Land Use Application

Submitted by:

Phillips 66 Company
2555 Willow Road
Arroyo Grande, CA

Project Contact:

Mr. Jim Anderson
(805) 343-3224

Project Name:

Santa Maria Refinery Rail Project

June 2013

Santa Maria Refinery Rail Project

Phillips 66 Company
Santa Maria Rail Project

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GENERAL APPLICATION FORM

San Luis Obispo County Department of Planning and Building File No _____

APPLICATION TYPE - CHECK ALL THAT APPLY

- ☐ Emergency Permit
- ☐ Tree Permit
- ☐ Plot Plan
- ☐ Zoning Clearance
- ☐ Site Plan
- ☐ Minor Use Permit
- ☐ Variance
- ☐ Other
- ☒ Conditional Use Permit/Development Plan
- ☐ Surface Mining/Reclamation Plan
- ☐ Curb, Gutter & Sidewalk Waiver
- ☐ Modification to approved land use permit

APPLICANT INFORMATION Check box for contact person assigned to this project

☒ Landowner Name Phillips 66 Company Daytime Phone 805-343-3224
Mailing Address 2555 Willow Road, Arroyo Grande CA Zip Code 93420
Email Address: _____

☒ Applicant Name Phillips 66 Company Daytime Phone 805-343-3224
Mailing Address 2555 Willow Road, Arroyo Grande, CA Zip Code 93420
Email Address: James.O.Anderson@p66.com

☒ Agent Name Mr. Greg McGowan Daytime Phone 805-878-4288
Mailing Address 301 South Miller Street, Santa Maria CA Zip Code 93454
Email Address: Greg.McGowan@arcadis-us.com

PROPERTY INFORMATION

Total Size of Site: 48.9 acre project area (1650 acre property) Assessor Parcel Number(s): 092-401-011, 092-401-013, 092-411-005, 092-401-005
Legal Description: See attached
Address of the project (if known): 2555 Willow Road, Arroyo Grande CA 93420
Directions to the site (including gate codes) - describe first with name of road providing primary access to the site, then nearest roads, landmarks, etc.: Site is at 2555 Willow Road.
Access is from Highway 1
Describe current uses, existing structures, and other improvements and vegetation on the property:
Existing Phillips 66 refinery, coke storage, grazing, open space. Vegetation is described in the attached botanical report

PROPOSED PROJECT

Describe the proposed project (inc. sq. ft. of all buildings): See attached project description.
Extension of existing rail spur, construction of off-loading facility and conveyance pipeline.

LEGAL DECLARATION

I, the owner of record of this property, have completed this form accurately and declare that all statements here are true. I do hereby grant official representatives of the county authorization to inspect the subject property.

Property owner signature James O. Anderson Date 6/18/13

FOR STAFF USE ONLY

Reason for Land Use Permit: _____

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CONSENT OF LANDOWNER

San Luis Obispo County Department of Planning and Building File No _____

I (we) the undersigned owner of record of the fee interest in the parcel of land located at (print address): 2555 Willow Road, Arroyo Grande, CA, identified as Assessor Parcel Number 092-401-011, 092-401-013, 092-411-005, 092-401-005, for which a construction permit, land use permit, land division, general plan or ordinance amendment, or LAFCo application referral is being filed with the county requesting an approval for: Santa Maria Refinery rail project (specify type of project, for example: addition to a single family residence; or general plan amendment), do hereby certify that:

1. Such application may be filed and processed with my (our) full consent, and that I (we) have authorized the agent named below to act as my (our) agent in all contacts with the county and to sign for all necessary permits in connection with this matter.

2. I (we) hereby grant consent to the County of San Luis Obispo, its officers, agents, employees, independent contractors, consultants, sub-consultants and their officers, agents, and employees to enter the property identified above to conduct any and all surveys and inspections that are considered appropriate by the inspecting person or entity to process this application. This consent also extends to governmental entities other than the county, their officers, agencies, employees, independent contractors, consultants, sub-consultants, and their officers agents or employees if the other governmental entities are providing review, inspections and surveys to assist the county in processing this application. This consent will expire upon completion of the project.

3. If prior notice is required for an entry to survey or inspect the property. Please contact:
   Print Name: Mr. James Anderson
   Daytime Telephone Number: 805-343-3224

4. I (we) hereby give notice of the following concealed or unconcealed dangerous conditions on the property Site access requires safety escort.

PERSON OR ENTITY GRANTING CONSENT:

Print Name: Phillips 66, James Anderson, Supervisor

Print Address: 2555 Willow Road, Arroyo Grande, CA 93420

Daytime Telephone Number: 805-343-3224

Signature of landowner: James O. Anderson Date: 6/18/13

AUTHORIZED AGENT:

Print Name: Greg McGowan

Print Address: 301 South Miller Street, Santa Maria, CA

Daytime Telephone Number: 805-878-4288

Signature of authorized agent: [illegible] Date: 6/13/13

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LAND USE PERMIT APPLICATION

San Luis Obispo County Department of Planning and Building File No _____

Type of project: ❑ Commercial ☒ Industrial ❑ Residential ❑ Recreational ❑ Other

Describe any modifications/adjustments from ordinance needed and the reason for the request (if applicable): NONE

Describe existing and future access to the proposed project site: Existing access gate at 2555 Willow Road, Arroyo Grande

Surrounding parcel ownership: Do you own adjacent property? ☒ Yes ❑ No
If yes, what is the acreage of all property you own that surrounds the project site? 1650 acres

Surrounding land use: What are the uses of the land surrounding your property (when applicable, please specify all agricultural uses):
North: IND and RS South: AG
East: AG and REC West: OS and REC

For all projects, answer the following:
Square footage and percentage of the total site (approximately) that will be used for the following:
Buildings: 1,100 sq. feet _____% Landscaping: - sq. feet - %
Paving: 124,000 sq. feet _____% Other (specify) _____
Total area of all paving and structures: _____ ❑ sq. feet ❑ acres
Total area of grading or removal of ground cover: 27 ❑ sq. feet ☒ acres
Number of parking spaces proposed: 2 Height of tallest structure: 28 ft. for canopy, 35 ft. for light pole
Number of trees to be removed: 0 Type: _____
Setbacks: Front _____ Right_____ Left_____ Back_____

Proposed water source: ☒ On-site well ❑ Shared well ❑ Other_____
❑ Community System - List the agency or company responsible for provision:_____
Do you have a valid will-serve letter? ❑ Yes ❑ No (If yes, please submit copy)

Proposed sewage disposal: ☒ Individual on-site system ❑ Other_____
❑ Community System - List the agency or company responsible for sewage disposal: _____
Do you have a valid will-serve letter? ❑ Yes ❑ No (If yes, please submit copy)

Fire Agency: List the agency responsible for fire protection: Cal Fire

For commercial/industrial projects answer the following:
Total outdoor use area: 48.9 ❑ sq. feet ☒ acres
Total floor area of all structures including upper stories: 1,100 sq. feet (restrooms and break room only)

For residential projects, answer the following: NA
Number of residential units:_____ Number of bedrooms per unit: _____
Total floor area of all structures including upper stories, but not garages and carports:_____
Total of area of the lot(s) minus building footprint and parking spaces: _____

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ENVIRONMENTAL DESCRIPTION FORM

San Luis Obispo County Department of Planning and Building File No _____

The California Environmental Quality Act (CEQA) requires all state and local agencies to consider and mitigate environmental impacts for their own actions and when permitting private projects. The Act also requires that an environmental impact report (EIR) be prepared for all actions that may significantly affect the quality of the environment. The information you provide on this form will help the Department of Planning and Building determine whether or not your project will significantly affect the quality of the environment.

To ensure that your environmental review is completed as quickly as possible, please remember to:

a. Answer **ALL** of the questions as accurately and completely as possible.
b. Include any additional information or explanations where you believe it would be helpful or where required. Include additional pages if needed.
c. If you are requesting a land division or a re-zoning, be sure to include complete information about future development that may result from the proposed land division or rezoning.
d. Include references to any reports or studies you are aware of that might be relevant to the questions asked or the answers you provide.

Should a determination be made that the information is inaccurate or insufficient, you will be required to submit additional information upon request.

Physical Site Characteristic Information

Your site plan will also need to show the information requested here:

1. Describe the topography of the site:
   Level to gently rolling, 0-10% slopes: 48.9 acres
   Moderate slopes of 10-30%: 0 acres
   Steep slopes over 30%: 0 acres
2. Are there any springs, streams, lakes or marshes on or near the site? ☒ Yes ☐ No
   If yes, please describe: Oso Flaco Creek off site to the south
3. Are there any flooding problems on the site or in the surrounding area? ☐ Yes ☒ No
   If yes, please describe: _____
4. Has a drainage plan been prepared? ☒ Yes ☐ No
   If yes, please include with application.
5. Has there been any grading or earthwork on the project site? ☒ Yes ☐ No
   If yes, please explain: Site includes developed and undeveloped portions of SMR property.
6. Has a grading plan been prepared? ☒ Yes ☐ No
   If yes, please include with application.
7. Are there any sewer ponds/waste disposal sites on/adjacent to the project? ☒ Yes ☐ No
8. Is a railroad or highway within 300 feet of your project site? ☒ Yes ☐ No
9. Can the proposed project be seen from surrounding public roads? ☒ Yes ☐ No
   If yes, please list: Oso Flaco Road, Highway 1

Water Supply Information

1. What type of water supply is proposed? (existing on-site wells)
   ☒ Individual well ❑ Shared well ❑ Community water system
2. What is the proposed use of the water?
   ❑ Residential ❑ Agricultural - Explain _____
   ❑ Commercial/Office - Explain _____
   ☒ Industrial – Explain Fire suppression, restrooms
3. What is the expected daily water demand associated with the project? 250 gallons per day
4. How many service connections will be required? none
5. Do operable water facilities exist on the site?
   ☒ Yes ❑ No If yes, please describe: On refinery property
6. Has there been a sustained yield test on proposed or existing wells?
   ❑ Yes ☒ No If yes, please attach.
7. Does water meet the Health Agency's quality requirements?
   Bacteriological? ☒ Yes ❑ No
   Chemical? ☒ Yes ❑ No
   Physical ☒ Yes ❑ No
   Water analysis report submitted? ☒ Yes ❑ No
8. Please check if any of the following have been completed on the subject property and/or submitted to County Environmental Health.
   ❑ Well Driller's Letter ☒ Water Quality Analysis ❑ OK or ❑ Problems
   ❑ Will Serve Letter ❑ Pump Test _____ Hours_____G.P.M.
   ❑ Surrounding Well Logs ❑ Hydrologic Study ☒ Other County-prepared Water Supply Assessment

Please attach any letters or documents to verify that water is available for the proposed project.

Sewage Disposal Information

If an on-site (individual) subsurface sewage disposal system will be used:

1. Has an engineered percolation test been accomplished?
   ❑ Yes ☒ No If yes, please attach a copy.
2. What is the distance from proposed leach field to any neighboring water wells? 800 feet
3. Will subsurface drainage result in the possibility of effluent reappearing in surface water or on adjacent lands, due to steep slopes, impervious soil layers or other existing conditions?
   ❑ Yes ☒ No
4. Has a piezometer test been completed?
   ❑ Yes ☒ No
5. Will a Waste Discharge Permit from the Regional Water Quality Control Board be required?
   ❑ Yes ☒ No *(a waste discharge permit is typically needed when you exceed 2,500 gallons per day)*

If a community sewage disposal system is to be used: NA

1. Is this project to be connected to an existing sewer line? ❑ Yes ☒ No
   Distance to nearest sewer line: NA Location of connection: NA
2. What is the amount of proposed flow? NA G.P.D.
3. Does the existing collection treatment and disposal system have adequate additional capacity to accept the proposed flow? ❑ Yes ❑ No

Solid Waste Information

1. What type of solid waste will be generated by the project?
   ❑ Domestic ❑ Industrial ❑ Agricultural ☒ Other, please explain? Minor construction waste and routine worker trash.
2. Name of Solid Waste Disposal Company: South County Sanitation
3. Where is the waste disposal storage in relation to buildings? Garbage cans adjacent to buildings
4. Does your project design include an area for collecting recyclable materials and/or composting materials? ❑ Yes ☒ No

Community Service Information

1. Name of School District: Lucia Mar Unified School District
2. Location of nearest police station: 200 North Halcyon Road, Arroyo Grande
3. Location of nearest fire station: 2391 Willow Road, Arroyo Grande
4. Location of nearest public transit stop: SLO RTA, Arroyo Grande (Halcyon Park & Ride)
5. Are services (grocery/other shopping) within walking distance of the project? ❑ Yes ☒ No
   If yes, what is the distance? _____ feet/miles

Historic and Archeological Information

1. Please describe the historic use of the property:
   Active refinery and livestock grazing.
2. Are you aware of the presence of any historic, cultural or archaeological materials on the project site or in the vicinity? ☒ Yes ❑ No
   If yes, please describe: One previously recorded site occurs along the EVA road (see attached technical report)
3. Has an archaeological surface survey been done for the project site? ☒ Yes ❑ No
   If yes, please include two copies of the report with the application.

Commercial/Industrial Project Information

Only complete this section if you are proposing a commercial or industrial project or zoning change.

1. Days of Operation: Every day Hours of Operation: 24 hours/day
2. How many people will this project employ? Approximately 4-6
3. Will employees work in shifts? ☒ Yes ❑ No
   If yes, please identify the shift times and number of employees for each shift
   Work shifts will vary and will be determined by train arrival schedules. Average 1 - 6 people per shift
4. Will this project produce any emissions (i.e., gasses, smoke, dust, odors, fumes, vapors)?
   ☒ Yes ❑ No If yes, please explain: Criteria Air Pollutants, Greenhouse Gases (see attached), construction dust
5. Will this project increase the noise level in the immediate vicinity? ☒ Yes ❑ No
   If yes, please explain: See attached noise study report
   (If loud equipment is proposed, please submit manufacturers estimate on noise output.)
6. What type of industrial waste materials will result from the project? Explain in detail: None
7. Will hazardous products be used or stored on-site? ☒ Yes ❑ No
   If yes, please describe in detail: Crude oil, lubricants, solvents, fuels
8. Has a traffic study been prepared? ❑ Yes ☒ No If yes, please attach a copy.

9. Please estimate the number of employees, customers and other project-related traffic trips to or from the project: Between 7:00 - 9:00 a.m. 1-6 Between 4:00 to 6:00 p.m. 1-6
10. Are you proposing any special measures (carpooling, public transit, telecommuting) to reduce automobile trips by employees ❑ Yes ☒ No
    If yes, please specify what you are proposing: _____
11. Are you aware of any potentially problematic roadway conditions that may exist or result from the proposed project, such as poor sight distance at access points, connecting with the public road?
    ❑ Yes ☒ No If yes, please describe: _____

Agricultural Information

Only complete this section if your site is: 1) Within the Agricultural land use category, or 2) currently in agricultural production.

1. Is the site currently in Agricultural Preserve (Williamson Act)? ❑ Yes ☒ No
2. If yes, is the site currently under land conservation contract? ❑ Yes ☒ No
3. If your land is currently vacant or in agricultural production, are there any restrictions on the crop productivity of the land? That is, are there any reasons (i.e., poor soil, steep slopes) the land cannot support a profitable agricultural crop? Please explain in detail: NA

Special Project Information

1. Describe any amenities included in the project, such as park areas, open spaces, common recreation facilities, etc.(these also need to be shown on your site plan): None
2. Will the development occur in phases? ❑ Yes ☒ No
   If yes describe: _____
3. Do you have any plans for future additions, expansion or further activity related to or connected with this proposal? ❑ Yes ☒ No If yes, explain: _____
4. Are there any proposed or existing deed restrictions? ❑ Yes ☒ No
   If yes, please describe: _____

Energy Conservation Information

1. Describe any special energy conservation measures or building materials that will be incorporated into your project *: Low-flow toilets to conserve water

   *The county's Building Energy Efficient Structures (BEES) program can reduce your construction permit fees. Your building must exceed the California State Energy Standards (Title 24) in order to qualify for this program. If you are interested in more information, please contact the Building Services Division of the Department of Planning and Building at (805) 781-5600.

Environmental Information

1. List any mitigation measures that you propose to lessen the impacts associated with your project:
   Please see attached technical reports and the applicant-prepared draft IS supporting information.

2. Are you aware of any unique, rare or endangered species (vegetation or wildlife) associated with the project site? ☒ Yes ☐ No
   If yes, please list: See attached Botanical Survey Report
3. Are you aware of any previous environmental determinations for all or portions of this property?
   ☒ Yes ☐ No
   If yes, please describe and provide "ED" number(s): ED10-248; Throughput Increase Project

Other Related Permits

1. List all permits, licenses or government approvals that will be required for your project (federal, state and local): Notification to SLO County Air Pollution Control District, State Water Resources Control Board NPDES Permit

   (If you are unsure if additional permits are required from other agencies, please ask a member of the Planning Department staff currently assigned in either Current Planning or the Environmental Division.)

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INFORMATION DISCLOSURE FORM

San Luis Obispo County Department of Planning and Building File No _____

TIME LIMITS FOR PROCESSING AND PUBLIC NOTICE DISTRIBUTION REQUIREMENTS - California state law (California Government Code Section 65941.5) requires that the county provide the following information to applicants, when a permit application is filed:

Not later than 30 days after a land use or land division application is received, the county must notify the project applicant or designated representative in writing either that the application is complete, or that items are necessary to complete the application. If you are not notified in writing, the application is considered complete. Any land use or land division application must be approved or denied within three months of adoption of the Negative Declaration or determination that the project is exempt, or within six months of the certification of an Environmental Impact Report. The County of San Luis Obispo processes the land use application and the environmental review concurrently, so these decisions are made simultaneously. (Government Code Sections 65943 and 65950, et seq.)

A project applicant may make a written request to the county to receive notice of any proposal to adopt or amend the general plan and the land use, real property division, building and construction, road name and addressing, and growth management ordinances which might reasonably be expected to affect that applicant's project. The county offers a subscription service for notification of either: (1) all applications received by the county, or (2) Planning Commission agendas. The cost for each of these services is established by the county fee ordinance. (Government Code Sections 65945, 65945.3 and 65945.5)

When a property was created through recordation of a final or parcel map, and it is within five years of recordation, the county cannot withhold or condition the issuance of building permits for residential units based on conformance with conditions that could have been imposed as conditions of the tentative map, except where: (1) A failure to do so would place subdivision residents or residents in the immediate area in a condition perilous to health, safety or both; or (2) The condition is required in order to comply with state or federal law. (Government Code Section 65961)

Copies of Government Code Sections are available at the County of San Luis Obispo Law Library, County Government Center, San Luis Obispo, California.

RIGHT TO FARM DISCLOSURE - The County of San Luis Obispo recognizes the statewide policy to protect and encourage Agriculture. Sections 3482.5 and 3482.6 of the California Civil Code and Chapter 5.16. of the San Luis Obispo County Code protect certain, pre-existing agricultural production and processing operations ("agricultural operation") from nuisance claims. If your property is near a protected agricultural operation, you may be subject to certain inconveniences and/or discomforts which are protected by law. In order for the agricultural operation to be protected, the following requirements of Civil Code Sections 3482.5 and 3482.6 must be satisfied:

(1) The agricultural operation must be conducted or maintained for commercial purposes; (2) The agricultural operation must be conducted or maintained in a manner consistent with proper and accepted customs and standards as established and followed by similar agricultural operations in the same locality; (3) The agricultural operation predated the affected use(s) on your property; (4) The agricultural operation has been in existence for more than three years; and (5) The agricultural operation was not a nuisance at the time it began.

If your property is near an agricultural operation in the unincorporated area of the County which satisfies the above requirements, you may at times be subject to one or more inconveniences and/or discomfort arising from that operation. Such inconveniences may include (depending upon the type of agricultural operation protected), but are not necessarily limited to, the following: noise, odors, fumes, dust, legal pesticide use, fertilizers, smoke, insects, farm personnel and truck traffic, visual impacts, night time lighting, operation of machinery and the storage, warehousing and processing of agricultural products or other inconveniences or discomforts associated with the protected agricultural operations. For additional information pertaining to this disclosure and the Right to Farm Ordinance, or concerns with an agricultural operation, please contact the San Luis Obispo County Agricultural Commissioner's Office.

HAZARDOUS WASTE AND SUBSTANCE SITES AND LANDFILL DISCLOSURE - Please verify whether your project is on the Known Hazardous Waste and Substances Sites List pursuant to AB 3750 and if you are within ½ mile of certain landfills (see back of sheet).

PLEASE COMPLETE AND SIGN BELOW

I acknowledge that I have read and understand the information and policy and detailed above: (1) Time Limits for processing and (2) Public Notice Distribution requirements and (3) the Right to Farm Disclosure.

AND

I acknowledge that I have reviewed the list of Identified Hazardous Waste and Substances Sites List and the Landfill Disclosure on the back of this form and find the following: (1) The site is not shown on the list of Identified Hazardous Waste and Substances Site; (2) The site is not shown on the list dated April 1998, or any later list published by the State Office of Planning and Research and (3) I have read the disclosure statement on landfill operations.

James O. Anderson — Signature

6/13/18 — Date

Print Name: JAMES ANDERSON

APPENDIX A

Project Description

Introduction

Phillips 66 Company (Phillips 66) proposes to modify the existing rail spur currently on the southwest side of the Santa Maria Refinery (SMR) located in unincorporated San Luis Obispo County California (see Figures 1 and 2). The project would include an eastward extension of the existing rail spur as well as a railcar unloading facility. The trains would deliver crude oil to the SMR for processing. The unloaded material would be transferred from the new unloading facility to existing crude-oil storage tanks via a new on-site above-ground pipeline. The unloading area would also include employee facilities such as a restroom.

The proposed tracks and unloading facilities are designed to accommodate unit trains and manifest trains. Unit trains consist of approximately 80 tank cars and associated locomotives and other supporting cars that stay together as one assembly. Manifest trains may have a variety of car types and cargos and are not fully dedicated as are unit trains. Manifest trains may deliver one or more cars to the refinery and then continue to other destinations to deliver other cargo.

Project Purpose and Objectives

The purpose of the project is to allow SMR to access a full range of competitively priced crude oil. The facility currently processes San Joaquin crude oil, one of the heaviest crude oils available. The project does not allow for an increase in the processing capacity or throughput. The project would extend the existing rail spur within the refinery and install the necessary infrastructure to safely and efficiently transfer crude oil from rail cars to the existing refinery storage tanks for processing. As defined by the International Energy Agency, the term crude oil comprises crude oil, natural gas liquids, refinery feedstocks, and additives as well as other hydrocarbons (including emulsified oils, synthetic crude oil, mineral oils extracted from bituminous minerals such as oil shale, bituminous sand, etc., and oils from coal liquefaction). Crude oil is a mineral oil consisting of a mixture of hydrocarbons of natural origin and associated impurities, such as sulphur.

Project Location

The refinery has been operating since 1955 and is located in unincorporated San Luis Obispo County, near the City of Arroyo Grande on the Nipomo Mesa. The project would occur entirely within the existing Phillips 66 boundary. In the project description and impact assessment presented below, the term ‘site’ is used to refer to the area directly affected by construction, including grading, excavation, rail construction and fencing. The larger grounds of SMR are referred to as the Phillips 66 property and the adjacent and surrounding lands within San Luis Obispo County and nearby incorporated municipalities are referred to as the project area.

Proposed Facilities

Phillips 66 proposes to modify the existing rail spur on the southwest side of the refinery to include an eastward extension as well as an unloading facility, new, on-site transfer conveyance (pipelines), and a restroom (see Figures). Additionally, CalFire has requested an unpaved eastern Emergency Vehicle Access route between the eastern end of the rail spur and Highway 1. The tracks and unloading facilities have been designed to accommodate trains of approximately 80 tank cars and associated locomotives in unit train or manifest train configurations. These trains would deliver crude oil to the facility for processing.

The unloaded material would be transferred to the existing storage tanks via a new pipeline that would be constructed across the existing coke storage area and along an existing internal refinery road.

The project would also include work within the existing refinery connecting and upgrading existing infrastructure. This includes adding a new electricity cable to an existing pipeway and adding a new fire water pipeline to an existing pipe rack. The rails on the existing rail spur would also be replaced.

The new rail spur lines would extend approximately 2600 yards from the terminus of the current spur. The unloading facility would be located at the end of the existing coke storage area and along an existing internal refinery road to and provide an efficient route for the new, above-ground pipeline to convey the crude oil to existing tanks.

The approximate construction areas are summarized below and shown on Figure 2:

- 2305 yards (2110 m) – Length of spur extension (including approximately 815 yards within the existing industrial coke plant area)
- 270-feet (82m) – Approximate width of construction area for rail extension (note that much of the area would only be affected temporarily).
- 775-yards (710 m) – Length of new pipeline from the unloading facility to the internal refinery (note that an additional 400 yards will be constructed within the existing refinery connecting to the existing storage tanks).
- 25-feet (7.5 m) – Approximate width of temporary construction area for pipeline installation

Acreage Breakdown (temporary + permanent):

- 38.6 acres – Rail Spur and Unloading Facility
- 4.1 acres – New Pipeline (mostly temporary impacts)
- 1.7 acres – Secondary Emergency Vehicle Access
- 4.5 acres – Internal Refinery Piping and Existing Track Upgrade

Collectively, the entire project, including temporary and permanent impacts, would affect approximately 48.9 acres. Of this area, a significant portion occurs within the existing refinery:

- 21.9 acres (45% of total) occurs within the existing industrial refinery area
- 27 acres occur in undeveloped areas and include portions of the rail extension, the new pipeline, and the secondary emergency vehicle access road (Figure 2).

As noted above, a significant portion of the impacts would be temporary during construction and affected plant communities would be returned to pre-project conditions following completion of construction.

Phillips 66 has designed all facilities based on geotechnical investigations and to minimize the potential for geological effects such as lateral spreading, subsidence, liquefaction, or soil collapse, and would incorporate design features such as stabilization fills, retaining walls, and removal of unstable materials if necessary.

Alternatives

Before selecting the proposed track configuration, Phillips 66 evaluated several alternatives, including 'teardrop' looped track configurations as well as a northern access track (see Figure 3 and supporting figures). The summary below compares these alternatives in terms of their areal extent, visibility from surrounding areas, amount of excavation and fill required, and potential ecological resource impacts.

Phillips 66 selected the straight track based its reduced effect on the environment compared to the other alternatives. The considered northern access would not accommodate the number of cars associated with the unit trains and was therefore technically infeasible, but also would have the highest impact on sensitive biological resources as it would need to cross the most dense population of the endangered Nipomo Mesa lupine. Both of the considered loop track configurations are challenged by the natural grade change at the southern end of the property where the Nipomo Mesa drops to the Santa Maria Valley floor. To maintain the required turn radius for the trains and to meet the grade requirements for a flat track, both loop configurations would require substantial fill along the southern portions. The small loop would require import of approximately 448,000 cubic yards of fill to raise the southern portion of the property, resulting in substantial truck trips and construction-related dust, visual impacts (e.g., from Oso Flaco Road), and other issues. The large loop was extended in an effort to avoid the grade issue, but would also require substantial fill (though less than the small loop), would have the largest construction footprint, and would encroach on the sensitive open dune habitat directly east of the refinery. The straight track requires the least excavation/fill and maximizes avoidance of sensitive natural resources.

The table below describes some of the key considerations in comparing the alternatives.

	Northern Access Track	**Small Loop Track**	**Large Loop Track**	**Straight Track (Proposed Project)**
Approximate Affected Area	Not quantified	44.23-acre footprint + 44.34 acre area enclosed by track and fencing	51.26-acre footprint + 66.27 acre area enclosed by track and fencing	48.9-acre footprint
Visibility	Medium	Highly visible fill area – 44'	Visible fill area – 25'	Low
Cut (excavation required)	Not quantified	154,000 cy	349,000 cy	120,000 cy
Fill	Not quantified	448,000 cy	218,000 cy	117,000 cy
Biological impacts	Direct impacts on endangered Nipomo Mesa lupine	Close to dune sheet habitat (70 feet)	Direct impact on dune sheet habitat	No impacts to sensitive habitat or listed species

The new facilities for the proposed project are described below.

Rail Spur Modification

Modification of the existing rail spur would include constructing up to five parallel ladder tracks, each long enough to hold an entire train (as the tracks extend east, some sets would merge reducing the affected area and the number of parallel tracks). The existing rail spur on the southern portion of the property currently provides rail access to the coke storage area and would provide a common entry point for the new tracks. Two tracks would surround an unloading rack and then would come together to form a common tail track at the east end. The tail track would allow the road locomotives to return to the common entry and leave the facility, if required, and would also allow switching the tank car strings onto and off of the unloading rack. The tail track would be long enough to accommodate two locomotives (and buffer cars) and the lead track would be long enough for 10 tank cars and the switching locomotives. A third track (the "runaround track") would allow locomotives to return to the front of the facility after dropping off an 80-car train on Track(s) 1 and (or) 2. A fourth track (Track A) would be constructed to receive a full unit train should Tracks 1 and 2 be occupied by unloading trains. The fifth track (Track B) would be used for queuing up empty cars after the unloading process is complete.

Mainline Turnout

Unit train service would not require substantial changes to the turnout from the Union Pacific mainline running north-south adjacent to the refinery. The turnout guides trains off the mainline onto the refinery's rail spur. Union Pacific may require a small change in the angle of the turnout (e.g., change from a turnout #10 to #11); however, if required, the construction of the new turnout would be a minor change from the current configuration and the construction would occur entirely within the existing disturbed track area. Because other trains continually pass through the Arroyo Grande/Santa Maria area on the Union Pacific mainline, the turnout must allow a unit train to clear the mainline without stopping. The existing rails would be replaced as part of the project.

Unloading Facility

The unloading facility would include an access platform and a system of pumps and meters, suction lines from the railcars, steam lines, and a common pipeline leading to the refinery's existing tank farm. Figure 4 provides plan and cross-section views of the proposed facility. View simulations of the facilities are provided with the figures supporting this document. The access platform would run parallel to the track, with an individual gangway and safety cage at each unloading station. The access platform and tracks would be supported by reinforced concrete construction. This area would provide structural support, spill containment (see description below), and a clear, solid work surface for the operators.

The unloading facility would be designed around "train slots" (a track that can contain an entire unit train). Union Pacific bases the number of slots on the number of trains arriving per day and/or the yearly tonnage, and the 'dwell period' (the hours that the train would be at the facility.) Phillips 66 would unload up to five trains per week. Phillips 66 estimates that a complete 80-car train would be unloaded within 12 hours. The proposed two-slot facility would allow adequate capacity unloading.

Unloading System

The unloading facility would be equipped with a 24-car unloading system with individual positive displacement pumps. The unloading rack would be configured to unload two 12-car strings simultaneously. The 600-foot-long center platform would provide access to the tops of the railcars.

The system used to unload each car would consist of an adapter unit to connect the rail car to couplings, hoses, valves, flow meters and piping connecting to a 400 gallon-per-minute (gpm) positive displacement pump. The system may employ articulated loading arms as an alternative to flexible hoses. The loading rack would be the length of 12 cars; the four additional spots would allow unloading 20 cars of either 55 or 60 feet long.

Each car's unloading system would be equipped with an air eliminator to remove vapors (mostly air) potentially mixed in with the product. Air is typically present at the beginning and end of unloading when liquid levels are low. Air removal protects the system's flow meters and ensures accurate flow measurement. This air/vapor flow would be passed through two carbon beds piped in series. The filter medium would be regenerated as needed during operations. In addition, a small volume 'prover' would be installed to allow frequent proving of flow meters. Because of high planned flow rates, a truck-mounted prover would also be available.

A computer system would be used to control and monitor the unloading system's pumps, air compressors, meters and its interface with the refinery's tank system. A new 4160V-480V power distribution center would run the pumps, ventilation system, lighting, telephones, fire alarm and fire suppression systems. Power would be supplied initially from the Carbon Plant and subsequently by extending a line from the main substation in 2015.

Fire Protection and Safety System

A new fire protection and safety system would be installed for the unloading rack, consisting of fire detection equipment, safety showers, eyewash stations, pumps, hydrants, controls and piping. The unloading rack would be equipped with a foam sprinkler deluge system and firewater monitors with foam generators at the unloading rack periphery. The foam spray system would require a foam concentrate storage tank. The system specifications are provided below. The project would also include a secondary Emergency Vehicle Access route from the eastern end of the rail spur to Highway 1.

Foam/Water Deluge System

- Square footage under canopy: 32,860 ft^2
- Divide under canopy area into 5 zones of 6,572 ft^2 each
- Assume two adjacent zones will be activated in a fire
- Design density = 0.16 GPM/ft^2
- Flow rate required = 2 x 6572 x 0.16 = 2,104 GPM
- Provide additional flow of 2 x 500 GPM monitors = 1,000 GPM
- Total fire water flow required = 3,104 GPM
- Activation of deluge valves via manual pull stations (valves) or pilot sprinkler line
- Pilot sprinkler line shall have fusible heads rated at 175°F
- Bladder tank for foam concentrate storage sized for two consecutive activations of two adjacent zones.
- Pressurizing of line downstream of deluge valve activates pressure switch for remote alarm and pressurizes hydraulic valve that opens to allow foam concentrate flow to ratio proportioner
- Assumed foam concentrate is 1% type

Foam/Water Monitors

- Monitors shall be self-educting nozzles with foam totes
- North side monitors will be mounted at grade approximately 50' away from unloading cars
- South side monitors will be provided based on final road clearance dimensions (minimum clearance from empty cars on Track B).

Water Supply System

- Install approximately 2300 feet of 8-inch pipe from the existing water line at the Coke Control Room to the unloading rack area. The supply for this pipe comes from incorporating the existing 6-inch water line and another 6-inch pipe in the area. The two lines will come together to supply the lower portion of the loop.
- Install approximately 2300 feet of 8inch pipe from the existing water line near the flare to the unloading rack area. The source of this line will either be at the 8-inch portion of the line or the 6-inch portion and will be replaced with 8-inch line to provide the adequate flow rate.
- Provide 8-inch fire water loop around the unloading rack.
- Provide two FDC's with check valve between for boosting of pressure in fire water loop at unloading rack (if necessary).
- Two new lines will tie together for a short run to allow for repumping by refinery fire truck pump into looped system around rack.

Pipeline

Downstream of the meter assembly, a new 24-inch above ground pipeline would be routed along an existing internal dirt road on the Phillips 66 property between the unloading facility and the refinery to connect with the existing crude oil storage tanks. This dirt road accommodates periodic on-site traffic only associated with refinery personnel traveling at low-speeds. The line would be approximately 1100-yards (1005 m) in length.

Access Roads

Paved access roads would be constructed near the unloading rack and around the rail spur for access by operations, safety, and maintenance crews. The access road surrounding the rail spur would be 24 feet in width along the southern side of the spur and 12 feet in width along the northern side. Appropriately sized turn-around areas meeting County and CalFire standards and a mid-way track crossing are also included to maximize efficiency in the event of an emergency. Additionally, an eastern Emergency Vehicle Access route would be constructed from the eastern end of the rail spur to Highway 1 following existing agricultural roads. The secondary access road would be improved with decomposed granite or comparable surfacing to support emergency vehicles as prescribed by CalFire but would not be paved.

Security Fence

As required by the U.S. Department of Homeland Security, an extension of the existing chain link fencing topped with barbed wire would be required around the periphery of the new tracks. Additional lighting would also be required, though light would be shielded down to minimize glare in adjacent areas.

Spill Containment and Response Facilities

Drain boxes would feed below-grade 16-inch-diameter drain lines routed to two parallel rectangular storage tanks (approximately 40,000 gallons total volume) located in a vault for containment. Two pumps would transfer any contained oil/water through a new pipeline into the existing refinery's oily water system. The

system would be sized to contain the contents of one rail car as well as the foam and water that would be released from the fire suppression system.

Phillips 66 has a number of existing process safety policies and procedures that would apply to the rail project, including the equipment and operating procedures. These programs are designed to prevent releases of hazardous materials, minimize risk, and ensure the refinery's ability to process crude without increasing risk of releases. For example, the Mechanical Integrity Program covers equipment used to process, control, and store hazardous chemicals and assigns responsibility for equipment inspection and testing as well as maintenance. This program meets the requirements of CCR Title 8 Sec 5189, "Process Safety Management of Acutely Hazardous Materials" (f), (j) and 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals" (j)

The refinery uses a Positive Material Identification (PMI) program to ensure the integrity of all mechanical and pressurized systems. This program is overseen by the refinery's Inspection Supervisor.

