FINAL FEASIBILITY STUDY

Caltrans Modesto Soil Stockpiles
State Route 132
West Freeway/Expressway Project
Stanislaus County, California

PREPARED FOR:

CALIFORNIA DEPARTMENT OF TRANSPORTATION – DISTRICT 6
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GEOCON PROJECT NO. S9800-01-17
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GEOCON
CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. S9800-01-17
June 24, 2014

Randy Adams, CEG
Department of Toxic Substances Control
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Subject: FINAL FEASIBILITY STUDY
CALTRANS MODESTO SOIL STOCKPILES
STATE ROUTE 132 WEST FREEWAY/EXPRESSWAY PROJECT
MODESTO, STANISLAUS COUNTY, CALIFORNIA

Dear Mr. Adams:

In accordance with the Interagency Agreement between the California Department of Toxic Substances Control (DTSC), in cooperation with the California Regional Water Quality Control Board, Central Valley Region, and the California Department of Transportation (Caltrans) dated June 22, 2012, we are pleased to submit the enclosed Final Feasibility Study (FS) for the Caltrans Modesto Soil Stockpiles (the Site) located south of the State Route 99/Kansas Avenue interchange in Modesto, Stanislaus County, California. The Final FS incorporates revisions to the Draft Final FS made in accordance with comments provided in DTSC's letter dated February 11, 2014.

We trust that this Final FS adequately describes the project and the proposed remedial alternative for the Site. Please call if you have any questions.

Sincerely,

GEOCON CONSULTANTS, INC.

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ACRONYMS AND ABBREVIATIONS

ARARs	applicable or relevant and appropriate requirements
BMP	best management practice
Cal-OSHA	California Division of Occupational Safety and Health
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCR	California Code of Regulations
CDMG	California Division of Mines and Geology
CEG	Certified Engineering Geologist
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHHSLs	California Human Health Screening Levels
COPC	contaminant of potential concern
CVRWQCB	Central Valley Regional Water Quality Control Board
CSEM	Conceptual Site Exposure Model
DI	deionized water
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EPC	exposure-point concentrations
ESL	Environmental Screening Level
FMC	Food Machinery and Chemical Corporation
FS	Feasibility Study
GRA	General Response Action
HI	hazard index
HHRA	Human Health Risk Assessment
HSP	health and safety plan
IA	Interagency Agreement
IIPP	injury and illness prevention plan
ISA	Initial Site Assessment
kg/m^3	kilograms per cubic meter
LUC	land use covenant
MCL	Maximum Contaminant Level
MDC	maximum detected concentration
µg/dL	micrograms per deciliter
µg/kg	micrograms per kilogram
µg/l	micrograms per liter
$\mu g/ m^3$	micrograms per cubic meter
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
mg/m^3	milligrams per cubic meter
MID	Modesto Irrigation District
MSL	mean sea level
NCP	National Contingency Plan
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
O&M	operations and maintenance
OMP	operations and maintenance plan

OSHA	Occupational Safety and Health Administration
PAHs	polycyclic aromatic hydrocarbons
PEA	Preliminary Endangerment Assessment
PE	Professional Engineer
PG	Professional Geologist
PSI	Preliminary Site Investigation
RAO	Removal Action Objective
RAOR	Remedial Action Options Report
RAP	Remedial Action Plan
ROW	right-of-way
RSL	Regional Screening Level
SFBRWQCB	San Francisco Bay Area Regional Water Quality Control Board
SJVAPCD	San Joaquin Valley Air Pollution Control District
SI	site investigation
SR	State Route
SWPPP	Storm Water Pollution Prevention Plan
SSI	Supplemental Site Investigation
StanCOG	Stanislaus Council of Governments
STLC	Soluble Threshold Limit Concentration
TTLC	Total Threshold Limit Concentration
UCL	upper confidence limit
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WET	waste extraction test
yd^3	cubic yard

FINAL FEASIBILITY STUDY

1.0 INTRODUCTION

This Final Feasibility Study (FS) was prepared on behalf of the California Department of Transportation (Caltrans) for the Caltrans Modesto Soil Stockpiles (the Site) located south of State Route (SR)-99/Kansas Avenue interchange in Modesto, Stanislaus County, California (Figure 1). Caltrans is in the process of finalizing the draft environmental document for the proposed SR-132 West Freeway/Expressway Project (the SR-132 project) that is being developed in coordination with Stanislaus Council of Governments (StanCOG). The SR-132 project is planned to result in the ultimate build-out of a four-lane expressway by 2028. An interim progress phase is planned to include construction of the SR-132 West/6th Street and SR-132/East/5th Street extensions, two of four traffic lanes from east of SR-99 to North Dakota Avenue, the Carpenter Road interchange, and the SR-132 roadway structures across Emerald Avenue and SR-99 by 2018. The ultimate build-out is planned to include highway widening to four traffic lanes, construction of structures to accommodate the roadway widening along SR-132, and the SR-99/SR-132 interchange with related improvements along SR-99 by 2028.

The stockpiles, portions of which contain elevated levels of barium are planned to be contained within the project by utilizing them as embankment material for roadway construction, retaining wall backfill, and bridge abutments. It is anticipated that remedial and contour cut/fill grading will be necessary to achieve final finish grades and to properly consolidate and contain the existing soil stockpiles.

1.1 Purpose and Organization of the FS

The purpose of the FS is to present remedial action objectives (RAOs), general response actions (GRAs), and process options; develop and screen remedial alternatives; and present an individual and comparative analysis of each retained alternative for the stockpiles. As directed in the United States Environmental Protection Agency's (USEPA's) *Guidance for Conducting Remedial Investigations and Feasibility Studies* under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, USEPA, 1988), potentially applicable remedial technologies and process options are screened against the criteria of effectiveness, implementability, and cost, then evaluated based on nine criteria in order to support an informed decision regarding the most appropriate remedy for the stockpiles. The preferred alternative will be identified in a Remedial Action Plan (RAP), which will be made available for public review and comment.

This FS includes the following:

- **Section 1.0 Introduction** – includes a description of the site and its history with respect to the origin of the stockpiles, a summary of previous site characterization activities, and a description of site physical conditions including geologic, hydrogeologic, geotechnical characteristics, stormwater, and background soil conditions.

- **Section 2.0 Nature and Extent of Impacts** - summarizes the results of site characterization to identify and assess the nature and extent of contaminants of potential concern (COPC) at the Site.
- **Section 3.0 Remedial Action Objectives** - summarizes a human health risk assessment (HHRA) and an HHRA Update performed based on COPC concentrations in the soil. Applicable or relevant and appropriate requirements (ARARs) for implementation of the selected remedial alternative are also summarized.
- **Section 4.0 Identification and Screening of Technologies** - in this section GRAs, process options, and remedial technologies are identified, and potential remedial technologies screened against the criteria of effectiveness, implementability, and cost then are either retained for further evaluation or rejected.
- **Section 5.0 Evaluation of Alternatives** - evaluates potential remedial alternatives to address the COPCs retained from the screening process, and selects the most appropriate alternative.

1.2 Site Description

The Site consists of three separate soil stockpiles within Caltrans right-of-way (ROW) located south of the SR-99/Kansas Avenue interchange, which are planned to be used for the SR-132 project. The following is a summary of the configuration, orientation, size, and surrounding vicinity of each stockpile:

- **Stockpile #1** is located south of Kansas Avenue and west of Emerald Avenue. It is approximately 600 feet long in the east-west direction, 160 feet wide, and has an estimated volume of approximately 34,000 cubic yards (yd^3). It is bounded by commercial/light industrial development to the north and single-family residential to the south. To the west is undeveloped ROW, and to the east is an approximately 240 feet long undeveloped section of ROW and North Emerald Avenue;
- **Stockpile #2** is located south of Kansas Avenue, between Emerald Avenue and SR- 99. It is approximately 1,650 feet long in the east-west direction, 160 feet wide, and has an estimated volume of approximately 102,000 yd^3. It is bounded by commercial/light industrial development to the north and single-family residential to the south. To the west is North Emerald Avenue, and to the east is SR-99.
- **Stockpile #3** is located south of Kansas Avenue and east of SR-99. It has a curvilinear shape extending northwest to southeast, concave to the southwest, with a length of approximately 1,100 feet and a width of approximately 120 feet. It has an estimated volume of approximately 24,000 yd^3. It is bounded by SR-99 to the south and west and commercial/light industrial development to the north and east. The Modesto Irrigation District (MID) Lateral #4 canal concrete box culvert extends beneath its southeastern end.

The stockpiles are enclosed within security fencing and bordered by adjacent property boundary fencing/walls or structures. The stockpiles, ROW boundaries, and surrounding vicinity are depicted on the Site Plan (Figure 2).

1.3 Site History

From the 1930s to 1970s, property beneath and northeast of the SR-99/Kansas Avenue Interchange was occupied by chemical processing facilities operated by Barium Products LTD, Westvaco Chlorine Products Corporation, and Food Machinery and Chemical Corporation (FMC). Ores and minerals including barite (barium sulfate) and celestite (strontium sulfate) were processed for use in greases, lubricating oil and pigment blanks. Sodium sulfide was generated as a by-product and sold as a caustic and reagent.

From the 1950s to the 1970s, liquid residue ("tailings") generated by FMC at this facility was discharged to unlined evaporation ponds. In 1961, the State purchased a 4.3-acre parcel in the southwestern portion of the FMC facility, including a portion of the ponds, for the construction of the SR-99 freeway through Modesto. Pond tailings and underlying soils from the FMC site along with native soils excavated south of the SR-99/Kansas Avenue interchange were placed to create the three stockpiles that exist today.

In order to establish the timing of placement of the stockpile material within the boundaries of Caltrans' ROW, aerial photographs from 1963 and 1967 (Figures 3a and 3b, respectively) were reviewed. The 1963 photograph shows grading/construction of SR-99 including the southwestern portion of the FMC property, interchange ramps at Kansas Avenue, and placement of Stockpiles 2 and 3. The Kansas Avenue overpass appears to have been completed. Haul roads to Stockpiles 2 and 3 were within Caltrans ROW. Adjacent property conditions included rural residential and agricultural property west of Emerald Avenue in the current location of Stockpile 1. Residential development was adjacent to the south of Stockpile 2. The areas north and northeast of Stockpiles 2 and 3 were rural residential, agricultural land, and commercial/industrial businesses.

The 1967 photograph shows that SR-99 north and south of the Kansas Avenue interchange had been completed and Stockpiles 1, 2 and 3 existed essentially as they do today. Property conditions adjacent to Stockpile 1 consisted of rural agricultural property and recent residential subdivision development along the western half of the southerly stockpile boundary. Haul roads to Stockpile 1 were within Caltrans ROW.

1.4 Site Characterization

Shaw Environmental, Inc. (Shaw) conducted an Initial Site Assessment (ISA) for the planned SR-132 West Freeway/Expressway Project in 2003. The ISA identified a potential for the soil stockpiles within the SR-132 ROW to contain residual chemicals associated with the former FMC impoundments. Shaw then conducted a Preliminary Site Investigation (PSI) in 2004 to characterize the stockpiles. The PSI consisted of drilling 50 borings into the stockpiles, underlying native soil, and background soil from which they collected soil samples and had them analyzed for heavy metals, polycyclic aromatic hydrocarbons (PAHs), nitrate, and pH. The analytical results indicated elevated barium concentrations in stockpile soil samples exceeding commercial/industrial California Human Health Screening Levels

(CHHSLs). Cadmium concentrations exceeding the commercial/industrial CHHSL were also detected in soil samples collected from 8 of 25 borings in Stockpile 2 and from 2 of 10 borings in Stockpile 3.

In accordance with a Department of Toxic Substances Control (DTSC)/Caltrans 2006 Interagency Agreement (IA) and the requirement to complete a Preliminary Endangerment Assessment (PEA), Shaw conducted additional site investigation (SI) in 2006 to further characterize the soil stockpiles and compare the analytical data to background conditions and CHHSLs. They also installed eight groundwater monitoring wells in order to assess groundwater quality. The 2004 and 2006 Shaw investigations found that the stockpiles are primarily composed of layered, poorly graded sand and silty sand similar to underlying native alluvial deposits of the Modesto Formation. The average maximum stockpile fill thickness was determined to be approximately 20 feet. Groundwater was encountered in the project vicinity at depths between 30 and 40 feet (below natural grade) with flow toward the southeast. The results of analysis of groundwater samples collected from the eight monitoring wells in June and October 2006 indicated that groundwater met drinking water standards (primary and secondary maximum contaminant levels – MCLs) for those constituents analyzed.

Shaw prepared an HHRA in 2007 for the COPCs in the stockpiles and groundwater using multiple exposure scenarios. Metals (notably barium) and PAHs were identified as the primary COPCs in the soil stockpiles and metals and general minerals (i.e. nitrate, total dissolved solids) as the primary COPCs in groundwater. For the purposes of the HHRA, Shaw did not identify cadmium as a COPC due to the lack of elevated cadmium concentrations reported for soil samples collected during the 2006 SI. Shaw also did not identify strontium as a COPC in the HHRA since the maximum strontium concentration of 231 milligrams per kilogram (mg/kg) reported in the Shaw 2004 PSI is more than two orders of magnitude less than the USEPA's residential Regional Screening Level (RSL) of 47,000 mg/kg. There is no CHHSL for strontium. The results of the HHRA indicated that the soil stockpiles do not pose an unacceptable risk or hazard to current or future offsite residents, trespassers, construction workers or hypothetical future shallow groundwater users.

In response to the HHRA, the DTSC issued an August 2007 letter that requested additional toxicological and site information prior to making a final determination regarding risk or hazard posed by the COPCs in the stockpile material. Shaw prepared a Final PEA and a Response to Comments document in 2009 to summarize the findings of previous reports prepared for the soil stockpiles and to provide the additional information requested by the DTSC. In a letter dated December 17, 2009, the DTSC responded to the Final PEA stating that:

> *"DTSC finds that the soil stockpiles, as currently managed by Caltrans on Caltrans property, do not pose a risk to human health for: 1) Caltrans workers who access the fenced site to conduct mowing operations, conduct fence repairs, or other routine activities; 2) trespassers; and 3) residents adjacent to the stockpiles. Until such time that the State Route 132/99 Interchange project is constructed and/or the final disposition of the soil stockpiles is determined, Caltrans should continue to manage the soil stockpiles by: 1) limiting access to Caltrans authorized personnel; 2) inspecting and maintaining the chain-link fence; 3) prohibiting any activities involving excavation/grading, off-site removal of soil, or placement of other soil on the Site; and 4) maintaining the current grade and vegetative cover. Caltrans should also maintain the existing groundwater monitoring system associated with the Site."*

In conjunction with activities associated with the planned SR-132 Project, groundwater monitoring was reinitiated and conducted bi-monthly from March 2012 to March 2013. Beginning in June 2013, groundwater monitoring is being conducted on a quarterly basis.

Caltrans and the DTSC, in cooperation with the Central Valley Regional Water Quality Control Board (CVRWQCB), entered into a second IA dated June 22, 2012, to further address the soil in Stockpiles 1 through 3. This IA outlined tasks for additional site characterization, risk evaluation and cleanup level determination, an FS to evaluate remedial alternatives, preparation of a RAP, preparation of the necessary California Environmental Quality Act (CEQA) documents, public participation activities, quality assurance, and quarterly groundwater monitoring and reporting.

Upgradient wells MW-9 and MW-10 were installed immediately south of Kansas Avenue and west and east of SR-99 (Figure 2), respectively, in May 2012. Groundwater samples were initially collected in these wells in June 2012 then incorporated into subsequent bi-monthly sampling rounds.

The analytical results from the 2012 and 2013 groundwater monitoring events are similar to the results from 2006, with primary analytes reported at concentrations less than California MCLs.

On July 26, 2012, a meeting was held with representatives from Geocon, Caltrans, DTSC, and CVRWQCB to review existing site data and discuss potential remedies to address human health exposure and environmental impacts associated with the barium-impacted soil stockpiles. DTSC and the CVRWQCB requested additional sampling to fill potential data gaps in the following areas:

1. Perimeter ROW fenceline stockpile soil sampling to assess potential offsite and vertical migration of contaminants.

2. Perimeter stockpile soil sampling to define the lateral stockpile limits to aid in consolidation during the planned future construction of the SR-132 Project.
3. Additional stockpile soil sampling in areas of elevated cadmium concentrations identified in Stockpiles 2 and 3 during the Shaw 2004 PSI.

Geocon performed a Supplemental Site investigation (SSI) in September 2012 to address these data gaps. Laboratory analysis of 97 soil samples collected from 35 "Fenceline Borings" and 28 "Perimeter Borings" did not detect barium at concentrations exceeding residential or commercial CHHSLs. Barium concentrations in the surface soil samples ranged to a maximum of 4,300 mg/kg. Barium concentrations were consistently lower in the bottom of boring soil samples (2 to 5 feet) collected from the Fenceline Borings compared to those reported for the surface samples. Strontium was detected at concentrations up to 110 mg/kg for the Fenceline Boring surface soil samples, which is within the range of background and orders of magnitude below the residential RSL of 47,000 mg/kg. Cadmium was not detected in any of the soil samples collected from the "Cadmium Borings" advanced in Stockpiles 2 and 3 in areas of elevated cadmium reported in the Shaw 2004 PSI.

1.5 Previous Removal Actions Taken

To date, the only removal action taken on the Site has been excavation and landfill disposal of a portion of Stockpile 3 as part of Caltrans' rehabilitation of the off-ramp to Kansas Avenue to improve traffic safety and meet current design standards. The highway safety improvement project included widening the off-ramp shoulder areas and associated drainage features. Shoulder widening on the east side of the off-ramp included construction of a retaining wall against the existing Stockpile 3 embankment and laying back the embankment slope.

Geocon previously completed eight direct-push borings and eleven hand-auger borings within the embankment area. Barium was detected in each sample at concentrations ranging from 34 to 1,600 mg/kg, all less than the residential and commercial/industrial CHHSLs for barium of 5,200 and 63,000 mg/kg, respectively. Based on this data, data previously presented in the PEA, and review by DTSC, the excavated soil stockpile materials were designated for offsite disposal as non-hazardous soil to an accepting licensed landfill facility. The DTSC conveyed their finding that offsite management of the soil from Stockpile 3 did not pose a threat to human health or the environment in a letter dated August 30, 2012.

The *Stockpile 3 Excavation Monitoring Plan* completed in June 2012 described procedures for air monitoring and verification of completed stockpile excavations during construction of the highway off-ramp improvements. Approximately 2,800 yd^3 of the Stockpile 3 soil embankment were excavated over ten days between September 7 and 26, 2012. The excavated stockpile material was directly loaded into covered trucks for transport to the Forward Class II landfill facility in Manteca, California, under non-hazardous waste manifests. Dust suppression provided by the Caltrans contractor during the stockpile excavation and loading activities consisted of pre-soaking and water spray during the

stockpile excavation activities. A Geocon project scientist, working under the direct supervision of a California Professional Geologist (PG), oversaw the excavation activities. The individual performing the oversight also prepared and maintained daily field logs that documented the daily quantities of materials excavated. The project scientist provided a determination when the planned construction excavation limits within Stockpile 3 had been completed, exposing native soil of the Modesto Formation (Geocon, June 2012).

Ambient perimeter air was monitored during Stockpile 3 excavation and loading activities to document total airborne particulate concentrations in accordance with the air monitoring plan. The results of air monitoring aided in assessing the effectiveness of the contractor's dust control measures. Air monitoring tasks included:

- Documenting and photographing the locations of air monitoring stations;
- Monitoring daily meteorological forecast to anticipate onsite wind direction and speed; and
- Verifying that downwind direct-read, real-time particulate counter readings (pDR-1200 monitors) did not exceed the preset Fence Line Total Dust Action Level of 4.0 milligrams per cubic meter (mg/m^3).

In addition to the data logging programmed in the real-time monitors, field personnel checked each real-time air monitoring instrument hourly to ensure proper operation and battery capacity and also recorded the time-weighted average airborne dust readings hourly.

Direct read (pDR-1200) and laboratory air sample results for the project indicated that airborne levels of lead and barium were well below levels of concern during excavation activities at Stockpile 3. The removal activities are documented in the *Stockpile 3 Excavation Summary Report, Modesto Ramp Rehabilitation Project, State Route 99 Kansas Avenue Northbound Off-Ramp, Modesto, California, March 15, 2013.*

1.6 Site Geology and Hydrogeology

The following subsections provide a summary of the regional and local topographic, geologic, soil, and hydrogeologic conditions associated with the Site.

1.6.1 Topography

The United States Geological Survey (USGS) *Salida, California,* 7.5-minute topographic map indicates the Site is located within Township 3 South, Range 9 East, with Stockpiles 1 and 2 in the southern half of Section 30, and Stockpile 3 in the southwestern quarter of Section 29, Mount Diablo baseline and meridian. Based on contour lines on the topographic map, with the exception of the SR-99 Kansas Avenue underpass, the vicinity surrounding the Site is relatively flat-lying at an elevation of approximately 84 feet

above mean sea level (MSL), and a low westerly-trending surface gradient (USGS, 1987). The stockpiles range in height from approximately 2 to 20 feet above the surrounding ground surface.

1.6.2 Geologic and Soil Conditions

The Site is located within the northern San Joaquin Valley of California's Great Valley geomorphic province. The San Joaquin Valley is an asymmetrical structural trough bound by the Sacramento Valley to the north, the Coast Ranges to the west, and the Sierra Nevada to the east and south. The base of the Sierra Nevada slopes westward beneath the San Joaquin Valley to its greatest depth near the valley's western margin. The San Joaquin Valley has been filled with several thousand feet of sedimentary deposits eroded from the Sierra Nevada, which include deposits of sands, silts, clays, and gravels from western-flowing drainages and their tributaries. Sediments in the Modesto region were deposited primarily by the Stanislaus and Tuolumne Rivers to the north and south of the Site, respectively.

