment Repair SC-22

Oregon Department of Environmental Quality, 2013. *Industrial Stormwater Best Management Practices Manual- BMP 8 Vehicle, Pavement and Building Washing*. Available online at: <http://www.deq.state.or.us/wq/wqpermit/docs/IndBMP021413.pdf>.

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Description

The loading/unloading of materials usually takes place outside on docks or terminals; therefore, materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by wind, stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move materials. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.
- ☐ Limit exposure of material to rainfall whenever possible.
- ☐ Prevent stormwater run-on.
- ☐ Check equipment regularly for leaks.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

 Good Housekeeping	✓
 Preventative Maintenance	
 Spill and Leak Prevention and Response	✓
 Material Handling & Waste Management	✓
 Erosion and Sediment Controls	
 Employee Training Program	✓
 Quality Assurance Record Keeping	✓



Good Housekeeping

- ☐ Develop an operations plan that describes procedures for loading and/or unloading.
- ☐ Conduct loading and unloading in dry weather if possible.



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- ☐ Cover designated loading/unloading areas to reduce exposure of materials to rain.
- ☐ Consider placing a seal or door skirt between delivery vehicles and building to prevent exposure to rain.
- ☐ Design loading/unloading area to prevent stormwater run-on, which would include grading or berming the area, and position roof downspouts so they direct stormwater away from the loading/unloading areas.
- ☐ Have employees load and unload all materials and equipment in covered areas such as building overhangs at loading docks if feasible.
- ☐ Load/unload only at designated loading areas.
- ☐ Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.
- ☐ Pave loading areas with concrete instead of asphalt.
- ☐ Avoid placing storm drains inlets in the area.
- ☐ Grade and/or berm the loading/unloading area with drainage to sump; regularly remove materials accumulated in sump.



Spill Response and Prevention Procedures

- ☐ Keep your spill prevention and control plan up-to-date or have an emergency spill cleanup plan readily available, as applicable.
- ☐ Contain leaks during transfer.
- ☐ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees.
- ☐ Ensure that employees are familiar with the site's spill control plan and proper spill cleanup procedures.
- ☐ Use drip pans or comparable devices when transferring oils, solvents, and paints.



Material Handling and Waste Management

- ☐ Spot clean leaks and drips routinely to prevent runoff of spillage.
- ☐ Do not pour liquid wastes into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.

- ☐ Do not put used or leftover cleaning solutions, solvents, and automotive fluids in the storm drain or sanitary sewer.
- ☐ Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- ☐ Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
- ☐ Minimize the possibility of stormwater pollution from outside waste receptacles by doing at least one of the following:
 - ✓ Use only watertight waste receptacle(s) and keep the lid(s) closed.
 - ✓ Grade and pave the waste receptacle area to prevent run-on of stormwater.
 - ✓ Install a roof over the waste receptacle area.
 - ✓ Install a low containment berm around the waste receptacle area.
 - ✓ Use and maintain drip pans under waste receptacles.
- ☐ Post “no littering” signs.
- ☐ Perform work area clean-up and dry sweep after daily operations.



Employee Training Program

- ☐ Train employees (e.g., fork lift operators) and contractors on proper spill containment and cleanup.
- ☐ Have employees trained in spill containment and cleanup present during loading/unloading.
- ☐ Train employees in proper handling techniques during liquid transfers to avoid spills.
- ☐ Make sure forklift operators are properly trained on loading and unloading procedures.



Quality Assurance and Record Keeping

- ☐ Keep accurate maintenance logs that document activities performed, quantities of materials removed, and improvement actions.
- ☐ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- ☐ Establish procedures to complete logs and file them in the central office.
- ☐ Keep accurate logs of daily clean-up operations.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended “work-arounds.”

- ☐ Space and time limitations may preclude all transfers from being performed indoors or under cover.
 - ✓ Designate specific areas for outdoor loading and unloading.
 - ✓ Require employees to understand and follow spill and leak prevention BMPs.
- ☐ It may not be possible to conduct transfers only during dry weather.
 - ✓ Limit materials and equipment rainfall exposure to all extents practicable.
 - ✓ Require employees to understand and follow spill and leak prevention BMPs.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

Many facilities will already have indoor or covered areas where loading/unloading takes place and will require no additional capital expenditures.

If outdoor activities are required, construction of berms or other means to retain spills and leaks may require appropriate constructed systems for containment. These containment areas may require significant new capital investment.

Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

Most of the operations and maintenance activities associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore additional O&M is not required.

- ☐ Conduct regular inspections and make repairs and improvements as necessary.
- ☐ Check loading and unloading equipment regularly for leaks.
- ☐ Conduct regular broom dry-sweeping of area. Do not wash with water.

Supplemental Information

Loading and Unloading of Liquids

- ☐ Loading or unloading of liquids should occur in the manufacturing building so that any spills that are not completely retained can be discharged to the sanitary sewer,

- treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.
- For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used:
 - ✓ The area where the transfer takes place should be paved. If the liquid is reactive with the asphalt, Portland cement should be used to pave the area.
 - ✓ The transfer area should be designed to prevent run-on of stormwater from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.
 - ✓ The transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer. A positive control valve should be installed on the drain.
 - For transfer from rail cars to storage tanks that must occur outside, use the following procedures:
 - ✓ Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles. Use drip pans when making and breaking connections.
 - ✓ Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources

Minnesota Pollution Control Agency, *Industrial Stormwater Best Management Practices Guidebook BMP 26 Fueling and Liquid Loading/Unloading Operations*. Available online at: <http://www.pca.state.mn.us/index.php/view-document.html?gid=10557>.

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Santa Clara Valley Urban Runoff Pollution Prevention Program. <http://www.scvurppp-w2k.com/>.

US EPA. National Pollutant Discharge Elimination System – Industrial Fact Sheet Series for Activities Covered by EPA’s Multi Sector General Permit. Available online at:
<http://cfpub.epa.gov/npdes/stormwater/swsectors.cfm>.

Description

Accidental releases of materials from above ground liquid storage tanks, drums, and dumpsters present the potential for contaminating stormwater with many different pollutants. Tanks may store many potential stormwater runoff pollutants, such as gasoline, aviation gas, diesel fuel, kerosene, oils, greases, lubricants and other distilled, blended and refined products derived from crude petroleum. Materials spilled, leaked, or lost from storage tanks may accumulate in soils or on other surfaces and be carried away by rainfall runoff. These source controls apply to containers located outside of a building used to temporarily store liquid materials and include installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.

Approach

General Pollution Prevention Protocols

- ☐ Educate employees about pollution prevention measures and goals.
- ☐ Keep an accurate, up-to-date inventory of the materials delivered and stored on-site.
- ☐ Try to keep chemicals in their original containers, and keep them well labeled.
- ☐ Develop an operations plan that describes procedures for loading and/or unloading. Refer to SC-30 Outdoor Loading/Unloading of Materials for more detailed BMP information pertaining to loading and unloading of liquids.
- ☐ Protect materials from rainfall, run-on, runoff, and wind dispersal:
 - ✓ Cover the storage area with a roof.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

	Good Housekeeping	
	Preventative Maintenance	✓
	Spill and Leak Prevention and Response	✓
	Material Handling & Waste Management	✓
	Erosion and Sediment Controls	
	Employee Training Program	✓
	Quality Assurance Record Keeping	✓



- ✓ Minimize stormwater run-on by enclosing the area or building a berm around it.
- ✓ Use a walled structure for storage of liquid containers.
- ✓ Use only watertight containers and keep the lids closed.
- Employ safeguards against accidental releases:
 - ✓ Provide overflow protection devices to warn operator or automatic shutdown transfer pumps.
 - ✓ Provide protection guards (bollards) around tanks and piping to prevent damage from a vehicle or forklift.
 - ✓ Provide clear tagging or labeling, and restrict access to valves to reduce human error.
 - ✓ Berm or surround tank or container with secondary containment system, including dikes, liners, vaults, or double walled tanks.
 - ✓ Be aware and ready to address the fact that some municipalities require secondary containment areas to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
 - ✓ Contact the appropriate regulatory agency regarding environmental compliance for facilities with “spill ponds” designed to intercept, treat, and/or divert spills.
 - ✓ Have registered and specifically trained professional engineers identify and correct potential problems such as loose fittings, poor welding, and improper or poorly fitted gaskets for newly installed tank systems.
- Use MSDSs to ID hazardous components and keep incompatible products apart and to list/have available appropriate PPE and clean-up products.



Good Housekeeping

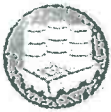
- Provide storage tank piping located below product level with a shut-off valve at the tank; ideally this valve should be an automatic shear valve with the shut-off located inside the tank.
- Provide barriers such as posts or guardrails, where tanks are exposed, to prevent collision damage with vehicles.
- Provide secure storage to prevent vandalism-caused contamination.
- Place tight-fitting lids on containers.

- ☐ Enclose or cover the containers where they are stored.
- ☐ Raise the containers off the ground by use of pallet or similar method, with provisions for spill control.
- ☐ Do not store liquid containers near the storm drainage system or surface waters.
- ☐ Sweep and clean the storage area regularly if it is paved, do not hose down the area to a storm drain.



Preventative Maintenance

- ☐ Inspect storage areas regularly for leaks or spills.
- ☐ Conduct routine inspections and check for external corrosion of material containers. Also check for structural failure, spills and overfills due to operator error, failure of piping system.
- ☐ Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- ☐ Visually inspect new tank or container installations for loose fittings, poor welding, and improper or poorly fitted gaskets.
- ☐ Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- ☐ Replace containers that are leaking, corroded, or otherwise deteriorating with ones in good condition. If the liquid chemicals are corrosive, containers made of compatible materials must be used instead of metal drums.
- ☐ New or secondary containers must be labeled with the product name and hazards.



Spill Response and Prevention Procedures

- ☐ Keep your spill prevention and control plan up-to-date.
- ☐ Maintain an adequate stockpile of spill cleanup materials at locations where it will be readily accessible.
- ☐ Have an emergency plan, equipment, and trained personnel ready at all times to deal immediately with major spills.
- ☐ Collect spilled liquids and properly dispose of them.
- ☐ Remove the adsorbent materials promptly and dispose of properly when using adsorbent materials on small spills.
- ☐ Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.

- Prevent operator errors by using engineering safeguards and thus reducing accidental releases of pollutants.



Material Handling and Waste Management

- Contain the material in such a manner that if the container leaks or spills, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters or groundwater.
- Place drip pans or absorbent materials beneath mounted container taps, and at potential drip and spill locations during filling and unloading of containers. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
- Ensure that any underground or aboveground storage tanks are designed and managed in accordance with applicable regulations, identified as a potential pollution source, and have secondary containment such as a berm or dike with an impervious surface.
- Do not pour liquids into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.