Any new feedstock coming to the refinery undergoes a complete Management of Change (MOC) analysis to ensure that all hazards, as well as the refinery's systems are safe and operable. The MOC program is part of the refinery's Process Safety Management program and tracks equipment modification, addition of new systems and process changes. MOC covers all changes that involve specific chemicals at or above threshold limits as defined in California Code of Regulation, Section 5189, Appendix A or flammable liquids or gasses as defined by California Code of Regulations, Section 5194(c) including new construction, modifications, changes in chemicals or materials, changes in feedstock, and changes in concentrations, temperatures, pressures, or flow rates outside of established Safe Process Limits.

The refinery is also covered by the California Accidental Release Prevention (CalARP) program, which is designed to prevent accidental releases potentially harming the public and the environment and to satisfy community right-to-know laws. Phillips 66 has prepared the required Risk Management Plan (RMP) to analyze the potential for accidents and development of operating procedures, training and maintenance requirements, compliance audits and incident investigation. The refinery additionally has an approved Spill Prevention, Control and Countermeasure Plan (SPCC).

Support Buildings

The unloading facility would include a small parking area and restroom facilities. Both men's and women's restroom facilities would be served by potable water and a septic system for wastewater disposal. All septic system components would be constructed in accordance with applicable State and County regulations and State Regional Water Quality Control Board standards.

Construction

Construction would require contractor mobilization, construction site preparation, establishment of a staging and equipment laydown area, clearing and grading, removal of the existing rail turnout, laying new track, and assembling the unloading facility and pipeline. The last stage of construction would include demobilization, soil stabilization, restoring vegetation, and removal and disposal of construction wastes (e.g., demolition materials, packaging, and other solid waste).

After contractor mobilization, the site would be prepared, the limits of disturbance would be clearly marked, and initial clearing and grubbing would occur within the construction area. The site would be graded and any remaining soil would be managed on-site. If specified by Union Pacific, the existing rail turnout would be modified to accommodate the planned unit trains, including demolition/removal of approximately 1,300 feet of existing track and placement of a new turnout track and signal, if needed. This work would occur within the existing track corridor and would not require impacts outside the existing disturbed area.

The primary facilities, including the rail extension, unloading station and pipeline, would be constructed by Phillips 66 construction contractors. The number of construction workers would peak at approximately 200. Trucks would import construction materials and components (e.g., track segments, pipe), which would be stored on site in a laydown area. Track construction would include grading, soil compaction and stabilization, placement of sub-ballast and installation of rail, ties and ballast. Track ballast is used to form the rail track bed to allow drainage and to bear the weight of the rail cars. Delivery of construction materials would avoid peak traffic hours.

The unloading facility and system would be assembled adjacent to the completed tracks with connections to the refinery pipeline, stormwater collection system, and oily water treatment system.

Construction Schedule

The overall construction is anticipated to occur over a period of 9 – 10 months. In some cases, portions of the individual tasks below would occur concurrently.

- Turnout track replacement (if needed) – 2 months
- Grading/Soil Transport – 4 months
- Construction of Pipeline – 1 month
- Construction of Tracks – 4 months
- Construction of Unloading System – 2 months

Project Operations

Project operations would include unloading of up to five trains per week. Trains would arrive from different oilfields and/or crude oil loading points depending on market availability. In a unit train configuration, each train would consist of two locomotives, two buffer cars, and eighty railcars carrying 23,500 gallons each or seventy-three railcars carrying 30,000 gallons each depending on the car size, for a total of approximately 2,190,000 gallons (52,142 bbls) or 2,400,000 (57,143 bbls) of crude oil. In a manifest train configuration, varying number of railcars would be dropped off at SMR by a passing train. A dedicated locomotive would remain on-site to move cars.

Because trains would arrive at different times throughout the week, the number of workers would vary depending on the number of trains and worker arrival and departure time would vary throughout the day and night.

Unloading Sequence

The tracks and unloading rack would be designed to allow for the safe and efficient movement of multiple trains and cars in and out of the facility while minimizing the required space. Union Pacific locomotives

would arrive on Union Pacific's mainline track heading south to the SMR. Locomotives would move tank cars into the unloading facility with 10 cars positioned at the unloading rack. Phillips 66 crews would manage movement of the rail cars on-site, unloading 10 cars at a time. Emptied cars would be moved to a storage track. After unloading all cars, train crews would attach locomotives to the empty cars and depart to the west and then to the north and off the Phillips 66 property. Sufficient track would be available to store a second train should one arrive.

Workers would unload incoming unit trains and then disconnect the unloading pumps and prepare the railcars for departure. Phillips 66 would also refuel locomotives when the locomotives were used as switch engines to move the tank cars on and off the track. Locomotive refueling would be completed using a tank truck or a permanent refueling station with a fixed tank and fuel metering system. This process includes repressurizing the brakes using an air compressor system and replenishing the sand used by the locomotives for traction.

Coastal Access Route

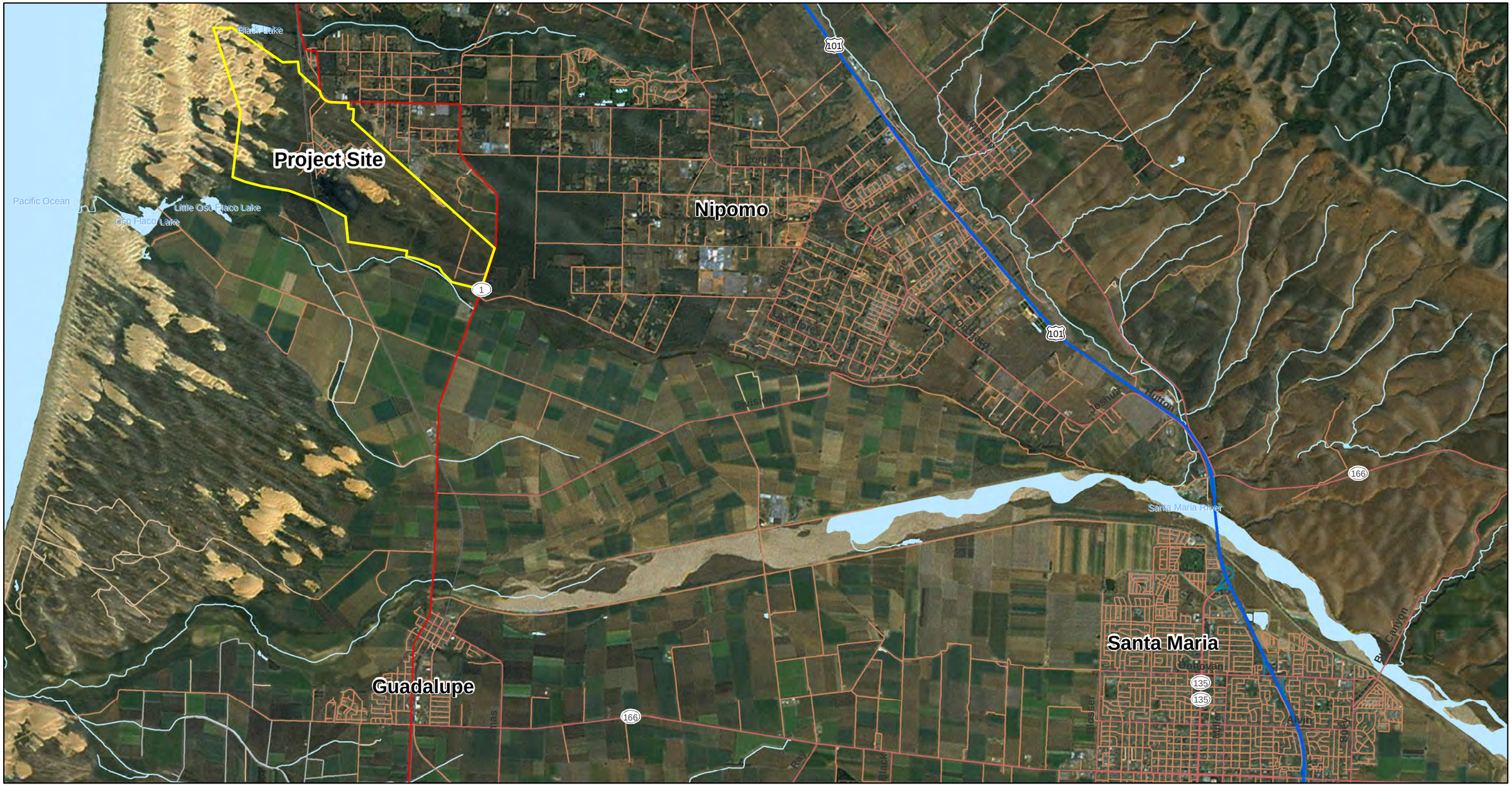
As part of a separate Development Plan/Coastal Development Permit initiated in 2008 ("Throughput Project"; Permit DRC2008-00146) and approved by the San Luis Obispo County Board of Supervisors on February 26, 2013, Phillips may be required to construct vertical public access from Highway 1 to their western property line consistent with the County requirement in Section 23.04.420 – Coastal Access Required, as part of the Rail Spur Project. The access would lead into the Oceano Dunes State Vehicular Recreation Area. The size and alignment of such access, as well as the appropriateness of the access, considering the existing environmental setting, public safety concerns, and the current land uses in the area is currently under consideration by the California Coastal Commission and the County.

The County has requested that a feasibility study be prepared to consider coastal access across the SMR. That document is currently in preparation. For purposes of the current project description for the rail spur project, a representative coastal access route has been developed in accordance with the alignment proposed in the County Conditions of Approval for the Throughput Project generally following existing roads on the SMR property. One alternative route has also been proposed to avoid areas previously mapped to support the endangered Nipomo Mesa lupine (Figure 8).

The conceptual routes considered are approximately 1.5 miles in length and 30-feet in width. The routes would require users to cross the active main railroad lines. It is assumed that the route would include a paved pedestrian and bicycle path. The access would not be intended to provide a new vehicle access route to the Oceano Dunes State Recreational Vehicles Area.

APPENDIX B

Site Layout Plans



Legend

Property Boundary

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

N

0 5,000 10,000

SCALE IN FEET

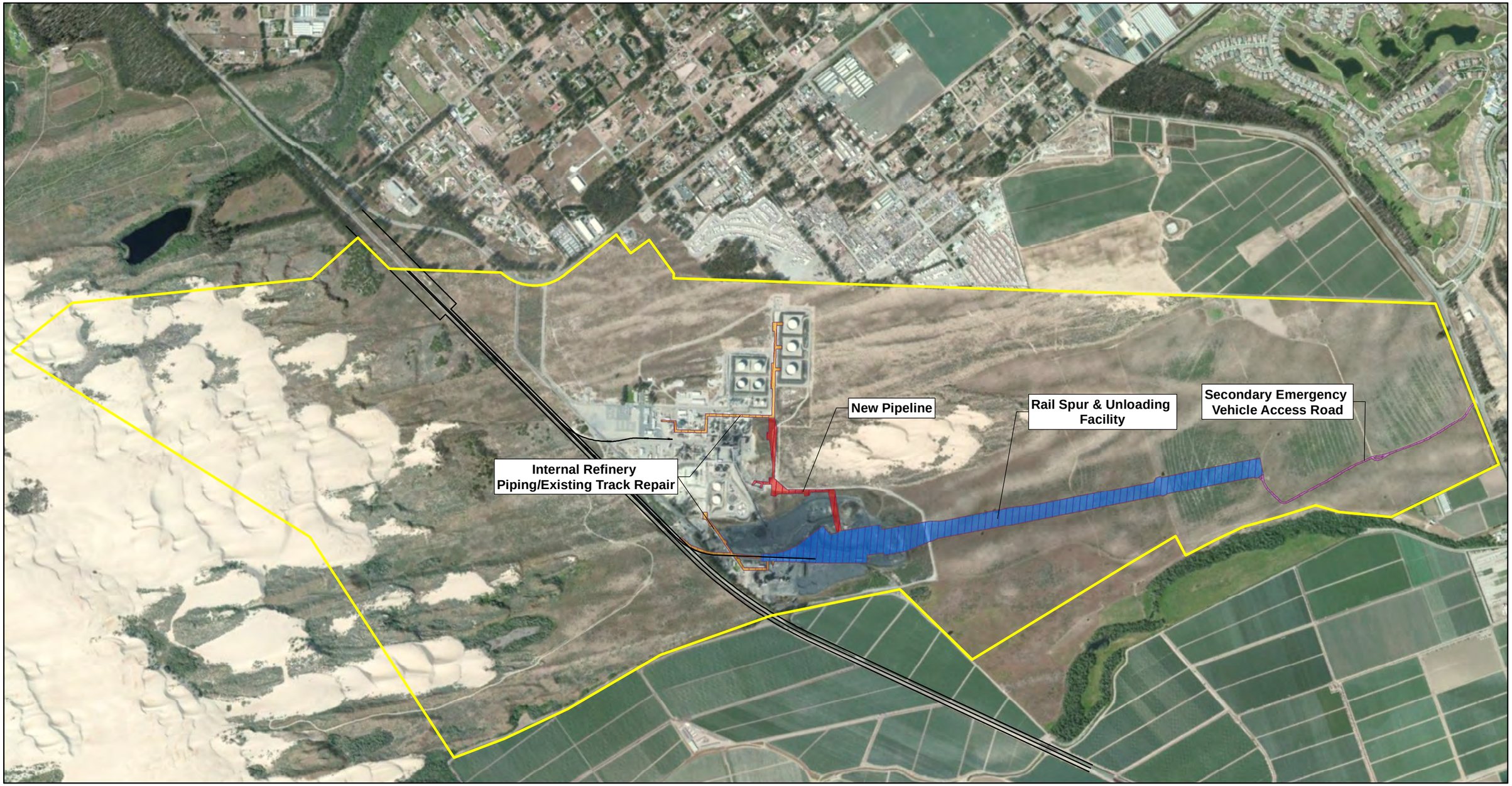
Phillips 66
Santa Maria Refinery Rail Project

PROJECT AREA

ARCADIS

FIGURE
1

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 1 ProjectArea.mxd 6/14/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



Legend

- Property Boundary
- Existing Rail Line
- Limits of Disturbance

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

N

0 1,255 2,510

SCALE IN FEET

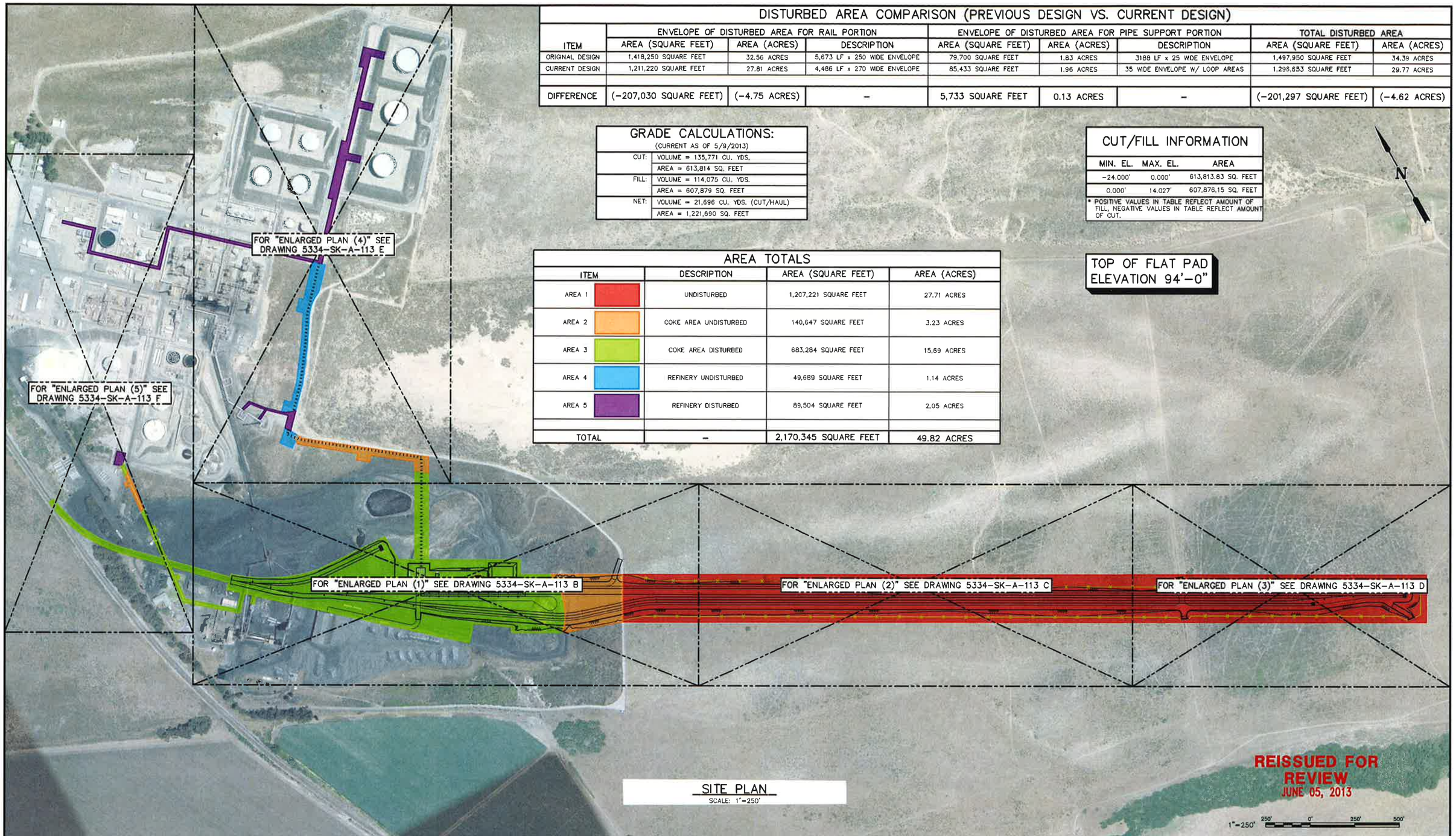
Phillips 66
Santa Maria Refinery Rail Project

PROPOSED PROJECT SITE ON PHILLIPS 66 PROPERTY

ARCADIS

FIGURE
2

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 2 ProposedProjectSite_rev1.mxd 6/17/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



DISTURBED AREA COMPARISON (PREVIOUS DESIGN VS. CURRENT DESIGN)

ITEM	ENVELOPE OF DISTURBED AREA FOR RAIL PORTION			ENVELOPE OF DISTURBED AREA FOR PIPE SUPPORT PORTION			TOTAL DISTURBED AREA	
	AREA (SQUARE FEET)	AREA (ACRES)	DESCRIPTION	AREA (SQUARE FEET)	AREA (ACRES)	DESCRIPTION	AREA (SQUARE FEET)	AREA (ACRES)
ORIGINAL DESIGN	1,418,250 SQUARE FEET	32.56 ACRES	5,673 LF x 250 WIDE ENVELOPE	79,700 SQUARE FEET	1.83 ACRES	3188 LF x 25 WIDE ENVELOPE	1,497,950 SQUARE FEET	34.39 ACRES
CURRENT DESIGN	1,211,220 SQUARE FEET	27.81 ACRES	4,486 LF x 270 WIDE ENVELOPE	85,433 SQUARE FEET	1.96 ACRES	35 WIDE ENVELOPE W/ LOOP AREAS	1,296,653 SQUARE FEET	29.77 ACRES
DIFFERENCE	(-207,030 SQUARE FEET)	(-4.75 ACRES)	-	5,733 SQUARE FEET	0.13 ACRES	-	(-201,297 SQUARE FEET)	(-4.62 ACRES)

GRADE CALCULATIONS:

(CURRENT AS OF 5/9/2013)

CUT:	VOLUME = 135,771 CU. YDS.
	AREA = 613,814 SQ. FEET
FILL:	VOLUME = 114,075 CU. YDS.
	AREA = 607,879 SQ. FEET
NET:	VOLUME = 21,696 CU. YDS. (CUT/HAUL)
	AREA = 1,221,690 SQ. FEET

CUT/FILL INFORMATION

MIN. EL.	MAX. EL.	AREA
-24.000'	0.000'	613,813.83 SQ. FEET
0.000'	14.027'	607,876.15 SQ. FEET

* POSITIVE VALUES IN TABLE REFLECT AMOUNT OF FILL, NEGATIVE VALUES IN TABLE REFLECT AMOUNT OF CUT.

AREA TOTALS

ITEM	DESCRIPTION	AREA (SQUARE FEET)	AREA (ACRES)
AREA 1	UNDISTURBED	1,207,221 SQUARE FEET	27.71 ACRES
AREA 2	COKE AREA UNDISTURBED	140,647 SQUARE FEET	3.23 ACRES
AREA 3	COKE AREA DISTURBED	683,284 SQUARE FEET	15.69 ACRES
AREA 4	REFINERY UNDISTURBED	49,689 SQUARE FEET	1.14 ACRES
AREA 5	REFINERY DISTURBED	89,504 SQUARE FEET	2.05 ACRES
TOTAL	-	2,170,345 SQUARE FEET	49.82 ACRES

SITE PLAN

SCALE: 1"=250'

NUMBER	SH.	REFERENCE DRAWINGS

REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CKD. BY	APP'D
A	5/28/13	ISSUED FOR REVIEW	-	-	-
B	6/3/13	REISSUED FOR REVIEW	-	-	-
C	6/4/13	REISSUED FOR REVIEW	-	-	-
D	6/5/13	REISSUED FOR REVIEW	-	-	-

APPROVED FOR CONSTRUCTION

A. F. E.	DATE	SIGNED

DRAWN BY -
CHECKED BY -
TRACED BY -
TRAC'G. CKD. -
APP'D -
APP'D -
SCALE AS NOTED
DATE 6/6/2013

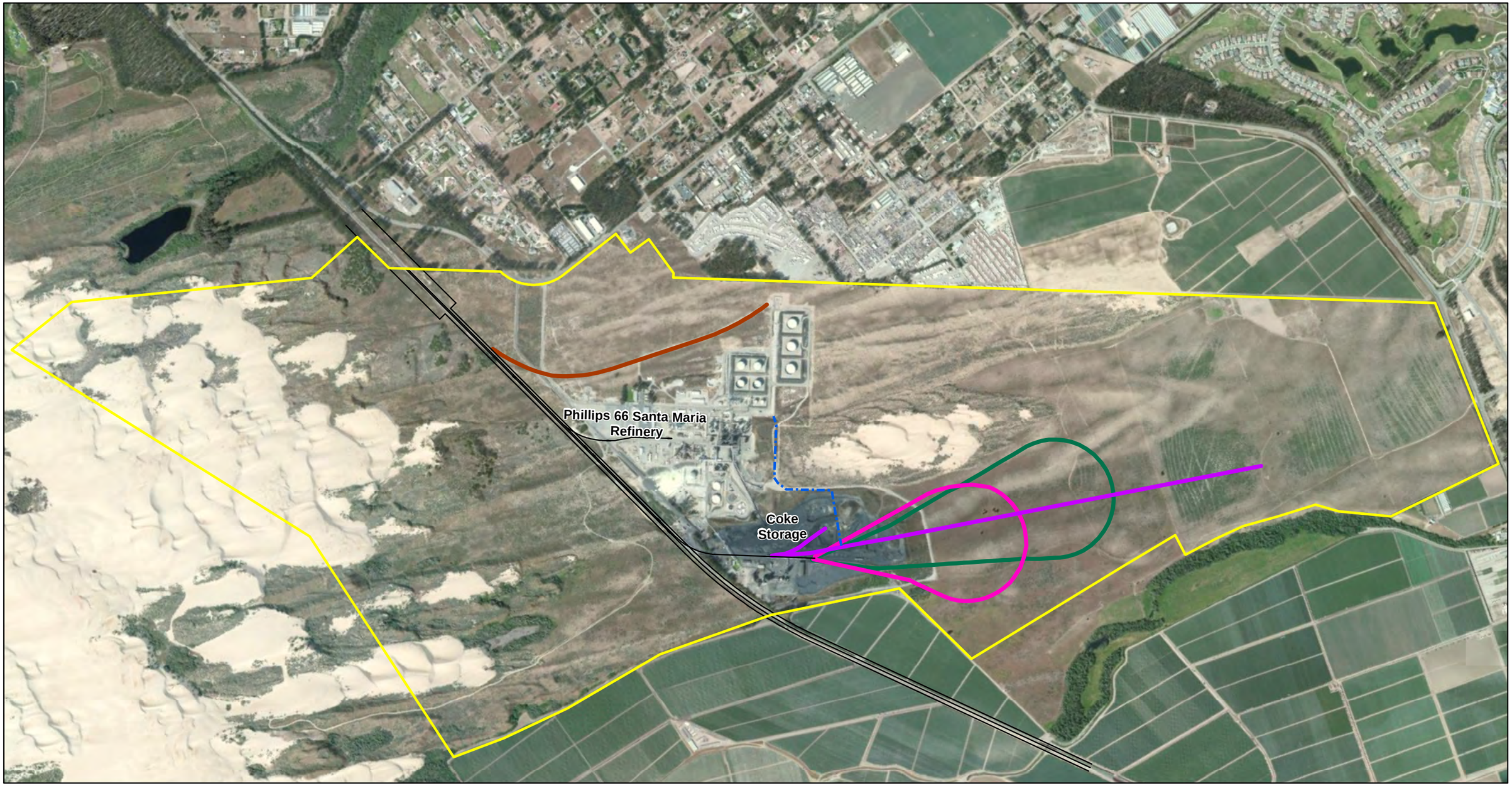
SPEC SERVICES
SPEC Services, Inc.
17101 Bushard Street
Fountain Valley, CA 92708
(714) 963-8077
5334_SK-A-113.dwg:(SK-A-113 A GRADING PLAN)

SANTA MARIA FACILITY
PHILLIPS 66 RAIL PROJECT
SITE PLAN

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO. 5334-SK-A-113 A

SHEETS 1 OF 1



Legend

- Property Boundary
- Existing Rail Line
- Pipe Routing
- Northern Access Track
- Small Loop Track
- Large Loop Track
- Straight Track (Proposed Project)

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

N

0 1,255 2,510

SCALE IN FEET

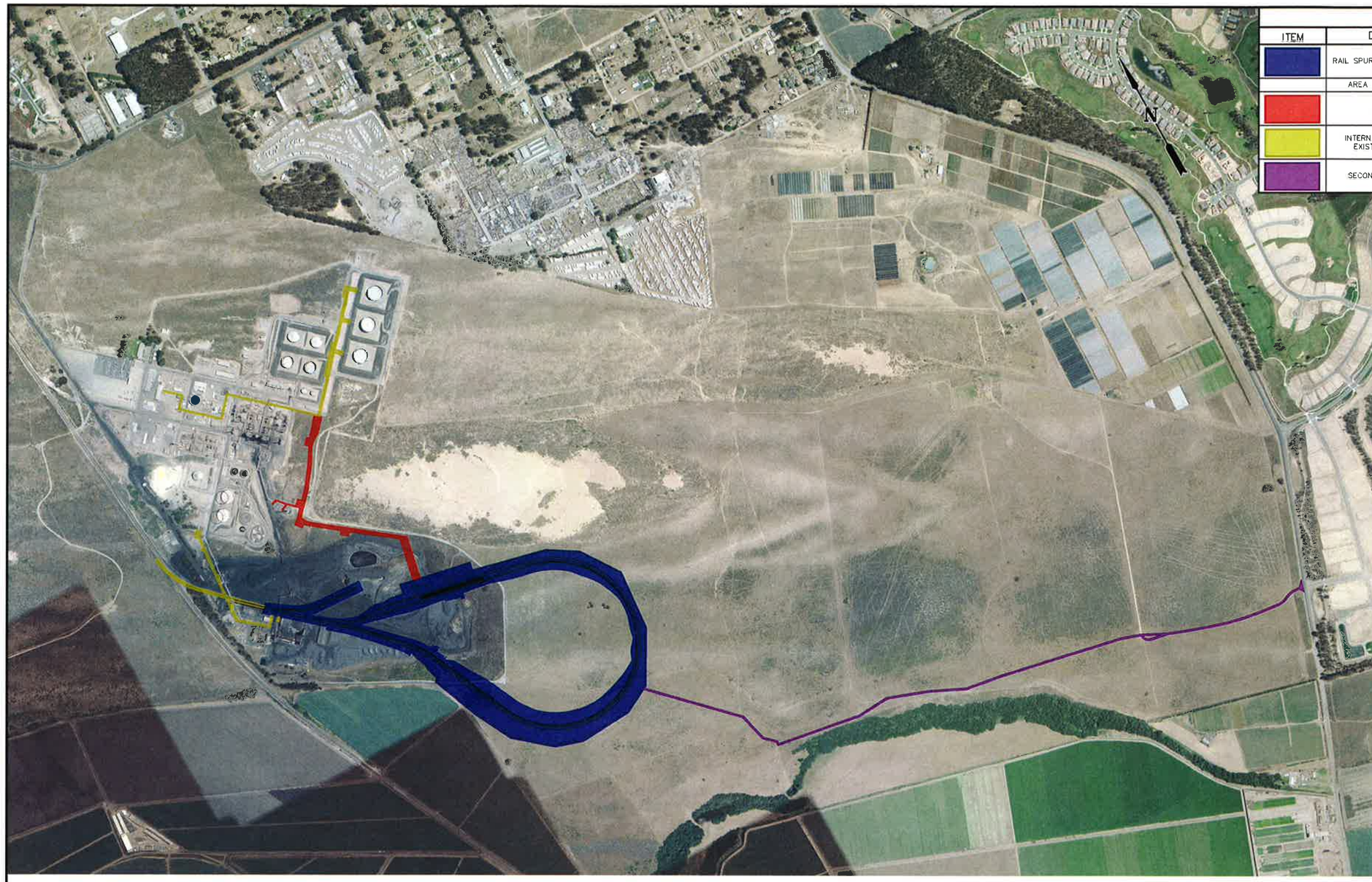
Phillips 66
Santa Maria Refinery Rail Project

TRACK LAYOUT ALTERNATIVES

ARCADIS

FIGURE
3

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 3 TrackLayoutAlternatives.mxd 6/14/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



AREA TOTALS

ITEM	DESCRIPTION	AREA (SQUARE FEET)	AREA (ACRES)
	RAIL SPUR & UNLOADING FACILITY	1,539,201 SQUARE FEET	35.34 ACRES
	AREA INSIDE OF THE LOOP	1,931,293 SQUARE FEET	44.34 ACRES
	NEW PIPELINE	121,728 SQUARE FEET	2.79 ACRES
	INTERNAL REFINERY PIPING/ EXISTING TRACK REPAIR	142,405 SQUARE FEET	3.27 ACRES
	SECONDARY ACCESS ROAD	123,298 SQUARE FEET	2.83 ACRES

SMALL LOOP – AREA PLAN

SCALE: 1"=500'

PROGRESS PRINT
JUNE 18, 2013

1"=500' 500' 0' 500' 1000'

NUMBER	SH.	REFERENCE DRAWINGS

REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CKD. BY	APP'D
A	–	(OPEN REVISION)	–	–	–

APPROVED FOR CONSTRUCTION

A. F. E.	DATE	SIGNED

DRAWN BY –
CHECKED BY –
TRACED BY –
TRAC'G. CKD. –
APP'D. –
APP'D. –
SCALE AS NOTED
DATE 6/18/2013

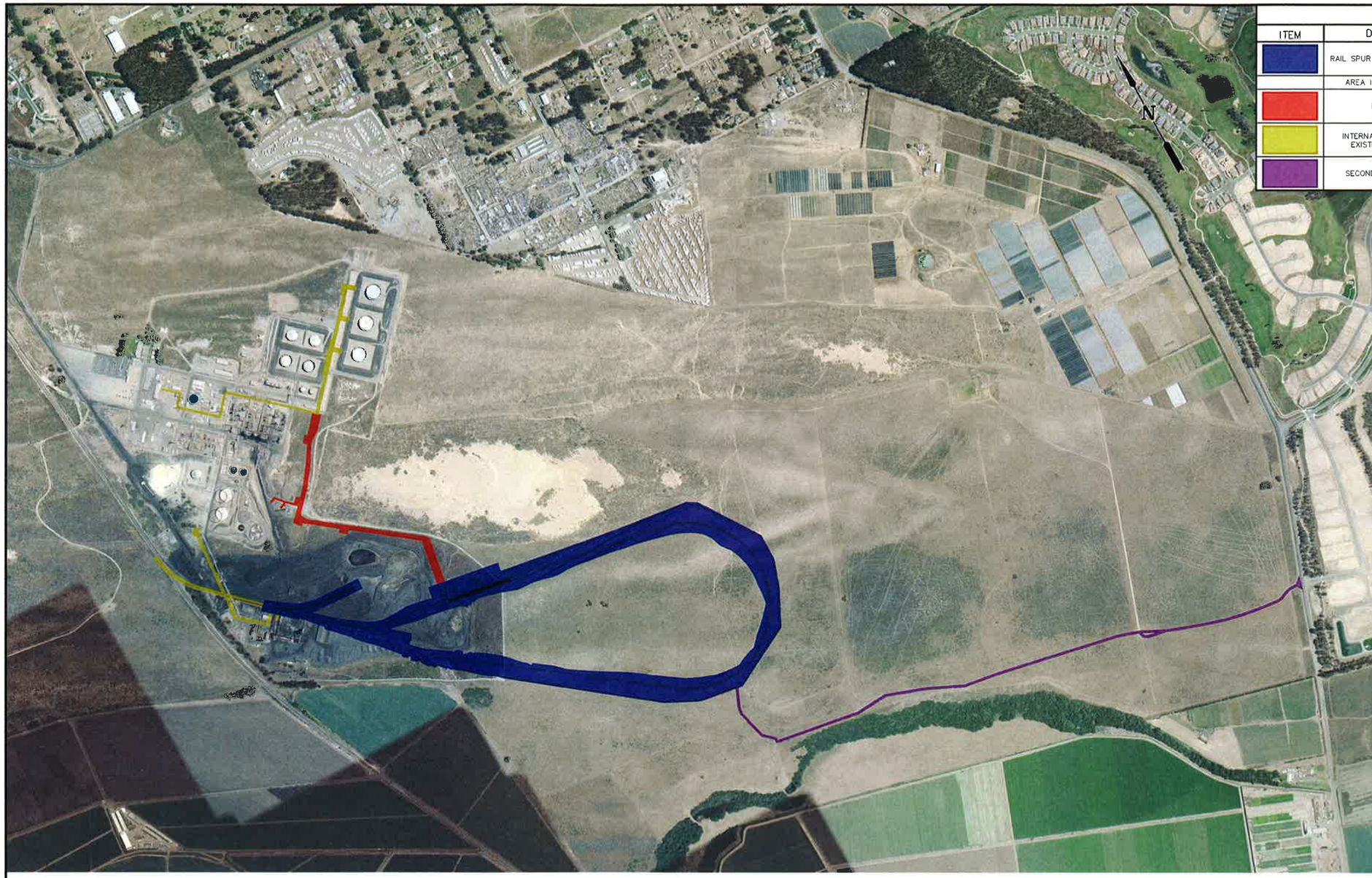
SPEC SERVICES
SPEC Services, Inc.
17101 Bushard Street
Fountain Valley, CA 92708
(714) 963-8077
5334-SK-A-118.dwg (SK-A-118 SMALL LOOP – AREA PLAN)

SANTA MARIA FACILITY
PHILLIPS 66 RAIL PROJECT
SMALL LOOP – AREA PLAN

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO.
5334-SK-A-118

SHEETS 1 OF 1



AREA TOTALS

ITEM	DESCRIPTION	AREA (SQUARE FEET)	AREA (ACRES)
	RAIL SPUR & UNLOADING FACILITY	1,847,127 SQUARE FEET	42.40 ACRES
	AREA INSIDE OF THE LOOP	2,886,576 SQUARE FEET	66.27 ACRES
	NEW PIPELINE	132,599 SQUARE FEET	3.04 ACRES
	INTERNAL REFINERY PIPING/ EXISTING TRACK REPAIR	142,405 SQUARE FEET	3.27 ACRES
	SECONDARY ACCESS ROAD	110,861 SQUARE FEET	2.55 ACRES