The Site is underlain by sediments of the late Pleistocene to early Holocene age Modesto formation, which were derived from granitic rocks of the Sierra Nevada and deposited in an alluvial environment. The Modesto formation is composed primarily of sand, silt, and silty sand, with lesser amounts of laterally discontinuous clay and silty clay. The thickness of the Modesto formation is variable, with a regional thickness of approximately 100 feet in the vicinity of the Site (California Division of Mines and Geology [CDMG], 1962).

The Modesto formation is underlain by Pleistocene age sands and silts of the Riverbank and Turlock Lake formations, and pediment gravels of the North Merced formation. Tertiary age pediment gravels of metamorphic origin, and clays, tuffs, and ash of volcanic origin underlie these formations, with Cretaceous age marine sandstones and shale of the Great Valley sequence beneath the Tertiary formations at regional depths of approximately 3,000 feet (CDMG, 1962).

Shaw's SI Report *(Shaw,* 2007a and Appendix A of the HHRA) indicates that the onsite stockpile materials were placed over the native Modesto formation sediments and that there appeared to be some undulation in the original ground surface. The stockpile boring logs and associated cross-sections in Shaw's report indicate that the Modesto formation is situated beneath the onsite stockpiles at depths ranging from approximately 2 feet near the western end of Stockpile 1 to approximately 20 feet near the western end of Stockpile 3 (Shaw, 2007a). Shaw described the native sedimentary materials encountered in the Modesto formation as primarily consisting of silt, silty sand, and sand, with lesser amounts of laterally discontinuous clay and silty clay. Shaw also indicated that fill materials encountered in the stockpiles were "generally similar" to the native soils; however, distinct layers of gray and bluish-gray non-native materials were encountered in the stockpile materials (Shaw, 2007a).

According to the Unites States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) website (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx)., the soil onsite primarily consists of Dinuba fine sandy loam to a depth of approximately 10 inches that was derived from granitic sediments deposited in an alluvial environment. The Dinuba fine sandy loam is described as moderately well-drained and underlain by sandy loam to a depth of approximately 28 inches, and very fine sand and silt loam to a depth of approximately 60 inches. The NRCS website database also indicates that native soil on the approximate southern one-third of the Site beneath Stockpile 1 consists of Modesto loam to a depth of approximately 12 inches that was also derived from granitic sediments deposited in an alluvial environment. The Modesto loam is described as moderately well-drained and underlain by clay to a depth of approximately 35 inches, sandy clay loam to a depth of approximately 55 inches, and silty clay to a depth of approximately 62 inches.

1.6.3 Geotechnical Characteristics

In June 2012, Kleinfelder performed a geotechnical investigation of the stockpiles. The investigation included nine hollow-stem auger borings to a depth of 41.5 feet below the surfaces of the stockpiles. As reported in their September 2012 *Final Geotechnical Design Report,* stockpile soil was encountered to depths of approximately 10 to 20 feet at each boring location. The soil conditions were reported as loose to very dense, interbedded layers of silty sand, sandy silt with some layers of hard sandy clay. Debris consisting of asphalt, metal and brick at depths between 3 and 10 feet in boring A-12-002 advanced on the eastern portion of Stockpile 1 was also reported. Groundwater was not encountered to the maximum depth explored.

Kleinfelder presented the following specific conclusions and recommendations to assist in design and construction of the proposed SR-132 highway improvements in the vicinity of the soil stockpiles:

- Embankment foundation soil is adequate to support the proposed embankment without adverse consequences.
- Final unpaved slopes should be 2:1 or flatter and be protected from erosion by proper management of drainage, planting drought resistant vegetation, and necessary maintenance.
- No surface water should be allowed to pond near the tops of slopes or discharge over the slope face.
- Remove any debris materials encountered in the stockpile fill soil during planned highway construction excavations.

Kleinfelder concluded that the soil encountered in the stockpiles is “geotechnically adequate” for design to support the planned highway improvements including placement from 5 to 20 feet of additional fill material on top of the stockpiles and the construction of retaining walls along the length of Stockpiles 1 and 2 (Kleinfelder, 2012).

The use of the stockpile material in the planned construction of the SR-132 project is one of five GRAs that can potentially achieve the RAOs for the stockpiles. The RAOs and GRAs are discussed further in Section 3.0.

1.6.4 Hydrogeologic Conditions

The Site is situated within the Modesto Subbasin of the San Joaquin Basin Hydrologic Study Area. The Modesto Subbasin is situated between the Stanislaus and Tuolumne Rivers to the north and south, respectively, and is bounded by the Sierra Nevada foothills to the east, and the San Joaquin River to the west. The San Joaquin Basin Hydrologic Study Area includes the southern two-thirds of the Great Valley. Movement of groundwater within the San Joaquin Valley is generally from the flanks of the valley toward the axis of the trough beneath the western side of the valley, then subsequently north toward the Sacramento – San Joaquin Delta. In the San Joaquin Valley groundwater occurs in unconfined and semi-confined aquifers (California Department of Water Resources [DWR], 1980).

The San Joaquin Valley is an area of substantial groundwater withdrawal and recharge due to municipal, industrial, and agricultural use. Wide fluctuations in groundwater levels are not uncommon due to variations in annual rainfall, municipal pumping, and irrigation practices. The *Lines of Equal Depth to Water in Wells, Unconfined Aquifer, San Joaquin Valley, Spring 2010* issued by the DWR indicates a regional depth to groundwater of approximately 40 feet beneath the Site, with a generally south-southeasterly flow direction.

The hydrogeology of the FMC facility, approximately 1,100 feet north of the Site, has been characterized by several studies since the early 1980s. GeoTrans, Inc's report: *Addendum to Comprehensive Remedial Investigations Report*, dated January 2005, provides the following description of the hydrogeology associated with FMC facility:

> *"The site is underlain by laterally discontinuous and unconsolidated sand and silty sand associated with the Modesto and Riverbank Formations. First-encountered groundwater is approximately 30 feet below ground surface (bgs) under confined to semi-confined conditions. A deeper aquifer is present at a depth of 165 feet bgs and separated from the upper zone by a blue clay aquitard. The upper water bearing unit has been divided into two zones: a shallow zone from first encountered groundwater to 120 feet bgs and a deeper zone from 140 feet bgs to the top of the aquitard. Groundwater flow within the upper zone is toward the southeast under a gradient of 0.002 ft/ft."*

As described in Section 1.4, Shaw installed eight groundwater monitoring wells adjacent to the three stockpiles in June 2006. Each well was installed into unconsolidated sand, silty sand, and silt layers within the Modesto formation underlying the Site (Shaw 2007b). The wells were completed within the shallow zone of the upper aquifer as described by GeoTrans. The lithology encountered in the well borings included interbedded (laterally discontinuous) sands, silts, and clays. Shallow zone groundwater beneath the stockpiles was encountered at a depth of approximately 35 feet under unconfined to semi-confined

conditions. Shaw determined that groundwater flow is toward the southeast at a gradient of approximately 0.001. The shallow aquifer conditions beneath the Site and the adjacent FMC facility are similar and representative of the local hydrogeologic conditions (Shaw 2007b).

In June 2013, depth to groundwater at the Site ranged from 31.73 (MW-1) to 40.11 (MW-5) feet below TOC. Based on the groundwater elevation data, the groundwater flow is toward the east-southeast at an average gradient of 0.0005, which is generally consistent with historical flow.

1.6.5 Stockpile Stormwater

Shaw performed stormwater monitoring for the soil stockpiles in March 2006 in general accordance with their *Final Surface Water Sampling and Analysis Plan* (Shaw, January 2006). Seven stormwater runoff samples were collected from constructed impoundments during a qualifying rain event (visible runoff and 72 hours of prior dry weather). Shaw reported that they did not observe stormwater flowing away from the Caltrans ROW. The samples were analyzed for dissolved metals, PAHs, nitrate, sulfate, and sulfide.

With the sole exception of an elevated barium concentration reported for one stormwater sample collected from the northwestern side of Stockpile 3 (sample SW03), the stormwater samples did not contain target analytes exceeding MCLs or determined site background levels. Barium was reported at a concentration of 2,000 micrograms per liter (µg/l) in sample SW03 exceeding the MCL of 1,000 µg/l. Barium in the six other stormwater samples ranged from 16 to 190 µg/l. Shaw concluded that the elevated barium concentration reported for sample SW03 was isolated and that runoff in that area was confined to Caltrans ROW. Based on these results and due to site topography, vegetation and limited rainfall events, DTSC concluded that stormwater was not a chronic exposure issue. Therefore, surface water was not considered as a pathway in the HHRA.

Geocon prepared an addendum to the Shaw SAP to resume stormwater sampling at the soil stockpiles. The addendum identified revised sampling locations including ponding that was observed at the western end of Stockpile 2 adjacent to Emerald Avenue during a rain event on November 28, 2012.

Stormwater was most recently sampled on April 4, 2013. Stormwater samples were collected from four locations adjacent to the stockpiles and two background locations away from the stockpiles and analyzed for total and dissolved metals, nitrate, sulfate, sulfide and total suspended solids (TSS). The results of this monitoring event were presented by Geocon in a report dated June 17, 2013 (Geocon, June 2013). Analysis results were generally consistent with background values, although some constituents in the runoff sample adjacent to Stockpile 2, as well as the sample from a ponding basin next to Stockpile 3 that receives runoff from the surrounding streets, tended to be slightly higher for some constituents.

Additional stormwater monitoring will be performed at the Site during qualifying rain events in the upcoming wet season (Fall 2013/Winter 2014).

1.7 Background COPC Concentrations

Shaw assessed background concentrations of COPCs during the 2006 SI for comparison to COPC concentrations in the stockpiles. Background soil samples were collected from what is reported as undeveloped and relatively undisturbed ground west of Stockpile 1. Eight soil borings were advanced to depths of 15 feet and soil samples were collected at depths of 5, 10, and 15 feet. Shaw reported that the soil encountered in the eight background borings was predominantly sand with varying amounts of silt and clay.

The background soil samples were analyzed for inorganics, PAHs, and other inorganics (e.g., nitrate, sulfate, etc.). Shaw calculated 95th upper confidence limits (UCLs) for inorganics to establish local background concentrations for the Site. The 95th UCLs could not be calculated for the infrequently detected constituents (e.g., beryllium, cadmium, and mercury) due to small population sizes so arithmetic means for those constituents were calculated instead. For inorganics that were not detected, a concentration of one-half the detection limit was used as the background concentration. Shaw reported that the background concentrations of metals calculated for undisturbed soil near the stockpiles were in the general range as those determined for the FMC site.

Four background samples collected from various depths were also analyzed for PAHs, which were not detected (Shaw, 2007a).

2.0 NATURE AND EXTENT OF IMPACTS

This section describes the nature and extent of COPCs in the stockpiles.

2.1. Conceptual Site Exposure Model

Shaw prepared a Conceptual Site Exposure Model (CSEM) as part of their HHRA (Shaw, 2007c). The CSEM identifies primary sources of COPCs, exposure routes, receptor scenarios, and identifies whether they are "complete" or "incomplete." The CSEM concluded that the offsite resident and trespasser were the current human receptors. Future receptors during the project would include the future construction worker and future offsite resident.

Potential exposure routes for the current resident/trespasser exposure scenario include incidental ingestion, inhalation of dust, and dermal contact. Exposure routes for the future land-use scenario would include incidental ingestion, dermal contact, and inhalation of dust for the construction worker.

An offsite resident or trespasser would not have access to the Site during construction; therefore, direct-contact exposure pathways would not be relevant for the resident/trespasser. However, dust could be carried offsite during construction activities. Therefore, Shaw evaluated inhalation for the offsite resident for the future construction scenario.

2.2 Soil Impacts

As described in Section 1.4, the nature and extent of COPCs in the stockpiles have been characterized through several investigations including the PSI conducted by Shaw in 2004, the SI in 2006, and Geocon's SSI in September 2012. The results of these investigations are summarized below.

2.2.1 Shaw 2004 PSI

Shaw collected 194 stockpile soil and 49 native soil samples (soil from beneath the stockpiles) from 50 direct-push borings advanced through the soil stockpiles in January 2004 and, as described in Section 1.7, they also collected eight "background" soil samples from four borings completed in assumed non-impacted areas. Each soil sample was analyzed for metals including antimony, arsenic, barium, chromium, iron and strontium. Selected soil samples were further analyzed for PAHs, nitrate and pH.

Shaw identified barium as the only metal detected at elevated concentrations of concern and as the primary COPC (Shaw, 2004). Barium was detected at maximum concentrations of 1,730 mg/kg for Stockpile 1, 60,700 mg/kg for Stockpile 2, and 44,900 mg/kg for Stockpile 3. Barium concentrations reported for the eight background soil samples ranged from 57 to 888 mg/kg.

PAHs were not detected in 125 stockpile soil, native soil, or background soil samples analyzed. Nitrate was detected at a maximum concentration of 310 mg/kg in 42 of 54 stockpile soil, native soil, and background soil samples analyzed, though not at concentrations of concern. Reported soil pH values ranged from 6.6 to 11.2.

In May 2004, 86 of the stockpile soil and 24 of the native soil samples that were collected in January 2004 were reanalyzed for metals. The original analysis data and the reanalysis data were reported together in the July 2004 Remedial Action Options Report (RAOR) (Shaw, 2004). The results of the additional analysis did not identify metals other than barium at concentrations of concern in Stockpiles 2 and 3. However, barium was reported as having been detected in several samples from Stockpiles 2 and 3 at concentrations three to five times higher than were reported for the same samples in February 2004. This increase in reported concentrations occurred mainly with those samples that had the highest barium concentrations to begin with in February 2004. No explanation was provided by the lab or Shaw for the reporting differences. One possibility may be that the material in the stockpiles with the highest concentrations of barium may also have a great degree of heterogeneity such that a sample aliquot taken from one portion of the sample and analyzed may have a much different barium concentration than an aliquot from another portion of the same sample. However, if heterogeneity were the reason for the variability in concentrations, it would be expected then that the variability would manifest itself in both increased and decreased concentrations. In this case there is a strong bias towards large increases in concentrations from the February 2004 results to the May 2004 results, with very few, smaller magnitude decreases. Other possible explanations may be related to laboratory errors.

Lead and arsenic were detected in all three stockpiles at concentrations exceeding background values. As previously discussed, elevated cadmium concentrations exceeding the commercial/industrial CHHSLs were detected in soil samples collected from Stockpiles 2 and 3 in January 2004.

2.2.2 Shaw 2006 SI

Shaw completed additional soil stockpile characterization activities in May 2006 as reported in their SI Report (Shaw, 2007a and Appendix A of HHRA). They collected 165 stockpile soil and 89 native soil samples from 51 borings advanced through the stockpiles. Additionally, 24 native soil samples were obtained from eight background borings advanced in Caltrans ROW west of Stockpile 1. Each soil sample was analyzed for total metals. Selected soil samples were further analyzed for soluble barium and lead by the waste extraction test (WET and de-ionized [DI] water-WET), PAHs, and total and soluble (DI-WET) nitrate/sulfate/sulfite.

Total Metals Analysis Results

Antimony, selenium and silver were not detected in any of the 278 soil samples analyzed. Beryllium, cadmium, mercury, molybdenum and thallium were detected in the stockpile soil samples at low concentrations. Arsenic, chromium, cobalt and copper were detected in the stockpile soil samples at concentrations slightly exceeding background concentrations. Barium, lead, nickel, vanadium and zinc were detected in the stockpile soil samples at concentrations considerably higher than background values. Barium, the primary COPC, was detected at maximum concentrations of 130 mg/kg in Stockpile 1, 64,000 mg/kg in Stockpile 2, and 72,000 mg/kg in Stockpile 3. Barium concentrations reported for the background soil samples ranged from 17 to 120 mg/kg.

Soluble Metals Analysis Results

Thirty-three stockpile soil samples were analyzed for WET and DI-WET soluble barium. Soluble barium concentrations ranged from 39 to 2,300 milligrams per liter (mg/l), 28 of which exceeded the Title 22 California Code of Regulations (CCR) Soluble Threshold Limit Concentration (STLC) for barium of 100 mg/l. Soluble (DI-WET) barium concentrations ranged from 1.8 to 220 mg/l, nine of which exceeded the STLC. The Title 22 criteria cited above for the evaluation of WET and DI-WET analyses applies to non-barite barium compounds. Shaw noted that the barium compounds present at the Site were primarily barite (barium sulfate), and as a result, the Title 22 evaluation criteria are not strictly applicable to the Site.

Only two stockpile soil samples contained total lead concentrations exceeding 50 mg/kg (hazardous waste threshold for requiring WET soluble testing) at concentrations of 150 and 1,500 mg/kg. WET soluble lead was detected in these two samples at 2.9 and 5.7 mg/l, respectively, and DI-WET soluble lead at 0.07 and 0.1 mg/l, respectively.

Nitrate, Sulfate, and Sulfide Analysis Results

Sixty-nine soil samples were analyzed for nitrate, sulfate and sulfide. No regulatory screening levels exist for these compounds. Nitrate was detected in the stockpile soil samples at concentrations within the range of background. Sulfate was detected in the stockpile soil samples at concentrations considerably higher than background and appears to correspond to samples with high barium concentrations. Only one stockpile soil sample contained detectable sulfide. DI-WET soluble nitrate concentrations ranged from 0.2 to 2.6 mg/l in 28 of 33 soil samples analyzed, DI-WET soluble sulfate from 0.5 to 14 mg/l in 32 of 33 soil samples analyzed, and DI-WET soluble sulfide was not detected in the 33 soil samples analyzed.

PAHs were detected at low concentrations ranging from 11 to 21 micrograms per kilogram (µg/kg) in 3 of 58 stockpile soil and native soil samples analyzed. PAHs were not detected in the background soil samples.

Shaw utilized the results of the 2006 SI in for the HHRA and summarized the results in the PEA.

2.2.3 Geocon 2012 SSI

Geocon completed an SSI in September 2012, which consisted of advancing 68 soil borings and collecting and analyzing soil samples to address potential stockpile and native soil data gaps to update the risk exposure scenarios from the 2007 HHRA prior to regulatory approval of the planned SR-132 Project. The SSI consisted of following:

- Advancing 35 "Fenceline Borings" at stockpile perimeter/fenceline locations adjacent to residential and commercial/industrial development to assess potential offsite and vertical migration of contaminants. Soil samples were collected from the surface and at maximum boring depths ranging from 3 to 5 feet and analyzed for Title 22 metals and strontium.
- Advancing 28 "Perimeter Borings" at stockpile perimeter and end locations to define the lateral stockpile limits to aid in consolidation during future highway construction. The surface soil sample collected from each 3-foot-deep boring was analyzed for barium.
- Advancing five "Cadmium Borings" in the vicinity of Shaw's 2004 PSI borings where soil samples were collected and reported to have elevated cadmium concentrations. Soil samples were collected from the Cadmium Borings at the surface and at 5-foot intervals thereafter to the maximum boring depths ranging from 11 to 22 feet. Each soil sample was analyzed for barium and cadmium.

Fenceline Borings

None of the metal concentrations reported for the Fenceline Boring soil samples exceeded California hazardous waste thresholds. With the exception of arsenic (within the range of site-specific background), none of the reported metal concentrations exceeded residential CHHSLs. With the exception of barium and lead, the remaining metals concentrations were generally within the range of the site-specific naturally occurring background levels. Barium was detected in each soil sample at concentrations ranging from 140 to 4,300 mg/kg for the surface soil samples and 42 to 680 mg/kg for the deepest soil sample obtained from the Fenceline Borings. At each boring location, the reported barium levels decreased with depth. The majority of the deeper soil samples contained barium within the range of background (47 to 110 mg/kg for 5-foot-deep background soil samples). Surface soil samples collected from five borings located along the north side of Stockpile 2 adjacent to commercial/industrial development contained the highest barium concentrations greater than 1,000 mg/kg. None of the reported barium concentrations exceeded residential or industrial CHHSLs of 5,200 and 63,000 mg/kg, respectively.

Perimeter Borings

Barium was detected in each soil sample collected from the Perimeter Borings at concentrations ranging from 76 to 1,600 mg/kg. The majority of the perimeter surface samples contained barium up to 300 mg/kg. Elevated barium concentrations between 710 and 1,600 mg/kg were detected in surface soil samples obtained from borings at the east end of Stockpile 2 and southwest side of Stockpile 3. None of the reported barium concentrations exceeded residential or industrial CHHSLs.

Cadmium Borings

Barium was detected in each soil sample obtained from the Cadmium Borings at concentrations ranging from 58 to 130,000 mg/kg. Cadmium was not detected at concentrations exceeding the laboratory reporting limit of 1.0 mg/kg for each soil sample. The results of the Shaw 2004 PSI identified elevated cadmium concentrations (exceeding the industrial CHHSL for cadmium of 7.5 mg/kg) for eleven soil samples collected from Stockpiles 2 and 3 with corresponding elevated barium concentrations (25,800 to 196,000 mg/kg). Cadmium was not detected at concentrations greater than 1.0 mg/kg for all 348 soil samples analyzed during the Shaw 2006 SI and the Geocon 2012 SSI, including 19 soil samples with reported elevated barium concentrations between 25,000 mg/kg and 130,000 mg/kg. The Shaw 2004 PSI data (provided by Sparger Technology, Inc.), Shaw 2006 SI data (Creek Environmental Laboratories, Inc.), and the Geocon 2012 SSI data (Advanced Technology Laboratories) were generated by three different analytical laboratories. Based on the cumulative cadmium data, it appears the Shaw 2004 PSI cadmium data is neither reproducible nor reliable and represents false positives possibly as result of sample interference/dilution effects due to the associated high barium concentrations.