Employee Training Program

- Train employee (e.g., fork lift operators) and contractors in proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.
- Train employees in proper spill response and prevention, materials handling, and waste management.
- Use a training log or similar method to document training.



Quality Assurance and Record Keeping

- Keep accurate maintenance/inspection logs that document minimum BMP activities performed for liquid container storage and improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Other Facility-Specific Considerations

- Storage sheds often must meet building and fire code requirements.

- ☐ The local fire district must be consulted for limitations on clearance of roof covers over containers used to store flammable materials.
- ☐ All specific standards set by Federal and State laws concerning the storage of oil and hazardous materials must be met.
- ☐ Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code.
- ☐ Storage of oil and hazardous materials must meet specific Federal and State standards including:
 - ✓ Spill Prevention Control and Countermeasure Plan (SPCC) Plan;
 - ✓ Secondary containment;
 - ✓ Integrity and leak detection monitoring; and
 - ✓ Emergency preparedness plans.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- ☐ Capital investments such as sheds, covers, dikes, and curbs will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- ☐ Most of the operations and maintenance activities associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore additional O&M is not required.
- ☐ Conduct regular inspections and make repairs and improvements as necessary.
- ☐ Conduct regular broom dry-sweeping of area. Do not wash with water.

Supplemental Information

The most common causes of unintentional releases are:

- ☐ Installation problems;
- ☐ Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves);
- ☐ External corrosion and structural failure;
- ☐ Spills and overfills due to operator error; and
- ☐ Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa.

Aboveground Tank Leak and Spill Control

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- ☐ Tanks should be placed in a designated area.
- ☐ Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- ☐ Designated areas should be paved with Portland cement concrete, free of cracks and gaps, and impervious in order to contain leaks and spills.
- ☐ Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10% of the volume of the containers or 110% of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- ☐ For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- ☐ Other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- ☐ Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine weekly inspections and:

- ☐ Check for external corrosion and structural failure.
- ☐ Check for spills and overfills due to operator error.
- ☐ Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves).
- ☐ Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- ☐ Inspect new tank or container installation visually for loose fittings, poor welding, and improper or poorly fitted gaskets.
- ☐ Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- ☐ Frequently release accumulated stormwater during the wet season.
- ☐ Have periodic integrity testing conducted by a qualified professional.

Dikes

One of the best protective measures against contamination of stormwater is the use of dikes. Containment dikes are berms or retaining walls that are designed to hold spills. Use of dikes is an effective pollution prevention measure for above ground storage tanks and railcar or tank truck loading and unloading areas. The dike surrounds the area of concern and holds the spill, keeping spill materials separated from the stormwater side of the dike area. Diking can be used in any industrial or municipal facility, but it is most commonly used for controlling large spills or releases from liquid storage areas and liquid transfer areas.

- ☐ For single-wall tanks, containment dikes should be large enough to hold the contents of the storage tank for the facility plus rain water.
- ☐ For trucks, diked areas should be capable of holding an amount equal to the volume of the tank truck compartment. Diked construction material should be strong enough to safely hold spilled materials.
- ☐ Dike materials can consist of earth, concrete, synthetic materials, metal, or other impervious materials.
- ☐ Strong acids or bases may react with metal containers, concrete, and some plastics.
- ☐ Where strong acids or bases are stored, alternative dike materials should be considered. More active organic chemicals may need certain special liners for dikes.
- ☐ Dikes may also be designed with impermeable materials to increase containment capabilities.
- ☐ Dikes should be inspected during or after significant storms or spills to check for washouts or overflows.
- ☐ Regular checks of containment dikes to insure the dikes are capable of holding spills should be conducted.
- ☐ Inability of a structure to retain stormwater, dike erosion, soggy areas, or changes in vegetation indicate problems with dike structures. Damaged areas should be patched and stabilized immediately.
- ☐ Earthen dikes may require special maintenance of vegetation such as mulching and irrigation.
- ☐ Remove accumulated stormwater after precipitation events and dispose of according to local regulations.

Curbing

Curbing is a barrier that surrounds an area of concern. Curbing is similar to containment diking in the way that it prevents spills and leaks from being released into the environment. Curbing is usually small scaled and does not contain large spills to the degree that dikes can. Curbing is common at many facilities in small areas where

handling and transfer of liquid materials occur. Curbing can redirect contaminated stormwater away from the storage area. It is useful in areas where liquid materials are transferred from one container to another. Asphalt is a common material used for curbing; however, curbing materials can include earth, concrete, synthetic materials, metal, or other impenetrable materials.

- Spilled materials should be removed immediately from curbed areas to allow space for future spills.
- Curbs should have manually-controlled pump systems rather than common drainage systems for collection of spilled materials.
- The curbed area should be inspected regularly to clear clogging debris.
- Maintenance should also be conducted frequently to prevent overflow of any spilled materials as curbed areas are designed only for smaller spills.
- Remove accumulated stormwater after precipitation events and dispose of according to local regulations.
- Curbing has the following advantages:
 - ✓ Excellent run-on control;
 - ✓ Inexpensive;
 - ✓ Ease of installment;
 - ✓ Provides option to recycle materials spilled in curb areas; and
 - ✓ Common industry practice.

References and Resources

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Outdoor Liquid Container Storage SC-31

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Outdoor Equipment Operations SC-32

Description

Outside process equipment operations and maintenance can contaminate stormwater runoff. Activities, such as grinding, painting, coating, sanding, degreasing or parts cleaning, landfills and waste piles, and solid waste treatment and disposal are examples of process operations that can lead to contamination of stormwater runoff. The targeted constituents will vary for each site depending on the operation being performed.

Approach

Implement source control BMPs to limit exposure of outdoor equipment to direct precipitation and stormwater run-on. Refer to SC-22 Vehicle and Equipment Repair for additional information.

General Pollution Prevention Protocols

- ☐ Perform the activity during dry periods whenever possible.
- ☐ Install secondary containment measures where leaks and spills may occur.
- ☐ Use non-toxic chemicals for maintenance and minimize or eliminate the use of solvents.
- ☐ Connect process equipment area to public sanitary sewer or facility wastewater treatment system when possible. Some jurisdictions require that secondary containment areas be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.



Good Housekeeping

- ☐ Manage materials and waste properly (see Material Handling and Waste Management) to reduce adverse impacts on stormwater quality.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

<i>Sediment</i>	✓
<i>Nutrients</i>	✓
<i>Trash</i>	✓
<i>Metals</i>	✓
<i>Bacteria</i>	✓
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

Minimum BMPs Covered

	<i>Good Housekeeping</i>	✓
	<i>Preventative Maintenance</i>	✓
	<i>Spill and Leak Prevention and Response</i>	✓
	<i>Material Handling & Waste Management</i>	✓
	<i>Erosion and Sediment Controls</i>	
	<i>Employee Training Program</i>	✓
	<i>Quality Assurance Record Keeping</i>	✓



CALIFORNIA STORMWATER
QUALITY ASSOCIATION

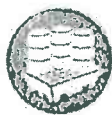
Outdoor Equipment Operations SC-32

- ☐ Cover the work area with a permanent roof if possible.
- ☐ Use drop cloths for sanding and painting operations.
- ☐ Use a vacuum for fine particle clean-up in pavement cracks and crevices.
- ☐ Minimize contact of stormwater with outside process equipment operations through berming and drainage routing (run-on prevention).
- ☐ "Spot clean" leaks and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.
- ☐ Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- ☐ Use roll down or permanent walls when windy/breezy to prevent wind transport of particulates/pollutants.



Preventative Maintenance

- ☐ Design outdoor equipment areas to prevent stormwater runoff and spills. Use a perimeter drain or slope pavement inward with drainage to sump.
- ☐ Dry clean the work area regularly. Do not wash outdoor equipment with water if there is a direct connection to the storm drain.
- ☐ Pave area with concrete rather than asphalt.
- ☐ Inspect outdoor equipment regularly for leaks or spills. Also check for structural failure, spills and overfills due to operator error, and/or failure of piping system.
- ☐ Inspect and clean, if necessary, storm drain inlets and catch basins within the outdoor equipment area before October 1 each year.



Spill Response and Prevention Procedures

- ☐ Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- ☐ Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.
- ☐ Place a stockpile of spill cleanup materials where it will be readily accessible.
- ☐ Prevent operator errors by using engineering safe guards and thus reducing accidental releases of pollutant.



Material Handling and Waste Management

Outdoor Equipment Operations SC-32

- ☐ Do not pour liquid wastes into floor drains, sinks, outdoor storm drain inlets, or other storm drain or sewer connections.
- ☐ Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- ☐ Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
- ☐ Minimize the possibility of stormwater pollution from outside waste receptacles by doing at least one of the following:
 - ✓ Use only watertight waste receptacle(s) and keep the lid(s) closed.
 - ✓ Grade and pave the waste receptacle area to prevent run-on of stormwater.
 - ✓ Install a roof over the waste receptacle area.



Employee Training Program

- ☐ Educate employees about pollution prevention measures and goals.
- ☐ Train employees on proper equipment operation and maintenance procedures.
- ☐ Train all employees upon hiring and annually thereafter on proper methods for handling and disposing of waste. Ensure that all employees understand stormwater discharge prohibitions, wastewater discharge requirements, and these best management practices.
- ☐ Use a training log or similar method to document training.
- ☐ Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.



Quality Assurance and Record Keeping

- ☐ Keep accurate maintenance logs that document minimum BMP activities performed for outdoor equipment, types and quantities of materials removed and disposed of, and any improvement actions.
- ☐ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- ☐ Establish procedures to complete logs and file them in the central office.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended "work-arounds."

Outdoor Equipment Operations SC-32

- ❑ Providing cover over outdoor equipment may be impractical or cost-prohibitive.
 - ✓ Operate outdoor equipment only during periods of dry weather.
- ❑ Regular operations and time limitations may require outdoor activities during wet weather.
 - ✓ Designate specific areas for outdoor activities.
 - ✓ Allow time for work area clean-up after each shift.
 - ✓ Require employees to understand and follow preventive maintenance and spill and leak prevention BMPs.
 - ✓ Design and install secondary containment and good housekeeping BMPs for outdoor equipment area.
- ❑ Storage sheds often must meet building and fire code requirements.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- ❑ Many facilities will already have indoor covered areas where vehicle and equipment repairs take place and will require no additional capital expenditures.
- ❑ If outdoor activities are required, construction of berms or other means to retain spills and leaks may require appropriate constructed systems for containment. These containment areas may require significant new capital investment.
- ❑ Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- ❑ Most of the operations and maintenance activities associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore additional O&M is not required.
- ❑ For facilities responsible for pre-treating their wastewater prior to discharging, the proper functioning of structural treatment system is an important maintenance consideration.
- ❑ Routine cleanout of oil and grease is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the device working efficiently.