BIG LOOP – AREA PLAN

SCALE: 1"=500'

PROGRESS PRINT
JUNE 18, 2013

1"=500' 500' 0' 500' 1000'

NUMBER	SH	REFERENCE DRAWINGS

REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CK'D. BY	APP'D
A	–	(OPEN REVISION)	–	–	–

APPROVED FOR CONSTRUCTION		
A. F. E.	DATE	SIGNED

DRAWN BY –
CHECKED BY –
TRACED BY –
TRAC'G. CK'D. –
APP'D. –
APP'D. –
SCALE AS NOTED
DATE 6/18/2013

SPEC SERVICES
SPEC Services, Inc.
17101 Bushard Street
Fountain Valley, CA 92708
(714) 983-8077
5334 SK-A-117.dwg:(SK-A-117 BIG LOOP – AREA PLAN)

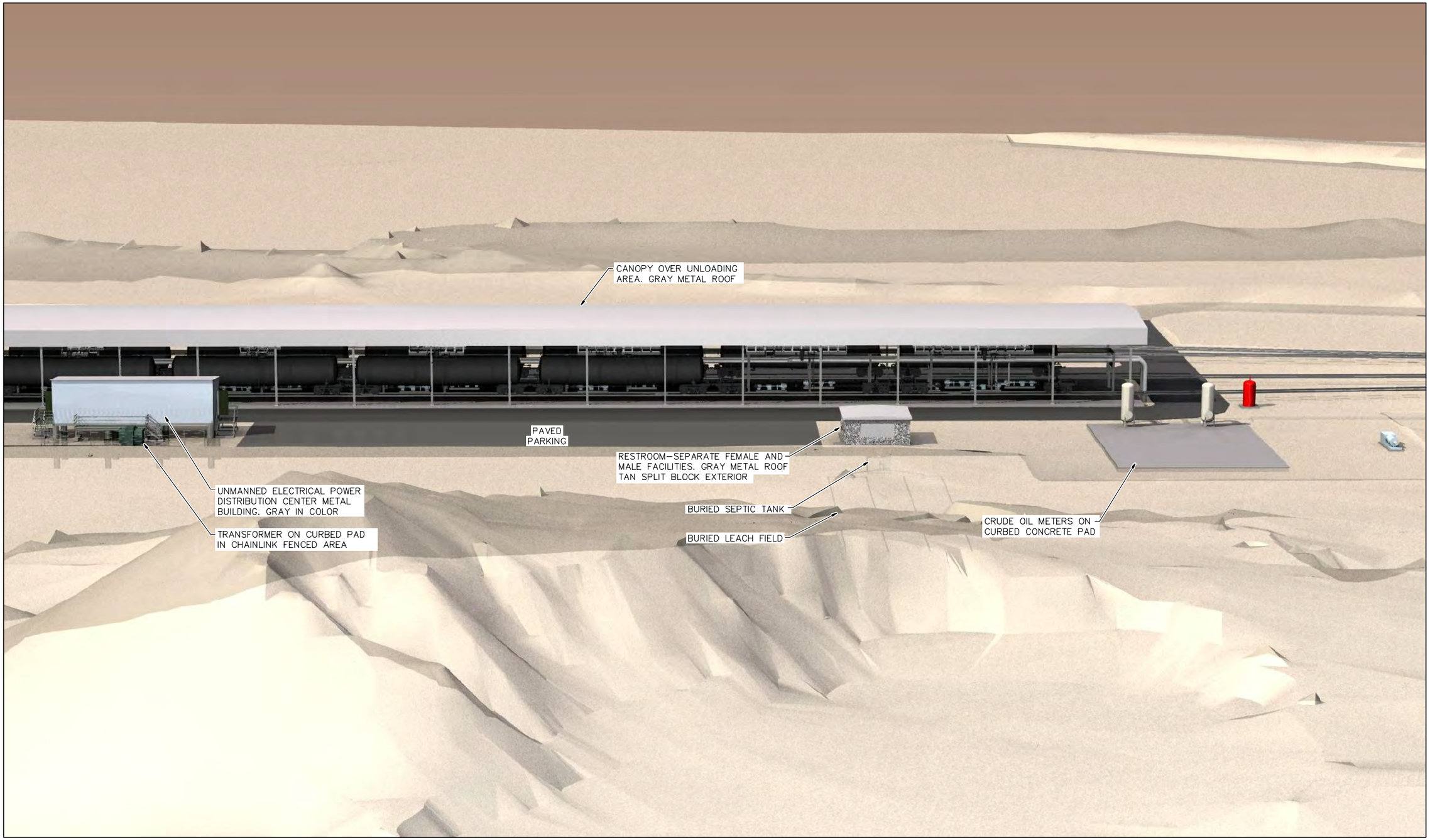
SANTA MARIA FACILITY
PHILLIPS 66 RAIL PROJECT
BIG LOOP – AREA PLAN

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO. 5334-SK-A-117
SHEETS 1 OF 1

APPENDIX C

Preliminary Floor Plans And Architectural Elevations



VIEW–A

LOOKING SOUTH

ENLARGED PIPING PLAN SEE DWG. 5334–P–SK–03

NUMBER	SH.	REFERENCE DRAWINGS

ISSUED FOR REVIEW
JUNE 7, 2013

SPEC SERVICES®
SPEC Services, Inc.
17101 Bushard Street
Fountain Valley, CA 92708
(714) 963–8077
S:\5334\5334–P–SK–04.dwg:1

REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CKD. BY	APP'D
A	02/20/13	ISSUED FOR REVIEW	MAS		
B	06/07/13	ISSUED FOR REVIEW	SAS		

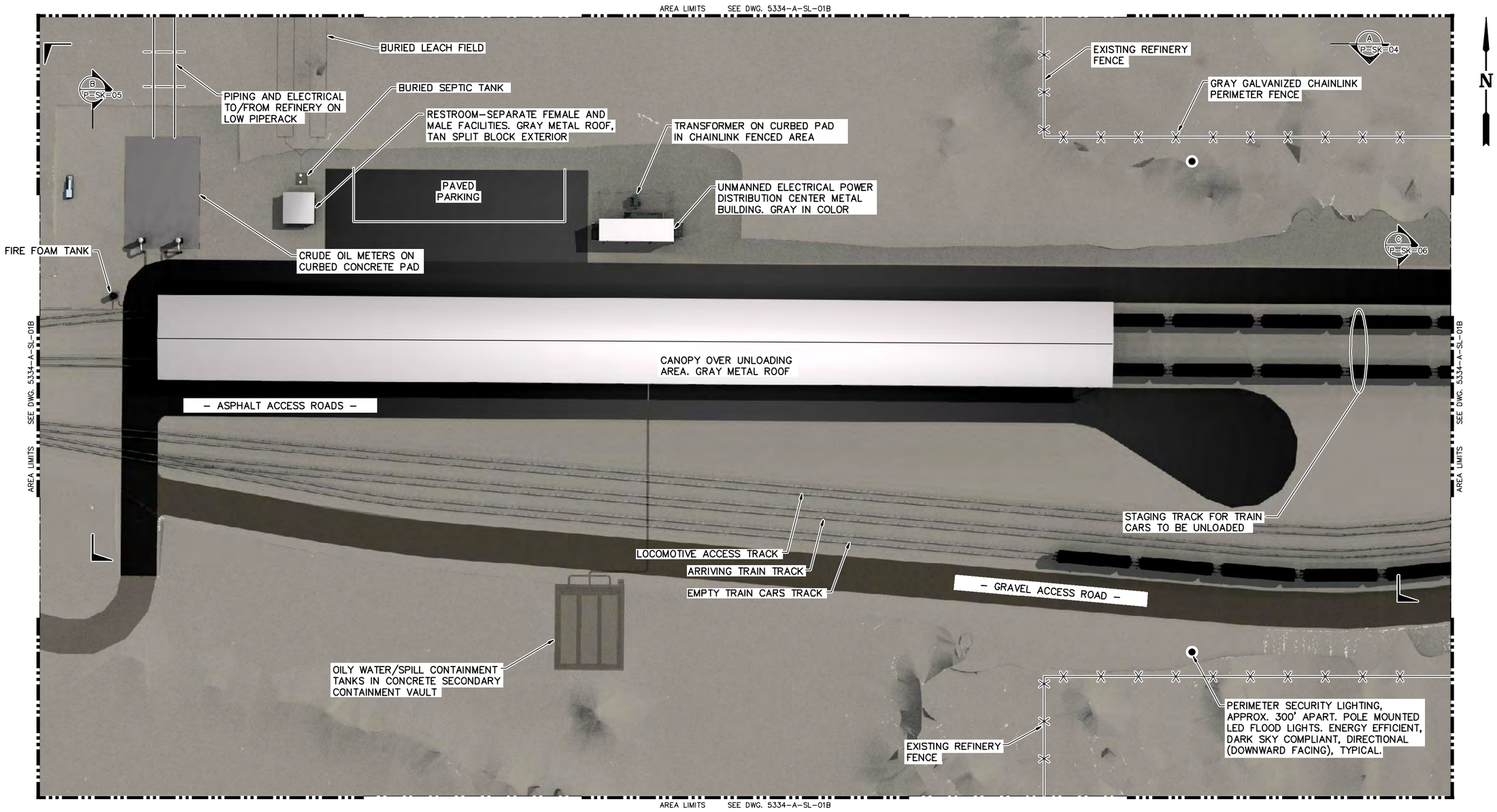
APPROVED FOR CONSTRUCTION		
A. F. E.	DATE	SIGNED

DRAWN BY MAS
CHECKED BY
TRACED BY
TRAC'G. CKD.
APP'D.
APP'D.
SCALE 1"=30'–0"
DATE 02/20/13

Phillips 66 Santa Maria Rail Project
RAIL PROJECT
UNLOADING AREA ELEVATION

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO. 5334–P–SK–04
SHEETS SHEET NO



1"=30' 30' 0' 30' 60'

NUMBER	SH.	REFERENCE DRAWINGS
5334-A-SL-01B		STRAIGHT TRACK KEY PLAN

ISSUED FOR REVIEW
JUNE 7, 2013

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REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CKD. BY	APP'D
A	02/20/13	ISSUED FOR REVIEW	MAS		
B	06/07/13	ISSUED FOR REVIEW	SAS		

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A. F. E.	DATE	SIGNED

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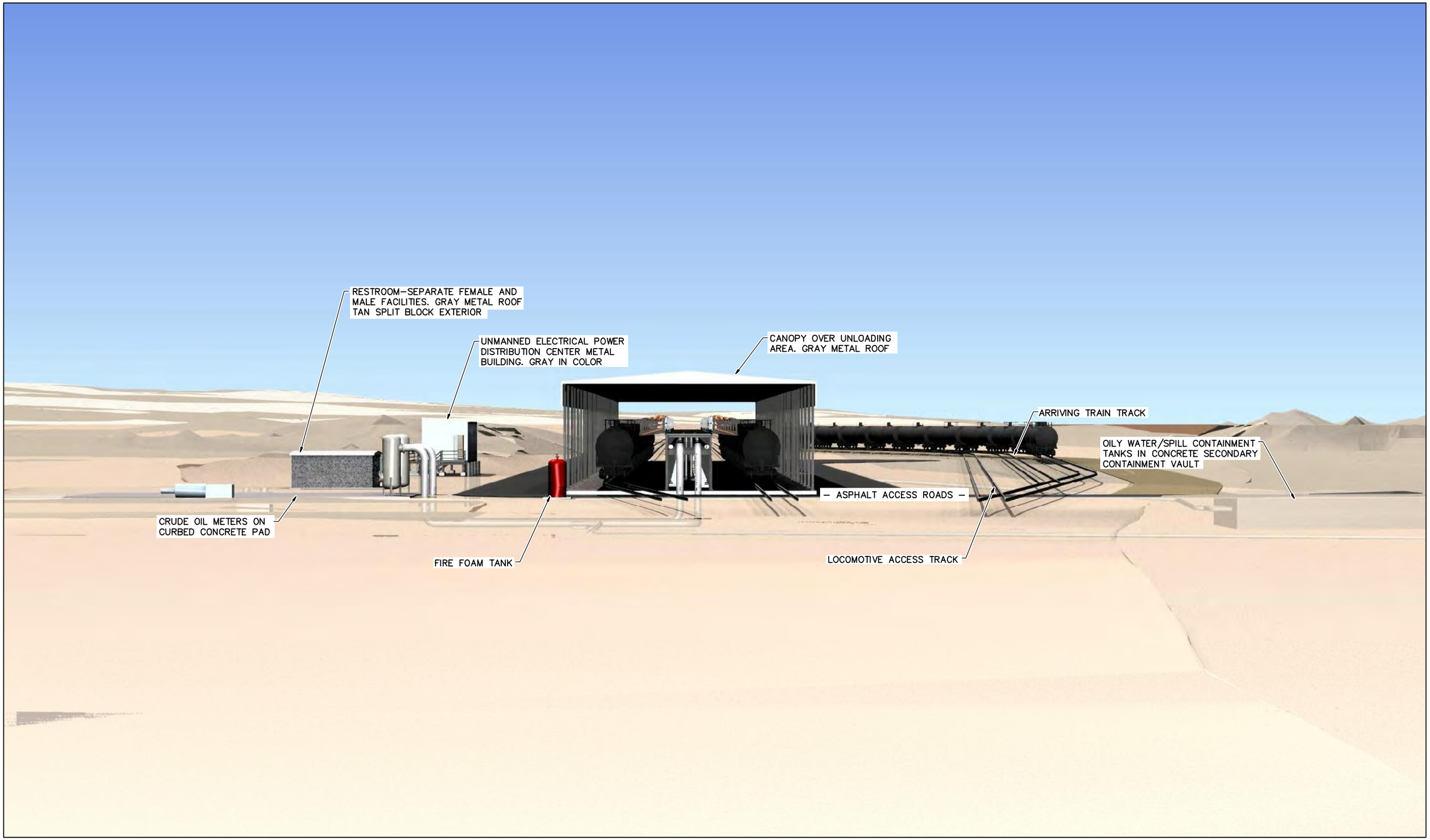
APP'D.
APP'D.
SCALE 1"=30'-0"
DATE 02/19/13

Phillips 66 Santa Maria
RAIL PROJECT
UNLOADING AREA ARCHITECTURAL PLAN

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO. 5334-P-SK-03
SHEETS SHEET NO



VIEW–B

LOOKING EAST

ENLARGED PIPING PLAN SEE DWG. 5334–P–SK–03

NUMBER	SH.	REFERENCE DRAWINGS

ISSUED FOR REVIEW
JUNE 6, 2013

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A	02/20/13	ISSUED FOR REVIEW	BEARING EARLIER DATE	MAS	BY	
B	06/07/13	ISSUED FOR REVIEW		SAS		

APPROVED FOR CONSTRUCTION		
A. F. E.	DATE	SIGNED

DRAWN BY MAS
CHECKED BY
TRACED BY
TRAC'G. CKD.
APP'D.
APP'D.
SCALE 1"=30'–0"
DATE 02/20/13

Phillips 66 Santa Maria Rail Project
RAIL PROJECT
UNLOADING AREA ELEVATION

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO.
5334–P–SK–05
SHEETS SHEET NO

VIEW–C

LOOKING EAST

ENLARGED PIPING PLAN SEE DWG. 5334–P–SK–03

NUMBER	SH.	REFERENCE DRAWINGS

ISSUED FOR REVIEW
JUNE 7, 2013

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REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CKD. BY	APP'D
A	02/20/13	ISSUED FOR REVIEW	MAS		
B	03/18/13	REVISED AND ISSUED FOR REVIEW	SA		
C	06/07/13	ISSUED FOR REVIEW	SAS		

APPROVED FOR CONSTRUCTION		
A. F. E.	DATE	SIGNED

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APP'D.
APP'D.
SCALE 1"=30'–0"
DATE 02/20/13

Phillips 66 Santa Maria Rail Project
RAIL PROJECT
HEATING/STAGING AREA ELEVATION

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO.
5334–P–SK–06
SHEETS SHEET NO

APPENDIX D

Fire Safety Plan

Santa Maria Crude Oil Unloading Rack Fire Protection

SPEC Job 5334

Foam/Water Deluge System

- Square footage under canopy: 32,860 ft^2
- Divide under canopy area into 5 zones of 6,572 ft^2 each
- Assume two adjacent zones will be activated in a fire
- Design density = 0.16 GPM/ft^2
- Flow rate required = 2 x 6572 x 0.16 = 2,104 GPM
- Provide additional flow of 2 x 500 GPM monitors = 1,000 GPM
- Total fire water flow required = 3,104 GPM
- Activation of deluge valves via manual pull stations (valves) or pilot sprinkler line
- Pilot sprinkler line shall have fusible heads rated at 175^oF
- Bladder tank for foam concentrate storage sized for two consecutive activations of two adjacent zones.
- Pressurizing of line downstream of deluge valve activates pressure switch for remote alarm and pressurizes hydraulic valve that opens to allow foam concentrate flow to ratio proportioner
- Assumed foam concentrate is 1% type

Foam/Water Monitors

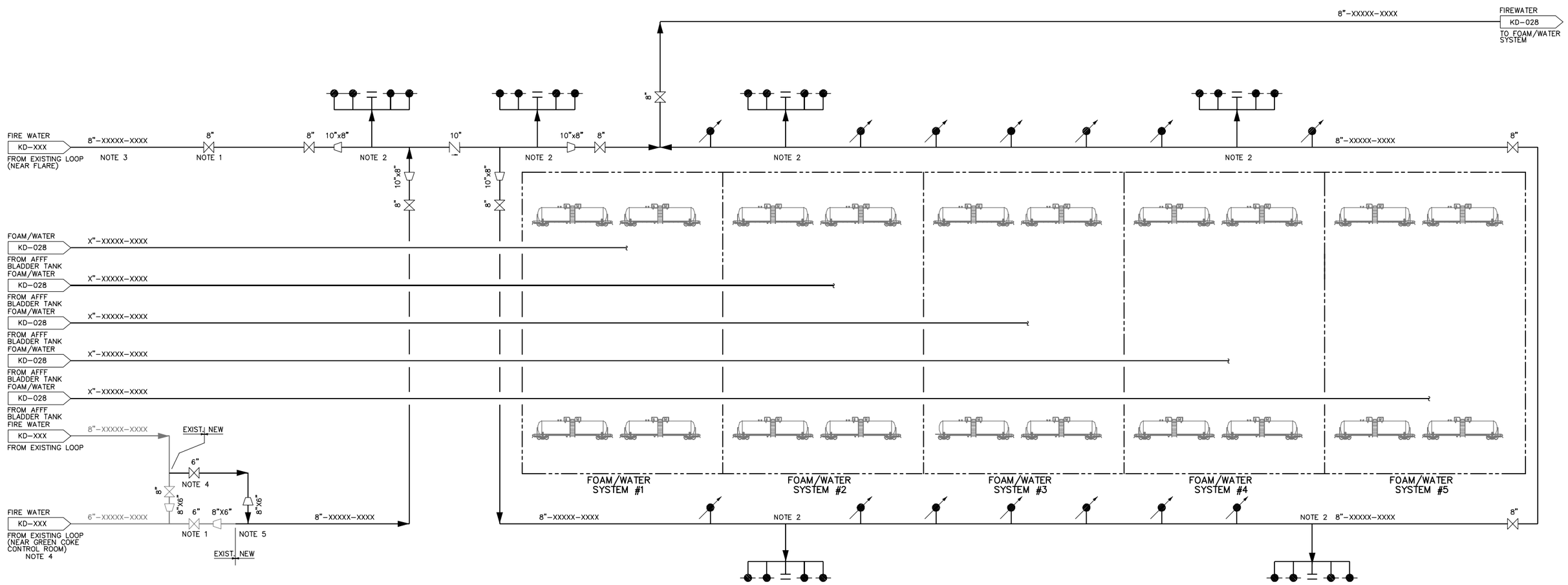
- Monitors shall be self-educting nozzles with foam totes
- North side monitors will be mounted at grade approximately 50’ away from unloading cars
- South side monitors will be provided based on final road clearance dimensions (minimum clearance from empty cars on Track B).

Water Supply System

- Install approximately 2300-feet of 8-inch pipe from the existing water line at the Coke Control Room to the unloading rack area. The supply for this pipe comes from incorporating the existing 6-inch water line and another 6-inch pipe in the area. There is an abandoned 6-inch line that will be cleaned and extended to the 8-inch portion of the existing firewater system. The two 6-inch lines will come together at the original location of the 8-inch line and will supply the lower portion of this 8-inch loop providing ample flow.
- Install approximately 2300-feet of 8-inch pipe from the existing water line near the flare to the unloading rack area. The source of this line will either be back at the 8-inch portion of the line or the 6-inch portion in question will be replaced with 8-inch line to provide the adequate flowrate.
- Provide 8-inch fire water loop around the unloading rack.
- Provide two FDC’s with check valve between for boosting of pressure in fire water loop at unloading rack (if necessary).
- Two new lines will tie together for a short run to allow for repumping by refinery fire truck pump into looped system around rack.

Access Roads

- Access roads provided on both sides of the offloading rack and the entire rail spur including turn-around areas, a mid-track crossing point, and a secondary Emergency Vehicle Access route extending east from the end of the rail spur to Highway 1.



NOTES:

1. LOCATE VALVE APPROX. MIDWAY ALONG FIREWATER HEADER.
2. MANIFOLD OF DUAL HOSE CONNECTIONS w/ ONE 5" STROZ CONNECTION.
3. TIE-IN AT EXISTING 6" SEGMENT TO BE REPLACED WITH 8".
4. TIE-IN ABANDONED 6" LINE IN AREA TO NEW 8" SEGMENT. BOTH 6" SEGMENTS WILL COMBINE TO PROVIDE NECESSARY FLOW FOR 8" SEGMENT.
5. NEAR GREEN COKE CONTROL ROOM.

NUMBER	SH.	REFERENCE DRAWINGS

ISSUED FOR REVIEW
FEBRUARY 20, 2013

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5334_KD-027:1

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B	02/20/13	ISSUED FOR REVIEW	SP	GL	JDE

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A. F. E.	DATE	SIGNED

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APP'D.
SCALE NONE
DATE 11/26/12

PIPING AND INSTRUMENT DIAGRAM
CRUDE RAIL
FIREWATER/FOAM SYSTEM

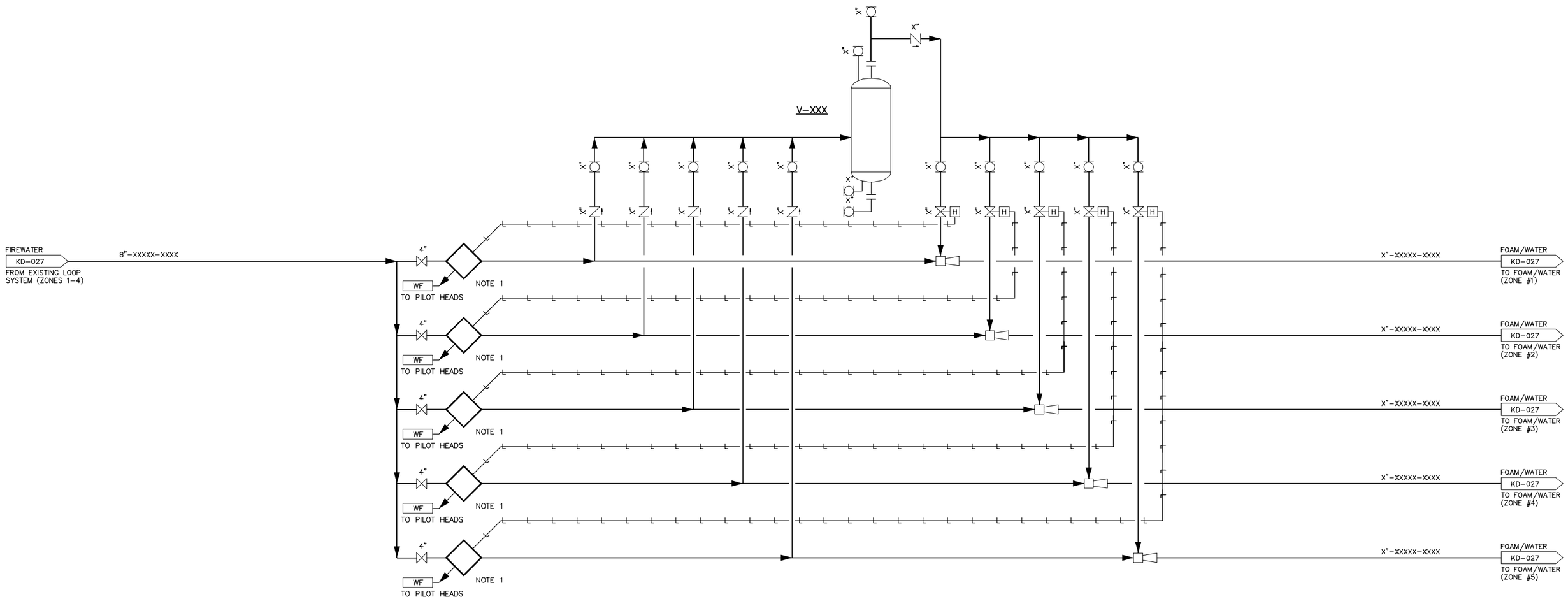
PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO.
KD-027

SHEETS SHEET NO

TK-XXX

AFFF BLADDER TANK
48"ø X 90" E/E
500 GAL CAPACITY
BASKET: X"ø ON X" CTR, NO LINER



NOTES:

1. DELUGE VALVE (PER NFPA)

NUMBER	SH.	REFERENCE DRAWINGS

ISSUED FOR REVIEW
JANUARY 02, 2013

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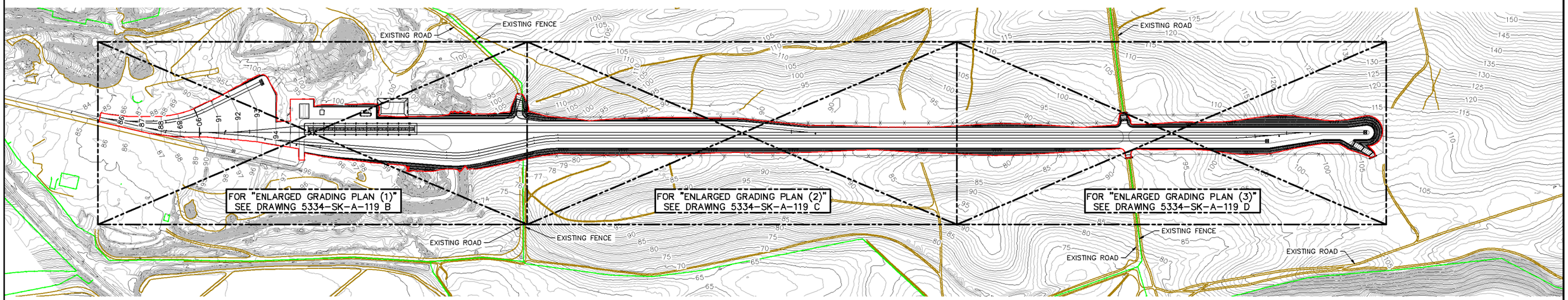
APP'D.
SCALE NONE
DATE 11/26/12

PIPING AND INSTRUMENT DIAGRAM
CRUDE RAIL
FOAM/WATER SYSTEM

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO. KD-028
SHEETS SHEET NO



GRADING PLAN

SCALE: 1"=250'

PROGRESS PRINT
JUNE 18, 2013

1"=250' 250' 0' 250' 500'

NUMBER	SH.	REFERENCE DRAWINGS

REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CKD. BY	APP'D
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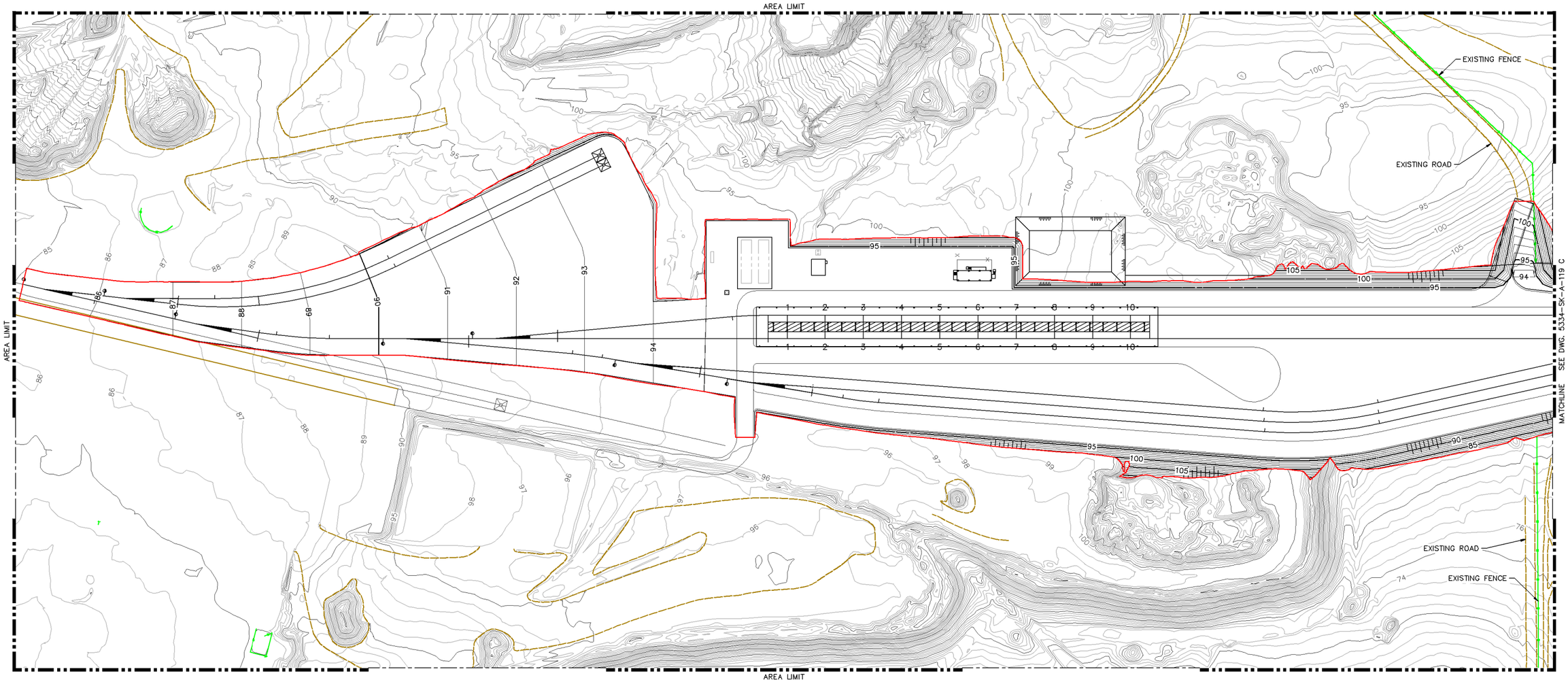
5334_SK-A-119.dwg:(SK-A-119 A GRADING PLAN)

SANTA MARIA FACILITY
PHILLIPS 66 RAIL PROJECT
GRADING PLAN

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO. 5334-SK-A-119 A
SHEETS 1 OF 1



ENLARGED GRADING PLAN (1)

SCALE: 1"=75'

FOR "GRADING PLAN" SEE DRAWING 5334-SK-A-119 A

PROGRESS PRINT
JUNE 18, 2013

1"=75' 75' 0' 75' 150'

NUMBER	SH.	REFERENCE DRAWINGS

REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CK'D. BY	APP'D
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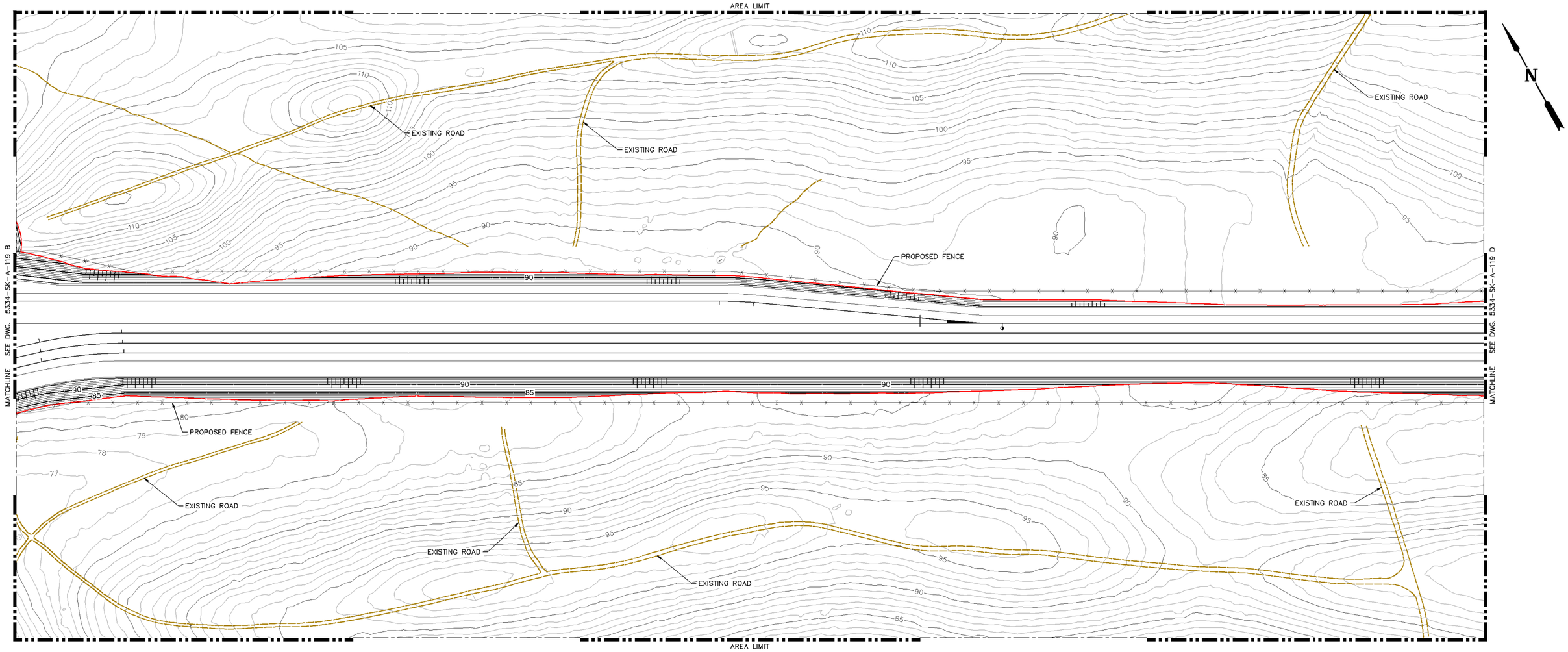
5334_SK-A-119.dwg:(SK-A-119 B ENLARGED GRADING PLAN (1))

SANTA MARIA FACILITY
PHILLIPS 66 RAIL PROJECT
ENLARGED GRADING PLAN (1)

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO. 5334-SK-A-119 B
SHEETS 1 OF 1



ENLARGED GRADING PLAN (2)

SCALE: 1"=75'

FOR "GRADING PLAN" SEE DRAWING 5334-SK-A-119 A

PROGRESS PRINT
JUNE 18, 2013

1"=75' 75' 0' 75' 150'