One soil sample obtained from a Stockpile 2 Cadmium Boring was analyzed for petroleum hydrocarbons and PAHs based on field indicators of potential impacts. Gasoline-range organics were not detected at a concentration exceeding the RL of 1.0 mg/kg. Diesel-range organics were detected at a concentration of 120 mg/kg, slightly higher than the residential/industrial Environmental Screening Level (ESL) established by the San Francisco Bay Area Regional Water Quality Control Board (SFBRWQCB) of 83 mg/kg. Petroleum organics concentrations were compared to ESLs because there are no CHHSLs or other regulatory screening levels for petroleum. The ESL of 83 mg/kg for diesel-range organics is the lowest ESL based on potential leaching to groundwater – the direct-exposure ESLs for residential and industrial land use are 110 and 450 mg/kg, respectively. Oil-range organics were detected at a concentration of 82 mg/kg, less than the residential ESL of 370 mg/kg. PAHs 2-methylnaphthalene, fluorene and phenanthrene were detected at concentrations ranging from 23 to 45 µg/kg, significantly less than their respective residential/industrial ESLs.

The results of the Fenceline and Perimeter Boring soil sample analytical data does not suggest lateral or vertical migration of soil containing metals (notably barium) at concentrations exceeding State and Federal residential human health screening levels (or in the case of arsenic, site-specific background levels) along the stockpile perimeters and adjacent property fencelines. The 1963 and 1967 aerial photographs (Figures 3a and 3b) show that transport and placement of barium-impacted soil materials in Stockpiles 2 and 3 occurred within Caltrans ROW.

Cadmium was not detected in any of the soil samples collected from the Cadmium Borings advanced in Stockpiles 2 and 3 where elevated cadmium was identified in the Shaw 2004 PSI. Cadmium is therefore not considered a COPC for the project site. The results of the SSI satisfied regulatory directives to address the remaining potential environmental assessment data gaps and were utilized to update the 2007 HHRA (Geocon 2013 HHRA Update).

2.3 Groundwater Impacts

Shaw installed eight groundwater monitoring wells adjacent to the stockpiles in May and June 2006 as reported in the May 2007 *Site Investigation Report Groundwater Assessment* (Shaw 2007b and Appendix B of HHRA). The results of analysis of groundwater samples collected from the eight monitoring wells in June and October 2006 show that the concentrations of COPCs that were analyzed for did not exceed drinking water standards (MCLs).

Caltrans reinitiated groundwater monitoring activities in March 2012 as part of the planned SR-132 Project. To date, Geocon completed bi-monthly groundwater monitoring events in March, May, July, September and November 2012, and January and March 2013. Beginning with the recent monitoring event conducted in June 2013, groundwater monitoring is being performed on a quarterly basis.

Upgradient wells MW-9 and MW-10 immediately south of Kansas Avenue and west and east of SR 99 were installed and incorporated into subsequent sampling events beginning in June 2012. The results of the 2012 and 2013 groundwater monitoring events are similar to those of the 2006 monitoring events. The COPCs are at concentrations less than California MCLs.

3.0 REMEDIAL ACTION OBJECTIVES

Site characterization revealed the presence of COPCs in soil at the Site. This section of the FS summarizes Shaw's evaluation of COPC concentrations through an HHRA, describes the update of the HHRA using 2012 data, describes the RAOs for the Site, discusses the ARARs related to remediation, and states the cleanup goal for the project.

3.1 Summary of the 2007 HHRA

The 2007 HHRA is included as Appendix A of the PEA (Shaw, 2009). The risk characterization in the HHRA integrated the selected COPCs, exposure assessment, and toxicity assessment to describe risks to individuals (receptors) in terms of the nature and likelihood of potential adverse health risks for current and future land uses. Shaw's risk characterization integrated exposure intakes and toxicity values to estimate both cancer risk and non-cancer health effects for the various land use scenarios. Using the available soil data from the investigations of the stockpiles and the assumptions described in the HHRA, the HHRA indicated that neither the current land-use nor the proposed future land-use scenario pose an unacceptable risk or hazard to Caltrans workers entering the Site for mowing, for trespassers, or for adjacent residents. Additionally, the estimated non-cancer hazard index (HI) for a hypothetical groundwater user is less than the threshold of concern. Therefore, based on the available data, neither soil nor groundwater at the Site is considered to present an unacceptable risk or hazard under the receptor scenarios evaluated in the HHRA.

Three groups of receptors are considered in the HHRA – a current offsite resident/trespasser, a future construction worker, and a future (during construction) offsite resident. The estimated cancer risk, non-cancer HIs, and blood lead concentrations for each receptor group are summarized in the following subsections.

3.1.1 Current Offsite Resident and Trespasser

The 2007 HHRA evaluated the current offsite resident and trespasser for exposure to the COPCs in soil of Stockpile 1 through incidental ingestion, dermal contact, and dust inhalation. The exposure pathway for the offsite resident would mainly be via inhalation while the trespasser could be exposed through all three pathways. The calculated cancer risk and non-cancer HI for the current offsite resident and trespasser receptors exposed to surface soil on Stockpile 1 is 8E-8 and 4E-2, respectively. The estimated excess cancer risk of 8E-8 is much less than the generally used, conservative criterion of 1E-6 (one in one million excess cancer risk) and the estimated HI for non-cancer effects is well below the threshold of 1.

The health risk related to lead in Stockpile 1 estimated in the HHRA uses the maximum detected concentration of lead in Stockpile 1 surface soil in the LeadSpread model. LeadSpread did not indicate that an offsite resident or trespasser would have a blood lead concentration greater than 10 micrograms per deciliter (µg/dL) in the 95th or 99th percentile. Therefore, lead in surface soil of Stockpile 1 does not pose an unacceptable hazard to a current resident/trespasser.

The calculated cancer risk and non-cancer HI for the offsite resident/trespasser receptor exposed to surface soil on Stockpile 2 is reported in the 2007 HHRA as 1E-5 and 0.1, respectively. While the total estimated non-cancer HI is below the threshold of 1, the total estimated cancer risk exceeds the general risk target of 1E-6 for residential exposures. This cancer risk estimate was driven by the large contribution from arsenic in surface soil. The arsenic cancer risk estimate is 1.45E-5 for the offsite resident/trespasser based on the 95th UCL of arsenic in Stockpile 2 of 1.63 mg/kg. However, the background arsenic 95th UCL of 1.15 mg/kg resulted in an estimated cancer risk of 1.15E-5, which is very similar to that for arsenic in Stockpile 2. Therefore, arsenic in surface soil of Stockpile 2 is not included in the final total risk estimate for Stockpile 2. The revised cancer risk estimate, with arsenic excluded, is 1E-7. Additionally, the estimated HI for non-cancer effects is below the threshold of 1. Therefore, surface soil from Stockpile 2 does not pose an unacceptable risk or hazard to a current resident/trespasser receptor.

The assessment of health risk related to lead in Stockpile 2 as reported in the 2007 HHRA uses the 95th UCL for lead in Stockpile 2 surface soil of 30 mg/kg. The results indicate that all percentiles of adults and children would have blood lead concentrations less than 10 µg/dL. Therefore, lead in Stockpile 2 surface soil does not represent an unacceptable hazard.

Shaw evaluated the current offsite resident/trespasser for exposure to COPCs in soil of Stockpile 3 through incidental ingestion, dermal contact, and dust inhalation. The COPCs in Stockpile 3 surface soil are not considered to be carcinogens; therefore, they were not estimated as a cancer risk. The estimated non-cancer HI for the offsite resident/trespasser receptor exposed to surface soil on Stockpile 3 to be 0.02, which is well below the threshold of 1.

Shaw also evaluated the health risk related to lead in Stockpile 3 using the 95th UCL for lead of 6.7 mg/kg in the LeadSpread model. LeadSpread did not indicate that offsite residents or trespassers would have a blood lead concentration greater than 10 µg/dL. Therefore, lead in surface soil of Stockpile 3 does not pose an unacceptable hazard to a current resident/trespasser.

3.1.2 Future Construction Worker

Shaw evaluated the future construction worker receptor for exposure to COPCs in soil in the future construction soil zone (depths of 0 to 20 feet) through incidental ingestion, dermal contact, and dust inhalation. The cumulative excess lifetime cancer risk was calculated as 9.2E-7, which is below the 1E-06 cancer risk criterion. The cumulative non-cancer HI was calculated to be 0.4, which is less than the threshold of 1.

Shaw also evaluated the health risk related to lead using the 95th UCL for lead in the future construction soil zone of 54 mg/kg. The results indicate that blood lead concentrations would be less than 10 µg/dL for the pica child. Because the pica child exposure is more conservative than a construction worker's exposure, it is presumed that a construction worker would not have an unacceptable exposure either. Therefore, lead in soil is not considered to pose an unacceptable hazard to construction workers.

3.1.3 Future Offsite Resident

Shaw evaluated the future offsite resident for exposure to COPCs in dust produced from the future construction work (estimated to include 60 days of construction). The excess lifetime cancer risk was calculated to be 6E-10, which is well below the 1E-06 cancer risk criterion. The calculated cumulative non-cancer HI of 0.017 is also well below the threshold of 1.

Shaw also evaluated the health risk related to lead using the LeadSpread model, which indicated that an onsite pica child exposed to the 95th UCL lead concentration would not exceed 10 µg/dL. Shaw indicated that because the offsite resident would only be potentially exposed to soil through dust during the proposed future construction work, the estimated blood lead concentration would be much less than that estimated for the pica child. Additionally, the default lead in respirable dust concentration is 1.5 micrograms per cubic meter ($\mu g/m^3$) in the LeadSpread model. As calculated using the maximum lead concentration of 1,500 mg/kg from soil (from depths of 0 to 20 feet) multiplied by the offsite dust concentration of 9.95E-8 kilograms per cubic meter (kg/m^3), the resulting respirable dust concentration is 0.15 $\mu g/m^3$, well below the default value.

3.1.4 Hypothetical Future Shallow Groundwater User

Shaw evaluated the health risk for a hypothetical future user of shallow groundwater beneath the Site. According to the results of a well survey, no one within a 1-mile radius is using the shallow aquifer as a source of drinking water. Shaw calculated health risks from ingestion and dermal contact using the maximum detected concentrations (MDCs) from two groundwater sampling events in 2006 as the exposure-point concentrations (EPCs). The resulting cumulative noncancer hazard estimate is 0.9, less than the threshold of 1. For lead, the maximum concentration detected in a groundwater sample was 3.4 µg/l, which is less than the federal action level of 15 µg/l. Therefore, lead in groundwater does not appear to present an unacceptable hazard.

3.2 HHRA Update

Geocon updated the 2007 HHRA by incorporating soil analytical data generated from the fenceline, perimeter, and stockpile sampling as presented in the revised *Supplemental Site Investigation* dated March 1, 2013, and groundwater analytical data generated from bi-monthly sampling events. The COPC EPCs that Shaw utilized in the 2007 HHRA were compared to the supplemental soil data

collected in September 2012 and groundwater data collected between March 2012 and March 2013. The EPCs utilized in the 2007 HHRA are the MDCs for the selected COPCs for each exposure scenario with the exception of the Stockpile 2 Current Exposure Assessment which utilized the 95% UCLs for the selected COPCs. This information was used to evaluate the validity of the 2007 HHRA cancer risk and non-cancer hazard estimates. The following sections summarize the EPC comparisons and risk/hazard evaluations for each exposure scenario.

3.2.1 Stockpile 1 Current Exposure Assessment

Eight metals (barium, beryllium, chromium, cobalt, copper, lead, mercury and nickel) reported for five surface soil samples from the 2006 SI were used as the COPCs for Stockpile 1 in the 2007 HHRA. The MDCs for these metals detected in surface soil samples collected from the September 2012 Fenceline Borings and Perimeter Borings (first values in brackets) are slightly higher as compared to the 2007 HHRA EPCs (second values in brackets) with relative concentrations as follows: barium (240 vs. 130 mg/kg), copper (24 vs. 13 mg/kg), and lead (17 vs. 12 mg/kg). Zinc was detected at an MDC of 120 mg/kg in the 2012 surface soil samples, exceeding the background MDC of 44 mg/kg. Cadmium was detected in one 2012 surface soil sample at 0.26 mg/kg, slightly above the reporting limit of 0.25 mg/kg and less than the residential CHHSL of 1.7 mg/kg. Strontium was detected in each 2012 surface soil sample with an MDC of 61 mg/kg.

The 2007 HHRA calculated current cancer risk and non-cancer hazard estimates of 8E-8 and 0.04, respectively, for the offsite resident/trespasser receptor exposed to surface soil at Stockpile 1. Because the 2012 metal concentrations are of the same order of magnitude as those used in the 2007 HHRA and that none of the 2012 metal detections exceeded respective residential CHHSLs or RSLs, the 2007 HHRA risk and hazard calculations for the current resident/trespasser remain valid for Stockpile 1. The 2007 HHRA calculated excess cancer risk is orders of magnitude less than the conservative criterion of 1E-6 and the estimated non-cancer HI is orders of magnitude less than the threshold of 1.

3.2.2 Stockpile 2 Current Exposure Assessment

The 95% UCLs for seven metals (arsenic, barium, copper, lead, molybdenum, nickel and zinc) detected in 33 surface soil samples collected during the 2006 SI were selected as the COPCs for Stockpile 2 in the 2007 HHRA. The 2007 HHRA also used the MDC for chromium (divided as chromium III and VI). Of these metals, barium, copper and zinc were detected at higher concentrations in the surface soil samples collected from the September 2012 Fenceline and Perimeter Borings compared to the concentrations detected in the 2006 SI and used in the 2007 HHRA. Specifically barium had an MDC of 4,300 mg/kg in the 2012 samples vs. 1,100 mg/kg for the 2006 SI, copper had an MDC of 41 mg/kg in 2012 vs. 29 mg/kg in 2006, and zinc had an MDC of 200 mg/kg in 2012 vs. 89 mg/kg in 2006.

Cadmium was detected in one 2012 surface soil sample at 0.42 mg/kg, which is less than the residential CHHSL of 1.7 mg/kg. Strontium was detected in each of the 2012 surface soil samples, with an MDC of 110 mg/kg.

The 2007 HHRA calculated current cancer risk and non-cancer hazard estimates of 1E-7 (background arsenic not considered) and 0.1, respectively, for the offsite resident/trespasser receptor exposed to surface soil at Stockpile 2. Because the 2012 metal concentrations are the same order of magnitude as those used in the 2007 HHRA and none of 2012 metal detections exceeded respective residential CHHSLs or RSLs, the 2007 HHRA risk and hazard calculations for the current resident/trespasser remain valid for Stockpile 2. The 2007 HHRA calculated excess cancer risk is less than the conservative criterion of 1E-6, and the estimated non-cancer HI is an order of magnitude less than the threshold of 1.

3.2.3 Stockpile 3 Current Exposure Assessment

Shaw selected the MDCs for three metals (barium, lead and molybdenum) reported for 13 surface soil samples from the 2006 SI as the COPCs for Stockpile 3. Of these metals, barium (1,600 vs. 250 mg/kg) and lead (34 vs. 12 mg/kg) were detected at higher levels in the surface soil samples obtained from the September 2012 Fenceline Borings and Perimeter Borings (first values in brackets) compared to the 2007 HHRA EPCs (second values in brackets). Copper and zinc were further detected at maximum concentrations of 17 and 190 mg/kg, respectively, in the 2012 surface soil samples, which exceed the respective background MDCs of 11 and 44 mg/kg. Cadmium was detected in four 2012 surface soil samples at a MDC of 0.78 mg/kg, less than the residential CHHSL of 1.7 mg/kg. Strontium was detected in all but one of the 2012 surface soil samples with an MDC of 100 mg/kg.

The 2007 HHRA calculated a current non-cancer hazard estimate of 0.02 for the offsite resident/trespasser receptor exposed to surface soil at Stockpile 3. Shaw considered one of the COPCs for Stockpile 3 to be a carcinogen, and therefore they calculated no cancer risk. Based on the 2012 metal concentrations being the same order of magnitude as those used in the 2007 HHRA, the lack of any 2012 metal detections exceeding respective residential CHHSLs or RSLs, and the estimated non-cancer HI being orders of magnitude less than the threshold of 1, the 2007 HHRA risk and hazard calculations for the current resident/trespasser remain valid for Stockpile 3.

3.2.4 Stockpiles 1 through 3 - Future Construction Worker and Offsite Resident

The MDCs for ten metals (arsenic, barium, chromium, cobalt, copper, lead, molybdenum, nickel, vanadium and zinc) reported for 165 soil samples from the 2006 SI as the COPCs for Stockpiles 1 through 3 and the PAH benzo(a)pyrene as a COPC were used in the 2007 HHRA. The metals barium (130,000 vs. 72,000 mg/kg), copper (41 vs. 29 mg/kg), and zinc (200 vs. 110 mg/kg) were detected at higher concentrations in the soil samples obtained from the September 2012 Fenceline Borings and Cadmium

Borings (first values in brackets) as compared to the 2007 HHRA EPCs (second values in brackets). The calculated 95% UCL for the 2012 barium data is 7,556 mg/kg, significantly less than the MDC of 130,000 mg/kg and the EPC of 72,000 mg/kg used in the 2007 HHRA. Strontium was detected in all but one of the 2012 soil samples with an MDC of 270 mg/kg.

The 2007 HHRA calculated current cancer risk and non-cancer hazard estimates of 9.2E-7 and 0.4, respectively, for the construction worker receptor exposed to soil at Stockpiles 1 through 3. The calculated current cancer risk and non-cancer HI were 6E-10 and 0.017, respectively, for the future offsite resident receptor exposed to soil at Stockpiles 1 through 3. Based on the conservative approach of using MDCs of each metal versus the 95% UCLs, the 2007 HHRA risk and hazard calculations for future conditions for construction workers and offsite residents remain valid for Stockpiles 1 through 3. The 2007 HHRA calculated excess cancer risks is order(s) of magnitude less than the conservative criterion of 1E-6, and the estimated non-cancer HI is significantly less than the threshold of 1.

3.2.5 Onsite Shallow Groundwater

The MDCs for twelve metals (barium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium and zinc) reported for groundwater samples collected in June and October 2006 were identified as the COPCs for evaluation of the hypothetical shallow groundwater user. The maximum 2006 metal concentrations were reported for samples obtained from wells MW-5 and MW-6. Of these metals, cobalt (5.3 vs. 3.0 µg/l), copper (7.4 vs. 6.2 µg/l), manganese (290 vs. 260 µg/l), nickel (9.6 vs. 7.1 µg/l), selenium (4.4 vs. 3.0 µg/l), vanadium (42 vs. 34 µg/l) and zinc (120 vs. 15 µg/l) were detected at slightly higher concentrations in the 2012 groundwater samples (primarily from upgradient well MW-10) compared to the 2007 HHRA EPCs. Strontium was detected in all of the 2012 groundwater samples with an MDC of 1,400 µg/l.

The 2007 HHRA calculated a then current non-cancer HI for the hypothetical shallow groundwater user at 0.9. None of the selected groundwater COPCs are considered to be carcinogens and therefore the 2007 HHRA did not calculate a cancer risk. Based on the similar metals data with the majority of the higher concentrations reported for samples collected from upgradient well MW-10, and the estimated non-cancer HI being less than the threshold of 1, the 2007 HHRA risk and hazard calculations for the hypothetical groundwater user remain valid.

3.2.6 HHRA Update Summary

The 2007 HHRA conservatively utilized MDC or 95% UCL soil and groundwater COPC concentrations obtained during the Shaw 2006 SI and groundwater monitoring events. Geocon compared the 2012 soil and groundwater data collected at the Site to the 2007 HHRA EPCs, which indicates that the 2012 soil and groundwater data is similar to the 2006 data utilized in the 2007 HHRA and do not significantly increase the conservative cancer risk and non-cancer HIs. The HHRA Update concluded that the 2007

HHRA remains valid with respect to exposure potential for the current resident/trespasser, future construction worker and offsite resident, and hypothetical shallow groundwater user at the Caltrans Modesto Soil Stockpile Site.

The DTSC commented on the HHRA update in a letter dated February 15, 2013, which included a memorandum from the Human and Ecological Risk Office (HERO) dated February 14, 2013. The HERO memorandum stated: "*the soil stockpiles do not pose a cancer risk or noncancer hazard to persons in the vicinity of these stockpiles as long as the stockpiles remain in place and are properly managed. The evaluation presented here is based on concentrations measured in surface soil. There are areas in the stockpiles with elevated concentrations of chemicals at depths greater than one foot below ground surface. Therefore, if there is substantial grading or reworking of the stockpiles or if the stockpiles are removed, these elevated concentrations at depth will have to be evaluated with respect to the potential for exposure by residents living adjacent or near the stockpiles during the period when the soil is being moved.*" Being "properly managed" implies that Caltrans would continue the current management which includes: maintaining fencing and signage around the stockpiles thereby limiting access to the stockpiles, not disturbing or exposing soil in the stockpiles, maintaining vegetative cover to reduce potential wind and rain soil erosion and transport off-site (i.e. soil dust transport from wind and sediment laden surface water runoff), mowing the vegetative cover to minimize fire danger, and groundwater and stormwater runoff monitoring.