Outdoor Equipment Operations SC-32

References and Resources

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Outdoor Storage of Raw Materials SC-33

Description

Stockpiles of raw materials, by-products, and finished products exposed to rain and/or runoff can pollute stormwater. Stormwater can become contaminated when materials wash off or dissolve into water due to improper storage and containment. To prevent or reduce the discharge of pollutants to stormwater from raw material delivery and storage, pollution prevention and source control measures must be implemented, such as minimizing the storage of hazardous materials on-site, enclosing or covering materials, storing materials in a designated area, installing secondary containment, conducting regular inspections, preventing stormwater run-on and runoff, and training employees and subcontractors. This fact sheet focuses on source control BMPs for stockpiles of solid materials; if the raw material, by-product, or product is a liquid, more information for outside storage of liquids can be found under SC-31 Outdoor Liquid Container Storage.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Emphasize employee education for successful BMP implementation.
- ☐ Store materials that could contaminate stormwater inside or under permanent cover. If this is not feasible, then all outside storage areas should be covered with a roof and bermed or enclosed to prevent stormwater contact.
- ☐ Elevate and tarp solid materials such as beams, metal, etc.
- ☐ Minimize the inventory of raw materials kept outside.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

<i>Sediment</i>	✓
<i>Nutrients</i>	✓
<i>Trash</i>	
<i>Metals</i>	✓
<i>Bacteria</i>	
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

Minimum BMPs Covered

 <i>Good Housekeeping</i>	✓
 <i>Preventative Maintenance</i>	✓
 <i>Spill and Leak Prevention and Response</i>	✓
 <i>Material Handling & Waste Management</i>	
 <i>Erosion and Sediment Controls</i>	✓
 <i>Employee Training Program</i>	✓
 <i>Quality Assurance Record Keeping</i>	✓



Outdoor Storage of Raw Materials SC-33

- Keep an accurate, up-to-date inventory of the materials delivered and stored on-site.
- Stormwater runoff that could potentially be contaminated by materials stored outdoors should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.



Good Housekeeping

- If raw materials cannot all be stored inside or under permanent cover, prevent exposure to direct precipitation and stormwater run-on by installing a storm-resistant waterproof covering made of polyethylene, polypropylene or hypalon over all materials stored outside. The covers must be in place at all times when work with the stockpiles is not occurring (Applicable to small stockpiles only).
- Implement erosion control practices at the perimeter of the facility site and at any catch basins to prevent erosion of the stockpiled material off-site, if the stockpiles are so large that they cannot feasibly be covered and contained.
- Minimize stormwater run-on by enclosing the area or building a berm around it.
- Keep storage areas clean and dry.
- Slope paved areas in a manner that minimizes pooling of water on the site, particularly with materials that may leach pollutants into stormwater and/or groundwater, such as compost, logs, and wood chips. A minimum slope of 1.5% is recommended.
- Secure drums stored in an area where unauthorized persons may not gain access to prevent accidental spillage, pilferage, or any unauthorized use.
- Install curbing or berms along the perimeter of the area to prevent the run-on of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the stockpile areas.
- Slope the area inside the curb or berm to a drain with sump. The sump should be equipped with an oil and water separator if applicable for materials stored onsite.
- Do not store materials on top of or directly adjacent to storm drain inlets.
- Cover wood products treated with chromated copper arsenate, ammoniacal copper zinc arsenate, creosote, or pentachlorophenol with properly secured tarps or store indoors.

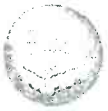


Preventative Maintenance

- Maintain outdoor storage containers in good condition. Replace leaky or otherwise inadequate containers as necessary.
- Maintain outdoor waterproof covers (e.g., tarps) in good condition and properly secure them to be storm resistant. Replace tarps damaged by UV exposure or wear and tear on a regular basis.

Outdoor Storage of Raw Materials SC-33

- ☐ Perform routine inspection of storm drains and sumps and regularly remove accumulated materials.
- ☐ Dry clean the work area regularly. Do not wash outdoor material storage areas with water if there is a direct connection to the storm drain.
- ☐ Pave outdoor storage areas for liquids such as solvents with concrete rather than asphalt.
- ☐ Conduct regular inspections of storage areas so that leaks and spills are detected as soon as possible.
- ☐ Routinely inspect berms, curbing, containment, and sediment controls for proper function and repair as necessary.



Spill and Leak Prevention and Response

- ☐ Keep the facility spill prevention and control plan up-to-date.
- ☐ Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- ☐ Have employees trained in spill containment and cleanup present during the loading/unloading of hazardous or otherwise dangerous materials.



Erosion and Sediment Controls

- ☐ Keep materials covered to prevent erosion of stockpiles. This may not be feasible for large stockpiles.
- ☐ Install sediment controls such as fiber rolls around the perimeter of stockpiles to prevent transport of raw materials to the storm drain.
- ☐ Install drain inlet protection around all inlets to prevent raw materials from entering storm drain.
- ☐ Install sediment controls such as silt fence around the perimeter of the site to prevent transport of raw materials to the storm drain or offsite surface waters.



Employee Training Program

- ☐ Educate employees about pollution prevention measures and goals.
- ☐ Train employees how to properly store outdoor raw materials using the source control BMPs described above.
- ☐ Use a training log or similar method to document training.
- ☐ Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

Outdoor Storage of Raw Materials SC-33



Quality Assurance and Record Keeping

- ☐ Keep accurate maintenance logs that document minimum BMP activities performed for outdoor storage of raw materials, types and quantities of materials removed and disposed of, and any improvement actions.
- ☐ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- ☐ Establish procedures to complete logs and file them in the central office.

Other Facility-Specific Considerations

- ☐ Storage sheds often must meet building and fire code requirements. Storage of reactive, ignitable, or flammable liquids must comply with the Uniform Fire Code and the National Electric Code.
- ☐ Some municipalities require that secondary containment areas (regardless of size) be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
- ☐ The local fire district must be consulted for limitations on clearance of roof covers over containers used to store flammable materials.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended "work-arounds"

- ☐ Space limitations may preclude storing all materials indoors.
 - ✓ Implement good housekeeping, preventative maintenance, and erosion and sediment controls as described above.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- ☐ Many facilities will already have indoor covered areas where raw materials will be stored and will require no additional capital expenditures.
- ☐ If outdoor storage of materials is required, construction of berms or other means to prevent stormwater run-on and runoff may require appropriate constructed systems for containment. These containment areas may require significant new capital investment.
- ☐ Purchase and installation of erosion and sediment controls will require additional capital investments, and this amount will vary depending on site characteristics.
- ☐ Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Outdoor Storage of Raw Materials SC-33

Maintenance

- ☐ Accurate and up-to-date inventories should be kept of all stored materials.
- ☐ Berms and curbs may require periodic repair and patching.
- ☐ Parking lots or other surfaces near bulk materials storage areas should be swept periodically to remove debris blown or washed from storage areas.
- ☐ Sweep paved storage areas regularly for collection and disposal of loose solid materials, do not hose down the area to a storm drain or conveyance ditch.
- ☐ Erosion and sediment controls require regular inspection and periodic replacement or reinstallation.

Supplemental Information

Raw Material Containment

Paved areas should be sloped in a manner that minimizes pooling of water on the site, particularly with materials that may leach pollutants into stormwater and/or groundwater, such as compost, logs, and wood chips. A minimum slope of 1.5% is recommended.

- ☐ Curbing or berms should be placed along the perimeter of the area to prevent the run-on of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from stockpile areas.
- ☐ The storm drainage system should be designed to minimize use of catch basins in the interior of the area as they tend to rapidly fill with manufacturing material.

The area should be sloped to drain stormwater to the perimeter where it can be collected or to internal drainage alleyways where material is not stockpiled.

The “doghouse” design has been used to store small liquid containers. The roof and flooring design prevent contact with direct rain or runoff. The doghouse has two solid structural walls and two canvas covered walls. The flooring is wire mesh about secondary containment.

References and Resources

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Outdoor Storage of Raw Materials SC-33

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Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- Accomplish reduction in the amount of waste generated using the following source controls:
 - ✓ Production planning and sequencing;
 - ✓ Process or equipment modification;
 - ✓ Raw material substitution or elimination;
 - ✓ Loss prevention and housekeeping;
 - ✓ Waste segregation and separation; and
 - ✓ Close loop recycling.
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment

Nutrients

Trash

Metals

Bacteria

Oil and Grease

Organics

Minimum BMPs Covered

	Good Housekeeping	✓
	Preventative Maintenance	✓
	Spill and Leak Prevention and Response	✓
	Material Handling & Waste Management	✓
	Erosion and Sediment Controls	
	Employee Training Program	✓
	Quality Assurance Record Keeping	✓



- ☐ Use the entire product before disposing of the container.
- ☐ To the extent possible, store wastes under cover or indoors after ensuring all safety concerns such as fire hazard and ventilation are addressed.
- ☐ Provide containers for each waste stream at each work station. Allow time after shift to clean area.



Good Housekeeping

- ☐ Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.
- ☐ Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- ☐ Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain. Clean in a designated wash area that drains to a clarifier.
- ☐ Transfer waste from damaged containers into safe containers.
- ☐ Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.
- ☐ Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- ☐ Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- ☐ Stencil or demarcate storm drains on the facility's property with prohibitive message regarding waste disposal.
- ☐ Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.
- ☐ If possible, move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.



Preventative Maintenance

- ☐ Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.
- ☐ Prevent waste materials from directly contacting rain.

- ☐ Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.
- ☐ Cover the area with a permanent roof if feasible.
- ☐ Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- ☐ Check waste containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- ☐ Sweep and clean the waste management area regularly. Use dry methods when possible (e.g., sweeping, vacuuming, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- ☐ Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- ☐ Repair leaking equipment including valves, lines, seals, or pumps promptly.



Spill Response and Prevention Procedures

- ☐ Keep your spill prevention and plan up-to-date.
- ☐ Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills.
- ☐ Collect all spilled liquids and properly dispose of them.
- ☐ Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.
- ☐ Ensure that vehicles transporting waste have spill prevention equipment that can prevent spills during transport. Spill prevention equipment includes:
 - ✓ Vehicles equipped with baffles for liquid waste; and
 - ✓ Trucks with sealed gates and spill guards for solid waste.