NUMBER	SH.	REFERENCE DRAWINGS

REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CKD. BY	APP'D
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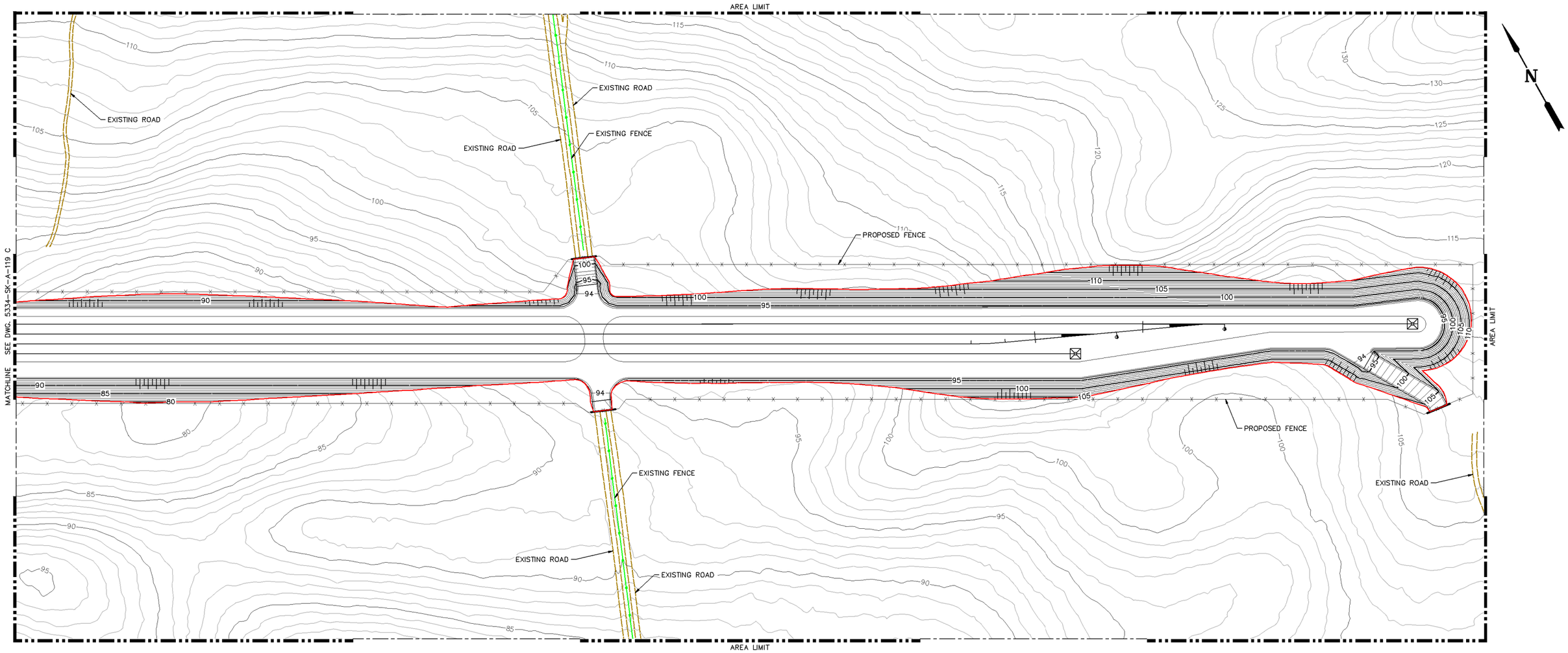
5334_SK-A-119.dwg:(SK-A-119 C ENLARGED GRADING PLAN (2))

SANTA MARIA FACILITY
PHILLIPS 66 RAIL PROJECT
ENLARGED GRADING PLAN (2)

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO. 5334-SK-A-119 C
SHEETS 1 OF 1



ENLARGED GRADING PLAN (3)

SCALE: 1"=75'

FOR "GRADING PLAN" SEE DRAWING 5334-SK-A-119 A

PROGRESS PRINT
JUNE 18, 2013

1"=75' 75' 0' 75' 150'

NUMBER	SH.	REFERENCE DRAWINGS

REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CKD. BY	APP'D
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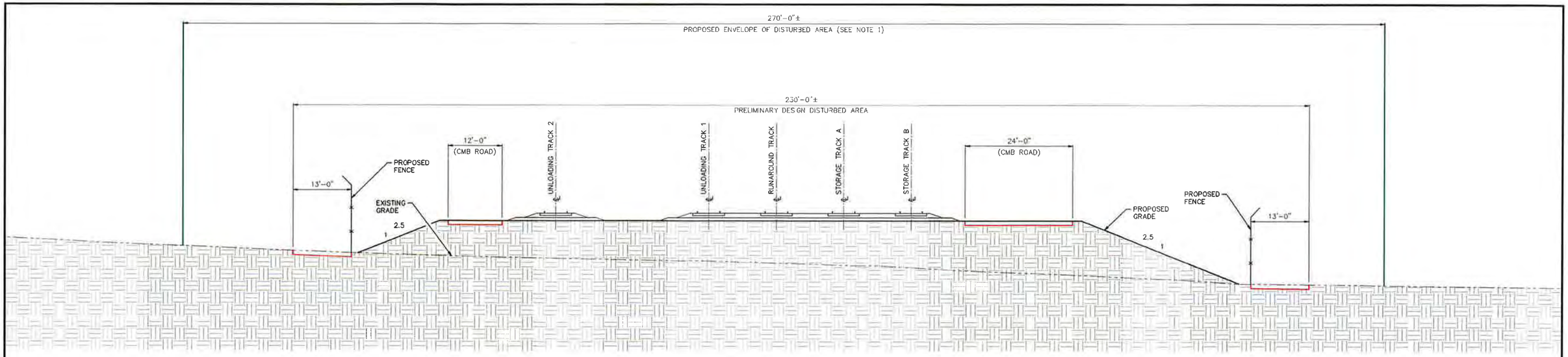
5334_SK-A-119.dwg:(SK-A-119 D ENLARGED GRADING PLAN (3))

SANTA MARIA FACILITY
PHILLIPS 66 RAIL PROJECT
ENLARGED GRADING PLAN (3)

PHILLIPS 66 CO.
Santa Maria Facility

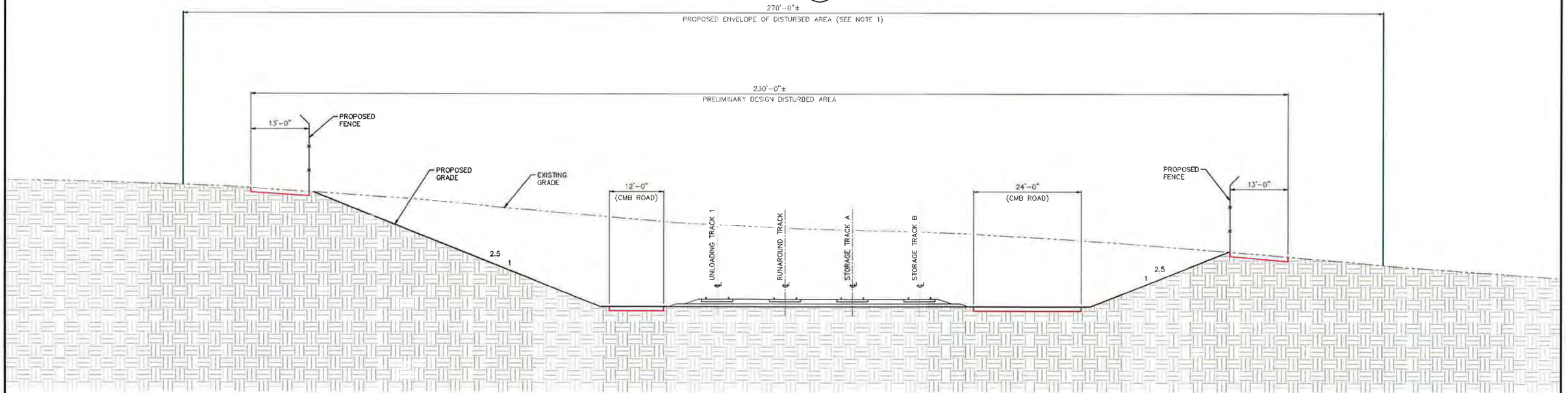
DRAWING NO. 5334-SK-A-119 D

SHEETS 1 OF 1



FILL SLOPE CASE

SECTION A
3/32"=1'-0"
SK-A-113 C



CUT SLOPE CASE

SECTION B
3/32"=1'-0"
SK-A-113 D

REISSUED FOR REVIEW
JUNE 05, 2013

LEGEND:

= PROPOSED ENVELOPE OF DISTURBED AREA (SEE NOTE 1)

= PROPOSED FENCE

NOTES:

1. THE "PROPOSED ENVELOPE OF DISTURBED AREA" SHOWN ON THIS DRAWING IS BASED ON THE COORDINATES THAT WERE PROVIDED BY SPEC SERVICES, TO ARCADIS, FOR THE EIR DOCUMENTATION. ACTUAL DISTURBED AREA FOR DEVELOPMENT MAY BE LESS.

3/32"=1'-0" 4' 0' 4' 8' 12' 16' 20' 24' 28'

NUMBER	SH	REFERENCE DRAWINGS

REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CKD. BY	APP'D
A	5/28/13	ISSUED FOR REVIEW	–	–	–
B	6/3/13	REISSUED FOR REVIEW	–	–	–
C	6/4/13	REISSUED FOR REVIEW	–	–	–
D	6/5/13	REISSUED FOR REVIEW	–	–	–

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5334_SK-A-113.dwg;(SK-A-114 A GRADING SECTIONS)

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PHILLIPS 66 RAIL PROJECT
GRADING SECTIONS

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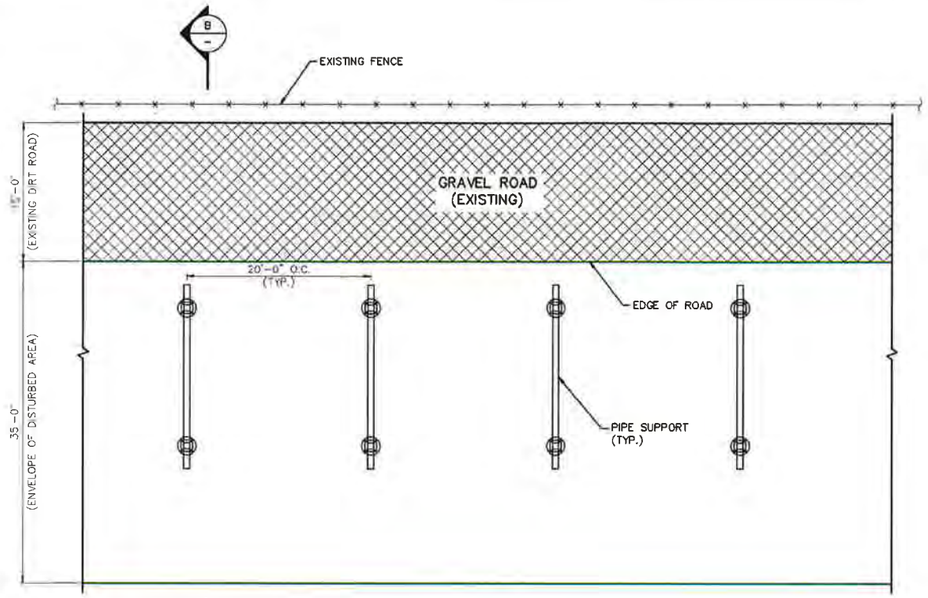
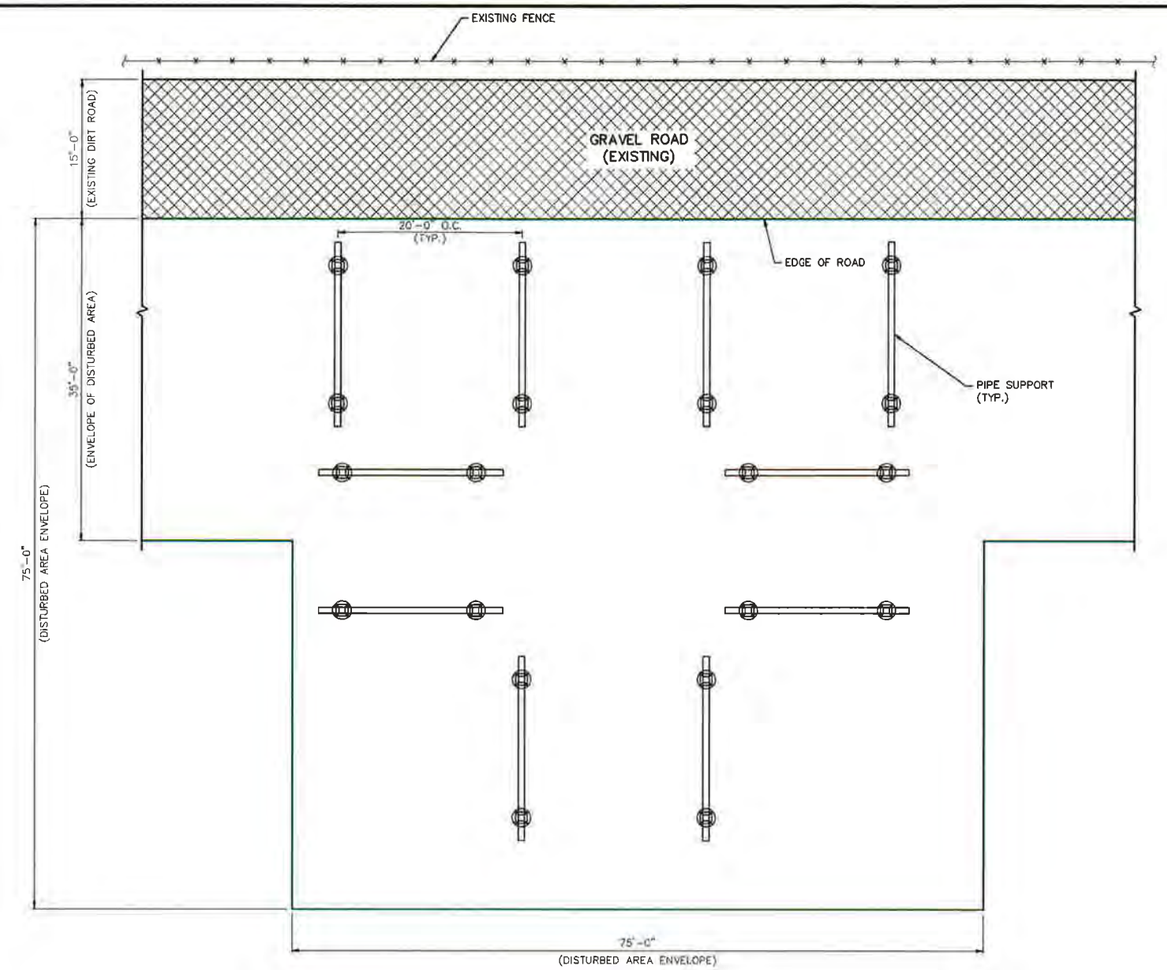
Santa Maria Facility

DRAWING NO. 5334-SK-A-114 A
SHEETS 1 OF 1



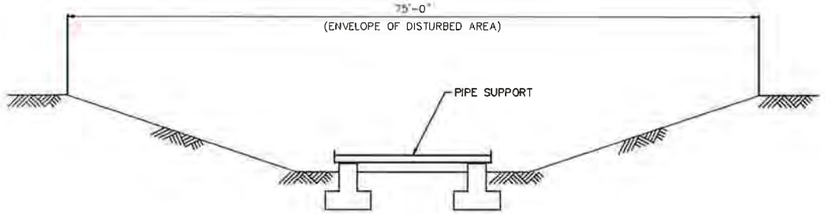
TYPICAL PLAN @ ROAD

DETAIL 1 — 5334-SK-A-113 E
1/8"=1'-0"

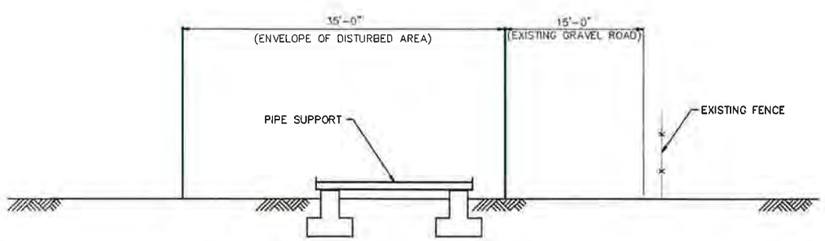


TYPICAL PIPE LOOP PLAN

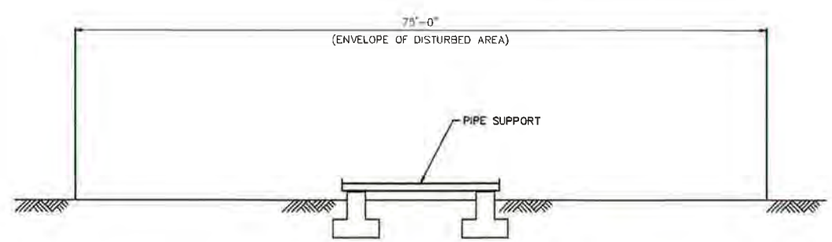
DETAIL 2 — 5334-SK-A-113 E
1/8"=1'-0"



SECTION A — 5334-SK-A-113 E
1/8"=1'-0"



SECTION B — 5334-SK-A-113 E & THIS DWG.
1/8"=1'-0"



SECTION C — 5334-SK-A-113 E
1/8"=1'-0"

= PROPOSED ENVELOPE OF DISTURBED AREA

REISSUED FOR REVIEW
JUNE 05, 2013

1/8"=1'-0" 2' 0' 4' 8' 12' 16' 20'

NUMBER	SH	REFERENCE DRAWINGS

REV. NO.	DATE	REVISED (DESTROY ALL PRINTS BEARING EARLIER DATE)	REV. BY	CKD BY	APP'D
A	5/28/13	ISSUED FOR REVIEW	–	–	–
B	6/3/13	REISSUED FOR REVIEW	–	–	–
C	6/4/13	REISSUED FOR REVIEW	–	–	–
D	6/5/13	REISSUED FOR REVIEW	–	–	–

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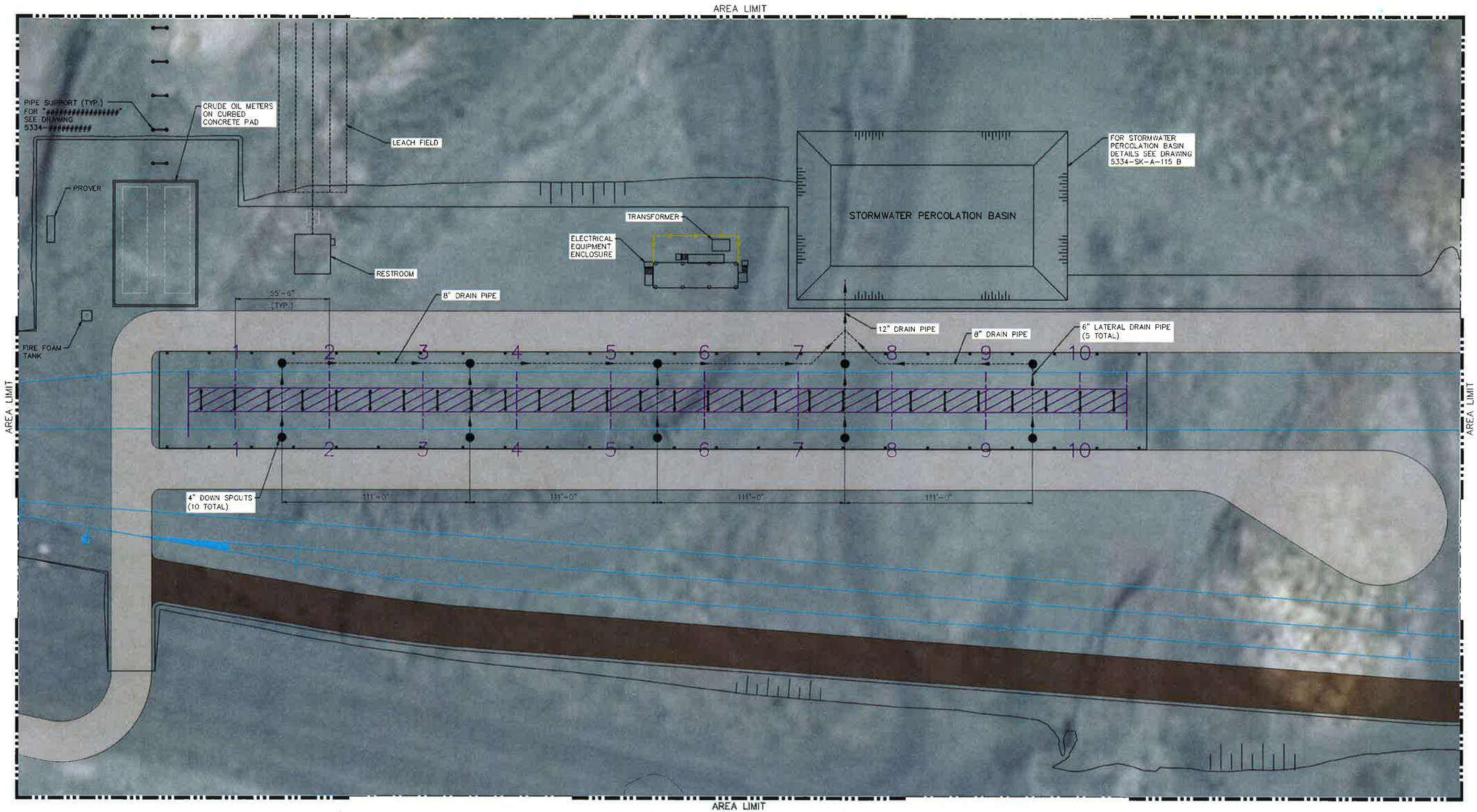
5334_SK-A-114.dwg (SK-A-114 B PIPE SUPPORT SECTION(S))

SANTA MARIA FACILITY
PHILLIPS 66 RAIL PROJECT
PIPE SUPPORT SECTIONS

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO. 5334-SK-A-114 B
SHEETS 1 OF 1



DRAINAGE PLAN @ CANOPY

SCALE: 1"=30'

FOR LOCATION SEE
DWG. 5334-SK-A-113 B

REISSUED FOR REVIEW
JUNE 05, 2013

1"=30' 30' 0' 30' 60'

NUMBER	SH.	REFERENCE DRAWINGS

REV. NO.	DATE	REVISED (DESTROY ALL PRNTS BEARING EARLIER DATE)	REV. BY	CKD. BY	APP'D
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B	6/5/13	REISSUED FOR REVIEW	–	–	–

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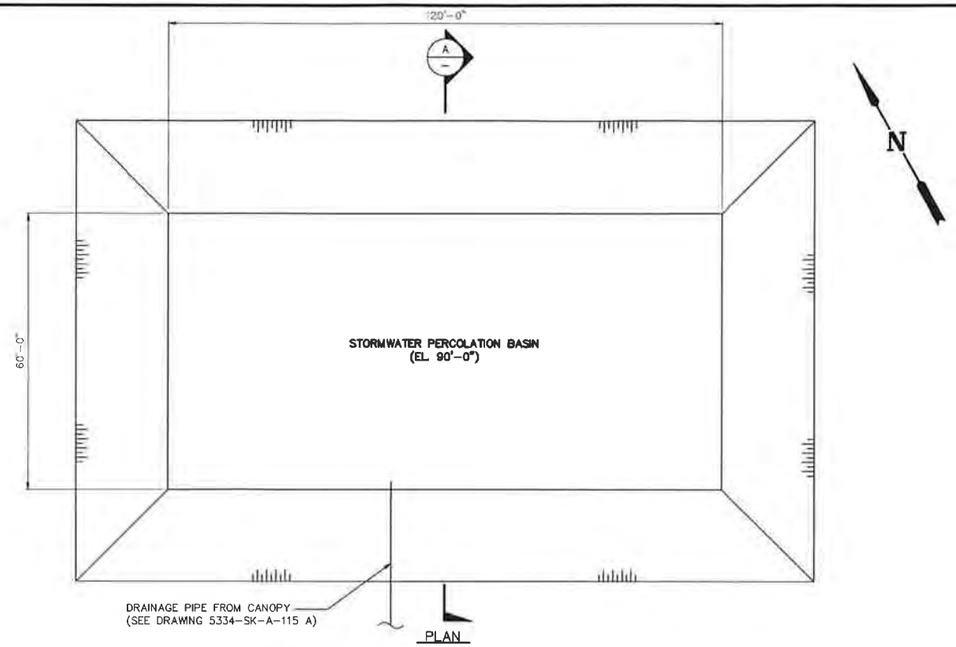
5334-SK-A-115.dwg (SK-A-115 A DRAINAGE PLAN @ CANOPY)

SANTA MARIA FACILITY
PHILLIPS 66 RAIL PROJECT
DRAINAGE PLAN @ CANOPY

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO. 5334-SK-A-115 A
SHEETS 1 OF 1

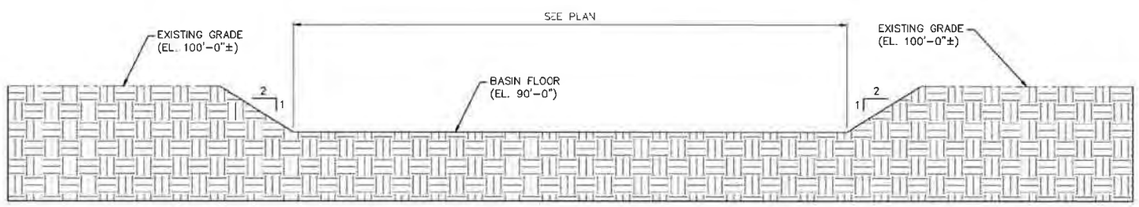


PLAN

STORMWATER PERCOLATION BASIN

SCALE: 1/16"=1'-0"

FOR LOCATION SEE DWG. 5334-SK-A-115 A



SECTION A

1/16"=1'-0"

REISSUED FOR REVIEW
JUNE 05, 2013

1/16"=1'-0" 4' 0' 8' 16' 24' 32' 40'

NUMBER	SH	REFERENCE DRAWINGS

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Fountain Valley, CA 92708
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5334_SK-A-115B.dwg (SK-A-115 B STORMWATER PERCOLATION BASIN)

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A	6/4/13	REISSUED FOR REVIEW	–	–	–
B	6/5/13	REISSUED FOR REVIEW	–	–	–

APPROVED FOR CONSTRUCTION		
A. F. E.	DATE	SIGNED

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SANTA MARIA FACILITY
PHILLIPS 66 RAIL PROJECT
STORMWATER PERCOLATION BASIN

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO. 5334-SK-A-115 B
SHEETS 1 OF 1

Imagine the result

Project Proponent:

Phillips 66
Santa Maria Refinery

CULTURAL RESOURCES ASSESSMENT REPORT
Phillips 66 Santa Maria Refinery Rail Project
San Luis Obispo County, California

Lead Agency:

County of San Luis Obispo
County Government Center
1055 Monterey Street
San Luis Obispo, CA 93408

Submitted: June 2013

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Cultural Resources Assessment Report for the Phillips 66 Santa Maria Refinery Rail Project

San Luis Obispo County, California

Prepared for:
Phillips 66
Santa Maria Refinery

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Acronyms

APE	Area of Potential Effect
APM	Applicant Proposed Measures
CCIC	Central Coastal Information Center
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CMMP	Construction Mitigation Monitoring Plan
CRHR	California Register of Historical Resources
DPR	Department of Parks and Recreation
EIR	Environmental Impact Report
EVA	Emergency Vehicle Access
ft	foot/feet
GPS	global positioning system
km	kilometers
m	meters
mi	miles
NAHC	Native American Heritage Commission
NRB	National Register Bulletin
NRHP	National Register of Historic Places
PCT	Paleo Coastal Tradition
PRC	Public Resources Code
USGS	United States Geological Survey
WEAP	Worker's Environmental Awareness Plan
WPLT	Western Pluvial Lakes Tradition

National Archeological Data Base Information

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Client/Project Proponent:
Phillips 66
Santa Maria Refinery

Report Date:
February 2013

Report Title:
Cultural Resources Assessment Report for the Phillips 66 Santa Maria Refinery Rail Project, San Luis Obispo County, California

Type of Study:
Cultural Resources Assessment Literature Review and Survey

New Sites:
None

Updated Sites:
None

USGS Quad:
Oceano 7.5' T12N/R35W/Unsectioned

Acreage:
~50 acres

Key Words:
Arroyo Grande, Obispeño Chumash, Intensive Survey, Historic Era Resources, San Luis Obispo County, Oceano 7.5' quadrangle

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Executive Summary

This report presents the results of an intensive cultural resources survey and archival research for a project at the Phillips 66 Santa Maria Refinery. The project consists of a rail spur modification within the Phillips 66 property in a portion of the developed refinery and extending to the south and east. The project is located in unincorporated San Luis Obispo County, California, as depicted on the Oceano 7.5-minute United States Geological Survey (USGS) quadrangle.

A pedestrian reconnaissance survey of the approximately 40 acre construction area (the Site) and the surrounding area was completed on November 14, 2012. An approximately 50-acre area was surveyed using a maximum transect width of 15 meters (m). In addition, a proposed Emergency Vehicle Access (EVA) road was surveyed on June 8, 2013. Visibility was good to excellent, with the majority of the surface covered with sparse vegetation. Many areas were exposed, which enabled adequate survey visibility within the project area.

The survey was preceded by a cultural resources records search conducted on October 12, 2012 by the staff of the Central Coastal Information Center (CCIC 2012) at the University of California, Santa Barbara. The CCIC determined that 45 previous cultural resource studies had taken place within a 1-mile radius of the project area. The records search indicates that, while the project area has been the subject of research investigations, it has not been fully surveyed. Previous research investigations identified nine previously known archaeological sites within a 1-mile radius with one cultural resource site, CA-SLO-1190, being located adjacent to and partially within the EVA.

Survey and background research of the Phillips 66 property did not identify previously recorded archaeological sites, newly identified cultural resources, or isolated artifacts within the main project area. Survey did identify artifacts associated with CA-SLO-1190 within the EVA. Evaluation of the portions of this resource within the impact area will be required to determine if the resource meets criteria for inclusion in the California Register of Historic Resources (CRHR). This analysis is currently in progress.

Impacts on California Register of Historic Resources (CRHR)-eligible historic resources (should they be present) will require impact mitigation measures such as avoidance or data recovery.

Archaeological monitoring is recommended during earth-disturbing activities to ensure that any previously unidentified cultural resources discovered during project

construction and operations are addressed according to a Worker Environmental Awareness Plan (WEAP) and a Construction Mitigation Monitoring Plan (CMMP). These plans will require that work in the immediate area of a cultural resource discovery be suspended until the resource is evaluated by a County-certified cultural resources professional for CRHR eligibility and appropriate mitigation measures implemented according to the requirements of the WEAP and the CMMP.

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1. Introduction

This report presents the results of a cultural resources assessment for the Phillips 66 Santa Maria Refinery Rail Project. The cultural resources assessment comprised background research, including a records search with the Central Coastal Information Center (CCIC 2012), and a pedestrian survey.

1.1 Project Description

The project is located on the coast of the Pacific Ocean just north of the City of Santa Maria in an unincorporated portion of San Luis Obispo County. (Figures 1 and 2). The construction area is located entirely on Phillips 66 property.

Phillips 66 proposes to modify the existing rail spur currently on the southwest side of the refinery to include an eastward extension as well as a railcar unloading facility. The tracks and unloading facilities would be designed to accommodate approximately 80 tank cars and associated locomotives. The offloaded material would be transferred to existing storage tanks via a new pipeline. A 30-foot wide, 0.64-mile long Emergency Access Road (EVA) connects the project area with Highway 1.

Addendum: Two Coastal Access Roads are also potentially to be included in the project. The survey areas included the 30-foot wide, approximately 1.5 mile long alternatives.

1.2 Existing Conditions

1.2.1 Environmental Setting

Natural

The project will be located within the coastal plain, along the eastern margin of the Pismo Beach dune complex. An isolated dune area that extends above the present surface elevation is located directly north of the rail spur alternatives and east of the proposed pipeline corridor. Cross-sections of these Aeolian deposits indicate windblown sands up to 200 feet deep.