In a letter dated April 4, 2013, DTSC stated their concurrence with the findings of the HHRA Update as follows: *"DTSC concurs with reports titled "SSI, Caltrans Modesto Soil Stockpiles, State Route 132 West Freeway/Expressway Project, Stanislaus County, California" (Geocon, March 1, 2013) and "HHRA Update, Caltrans Modesto Soil Stockpiles, State Route 132 West Freeway/Expressway Project, Stanislaus County, California"*.

3.3 Remedial Action Objectives

RAOs are medium or site-specific goals for protecting human health and the environment. RAOs are developed as a basis for evaluating the ability of remedial alternatives to comply with ARARs and to protect human health and the environment.

As summarized in Sections 3.1 and 3.2, the 2007 HHRA found that potential exposure to COPCs in surface soil of the stockpiles under the current land-use and proposed future land-use scenarios does not pose an unacceptable risk or hazard. Additionally, the hazard for a hypothetical future groundwater user is less than the threshold of concern. The update to the 2007 HHRA supported these findings and conclusions and the DTSC concurred with the HHRA update under the condition that the stockpiles be properly managed and potential receptors not be exposed to COPCs in deeper soil within the stockpiles. The potential for the stockpiles to impact groundwater from a water quality degradation standpoint remains a concern of the CVRWQCB.

Therefore, the RAOs for the Site are to protect the health of neighboring residents, onsite trespassers, and Caltrans-authorized personnel and prevent future impact to groundwater by managing the stockpiles either in-place or by removing them from the Site. GRAs to accomplish the RAOs are discussed in Section 4.0.

3.4 ARARs

ARARs are used to determine the extent of site cleanup and govern the implementation and operation of the selected action. ARARs are necessary to establish RAOs in order to support subsequent remediation alternatives screening. ARARs consist of three categories.

- Chemical Specific ARARs are either health or environmentally based numerical values or methodologies limiting the amount of a contaminant that may be released to or allowed to remain in the environment during and upon successful completion of a remedial action, including establishing clean up levels for soil or groundwater at an affected site. Examples include drinking water maximum contaminant levels (MCLs) and waste classification thresholds.
- Action specific ARARs are remedial, technology, or activity based requirements or limitations on specific remedial actions at a site. Examples include prohibitions or restrictions for the discharge of chemicals or contaminants to the air, water, or soil and the proper transfer, treatment, or storage of chemicals and contaminants.
- Location Specific ARARs are restrictions or prohibitions placed on remedial actions at a given location due to features, such as a flood plain, wetland, sensitive ecosystem, seismic, or historic area. Examples include the National Historic Preservation Act and Endangered Species Act.

Additionally, "To Be Considered" (TBC) standards are non-promulgated advisories or guidance issued by federal or state agencies that complement ARARs. Both the USEPA and DTSC have guidance materials. For example: USEPA has guidance on assessing risk and identifying preliminary remediation goals including the Human Health Evaluation Manual (Parts A & B) Risk Assessment Guidance for Superfund and Regional Screening levels and the California Environmental Protection Agency/DTSC has Supplemental Guidance for Human Health Risk Assessment and California Human Health Screening Levels.

3.4.1 Summary of State and Federal ARARs

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically apply to cleanup at a site. The process for determining applicable standards is set forth in Section 121(d) of CERCLA. In part, CERCLA states that the more stringent of State or Federal requirements will apply to cleanup sites. Typically, California requirements are more stringent than Federal requirements.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not applicable, address problems or circumstances similar to those found where the proposed removal action will be performed, and are well suited to the conditions of the cleanup site. Requirements that are determined to not be legally applicable are evaluated to determine whether they are relevant and appropriate. A requirement must be both relevant and appropriate to be an ARAR. Criteria for determining relevance and appropriateness are listed in Part 40, Code of Federal Regulation (CFR) Section 300.400(g)(2).

According to CERCLA ARAR guidance, requirements may be "applicable" or "relevant and appropriate," but not both. ARARs are identified on a site-specific basis, using a two-part analysis to determine first if a requirement is applicable, and then, if not applicable, whether it is both relevant and appropriate. Based on CERCLA ARAR guidance, an ARAR qualifies as a State ARAR if it meets the following requirements:

- It is a State law;
- It is an environmental, or facility siting law;
- It is promulgated, and thus generally applicable and legally enforceable;
- It is substantive rather than procedural or administrative;
- It is more stringent than the Federal requirement;
- It is identified in a timely manner; and
- It is consistently applied.

3.4.2 ARARs for Remediation of the Stockpiles

Table 1 is a compilation of ARARs for remediation of the stockpiles.

3.5 Cleanup Goals

Cleanup goals are numerical or performance-based goals to which a cleanup (remedial) action can be compared to determine when the action has been performed to an extent that it can be considered complete. Numerical-based goals are quantitative limits (units of concentrations, volumes, etc.) that a cleanup action must meet in order to be considered complete. An example of a numerical-based goal is a COPC concentration in affected media (e.g., soil, soil vapor, groundwater, surface water, air) that has been determined to represent an acceptable health risk or other regulatory level and which cleanup must achieve in order to be considered complete. A performance-based goal is an action such as removal, capping, or treatment which a cleanup action must achieve in order to be considered complete. An example of a performance-based goal would be the placement of a one-foot-thick layer of clean soil over an area of contaminated soil to minimize potential exposure to COPCs in the soil.

The HHRA demonstrated that the excess cancer risk related to exposure to COPCs in surface soil of the stockpiles is orders of magnitude less than the conservative criterion of 1E-6 and the non-cancer HI is orders of magnitude less than the threshold of 1. The DTSC concurred with the findings of the HHRA and HHRA update under the condition that the stockpiles continue to be properly managed and not graded or reworked to expose COPCs in deeper soil within the stockpiles.

Based on the current level of health risk and stockpile management practices, it is not necessary to achieve a numerical-based cleanup goal to be protective of human health. Therefore, the cleanup goal for the project will be performance-based to assure that there is no route of exposure to COPCs in the stockpiles and to reduce the potential threat to groundwater. The GRAs which could be implemented to manage the stockpiles are discussed in Section 4.0. The remedial action that is selected by this FS will be implemented with DTSC and CVRWQCB oversight and these agencies will provide a final determination as to when the action is complete.

4.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

This section identifies GRAs, various remediation technologies under each GRA, and process options for each remedial technology. The remediation technologies and process options are screened to determine which are applicable and may achieve the RAOs.

4.1 General Response Actions

GRAs are actions that can potentially achieve the RAOs that are stated in Section 3.3. Identifying the GRAs is the first step in developing and selecting the remedial alternatives. GRAs to address the stockpiles include:

- No action - no action is included as a baseline for comparing other potential GRAs. Consideration of a no action approach is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP - 40 CFR 300.430).
- Institutional controls - are used to restrict access to the stockpiles thereby limiting exposure to COPCs in the soil. Institutional controls may include legal or administrative land use restrictions, access restrictions, informational and/or communication devices, monitoring, and/or a combination of these to minimize the potential for exposure to COPCs.
- Removal - consists of excavating and removing all or portions of the stockpiles and disposal at an off-site permitted disposal facility.
- Containment - restricts COPC mobility via technologies such as stormwater run-on/runoff controls and capping, thus reducing or eliminating potential exposure pathways and infiltration of water into the stockpiles.
- Treatment - includes physical, chemical, or biological processes to treat the soil and fixate or reduce COPC concentrations. Treatment could be conducted in-situ or ex-situ.
- Reuse/recycle/reclaim - of these three options only reuse of the stockpile soil offsite as fill is considered.

For most projects, “no action” implies that a site would be left “as is.” However, in the case of the stockpiles it should be noted that they are not currently in a state of “no action,” but are being actively managed under institutional controls. The Site is enclosed within a maintained perimeter chain-link fence and has access restriction signage posted in visibly conspicuous locations. The vegetative cover is mowed twice yearly to reduce fire danger. Groundwater monitoring and reporting is performed on a quarterly basis, and stormwater monitoring is performed on a storm-specific basis. Therefore, “no action” would mean discontinuing the maintenance of the fence, signage, and the stockpile vegetative cover and no monitoring of groundwater, stormwater, or site conditions.

The remedial technologies and process options that comprise the GRAs are described in greater detail in the following sections.

4.2 Identification and Screening of Technology Types and Process Options

This section identifies and evaluates the technologies that were considered potentially viable for each GRA and, where appropriate, identifies and evaluates process options. A general description of each technology and process option is followed by the rationale for retaining or eliminating it from further consideration.

"Process option" is a CERCLA term used for technologies that are being pre-screened. The potential for a process option to treat the stockpiles and to achieve the RAOs is evaluated, as are the potential impacts on human health and the environment during implementation of the process option. The no action alternative is evaluated as required by the NCP and is carried through to the detailed analysis of alternatives (Section 5) as a baseline for comparison with other alternatives.

The criteria for screening the applicable technologies and process options include effectiveness, implementability, and cost as follows:

- Effectiveness - the degree to which the alternative reduces the toxicity, mobility, or volume of COPCs; complies with ARARs; minimizes short-term impacts and residual risks,
  and provides long-term protection; and the speed at which the alternative accomplishes these benefits.
- Implementability - the technical feasibility and availability of the technologies and the administrative feasibility of implementing the alternative.
- Cost - the cost of construction, operation, and maintenance of the alternative.

Response actions, technologies, and process options that do not satisfy the RAOs and/or are not consistent with the above three evaluation criteria are not retained for further consideration and analysis. Table 2 lists the GRAs and the associated remedial technologies and process options.

4.2.1 Institutional Controls

Technologies considered for the stockpiles under institutional controls are governmental and administrative controls; site-access restrictions; informational and/or communication devices; and monitoring. Certain institutional actions and controls could partially meet the RAOs. Although no reduction in the toxicity or volume of COPCs would result from the implementation of institutional controls, institutional controls could be implemented in conjunction with other remedial actions to achieve the RAOs.

Governmental and Administrative Controls

Governmental and administrative controls use the regulatory authority of a government entity to impose restrictions under its jurisdiction, custody, or control. The process option considered for governmental and administrative controls is deed restrictions and covenants that limit land uses to those that have less potential for exposure based on the nature of the development and the types of site

occupants/users associated with the acceptable land uses. Governmental and administrative controls may be used in conjunction with other remedial technologies. This process option may provide some limitations on the present and future land use; however, the stockpiles would remain at the site in their current condition. No technical issues are present that would adversely affect the feasibility of implementing this process option and is considered to have low capital costs and negligible-to-low operations and maintenance (O&M) costs.

Site Access Restrictions

This technology consists of one process option - maintaining the existing physical barrier to site access (fencing) with controlled access to Caltrans-authorized personnel only. This option will minimize human receptor contact with COPCs in the soil.

Fencing and access control can be effective in mitigating exposure to COPCs, but does not reduce toxicity or volume. Ongoing O&M would be required to ensure continuing effectiveness. There are no technical issues that would adversely affect the feasibility of implementing this process option. However, site-access restrictions may not effectively deter all trespassers. There also may be problems gaining public acceptance for this process option. Capital and O&M costs associated with this process option are considered low.

Informational and Communication Devices

Informational and communication devices are process options include posting advisories (signage) at the Site, deed notices, public awareness meetings, and fact sheets to inform the public about potential risks at the Site.

It is difficult to ensure that informational and/or communication devices will be effective in reducing exposure to COPCs in the stockpiles as not all members of the community may receive the information and, as with access restrictions, may not deter trespassing. There are no technical issues that would adversely affect the feasibility of implementing this process option, but there may be problems gaining public acceptance for this process option as the sole remedial action at the site. Capital and O&M costs associated with this process option are considered to be low.

Monitoring

Process options for this technology can include monitoring of air, groundwater, stormwater, and site conditions. Monitoring COPCs in ambient air would likely be performed in combination with other technologies such as governmental and administrative controls, access restrictions, and informational technologies. However, the stockpiles are vegetated with seasonal grasses, and airborne dust has not been an issue. Monitoring COPCs in air would be performed in combination with other remedial technologies that involve excavation or grading such as removal or containment. In this way air monitoring would be an effective process option when implemented in combination with other remedial technology process options.

Other types of monitoring that have been ongoing and would continue in combination with certain other GRAs such as institutional controls or containment include site monitoring, groundwater monitoring, and stormwater monitoring. Site monitoring consists of fence inspection, repair, and maintenance, and mowing of the grass cover on the stockpiles to reduce fire danger. Under certain future technologies such as containment, site monitoring would continue for features such as soil caps, revegetation, and runoff controls. Groundwater monitoring currently consists of quarterly groundwater elevation measurement and groundwater sample collection for ten wells, laboratory analysis of samples, and reporting. Stormwater monitoring has been conducted and would continue as long as the stockpiles or portions of them are exposed to precipitation. Capital and O&M costs associated with this process option are considered low to moderate.

4.2.2 Removal

Removal is the excavation, loading, transportation, and offsite disposal in a permitted landfill of the stockpiled soil. Excavation would typically be performed using mechanical equipment such as a backhoe, front-end loader, or bulldozer and transportation would be by truck. The removed soil would have to meet a receiving landfill's waste-acceptance criteria.

Removal of the stockpiles would reduce COPC mobility, toxicity, and volume for the Site thereby eliminating routes of exposure for any future land use on the Site. Engineering controls and monitoring would be used to limit exposure to onsite workers during excavation and loading of soil. During excavation, air would be monitored to confirm that dust suppression methods (water spray) are effective in preventing airborne dust so that workers and offsite residents would not be exposed to COPCs.

There are no significant barriers to implementing this process option administratively. However, this option would require that the removed soil be replaced by importing an even larger volume of clean fill soil in order to construct the SR-132 Project. Capital costs for soil removal and replacement would be prohibitively high and no funding source is available. There would be no O&M of the stockpile area following removal and therefore no O&M costs. O&M of the facility where the stockpiles are disposed would be the responsibility of the facility operator.

4.2.3 Containment

The containment GRA includes technologies of stormwater runoff/infiltrations controls and capping. These technologies could be implemented individually or in combination and would eliminate exposure pathways and minimize potential stormwater infiltration. Each of the containment technologies is further described below.

Runoff/Infiltration Controls

Runoff/infiltrations controls process options considered for the stockpiles include grading and revegetation. Stormwater contact with stockpile soil and subsequent COPC transport can be reduced by grading for drainage. The surface topography of the stockpiles would be modified to direct stormwater off of the stockpiles into adjacent drainage swales, thus reducing potential infiltration into the stockpiles. Grading would reduce COPC mobility via potential leaching; however, it would not reduce COPC toxicity or volume. Grading, when applied in conjunction with other remedial actions (such as capping), could achieve the RAOs. There are no technical or administrative issues that would adversely affect the feasibility of implementing this process option. Capital and O&M costs associated with this process option would be moderate.

Revegetation may be an effective method of stabilizing surface soils, especially when performed in conjunction with (following) grading and capping. Revegetation would decrease erosion by wind and stormwater and, in combination with grading and capping, would minimize infiltration. There are no administrative issues that would adversely affect the feasibility of implementing this process option. Capital and O&M costs associated with this process option are considered to be low to moderate.

Capping

Soil in the stockpiles could be contained by placing a physical barrier (cap) over a portion or all of the stockpiles to minimize exposure and stormwater infiltration. As described in Section 1, the stockpiles were originally placed to be used as embankment fill as part of the planned construction of the SR-132 Project. Therefore, a cap over the stockpiles could consist of the components of the planned SR-132 Project including: roadways, retaining walls, and bridge abutments. Figures 4a and 4b show the current footprint of the stockpiles overlain by design drawings of the planned SR-132 Project. Figure 4a shows that Stockpiles 1 and 2 are situated such that, with minor consolidation of soil along the northern and southern edges of the stockpiles, they are planned to be covered by the SR-132 roadways and contained behind retaining walls and bridge abutments. Figure 4b shows that Stockpile 3, in its current configuration, will have to be partially relocated/consolidated to be capped by and contained within project roadways.

If the planned SR-132 project were not constructed, an alternative form of cap could consist of constructing a layer of clean soil (typically one foot thick) over the stockpiles. Prior to constructing the cap, the surface of the stockpiles would be graded for drainage to ensure primarily that stormwater did not pond on top of the stockpiles. Following construction, the cap surface would be vegetated to protect against stormwater and wind erosion.

Capping the stockpiles by either method would eliminate exposure pathways and reduce the mobility of COPCs in the soil; however, it would not reduce their toxicity or volume. This technology would be effective in meeting the RAOs for the project. This remedial technology is readily implementable from

a technical standpoint and there are no foreseeable administrative problems with implementation. Capital costs associated with either capping process option would range from moderate to high. O&M costs would range from low to moderate.

4.2.4 Treatment

The technology considered for the stockpiles under the treatment GRA is active chemical treatment of the soil by the process options of soil washing or soil mixing. Other types of treatment such as physical (i.e., separation) and biological were not considered because they are not applicable to the COPCs in the soil.

Soil Washing

This process option would be conducted ex-situ following excavation of the soil. Soil washing is a water-based process for removing COPCs from soil by dissolving or suspending them in the wash solution. The liquid stream may require additional treatment before disposal. This process option could be effective in reducing the toxicity and mobility of COPCs but would not reduce the volume. Soil washing is not a highly commercialized technology, and appropriate equipment and trained personnel are required. Such equipment and personnel may be available; however, this process option is considered difficult to implement technically. Capital costs for a soil washing system, including material handling equipment, process equipment, process materials, and labor, would be high. Additionally, space for the processing and transportation of the soil from its current location to a suitable processing location and then back would be problematic. As such, soil washing was not retained for further evaluation.

Soil Mixing

Soil mixing involves adding cement, fly ash, or other fixing agents to the soil to reduce the potential for COPC mobility through leaching. This process option would increase the volume of waste material. This process option is technically implementable but would require specialized equipment to perform the soil mixing. There are no significant administrative barriers to implementing this technology. Because of the large volume of soil that would be amended with a stabilizing agent, the capital costs for soil mixing for all stockpiled soil at the Site would be prohibitively high. Therefore, soil mixing was not retained for further evaluation.

4.2.5 Reuse/Recycle/Reclaim

This process option would consist of reuse of the soil as fill in an offsite location(s). There are no legitimate recycling or reclamation options for the soil. This option would be effective in eliminating the mobility and volume of the COPCs at the Site but would transfer the mobility, toxicity, and volume to an offsite, non-landfill location. This option would likely not receive regulatory approval and, as with removal to a landfill, would require replacement by importing an even greater volume of imported clean fill to the Site. Reuse/recycling/reclamation was not retained for further evaluation.

4.3 Technologies Screening Summary

Section 4.2 identified GRAs, remedial technologies for each GRA, and identified and evaluated process options that could be applicable under each technology in order to meet the RAOs. The criteria for screening of technologies and process options included cost, effectiveness, and implementability. Table 2 summarizes the screening methodology and results of the evaluation of each process option. "No action," institutional controls, removal, and containment were retained as alternatives for analysis and evaluation in Section 5.

5.0 EVALUATION OF ALTERNATIVES

In accordance with CERCLA guidance and the remedial technology screening in Section 4, four alternatives are retained for further evaluation in this FS:

- Alternative 1 - No action;
- Alternative 2 - Institutional controls;
- Alternative 3 - Removal (excavation and offsite disposal); and
- Alternative 4 - Containment.

Each of these alternatives is described in the following subsections then evaluated against the nine NCP criteria.

5.1 Evaluation Criteria

The nine NCP evaluation criteria are as follows:

Threshold Criteria:

1. Overall Protection of Human Health and the Environment
2. Compliance with ARARs

Balancing Criteria:

3. Long-Term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility, and Volume through Treatment
5. Short-Term Effectiveness
6. Implementability
7. Cost

Modifying Criteria:

8. Regulatory Acceptance
9. Community Acceptance

A description of each evaluation criterion is provided below. Remedial alternatives for the stockpiles were compared to the first seven of the nine criteria listed. Regulatory and community acceptance will be evaluated after the FS has been finalized and the preferred alternative is approved by the DTSC and CVRWQCB. The RAOs are stated in Section 3.3and include building the planned SR-132 Project using the stockpiles as embankment fill as originally intended, which in turn will provide a greater degree of protection of human health and the environment than currently exists. Therefore each alternative's attainment of the RAOs is presented in the evaluation of Overall Protection of Human Health and the Environment.

5.1.1 Threshold Criteria

Threshold criteria relate to statutory requirements that each alternative must satisfy in order to be eligible for selection.

Overall Protection of Human Health and the Environment

This criterion is used to assess each alternative's ability to protect human health and the environment. The assessment of overall protection describes how risks to human health and the environment are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls. While the HHRA and update to the HHRA found that potential exposure of onsite trespassers and offsite residents to COPCs under the current land-use and of construction workers and adjacent residents during the planned construction of the SR-132 Project does not pose an unacceptable risk or hazard, the detailed evaluation will still consider potential further reductions in risks to human health and the environment afforded by each alternative.

Compliance with ARARs

This evaluation criterion is used to determine whether each alternative would meet the Federal and State ARARs identified in Section 3. The ability of a remedial alternative to comply with certain ARARs that have been identified for the remedial action would depend entirely on the manner in which the remedy is implemented. For evaluation purposes, it is assumed that any remedy selected would be implemented in a manner that would meet these ARARs.

5.1.2 Balancing Criteria

Balancing criteria are used to evaluate the technical aspects of a remedial alternative and include the following:

Long-Term Effectiveness and Permanence

This criterion is used to assess the long-term ability of the remedial alternative to address the threshold criteria by (1) assessing the risk remaining at the site after implementation of the remedial alternative, and (2) evaluating the long-term adequacy and reliability of the remedial alternative, including requirements for management and monitoring.