Material Handling and Waste Management

Litter Control

- ☐ Post “No Littering” signs and enforce anti-litter laws.
- ☐ Provide a sufficient number of litter receptacles for the facility.
- ☐ Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- ☐ Keep waste collection areas clean.

- ☐ Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- ☐ Secure solid waste containers; containers must be closed tightly when not in use.
- ☐ Do not fill waste containers with washout water or any other liquid.
- ☐ Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).
- ☐ Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal. Affix labels to all waste containers.

Chemical/Hazardous Wastes

- ☐ Select designated hazardous waste collection areas on-site.
- ☐ Store hazardous materials and wastes in covered containers and protect them from vandalism.
- ☐ Place hazardous waste containers in secondary containment.
- ☐ Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- ☐ Hazardous waste cannot be reused or recycled; it must be disposed of by a licensed hazardous waste hauler.



Employee Training Program

- ☐ Educate employees about pollution prevention measures and goals.
- ☐ Train employees how to properly handle and dispose of waste using the source control BMPs described above.
- ☐ Train employees and subcontractors in proper hazardous waste management.
- ☐ Use a training log or similar method to document training.
- ☐ Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.



Quality Assurance and Record Keeping

- ☐ Keep accurate maintenance logs that document minimum BMP activities performed for waste handling and disposal, types and quantities of waste disposed of, and any improvement actions.
- ☐ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.

- Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital costs will vary substantially depending on the size of the facility and the types of waste handled. Significant capital costs may be associated with reducing wastes by modifying processes or implementing closed-loop recycling.
- Many facilities will already have indoor covered areas where waste materials will be stored and will require no additional capital expenditures for providing cover.
- If outdoor storage of wastes is required, construction of berms or other means to prevent stormwater run-on and runoff may require appropriate constructed systems for containment.
- Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- Check waste containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the waste management area regularly. Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Repair leaking equipment including valves, lines, seals, or pumps promptly.

References and Resources

Minnesota Pollution Control Agency, *Industrial Stormwater Best Management Practices Guidebook*. Available online at: <http://www.pca.state.mn.us/index.php/view-document.html?gid=10557>.

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<http://cfpub.epa.gov/npdes/stormwater/swsectors.cfm>.

Contaminated or Erodible Areas SC-40

Description

Areas within an industrial site that are bare of vegetation or are subject to activities that promote the suppression of vegetation are often subject to erosion. In addition, they may or may not be contaminated from past or current activities. If the area is temporarily bare because of construction, see SC-42 Building Repair, Remodeling, and Construction. Sites with excessive erosion or the potential for excessive erosion should consider employing the soil erosion BMPs identified in the Construction BMP Handbook. Note that this fact sheet addresses soils that do not exceed hazardous waste criteria (see Title 22 California Code of Regulations for Hazardous Waste Criteria).

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

Implement erosion and sediment control BMPs to stabilize soils and reduce pollutant discharges from contaminated or erodible surfaces.

Erosion and Sediment Controls

- ☐ Preserve natural vegetation whenever possible. See also EC-2 Preservation of Existing Vegetation, in the Construction BMP Handbook.
- ☐ Analyze soil conditions.
- ☐ Remove contaminated soil and dispose of properly.
- ☐ Stabilize loose soils by re-vegetating whenever possible. See also EC-4 Hydroseeding, in the Construction BMP Handbook.








Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

	Good Housekeeping	
	Preventative Maintenance	
	Spill and Leak Prevention and	
	Material Handling & Waste Management	
	Erosion and Sediment Controls	✓
	Employee Training Program	✓
	Quality Assurance Record Keeping	✓



Contaminated or Erodible Areas SC-40

- Utilize non-vegetative stabilization methods for areas prone to erosion where vegetative options are not feasible. Examples include:
 - ✓ Areas of vehicular or pedestrian traffic such as roads or paths;
 - ✓ Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation;
 - ✓ Rocky substrate, infertile or droughty soils where vegetation would be difficult to establish; and
 - ✓ Areas where vegetation will not grow adequately within the construction time frame.

There are several non-vegetative stabilization methods and selection should be based on site-specific conditions. See also EC-16 Non-Vegetative Stabilization, in the Construction BMP Handbook.

- Utilize chemical stabilization when needed. See also EC-5 Soil Binders, in the Construction BMP Handbook.
- Use geosynthetic membranes to control erosion if feasible. See also EC-7 Geotextiles and Mats, in the Construction BMP Handbook.
- Stabilize all roadways, entrances, and exits to sufficiently control discharges of erodible materials from discharging or being tracked off the site. See also TC 1-3 Tracking Control, in the Construction BMP Handbook.
- Implement wind erosion control measures as necessary. See also WE-1 Wind Erosion Control, in the Construction BMP Handbook.



Employee Training Program

- Educate employees about pollution prevention measures and goals.
- Train employees how to properly install and maintain the erosion and sediment source control BMPs described above. Detailed information is provided in the Construction BMP Handbook.
- Use a training log or similar method to document training.



Quality Assurance and Record Keeping

- Keep accurate logs that document actions taken to maintain and improve the effectiveness of the erosion and sediment control BMPs described above.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Contaminated or Erodible Areas SC-40

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Many facilities do not have contaminated or erodible areas and will require no additional capital expenditures.
- For sites with contaminated or erodible areas, purchase and installation of erosion and sediment controls will require additional capital investments, and this amount will vary depending on site characteristics and the types of BMPs being implemented.
- Minimize costs by maintaining existing vegetation and limiting site operations on bare soils.

Maintenance

- The erosion and sediment control BMPs described above require periodic inspection and maintenance to remain effective. The cost of these actions will vary depending on site characteristics and the types of BMPs being implemented.
- Irrigation costs may be required to establish and maintain vegetation.

Supplemental Information

Stabilization of Erodible Areas

Preserving stabilized areas minimizes erosion potential, protects water quality, and provides aesthetic benefits. The most effective way to control erosion is to preserve existing vegetation. Preservation of natural vegetation provides a natural buffer zone and an opportunity for infiltration of stormwater and capture of pollutants in the soil matrix. This practice can be used as a permanent source control measure.

Vegetation preservation should be incorporated into the site. Preservation requires good site management to minimize operations on bare soils where vegetation exists. Proper maintenance is important to ensure healthy vegetation that can control erosion. Different species, soil types, and climatic conditions will require different maintenance activities such as mulching, fertilizing, liming, irrigation, pruning and weed and pest control.

The preferred approach is to leave as much native vegetation on-site as possible, thereby reducing or eliminating any erosion problem. However, assuming the site already has contaminated or erodible surface areas, there are four possible courses of action which can be taken:

- The area can be revegetated if it is not in use and therefore not subject to damage from site activities. In as much as the area is already devoid of vegetation, special measures are likely necessary. Lack of vegetation may be due to the lack of water and/or poor soils. The latter can perhaps be solved with fertilization, or the ground may simply be too compacted from prior use. Improving soil conditions may be sufficient to support the recovery of vegetation. Use process wastewater for irrigation if possible, and see the Construction BMP Handbook for further procedures on establishing vegetation.

Contaminated or Erodible Areas SC-40

- Watering trucks to prevent dust.
- Chemical stabilization can be used as an alternate method in areas where temporary seeding practices cannot be used because of season or climate. It can provide immediate, effective, and inexpensive erosion control. Application rates and procedures recommended by the manufacturer should be followed as closely as possible to prevent the products from forming ponds and creating large areas where moisture cannot penetrate the soil. See also EC-5, Soil Binders, in the Construction BMP Handbook for more information. Advantages of chemical stabilization include:
 - ✓ Applied easily to the surface;
 - ✓ Stabilizes areas effectively; and
 - ✓ Provides immediate protection to soils that are in danger of erosion.
- Contaminated soils should be cleaned up or removed. This requires determination of the level and extent of the contamination. Removal must comply with State and Federal regulations; permits must be acquired and fees paid.
- Non-vegetated stabilization methods are suitable for permanently protecting from erosion by water and wind. Non-vegetated stabilization should only be utilized when vegetation cannot be established due to soil or climactic conditions, or where vegetation may be a potential fire hazard.

Examples of non-vegetative stabilization BMPs are provided below:

- ✓ **Decomposed Granite (DG) and Gravel Mulch** are suitable for use in areas where vegetation establishment is difficult, on flat surfaces, trails and pathways, and when used in conjunction with a stabilizer or tackifier, on shallow slopes (i.e., 10:1 [H:V]). DG and gravel can also be used on shallow rocky slopes where vegetation cannot be established for permanent erosion control.
- ✓ **Degradable Mulches** can be used to cover and protect soil surfaces from erosion both in temporary and permanent applications. In many cases, the use of mulches by themselves requires routine inspection and re-application. See EC-3 Hydraulic Mulch, EC-6 Straw Mulch, EC-8 Wood Mulch, or EC-14 Compost Blankets of the Construction BMP Handbook for more information.
- ✓ **Geotextiles and Mats** can be used as a temporary stand-alone soil stabilization method. Depending on material selection, geotextiles and mats can be a short-term (3 months – 1 year) or long-term (1-2 years) temporary stabilization method. For more information on geotextiles and mats see EC-7 Geotextiles and Mats of the Construction BMP Handbook.
- ✓ **Rock Slope Protection** can be used when the slopes are subject to scour or have a high erosion potential, such as slopes adjacent to flowing waterways or slopes subject to overflow from detention facilities (spillways).

Contaminated or Erodible Areas SC-40

- ✓ **Soil Binders** can be used for temporary stabilization of stockpiles and disturbed areas not subject to heavy traffic. See EC-5 Soil Binders for more information. References and Resources.

References and Resources

California Stormwater Quality Association 2012, *Construction Stormwater Best Management Practice Handbook*. Available at <http://www.casqa.org>.