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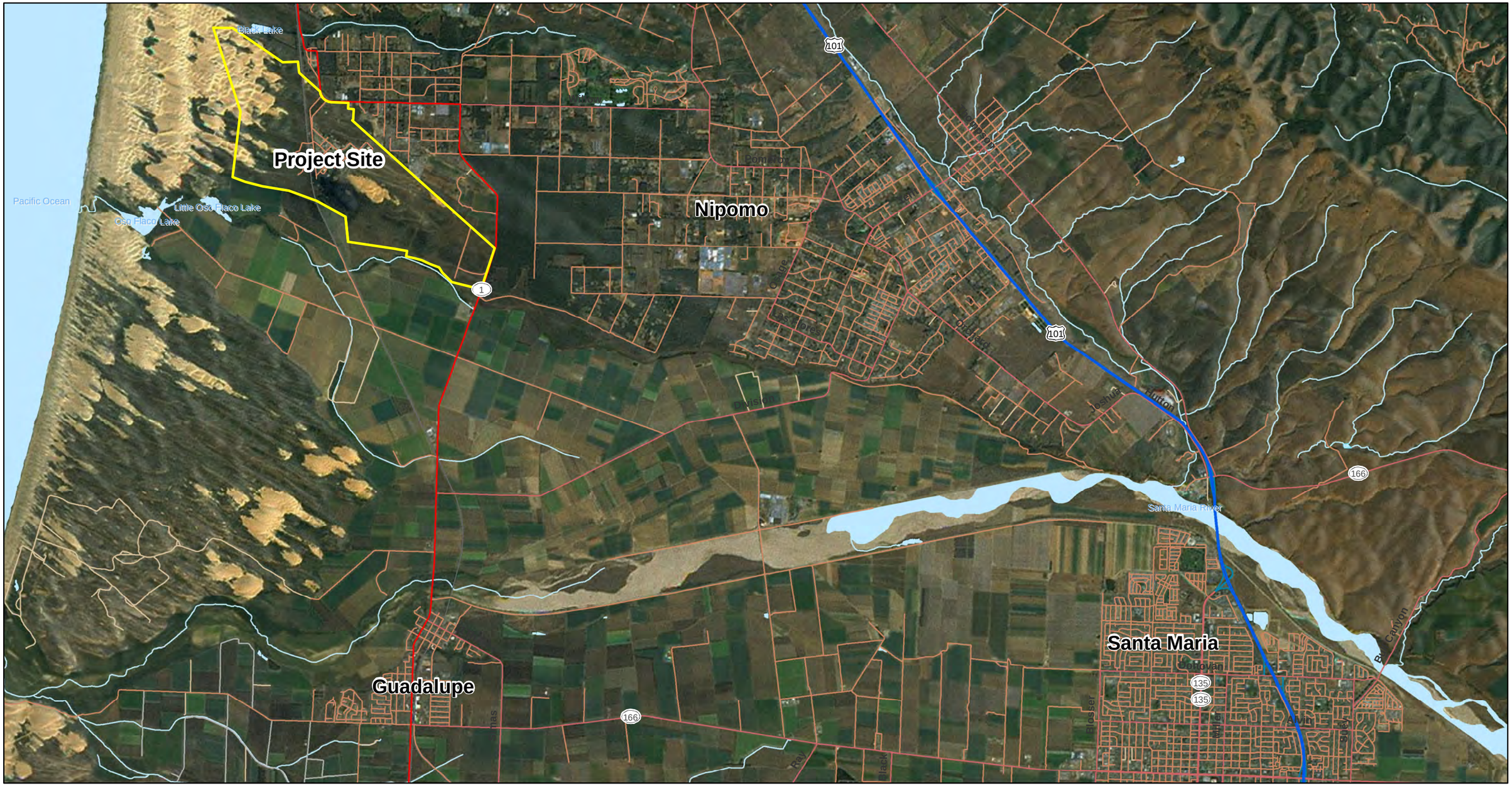

Legend

Property Boundary

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

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SCALE IN FEET

Phillips 66
Santa Maria Refinery Rail Project

PROJECT AREA

ARCADIS

FIGURE
1

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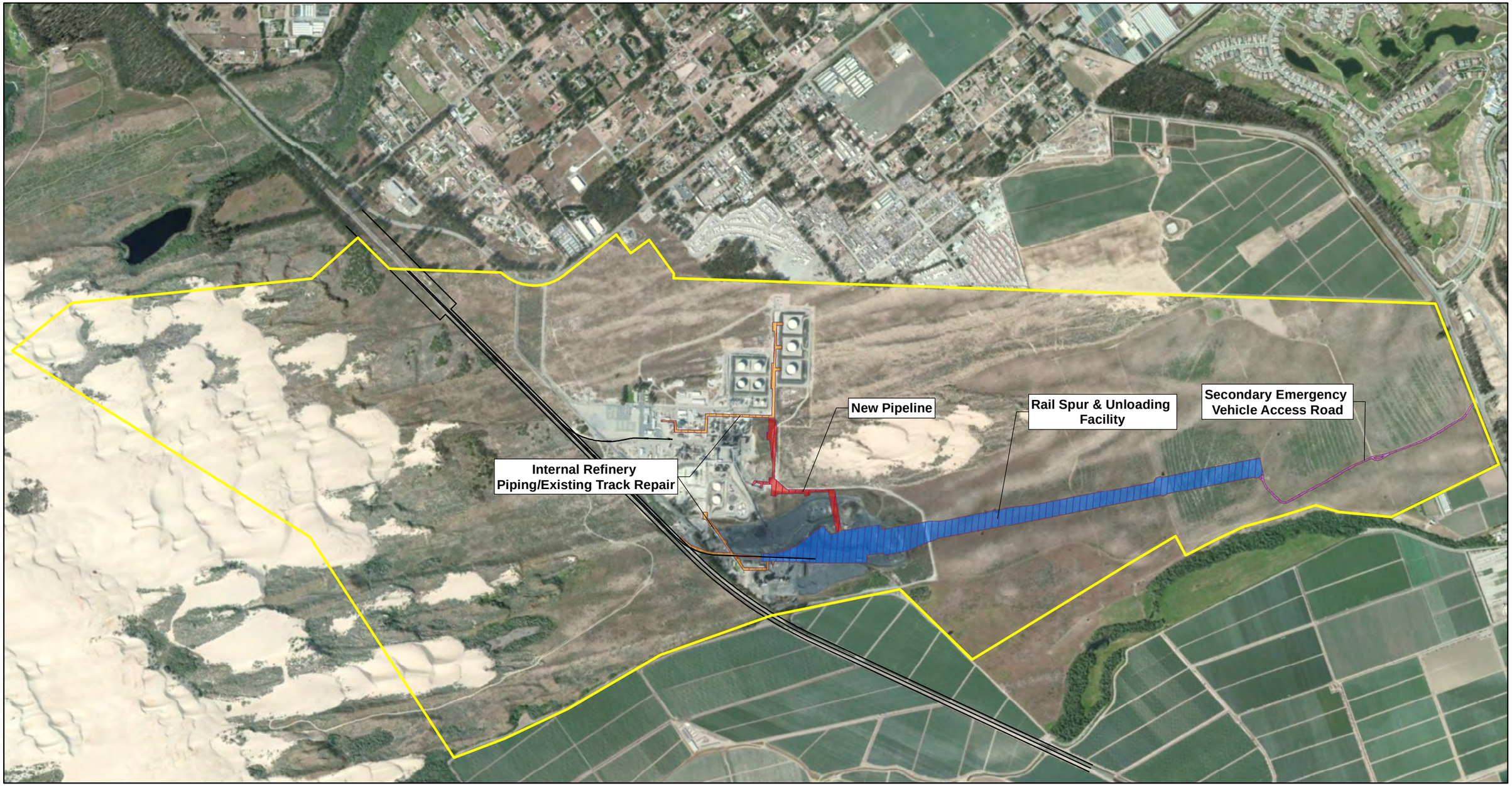
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



Legend

- Property Boundary
- Existing Rail Line
- Limits of Disturbance

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

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Phillips 66
Santa Maria Refinery Rail Project

PROPOSED PROJECT SITE ON PHILLIPS 66 PROPERTY

ARCADIS

FIGURE
2

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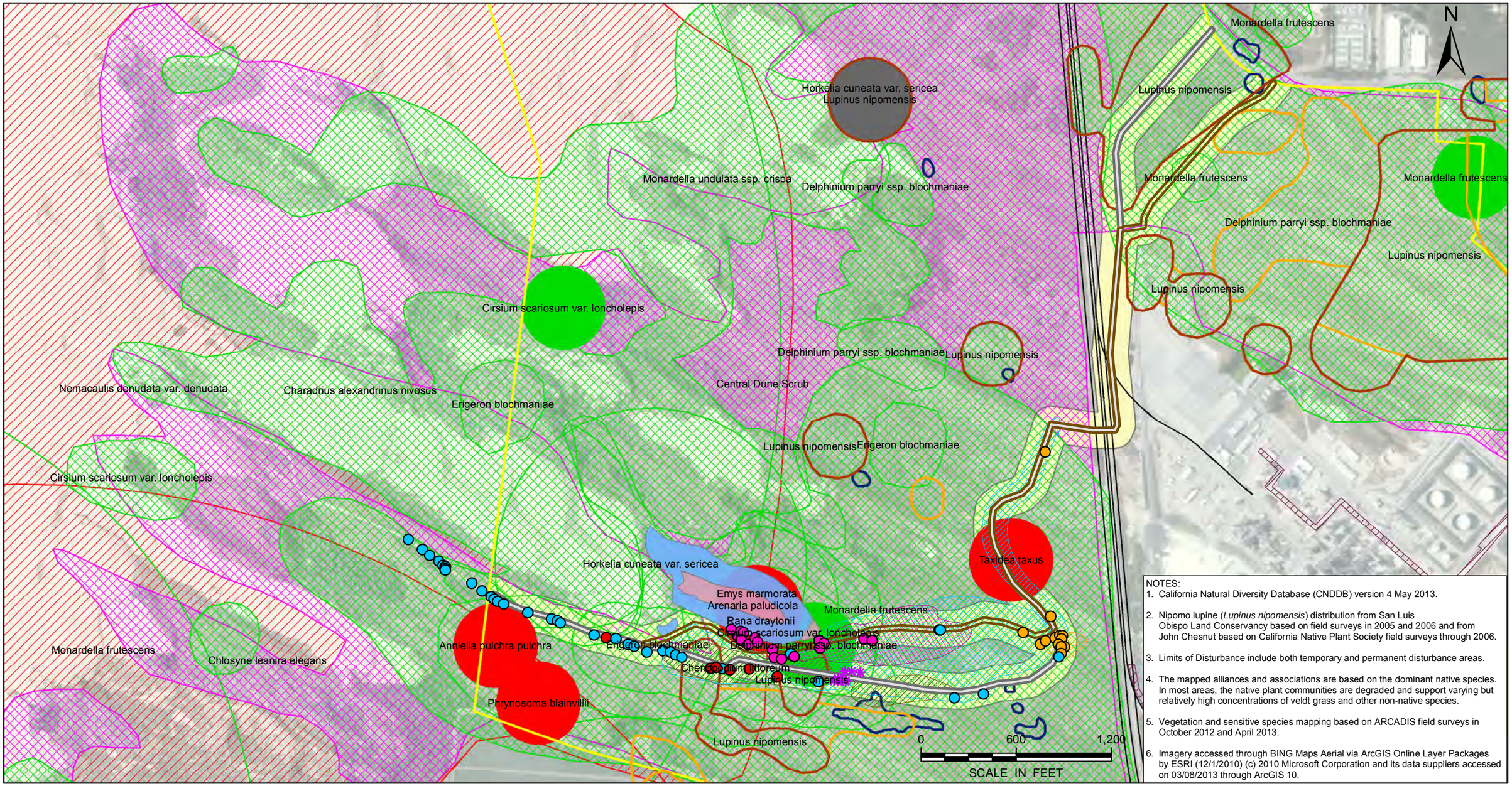
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



NOTES:

1. California Natural Diversity Database (CNDDB) version 4 May 2013.
2. Nipomo lupine (*Lupinus nipomensis*) distribution from San Luis Obispo Land Conservancy based on field surveys in 2005 and 2006 and from John Chesnut based on California Native Plant Society field surveys through 2006.
3. Limits of Disturbance include both temporary and permanent disturbance areas.
4. The mapped alliances and associations are based on the dominant native species. In most areas, the native plant communities are degraded and support varying but relatively high concentrations of veldt grass and other non-native species.
5. Vegetation and sensitive species mapping based on ARCADIS field surveys in October 2012 and April 2013.
6. Imagery accessed through BING Maps Aerial via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

Property Boundary
Existing Rail Line
Limits of Disturbance
Potential Coastal Access Route A
Potential Coastal Access Route B
Mapped Nipomo Lupine from CNDDB
Mapped Nipomo Lupine from SLO Land Conservancy 2006
Mapped Nipomo Lupine from John Chesnut

CNDDB Distributions
Plant (80m)
Plant (specific)
Plant (non-specific)
Plant (circular)
Animal (80m)
Animal (specific)
Animal (non-specific)
Animal (circular)
Terrestrial Comm. (80m)
Terrestrial Comm. (specific)
Terrestrial Comm. (non-specific)
Terrestrial Comm. (circular)
Aquatic Comm. (80m)
Aquatic Comm. (specific)
Aquatic Comm. (non-specific)
Aquatic Comm. (circular)
Multiple (80m)
Multiple (specific)
Multiple (non-specific)
Multiple (circular)

Sensitive Species Observed in June 2013
California Spineflower (*Mucronea californica*)
Sand almond (*Prunus fasciculata* var. *punctata*)
Blochman's Groundsel (*Senecio blochmaniae*)
Blochman's leafy daisy (*Erigeron blochmaniae*)
California Spineflower (*Mucronea californica*)
Sand almond(*Prunus fasciculata* var. *punctata*)
Blochman's Groundsel (*Senecio blochmaniae*)
Burrowing Owl (*Athene cunicularia*)
Blochman's Leafy Daisy (*Erigeron blochmaniae*)
Crisp monardella (*Monardella undulata* ssp. *crispa*)
Nipomo Mesa Lupine (*Lupinus nipomoensis*)

Sensitive Habitats (2013)
Central Dune Scrub Dune-Heather and Silver Bush Lupine Association
Arroyo Willow Scrub (Wetland)
Central Dune Scrub - Coastal Dune Lupine, Dune-Heather, Silver Bush Lupine Association
Central Dune Scrub - Silver Dune Lupine and Dune-Heather Association
Freshwater Marsh - Coast Carex Herbaceous Alliance

Phillips 66
Santa Maria Refinery Rail Project.

POTENTIAL COASTAL ACCESS ROUTES

ARCADIS

FIGURE
2A

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Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

The project area is within the South Coast Ranges physiographic province (Moratto 1984). According to paleontological records search data compiled by the Natural History Museum of Los Angeles County: "The entire proposed project area has surficial deposits composed of older Quaternary dune sands. … Older Quaternary or even Pliocene deposits probably underlie the Quaternary dune sands at relatively shallow depth" (McLeod 2012; **Appendix A**). The project area is within the coastal plain, with the southern end of the Santa Lucia Range to the east (Sharp 1976). An unnamed tributary to Oso Flaco Creek is located immediately south of the project area. Oso Flaco Creek provides water to Little Oso Flaco Lake and Oso Flaco Lake to the west before emptying into the Pacific Ocean. The Phillips 66 property east of the refinery supports three main vegetation communities in the area of the proposed rail line extension routes: two upland communities – Central Dune Scrub and Non-native Veldt Grassland, and one wetland community – Arroyo Willow Scrub; though the wetland community is outside (south) of the construction area and will not be impacted by project activities.

1.2.2 Cultural Setting

Prehistoric

The following culture history outlines and briefly describes the known prehistoric cultural traditions of the relevant portions of San Luis Obispo County with special emphasis on the project area.

The prehistory of the Arroyo Grande area is described using a general chronology developed for the southern California coastal region by William Wallace in 1955. Supported by radiocarbon dates from key archaeological sites, Wallace (1955) established a four-stage sequence to support the age-dating of archaeological finds that is still in used by archaeologists today.. He identified four archaeological "horizons" based on types of artifacts and features diagnostic of broad periods in prehistory.

- Horizon I. Early Man (before 7,000 years ago)
- Horizon II. Millingstone (7,000 to 3,500 years ago)
- Horizon III. Intermediate Cultures (3,500 to 1,500 years ago)
- Horizon IV. Late Prehistoric Cultures (1,500 to historic contact, ca. 200 years ago)

Horizon I, **Early Man**, included a speculated, but at the time unsubstantiated, late Pleistocene occupation. Since Wallace formulated his chronology, sites on the central coast and at Buena Vista Lake, for example, have yielded radiocarbon ages between 9,500 and 8,000 years ago (Greenwood 1972; Fredrickson and Grossman 1977; Glassow 1978). Clovis-style fluted projectile points at least 11,000 years old have been found in the southern San Joaquin Valley, Mojave Desert, and Tehachapi Mountains (Moratto 1984), substantiating Wallace's postulated late Pleistocene period of occupation.

The **Early Man Horizon** is usually thought to have been characterized by small, highly mobile bands of hunters who were drawn to Late Ice Age resources — broad inland lakes and marshes, and large game. Sites from this period, now known to correspond to the better-defined Western Pluvial Lakes Tradition (WPLT) of interior deserts or Paleo-Coastal Tradition (PCT) of the Pacific littoral zone (both 11,000 to 8,000 years ago), show a greater diversity of ecological settings and approaches to subsistence (Moratto 1984). Sophisticated lithic technology of the WPLT/PCT featured finely crafted projectile points, crescents, scrapers, and knives.

Horizon II, **Millingstone Assemblages**, represents a long period of time characterized by small but less nomadic groups that probably relied on a seasonal round of settlement that may have begun during earlier millennia (Moratto 1984). In many areas, the seasonal round likely included both inland and coastal residential bases. Millingstone sites are marked by the appearance of seed-grinding tools, such as manos, metates, and hammerstones, usually in large numbers. In coastal locations, these often occur in association with shell middens. Seeds from sage, buckwheat, and various grasses provided staple foods, and less emphasis appears to have been placed on hunting. Coarse-grained, durable lithic materials, such as quartzite, rhyolite and other volcanic materials, are more common in flaked stone tools from this period than fine-grained, silicious materials such as chert and jasper.

During Horizon III, **Intermediate Cultures**, the first evidence of acorn processing appeared in the form of mortars and pestles. As a high-calorie, storable food, acorns contributed to increasing sedentism and more complex social organization (Johnson and Earle 1987). The absence of small projectile points indicates that the bow and arrow — a hallmark of the Late Prehistoric Period — had not yet been introduced, but elaborate dart points are a common artifact of the Intermediate. Along the coast, the Intermediate Period saw the use of more diverse marine resources, evident in bone and shell fishhooks, harpoon points, and net weights. It was during this time that the introduction of plank canoes is postulated. Shell and steatite beads and ornaments

were produced in larger quantities and variety of style. Regional exchange intensified, with non-local materials such as steatite, serpentine, fused shale, and obsidian obtained through trade (McIntyre 1990).

Horizon IV, **Late Prehistoric Cultures**, exhibits evidence of larger populations and a wider variety of material culture and social institutions than those previous evinced. Storable surplus foods, such as acorns and dried meats, especially fish and shellfish, allowed populations to increase and social mechanisms to diversify. New artifact classes, such as small triangular projectile points and steatite shaft straighteners (indicating bow and arrow technology), some types of shell beads, and ceramics (in some areas) are diagnostic of the Late Prehistoric. The production of pictographs (rock paintings) is also thought to be a hallmark of this period.

The **Late Prehistoric** archaeology is generally better understood because the late nineteenth and early twentieth century descendants of these groups provided additional information to early anthropologists. Unfortunately, introduction of foreign diseases, displacement, and absorption into other groups caused by the arrival of the Spanish, Mexican, and American populations decimated native populations to such low numbers that, by the mid- to late 1800s, they were but a minor portion of the overall population. For this reason, very little interest in native inhabitants and their prehistory was initially generated. By the turn of the twentieth century, anthropologists began to collect data about traditional native lifeways in California. Knowledge of *Chumash* culture (those Native peoples most closely associated with the area under control of the Santa Barbara, Santa Ines, La Purisima and San Luis Obispo Missions) has been reconstructed through linguistic and ethnohistoric research, archaeological analysis, and remembrances of individuals.

Chumash

At Spanish Contact, the region was occupied by the Chumash, a diverse population living in settlements along the California coast from Malibu Creek to the southeast, Estero Bay in the north, Tejon Pass, Lake Casitas and the Cuyama River inland, and the islands of San Miguel, Santa Rosa, and Santa Cruz (**Figure 3**). Chumash society became more complex over the last 9,000 years.

Wallace (1955) and Warren (1968) developed chronologies for the region. King (1982) proposed sequences based on changes in ornaments, beads and other artifacts. After A.D. 1000, changes in bead types suggest the operation of a more complex economic system by the time the Spanish arrived.

Following the 1542 Cabrillo seminal voyage, of discovery along the California coast many small Chumash settlements were abandoned and some of the largest historic towns were founded. This change in population distribution is attributed to growth in importance of trade centers and the development of more integrated political confederations. The Chumash economic system enabled them to make efficient use of diverse environments within their territory. Acorns and seeds were traded between the islands, mainland and interior populations who lacked marine resources traded with coastal populations for fish and other seafood.

Most religious ceremonies had their roots in the Early Period when objects similar to those used historically were placed in mortuary associations or owned by religious leaders.

1.2.3 Ethnography

Ethnographic and historical research has indicated that, at the time of European Contact, the area was occupied by the Hokan-speaking, Obispeño Chumash. The Spanish viewed the Chumash as unique among California Indians due to their knowledge of the sea, canoe building expertise, ceremonial organization, their interest in acquiring and displaying possessions, willingness to work, and their extensive trade networks.

According to C. King (1982), the protohistoric Chumash maintained the most complex bead money system documented in the world. Prehistoric Chumash culture underwent dramatic changes following colonization in the late eighteenth century. The introduction of diseases quickly weakened and destroyed Native American cultures, with epidemics killing large numbers of people. Most Chumash towns and villages were abandoned by 1810. However, large segments of the population survived and worked to build the Spanish Missions, as well as the Mexican and American ranches which followed.

Much of the Chumash culture managed to survive by "going underground" and effectively blending into the cultural landscape. Several thousand Chumash live today in Los Angeles, Ventura, Santa Barbara, and San Luis Obispo Counties. In general, they place high spiritual value on objects and places associated with their history, namely archaeological sites, and artifacts from sites. Present-day Chumash are organized into dozens of social, cultural, and political groups, some of which take part in local affairs. Nearly all Chumash are concerned with preserving their heritage and are therefore interested in the preservation of the prehistoric and ethnographic archaeological records.

Figure 3 Native American Languages of California

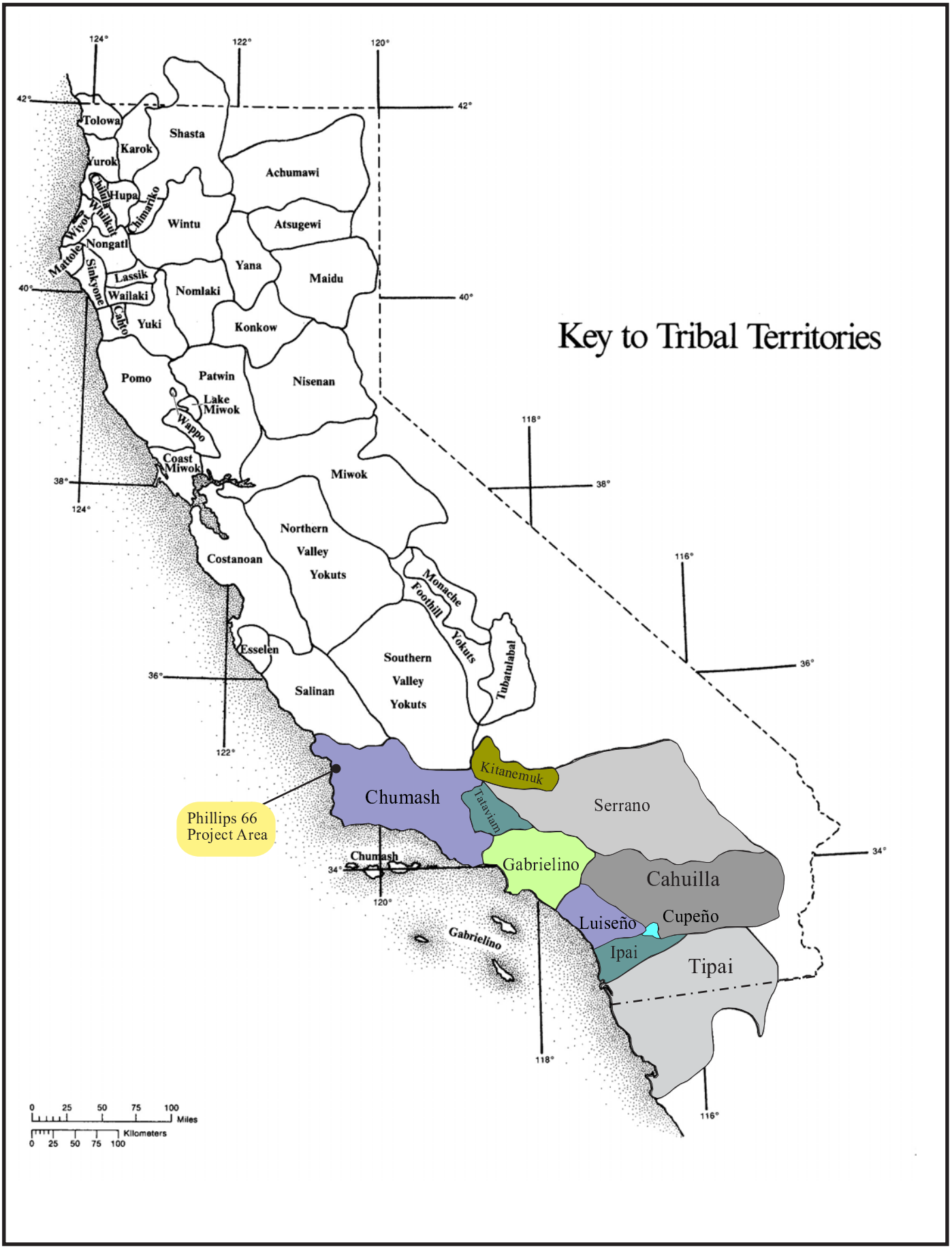

Figure 3. Native American languages of California
(Adapted from Heizer 1978)

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History

The major historic periods for the California area are defined by key events documented by participants, witnesses, historians, and cartographers. Paramount among these was the transfer of political control over *Alta California*, including the project area specifically.

- Spanish Period (1769-1821)
- Mexican Period (1821-1848)
- American Period (1848-Present)

The historic era encompasses the period of occupation by European descendants. This period marked a time of disease, exploitation, and deculturation of the native peoples, beginning circa 1769 with the founding of the Mission San Diego de Alcalá. The occupation and control by the Spanish was passed on to Mexico after the latter gained its independence in 1821. The Mexican period, in turn, gave way to control by the United States subsequent to the Mexican-American War and the Treaty of Guadalupe Hidalgo in 1848.

Spanish Period

Spanish explorer Juan Rodriguez Cabrillo made a temporary landfall at the Chumash village of *Sisolop* (present-day Ventura) on October 12, 1542 (Grant 1978). He was the first of several early explorers, representing several nations, to explore the *Alta California* coast. However, the end of the prehistoric era in southern California is marked by the arrival of the Gaspar de Portolá overland expedition from New Spain (Mexico) and founding of the first Spanish settlement at San Diego on July 16, 1769 (Johnston 1962).

The earliest European contact in the area came in 1595, when Sebastian Rodriguez Cermeno arrived along the coast. Cermeno's contact was soon followed by Sebastian Vizcaino in 1602, Portolá in 1769, and Anza from 1773-1775/1776. Native American populations maintained their cultural integrity through the late eighteenth century, despite European contact, until the establishment of Missions along the west coast. The Period of Exploration was followed by the Mission Period, which witnessed the establishment of 21 missions between 1769 and 1823. These missions were located roughly 1 day's ride from one another along the Camino Real, which connected San Diego with Solano.

Missions La Purisima Concepcion, Santa Ynez, and San Luis Obispo de Tolosa were closest to the project area (~28 miles [mi] south, 40 mi southeast, and 17.5 mi north, respectively). The missions were charged with administering to the natives within their areas. Mission life gave the Native Americans skills needed to survive in their rapidly changing world, but the population was decimated by the introduction of European diseases, such as measles and smallpox, against which they had no immunity. After 1810, mission populations declined faster than they could be replenished.

Mexican Period

Mexico's independence from Spain in 1821 brought the **Mexican Period** to California. The new government of Mexico had a very different outlook on mission activities. Secularization of the missions, planned under the Spanish, was greatly accelerated by the Mexican government. Mexico secularized the missions in 1833 and expanded on the Spanish practice of granting large tracts of ranch land to soldiers, civil servants, and pioneers (Cleland 1951, 1962). Plans to provide land, training, and living quarters for the Native American population never developed, and the mission lands were soon under the control of a relatively few influential Mexican families. The rancho life style was relatively short-lived, but remains an influential period in a romanticized version of California history.

The Mexican-American war officially ended on February 2, 1848, with the signing of the Treaty of Guadalupe Hidalgo (Rolle 1998). The treaty established California as a United States possession beginning the **American Period** with Mexico's concession of *Alta California* to the United States. The discovery of gold in 1849 catapulted California to the forefront of American commerce and politics. The transition to the **American Period** was more apparent in 1850, when the new State of California was apportioned into 27 original counties (Coy 1973; Marschner 2000).

American Period

The **American Period** began with the cession of California by Mexico in 1848. However, Americans were well established prior to this time; a number of them electing Mexican citizenship and marrying into the local families. The Mexican-American War tested the loyalty of the American emigrants to their adopted country, some of which elected to aid the American forces, while others maintained their allegiance to Mexico and, more relevant, to California.

A Lands Commission was created in responses to the Act of 1851, which provided a means of validating land ownership throughout the state through settlement of land

claims. Few Mexican ranchos remained intact because of legal costs and a lack of what Americans considered to be sufficient evidence to provide title claims. Much of the land that once constituted rancho holdings became public land, available for settlement by emigrants to California. Those ranchos that succeeded in laying legal claim remain unsectioned land visible on maps of California.

The influx of people to California and the region was the result of various factors, including the discovery of gold in the state, conclusion of the Civil War and subsequent availability of free land through passage of the Homestead Act, and importance of the country as an agricultural area supported by the construction of connecting railways. Towns grew and declined in response to an increased population and the economic "boom and bust" period of the late 1880s.

As more Americans ventured into California and San Luis Obispo County at the end of the nineteenth century, the old Spanish land grants were gradually broken up and the land changed hands many times. Agriculture and ranching were prime activities of the newcomers to the county and, by circa 1900, small towns had been created with all the facilities necessary for future growth: post offices, schools, churches, small commercial establishments, and growing residential sections.

History of the Project Area

The first European to see the area was Spanish explorer Juan Cabrillo. The Mission San Luis Obispo de Tolosa was established nearby, and agricultural activities expanded into the area. The Arroyo Grande Valley was found to have particularly fertile ground, and was given the name for "wide riverbed" in Spanish.

The project area is located within the boundaries of the Rancho Bolsa de Chamisal. The rancho was a 14,335-acre land grant made by Governor Juan Alvarado to Francisco Quijada in 1837 (Hoffman 1862). The grant extended along the Pacific coast, just south of present-day Oceano. It was bordered on the north by Rancho Pismo and the south by Rancho Guadalupe.

The rancho was passed on to his four children, Maria Delores, Leonora Manuela, Nasario, and Francisco. In 1846, they sold the rancho to Lewis T. Burton, who served with John C. Fremont during the Mexican-American War and would later become the first American mayor of Santa Barbara. The rancho was patented to Burton in 1867 in compliance with the post-war Land Act of 1851. The rancho was in turn sold to Francis Ziba Branch. Francis Branch was eventually the owner of Rancho Arroyo Grande, Rancho Bolsa de Chamisal, Rancho Huerhuero, and half of Rancho Pismo.

In 1862, the San Luis Obispo Board of Supervisors established the township of Arroyo Grande. Businesses developed along a road called Branch Street to serve local agriculture. A railroad depot was built in 1882.

1.2.4 Records Search Results

1.2.4.1 Historic Map and Aerial Photography Research

Inspection of historic maps of the area (USGS 1897 Arroyo Grande 15-minute, 1942 Arroyo Grande 15-minute, and 1952 Arroyo Grande 15-minute) indicates the railroad and a minor road network in the area of the project (**Figures 4, 5** and **6**). The communities of Arroyo Grande and Oceano are noted with additional single structures spread throughout the area. The project area is completely undeveloped with the exception of an east-west dirt road on the 1942 and 1952 maps.

The USGS 1965 Oceano 7.5-minute map illustrates the northern end of the refinery, the existing rail spur, the coke ovens, and coke piles much as they are today (**Figure 7**). The southern part of the refinery included pipelines, roads, and ponds, but lacks the current structural elements.

Review of aerial images between 1994 and 2011 indicate no development within the project area. The only discernible activity is within the coke yard.

1.2.4.2 Native American Heritage Commission Consultation

A Sacred Lands File search was requested from the Native American Heritage Commission (NAHC) on October 2, 2012 (**Appendix B-1**). In a letter dated October 3, 2012, NAHC staff analyst Mr. David Singleton stated that “Native American cultural resources were not identified within one-half mile of the project area, the ‘area of potential effect (e.g. APE): you specified.”

Figure 4 Portion of the 1897 Arroyo Grande 15-Minute Quadrangle with Project Area Circled

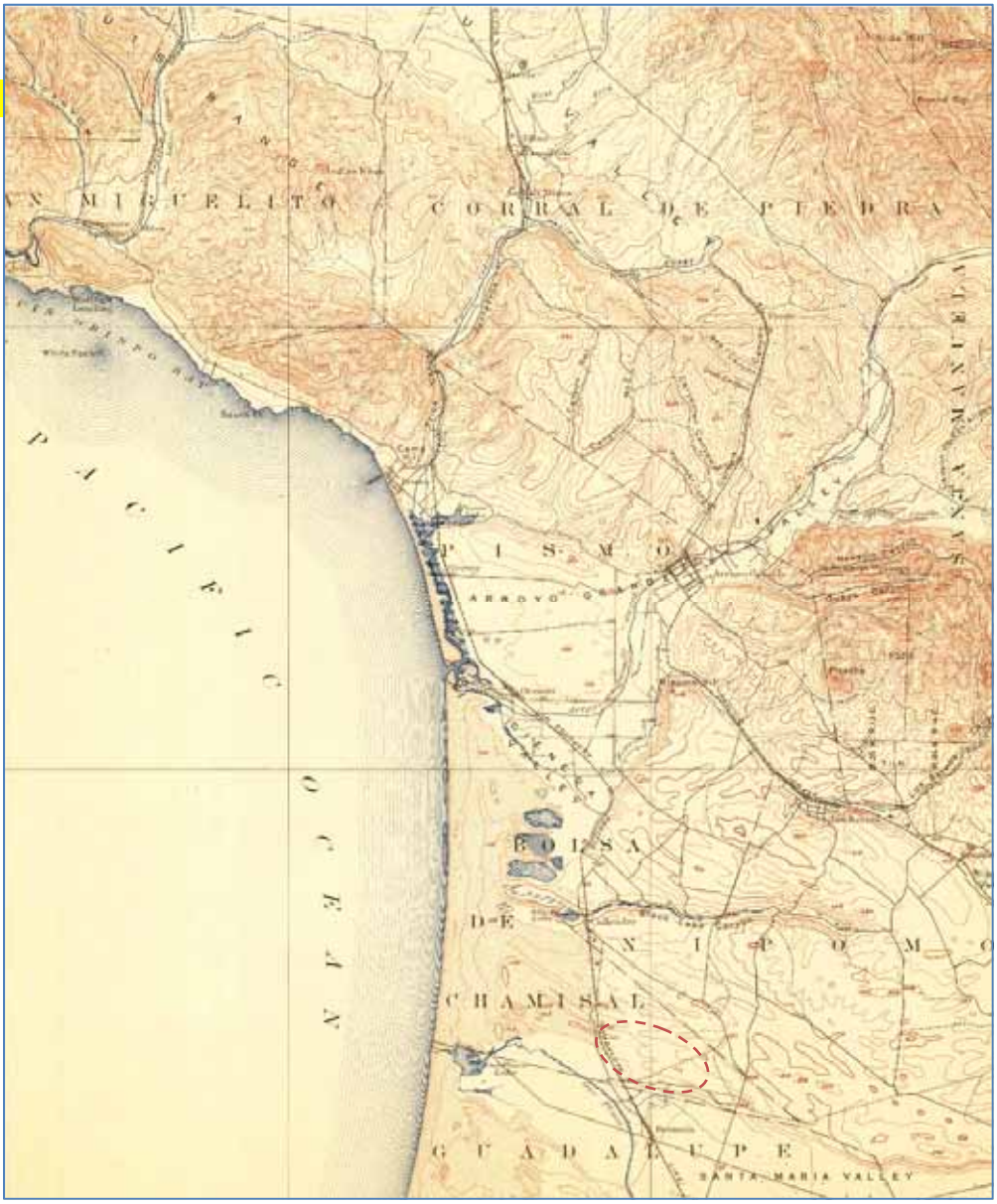
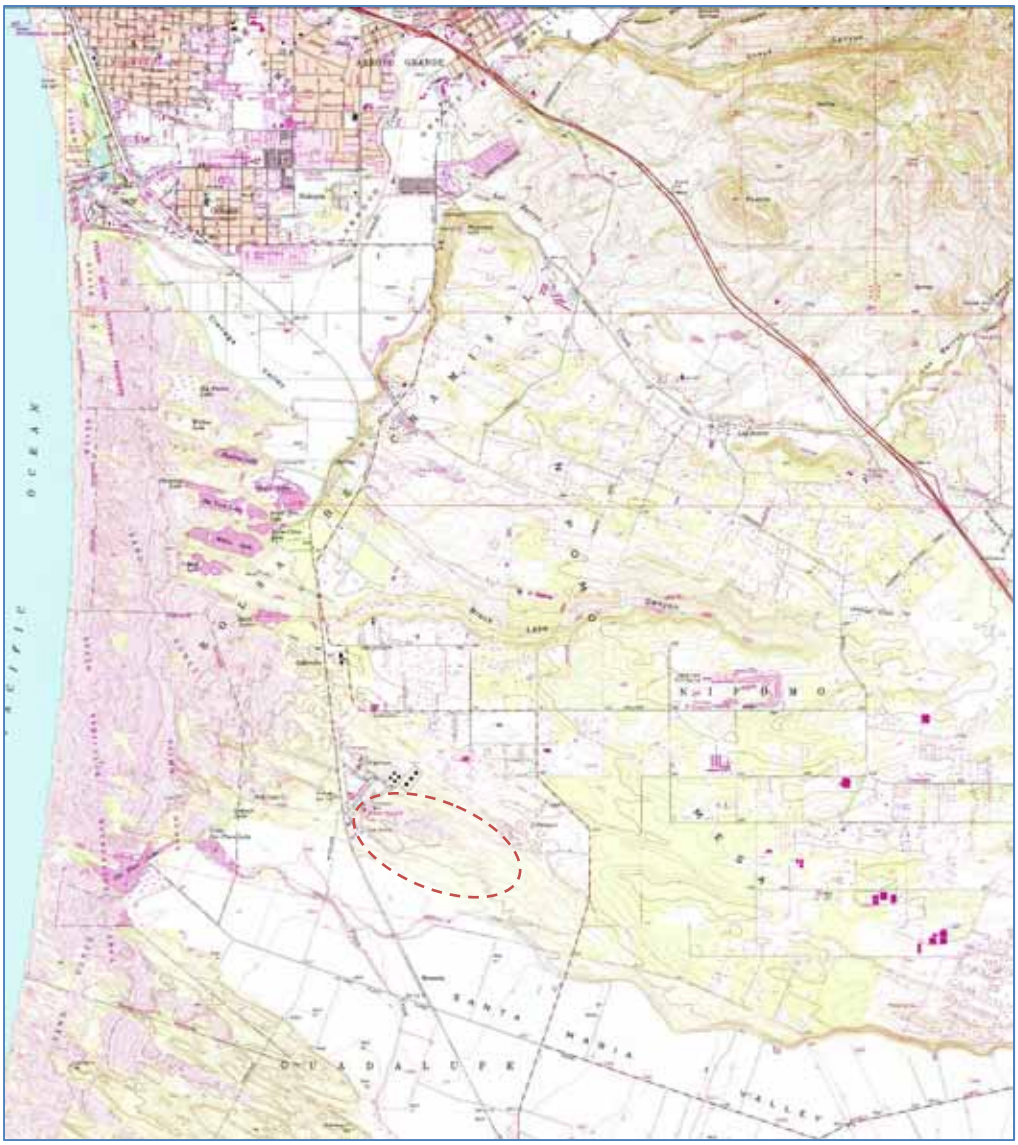


Figure 5 Portion of the 1942 Arroyo Grande 15-Minute Quadrangle with Project Area Circled

Figure 6 1952 USGS Arroyo Grande 15-Minute Quadrangle with Project Area Circled

Figure 7 1965 USGS Oceano 7.5-Minute Quadrangle with Project Area Circled



The NAHC indicates that the NAHC-listed Native American individuals and organizations may have knowledge about Sacred Sites or resources that may be affected by the project. Consultation with the NAHC-listed Native American individuals and organizations is scheduled for later in the permitting process.