Reductions in Toxicity, Mobility, and Volume of COPCs

This criterion is used to assess a remedial alternative's ability to reduce the inherent risk of the waste material. Technologies that permanently and significantly reduce toxicity, mobility, or volume are preferred over alternatives that only manage the stockpiles left in place. However, the degree of toxicity, mobility, or volume reduction achieved for the cost to achieve it is heavily weighted. Therefore, technologies that may have a significant effect on one or more of the criteria, but not necessarily all three, are strongly considered.

Short-Term Effectiveness

This criterion is used to assess the risks posed to the community, workers, and the environment during the implementation of a remedial action. Measures that would be taken to mitigate these risks will be addressed under this criterion. This criterion also considers the time required to achieve RAOs.

Implementability

This criterion is used to assess the technical feasibility (constructability, reliability of technology, operation, and monitoring requirements), administrative feasibility (coordination with other agencies), and availability of services and materials (labor, equipment, and materials) to implement an alternative.

Cost

This criterion is used to assess the anticipated capital and annual O&M and monitoring costs associated with each alternative over a 30-year period. Capital and annual costs in this FS are presented in 2013 dollars. Cost estimates are provided in Tables 3 through 7.

5.1.3 Modifying Criteria

The modifying criteria, regulatory and community acceptance, are as follows:

- Regulatory acceptance - this assessment evaluates the technical and administrative issues and concerns the DTSC and CVRWQCB may have regarding each of the alternatives.
- Community acceptance - this assessment evaluates the issues and concerns the public may have regarding each of the alternatives. These criteria will be addressed after the public comment period for the RAP and are not addressed or evaluated as part of this FS.

5.2 Evaluation of Alternatives

The remedial alternatives for the stockpiles are assessed with regard to their ability to meet the seven applicable NCP criteria.

5.2.1 Overall Protection of Human Health and the Environment

This criterion is an evaluation of the effect that each of the alternatives would have on human health and the environment. The evaluation of this criterion primarily addresses both existing and post-construction conditions, except where onsite construction activities have a potentially significant offsite impact (i.e., airborne dust generation).

Alternative 1 - No action

Under a no-action scenario the stockpiles would remain in place. There would be no access restrictions, no fencing, and no monitoring and maintenance. However, as long as Caltrans continues to own and control the property as State right-of-way they would maintain the perimeter fence and continue restricting access to Caltrans-authorized personnel. Therefore, the most likely site occupant would be a trespasser. The 2007 HHRA and recent update to the HHRA concluded that the concentrations of COPCs

in the stockpiles do not pose an unacceptable level of health risk to an onsite trespasser. The no action alternative can therefore be considered protective of human health as long as land use remains the same and access is restricted.

The no action alternative would be the least protective of the environment in that it would not reduce the contaminant mass or the potential of the COPCs to impact surface or groundwater quality.

Alternative 2 – Institutional Controls

In their memo of December 17, 2009, the DTSC indicated that the stockpiles in their current condition do not pose an unacceptable risk to human health for: Caltrans workers, trespassers, or offsite residents adjacent to the stockpiles based on continued management of the stockpiles. Management of the stockpiles consists of: limiting access to only Caltrans-authorized personnel, inspecting and maintaining the chain-link fence, prohibiting any activities involving excavation/grading, off-site removal of soil, or placement of other soil on the Site, and maintaining the current vegetative cover. They also stated that Caltrans should continue to maintain the groundwater monitoring system at the Site. These management activities and site conditions constitute institutional controls. Based on the DTSC's statement, this alternative is protective of human health and the environment.

Alternative 3 - Removal

Excavation and offsite disposal of the stockpiles would provide good overall protection of human health and the environment with respect to eliminating potential exposure to COPCs in the soil. However, excavation and transportation of the soil could increase the short-term risk of exposure to receptors adjacent to the Site and along the transportation route from airborne dust and diesel exhaust emissions from construction equipment and trucks hauling soil from the project and clean replacement fill back to the project. Engineering controls (e.g., water spray and air monitoring) would mitigate airborne dust generation. Diesel exhaust and greenhouse gas emissions (GHGEs) could be limited by use of certain practices during construction (e.g., use of high efficiency engines, proper equipment maintenance, no idling of equipment, etc.), but not eliminated as use of heavy equipment is required and the only means of transportation of stockpile soil to landfills and clean fill soil back to the Site would be by truck. GHGEs for removal of the stockpiles and replacement with clean fill have been calculated to be 529,200 pounds of CO_2. GHGE calculations are shown in Appendix A.

Alternative 4 – Containment

This alternative will provide an improved level of protection of human health and the environment over Alternatives 1 and 2 through further elimination of the exposure routes to COPCs in the stockpiles and by decreasing the potential for stormwater to contact COPCs and impact surface or groundwater quality. Construction of the project will ultimately cap and encapsulate the soil completely by containing it behind retaining walls, bridge abutments, slope pavements, and beneath roadway pavement, and either pavement or a synthetic liner and clean soil cap in median areas. During the interim progress phase of the project, not all of the retaining walls will be constructed and the

northern portions of Stockpiles and 1 and 2 will be graded for drainage and a clean soil cap placed over the stockpiles and vegetated. This temporary cap will remain in place and be maintained until the ultimate build-out.

If the SR-132 project were not constructed, then the containment alternative could be implemented by placing a clean soil cap over the stockpiles. This form of a cap would provide a similar degree of protection of human health and the environment as capping by the SR-132 project.

5.2.2 Compliance with State and Federal Requirements

This criterion is an evaluation of whether each of the three alternatives will comply with applicable State, and/or Federal regulations.

Alternative No. 1 - No action

This alternative would not meet State or Federal regulations with respect to hazardous waste levels of COPCs in soil on the Site because of the lack of site control and public notification.

Alternative 2 – Institutional Controls

This alternative complies with State and/or Federal regulations under the Site's current inactive (but maintained and monitored) use as long as the Site remains fenced, its vegetative cover maintained, and groundwater quality monitoring continues.

Alternative 3 - Removal

This alternative would comply with State and Federal regulations as the soil would be removed from the Site and potential for exposure to COPCs and threat to the environment would be mitigated. This alternative would comply with the SJVAPCD's Rule 8021 regarding fugitive dust emissions during construction as long as dust suppression (water spray) was adequately performed during earthmoving activities. A dust control plan would have to be prepared and submitted to and approved by the SJVAPCD's Air Pollution Control Officer and must provide the required notification prior to commencing earthmoving activities.

Alternative 4 – Containment

This alternative by either type of cap (the planned construction of the SR-132 Project or placement of a vegetated clean soil layer) would comply with State and Federal regulations in that either form of cap would be protective of human health and the environment (groundwater).

5.2.3 Long-term Effectiveness and Performance

This criterion evaluates whether each of the three alternatives will provide long-term protection of human health and the environment from exposure to COPCs in the stockpiles.

Alternative 1 - No action

This alternative would not be effective in the long-term because access to the stockpiles would not be controlled and therefore potential exposure to COPCs not mitigated. Additionally, stormwater contact with COPCs and impact to surface or groundwater quality would not be mitigated.

Alternative 2 – Institutional Controls

This alternative would be effective in the long-term because the COPCs do not pose a threat to human health of an onsite trespasser or offsite residents as long as access continues to be controlled. Under this alternative, the site perimeter fence would be monitored and maintained to restrict access, and the vegetative cover would continue to minimize erosion and potential offsite transport via wind or stormwater. Informational technologies such as public notification via site signage, published notices, and public meetings, if warranted, could help to keep the public informed of the site conditions and status. Governmental and administrative controls such as a deed restriction and land use covenant would prevent the site from being developed for uses that may not be suitable under the current site conditions such as residential or other "sensitive" land uses.

Alternative 3 - Removal

This alternative would be effective in the long-term, because removal of the stockpiles would mitigate any potential for exposure to COPCs in the stockpiles.

Alternative 4 – Containment

This alternative would also be effective in the long-term as either form of a cap would isolate and encapsulate the soil for the indefinite future. A vegetated clean soil layer cap would likely require a greater degree of long-term monitoring and maintenance to ensure that the cap and vegetative cover remain viable and effective.

5.2.4 Reduction of Toxicity, Mobility, and Volume

This criterion is used to assess the ability of each alternative to reduce the toxicity, mobility, or volume of COPCs in the stockpiles.

Alternative 1 - No action

This alternative will not reduce the toxicity, mobility, and/or volume of COPCs in the stockpiles. Regarding toxicity, the 2007 HHRA and 2013 update demonstrated that the concentrations of COPCs do not pose an unacceptable level of health risk to an onsite trespasser, offsite resident, or future user of shallow groundwater. Therefore, the concentrations of COPCs are not considered to be toxic for those users. If under no action, other land uses occurred (unlikely given Caltrans' ownership of the property), then the potential health risk specific to those uses would have to be evaluated.

With respect to mobility of the COPCs in the stockpiles, mobility via erosion from wind or stormwater infiltration is limited by the vegetative cover. Further, COPC concentrations in groundwater samples collected from monitoring wells adjacent to and downgradient of, and native soil samples collected from beneath, the stockpiles are inconclusive with respect to COPC migration from the stockpiles.

Alternative 2 – Institutional Controls

This alternative will also not reduce the toxicity (low), mobility, or volume of COPCs in the stockpiles. However, as stated above, the health risks associated with the COPC concentrations have been demonstrated to be at acceptable levels for site trespassers and offsite residents under the current site conditions and controls.

Alternative 3 - Removal

This alternative would be the most effective in reducing the toxicity, mobility and volume of COPCs as the stockpiles would be completely removed from the Site and disposed of in an appropriate, permitted landfill.

Alternative 4 – Containment

This alternative by either form of cap will further reduce the potential mobility of the COPCs in the stockpiles via an impermeable surface that would preclude infiltration, but will have no effect on toxicity (low) or volume. The stockpiles would be isolated and encapsulated either within the planned SR-132 project behind retaining walls, bridge abutments, beneath roadway pavement, and either pavement or a synthetic liner and vegetated clean soil layer in the median areas or beneath a vegetated clean soil layer over all of the stockpiles. The toxicity and volume of COPCs would not change. This alternative would be the second-most effective in reducing the mobility of the COPCs in the stockpiles.

5.2.5 Short-term Effectiveness

This criterion evaluates the impacts of each alternative prior to and during construction of the project.

Alternative 1 - No action

This alternative would be effective for the period of time in which the site remained fenced thereby continuing to limit access to the Site. Without fence monitoring and maintenance, however, it would become the least effective of the four alternatives in the short-term.

Alternative 2 - Institutional Controls

This alternative would be effective in the short-term as the current fencing, vegetative cover, and stockpile configurations/slopes and top deck slope grade would remain as-is continuing to provide sufficient protection of human health and the environment.

Alternative 3 - Removal

With implementation of best management practices (BMPs) such as dust control (water spray application) and air monitoring, soil track-off controls, and transportation planning (e.g., route planning, load tarping, etc.) during soil handling activities (excavation, loading, and transportation), removal would be effective in the short-term. However, under this alternative, truck traffic on roads in the site vicinity would increase dramatically for both removal of the material and replacement with imported fill material. Removal of the stockpiled soil for offsite disposal is estimated to require 175 truckloads per day over an approximate 30-day period. A similar number of loads and time would be required to import clean fill material to replace the stockpiles. Air emissions from heavy equipment (e.g., graders, excavators, loaders) and trucking will be significantly increased for this alternative relative to all other alternatives and the work would fall under the SJVAPCD's Indirect Source Review Rule 9510. The short-term impact to air quality from airborne dust and diesel exhaust emissions, local traffic, and roads may not be acceptable to the community and local government. In addition, as described in Section 5.2.1, GHGEs attributable to heavy equipment operations and truck transportation during removal of the stockpiles and replacement with clean fill are estimated at 529,200 pounds of CO^2.

Alternative 4 – Containment

Similar to the removal alternative, with implementation of BMPs, either form of capping of the stockpiles should be effective in the short-term.

5.2.6 Implementability

This criterion evaluates the implementability of each of the alternatives.

Alternative 1 - No action

No action is readily implementable because it requires no labor, materials, or equipment.

Alternative 2 – Institutional Controls

This alternative is also readily implementable in that it requires minimal labor, materials, and equipment to monitor the Site and maintain fencing and the vegetative cover and is currently ongoing. Groundwater and stormwater monitoring are also ongoing, so there would be no change in those activities.

Alternative 3 - Removal

This alternative is technically implementable. However, other constraints to this alternative exist that decrease its implementability. Those constraints include a significant increase in truck traffic on adjacent and nearby roads for a period of approximately 60 days, an increased potential for offsite exposure due to generation of airborne dust from truck loads or spillage, and prohibitively high cost with no funding source. Potential landfill capacity to accept the soil has been confirmed and should not affect the implementability of this alternative.

Alternative 4 – Containment

This alternative in either form is readily implementable. The SR-132 project is currently being planned and designed by Caltrans and StanCOG. The volume of soil requiring excavation from Stockpiles 1 and 2 for consolidation behind retaining walls and bridge abutments is not significant. The cross-sections shown on Figures 7, 8, and 9 depict the portions of the stockpiles that are outside where project retaining walls will be constructed and therefore will be excavated and placed on top of the stockpiles where additional fill is needed. As shown on Figures 5b (plan view) and 9 (cross-section) Stockpile 3 will be nearly entirely removed from its location and placed in the embankment for the eastern side of the SR-99 bridge (Figure 5b).

5.2.7 Cost

Alternative 1 - No action

There is no cost associated with this alternative.

Alternative 2 – Institutional Controls

The costs associated with ongoing maintenance and monitoring, which includes as-necessary fence maintenance, annual mowing of the vegetative cover to reduce fire danger, and quarterly groundwater monitoring and weather-dependent stormwater monitoring is on the order of $50,000 per year (Table 3). This cost is considered to be low to moderate and is the second least costly of the four alternatives.

Alternative 3 - Removal

Removal of the stockpiles through excavation, loading, transportation, and disposal at an offsite landfill is the most costly of the alternatives at approximately $21.5 million (Table 4). Disposal cost assumes disposal of a portion of the stockpile soil (primarily from Stockpile 1) in a Class II (non-hazardous) facility and a portion (primarily from Stockpile 2) in a Class I (California hazardous). The cost of this alternative also includes replacement of the stockpiles by importing clean fill material. There is no funding available for removal.

The cost of removal of Stockpile 3 only was estimated at $2.65 million (Table 7). The cost assumes that all of the soil in Stockpile 3 would be disposed of in a Class II (non-hazardous) facility. As stated above, there is no funding available for removal.

Alternative 4 – Containment

The cost of containment by capping beneath the planned SR-132 project, including excavation of portions of the stockpiles and consolidation behind retaining walls, bridge abutments, and beneath a vegetated clean soil cap and roadway pavement, is considered to be moderate to high for capital costs and moderate in terms of ongoing monitoring and maintenance (Table 5). The bulk of the capital cost of this alternative will be in grading of the soil for the interim progress phase of the project, placement of the

clean soil cap over the northern portions of Stockpiles 1 and 2, and placement of paving or a synthetic liner and clean soil cap over median areas for the ultimate build-out of the SR-132 Project.

The cost of containment by capping beneath a vegetated clean soil layer if the SR-132 project were not constructed is considered to be moderate to high for capital costs and moderate in terms of ongoing monitoring and maintenance (Table 6). The bulk of the capital cost of this alternative will be in grading of the stockpiles for drainage, placement of a one-foot-thick layer of clean soil over the stockpiles, and revegetation.

Monitoring costs for groundwater and stormwater monitoring will likely continue at levels similar to current costs until the ultimate build-out is complete. If the CVRWQCB approves a decrease in monitoring frequency, then annual monitoring costs would decrease.

5.2.8 Regulatory Acceptance

Each of the four alternatives is evaluated against this criterion to determine whether it meets legal and technical standards for regulatory acceptance.

Alternative 1 - No Action

This alternative would not be acceptable to the regulatory agencies because access to the Site would not be controlled, and groundwater quality monitoring would not continue.

Alternative 2 – Institutional Controls

This alternative currently has acceptance from the DTSC and CVRWQCB for the short-term with the understanding that Caltrans is moving forward with planned construction of the SR-132 project, which will encapsulate the stockpiles (Alternative 4).

Alternative 3 - Removal

This alternative also would likely receive regulatory acceptance from the DTSC and CVRWQCB because removal and offsite disposal of the stockpiles would reduce the level of health risk for any future land use and threat to the environment to the greatest extent possible. It would also receive regulatory acceptance from the SJVAPCD as long as dust suppression measures in accordance with a dust control plan were appropriately implemented.

Alternative 4 – Containment

This alternative is anticipated to receive regulatory acceptance by further eliminating exposure pathways to COPCs in the soil and reducing their mobility through encapsulation either within the planned SR-132 project or beneath a vegetated clean soil cap if the SR-132 project is not constructed.

5.2.9 Community Acceptance

This criterion involves the evaluation of whether each of the alternatives would be acceptable to the community.

Alternative 1 - No Action

Although the presence of the stockpiles has been generally acceptable to the community for five decades, this alternative would likely not remain acceptable to the public due to an increased perception of risk to human health and the environment associated with the stockpiles.

Alternative 2 – Institutional Controls

This alternative may be acceptable to the community if the current institutional controls (e.g., access restrictions, continued site monitoring and maintenance, and communication regarding the low level of risk to human health and the environment) continue to be implemented.

Alternative 3 - Removal

This alternative may be acceptable to the community because removing the stockpiles would likely eliminate any residual concern regarding health risk related to the stockpiles. In the short-term, the community may be averse to the perception of potential exposure to COPCs in airborne dust as soil is being excavated then transported along public roads to disposal facilities. There may also be some concern regarding increased truck traffic over an approximate 60-day period for offhaul of soil from the Site and import of new clean fill to replace the stockpiles. However, dust suppression and monitoring during excavation and loading by water spray, proper covering of waste loads, and appropriate routing of truck traffic would likely help the community to accept this alternative.

Alternative 4 – Containment

This alternative in either form of cap would likely be acceptable to the community because of the reduced potential for exposure to COPCs as a result of containment of the stockpile soil beneath the project. Some community opposition to the project exists which is unrelated to the stockpiles. Caltrans and StanCOG are moving forward with the planned SR-132 project, and public participation will continue through additional public informational meetings and a public hearing during public review of the draft environmental document and RAP. The public participation process will continue to afford the community opportunities to comment on the project and for StanCOG and Caltrans to respond to those comments with the intent of increasing community support for the project.

If the SR-132 project were not constructed, the alternative of constructing a vegetated clean soil cap over the stockpiles would likely receive the same community acceptance because of the same reduced potential for exposure to COPCs. The public participation process could proceed as planned for the SR-132 project. However, an environmental document would likely not need to be prepared, therefore a public hearing would not likely be necessary. An additional public meeting could be held to discuss the difference between the clean soil cap and the SR-132 project.

5.3 Comparative Analysis

This section provides a comparative analysis of the four alternatives which forms the basis for selection of the preferred alternative.

5.3.1 Alternative 1 – No Action

This alternative would provide the lowest level of overall protection of human health and the environment of the four alternatives. The level of protection for the onsite trespasser and offsite resident would remain the same as the current controlled condition, but the health risk for other land uses and receptors would need to be further evaluated. This alternative would have the lowest level of regulatory acceptance because of the lack of site controls and monitoring and maintenance. It also would likely have the lowest level of community acceptance due to the perceived threat to human health and the environment. This is the least costly of the alternatives and is the most implementable.

5.3.2 Alternative 2 – Institutional Controls

This alternative provides a higher level of protection to human health and the environment than no action and has regulatory acceptance by the DTSC. Although the DTSC has stated that the stockpiles do not pose a risk to human health for Caltrans workers, trespassers, or offsite residents under the current controlled and monitored conditions, the CVRWQCB has indicated that the stockpiles would need to be maintained in order to protect groundwater quality if the SR-132 Project were not constructed. Due to the perception by the public of some degree of health risk or threat to the environment, a more proactive remedial action is likely preferred by the community. This alternative is the second lowest in cost and the second most implementable.

5.3.3 Alternative 3 – Removal

Removal of the stockpiles and disposal in an offsite landfill would provide the greatest degree of protection of human health and the environment and may be the most acceptable to the DTSC, CVRWQCB, and the community. Short-term impacts would be the greatest with this alternative due to potential air quality and traffic impacts. Air emissions from soil removal equipment (e.g., graders, excavators, loaders) and trucking will be greatest with this alternative. This alternative could be performed in compliance with State and Federal requirements. Although technically implementable, it is the least implementable of the four alternatives due to the cost for which there is no funding. In addition, if the stockpiles, which were placed specifically for the planned SR-132 Project, were removed, they would have to be replaced with an even greater amount of clean soil fill in order to complete the project making the cost even greater. The cost of removal and replacement is not warranted for the degree of protection of human health and the environment achieved.

5.3.4 Alternative 4 – Containment

Containment of the soil by either form of cap will provide the second highest level of protection of human health and the environment of the four alternatives. Capping will eliminate routes of exposure to COPCs in the soil and minimize the potential for storm water infiltration. Short-term exposure to construction personnel and adjacent residents could be minimized through the implementation of

dust controls (e.g., water spray of disturbed areas). Long-term protection of human health and the environment would be provided by containment of the soil beneath either type of cap. This alternative can be performed in compliance with State and Federal requirements. This alternative would be implemented with DTSC and CVRWQCB oversight; therefore, regulatory acceptance is anticipated. This alternative should also be acceptable to the community as it is protective of human health and the environment. It is the third most costly of the alternatives, but significantly less than removal. It is the third most implementable of the alternatives, but its implementability is considered to be good as the stockpiles would be used for their originally intended purpose.