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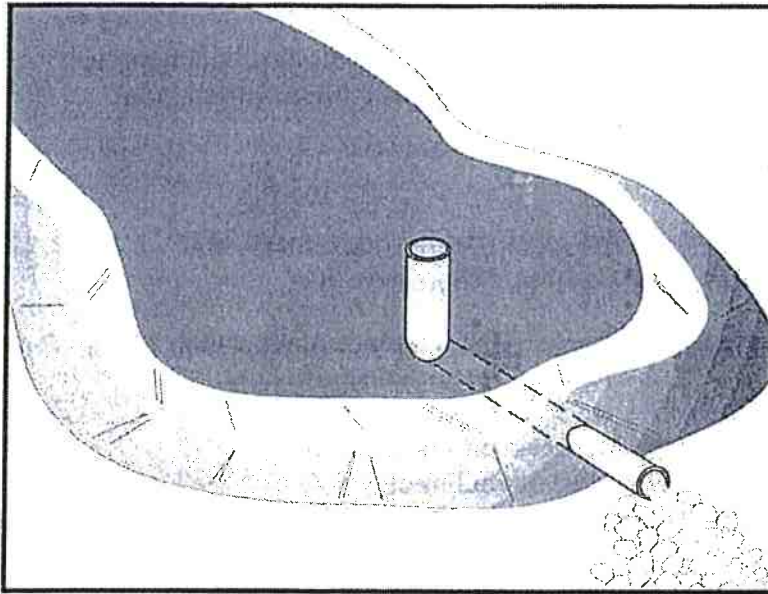
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Description and Purpose

A sediment basin is a temporary basin formed by excavation or by constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged.

Sediment basin design guidance presented in this fact sheet is intended to provide options, methods, and techniques to optimize temporary sediment basin performance and basin sediment removal. Basin design guidance provided in this fact sheet is not intended to guarantee basin effluent compliance with numeric discharge limits (numeric action levels or numeric effluent limits for turbidity). Compliance with discharge limits requires a thoughtful approach to comprehensive BMP planning, implementation, and maintenance. Therefore, optimally designed and maintained sediment basins should be used in conjunction with a comprehensive system of BMPs that includes:

- Diverting runoff from undisturbed areas away from the basin
- Erosion control practices to minimize disturbed areas on-site and to provide temporary stabilization and interim sediment controls (e.g., stockpile perimeter control, check dams, perimeter controls around individual lots) to reduce the basin's influent sediment concentration.

At some sites, sediment basin design enhancements may be required to adequately remove sediment. Traditional

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-3 Sediment Trap (for smaller areas)



(aka “physical”) enhancements such as alternative outlet configurations or flow deflection baffles increase detention time and other techniques such as outlet skimmers preferentially drain flows with lower sediment concentrations. These “physical” enhancement techniques are described in this fact sheet. To further enhance sediment removal particularly at sites with fine soils or turbidity sensitive receiving waters, some projects may need to consider implementing Active Treatment Systems (ATS) whereby coagulants and flocculants are used to enhance settling and removal of suspended sediments. Guidance on implementing ATS is provided in SE-11.

Suitable Applications

Sediment basins may be suitable for use on larger projects with sufficient space for constructing the basin. Sediment basins should be considered for use:

- Where sediment-laden water may enter the drainage system or watercourses
- On construction projects with disturbed areas during the rainy season
- At the outlet of disturbed watersheds between 5 acres and 75 acres and evaluated on a site by site basis
- Where post construction detention basins are required
- In association with dikes, temporary channels, and pipes used to convey runoff from disturbed areas

Limitations

Sediment basins must be installed only within the property limits and where failure of the structure will not result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. In addition, sediment basins are attractive to children and can be very dangerous. Local ordinances regarding health and safety must be adhered to. If fencing of the basin is required, the type of fence and its location should be shown in the SWPPP and in the construction specifications.

- As a general guideline, sediment basins are suitable for drainage areas of 5 acres or more, but not appropriate for drainage areas greater than 75 acres. However, the tributary area should be evaluated on a site by site basis.
- Sediment basins may become an “attractive nuisance” and care must be taken to adhere to all safety practices. If safety is a concern, basin may require protective fencing.
- Sediment basins designed according to this fact sheet are only effective in removing sediment down to about the silt size fraction. Sediment-laden runoff with smaller size fractions (fine silt and clay) may not be adequately treated unless chemical (or other appropriate method) treatment is used in addition to the sediment basin.
- Basins with a height of 25 ft or more or an impounding capacity of 50 ac-ft or more must obtain approval from California Department of Water Resources Division of Safety of Dams (<http://www.water.ca.gov/damsafety/>).

- Water that stands in sediment basins longer than 96 hours may become a source of mosquitoes (and midges), particularly along perimeter edges, in shallow zones, in scour or below-grade pools, around inlet pipes, along low-flow channels, and among protected habitats created by emergent or floating vegetation (e.g. cattails, water hyacinth), algal mats, riprap, etc.
- Basins require large surface areas to permit settling of sediment. Size may be limited by the available area.

Implementation

General

A sediment basin is a controlled stormwater release structure formed by excavation or by construction of an embankment of compacted soil across a drainage way, or other suitable location. It is intended to trap sediment before it leaves the construction site. The basin is a temporary measure expected to be used during active construction in most cases and is to be maintained until the site area is permanently protected against erosion or a permanent detention basin is constructed.

Sediment basins are suitable for nearly all types of construction projects. Whenever possible, construct the sediment basins before clearing and grading work begins. Basins should be located at the stormwater outlet from the site but not in any natural or undisturbed stream. A typical application would include temporary dikes, pipes, and/or channels to convey runoff to the basin inlet.

Many development projects in California are required by local ordinances to provide a stormwater detention basin for post-construction flood control, desilting, or stormwater pollution control. A temporary sediment basin may be constructed by rough grading the post-construction control basins early in the project.

Sediment basins if properly designed and maintained can trap a significant amount of the sediment that flows into them. However, traditional basins do not remove all inflowing sediment. Therefore, they should be used in conjunction with erosion control practices such as temporary seeding, mulching, diversion dikes, etc., to reduce the amount of sediment flowing into the basin.

Planning

To improve the effectiveness of the basin, it should be located to intercept runoff from the largest possible amount of disturbed area. Locations best suited for a sediment basin are generally in lower elevation areas of the site (or basin tributary area) where site drainage would not require significant diversion or other means to direct water to the basin but outside jurisdictional waterways. However, as necessary, drainage into the basin can be improved by the use of earth dikes and drainage swales (see BMP EC-9). . The basin should not be located where its failure would result in the loss of life or interruption of the use or service of public utilities or roads.

Construct before clearing and grading work begins when feasible.

- Do not locate the basin in a jurisdictional stream.

- Basin sites should be located where failure of the structure will not cause loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities.
- Basins with a height of 25 ft or more or an impounding capacity of 50 ac-ft must obtain approval from the Division of Dam Safety. Local dam safety requirements may be more stringent.
- Limit the contributing area to the sediment basin to only the runoff from the disturbed soil areas. Use temporary concentrated flow conveyance controls to divert runoff from undisturbed areas away from the sediment basin.
- The basin should be located: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where post-construction (permanent) detention basins will be constructed, and (3) where the basins can be maintained on a year-round basis to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area, and to maintain the basin to provide the required capacity.

Design

When designing a sediment basin, designers should evaluate the site constraints that could affect the efficiency of the BMP. Some of these constraints include: the relationship between basin capacity, anticipated sediment load, and freeboard, available footprint for the basin, maintenance frequency and access, and hydraulic capacity and efficiency of the temporary outlet infrastructure. Sediment basins should be designed to maximize sediment removal and to consider sediment load retained by the basin as it affects basin performance.

Three Basin Design Options (Part A) are presented below along with a Typical Sediment/Detention Basin Design Methodology (Part B). Regardless of the design option that is selected, designers also need to evaluate the sediment basin capacity with respect to sediment accumulation (See “*Step 3. Evaluate the Capacity of the Sediment Basin*”), and should incorporate approaches identified in “*Step 4. Other Design Considerations*” to enhance basin performance.

A) Basin Design Options:

Option 1:

Design sediment basin(s) using the standard equation:

$$A_s = \frac{1.2Q}{V_s} \quad (\text{Eq. 1})$$

Where:

A_s = Minimum surface area for trapping soil particles of a certain size

V_s = Settling velocity of the design particle size chosen ($V_s = 0.00028$ ft/s for a design particle size of 0.01 mm at 68°F)

1.2 = Factor of safety recommended by USEPA to account for the reduction in basin efficiency caused due to turbulence and other non ideal conditions.

$$Q = CIA \quad (\text{Eq.2})$$

Where

Q = Discharge rate measured in cubic feet per second

C = Runoff coefficient (unitless)

I = Peak rainfall intensity for the 10-year, 6-hour rain event (in/hr)

A = Area draining into the sediment basin in acres

The design particle size should be the smallest soil grain size determined by wet sieve analysis, or the fine silt sized (0.01 mm [or 0.0004 in.]) particle, and the Vs used should be 100 percent of the calculated settling velocity.

This sizing basin method is dependent on the outlet structure design or the total basin length with an appropriate outlet. If the designer chooses to utilize the outlet structure to control the flow duration in the basin, the basin length (distance between the inlet and the outlet) should be a minimum of twice the basin width; the depth should not be less than 3 ft nor greater than 5 ft for safety reasons and for maximum efficiency (2 ft of sediment storage, 2 ft of capacity). If the designer chooses to utilize the basin length (with appropriate basin outlet) to control the flow duration in the basin, the basin length (distance between the inlet and the outlet) should be a specifically designed to capture 100% of the design particle size; the depth should not be less than 3 ft nor greater than 5 ft for safety reasons and for maximum efficiency (2 ft of sediment storage, 2 ft of capacity).

The basin should be located on the site where it can be maintained on a year-round basis and should be maintained on a schedule to retain the 2 ft of capacity.

Option 2:

Design pursuant to local ordinance for sediment basin design and maintenance, provided that the design efficiency is as protective or more protective of water quality than Option 1.

Option 3:

The use of an equivalent surface area design or equation provided that the design efficiency is as protective or more protective of water quality than Option 1.

B) Typical Sediment/Detention Basin Design Methodology:

Design of a sediment basin requires the designer to have an understanding of the site constraints, knowledge of the local soil (e.g., particle size distribution of potentially contributing soils), drainage area of the basin, and local hydrology. Designers should not assume that a sediment basin for location A is applicable to location B. Therefore, designers can use this factsheet as guidance but will need to apply professional judgment and knowledge of the site to design an effective and efficient sediment basin. The following provides a general overview of typical design methodologies:

Step 1. Hydrologic Design

- Evaluate the site constraints and assess the drainage area for the sediment basin. Designers should consider on- and off-site flows as well as changes in the drainage area associated with site construction/disturbance. To minimize additional construction during the course of the project, the designer should consider identifying the maximum drainage area when calculating the basin dimensions.
- If a local hydrology manual is not available it is recommended to follow standard rational method procedures to estimate discharge. The references section of this factsheet provides a reference to standard hydrology textbooks that can provide standard methodologies. If local rainfall depths are not available, values can be obtained from standard precipitation frequency maps from NOAA (downloaded from <http://www.wcc.dri.edu/pcpnfreq.html>).