1.2.4.3 Central Coast Information Center

Records search data were requested from and compiled by the Central Coastal Information Center (CCIC 2012) at the University of California, Santa Barbara (**Appendix B-2** and Confidential **Appendix C**) in October of 2012.

The records search included the following databases:

- State Historic Property Data Files
- National Register of Historic Places
- National Register of Determined Eligible Properties
- California Historical Landmarks
- California Points of Historic Interest
- California Office of Historic Places Archaeological Determinations of Eligibility
- Caltrans State and Local Bridge Surveys

The records search indicates that 45 cultural resource investigations have taken place and nine archaeological sites previously identified within the 1-mile radius (**Confidential Appendix C; Table 1**). None of the previously identified cultural resources are within the project area.

The records search indicates that, although the project area has been the subject of research investigations, the entire area was not covered (**Appendix B-2).** Report E-35 (Spanne 1979) addressed the western one-quarter of the project area, but focused on a pipeline survey of a portion of the refinery. The project area was not included in the survey. Dills (1989) coverage addresses the entire project area (E-1569), but survey is not indicated. Report E-1643 (Engineering-Science 1988) is a draft Hazardous Waste Management Plan for a large area of the county. Cultural resources survey is not indicated.

The nine previously identified cultural resource sites consist of seven prehistoric era archaeological sites and two historic era sites (**Table 1**). The bulk of the prehistoric

sites are located along Little Oso Flaco Creek, to the south and west. Two prehistoric sites are located within the dune complex to the west-northwest. Prehistoric sites within the search radius contain marine shell (predominantly Pismo clam), flaked stone tools, and production debris. In addition, site P-40-001190 contains a probable hearth feature. Several of the sites contain flaked stone projectile points that may assist in dating the sites. No radiocarbon data are available.

Table 1 Cultural Resource Sites within a One-mile Radius of the Project Area

Site Number	Era	Size (m. sq.)	Constituents	Recorded By/Date
P-40-000615	Prehistoric	393	Light density scatter of shell and lithic	Deane/1971a Gibson and Crew/1985a
P-40-000616	Prehistoric	350	Heavy density scatter of shell and lithic	Deane/1971b
P-40-000859	Prehistoric	25	Light density scatter of shell and lithic	West & Bell/1978 Perez & Long/2010a
P-40-001118	Prehistoric	120	Light density scatter of shell and lithic	McFarlane & Osland/1984 Dills/1993
P-40-001189	Historic	7,000	Low density glass and shell	Gibson and Crew/1985b
P-40-001190	Prehistoric	54,000	Rock feature, lithic and shell	Gibson and Crew/1985c
P-40-001191	Prehistoric	600	Shell scatter	Gibson and Crew/1985d
P-40-001194	Historic	100,000	Multiple historic trash scatters	Gibson and Crew/1985e
P-40-002668	Prehistoric	10,000	Light density scatter of shell and lithic	Perez & Long/2010b

The two historic era sites are located to the southwest and east. Site P-40-001189 contains a low-density deposit of glass fragments and marine shell. Site P-40-001194 contains multiple scatters of historic trash with glass fragments, marine shell, and some metal items, including two license plates with dates of 1933 and 1940. Site P-40-001189 is the closest site to the project area, located approximately 200 m from the small loop alternative. Sites P-40-000615, P-40-001190, P-40-001191, and P-40-001194 are located within 300 m of various rail alternatives.

1.3 Applicable Regulations

Resource importance is assigned to districts, sites, buildings, structures, and objects that possess exceptional value or quality illustrating or interpreting the heritage of San Luis Obispo County in history, architecture, archaeology, engineering, and culture. A number of criteria are used in demonstrating resource importance. Specifically, criteria outlined in the California Environmental Quality Act (CEQA) Guidelines and the County of San Luis Obispo General Plan, Conservation and Open Space Element: Cultural Resources goals provide the guidance for making such a determination. The following sections detail the criteria that a resource must meet in order to be determined important.

CEQA Guidelines

According to CEQA Guidelines Section 15064.5a, the term “historical resource” or significant cultural resource includes the following:

(1) A resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the California Register of Historical Resources (CRHR) (Pub. Res. Code SS5024.1, Title 14 CCR. Section 4850 et seq.).

(2) A resource included in a local register of historical resources, as defined in section 5020.1(k) of the Public Resources Code (PRC) or identified as significant in an historical resource survey meeting the requirements of section 5024.1(g) of the PRC, shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.

(3) Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency’s determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be “historically significant” if the resource meets the criteria for listing on the CRHR (Pub. Res. Code SS5024.1, Title 14, Section 4852) including the following:

(A) Is associated with events that have made a significant contribution to the broad patterns of California’s history and cultural

(A) Is associated with the lives of persons important in our past;

(B) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

(C) Has yielded, or may be likely to yield, information important in prehistory or history.

(4) The fact that a resource is not listed in, or determined eligible for listing in the CRHR, not included in a local register of historical resources (pursuant to section 5020.1(k) of the PRC), or identified in an historical resources survey (meeting the criteria in section 5024.1(g) of the PRC) does not preclude a lead agency from determining that the resource may be an historical resource as defined in PRC section 5020.1(j) or 5024.1.

According to CEQA Guidelines Section 15064.5b, a project with an effect that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. A substantial adverse change is defined as:

(1) Substantial adverse change in the significance of an historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired.

(2) The significance of an historical resource is materially impaired when a project:

(A) Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources; or

(B) Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or

(C) Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register of Historical Resources as determined by a lead agency for purposes of CEQA.

CEQA Guidelines Section 15064.5(c) applies to effects on archaeological sites and contains the following additional provisions regarding archaeological sites:

(1) When a project will impact an archaeological site, a lead agency shall first determine whether the site is an historical resource, as defined in subsection (a).

(2) If a lead agency determines that the archaeological site is an historical resource, it shall refer to the provisions of Section 21084.1 of the PRC, and this section, Section 15126.4 of the Guidelines, and the limits contained in Section 21083.2 of the PRC do not apply.

(3) If an archaeological site does not meet the criteria defined in subsection (a), but does meet the definition of a unique archaeological resource in Section 21083.2 of the PRC, the site shall be treated in accordance with the provisions of section 21083.2. The time and cost limitations described in PRC Section 21083.2 (c-f) do not apply to surveys and site evaluation activities intended to determine whether the project location contains unique archaeological resources.

(4) If an archaeological resource is neither a unique archaeological nor an historical resource, the effects of the project on those resources shall not be considered a significant effect on the environment. It shall be sufficient that both the resource and the effect on it are noted in the Initial Study or EIR [Environmental Impact Report], if one is prepared to address impacts on other resources, but they need not be considered further in the CEQA process.

CEQA Guidelines Sections 15064.5(d) & (e) contain additional provisions regarding human remains. Regarding Native American human remains, paragraph (d) provides:

(1) When an initial study identifies the existence of, or the probable likelihood, of Native American human remains within the project, a lead agency shall work with the appropriate Native Americans as identified by the Native American Heritage Commission as provided in PRC SS5097.98. The applicant may develop an agreement for treating or disposing of, with appropriate dignity, the human remains and any items associated with Native American burials with

the appropriate Native Americans as identified by the Native American Heritage Commission. Action implementing such an agreement is exempt from:

(A) The general prohibition on disinterring, disturbing, or removing human remains from any location other than a dedicated cemetery (Health and Safety Code Section 7050.5).

(B) The requirement of CEQA and the Coastal Act.

California Register of Historical Resources (CRHR) Criteria for Evaluation

The CRHR is a listing of State of California resources that are significant within the context of California's history, and includes all resources listed in or formally determined eligible for the National Register of Historic Places (NRHP). The CRHR is a state-wide program of similar scope to the NRHP. In addition, resources designated under municipal or county ordinances are also eligible for listing in the CRHR. A historic resource must be significant at the local, state, or national level under one or more of the following criteria defined in the California Code of Regulations (CCR) Title 14, Chapter 11.5, Section 4850:

(1) It is associated with events or patterns of events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States (Criterion 1); or

(2) It is associated with the lives of persons important to local, California, or national history (Criterion 2); or

(3) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master, or possesses high artistic values (Criterion 3); or

(4) It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation (Criterion 4).

The CRHR criteria are tied to CEQA, as any resource that meets the above criteria is considered an historic resource under CEQA.

Integrity must also be evident through historic qualities including location, design, setting, materials, workmanship, feeling, and association.

California Native American Graves Protection and Repatriation Act (2001)

California Health and Safety Code, Division 7, Part 2, Chapter 5 (Sections 8010-8030) sets forth broad provisions for the protection of Native American cultural resources and implements the State's policy of ensuring that all California Native American human remains and cultural items are treated with due respect and dignity. These sections also provide a mechanism for disclosure and return of human remains and cultural items held by publicly funded agencies and museums in California. Likewise, these sections also outline the mechanism with which California Native American tribes not recognized by the federal government may file claims to human remains and cultural items held in agencies or museums.

California Public Resources Code § 5020

Legislation enacting PRC Section 5020 resulted in the creation of the California Historic Landmarks Committee in 1939, and authorized the Department of Parks and Recreation to designate Registered Historical Landmarks and Registered Points of Historical Interest.

California Public Resources Code § 5097.9

California PRC Section 5097.9 sets forth the actions to be taken whenever Native American remains are discovered. Under that section, no public agency and no private party using or occupying public property, or operating on public property, under a public license, permit, grant, lease, or contract made on or after July 1, 1977, may in any manner whatsoever interfere with the free expression or exercise of Native American religion as provided in the United States Constitution and the California Constitution; nor may any such agency or party cause severe or irreparable damage to any Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine located on public property, except on a clear and convincing showing that the public interest and necessity so require.

California Public Resources Code § 5097.98

Section 5097.98 sets forth the procedures to be followed upon discovery of Native American human remains. These procedures include notification of those persons most likely descended from the deceased; inspection of the discovery site by the descendants; recommendations for treatment or disposition of the remains; and the measures to prevent further damage or disturbance to the discovery site.

California Public Resources Code § 7050.5

Section 7050.5 states, in part, that every person who knowingly mutilates or disinters, wantonly disturbs, or willfully removes any human remains in or from any location other than a dedicated cemetery without authority of law is guilty of a misdemeanor, except as provided in Section 5097.99 of the PRC. The Section also notes that, in the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the human remains are discovered has determined. If the coroner determines that the remains are not subject to his or her authority, and if the coroner recognizes the human remains to be those of a Native American, or has reason to believe that they are those of a Native American, he or she shall contact, by telephone within 24 hours, the NAHC.

California Public Resources Code § 7051

Section 7051 notes, in part, that every person who removes any part of any human remains from any place where it has been interred, or from any place where it is deposited while awaiting interment or cremation, with intent to sell it or to dissect it, without authority of law, or written permission of the person or persons having the right to control the remains under Section 7100, or with malice or wantonness, has committed a public offense that is punishable by imprisonment in the State prison.

Title 14 California Code of Regulations § 4307

Under this State preservation regulation, no person shall remove, injure, deface, or destroy any object of paleontological, archaeological, or historical interest or value.

County of San Luis Obispo General Plan Conservation and Open Space Element: Goals for Historic Resources

The County recognizes that archaeological resources are “living resources,” meaning that the culture represented by these resources still thrives here. Preserving local history and cultural diversity helps us retain our links to the past and remain a dynamic and desirable place.

Cultural resources throughout the State and County are increasingly vulnerable to development pressures, growing use of our open spaces, changes in technology, and lack of funding for their repair and maintenance. The intent of the cultural resource goals, policies, and implementation strategies is to identify and protect areas, sites, and buildings having Native American, architectural, historical, archaeological,

paleontological, or cultural significance. These resources contribute to the vitality and diversity of the County and its sense of place.

Goal CR 1 The County will have a strong, positive community image that honors our history and cultural diversity.

Policy CR 1.1 Cultural Identity
Establish and support programs that enhance the county's sense of community and identity, such as the collection of oral histories, cultural and genealogical research, and the acquisition of collections of historic artifacts, documents, and memorabilia relevant to the history of the county.

- ***Implementation Strategy CR 1.1.1 Curation***

Support existing museums or cultural centers and establishment of new ones to educate the public about the importance of local history, Native American resources, and archaeology, and to display artifacts, documents, and art relevant to the county's history and cultural diversity.

- ***Implementation Strategy CR 1.1.2 Curation Facility***

Work with stakeholders to locate, construct and maintain a storage, curation and research facility in a central location for cultural resource artifacts and documents from the County.

- ***Implementation Strategy CR 1.1.3 Diversified Funding***

Identify and pursue funding for existing and new curation facilities to ensure the continued curation of collections in perpetuity.

Goal CR 2 The County will promote public awareness and support for the preservation of cultural resources in order to maintain the county's uniqueness and promote economic vitality.

Policy CR 2.1 Community Participation
The County will actively promote and support community participation in the preservation and enhancement of the County's culture and history.

- ***Implementation Strategy CR 2.1.1 Public Outreach***

Establish a program to publicize the County's efforts to protect historical and cultural resources at risk from development and its commitment to preserve its cultural heritage. The program may include public outreach and education through posters, signs, handouts, brochures, exhibits, videos, the County website, and workshops.

- ***Implementation Strategy CR 2.1.2 Outreach to Schools***

Support education programs through local historical societies, schools, and other groups that provide information to the community regarding the rich history of the county and the importance of preserving it for future generations to appreciate.

- ***Implementation Strategy CR 2.1.3 Unauthorized Collection***

Protect sensitive sites from vandalism and unauthorized collection of artifacts by educating staff, public officials, the public, and landowners about the importance of such sites.

- ***Implementation Strategy CR 2.1.4 Interpretive Signage***

Require the incorporation of monuments, plaques, signs, or artwork into public and private development projects in areas associated with history or cultural resources in order to identify and interpret the county's diverse history and cultural resources. Promote such interpretive signage in existing public and private sites.

- ***Implementation Strategy CR 2.1.5 Cultural Resources Advisory Committee***

Establish a Cultural Resources Advisory Committee to make recommendations to the Board of Supervisors and other decision-making bodies on ways to protect Native American, archaeological, historic, and other cultural resources. The Committee shall also:

1. Assist in developing historic contexts of County history;
2. Assist in surveying and identifying cultural resources;
3. Recommend standards and procedures to designate cultural resources.
4. Recommend historic sites to be included in the General Plan H designations or ordinances.
5. Review of applications for projects that involve alteration or demolition of recognized cultural resources.

Policy CR 2.2 Acquisition

The County encourages and supports acquisition by public agencies or historical or conservation organizations of the most important archaeological and cultural sites from willing sellers.

Policy CR 2.3 "Living Resources"
Preserve historic sites and buildings and recognize cultural and archaeological resources as "living resources" that are part of a continuing culture.

- ***Implementation Strategy CR 2.3.1 Stakeholder Outreach***

Support and facilitate ongoing discussions or forums about protecting and preserving cultural resources with Native American groups, historical and archaeological interest groups, cultural resource professionals, decision makers, and landowners.

- ***Implementation Strategy CR 2.3.2 Government-to-Government Consultation***

Establish a government-to-government consultation process with the Native American community and a consultation process with other stakeholders to identify potentially significant cultural resources in the county and to discuss issues relevant to the protection and preservation of cultural resources.

Goal CR 3 The County's historical resources will be preserved and protected.

Policy CR 3.1 Historic Preservation
The County will provide for the identification, protection, enhancement, perpetuation, and use of features that reflect the County's historical, architectural, Native American, archaeological, cultural, and aesthetic heritage.

- ***Implementation Strategy CR 3.1.1 Historic Preservation Ordinance***

The County will develop a cultural resources preservation ordinance to: 1) more effectively preserve Native American cultural sites, archaeological resources, and protect and enhance historic buildings, 2) prevent demolition or substantial changes in outward appearance of historically designated buildings, unless it is necessary for public health and safety, 3) integrate historically accurate designs and features in historic residential and commercial structures, 4) promote restoration of historic buildings or sites using the greatest degree of authenticity practicable, consistent with the Secretary of the Interior's Standards as appropriate, and 5) create the Cultural Resources Advisory Committee.

- ***Implementation Strategy CR 3.1.2 Historic Resources Inventory***

Develop a description of the broad patterns of human occupation or historic contexts of the area in order to provide a basis on which to judge the place and importance of potential cultural resources. Based on these contexts, develop and regularly update a comprehensive and systematic historic resources inventory, coordinating with other

agencies and organizations as necessary. The inventory will include sites, historic buildings, and structures, such as the Avila Schoolhouse, and historic documents within the county, and a map depicting their locations. It shall use the State of California, Department of Parks and Recreation "Building, Structure, and Object Record" or similar format. The inventory will include a map depicting the locations of the features (unless the locations are confidential).

- ***Implementation Strategy CR 3.1.3 National Register***

Work with recognized preservation organizations and interested individuals and landowners to determine whether additional churches, schools, and other private and public structures deserve State or federal designation and protection as historic resources. Pursue formal listing of all eligible sites and properties in the National Register of Historic Places and California Register of Historical Resources, or as California Historic Landmarks.

- ***Implementation Strategy CR 3.1.4 Historic Listing Process***

Develop a process to protect newly identified historic sites, buildings, and structures in a timely manner as an alternative to including them in the Historic (H) combining designation.

Examples are 1) adopt a Historic Preservation Ordinance that includes or references a list, to be updated periodically, of historic sites, buildings and structures, and 2) amend planning area/Land Use Ordinance standards to include such lists for each Planning Area.

Policy CR 3.2 Historic Preservation Programs

The County supports and encourages historic preservation activities. County agencies should cooperate and coordinate their activities with preservation activities.

- ***Implementation Strategy CR 3.2.1 Grants***

Support applications for grants and other sources of funding for historic preservation projects that are consistent with the County's General Plan.

- ***Implementation Strategy CR 3.2.2 Restoration Incentives***

Identify and provide incentives, as feasible, to private landowners, nonprofit organizations, and interested preservation groups to rehabilitate and restore historic buildings and structures and to encourage their continued use.

- ***Implementation Strategy CR 3.2.3 Tax Incentives***

Share information on federal and state tax incentive programs and nonprofit conservation programs for historic preservation with landowners and preservation groups.

- ***Implementation Strategy CR 3.2.4 Mills Act***

Consider participating in the Mills Act Tax Abatement Program starting with research or studies of costs and benefits. The Mills Act is an economic incentive program for the restoration and preservation of qualified historic buildings by private owners. Private owners who pledge to rehabilitate and maintain the historical and architectural character of their properties for at least a 10-year period receive substantial property tax savings under the act.

Policy CR 3.3 Remodeling and Reconstruction
Maintain and enhance the historic character of the county by establishing review procedures for the remodeling and reconstruction of buildings and other structures consistent with the Secretary of the Interior's Standards.

- ***Implementation Strategy CR 3.3.1 Restoration Assistance***

Provide property owners and developers with design assistance, including information on the restoration and adaptive reuse of historic buildings and structures. Use private and public resources to provide information on proper methods and techniques of restoration and rehabilitation, including sources of funding assistance.

- ***Implementation Strategy CR 3.3.2 Salvaged Materials***

Encourage the reuse of salvaged architecturally significant materials.

Goal CR 4 The County's known and potential Native American, archaeological and paleontological resources will be preserved and protected.

Policy CR 4.1 Non-development Activities
Discourage or avoid non-development activities that could damage or destroy Native American and archaeological sites, including off-road vehicle use on or adjacent to known sites. Prohibit unauthorized collection of artifacts. (Also refer to Implementation Strategy CR 2.1.3.)

Policy CR 4.2 Protection of Native American Cultural Sites
Ensure protection of archaeological sites that are culturally significant to Native Americans, even if they have lost their scientific or archaeological integrity through

previous disturbance. Protect sites that have religious or spiritual value, even if no artifacts are present. Protect sites that contain artifacts, which may have intrinsic value, even though their archaeological context has been disturbed.

- ***Implementation Strategy CR 4.2.1 Archaeological Sensitivity Mapping***

Identify significant archaeological and cultural sites and conduct sensitivity mapping in consultation with Native Americans and archaeological and conservation organizations to improve the County's ability to protect the resources. Map resources consistently in urban and rural areas of the County.

- ***Implementation Strategy CR 4.2.2 Archaeological Site Records***

Establish and maintain, but do not publicize archaeological site records. Site records may be released to limited individuals and groups with appropriate professional or tribal credentials.

Policy CR 4.3 Cultural Resources and Open Space
The County supports the concept of cultural landscapes and the protection and preservation of archaeological or historical resources as open space or parkland on public or private lands.

- ***Implementation Strategy CR 4.3.1 Cultural Landscapes***

The identification and interpretation of cultural resources should consider the larger landscape in order to address the relationships between archaeological sites, landscape features and the environment.

- ***Implementation Strategy CR 4.3.2 Cultural Landscapes: Open Space Easements***

In proposed land divisions and discretionary land use permits: 1) locate parcels and easements to optimize protection of cultural resources, 2) as necessary, clearly define allowable uses, prohibited activities, and open space maintenance responsibilities as a condition of approval, and 3) use open space easements to protect designated archaeological sites.

- ***Implementation Strategy CR 4.3.3 Cultural Landscapes: Management***

Manage public open space and parkland so that public use does not disturb or degrade archaeological or historical resources.

Policy CR 4.4 Development Activities and Archaeological Sites
Protect archaeological and culturally sensitive sites from the effects of development by avoiding disturbance where feasible. Avoid archaeological resources as the primary method of protection.

- ***Implementation Strategy CR 4.4.1 Native American participation in development review process***

In areas likely to contain Native American and cultural resources, include Native Americans in tasks such as Phase I, II, and III surveys, resource assessment, and impact mitigation. Consult with Native American representatives early in the development review process and in the design of appropriate mitigations. Enable their presence during archaeological excavation and construction in areas likely to contain cultural resources.

- ***Implementation Strategy CR 4.4.2 Cultural Resource Studies***

Require cultural resources studies (i.e., archaeological and historical investigations) by a professional who meets the Secretary of the Interior's Professional Qualifications Standards when development is proposed within an archaeologically or historically sensitive area. These studies will conform to the County's approved guidelines.

Policy CR 4.6 Resources-Based Sensitivity
Protect archaeological resources near streams, springs and water sources, rock outcrops, and significant ridgetops, as these are often indicators of the presence of cultural resources.

- ***Implementation Strategy CR 4.6.1 Resource-Based Surveys***

a. Require a preliminary site survey to determine the likelihood of resources with all development subject to a discretionary permit that is proposed within 1) 100 feet of the bank of a creek or spring or 2) 300 feet of a creek where the slope of that area is less than 10 percent. Require that a professional archaeologist who meets the Secretary of the Interior's Professional Qualifications for Archaeology conduct the preliminary survey. Recommendations made by the archaeologist may be applied as mitigation measures.

b. As significant rock outcrops and ridge tops are identified, determine the distances within which or the circumstances under which proposed discretionary development would be subject to a preliminary site survey, based on site-specific conditions.

COASTAL ZONE LAND USE ORDINANCE:
TITLE 23 OF THE SAN LUIS OBISPO COUNTY CODE

ADOPTED BY THE SAN LUIS OBISPO COUNTY BOARD OF SUPERVISORS

March 1, 1988, Ordinance 2344

23.04.200 - Protection of Archaeological Resources Not Within the Archaeologically Sensitive Areas Combining Designation:

All development applications that propose development that is not located within the Archaeologically Sensitive Areas combining designation and that meets the following location criteria shall be subject to the standards for the Archaeologically Sensitive Areas Combining Designation in Chapter 23.07: development that is either within 100 feet of the bank of a coastal stream (as defined in the Coastal Zone Land Use Ordinance), or development that is within 300 feet of such stream where the slope of the site is less than 10 percent.

[Amended 2004, Ord. 3048]

23.07.100 - Historic Site (H):

The Historic Site combining designation is applied to areas of the county by the Official Maps (Part III) of the Land Use Element to recognize the importance of archeological and historic sites, structures and areas important to local, state, or national history. Specific areas are also designated as Archaeologically Sensitive Areas on the Official Maps (Part III) of the Land Use Element. These standards apply to both these combining designations and are intended to protect archeological resources, historic structures and sites by requiring new uses and alterations to existing uses to be designed with consideration for preserving and protecting such resources. The requirements of this title that apply to historic and archeological sites are organized into the following sections (additional standards regarding the discovery of archeological resources during construction are in Section 23.05.140):

23.07.101 Minimum Parcel Size

23.07.102 Permit and Processing Requirements

23.07.104 Archaeologically Sensitive Areas

23.07.101 - Minimum Parcel Size: The minimum size for a new parcel with an established structure and Historic Site combining designation shall be determined by Development Plan. Any parcel where the historic structure is located that is less than the minimum or what would otherwise be required for the applicable land use category can only be transferred to a valid tax-exempt charity under Internal Revenue code section 501(c)(3) or a public agency.

a. Application content. The Development Plan application shall be accompanied by a statement from the applicant explaining why it is necessary to separate the existing historic structure from the surrounding ownership, and how such separation will support the restoration or continuation of the historic structure.

b. Residential use prohibited. No residential use shall be established on the parcel where the historic structure is located if that parcel is smaller than the minimum parcel size or what would otherwise be required by Sections 23.04.020 et seq. for the applicable land use category.

c. Non-profit organization. If the parcel where the historic structure is located is smaller than the minimum parcel size or what would otherwise be required by Sections 23.04.020 et seq. for the applicable land use category, that parcel shall only be transferred to a valid tax-exempt charity under Internal Revenue code section 501(c)(3) or a public agency. Evidence shall be submitted in the form of a letter from the Internal Revenue Service verifying the organization is a valid non-profit organization prior to recordation of a final or parcel map. In addition, a letter of intent to accept title from the valid non-profit organization or public agency shall be submitted prior to recordation.

d. Declaration of restrictions required. Prior to, or concurrent with, recordation of a final or parcel map, the applicant shall execute and record a declaration of restrictions in a form approved by County Counsel, wherein the applicant agrees on their own behalf and all successors in interest to the parcel that, they will not request approval of or establish any residential use on the parcel. In addition, the declaration of restrictions shall specify that any parcel smaller than the minimum parcel size or what would otherwise be required by Sections 23.04.020 et seq. shall not be sold except to a valid non-profit organization or public agency. The declaration of restrictions shall not be amended or terminated without the prior approval of the Board of Supervisors.

e. Required findings. No parcel smaller than the minimum parcel size or what would otherwise be required by Sections 23.04.020 et seq. for the applicable land use category shall be approved pursuant to this section unless the Review Authority first

finds that the parcel meets the minimum site area provisions in Section 23.04.044, that the proposed parcel being smaller than the surrounding holdings will have no adverse effect on the continuing use of parcels adjacent to and in the vicinity of the site, and that the applicant has demonstrated the division will support the restoration or continuation of the historic structure.

23.07.102 - Permit and Processing Requirements: The following standards apply to all development proposals within an Historic Site combining designation.

a. Minor Use Permit required. Minor Use Permit approval is required for all new structures and uses within an Historic Site combining designation, and also for any modifications to existing historic structures within an Historic Site combining designation, including restoration or alteration that changes the historic or architectural character of the structure, demolition or relocation, except for minor exterior or interior alterations that do not materially change the historic character of the structure.

b. Application content. Applications for projects within an Historic Site combining designation shall include a description of measures proposed to protect the historic resource identified by the Land Use Element (Part II).

c. Environmental determination. The initial study shall evaluate the potential effect of the proposed project upon the visual character of the historic site or district, and evaluate the other direct and indirect effects of the new construction upon the actual archeological resources or historic structures.

d. Required findings for approval. A land use permit application within an Historic Site combining designation shall be approved only where the review authority first makes all the following findings:

(1) Historic structures, landmarks and districts. Where an Historic Site combining designation is applied to identify historic structures, landmarks, or districts, project approval shall require the following findings:

(i) The height, bulk, location, structural materials, landscaping and other aspects of the proposed use will not obstruct public views of the historic structure or of its immediate setting;

(ii) Any proposed alteration or removal of structural elements, or clearing of landscaping or natural vegetation features will not damage or destroy the character of significant historical features and settings;

(iii) Any proposed remodeling or demolition is unavoidable because it is not structurally or economically feasible to restore or retain existing structures or features.

23.07.104 - Archaeologically Sensitive Areas:

To protect and preserve archaeological resources, the following procedures and requirements apply to development within areas of the coastal zone identified as archaeologically sensitive.

a. Archaeologically sensitive areas. The following areas are defined as archaeologically sensitive:

(1) Any parcel within a rural area which is identified on the rural parcel number list prepared by the California Archaeological Site Survey Office on file with the county Planning Department.

(2) Any parcel within an urban or village area which is located within an archaeologically sensitive area as delineated by the official maps (Part III) of the Land Use Element.

(3) Any other parcel containing a known archaeological site recorded by the California Archaeological Site Survey Office.

b. Preliminary site survey required. Before issuance of a land use or construction permit for development within an archaeologically sensitive area, a preliminary site survey shall be required. The survey shall be conducted by a qualified archaeologist knowledgeable in local Native American culture and approved by the Environmental Coordinator. The County will provide pertinent project information to the Native American tribe(s).

c. When a mitigation plan is required. If the preliminary site survey determines that proposed development may have significant effects on existing, known or suspected archaeological resources, a plan for mitigation shall be prepared by a qualified archaeologist. The County will provide pertinent project information to the Native American tribe(s) as appropriate. The purpose of the plan is to protect the resource. The plan may recommend the need for further study, subsurface testing, monitoring

during construction activities, project redesign, or other actions to mitigate the impacts on the resource. Highest priority shall be given to avoiding disturbance of sensitive resources. Lower priority mitigation measures may include use of fill to cap the sensitive resources. As a last resort, the review authority may permit excavation and recovery of those resources. The mitigation plan shall be submitted to and approved by the Environmental Coordinator, and considered in the evaluation of the development request by the Review Authority.

d. Archeological resources discovery. In the event archeological resources are unearthed or discovered during any construction activities, the standards of Section 23.05.140 of this title shall apply. Construction activities shall not commence until a mitigation plan, prepared by a qualified professional archaeologist reviewed and approved by the Environmental Coordinator, is completed and implemented. The County will provide pertinent project information to the affected Native American tribe(s) and consider comments prior to approval of the mitigation plan. The mitigation plan shall include measures to avoid the resources to the maximum degree feasible and shall provide mitigation for unavoidable impacts. A report verifying that the approved mitigation plan has been completed shall be submitted to the Environmental Coordinator prior to occupancy or final inspection, whichever occurs first.

[Amended 1995, Ord. 2715; Amended 2004, Ord. 3048]

2. Guidelines for Determining Significance

Prehistoric and Historic Era Archaeological Resources

For the purposes of this technical report, any of the following will normally be considered a potentially significant environmental impact to cultural resources:

1) The project, as designed, causes a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5 of the State CEQA Guidelines.
2) The project proposes activities or uses damaging to, and fails to preserve, significant cultural resources.

The significance guidelines listed above have been selected for the following reasons:

Guideline 1 is derived directly from CEQA. Sections 21083.2 of CEQA and 15064.5 of the State CEQA Guidelines recommend evaluating archaeological resources to determine whether or not a proposed action would have a significant effect on unique archaeological sites.

Guideline 2 was selected because the San Luis Obispo County General Plan (General Plan) Conservation and Open Space element requires that cultural resources be considered when assessing environmental impacts. The General Plan provides preferred preservation measures for identified cultural sites. In addition, County regulations provide protection for previously undocumented resources that may be discovered during construction. See Section 1.3 for a discussion of the specific regulations. Any project that would have an adverse impact (direct, indirect, cumulative) on significant cultural resources as defined by these guidelines would be considered a significant impact.

Human Remains

California PRC (section 5097.98) and Health and Safety Code (section 7050.5) address the discovery and disposition of human remains. In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, the law requires that no further excavation or disturbance of the site, or any nearby area where human remains may be located, occur until:

1. The County Coroner has been informed and has determined that no investigation of the cause of death is required, and

2. If the remains are of Native American origin, the descendants from the deceased Native Americans have made a recommendation for the means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods.

If the discovery of human remains is in conjunction with a project requiring a permit from the County, then the County Environmental Coordinator must also be contacted. If the activity leading to the discovery does not require a County permit, the Environmental Coordinator can still provide assistance to the landowner.

It is important to note that California law prohibits disinterring, disturbing, or removing human remains from any location other than a dedicated cemetery without first complying with the above provisions. Desecration of a Native American burial in California is a crime.

For the purposes of this technical report, any of the following will normally be considered a potentially significant environmental impact to cultural resources:

1) The project, as designed, disturbs any human remains, including those interred outside of formal cemeteries.
2) The project proposes activities or uses damaging to, and fails to preserve, significant cultural resources.

The significance guidelines listed above have been selected for the following reasons:

Guideline 1 is included because human remains must be treated with dignity and respect and CEQA requires consultation with the “Most Likely Descendant” as identified by the NAHC for any project in which human remains have been identified.

Guideline 2 was selected because the CEQA requires that cultural resources be considered when assessing environmental impacts. The County provides preservation goals for identified cultural sites. In addition, County regulations provide protection for previously undocumented resources that may be discovered during construction. See Section 1.3 for a discussion of the specific regulations. Any project that would have an adverse impact (direct, indirect, cumulative) on significant cultural resources as defined by these guidelines would be considered a significant impact.

2.1 Theoretical Orientation

2.1.1 Research Questions

The formulation of research questions pertaining to survey-level investigations is typically based on information specific to the project area under investigation and reflective of previously gathered data. Within the prehistoric research realm, typical regimes within a cultural ecology model would focus on probability models positing a relationship between functional site types and resource location. These correlations would, naturally, be highly dependent on the time periods represented. Thus, the identification of complexes relating to specific time periods and the establishment of prehistoric context would be paramount. The following are research questions appropriate to the project area.

1) Can the archaeological data supplement the prehistoric record to place the site in a local chronology?
2) Does the artifact assemblage reflect participation by the occupants in local and regional commodities exchange?
3) Can the site contribute to an understanding of the regional land use?
4) Can the site provide insight into the types of sites anticipated within the region?
5) How do the artifacts contribute to ethnic, economic or other behavioral identities?

2.2 Historic Architectural and Archaeological Sites

2.2.1 Introduction to Historic Period Foci

Historic Period research focuses on defining how the occupants of the region utilized the local environ. When a Historic Period resource is identified, it is traced through documentation to an individual or group if possible. A survey-level recording of site constituents would be correlated with socio-economic, ethnic, and religious identities of the registered occupants to formulate further research questions applicable to evaluation studies.

Evaluation of Historic Period assemblages requires a higher level of documentation than that associated with prehistoric assemblages. Analysis of architectural elements, historic artifacts, and assemblages must, therefore, be within the context of an accurately documented group responsible for the site(s).

Archival materials available cover the entire Historical Period. The period of greatest interest is the American period, specifically, circa 1880 to 1945. American era documents include various maps, chain of title back to the U.S. Patent for the land, U.S. Census, Great Register of Voters, County Lease Books, and other forms of documentation.

2.2.2 Built Environment Evaluation

Potential historic properties are described according to guidelines set forth in National Register Bulletin 16A (NRB-16A) (National Park Service 1997). NRB-16A provides guidance in collecting and organizing historic data, as well as the stylistic and functional categorization of buildings, structures, and objects. Historic context and field data are examined with respect to their CRHR eligibility according to the following criteria.

(A) It is associated with events or patterns of events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States (Criterion 1); or

(B) It is associated with the lives of persons important to local, California, or national history (Criterion 2); or

(C) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master, or possesses high artistic values (Criterion 3); or

(D) It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation (Criterion 4).

2.2.3 Historic Artifact Analysis

The combination of artifact analysis and historic documentation attempts to address questions regarding the period(s) represented; ethnicity, gender, and age of the group represented; functional behavioral activities of the group; relative economic status; and consumer choice within the context of the perceived economic status.