5.4 Description of Recommended Alternative

Based on the screening of alternatives and comparative analysis, **Alternative 4 – Containment** is the recommended alternative. Containment will be achieved by use of the stockpiles in construction of the SR-132 Project, which requires a significant amount of fill for the embankments of the SR-132/SR-99 interchange portion of the project and is the reason the stockpiles were placed on the Site in the early 1960s.

For the SR-132 project the stockpiled soil will be contained behind retaining walls and bridge abutments and beneath roadway pavements of the project. As described in Section 1, the project will be constructed in two phases – the interim progress phase to be completed by 2018 and the ultimate build-out to be completed by 2028. The interim progress phase of the project will consist of a two-lane roadway, which will be constructed over the southern portions of Stockpiles 1 and 2. The northern portions of Stockpiles 1 and 2, which will not be contained beneath roadways and behind retaining walls and bridge abutments, will be graded for drainage and capped with a minimum 6- to 12-inch-thick vegetated, clean soil cap. Figures 5a and 5b show the interim progress phase of the project in plan view and indicate the portion of the stockpiles which will be temporarily covered by the clean soil cap until the ultimate build-out of the project is completed. Figures 6a and 6b show the ultimate project build-out in plan view and depict the complete containment of the stockpiles within the project retaining walls and beneath roadway pavements. Also shown on Figures 6a and 6b is that the median between the eastbound and westbound lanes of SR-132 will be covered by either pavement or a synthetic liner and clean soil layer.

Figures 7, 8, and 9 show cross-section views of the interim progress and ultimate build-out phases of the project for Stockpiles 1, 2, and 3, respectively. The cross-sections show:

- the sloping for drainage and clean soil cap over the northern portions of Stockpiles 1 and 2 during the interim progress phase and the complete containment of the stockpiles by the ultimate build-out;
- the pavement or liner cover over the median areas of the ultimate build-out;
- where the outer edges of the current stockpiles will be cut (in yellow) and placed on top of the stockpiles in the “stockpile fill consolidation zone.”

Stockpile 3 will be treated differently than Stockpiles 1 and 2 in that it is planned to be entirely contained within the interim progress phase of the project. As much of Stockpile 3 as possible will be placed in the stockpile fill consolidation zone within the eastern abutment for the SR-132 bridge over SR-99 (Figures 5b and 9). The remainder of Stockpile 3 will then be placed in the stockpile fill consolidation zone of Stockpile 2 (Figure 8). At the request of the CVRWQCB, the costs were estimated to completely remove Stockpile 3, dispose of it offsite in an appropriate landfill, and import an equal volume of clean replacement fill (Table 7).

Once approved, this alternative will be described in greater detail in the RAP, which will be made available for public review and comment as part of the environmental document for the project. After approval of the RAP, the details of construction of the project will be presented in a Remedial Design Implementation Plan.

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Caltrans Modesto Soil Stockpiles

Stanislaus County, California

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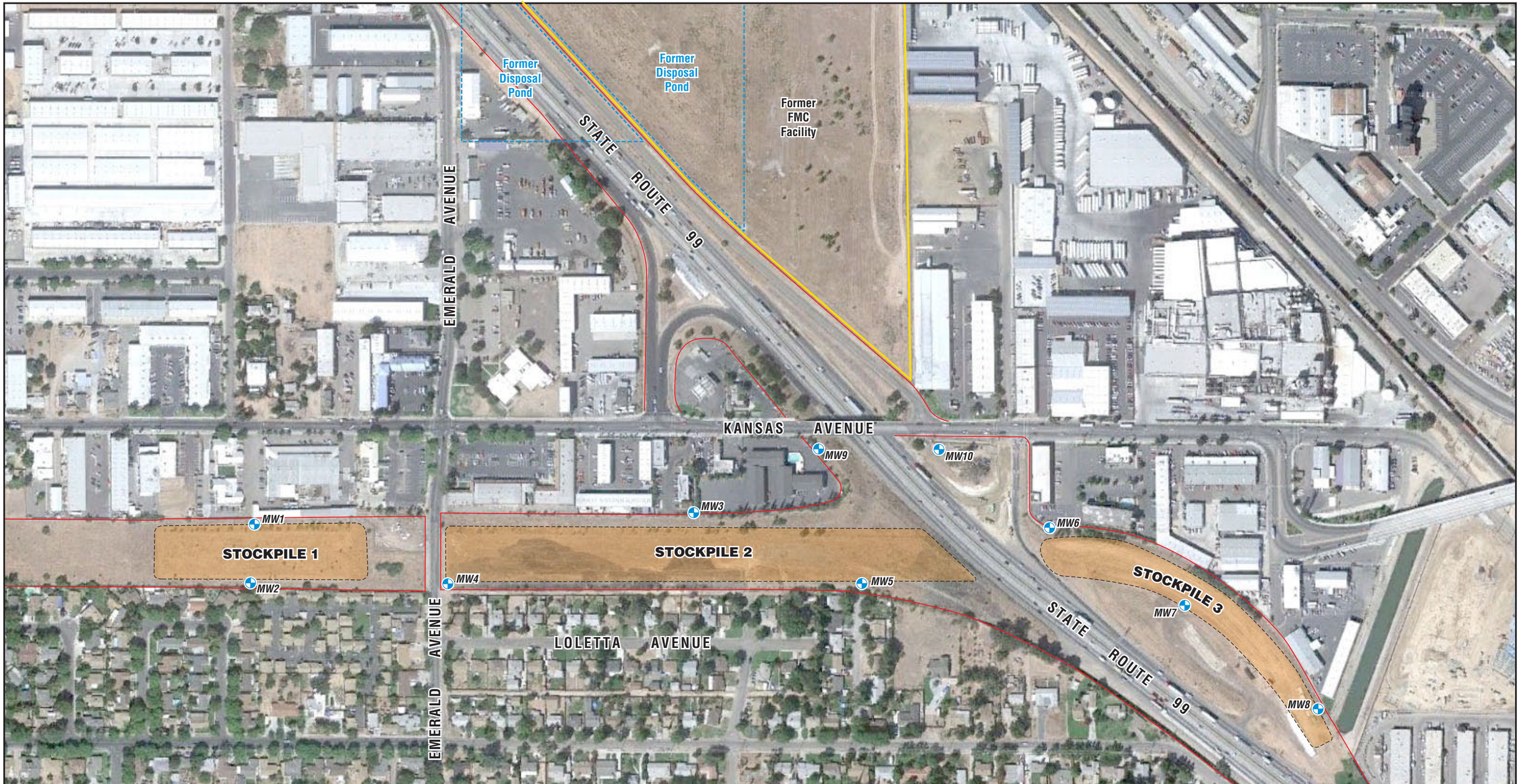
VICINITY MAP

Task Order No. 17 | June 2014 | Figure 1



LEGEND:

MW8 Approximate Monitoring Well Location

State Right-of-Way Boundary

N

0 300

Scale in Feet

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Caltrans Modesto Soil Stockpiles

Stanislaus County, California

GEOCON Proj. No. S9800-01-17

Task Order No. 17

SITE PLAN

June 2014

Figure 2

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1963 AERIAL PHOTOGRAPH

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GEOCON Proj. No. S9800-01-17	Stanislaus County, California	
Task Order No. 17	June 2014	Figure 3a

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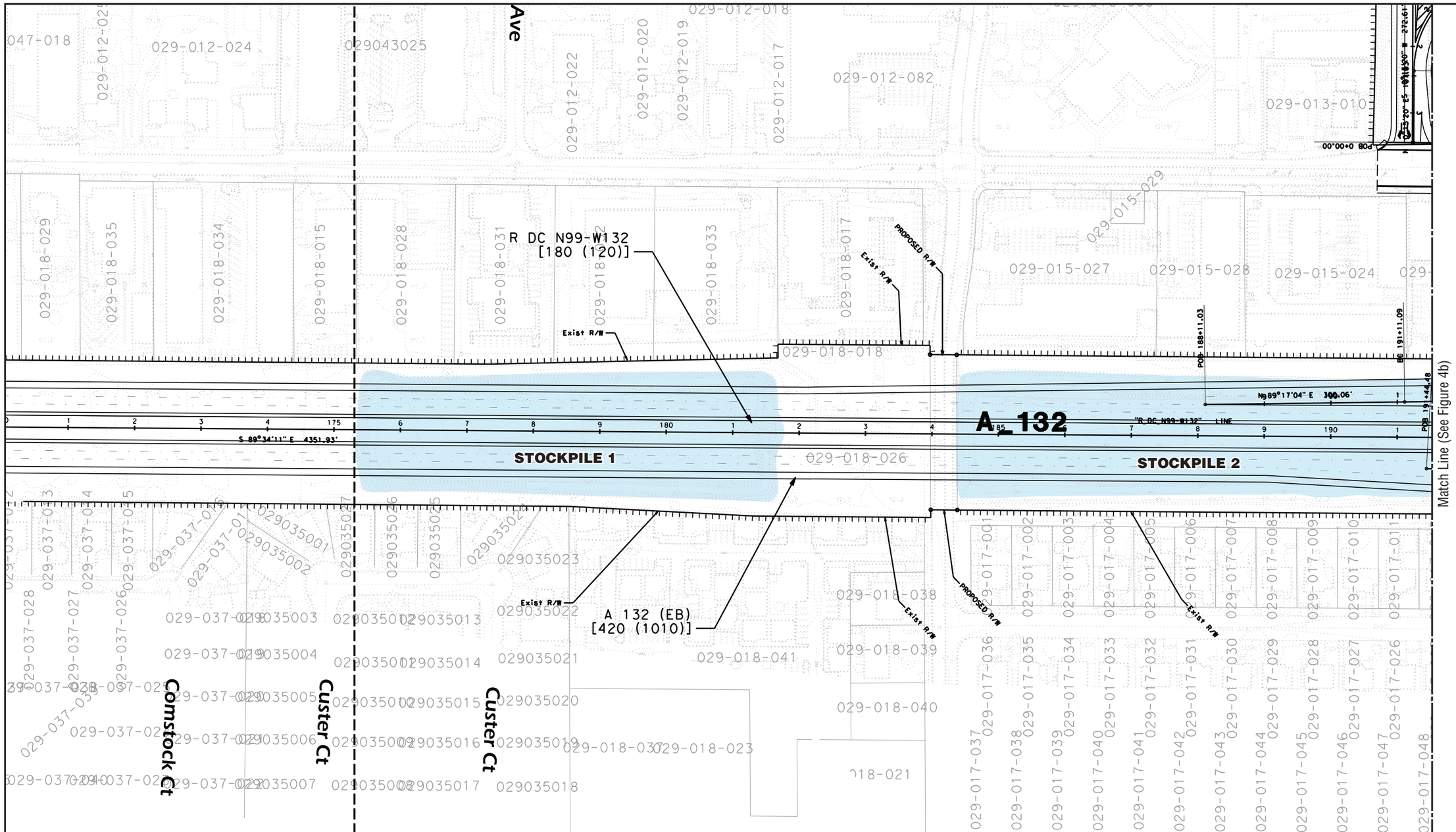
1967 AERIAL PHOTOGRAPH

Caltrans Modesto Soil Stockpiles		
GEOCON Proj. No. S9800-01-17	Stanislaus County, California	
Task Order No. 17	June 2014	Figure 3b



Soil Stockpile

N

0 150
Scale in Feet

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Stanislaus County, California	**SITE PLAN STOCKPILES 1 AND 2**
GEOCON Proj. No. S9800-01-17	
Task Order No. 17	June 2014 — Figure 4a

Match Line (See Figure 4a)

STOCKPILE 2

STOCKPILE 3

Soil Stockpile

0 150

Scale in Feet

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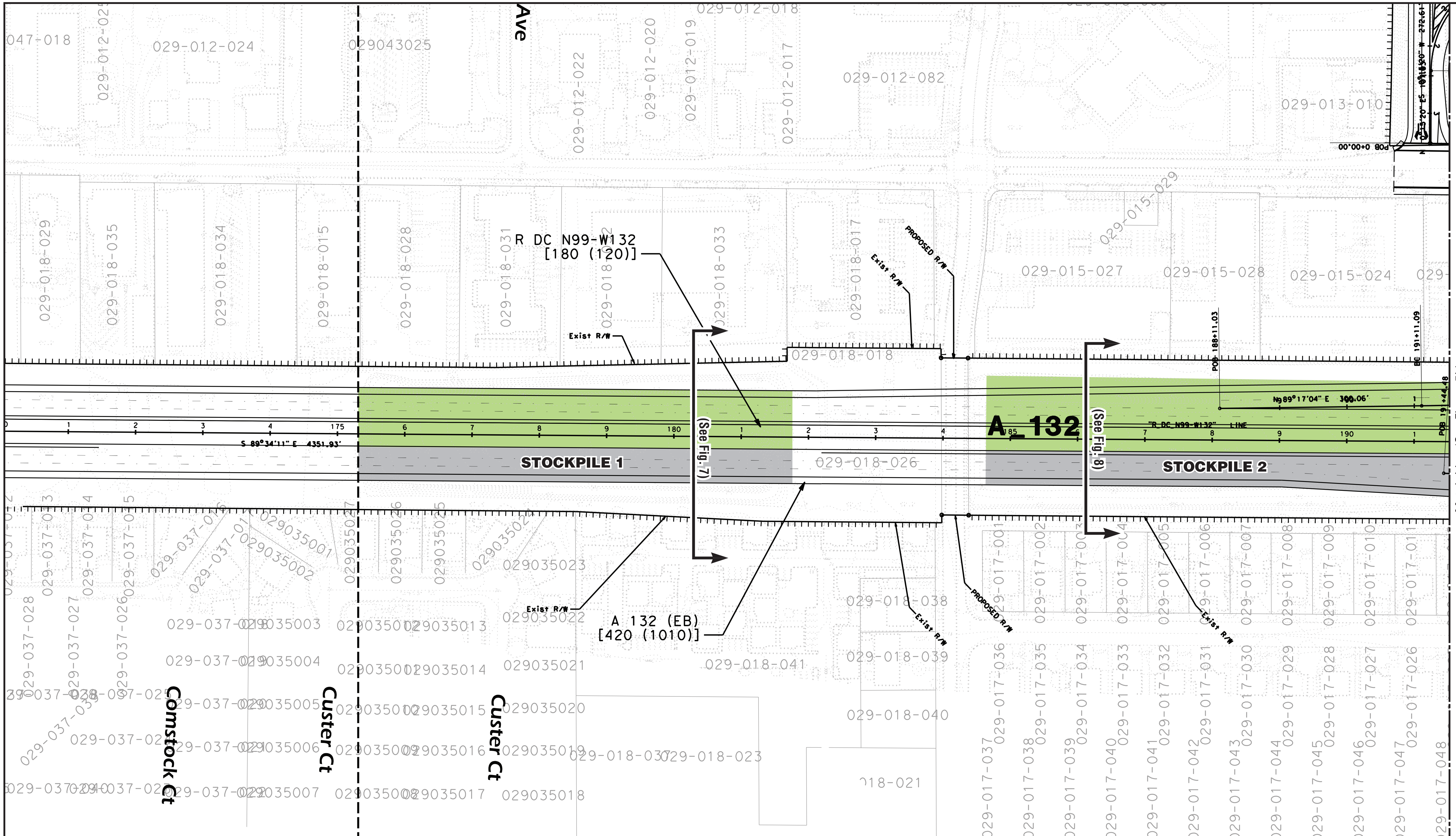
Stanislaus County, California	**SITE PLAN STOCKPILES 2 AND 3**	
GEOCON Proj. No. S9800-01-17		
Task Order No. 17	June 2014	Figure 4b



Structural Pavement Section	
Minimum 6 - 12 Inches Clean Cover Soil	

Cross-Section Location

N

0 150
Scale in Feet

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Caltrans Modesto Soil Stockpiles

Stanislaus County, California	**Stockpile Containment by Capping Plan – Interim Progress Phase**	
GEOCON Proj. No. S9800-01-17		
Task Order No. 17	June 2014	Figure 5a

Match Line (See Figure 5a)

STOCKPILE 2

STOCKPILE 3

Roadways to be Constructed for Project Ultimate Build-Out

Structural Pavement Section

Minimum 6 - 12 Inches Clean Cover Soil

Cross-Section Location

N

0 150

Scale in Feet

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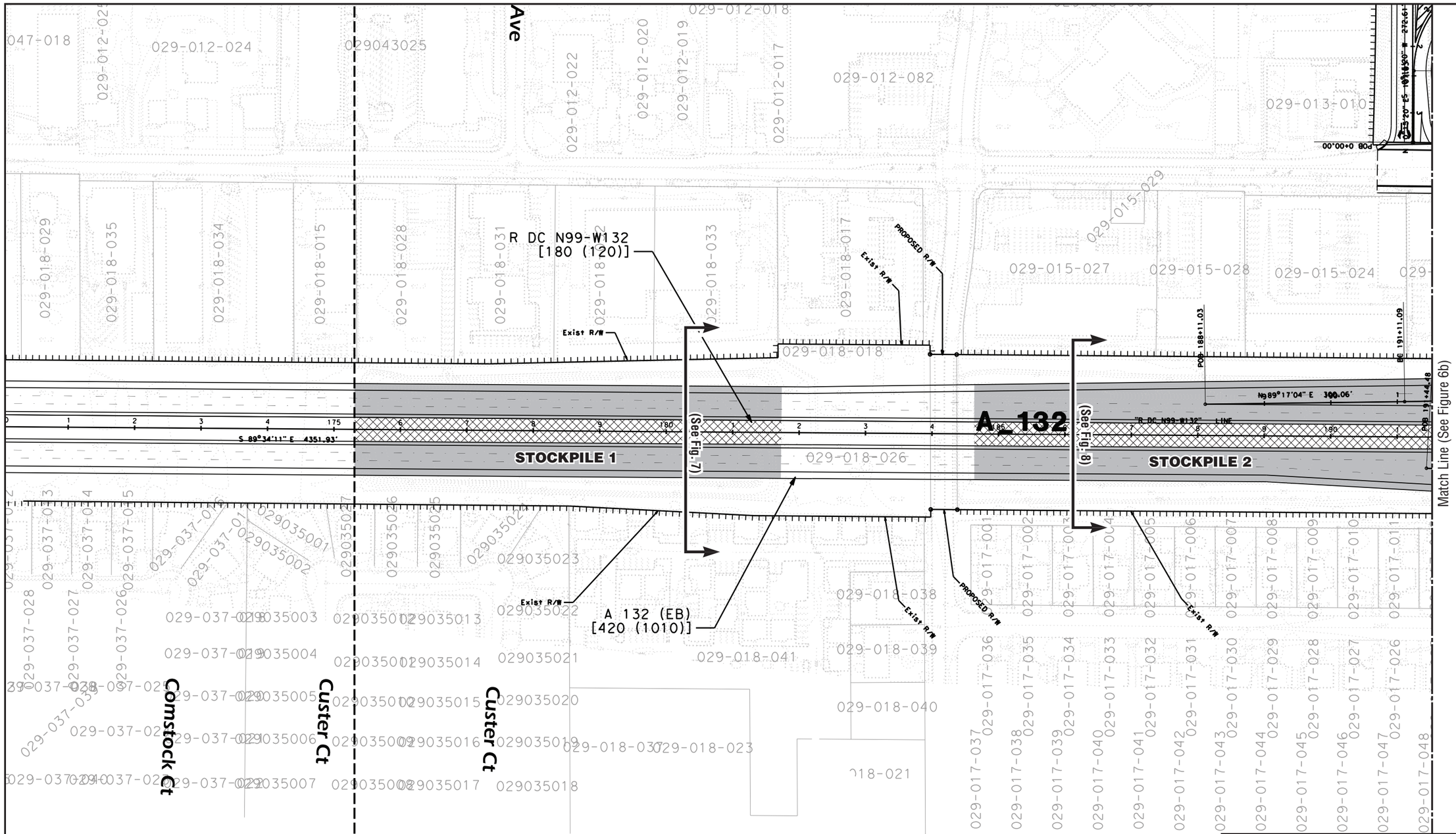
Caltrans Modesto Soil Stockpiles

Stanislaus County, California	**Stockpile Containment by Capping Plan – Interim Progress Phase**	
GEOCON Proj. No. S9800-01-17		
Task Order No. 17	June 2014	Figure 5b