Step 2. Hydraulic Design

- Calculate the surface area required for the sediment basin using Equation 1. In which discharge is estimated for a 10-yr 6-hr event using rational method procedure listed in local hydrology manual and V_s is estimated using Stokes Law presented in Equation 3.

$$V_s = 2.81d^2 \quad (\text{Eq.3})$$

Where

V_s = Settling velocity in feet per second at 68°F

d = diameter of sediment particle in millimeters (smallest soil grain size determined by wet sieve analysis or fine silt (0.01 mm [or 0.0004 in.]))

- In general the basin outlet design requires an iterative trial and error approach that considered the maximum water surface elevation, the elevation versus volume (stage-storage) relationship, the elevation versus discharge (stage-discharge) relationship, and the estimated inflow hydrograph. To adequately design the basins to settle sediment, the outlet configuration and associated outflow rates can be estimated by numerous methodologies. The following provides some guidance for design the basin outlet:
 - An outlet should have more than one orifice.
 - An outlet design typically utilizes multiple horizontal rows of orifices (approximately 3 or more) with at least 2 orifices per row (see Figures 1 and 2 at the end of this fact sheet).
 - Orifices can vary in shape.
 - Select the appropriate orifice diameter and number of perforations per row with the objective of minimizing the number of rows while maximizing the detention time.

- The diameter of each orifice is typically a maximum of 3-4 inches and a minimum of 0.25-0.5 inches.
- If a rectangular orifice is used, it is recommended to have minimum height of 0.5 inches and a maximum height of 6 inches.
- Rows are typically spaced at three times the diameter center to center vertically with a minimum distance of approximately 4 inches on center and a maximum distance of 1 foot on center.
- To estimate the outflow rate, each row is calculated separately based on the flow through a single orifice then multiplied by the number of orifices in the row. This step is repeated for each of the rows. Once all of the orifices are estimated, the total outflow rate versus elevation (stage-discharge curve) is developed to evaluate the detention time within the basin.
- Flow through a single orifice can be estimated using an Equation 4:

$$Q = BC' A(2gH)^{0.5} \quad (\text{Eq.4})$$

Where

Q = Discharge in ft³/s

C' = Orifice coefficient (unitless)

A = Area of the orifice (ft²)

g = acceleration due to gravity (ft³/s)

H = Head above the orifice (ft)

B = Anticipated Blockage or clogging factor (unitless), It is dependent on anticipated sediment and debris load, trash rack configuration etc, so the value is dependent on design engineers professional judgment and/or local requirements (B is never greater than 1 and a value of 0.5 is generally used)

- Care must be taken in the selection of orifice coefficient ("C'"); 0.60 is most often recommended and used. However, based on actual tests, Young and Graziano (1989), "Outlet Hydraulics of Extended Detention Facilities for Northern Virginia Planning District Commission", recommends the following:
 - C' = 0.66 for thin materials; where the thickness is equal to or less than the orifice diameter, or
 - C' = 0.80 when the material is thicker than the orifice diameter
- If different sizes of orifices are used along the riser then they have to be sized such that not more than 50 percent of the design storm event drains in one-third of the drawdown time (to provide adequate settling time for events smaller than the design storm event) and the entire volume drains within 96 hours or as regulated by the local vector control agency. If a basin fails to drain within 96 hours, the basin must be pumped dry.

- Because basins are not maintained for infiltration, water loss by infiltration should be disregarded when designing the hydraulic capacity of the outlet structure.
- Floating Outlet Skimmer: The floating skimmer (see Figure 3 at the end of this fact sheet is an alternative outlet configuration (patented) that drains water from upper portion of the water column. This configuration has been used for temporary and permanent basins and can improve basin performance by eliminating bottom orifices which have the potential of discharging solids. Some design considerations for this alternative outlet device includes the addition of a sand filter or perforated under drain at the low point in the basin and near the floating skimmer. These secondary drains allow the basin to fully drain. More detailed guidelines for sizing the skimmer can be downloaded from <http://www.fairclothskimmer.com/>.
- Hold and Release Valve: An ideal sediment/detention basin would hold all flows to the design storm level for sufficient time to settle solids, and then slowly release the storm water. Implementing a reliable valve system for releasing detention basins is critical to eliminate the potential for flooding in such a system. Some variations of hold and release valves include manual valves, bladder devices or electrically operated valves. When a precipitation event is forecast, the valve would be close for the duration of the storm and appropriate settling time. When the settling duration is met (approximately 24 or 48 hours), the valve would be opened and allow the stormwater to be discharged at a rate that does not resuspend settled solids and in a non-erosive manner. If this type of system is used the valve should be designed to empty the entire basin within 96 hours or as stipulated by local vector control regulations.

Step 3. Evaluate the Capacity of the Sediment Basin

- Typically, sediment basins do not perform as designed when they are not properly maintained or the sediment yield to the basin is larger than expected. As part of a good sediment basin design, designers should consider maintenance cycles, estimated soil loss and/or sediment yield, and basin sediment storage volume. The two equations below can be used to quantify the amount of soil entering the basin.
- The Revised Universal Soil Loss Equation (RUSLE, Eq.5) can be used to estimate annual soil loss and the Modified Universal Soil Equation (MUSLE, Eq.6) can be used to estimate sediment yield from a single storm event.

$$A = R \times K \times LS \times C \times P \quad (\text{Eq.5})$$

$$Y = 95(Q \times q_p)^{0.56} \times K \times LS \times C \times P \quad (\text{Eq.6})$$

Where:

A = annual soil loss, tons/acre-year

R = rainfall erosion index, in 100 ft.tons/acre.in/hr

K = soil erodibility factor, tons/acre per unit of R

LS = slope length and steepness factor (unitless)

C = vegetative cover factor (unitless)

P = erosion control practice factor (unitless)

Y = single storm sediment yield in tons

Q = runoff volume in acre-feet

q_p = peak flow in cfs

- Detailed descriptions and methodologies for estimating the soil loss can be obtained from standard hydrology text books (See References section).
- Determination of the appropriate equation should consider construction duration and local environmental factors (soils, hydrology, etc.). For example, if a basin is planned for a project duration of 1 year and the designer specifies one maintenance cycle, RUSLE could be used to estimate the soil loss and thereby the designer could indicate that the sediment storage volume would be half of the soil loss value estimated. As an example for use of MUSLE, a project may have a short construction duration thereby requiring fewer maintenance cycles and a reduced sediment storage volume. MUSLE would be used to estimate the anticipated soil loss based on a specific storm event to evaluate the sediment storage volume and appropriate maintenance frequency.
- The soil loss estimates are an essential step in the design and it is essential that the designer provide construction contractors with enough information to understand maintenance frequency and/or depths within the basin that would trigger maintenance. Providing maintenance methods, frequency and specification should be included in design bid documents such as the SWPPP Site Map.
- Once the designer has quantified the amount of soil entering the basin, the depth required for sediment storage can be determined by dividing the estimated sediment loss by the surface area of the basin.

Step 4. Other Design Considerations

- Consider designing the volume of the settling zone for the total storm volume associated with the 2-year event or other appropriate design storms specified by the local agency. This volume can be used as a guide for sizing the basin without iterative routing calculations. The depth of the settling zone can be estimated by dividing the estimated 2-yr storm volume by the surface area of the basin.
- The basin volume consists of two zones:
 - A sediment storage zone at least 1 ft deep.
 - A settling zone at least 2 ft deep.
 - The basin depth must be no less than 3 ft (not including freeboard).
- Proper hydraulic design of the outlet is critical to achieving the desired performance of the basin. The outlet should be designed to drain the basin within 24 to 96 hours (also referred

to as “drawdown time”). The 24-hour limit is specified to provide adequate settling time; the 96-hour limit is specified to mitigate vector control concerns.

- Confirmation of the basin performance can be evaluated by routing the design storm (10-yr 6-hr, or as directed by local regulations) through the basin based on the basin volume (stage-storage curve) and the outlet design (stage-discharge curve based on the orifice configuration or equivalent outlet design).
- Sediment basins, regardless of size and storage volume, should include features to accommodate overflow or bypass flows that exceed the design storm event.
 - Include an emergency spillway to accommodate flows not carried by the principal spillway. The spillway should consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible riprap (or equivalent protection) on fill slopes.
 - The spillway control section, which is a level portion of the spillway channel at the highest elevation in the channel, should be a minimum of 20 ft in length.
- Rock, vegetation or appropriate erosion control should be used to protect the basin inlet, outlet, and slopes against erosion.
- The total depth of the sediment basin should include the depth required for sediment storage, depth required for settling zone and freeboard of at least 1 foot or as regulated by local flood control agency for a flood event specified by the local agency.
- The basin alignment should be designed such that the length of the basin is more than twice the width of the basin; the length should be determined by measuring the distance between the inlet and the outlet. If the site topography does not allow for this configuration baffles should be installed so that the ratio is satisfied. If a basin has more than one inflow point, any inflow point that conveys more than 30 percent of the total peak inflow rate has to meet the required length to width ratio.
- An alternative basin sizing method proposed by Fifield (2004) can be consulted to estimate an alternative length to width ratio and basin configuration. These methods can be considered as part of Option 3 which allows for alternative designs that are protective or more protective of water quality.
- Baffles (see Figure 4 at the end of this fact sheet) can be considered at project sites where the existing topography or site constraints limit the length to width ratio. Baffles should be constructed of earthen berms or other structural material within the basin to divert flow in the basin, thus increasing the effective flow length from the basin inlet to the outlet riser. Baffles also reduce the change of short circuiting and allows for settling throughout the basin.
- Baffles are typically constructed from the invert of the basin to the crest of the emergency spillway (i.e., design event flows are meant to flow around the baffles and flows greater than the design event would flow over the baffles to the emergency spillway).

- Use of other materials for construction of basin baffles (such as silt fence) may not be appropriate based on the material specifications and will require frequent maintenance (maintain after every storm event). Maintenance may not be feasible when required due to flooded conditions resulting from frequent (i.e., back to back) storm events. Use of alternative baffle materials should not deviate from the intended purpose of the material, as described by the manufacturer.
- Sediment basins are best used in conjunction with erosion controls.
- Basins with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and basins capable of impounding more than 35,000 ft³, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the basin outlet and bypass structures.
- A forebay, constructed upstream of the basin may be provided to remove debris and larger particles.
- The outflow from the sediment basin should be provided with velocity dissipation devices (see BMP EC-10) to prevent erosion and scouring of the embankment and channel.
- The principal outlet should consist of a corrugated metal, high density polyethylene (HDPE), or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser, to prevent floating debris from flowing out of the basin or obstructing the system. This principal structure should be designed to accommodate the inflow design storm.
- A rock pile or rock-filled gabions can serve as alternatives to the debris screen, although the designer should be aware of the potential for extra maintenance involved should the pore spaces in the rock pile clog.
- The outlet structure should be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation.
- Attach riser pipe (watertight connection) to a horizontal pipe (barrel). Provide anti-seep collars on the barrel.
- Cleanout level should be clearly marked on the riser pipe.