Historic Period artifacts shall be classified into both technological and functional groups. Technological classifications shall comprise grouping such as ceramics, glass, metal cans, and others. Functional classes shall reflect an analysis scheme developed by Sprague (1983) and expanded upon by Glenn and May (May 1996, 2001a, 2001b; May and Glenn 2003).

Roderick Sprague's Functional Classification Method (Sprague 1983) is widely used in the Great Basin and Northwest (Polk 1996), and has been applied to historic collections in southern California (May 2001a, 2001b; May and Glenn 2003). Within southern California, the method has been applied to study developing agricultural homesteads in the Lusardi community along the San Dieguito River and near the historic Town of Linda Vista, both in San Diego County (May 2001a, 2001b). Excavations of circa 1880 to 1920 privy deposits within downtown San Bernardino permitted application of the method to an urban landscape (May and Glenn 2003). Uniformity in classification methodology is essential to generate readily comparable data useful to all archaeologists.

Analysis of the artifacts shall focus on testing for evidence of behavior activity groups that would shed light on early twentieth century rural life. Assigned clusters are anticipated to fall within "hyperspace communities" (Sprague 1983) that reflect the variation in income and social status among those responsible for the deposit, as well as the identifying changing use and status patterns resulting from increased access to goods from Los Angeles that resulted from improved transportation system that took place between the World Wars. The selection of household goods, commodities, quality of selections, and personal items of consumption and recreation should be reflected in the trash deposits. Behavioral inferences include ethnic diversity, gender, and economic status of the households represented. Behavioral groupings represented include Personal, Domestic, Architecture, Administrative, Garden/Agricultural, Maritime, Transportation, Utility conveyance, Warehouse, and Workshop. These data shall be compared and contrasted with expectations developed from archival research.

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3. Analysis of Project Effects

3.1 Methods

3.1.1 Survey Methods

Surveying efforts focus on identifying and recording of historic and prehistoric period artifacts, features, and sites. Research data to be carried into the field include: area GPS unit with maps of project area boundaries, previously identified cultural resources in the area, background aerial photographs and field forms designed to note attributes necessary for completion of State of California Department of Parks and Recreation (DPR) Forms 523A through L (DPR 523), as appropriate.

Reconnaissance survey using parallel pedestrian transects are to be spaced at intervals of no greater than 15 meters. Survey is to include the entire project area as determined by the GPS unit. The ground surface shall be visually inspected for cultural remains including, but not limited to, prehistoric food remains (primarily shellfish), chipped and groundstone artifacts, as well as remains of Historic Period deposits and structural remains.

Information to be gathered during site recording (should they be present) would include: the types and estimated amounts of artifacts and features; their distribution; an estimation of age; perceived integrity; and boundaries of each property sufficient to permit completion and/or updating of appropriate DPR 523 forms. Photographs are to be taken (overviews), as well as artifact concentration and feature (should they be present). Diagnostic artifacts and boundary information are to be plotted using the GPS unit and on aerial photographs, photographed, and described with emphasis on chronologically sensitive attributes. No artifact collection was authorized. All notes, photographs, and data are to be curated at ARCADIS' Carlsbad office.

3.2 Results

The historic properties intensive survey was conducted, recorded, and reported by Mr. Brian K. Glenn of ARCADIS who meets Department of Interior standards and is listed on the San Luis Obispo County-approved consultants list (see **Appendix D** for resume of the Principal Investigator). Reconnaissance field survey on November 14, 2012 was conducted solely by Mr. Glenn with a focus on archaeological resources within the main project area. (No built environment resources were identified.) Additional survey was conducted on June 8, 2013.

An approximately 50-acre area encompassing the entire construction area and the EVA was surveyed by the Mr. Glenn using standard pedestrian parallel and zigzag

transects spaced no greater than 15 m (50 feet) apart. Mr. Glenn photographed the field investigation with GPS references. Various mapping points were correlated with detailed aerial photographs and historic maps. The Native American community was not represented during the survey.

The area is dominated by coastal scrub and grasses, though vegetation type and density varied. The difference relates to the current use of the property (i.e. whether in use as a coke storage area, open range with cattle, or previously used agricultural lands [see below]). Ground surface visibility was fair to excellent (between 50 and 100 percent), representing approximately 80 percent of the area. Ground surface visibility was augmented by inspection of excavated soils from numerous animal burrows and mounds. Disturbance in several portions of the project area appears to be substantial due to previous agricultural activities and roads.

For logistical reasons, the project area was divided into five survey areas: the westernmost area that included the coke piles and fenced facility, the central area outside the fenced facility that is currently used for grazing cattle, the easternmost area previously disked for either agricultural use or weed abatement, the proposed pipeline route within the main facility fence and the EVA road. Visibility was good to excellent across the majority of these areas, with reduced, but still adequate visibility in the easternmost area where chaparral had re-grown.

No previously recorded or unrecorded cultural resources were identified within the three track areas or the proposed pipeline corridor. Present within the easternmost and central areas were occasional modern debris, such as modern-era bottles, and few wooden fence posts reflecting previous land use. No remains indicative of prehistoric activities were observed (i.e., no marine shell, flaked and groundstone tools, or tool-making debris).

Survey did identify one previously recorded cultural resource site: CA-SLO-1190 within or directly adjacent to the EVA. The site was recorded by Gibson and Crew in 1985 as part of the Survey of City Services Interconnect Pipeline and Union #3, Santa Barbara and San Luis Obispo Counties, CA (see Confidential Appendix C). The site was recorded as measuring 900 meters long by 60 meters wide and parallels the EVA for approximately 250 meters along Deparado Road. Given the numerous temporary roads, the mapped location relative to the EVA is problematic. The site was recorded in 1985 as consisting of flakes stone debris and tool fragments, marine shell, a possible hearth feature “probably … occupied … circa 1000 to 2000” years before present.

The current survey located a light scatter of marine shell, as well as historic era ceramics and glass within and directly adjacent to the EVA within Desperado Road. No prehistoric flaked stone materials were noted. Field analysis of the historic materials indicates early 20th century household debris.

Presented below are results for each resource type.

3.2.1 Isolated Finds

No isolated finds were documented as a result of survey.

3.2.2 Prehistoric Cultural Resources

No prehistoric sites, isolates, or features were documented as a result of survey within the track areas or the pipeline corridor. Prehistoric age artifacts (marine shell) associated with previously identified site CA-SLO-1190 were identified within the proposed EVA.

3.2.3 Historic Cultural Resources

No built environment or historic sites or features were documented as a result of this survey within the track areas or the pipeline corridor. Historic age artifacts (ceramic and glass fragments) associated with previously identified site CA-SLO-1190 were identified within the proposed EVA.

3.2.4 Coastal Access Road Addendum

Survey of the proposed Coastal Access Road was conducted by Mr. Glenn on June 7, 2013. Special attention was given the previously documented site CA-SLO-859 located immediately north of and possibly within the proposed Coastal Access Road (see Confidential Appendix C; West and Bell 1978). West and Bell (1978) note that as a result of pipeline construction and off road vehicle activities the site had been previously subjected to disturbance. A site record update for site CA-SLO-859 filed in 2010 also failed to relocate the resource (Perez and Long 2010). Perez and Long (2010) state: “an attempt to relocate CA-SLO-859 was made by OHMVR Division Associate State Archaeologists as part of a cultural resources inventory of Oceano Dunes SVRA. The site could not be relocated.”

No cultural resources were identified as a result of survey within the previously identified site location, though minor amounts of recent historic materials and marine shell were noted along the Coastal Access route.

4. Impact Identification

4.1 Resource Significance

No previously or newly identified cultural resources were identified through background research and pedestrian survey within the track area or pipeline corridor. Prior to field investigations, research focused on the identification of previously identified historic and prehistoric period sites, an estimation of their age, and their context within the landscape. Research indicated no previously recorded cultural resources within the track area or pipeline corridor. One previously recorded historic and prehistoric era site, CA-SLO-1190, was identified partially within the proposed EVA.

Cultural resource sites, if present, require evaluation for their potential to yield data capable of addressing CEQA Guidelines from which CRHR eligibility determinations are made. Potential project impacts to sites recommended as eligible for inclusion on the CRHR (should they be present and identified during construction) are discussed in the Section 5.0, including recommendations to reduce impacts to a level of less than significant.

4.1.1 CRHR Criteria and Discussion

Listed below are the CRHR criteria for evaluation of historic resources.

(A) It is associated with events or patterns of events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States (Criterion 1); or

(B) It is associated with the lives of persons important to local, California, or national history (Criterion 2); or

(C) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master, or possesses high artistic values (Criterion 3); or

(D) It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation (Criterion 4).

The ability of research questions to provide insight beyond that documented in historic texts is critical to evaluating cultural resources, especially as they pertain to Criterion 4, regarding data potential.

County records provide data necessary to better understand how the project area was used during the historic era. Architectural additions and alterations to buildings and structures provide insight into the shifting use of the area over time.

The ownership of property through time can be researched and, in part, provide context for the resources documented. Historic era remains in the form of buildings and structures provide data relevant to land use. Trash deposits reflect, in part, how they subsisted, what they imported and what economic status they achieved.

Research and prior documentation provides data necessary to make extremely specific findings regarding build dates of structures, as well as production dates of historic materials. Many consumer products have patent or manufacture dates, such as table ware, bottles, and cans. Analysis of manufacturing techniques allows for more general temporal placement.

Many of the historic era resources relate to land use. This is especially the case for ranching, water acquisition, and storage systems; oil industry use is likewise a possibility. Buildings are also informative given their size, materials and styles of manufacture, especially when combined with personal family histories.

Many elements of construction can be ascertained from examination of archaeological remains and deposits. Reuse of resources is typical of ranch environments, and their presence in archaeological context lends insight into rural adaptations. Foundations encountered in the project may provide further evidence of manufacturing techniques, the types and quality of cement and metal.

Site integrity is also considered and disturbance is noted. Integrity must also be evident through historic qualities including location, design, setting, materials, workmanship, feeling, and association.

4.2 Impact Identification

The survey resulted in the identification of previously recorded cultural resources within the EVA portion of the project area. The survey sought to assess the following:

Would the project cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?"

- Assessment Summary: Analysis of records search and survey data has determined that no known CRHR-eligible cultural resources are located within

the area of potential impact. A sparse deposit of marine shell, flaked stone tool production debris (debitage) and early 20th century historic artifacts associated with previously identified archaeological site CA-SLO-1190 were located within the proposed EVA. Evaluation of the portion of the site within the impact area will determine if the resource meets the CRHR eligibility criteria. Resources not eligible for the CRHR require do not require mitigation of impacts. Should CA-SLO-1190 or any other resource be determined CRHR-eligible, impacts may be addressed through avoidance or data recovery. Less Than Significant Impacts on historic resources are anticipated with mitigation incorporation.

- Construction Impacts: No impacts on historic (CRHR eligible) resources are anticipated during construction. Implementation of a Worker Environmental Awareness Plan (WEAP) and construction mitigation and monitoring plan (CMMP) will provide sensitivity training to workers and establish procedures for identifying historical resources and ensuring those resources are protected until such time as they are evaluated.
- Operation Impacts: No impacts on historic (CRHR eligible) resources are anticipated as a result of operations. Implementation of the WEAP will provide sensitivity training to workers and establish procedures for identifying historic resources and ensuring those resources are protected until they are evaluated.

Would the project cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5?

- Assessment Summary: Analysis of records search and survey data has determined that no known CRHR-eligible cultural resources are located within the area of potential impact. A sparse deposit of marine shell, flaked stone tool production debris (debitage) and early 20th century historic artifacts associated with previously identified archaeological site CA-SLO-1190 were located within the proposed EVA. Evaluation of the portion of the site within the impact area will determine if the resource meets the CRHR eligibility criteria. Resources not eligible for the CRHR require do not require mitigation of impacts. Should CA-SLO-1190 or any other resource be determined CRHR-eligible, impacts may be addressed through avoidance or data recovery. Less Than Significant Impacts on archaeological resources are anticipated with mitigation incorporation.
- Construction Impacts: Less Than Significant Impacts on potential CRHR-eligible archaeological resources are anticipated during construction with

mitigation incorporation. Implementation of the WEAP and CMMP will provide sensitivity training to workers and establish procedures for identifying archaeological resources and ensuring those resources are protected until they are evaluated.

- Operation Impacts: Less Than Significant Impacts on potential CRHR-eligible archaeological resources are anticipated as a result of operations. Implementation of the WEAP will provide sensitivity training to workers and establish procedures for identifying archaeological resources and ensuring those resources are protected until they are evaluated.

Would the project disturb any human remains, including those interred outside of formal cemeteries?

- Assessment Summary: Survey investigations provided no evidence of human remains. However, ground disturbing activities could disturb previously unidentified human remains, including those interred outside of formal cemeteries. The potential for encountering Native American human remains exists throughout California. Although not anticipated, human remains may be identified during ground disturbing activities. Implementation of the WEAP and CMMP (including relevant elements of Health and Safety Section 7050.5(b) and PRC Section 5097.98) will reduce potential adverse impacts on human remains to a level of Less Than Significant.
- Construction Impacts: Impacts during construction on human remains will be reduced to a level of Less Than Significant through the implementation of a WEAP and CMMP that include relevant sections of Health and Safety Codes and PRCs. Implementation of a WEAP and a CMMP will provide sensitivity training to workers and establish procedures for suspending work and notifying the assigned Cultural Resources monitor and construction supervisors should human remains be detected.
- Operation Impacts: Impacts during operations on human remains will be reduced to a level of Less Than Significant through the implementation of a WEAP that includes relevant sections of Health and Safety Codes and PRCs. Implementation of the WEAP will provide sensitivity training to workers and establish procedures for suspending work and notifying the assigned Cultural Resources monitor and construction supervisors should human remains be detected.

5. Management Considerations – Mitigation Measures and Design Considerations

No CRHR-eligible cultural resources have been identified. As such, no impacts on eligible resources are anticipated as a result of the project. However, portions of previously identified archaeological site CA-SLo-1190 are located within the EVA. Evaluation of the portion of the resource within the EVA will determine if the resource meets one or more criteria for CRHR eligibility. This evaluation is currently underway.

5.1 Applicant Proposed Measures

Applicant Proposed Measures (APMs) are proposed when there is a potentially significant impact on a resource that requires the incorporation of an APM to reduce the potential impact to less than significant. While no impacts on CRHR-eligible cultural resources are anticipated, the presence of previously identified and undiscovered cultural resources necessitates judicious inclusion of APMs. Evaluation of previously identified cultural resources and monitoring of construction is recommended.

Cult 1: Evaluation of Previously Identified Cultural Resources. Portions of archaeological site CA-SLO-1190 are present within the EVA and requires evaluation to determine if this portion of the resource meet CRHR eligibility criteria. Impacts to sites not CRHR eligible will be monitored during construction to insure the identification of previously unidentified significant resources (see Cult 2). CRHR-eligible resources will require mitigation of impacts through either avoidance or data recovery excavations.

Cult-2: Worker Environmental Awareness Plan (WEAP) and Construction Mitigation and Monitoring Plan (CMMP). An archaeological monitor will be present during ground disturbing activity, including, but not limited to, clearing, grubbing, and excavation that could reveal buried archaeological deposits. Implementation of the WEAP and CMMP will reduce potential adverse impacts to archaeological resources to level of less than significant.

A County-certified archaeologist/historian will attend the pre-grading meeting with the contractors to explain and coordinate the requirements of the WEAP. The on-site archaeological monitor will have authority to temporarily halt or redirect work to protect discoveries until the WEAP and CMMP protocols can be implemented. Cultural resource discoveries will be documented and assessed for their ability to meet CRHR eligibility criteria. Appropriate County staff will be notified and provided with recommendations for treatment of the discovery.

Cult-3: Human Remains Discovery. Implementation of the WEAP and CMMP (including relevant elements of Health and Safety Section 7050.5(b) and PRC Section 5097.98) will reduce potential adverse impacts on human remains to level of less than significant.

A County-certified archaeologist/historian will attend the pre-grading meeting with the contractors to explain and coordinate the requirements of the WEAP. Implementation of the WEAP and CMMP will provide sensitivity training to workers and establish procedures for stopping work and notifying the assigned Cultural Resources monitor and construction supervisors should human remains be detected. The on-site archaeological monitor will have authority to temporarily halt or redirect work to protect discoveries until the WEAP and CMMP protocols can be implemented.

Section 7050.5(b) of the California Health and Safety Code will be implemented in the event that human remains, or possible human remains, are located during project-related construction excavation. Section 7050.5(b) states - "In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the human remains are discovered has determined, in accordance with Chapter 10 (commencing with Section 27460) of Part 3 of Division 2 of Title 3 of the Government Code, that the remains are not subject to the provisions of Section 27492 of the Government Code or any other related provisions of law concerning investigation of the circumstances, manner and cause of death, and the recommendations concerning treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative, in the manner provided in Section 5097.98 of the Public Resources Code" Section 5097.98.

Cult-4: Previously Unidentified Cultural Resources Discovery. In the event that previously unidentified, potentially significant cultural resources are discovered, the cultural resources monitor and/or construction supervisor will divert or temporarily halt ground disturbance operations in the area of the discovery to allow evaluation of potentially significant cultural resources and appropriate WEAP and CMMP protocols will be implemented. The Lead Archaeologist, in consultation with County staff, will evaluate the discovered resources for CRHR eligibility. The County staff must concur with the results and recommendations of the evaluation before construction activities will be allowed to resume in the affected area.

For significant cultural resources, a Research Design and Data Recovery Program to mitigate impacts will be prepared by the consulting archaeologist and approved by the County staff, then carried out using professional archaeological methods.

Before construction activities are allowed to resume in the data recovery area, the artifacts will be recovered and features recorded using professional archaeological methods. The archaeologist, in consultation with County staff, will determine the amount of material to be recovered for an adequate artifact sample. Recovered materials will be curated at a facility meeting the requirements of 36 CFR 79. Monitoring will continue in the area to ensure previously unevaluated remains are properly treated.

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7. List of Preparers and Persons and Organizations Contacted

7.1 Preparers

Brian K. Glenn, M.A., RPA, Arcadis Principal Investigator / Cultural Resources Manager

7.2 Persons and Organizations Contacted

Central Coastal Information Center:

National Archaeological Database
Current and Historic USGS Maps
California State Historical Resources Inventory
(Dept of Parks and Recreation Forms 422 and 523)
National Register of Historic Places
California Register of Historical Resources
California Points of Historical Interest
California Historical Landmarks

Native American Heritage Commission

Sacred Lands File Check

Los Angeles County Natural History Museum

Paleontology Records Search and Recommendations

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Appendix A

Natural History Museum of Los Angeles County Paleontological Records Search

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Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

Vertebrate Paleontology Section
Telephone: (213) 763-3325
FAX: (213) 746-7431
e-mail: smcleod@nhm.org

6 November 2012

Arcadis U.S., Inc.
P.O. Box 578
Julian, California 92036-0578

Attn: Brian Glenn, Principal Investigator / Cultural Resources Manager

re: Paleontological Resources Records Search for the proposed Phillips 66 Project, near Nipomo, San Luis Obispo County, project area

Dear Brian:

I have thoroughly searched our paleontology collection records for the locality and specimen data for the proposed Phillips 66 Project, near Nipomo, San Luis Obispo County, project area as outlined on the portion of the Oceano USGS topographic quadrangle map that you sent to me via e-mail on 3 October 2012. We do not have any vertebrate fossil localities that lie directly within the proposed project boundaries, but we do have localities somewhat nearby from deposits somewhat similar to those that occur in the proposed project area.

The entire proposed project area has surficial deposits composed of older Quaternary dune sands. We do not have any fossil vertebrate localities nearby from such aeolian deposits, but as fine grained deposits they always have the potential to produce significant vertebrate fossils. Older Quaternary or even Pliocene deposits probably underlie the Quaternary dune sands in the proposed project area at relatively shallow depth. Our closest vertebrate fossil locality from these types of Quaternary deposits is LACM 4089, due east of the proposed project area in Nipomo, that produced a fossil specimen of Columbian mammoth, *Mammuthus columbi*.

Any substantial excavations in the older Quaternary dune sands in the proposed project area may well encounter significant remains of vertebrate fossils. Any significant excavations in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains while not impeding development. Any fossils collected should be placed in an accredited scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,

Samuel A. McLeod

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice

Appendix B

Records Searches

Appendix B-1:
Native American Heritage Commission Sacred Lands File Check

Appendix B2:
Central Coastal Information Center Archaeological Records Search (Public Portion)

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NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
Web Site www.nahc.ca.gov
ds_nahc@pacbell.net

October 3, 2012

Mr. Brian Glenn, Cultural Resources Manager, Principal
ARCADIS
1525 Farady Street, Suite 290
Carlsbad, CA 92008

Sent by e-mail to: Brian. Glenn@arcadis-us.com
No. of Pages: 5

Re: Sacred Lands File Search and Native American Contacts list for the proposed
Sacred Lands File Search and Native American Contacts list for the proposed
"Phillips 66 Project Area" located in the Community of Nipomo; San Luis Obispo County, California

Dear Mr. Glenn:

The Native American Heritage Commission (NAHC) conducted a Sacred Lands search based on the data provided and **Native American cultural resource sites were not identified** within one-half mile of the project site, the 'area of potential effect' (e.g. APE): you specified, Also the absence of archaeological fixtures and other cultural resource items does not preclude their existence at the subsurface level. In addition, please note; the NAHC Sacred Lands Inventory is not exhaustive and does not preclude the discovery of cultural resources during any project groundbreaking activity.

California Public Resources Code §§5097.94 (a) and 5097.96 authorize the NAHC to establish a Sacred Land Inventory to record Native American sacred sites and burial sites. These records are exempt from the provisions of the California Public Records Act pursuant to. California Government Code §6254 (r). The purpose of this code is to protect such sites from vandalism, theft and destruction.

In the 1985 Appellate Court decision (170 Cal App 3rd 604), the court held that the NAHC has jurisdiction and special expertise, as a state agency, over affected Native American resources, impacted by proposed projects including archaeological, places of religious significance to Native Americans and burial sites

The California Environmental Quality Act (CEQA – CA Public Resources Code §§ 21000-21177, amendments effective 3/18/2010) requires that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Report (EIR) per the CEQA Guidelines defines a significant impact on the environment as 'a substantial, or potentially substantial, adverse change in any of physical conditions within an area affected by the proposed project, including …objects of historic or aesthetic significance." In order to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential

effect (APE), and if so, to mitigate that effect. CA Government Code §65040.12(e) defines "environmental justice" provisions and is applicable to the environmental review processes. The NAHC recommends *avoidance* as defined by CEQA Guidelines §15370(a) to pursuing a project that would damage or destroy Native American cultural resources and California Public Resources Code Section 21083.2 (Archaeological Resources) that requires documentation, data recovery of cultural resources, construction to avoid sites and the possible use of covenant easements to protect sites.

Early consultation with Native American tribes in your area is the best way to avoid unanticipated discoveries once a project is underway. Local Native Americans may have knowledge of the religious and cultural significance of the historic properties of the proposed project for the area (e.g. APE). Consultation with Native American communities is also a matter of environmental justice as defined by California Government Code §65040.12(e). We urge consultation with those tribes and interested Native Americans on the list that the NAHC has provided in order to see if your proposed project might impact Native American cultural resources. Lead agencies should consider avoidance as defined in §15370 of the CEQA Guidelines when significant cultural resources as defined by the CEQA Guidelines §15064.5 (b)(c)(f) may be affected by a proposed project. If so, Section 15382 of the CEQA Guidelines defines a significant impact on the environment as "substantial," and Section 2183.2 which requires documentation, data recovery of cultural resources.

The 1992 *Secretary of the Interiors Standards for the Treatment of Historic Properties* were revised so that they could be applied to all historic resource types included in the National Register of Historic Places and including cultural landscapes. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful, supportive guides for Section 106 consultation. The aforementioned Secretary of the Interior's *Standards* include recommendations for all 'lead agencies' to consider the historic context of proposed projects and to "research" the cultural landscape that might include the 'area of potential effect.'

Partnering with local tribes and interested Native American consulting parties, on the NAHC list, should be conducted in compliance with the requirements of federal NEPA (42 U.S.C 4321-43351) and Section 106 4(f), Section 110 and (k) of the federal NHPA (16 U.S.C. 470 *et seq*), Section 4(f) of the Department of Transportation Act of 1966 (23 CFR 774); 36 CFR Part 800.3 (f) (2) & .5, the President's Council on Environmental Quality (CSQ, 42 U.S.C 4371 *et seq.* and NAGPRA (25 U.S.C. 3001-3013) as appropriate. The 1992 *Secretary of the Interiors Standards for the Treatment of Historic Properties* were revised so that they could be applied to all historic resource types included in the National Register of Historic Places and including cultural landscapes. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful, supportive guides for Section 106 consultation. The NAHC remains concerned about the limitations and methods employed for NHPA Section 106 Consultation.

Also, California Public Resources Code Section 5097.98, California Government Code §27491 and Health & Safety Code Section 7050.5 provide for provisions for accidentally discovered archeological resources during construction and mandate the processes to be followed in the event of an accidental discovery of any human remains in a project location other than a 'dedicated cemetery', another important reason to have Native American Monitors on board with the project.

To be effective, consultation on specific projects must be the result of an ongoing

relationship between Native American tribes and lead agencies, project proponents and their contractors, in the opinion of the NAHC. An excellent way to reinforce the relationship between a project and local tribes is to employ Native American Monitors in all phases of proposed projects including the planning phases.

Confidentiality of “historic properties of religious and cultural significance” may also be protected under Section 304 of he NHPA or at the Secretary of the Interior discretion if not eligible for listing on the National Register of Historic Places. The Secretary may also be advised by the federal Indian Religious Freedom Act (cf. 42 U.S.C., 1996) in issuing a decision on whether or not to disclose items of religious and/or cultural significance identified in or near the APE and possibility threatened by proposed project activity.

If you have any questions about this response to your request, please do not hesitate to contact me at (916) 653-6251.

Sincerely,

Dave Singleton

Attachment: Native American Contact List

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Native American Contacts
San Luis Obispo County
October 3, 2012

Beverly Salazar Folkes
1931 Shadybrook Drive
Thousand Oaks， CA 91362
folkes@msn.com
805 492-7255
(805) 558-1154 - cell

Chumash
Tataviam
Ferrnandeño

Judith Bomar Grindstaff
63161 Argyle Road
King City ， CA 93930
(831) 385-3759-home

Salinan

Santa Ynez Band of Mission Indians
Vincent Armenta, Chairperson
P.O. Box 517
Santa Ynez ， CA 93460
varmenta@santaynezchumash.
(805) 688-7997
(805) 686-9578 Fax

Chumash

San Luis Obispo County Chumash Council
Chief Mark Steven Vigil
1030 Ritchie Road
Grover Beach CA 93433
(805) 481-2461
(805) 474-4729 - Fax

Chumash

Barbareno/Ventureno Band of Mission Indians
Julie Lynn Tumamait-Stennslie, Chairwoman
365 North Poli Ave
Ojai ， CA 93023
jtumamait@sbcglobal.net
(805) 646-6214

Chumash

Peggy Odom
1339 24th Street
Oceano ， 93445
(805) 489-5390

Chumash

Lei Lynn Odom
1339 24th Street
Oceano ， CA 93445
(805) 489-5390

Chumash

Salinan Tribe of Monterey, San Luis Obispo Counties
John W. Burch, Traditional Chairperson
7070 Morro Rd, #A
Atascadero ， CA 93422
salinantribe@aol.com
805-460-9202
805 235-2730 Cell
805-460-9204

Salinan
Chumash

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Phillips 66 Project Area; located in the Nipomo Connunity of San Luis Obispo County, California for which a Sacred Lands File search and Native American Contacts were requested.

Native American Contacts
San Luis Obispo County
October 3, 2012

Santa Ynez Tribal Elders Council
Adelina Alva-Padilla, Chair Woman
P.O. Box 365
Santa Ynez , CA 93460
elders@santaynezchumash.org
(805) 688-8446
(805) 693-1768 FAX

Chumash

Salinan Nation Cultural Preservation Association
Robert Duckworth, Environmental Coordinator
4777 Driver Rd.
Valley Springs, CA 95252
dirobduck@thegrid.net
831-578-1852

Salinan

Randy Guzman - Folkes
6471 Cornell Circle
Moorpark , CA 93021
ndnRandy@yahoo.com
(805) 905-1675 - cell

Chumash
Fernandeño
Tataviam
Shoshone Paiute
Yaqui

Coastal Band of the Chumash Nation
Toni Cordero, Chairwoman
P.O. Box 4464
Santa Barbara, CA 93140
cordero44@charter.net
805-964-3447

Chumash

Xolon Salinan Tribe
Johnny R Eddy Jr
3179 Garrity Way #734
Richmond , CA 94806
831-210-9771

Salinan

Mona Olivas Tucker
660 Camino Del Rey
Arroyo Grande, CA 93420
(805) 489-1052 Home
(805) 748-2121 Cell

Chumash

Salinan Nation Cultural Preservation Association
Doug Alger, Cultural Resources Coordinator
PO Box 56
Lockwood , CA 93932
fabbq2000@earthlink.net

Salinan

Matthew Darian Goldman
495 Mentone
Grover Beach, CA 93433
805-748-6913

Chumash

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Native American Contacts
San Luis Obispo County
October 3, 2012

Santa Ynez Band of Mission Indians
Tribal Administrator
P.O. Box 517 Chumash
Santa Ynez , CA 93460
info@santaynezchumash.
(805) 688-7997
(805) 686-9578 Fax

Frank Arredondo
PO Box 161 Chumash
Santa Barbara CA 93102
ksen_sku_mu@yahoo.com
805-617-6884
ksen_sku_mu@yahoo.com

Salinan Nation Cultural Preservation Association
Gregg Castro, Administrator
5225 Roeder Road Salinan
San Jose , CA 95111
glcastro@pacbell.net
(408) 864-4115

Santa Ynez Tribal Elders Council
Freddie Romero, Cultural Preservation Conslnt
P.O. Box 365 Chumash
Santa Ynez , CA 93460
freddyromero1959@yahoo.
805-688-7997, Ext 37

Salinan-Chumash Nation
Xielolixii
3901 Q Street, Suite 31B Salinan
Bakersfield , CA 93301 Chumash

408-966-8807 - cell

Barbareno/Ventureno Band of Mission Indians
Kathleen Pappo
2762 Vista Mesa Drive Chumash
Rancho Pales Verdes, CA 90275
310-831-5295

Northern Chumash Tribal Council
Fred Collins, Spokesperson
67 South Street Chumash
San Luis Obispo CA 93401
fcollins@northernchumash.
(805) 801-0347 (Cell)

Barbareno/Ventureno Band of Mission Indians
Raudel Joe Banuelos, Jr.
331 Mira Flores Court Chumash
Camarillo , CA 93012
805-987-5314

This list is current only as of the date of this document.

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This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Phillips 66 Project Area; located in the Nipomo Connunity of San Luis Obispo County, California for which a Sacred Lands File search and Native American Contacts were requested.

Native American Contacts
San Luis Obispo County
October 3, 2012

Coastal Band of the Chumash Nation
Janet Darlene Garcia
P.O. Box 4464 Chumash
Santa Barbara, CA 93140
805-689-9528

Coastal Band of the Chumash Nation
Crystal Baker
P.O. Box 4464 Chumash
Santa Barbara, CA 93140
805-689-9528

This list is current only as of the date of this document.

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This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Phillips 66 Project Area; located in the Nipomo Connunity of San Luis Obispo County, California for which a Sacred Lands File search and Native American Contacts were requested.

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CENTRAL COAST INFORMATION CENTER

California
Archaeological
Inventory

SAN LUIS OBISPO AND
SANTA BARBARA COUNTIES

Department of Anthropology
University of California, Santa Barbara
Santa Barbara, CA 93106-3210
(805) 893-2474
FAX (805) 893-8707
Email: centralcoastinfo@gmail.com

October 12, 2012

Brian Glenn
Arcadis
O.O. Box 578
Julian, CA 92036

Dear Mr. Glenn,

Enclosed are the results of the record search you requested for the Phillips 66 (Conoco) Refinery Project. Our records were searched for all archaeological sites, historical resources, and previous cultural resource surveys within a one mile radius of the project area.

In this search nine archaeological site(s), and forty-five cultural resource survey(s) were found. The survey locations were mapped onto portions of the Oceano quad(s). A bibliography of these surveys is included. A search of the inventories for the State Historic Property Data Files, National Register of Historic Places, National Register of Determined Eligible Properties, California Historical Landmarks, California Points of Historic Interest, California OHP Archaeological Determinations of Eligibility, and the Caltrans State and Local Bridge Surveys yielded zero property evaluation(s) within the search radius.

According to our records, the property has not been surveyed. Therefore a cultural resource survey is recommended.

Please contact me if you have any questions about this search.