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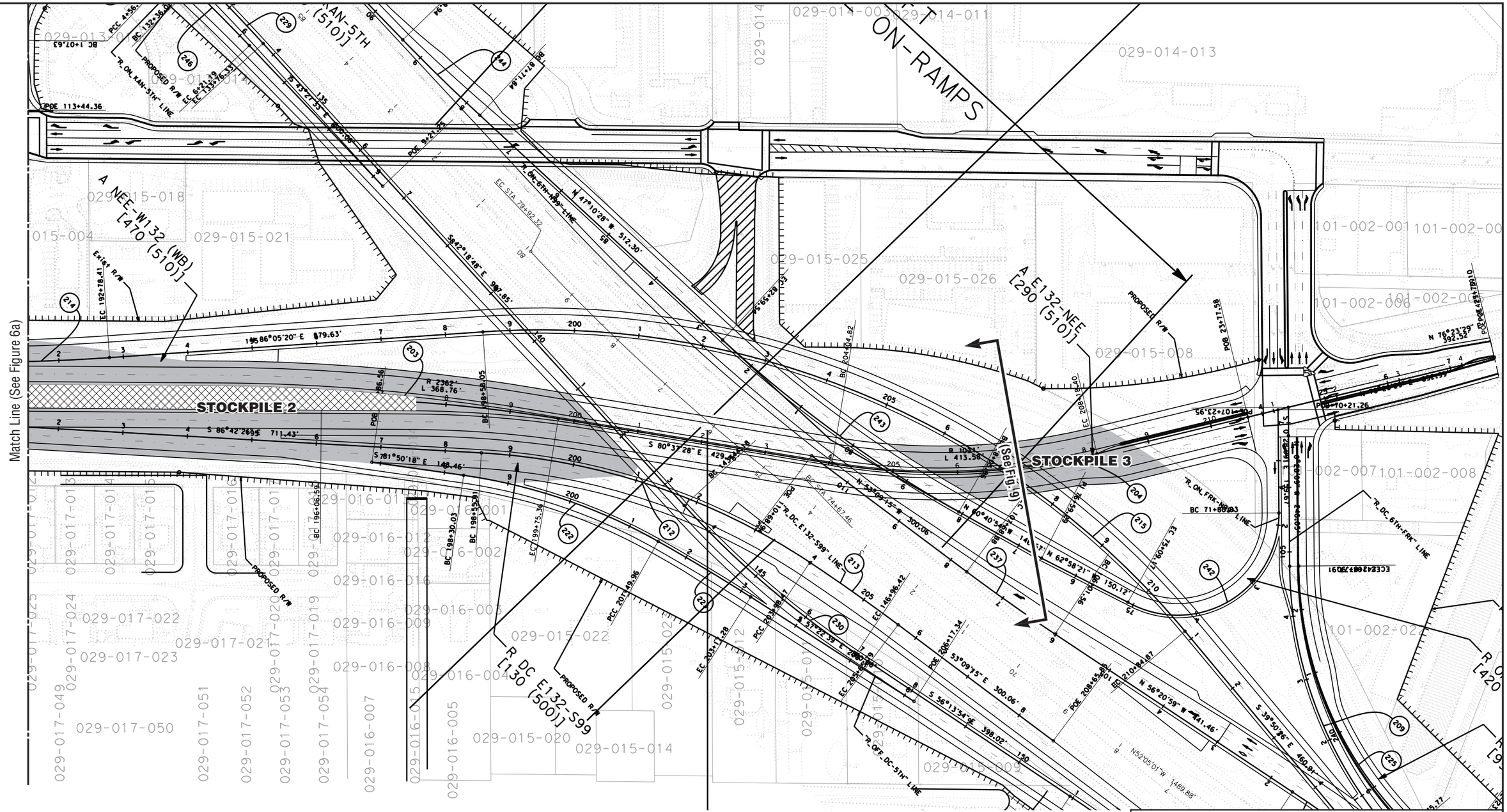
Caltrans Modesto Soil Stockpiles

Stanislaus County, California	**Stockpile Containment by Capping Plan – Ultimate Project Build-Out**
GEOCON Proj. No. S9800-01-17	
Task Order No. 17	June 2014 — Figure 6a



Structural Pavement Section

Pavement or Liner in Median

Cross-Section Location

0 150

Scale in Feet

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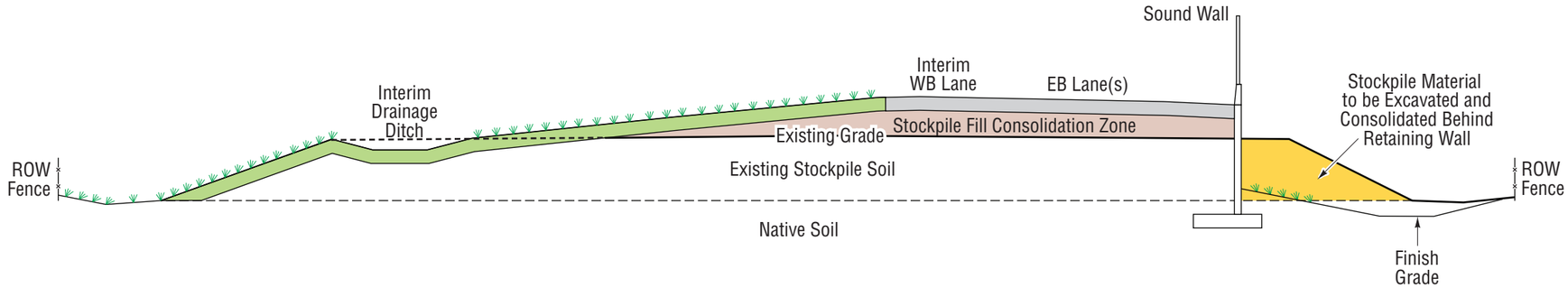
Caltrans Modesto Soil Stockpiles

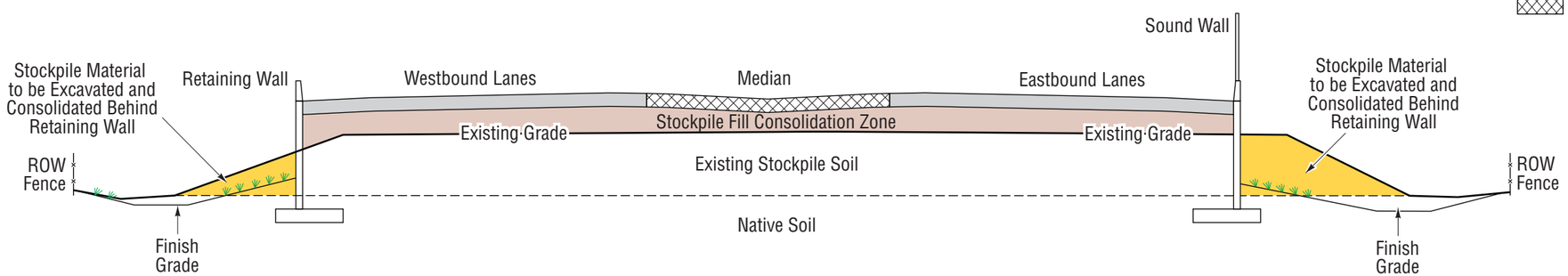
Stanislaus County, California	**Stockpile Containment by Capping Plan – Ultimate Project Build-Out**	
GEOCON Proj. No. S9800-01-17		
Task Order No. 17	June 2014	Figure 6b

Interim Progress Phase Cross-Section – Stockpile #1 (Typical)



- Structural Pavement Section
- Minimum 6 - 12 inches Clean Cover Soil
- Stockpile Soil to be Removed
- Stockpile Fill Consolidation Zone
- Pavement or Liner in Median

Ultimate Project Build-Out Cross-Section – Stockpile #1 (Typical)



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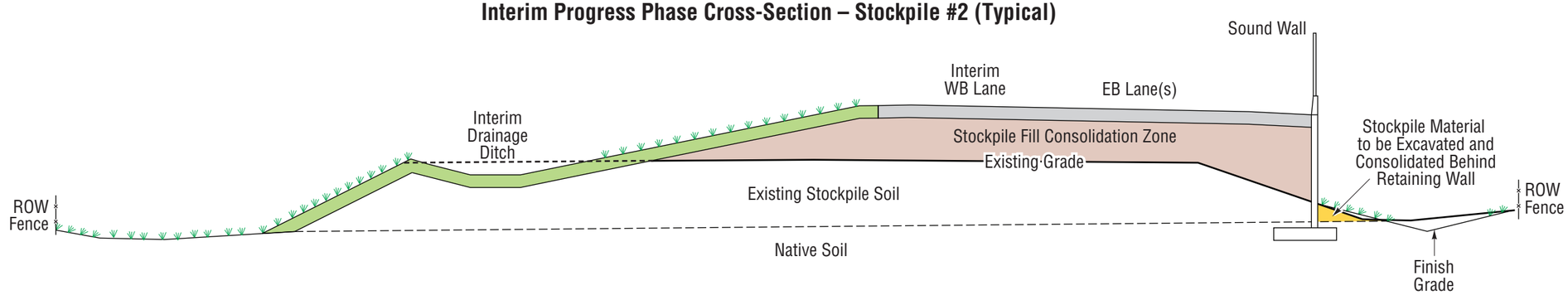
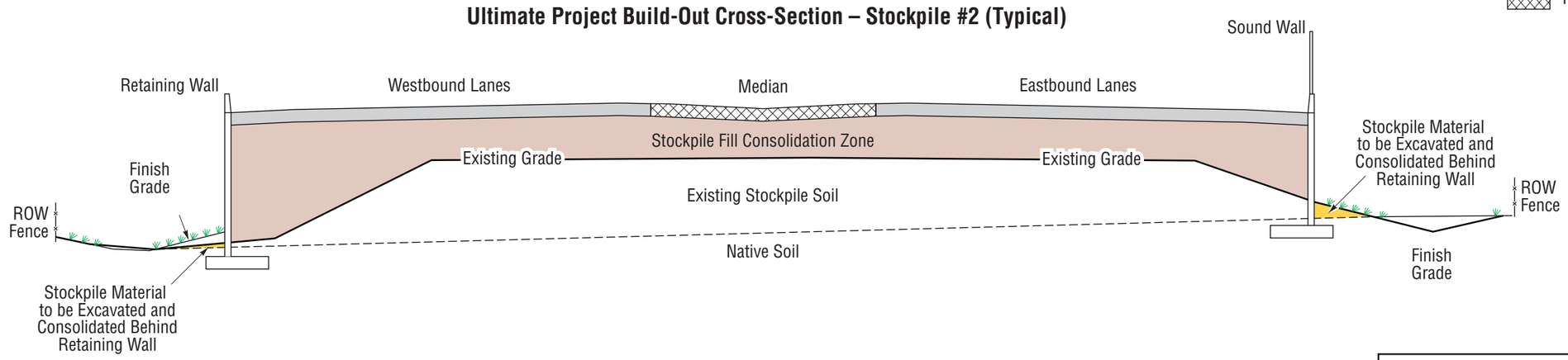
Caltrans Modesto Soil Stockpiles		
Stanislaus County, California	**CROSS-SECTIONS STOCKPILE #1**	
GEOCON Proj. No. S9800-01-17		
Task Order No. 17	June 2014	Figure 7

Interim Progress Phase Cross-Section – Stockpile #2 (Typical)



- Structural Pavement Section
- Minimum 6 - 12 inches Clean Cover Soil
- Stockpile Soil to be Removed
- Stockpile Fill Consolidation Zone
- Pavement or Liner in Median

Ultimate Project Build-Out Cross-Section – Stockpile #2 (Typical)



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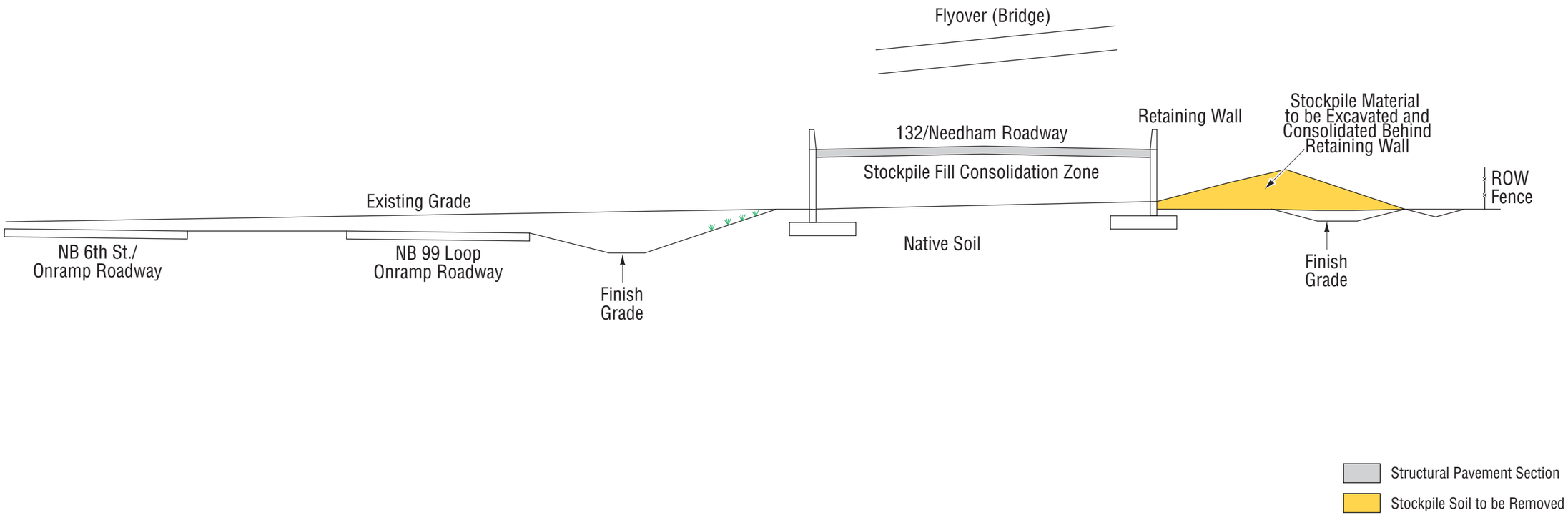
Caltrans Modesto Soil Stockpiles		
Stanislaus County, California	**CROSS-SECTIONS STOCKPILE #2**	
GEOCON Proj. No. S9800-01-17		
Task Order No. 17	June 2014	Figure 8

Interim Progress Phase and Ultimate Build-Out Cross-Section – Stockpile #3 (Typical)



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Caltrans Modesto Soil Stockpiles		
Stanislaus County, California	**CROSS-SECTION STOCKPILE #3**	
GEOCON Proj. No. S9800-01-17		
Task Order No. 17	June 2014	Figure 9

Table 1
ARARs and TBCs for Soil Remediation
Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
Porter-Cologne Water Quality Control Act (California Water Code Sections 13240, 13241, 13242, 13243)	Water Quality Control Plan (Basin Plan) for the RWQCB, CVR.	Establishes water quality objectives, including narrative and numerical standards, that protect the beneficial uses of surface and ground waters in the region. Describes implementation plans and other control measures designed to ensure compliance with statewide plans and policies and provide comprehensive water quality planning. Also includes implementation actions for setting soil cleanup levels for soils which threaten water quality. Unless otherwise designated by the Regional Water Board, all ground waters in the Region are considered as suitable or potentially suitable, at a minimum, for municipal and domestic water supply (MUN), agricultural supply (AGR), industrial service supply (IND), and industrial process supply (PRO).	Applicable	Chemical	Specific applicable portions of the Basin Plan include beneficial uses of affected water bodies and water quality objectives to protect those uses. Any activity, including, for example, a new discharge of contaminated soils or in-situ treatment or containment of contaminated soils, that may affect water quality must not result in water quality exceeding water quality objectives. Implementation plans and other policies and requirements may also apply.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13000, 13304, 13240, 13241, 13242, 13243)	RWQCB, CVR Basin Plan, "Policy for Investigation and Cleanup of Contaminated Sites."	Establishes and describes policy for investigation and remediation of contaminated sites. Also includes implementation actions for setting groundwater and soil cleanup levels.	Applicable	Chemical	Cleanup levels for soils should be equal to levels that would achieve background concentrations in groundwater unless such levels are technically and economically infeasible to achieve. In such cases, soil cleanup levels are such that groundwater will not exceed applicable groundwater quality objectives.

Table 1
ARARs and TBCs for Soil Remediation
Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
Porter-Cologne Water Quality Control Act (California Water Code Sections 13240, 13241, 13242, 13243)	RWQCB, CVR Basin Plan, "Policy for Application of Water Quality Objectives"	This policy defines water quality objectives and explains how the Regional Water Board applies numerical and narrative water quality objectives to ensure the reasonable protection of beneficial uses of water and how the Regional Water Board applies Resolution No. 68-16 to promote the maintenance of existing high quality waters.	Applicable	Chemical	Applies to all cleanups of discharges that may affect water quality.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13000, 13140, 13263, 13304)	State Water Resources Control Board Resolution No. 68-16 ("Antidegradation Policy")	Requires that high quality surface and ground waters be maintained to the maximum extent possible. Degradation of waters will be allowed (or allowed to remain) only if it is consistent with the maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial uses, and will not result in water quality less than that prescribed in RWQCB and SWRCB policies. If degradation is allowed, the discharge must meet best practicable treatment or control, which must prevent pollution or nuisance and result in the highest water quality consistent with maximum benefit to the people of the state.	Applicable	Chemical	Applies to discharges of waste to waters, including discharges to soil that may affect surface or ground waters. In-situ cleanup levels for contaminated soils must be set so that ground waters will not be degraded, unless degradation is consistent with the maximum benefit of the people of the state. If degradation is allowed, the discharge must meet best practical treatment or control, and result in the highest water quality possible consistent with the maximum benefit to the people of the state. In no case may water quality objectives be exceeded.
Porter-Cologne Water Quality Control Act (California Water Code Sections	State Water Resources Control Board Resolution No. 92-49 (As	Establishes requirements for investigation and cleanup and abatement of discharges. Among other requirements, dischargers must clean up and abate the effects of discharges in a manner that	Applicable	Chemical	Applies to all cleanups of discharges that may affect water quality.

Table 1
ARARs and TBCs for Soil Remediation
Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
13000, 13140, 13240, 13260, 13263, 13267, 13300, 13304, 13307)	amended April 21, 1994)	promotes the attainment of either background water quality, or the best water quality that is reasonable if background water quality cannot be restored. Requires the application of Title 23, CCR, Section 2550.4 requirements to cleanups.			
Porter-Cologne Water Quality Control Act (California Water Code Sections 13000, 13140, 13240)	State Water Resources Control Board Resolution No. 88-63 ("Sources of Drinking Water Policy") (as contained in the RWQCB's Water Quality Control Plan)	Specifies that, with certain exceptions, all ground and surface waters have the beneficial use of municipal or domestic water supply.	Applicable	Chemical	Applies in determining beneficial uses for waters that may be affected by dischargers of waste.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13260, 13263, 13370.5, 13372, 13373, 13374, 13375, 13376, 13377, 13383).	40 CFR Parts 122, 123, 124, National Pollutant Discharge Elimination System, implemented by California Storm water Permit for Industrial Activities, State Water Resources Control Board Order #97-03-DWQ.	Regulates pollutants in discharge of storm water associated with hazardous waste treatment, storage, and disposal facilities, wastewater treatment plants, landfills, land application sites, and open dumps. Requirements to ensure storm water discharges do not contribute to a violation of surface water quality standards.	Applicable	Action and Chemical	Applies to storm water discharges from industrial areas. Includes measures to minimize and/or eliminate pollutants in storm water discharges and monitoring to demonstrate compliance.

Table 1
ARARs and TBCs for Soil Remediation
Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
Porter-Cologne Water Quality Control Act (California Water Code Sections 13260, 13263, 13370.5, 13372 13373, 13374, 13375, 13376, 13377, 13383).	40 CFR Parts 122, 123, 124, National Pollutant discharge elimination system, implemented by State Water Resources Control Board Order No. 92-08 DWQ	Regulates pollutants in discharge of storm water associated with construction activity (clearing, grading, or excavation) involving the disturbance of 5 acres or more. Requirements to ensure storm water discharges do not contribute to a violation of surface water quality standards.	Applicable	Action and Chemical	Applies to construction areas over 5 acres in size. Includes measures to minimize and/or eliminate pollutants in storm water discharges and monitoring to demonstrate compliance.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260,13263, 13267, 13304).	Title 27, CCR, Section 20080(g), Title 23, CCR, Section 2510(g)	Requires monitoring. If water quality is threatened, corrective action consistent with Title 27, Title 23 is required.	Applicable	Action	Applies to areas of land where discharges had ceased as of November 27, 1984 (the effective date of the revised Title 27/ Title 23 regulations).
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20385, Title 23, CCR, Section 2550.1	Requires detection monitoring. Once a significant release has occurred, evaluation or corrective action monitoring is required.	Applicable	Action and Chemical	Applies to all areas in which waste has been discharged to land to determine the threat to water quality.

Table 1
ARARs and TBCs for Soil Remediation
Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20390, Title 23, CCR, Section 2550.2	Requires establishment of a water quality protection standard consisting of a list of constituents of concern, concentration limits, compliance monitoring points and all monitoring points. This section further specifies the time period that the standard shall apply.	Applicable	Action and Chemical	Applies to all areas in which waste has been discharged to land where groundwater is threatened.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20395, Title 23, CCR, Section 2550.3	Requires development of a list of constituents of concern which include all waste constituents, that are reasonably expected to be present in the soil from discharges to land, and could adversely affect water quality.	Applicable	Chemical	Applies to all areas in which waste has been discharged to land where groundwater is threatened.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20400, Title 23, CCR, Section 2550.4	Concentration limits must be established for groundwater, surface water, and the unsaturated zone. Must be based on background, equal to background, or for corrective actions, may be greater than background, not to exceed the lower of the applicable water quality objective or the concentration technologically or economically achievable. Specific factors must be considered in setting cleanup standards above background levels.	Relevant and Appropriate	Action	If water quality is threatened, this section applies in setting soil cleanup levels for all cleanups of discharges of waste to land.
Porter-Cologne Water Quality Control Act (California Water	Title 27, CCR, Section 20405, Title 23, CCR, Section 2550.5	Requires identification of the point of compliance, hydraulically down gradient from the area where waste was discharged to land.	Applicable	Action	Applies to all areas in which waste has been discharged to land where groundwater is threatened.