Installation

- Securely anchor and install an anti-seep collar on the outlet pipe/riser and provide an emergency spillway for passing major floods (see local flood control agency).
- Areas under embankments must be cleared and stripped of vegetation.
- Chain link fencing should be provided around each sediment basin to prevent unauthorized entry to the basin or if safety is a concern.

Costs

The cost of a sediment basin is highly variable and is dependent of the site configuration. To decrease basin construction costs, designers should consider using existing site features such as berms or depressed area to site the sediment basin. Designers should also consider potential savings associated with designing the basin to minimize the number of maintenance cycles and siting the basin in a location where a permanent BMP (e.g., extended detention basin) is required for the project site.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level and as required by local requirements. It is recommended that at a minimum, basins be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Check inlet and outlet area for erosion and stabilize if required.
- Check fencing for damage and repair as needed.
- Sediment that accumulates in the basin must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage volume. Sediment removed during maintenance should be managed properly. The sediment should be appropriately evaluated and used or disposed of accordingly. Options include: incorporating sediment into earthwork on the site (only if there is no risk that sediment is contaminated); or off-site export/disposal at an appropriate location (e.g., sediment characterization and disposal to an appropriate landfill).
- Remove standing water from basin within 96 hours after accumulation.
- If the basin does not drain adequately (e.g., due to storms that are more frequent or larger than the design storm or other unforeseen site conditions), dewatering should be conducted in accordance with appropriate dewatering BMPs (see NS-2) and in accordance with local permits as applicable.
- To minimize vector production:
 - Remove accumulation of live and dead floating vegetation in basins during every inspection.
 - Remove excessive emergent and perimeter vegetation as needed or as advised by local or state vector control agencies.

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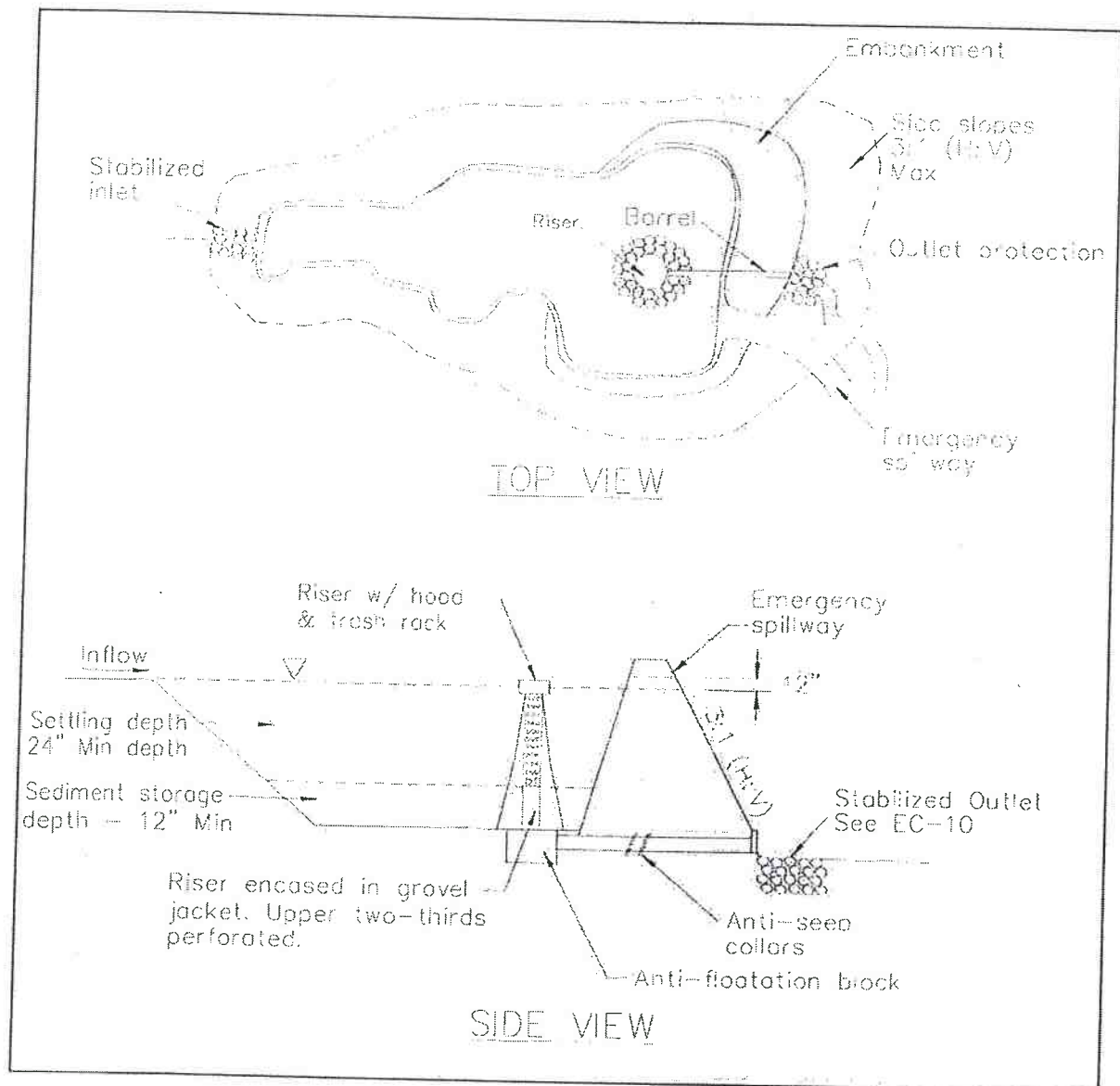
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**FIGURE 1: TYPICAL TEMPORARY SEDIMENT BASIN
MULTIPLE ORIFICE DESIGN
NOT TO SCALE**