Table 1
ARARs and TBCs for Soil Remediation
Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
Code Sections 13140-13147, 13172, 13260,13263, 13267, 13269).					
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20410 Title 23, CCR, Section 2550.6	Requires monitoring for compliance with remedial action objectives for three years from the date of achieving cleanup levels.	Relevant and Appropriate.	Action	Applies to all soil cleanup activities.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20415 Title 23, CCR, Section 2550.7.	Requires general soil, surface water, and ground water monitoring.	Relevant and Appropriate.	Action	Applies to all areas in which waste has been discharged to land.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147,	Title 27, CCR, Section 20420, Title 23, CCR, Section 2550.8.	Requires detection monitoring to determine if a release has occurred.	Applicable	Chemical	Applies to all areas where waste has been discharged to land and groundwater is threatened.

Table 1
ARARs and TBCs for Soil Remediation
Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
13172, 13260, 13263, 13267, 13269).					
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20425 Title 23, CCR, Section 2550.9	Requires an assessment of the nature and extent of the release, including a determination of the spatial distribution and concentration of each constituent.	Applicable	Chemical	Applies to sites at which monitoring results show statistically significant evidence of a release.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20430 Title 23, CCR, Section 2550.10 Title 27, CCR, Section 20430 Title 23, CCR, Section 2550.10	Requires implementation of corrective action measures that ensure that cleanup levels (i.e., water quality protection standard established under section 2550.2) are achieved throughout the zone affected by the release by removing the waste constituents or treating them in place. Source control may be required. Also requires monitoring to determine the effectiveness of the corrective actions.	Relevant and Appropriate	Action	If water quality is threatened, this section applies to all soil cleanup activities.
Cal EPA, DTSC	Preliminary Endangerment Assessment Guidance Manual	Provides guidance on performing standard risk assessments.	To Be Considered	Chemical	Performance standard on human health screening evaluation.
Office of Scientific Affairs, Cal EPA, DTSC	Supplemental Guidance for Human Health Multimedia Risk	Provides recommendations on specific technical or scientific issues that may be encountered when preparing multimedia risk assessment reports for submittal and	To Be Considered	Action	Performance standard for conducting quantitative human health risk assessments.

Table 1
ARARs and TBCs for Soil Remediation
Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
	Assessment of Hazardous Waste Sites and Permitted Facilities	review by the DTSC			
Guidance	USEPA Risk Reference Doses (RfDs)	RfDs are dose levels developed USEPA for evaluating human non-carcinogenic risk from exposure to carcinogens.	To Be Considered	Chemical	RfDs are used to evaluate to evaluate human health risks from exposure to non-carcinogenic Site contaminants. RfDs are also employed to develop Site cleanup levels.
Guidance	USEPA Human Health Assessment Cancer Slope Factors (CSFs)	CSFs are developed by USEPA for evaluating incremental human carcinogenic risk from exposure to carcinogens.	To Be Considered	Chemical	CSFs are used to evaluate human cancer risk resulting from exposure to carcinogenic Site contaminants. CSFs are also employed to develop Site cleanup levels.
Staff Report of the RWQCB, CVR	The Designated Level Methodology for Waste Classification and Cleanup Level Determination	Provides guidance on how to classify wastes according to Title 27, CCR, Division 2, Subdiv.1/ Title 23, CCR, Division 3, Chapter 15, Article 10. Provides a methodology for establishing “Designated Levels” for specific constituents of a waste which provides a numerical value that would indicate the water quality impairment potential of the waste.	To Be Considered	Action	Performance standard to be considered in determining the classification of wastes and contaminated soils.
Staff Report of the RWQCB, CVR	"A Compilation of Water Quality Goals"	Provides guidance on selecting numerical values to implement narrative water quality objectives contained in the Basin Plan.	To Be Considered	Action	Performance standard to be considered in selecting appropriate numerical values to implement the Basin Plan for setting cleanup levels and discharge limits. The numerical

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Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
					values contained in the staff report may be applicable, relevant and appropriate, or to be considered, depending on the source of the values.
Staff Report of the RWQCB, CVR	"Water Quality Site Assessment for Soils and Ground Water"	Provides guidance on how a site-wide water quality site assessment should be conducted to evaluate the impact of soil contaminants on groundwater quality. Guidance uses background soil and groundwater quality data to determine if Site soil and groundwater have been impacted by site activities and uses groundwater Water Quality Goals to determine if the beneficial use of groundwater has been impacted or whether concentrations of site constituents have the potential to affect beneficial groundwater uses.	To Be Considered	Action	Used to determine to identify Site soil and groundwater constituents of concern.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13269).	Title 23, CCR, Section, 2520, 2521	Requires that hazardous waste be discharged to Class I waste management units that meet certain design and monitoring standards.	Relevant and Appropriate	Action	Applies to discharges of hazardous waste to land for treatment, storage or disposal.
Porter-Cologne Water Quality Control Act (California Water Code Sections	Title 27, CCR, Section, 20200(c), 20210	Requires that designated waste be discharged to Class I or Class II waste management units.	Relevant and Appropriate	Action	Applies to discharges of designated waste (nonhazardous waste that could cause degradation of surface or ground waters) to land for treatment,

Table 1
ARARs and TBCs for Soil Remediation
Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
13140-13147 13172, 13260, 13263, 13269).					storage, or disposal.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147 13172, 13260, 13263, 13269).	Title 27, CCR, Section 20230	Requires that inert waste does not need to be discharged at classified units.	Relevant and Appropriate	Action	Applies to discharges of inert waste to land for treatment, storage, or disposal.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13269).	Title 27, CCR, Section 20200(c),20220	Requires that nonhazardous solid waste be discharged to a classified waste management unit.	Relevant and Appropriate	Action	Applies to discharges of nonhazardous solid waste to land for treatment, storage, or disposal.

Table 1
ARARs and TBCs for Soil Remediation
Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147,, 13172, 13260, 13263, 13267, 13304).	Title 27, CCR, Section 20090(d) Title 23 CCR, Section 2511(d)	Actions taken by public agencies to cleanup unauthorized releases are exempt from Title 27/Title 23 except that wastes removed from immediate place of release and discharged to land must be managed in accordance with classification (Title 27 CCR, Section 20200/ Title 23 CCR, Sections 2520) and siting requirements of Title 27 or Title 23 and wastes contained or left in place must comply with Title 27 or Title 23 to the extent feasible.	Applicable	Action	Applies to remediation and monitoring of sites.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304).	Title 27, CCR, Section 20080 (d) Title 23, CCR, Section 2510(d)	Requires closure of existing waste management units according to Title 27/Title 23.	Applicable	Action	Applies to existing waste management units (i.e., areas where waste was discharged to land on or before 27 November 1984, but that were not closed, abandoned, or inactive prior to that date).
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 1323, 13269).	Title 27, CCR, Section 21400, Title 23, CCR, Section 2582.	Requires surface impoundments to be closed by removing and treating all free liquid and either removing all remaining contamination or closing the surface impoundment as a landfill.	Applicable	Action	If water quality is threatened, this section is relevant and appropriate for natural topographic depressions, excavations, and diked areas where wastes containing free liquids were discharged.

Table 1
ARARs and TBCs for Soil Remediation
Caltrans Modesto Soil Stockpiles
Modesto, Stanislaus County, California

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Sections 20385-20435 Title 23, CCR, Section 2550 .	Where groundwater monitoring is required under 2510 or 2511 of Ch 15 (and equivalent for Title 27), applies to authorized waste management units as well as unauthorized discharges of waste to land and to closed abandoned or inactive units.	Applicable	Chemical and Action	Applies to all areas in which waste has been discharged to land to determine the threat to water quality.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20950; 22207 (a); 22212 (a), and 22222. Title 23, CCR, Section 2550.0 (b); 2580; 2580(f).	General closure requirements, including continued maintenance of waste containment, drainage controls, and groundwater monitoring throughout the closure and post closure maintenance periods.	Applicable	Action	Applies to partial or final closure of waste management units.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269	Title 27, CCR, Section 21090	Requires a final cover for landfills constructed in accordance with specific prescriptive standards, to be maintained as long as wastes pose a threat to water quality.	Relevant and Appropriate	Action	If water quality is threatened, this section is relevant and appropriate for wastes contained or left in place at the end of remedial actions that could affect water quality. Includes closure of landfills and other areas where wastes have been discharged to land.
Staff Report of the RWQCB, CVR	Items to be included in a Feasibility	Provides an outline presenting the minimum requirement for items to be included and discussed in the text of all	To be Considered	Chemical, Action, and Location	Applies to preparation of a feasibility study and remedial options evaluation for submittal to

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Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
	Study/Remedial Options Evaluation Report	feasibility studies/remedial option evaluation reports submitted to the RWQCB.			RWQCB.
Hazardous Waste Control Law (Health and Safety Code, Division 20, Chapter 6.5)	Title 22, California Code of Regulations, Division 4.5, Section 66260.1 et seq	Regulates the generation, storage, transportation, treatment and disposal of hazardous waste in the State.	Applicable	Chemical	Applies to material that may be hazardous waste.
Hazardous Waste Control Law (Health and Safety Code, Division 20, Chapter 6.5)	Title 22, California Code of Regulations, Division 4.5, 22 CCR §§66261-66261.126	Identifies those wastes that are subject to regulation as hazardous wastes. Provides definition of “wastes” and “hazardous wastes”.	Applicable	Chemical	Applies to material that would be transported from the Site for disposal, treatment or storage. Determination of material as “waste” and “hazardous waste” is required prior to removal from Site.
NCP	55 FR 8758-8760, March 8, 1990	Area of Contamination – Allows wastes to be consolidated and treated *in situ* within an AOC without triggering land disposal restrictions or minimum technology requirements. For an AOC, contamination must be contiguous but does not have to be homogeneous.	Relevant and Appropriate	Action	Allows for movement of impacted soil to be moved within the footprint of impacted soil.
City of Modesto	Municipal Code Section 5-10.301	Requires a grading and erosion control permit to grade, fill, excavation, store or dispose of 350 cubic yards or more of soil or earth material or clear and grub more than .5 acre of land within the City limits.	Applicable	Action	Would apply for remedial actions that included excavation of impacted soil.
City of Modesto	Municipal Code Section 5-10.303	Provides requirements for information to be included in a grading and erosion control permit.	Applicable	Action	Would apply for remedial actions that included excavation of impacted soil.

Source	Standard, Requirement, Criterion, or Limitation	Description	ARARs, or To Be Considered	Chemical-Action-, or Location-Specific	Comments
City of Modesto	Municipal Code Section 5-10.304	Provides requirements for grading plans required as part of the grading and erosion permit.	Applicable	Action	Would apply for remedial actions that included excavation of impacted soil.
San Joaquin Valley Unified Air Protection Control District	Rule 8021	Provides requirements for to limit fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities.	Applicable	Action	Would apply for remedial actions that included excavation of impacted soil. Permit is required if area subject to construction, demolition, etc is greater than five acres.
National Contingency Plan (40 CFR Part 300.430)	USEPA's regulations for implementing CERCLA	Identifies the development and evaluation process for remedial alternatives.	Relevant and Appropriate	Action	Applies to investigation and remediation of uncontrolled hazardous waste sites.
USEPA	Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, October 1988, (EPA/540-G-89/004	Presents the methodology that the Superfund program has established for characterizing the nature and extent of risks posed by uncontrolled hazardous waste sites and for evaluating potential remedial options.	To be Considered	Action	*Voluntary Cleanup Agreement, FMC-Modesto Site, Stanislaus County, Modesto, California* requires the RI/FS Process to follow CERCLA guidance, specifically this guidance document.

Table 2 Evaluation of General Response Actions and Process Options for the Caltrans Modesto Soil Stockpiles

Soil Specific General Response Actions	Remedial Technology	Process Option	Effectiveness	Implementability	Cost	Screening Comments
No Action	None	Not applicable	Does not meet RAO and does not reduce toxicity, mobility, or volume of contaminants.	Readily implementable as no actions are required.	negligible to very low	Retained as required by NCP
Institutional Controls	Governmental and Administrative Controls	Deed restrictions and covenants	Contaminant mass unchanged. Establishes land use restrictions and limitations protective of human health.	Readily implementable with most of the activities being performed by DTSC.	Low capital and O&M costs	Potentially applicable (deed restriction and covenants) in combination with other response actions. Retained.
	Access Restrictions	Physical barrier and access control	Contaminant mass unchanged. Prevents unauthorized access to protect human health.	Readily implementable as fencing is currently maintained around the Site.	Low capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
	Informational	Signage, public notices	Contaminant mass unchanged. Signage and notices raise public awareness.	Readily implementable at the Site and will be maintained	Low capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
	Monitoring	Air monitoring	Contaminant mass unchanged. Monitors airborne COC's.	Implementable	Low to moderate capital and O&M costs	Air is not a medium of concern for the final remedy, but is a short-term concern during construction so retained for consideration with other options.
		Site monitoring	Contaminant mass unchanged. Documents physical conditions of Site.	Readily implementable as this is currently ongoing at the Site.	Low to moderate capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
		Groundwater monitoring	Contaminant mass unchanged. Documents groundwater conditions/quality surrounding Site.	Readily implementable as this is currently ongoing at the Site.	Moderate capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
Removal	Excavation, loading, transport, disposal	Off-site landfill	Physical removal of contaminant mass. Nullifies mobility.	Implementable	Prohibitively high capital costs; negligible O&M costs	Potentially applicable. Retained.
Containment	Runoff/infiltration controls	Grading	Contaminant mass unchanged. Directs, collects, and transmits runoff away from Site. Decreases infiltration and contaminant mobility.	Readily implementable	Moderate capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
		Revegetation	Contaminant mass unchanged. Decreases erosion. Decreases soil moisture content via increased evapo-transpiration. Decreases contaminant mobility.	Readily implementable	Moderate capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
	Capping	Encapsulation beneath highway structures	Contaminant mass unchanged. Contains and isolates contaminants. Effectively eliminates contaminant mobility.	Readily implementable	Moderate to high capital and moderate O&M costs	Potentially applicable. Retained.
		Encapsulation beneath a vegetated clean soil layer	Contaminant mass unchanged. Contains and isolates contaminants. Effectively eliminates contaminant mobility.	Readily implementable	Moderate to high capital and moderate O&M costs	Potentially applicable. Retained.
Treatment	Chemical Treatment	Soil Washing	Potentially effective in reducing mobility and volume of contaminants. Treatment of liquid waste stream would be required.	Difficult to implement due to volume and location near residences	High capital costs for the volume of soil	Not retained after initial screening
		Soil Mixing	Potentially effective in reducing contaminant mobility; would increase volume of waste.	Difficult to implement due to volume and location near residences	High capital costs for the volume of soil	Not retained after initial screening
Reuse, Recycle, and /or Reclaim	Reuse at offsite location	Off-site non-landfill placement as fill	Would be effective in reducing mobility of contaminants for the Site, but would just transfer issues and concerns to another property.	Not implementable due to hazardous waste levels in soil.	Not applicable	Not retained after initial screening

Notes:

Shaded Cells = Shaded cells represent process technology options that were not retained after initial screening.

NCP = National Oil and Hazardous Substance Pollution Contingency Plan

O&M = Operations and Maintenance

RAO = remedial action objective

TABLE 3

REMEDIATION COST ESTIMATE SUMMARY

ALTERNATIVE NO. 2 – INSTITUTIONAL CONTROLS

CALTRANS MODESTO SOIL STOCKPILES

MODESTO, STANISLAUS COUNTY, CALIFORNIA

Item No.	Activity	Quantity	Unit	Unit Cost	Total Cost
1	Project Management [1]	15	Annual	$5,000	$75,000
2	Public Communications [2]	5	As-needed	$2,500	$12,500
2	Fence Maintenance [1]	15	Annual	$5,000	$75,000
3	Mowing [1]	30	Bi-annual	$2,500	$75,000
5	Groundwater Monitoring [3]	20	Quarterly	$12,500	$250,000
6	Surfacewater Monitoring	3	Weather-dependent	$2,500	$7,500
				Total Estimated Cost:	$495,000

Notes: 1 = assumed to be necessary from present until planned completion of ultimate build-out in 2028.

2 = could include public meetings, fact sheets, public notices, and other forms of information dissemination to the public.

3 = assumed that will be discontinued after interim progress phase is completed in 2018.

TABLE 4

REMEDIATION COST ESTIMATE SUMMARY

ALTERNATIVE NO. 3 – REMOVAL

CALTRANS MODESTO SOIL STOCKPILES

MODESTO, STANISLAUS COUNTY, CALIFORNIA

Item No.	Site Work	Quantity	Unit	Unit Cost	Total Cost
1	Project Management	1	Lump Sum	$53,000	$53,000
2	Pre-Field Planning/Permits	1	Lump Sum	$35,000	$35,000
3	SWPPP, BMPs, Trackout[1], Security	1	Lump Sum	$63,000	$63,000
4	Truck Decontamination Station[2]	47	Day	$1,200	$56,400
5	Air Monitoring	1	Lump Sum	$215,000	$215,000
6	Waste Profiling of Soil	1	Lump Sum	$36,500	$36,500
7	Traffic Control	47	Day	$800	$37,600
8	Excavation and Loading	216,000	Ton	$9	$1,944,000
9	Transportation and Disposal (Class II)	191,000	Ton	$35	$6,589,500
10	Transportation and Disposal (Class I)	25,000	Ton	$242	$6,050,000
11	Fill Placement	160,000	Cubic Yard	$40	$6,400,000
				Total Estimated Cost:	$21,480,000

Notes: 1 = trackout includes placement of rock for truck tire rough cleaning for each trip.

2 = truck decontamination includes daily washout and operation and maintenance of station

TABLE 5

REMEDIATION COST ESTIMATE SUMMARY

ALTERNATIVE NO. 4 – CONTAINMENT BY CAPPING WITH THE SR-132 PROJECT

CALTRANS MODESTO SOIL STOCKPILES

MODESTO, STANISLAUS COUNTY, CALIFORNIA

Item No.	Site Work	Quantity	Unit	Unit Cost	Total Cost
1	Project Management	1	Lump Sum	$20,000	$20,000
2	Pre-Field Planning/Permits	1	Lump Sum	$10,000	$10,000
3	SWPPP, BMPs, Trackout[1], Security	1	Lump Sum	$30,000	$30,000
4	Air Monitoring [2]	1	Lump Sum	$150,000	$150,000
5	Excavation and Consolidation of Soil from South Side of Stockpiles 1 and 2 (Interim Progress Phase)	15,000	Cubic Yard	$5	$75,000
6	Excavation and Consolidation of Soil from Stockpile 3 (Interim Progress Phase)	20,000	Cubic Yard	$5	$100,000
7	Grading of North Side Stockpiles 1 and 2	40,000	Cubic Yard	$5	$200,000
8	Clean Soil Cap - North Side of Stockpiles 1 and 2	8,000	Cubic Yard	$10	$80,000
9	Excavation and Consolidation of Soil - North Side of Stockpiles 1 and 2 (Ultimate Build-Out)	10,000	Cubic Yard	$10	$100,000
10	Pave Median of Ultimate Build-out	2,700	Ton	$150	$405,000
11	Revegetation - North Side of Stockpiles 1 and 2	200,000	Square Feet	$2	$400,000
				Total Estimated Cost:	$1,570,000

Notes: 1 = trackout includes placement of rock for truck tire rough cleaning for each trip.

2 = air monitoring to be conducted during all earthmoving activities during interim progress phase and ultimate build-out.

TABLE 6

REMEDIATION COST ESTIMATE SUMMARY

ALTERNATIVE NO. 4 – CONTAINMENT BY CAPPING WITH CLEAN SOIL LAYER

CALTRANS MODESTO SOIL STOCKPILES

MODESTO, STANISLAUS COUNTY, CALIFORNIA

Item No.	Site Work	Quantity	Unit	Unit Cost	Total Cost
1	Project Management	1	Lump Sum	$20,000	$20,000
2	Pre-Field Planning/Permits	1	Lump Sum	$10,000	$10,000
3	SWPPP, BMPs, Trackout[1], Security	1	Lump Sum	$30,000	$30,000
4	Air Monitoring [2]	1	Lump Sum	$150,000	$150,000
5	Grading of Stockpiles	25,000	Cubic Yard	$5	$125,000
6	Clean Soil Cap	20,000	Cubic Yard	$10	$200,000
7	Revegetation	400,000	Square Feet	$2	$800,000
				Total Estimated Cost:	$1,335,000

Notes: 1 = trackout includes placement of rock for truck tire rough cleaning for each trip.

2 = air monitoring to be conducted during all earthmoving activities during interim progress phase and ultimate build-out.

TABLE 7

REMEDIATION COST ESTIMATE SUMMARY

OPTIONAL REMOVAL AND OFFSITE DISPOSAL OF STOCKPILE 3

CALTRANS MODESTO SOIL STOCKPILES

MODESTO, STANISLAUS COUNTY, CALIFORNIA

Item No.	Site Work	Quantity	Unit	Unit Cost	Total Cost
1	Project Management	1	Lump Sum	$10,000	$10,000
2	Pre-Field Planning/Permits	1	Lump Sum	$10,000	$10,000
3	SWPPP, BMPs, Trackout[1], Security	1	Lump Sum	$20,000	$20,000
4	Truck Decontamination Station[2]	30	Day	$1,200	$36,000
5	Air Monitoring	1	Lump Sum	$100,000	$100,000
6	Waste Profiling of Soil	1	Lump Sum	$10,000	$10,000
7	Traffic Control	30	Day	$800	$24,000
8	Excavation and Loading	34,000	Ton	$9	$306,000
9	Transportation and Disposal (Class II)	34,000	Ton	$35	$1,173,000
10	Fill Placement	24,000	Cubic Yard	$40	$960,000
				Total Estimated Cost:	$2,649,000

Notes: 1 = trackout includes placement of rock for truck tire rough cleaning for each trip.

2 = truck decontamination includes daily washout and operation and maintenance of station