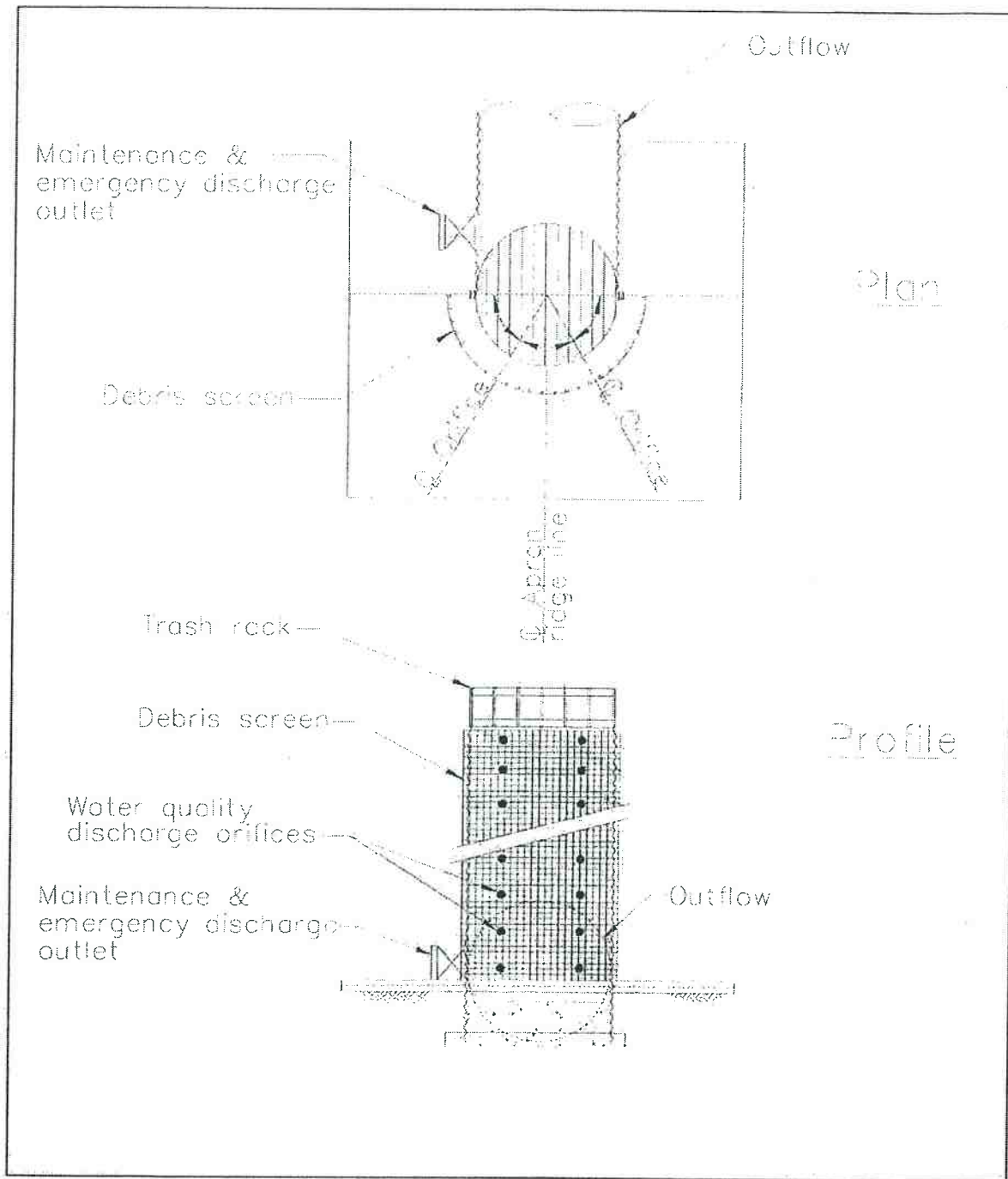


FIGURE 2: MULTIPLE ORIFICE OUTLET RISER

NOT TO SCALE

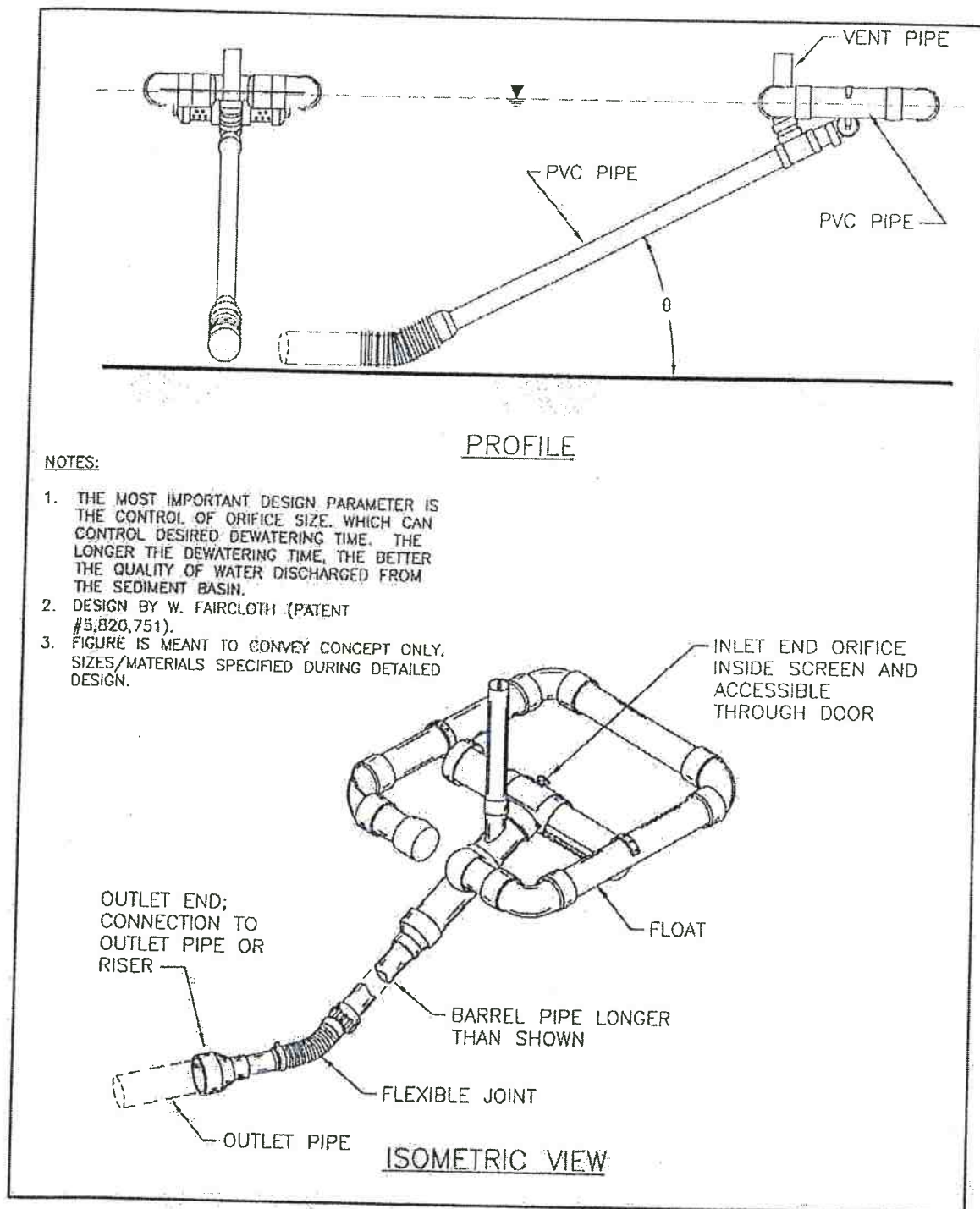
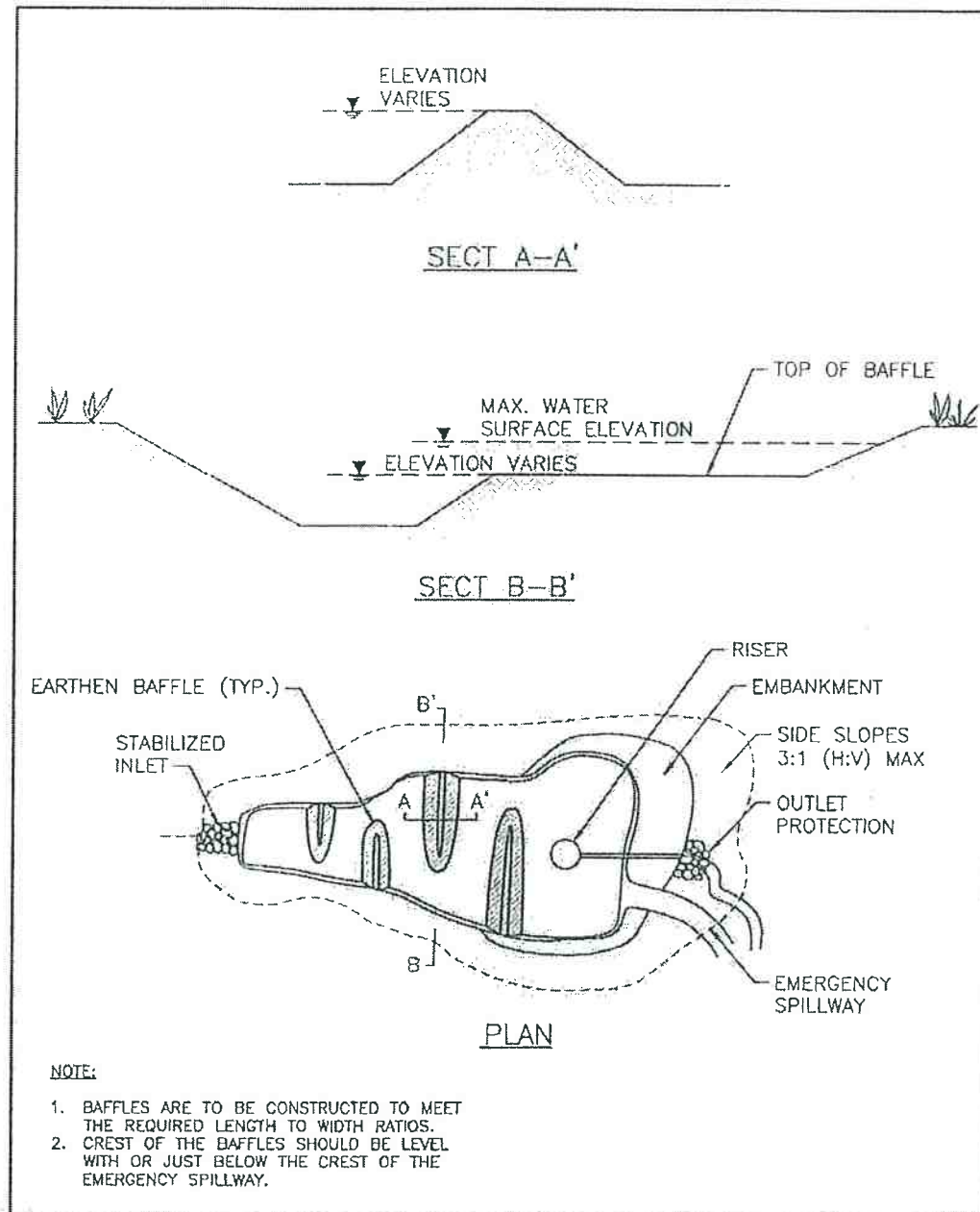
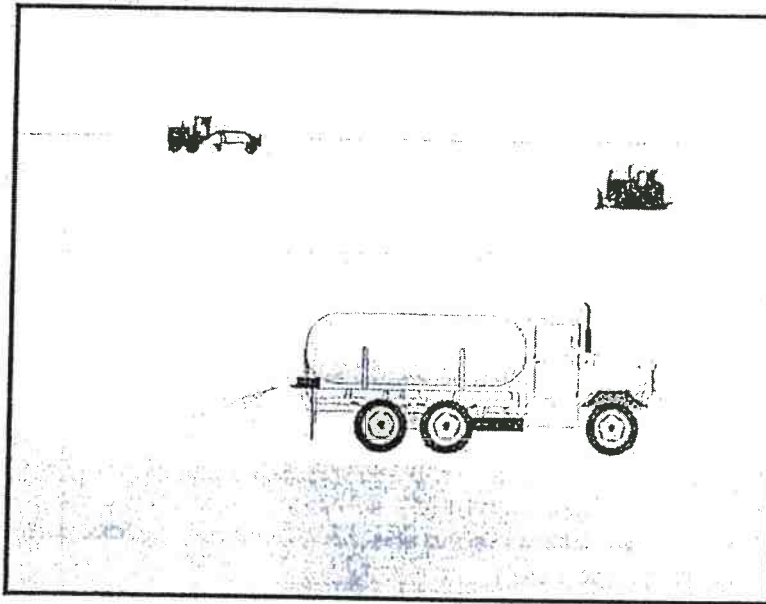


FIGURE 3: TYPICAL SKIMMER
NOT TO SCALE



**FIGURE 4: TYPICAL TEMPORARY SEDIMENT BASIN
WITH BAFFLES
NOT TO SCALE**



Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California's Mediterranean climate, with a short "wet" season and a typically long, hot "dry" season, allows the soils to thoroughly dry out. During the dry season, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment. Site conditions and climate can make dust control more of an erosion problem than water based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders



- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period (generally less than a few hours) and should be applied daily (or more often) to be effective.
- Over watering may cause erosion and track-out.
- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Chemical dust suppression agents may have potential environmental impacts. Selected chemical dust control agents should be environmentally benign.
- Effectiveness of controls depends on soil, temperature, humidity, wind velocity and traffic.
- Chemical dust suppression agents should not be used within 100 feet of wetlands or water bodies.
- Chemically treated subgrades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.
- If the soil surface has minimal natural moisture, the affected area may need to be pre-wetted so that chemical dust control agents can uniformly penetrate the soil surface.

Implementation

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table presents dust control practices that can be applied to varying site conditions that could potentially cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph or less, and controlling the number and activity of vehicles on a site at any given time.

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinyls, acrylic), clay additives (e.g. bentonite, montmorillonite) and electrochemical products (e.g. enzymes, ionic products).

Site Condition	Dust Control Practices							
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Temporary Gravel Construction Entrances/Equipment Wash Down	Synthetic Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X			X
Disturbed Areas Subject to Traffic			X	X	X	X		X
Material Stockpiles		X	X	X			X	X
Demolition			X			X	X	
Clearing/Excavation			X	X				X
Truck Traffic on Unpaved Roads			X	X	X	X	X	
Tracking					X	X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.
- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality

Control Board (RWQCB) requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."

- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

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