Sincerely,

Allison L. Jaqua
Assistant Coordinator

Phillips 66 Refinery

Customer Name: Arcadis
Project Location: Oceano

Report Map - 1 of 6

Central Coast Information Center
Department of Anthropology
University of California
Santa Barbara, CA 93106-3210
(805) 893-2474
(805) 893-8707 FAX

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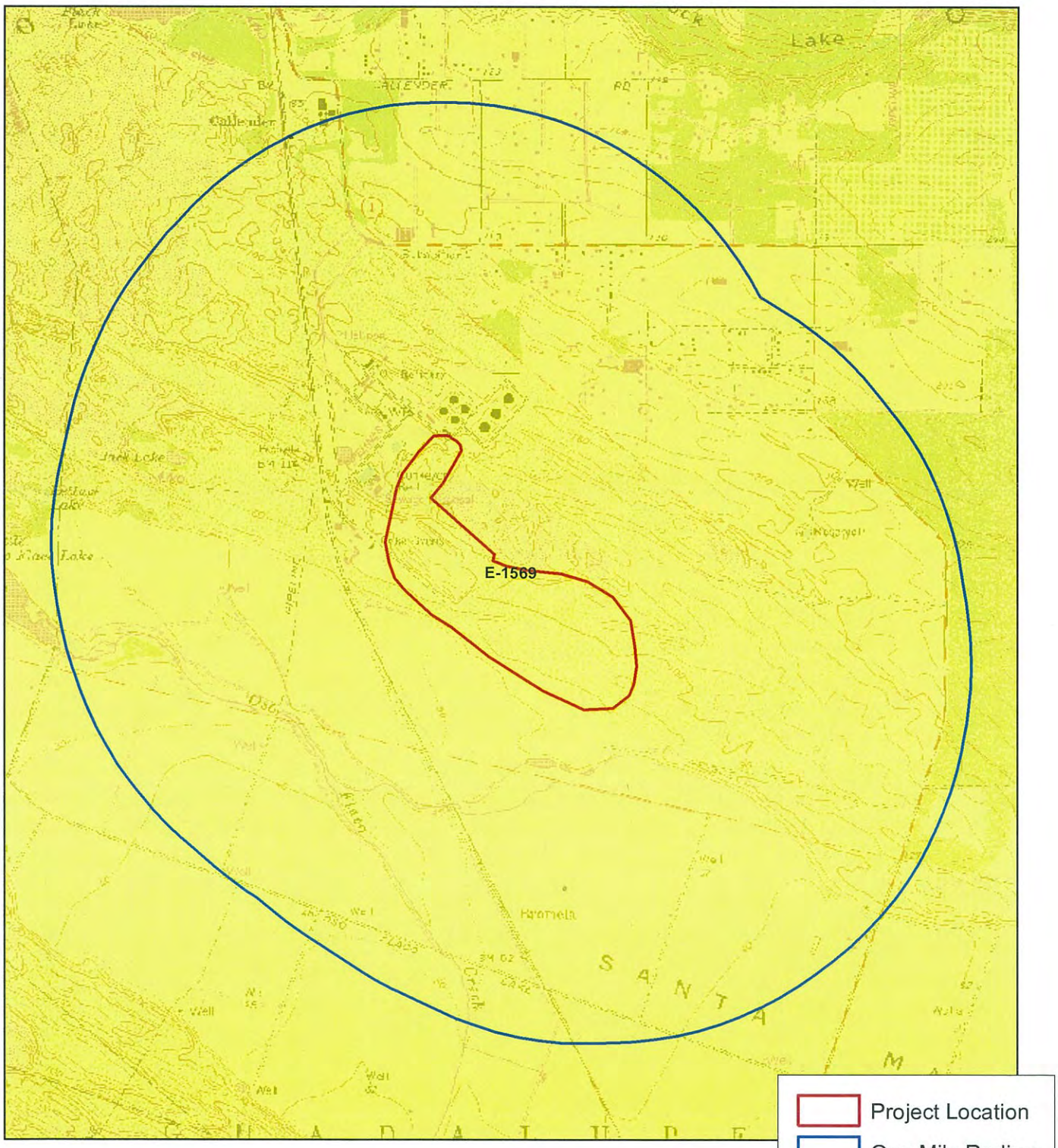
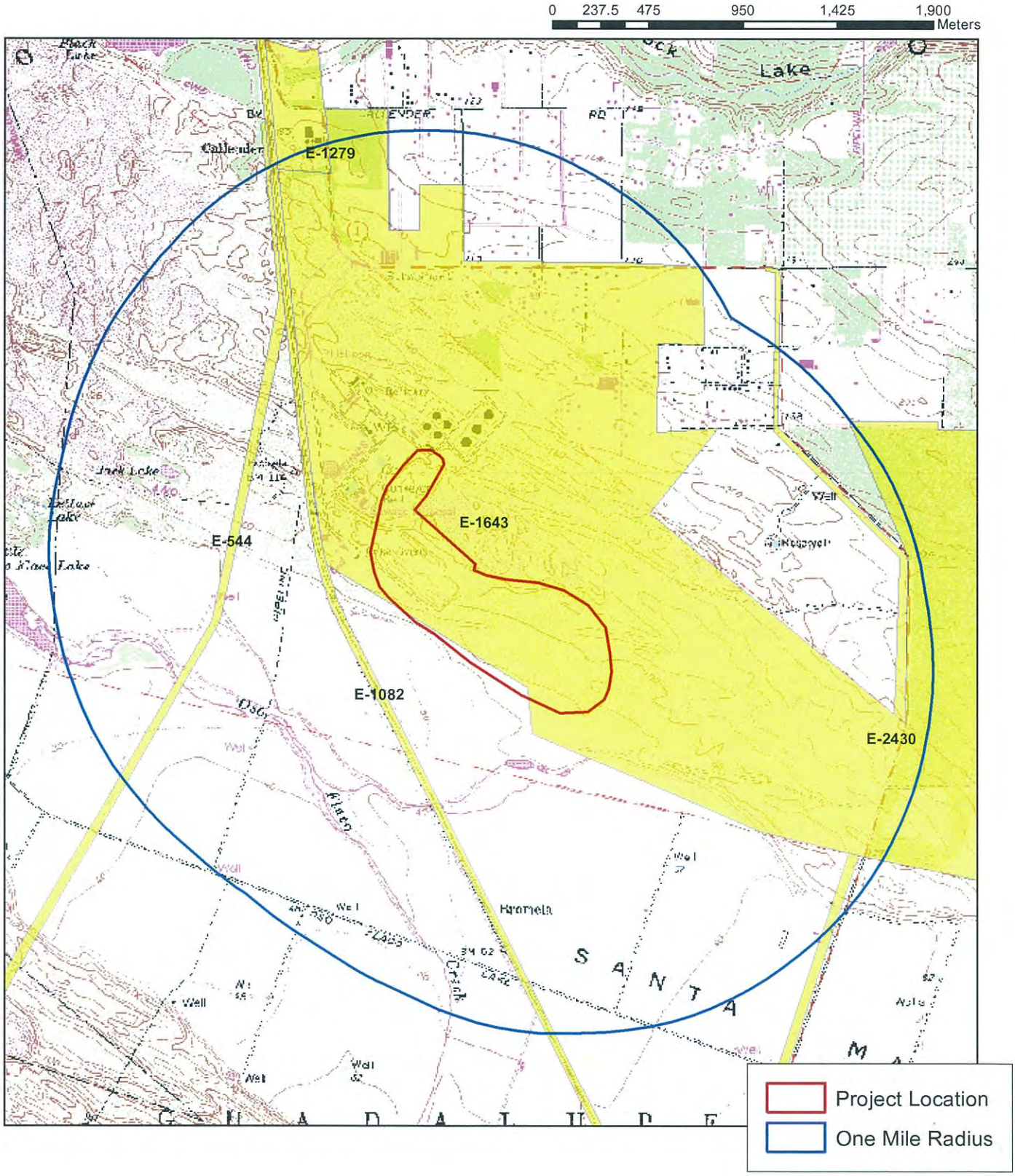


Phillips 66 Refinery

Customer Name: Arcadis
Project Location: Oceano

Report Map - 2 of 6

Central Coast Information Center
Department of Anthropology
University of California
Santa Barbara, CA 93106-3210
(805) 893-2474
(805) 893-8707 FAX



Phillips 66 Refinery

Customer Name: Arcadis
Project Location: Oceano

Report Map - 3 of 6

Central Coast Information Center
Department of Anthropology
University of California
Santa Barbara, CA 93106-3210
(805) 893-2474
(805) 893-8707 FAX

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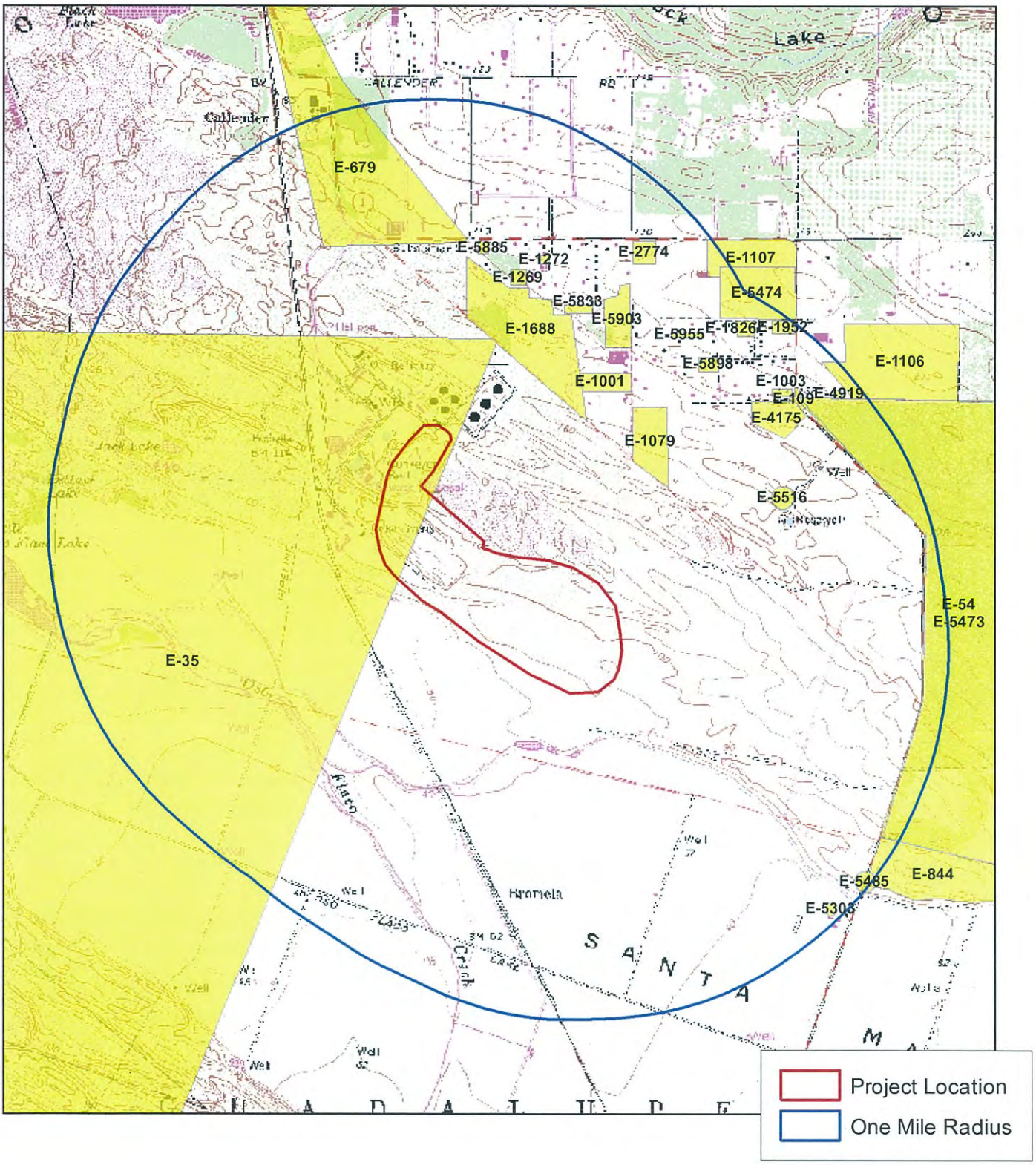

Phillips 66 Refinery

Customer Name: Arcadis
Project Location: Oceano

Report Map - 4 of 6

Central Coast Information Center
Department of Anthropology
University of California
Santa Barbara, CA 93106-3210
(805) 893-2474
(805) 893-8707 FAX

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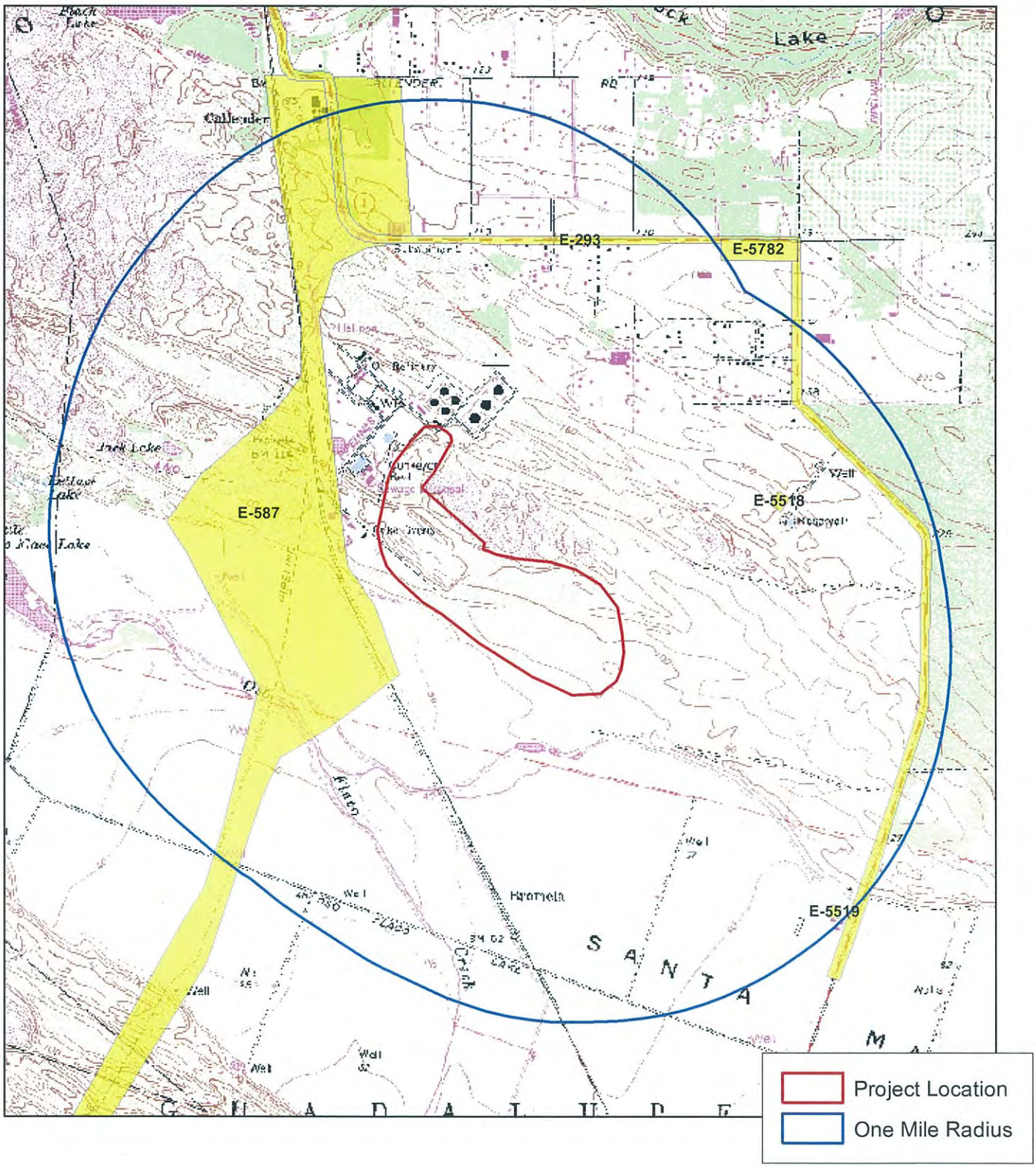

Phillips 66 Refinery

Customer Name: Arcadis
Project Location: Oceano

Report Map - 5 of 6

Central Coast Information Center
Department of Anthropology
University of California
Santa Barbara, CA 93106-3210
(805) 893-2474
(805) 893-8707 FAX

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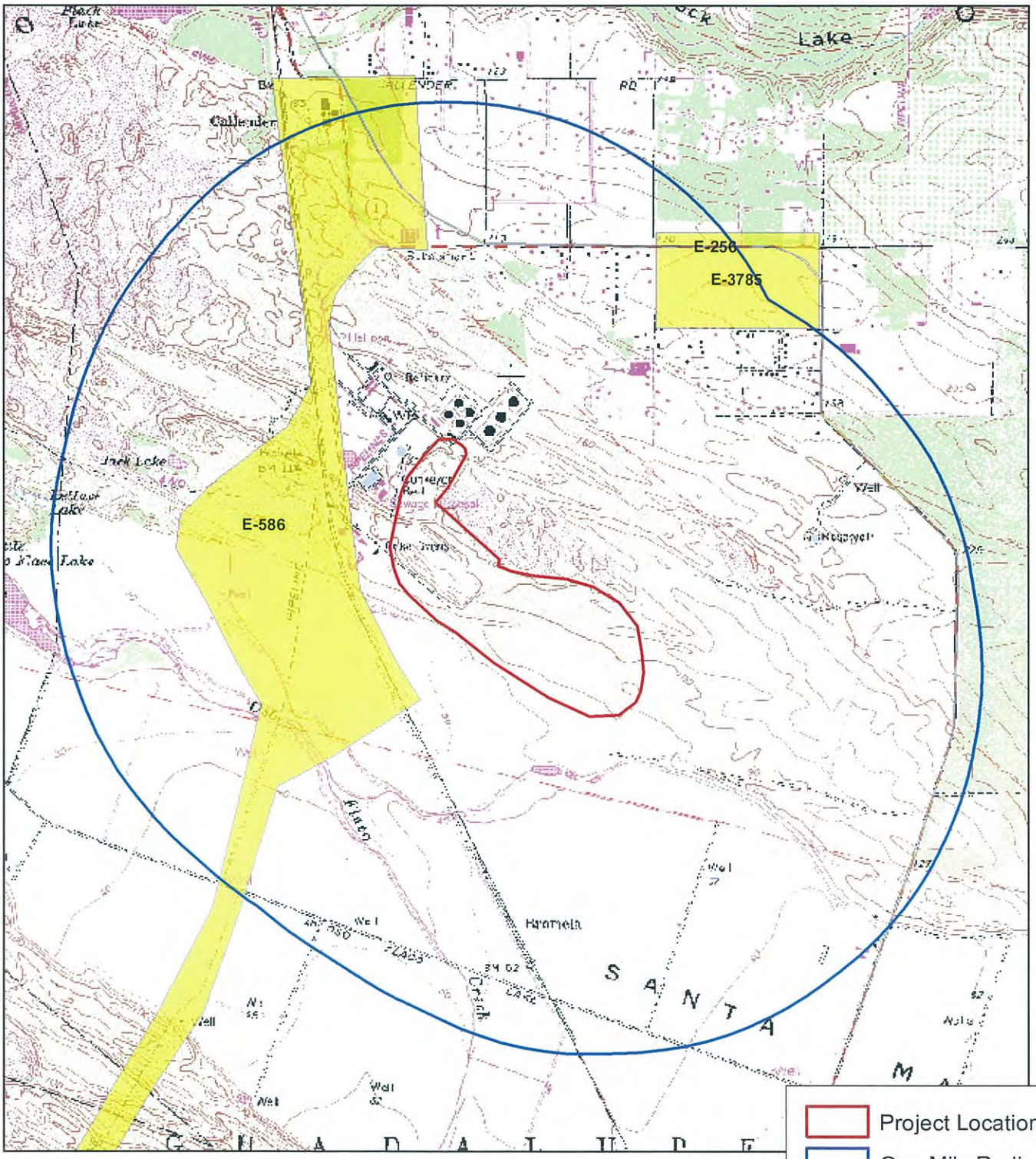

Phillips 66 Refinery

Customer Name: Arcadis
Project Location: Oceano

Report Map - 6 of 6

Central Coast Information Center
Department of Anthropology
University of California
Santa Barbara, CA 93106-3210
(805) 893-2474
(805) 893-8707 FAX

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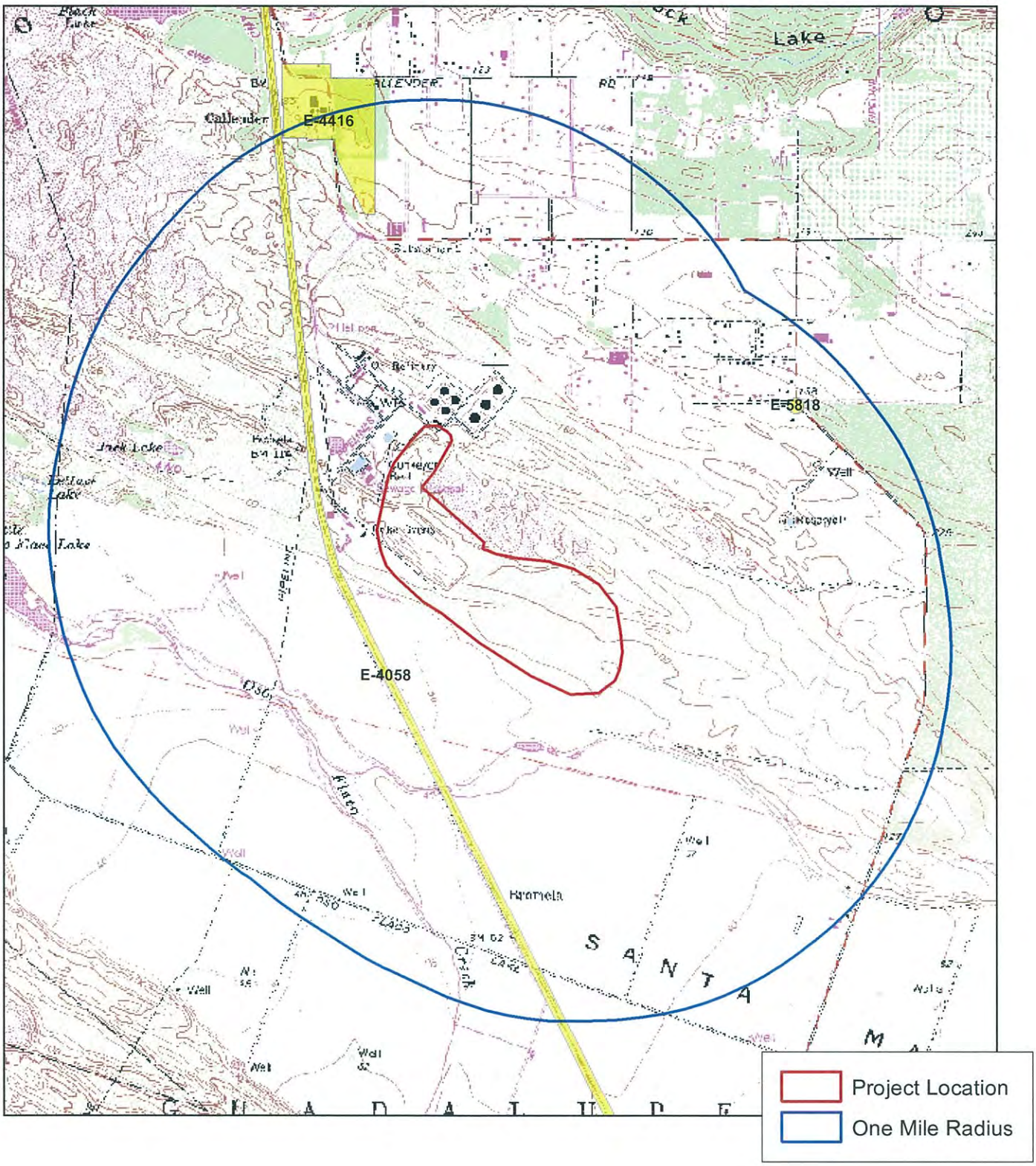
0 237.5 475 950 1,425 1,900 Meters



E Number 35 **Date** 1979 **Author** Spanne, L.

Title Archaeological Investigation of the Union Oil Company Santa Maria Refinery Pipeline, San Luis Obispo County, California

Quad Oceano, Guadalupe

Site SLO-615; SLO-616 **Comments** 30 pp.

Area None given **Units** **ReportType** **Pages**

E Number 54 **Date** 1978 **Author** Hoover, R.

Title Archaeological Survey and Impact Evaluation Flintkote Properties, Nipomo Mesa

Quad Oceano

Site Negative **Comments** 7 pp.

Area 4200786 sq **Units** **ReportType** **Pages**

E Number 109 **Date** 1979 **Author** Rhode, D.

Title State Highway 1 - Road Improvements and Culvert Replacements at Nine Locations (3.2/10.2 P.M.). 5 pgs and 6 maps.

Quad Oceano

Site Negative **Comments** 3 pp.

Area None given **Units** **ReportType** **Pages**

E Number 256 **Date** 1974 **Author** Ford, A.

Title Project 05-SLO-1-1.7/9.8, Nipomo Mesa, 05-220-082801, Report of Test Excavations SLO-364 and SLO-680

Quad Oceano

Site SLO-364, SLO-680 **Comments** 43 p..

Area **Units** **ReportType** **Pages**

E Number 293 **Date** 1973 **Author** Nissley, C.

Title Project 05-SLO-1-1.7/9.8 Nipomo Mesa (Highway 1) 05220-082801.

Quad Oceano

Site SLO-364, SLO-680 **Comments** 96 pp.

Area **Units** **ReportType** **Pages**

E Number 544 **Date** 1985 **Author** URS Corporation

Title Cities Service Oil and Gas Corporation and Celeron Pipeline Company of California San Miguel Project and the Northern Santa Maria Basin Area Study

Quad Oceano, Santa Maria, Twitchell Dam, Point Sal, Guadalupe,

Site Negative **Comments**

Area **Units** **ReportType** EIR **Pages**

E Number 586 **Date** 1984 **Author** MacFarlane, H.

Title Terrestrial Cultural Resources.

Quad Oceano

Site SLO-1118, SLO-615, SLO-616 **Comments** 36 pp.

Area **Units** **ReportType** **Pages**

E Number 587 **Date** 1984 **Author** MacFarlane, H.

Title Addendum: Cultural Resources Survey, San Miguel Project, Onshore Pipeline and Facility Site, San Luis Obispo County, California.

Quad Oceano

Site SLO-615, SLO-616, SLO-924, SLO-925 **Comments** 5 pp.

Area **Units** **ReportType** **Pages**

E Number 679 **Date** 1986 **Author** Waldron, W.

Title A-Archaeological Survey Report for Curve Improvement on State Highway Route 1 in San Luis Obispo County, Revised◀B-Negative Archaeological Survey Report◀C-First Addendum to: (A)original

Quad Oceano

Site SLO-1168 **Comments** 36 pp.

Area **Units** **ReportType** **Pages**

E Number 844 **Date** 198? **Author** Sawyer, W.

Title Archaeological Surface Reconnaissance of the 200 Acre Biaggini Parcel, Highway One, Nipomo Mesa

Quad Oceano

Site AS-5024, AS-5025, AS-5026, AS-5027, AS-5028,AS -5029, AS-5030, **Comments** 2 pp.

Area **Units** **ReportType** **Pages**

E Number 1001 **Date** 1988 **Author** Dills, C.

Title Letter Report: Archaeological Potential of Your Sheridan Road lot, Nipomo.

Quad Oceano

Site Negative **Comments** 5 pp.

Area **Units** **ReportType** **Pages**

E Number 1003 **Date** **Author** Sawyer, W.

Title Archaeological Surface Reconnaissance of the One Acre Von Werder Parcel, APN 91-194-38, Guadalupe Road (Highway 1), Nipomo, California

Quad Oceano

Site Negative **Comments** 17 pp.

Area **Units** **ReportType** **Pages**

E Number 1079 **Date** 1989 **Author** Dills, C.

Title Letter Report: Archaeological Potential of Nipomo Mesa Property on Sheridan off Highway

Quad Oceano

Site Negative **Comments** 5 pp.

Area **Units** **ReportType** **Pages**

E Number 1082 **Date** 1989 **Author** Dills, C.

Title Letter Report: Archaeological Potential of Tract 1649, Hetrick Road, Nipomo

Quad Oceano

Site Negative **Comments** 4 pp.

Area **Units** **ReportType** **Pages**

E Number 1106 **Date** 1989 **Author** Dills, C.

Title Letter report: Archaeological Potential of Cees, Dobbe Property on Dawn, Nipomo

Quad Oceano

Site Negative **Comments** 5 pp.

Area **Units** **ReportType** **Pages**

E Number 1107 **Date** 1989 **Author** Dills, C.

Title Letter Report: Archaelogical Potential of the Moore land Company Property, Nipomo

Quad Oceano

Site Negative **Comments** 5 pp.

Area **Units** **ReportType** **Pages**

E Number 1269 **Date** 1989 **Author** Dills, C.

Title Letter Report: Archaeological Potential of Nipomo Mesa Property

Quad Oceano

Site Negative **Comments** 5 pp.

Area **Units** **ReportType** **Pages**

E Number 1272 **Date** 1989 **Author** Dills, C.

Title Letter Report: Archaeological Potential of Ralcoa Property, Nipomo Mesa

Quad Oceano

Site Negative **Comments** 5 pp.

Area **Units** **ReportType** **Pages**

E Number 1279 **Date** 1989 **Author** Singer, C.; Atwood, J.

Title Cultural Resources Survey and Impact Assessment for 90+ Acres near Black Lake Canyon on Nipomo Mesa, San Luis Obispo County, CA

Quad Oceano

Site SLO-1256, Smith's Locus B? **Comments** 26 pp.

Area **Units** **ReportType** **Pages**

E Number 1569 **Date** 1989 **Author** Dills, C.

Title Archaeological potential of Ourieff project on Ridgecrest Place, Nipomo

Quad Nipomo

Site Negative **Comments**

Area **Units** **ReportType** **Pages**

E Number 1643 **Date** 1988 **Author** Engineering-Science, Inc.

Title Draft Hazardous Waste Management Plan, Environmental Impact Report

Quad Santa Maria; Cholame; Tent Hills; Orchard Peak; Huasna Peak; Twitchell Dam; Taylor Canyon;Miranda Pine Mtn;

Site SLO-94; SLO-578; SLO-93; SLO-1142; SLO-1153; SLO-576; SLO-579; **Comments** large volume

Area **Units** **ReportType** **Pages**

E Number 1688 **Date** 1990 **Author** Dills, C.

Title Arhaeologial potential of Brackett Recycling Project on Nipomo Mesa (0691)

Quad Oceano

Site Negative **Comments** 5 pp.

Area 1214747 sq **Units** **ReportType** **Pages**

E Number 1826 **Date** 1991 **Author** Hoover, R.

Title Archaeological survey of property at 818 Riqel Road

Quad Oceano

Site Negative **Comments** 2 pp.

Area **Units** **ReportType** **Pages**

E Number 1952 **Date** 1991 **Author** Dills, C.

Title Archaeological Potential of Property at Corner of Arriba Place and Hiway 1 (0798)

Quad Oceano

Site Negative **Comments** 6 pp.

Area **Units** **ReportType** **Pages**

E Number 2430 **Date** 1993 **Author** Gibson, R.

Title Results of Phase One Archaeological Surface Survey for GTE Fiber Optics Cable Project Along Highway One, San Luis Obispo County, CA.

Quad Oceano

Site Negative **Comments** 20 pp.

Area 5 linear **Units** **ReportType** **Pages**

E Number 2774 **Date** 1995 **Author** Gibson,R.

Title Results Of Phase One Archaeological Surface Survey Of The Pace Parcel At Sheridan Road And Willow Road, Nipomo Mesa, Ca.

Quad Oceano

Site Negative **Comments** 8 pp.

Area **Units** **ReportType** **Pages**

E Number 3785 **Date** 1999 **Author** Levulett, Valerie; Ballantyne, Kate and Deborah Jones

Title Archaeological Survey Report for the Proposed realignment on State Route 01, San Luis Obispo County, California

Quad Oceano

Site SLO-1078 **Comments** pp. 70

Area 17100 sq m **Units** **ReportType** **Pages**

E Number 4058 **Date** 1999 **Author** Parker & Associates

Title Cultural Resource Investigation of the Russ Parcel, Corner of Hwy 1 and Halcyon Road, Arroyo Grande, Part of APN 075-162-005 and 025

Quad Oceano

Site CA-SLO-402 **Comments** 7 pp

Area 2.75 Acres **Units** **ReportType** **Pages**

E Number 4175 **Date** 2000 **Author** Robert O Gibson

Title Results of and Archival Records Search and Phase one Archaeological Surface Survey on a 10 acre parcel at the intersection of Highway 1 and Olivera Avenue, on the Nipomo Mesa, San Luis Obispo County, CA

Quad Oceano

Site none **Comments** 18 pp

Area 10 acres **Units** **ReportType** **Pages**

E Number 4416 **Date** 2001 **Author** Gibson, Robert O.

Title Results of Phase 2 Archaeological Subsurface Testing on the Wittstrom Parcel Project, Callender Road and Highway One, Coal 99-0349, Nipomo Mesa, San Luis Obispo County, CA

Quad Oceano

Site Negative **Comments** 28 pp.

Area 1 acre **Units** **ReportType** **Pages**

E Number 4919 **Date** 2001 **Author** Millar, B

Title SBA Communications Wireless Telecommunications Service Facilty - San Luis Obispo County

Quad Oceano

Site Negative **Comments** 4 pp.

Area 7.94 **Units** acres **ReportType** Survey **Pages**

E Number 5303 **Date** 2005 **Author** Arnold, N.

Title Cultural Resources Survey of the Proposed Macagni Property Cellular Communications Site SNBBCAL105D, 1550 Guadalupe Road, Nipomo, San Luis Obispo County, California

Quad Oceano

Site negative **Comments** 13 pp.

Area ~ 0.8 **Units** square miles **ReportType** Survey **Pages**

E Number 5458 **Date** 2005 **Author** Angeloff, N. and J. Roscoe

Title A Cultural Resources Investigation of the Wolff Vineyeards Bank Restoration, located in San Luis Obispo County, California

Quad Arroyo Grande

Site negative **Comments**

Area ~49,063 **Units** square feet **ReportType** Survey **Pages** 9

E Number 5473 **Date** 2005 **Author** Jones, D.; J. Nelson; P. Mikkelsen

Title Archaeological Survey and Extended Phase I and II Test Excavations for the Woodlands Phase IA Development Project, Nipomo Mesa, San Luis Obispo County, California

Quad Oceano

Site CA-SLO-2354H, CA-SLO-2355H **Comments**

Area 957 **Units** acres **ReportType** Excavation **Pages** 89

E Number 5474 **Date** 2005 **Author** Conway, Thor

Title Phase I Archaeological Surface Survey at Tentative Tract 2719 at Arriba Road, Nipomo, San Luis Obispo County

Quad Oceano

Site CA-SLO-1191, CA-SLO-1199, CA-SLO-1256 **Comments**

Area 18.77 **Units** acres **ReportType** Survey **Pages** 10

E Number 5516 **Date** 2004 **Author** Gordon, Beth A.

Title Historic Resource Report, L106/Dobbe Enterprises, 950 Guadalupe Road, Nipomo, San Luis Obispo County, California

Quad Oceano

Site negative **Comments**

Area .25 **Units** square miles **ReportType** Survey **Pages** 50

E Number 5518 **Date** 2005 **Author** Gordon, Beth A.

Title Proposed Telecommunications Tower Project SNBBCAL106D/Dobbe Enterprises, 950 Guadalupe Road, Nipomo, San Luis Obispo County, California.

Quad Oceano

Site negative **Comments**

Area 0.25 **Units** square miles **ReportType** Survey **Pages** 22

E Number 5519 **Date** 2005 **Author** Gordon, Beth A.

Title Proposed Telecommunications Tower Project SNBBCAL105D/Macagni Property, 1550 Guadalupe Road, Nipomo, San Luis Obispo County, California.

Quad Oceano

Site negative **Comments**

Area 0.25 **Units** square miles **ReportType** Survey **Pages** 14

E Number 5782 **Date** 2006 **Author** Conway, T.

Title Phase I Archaeological Surface Survey at Tract 2819 at Highway 1, Nipomo Mesa Area, San Luis Obispo County

Quad Oceano

Site negative **Comments**

Area 19 **Units** acres **ReportType** Survey **Pages** 8

E Number 5833 **Date** 2006 **Author** Allison Lober

Title Phase I Archaeological Inventory Survey a One Acre Parcel at 790 Calle Bendito, Oceano, San Luis Obispo County, California

Quad Oceano

Site negative **Comments**

Area 1 **Units** acres **ReportType** Survey **Pages** 15

E Number 5818 **Date** 2006 **Author** Bonner, W.

Title Cultural Resources Records Search Results and Site Visit for Sprint Nextel Candidate CA7366B (Dawn), 950 Guadalupe Road, Nipomo, San Luis Obispo County, California

Quad Oceano

Site negative **Comments**

Area <.25 **Units** acres **ReportType** Survey **Pages** 5

E Number 5898 **Date** 2005 **Author** Gibson, Robert O.

Title Results of Archival Records Search and Phase One Archaeological Surface Survey on ABout A One Acre Parcel at 838 Alejandro Way, Arroyo Grande on Nipomo Mesa, San Luis Obispo County, CA.

Quad Oceano

Site negative **Comments**

Area 1 **Units** acres **ReportType** Survey **Pages** 8

E Number 588 **Date** 1984 **Author** MacFarlane, H.

Title Addendum: Cultural Resources Investigation, San Miguel Project, Onshore Pipeline and Facility Site, San Luis Obispo County, California.

Quad Oceano

Site SLO-1118 **Comments** 11 pp.

Area **Units** **ReportType** **Pages**

E Number 589 **Date** 1985 **Author** MacFarlane, H.

Title Cultural Resources Element, Cities Service Oil and Gas Corporation, San Miguel Project Interconnect All American Pipeline Company Mainline, San Luis Obispo County, California.

Quad Oceano

Site SLO-1118, SLO-165 **Comments** 8 pp.

Area **Units** **ReportType** **Pages**

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Appendix C

Central Coastal Information Center
Archaeological Records Search
(Confidential Portion)

Appendix D

Resume of the Principal Investigator

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ARCADIS

Education
MA, Archaeology, UCLA
BA, Anthropology, University of California, Santa Barbara
BA, Geography, University of California, Santa Barbara

Years of Experience
Total - 25
With ARCADIS –1

Professional Registrations
Register of Professional Archaeologists
Certificate, Geographic Information Systems, San Diego Mesa College

Professional Associations
Society for American Archaeology (SAA)
Society for California Archaeology (SCA)
San Diego County Archaeological Society (SDCAS) President, 1999
Register of Professional Archaeologists

Brian K. Glenn, MA RPA

Cultural Resources Manager / Principal Investigator

Mr. Glenn has worked on numerous cultural resources management projects throughout Southern California in compliance with Section 106 of the National Historic Preservation Act (NHPA) and the California Environmental Quality Act (CEQA). His recent experience includes cultural resources surveys and studies for clients such as the Los Angeles Department of Water and Power, Metropolitan Transit Authority, and La Plaza Foundation La Placita Cemetery excavation. His responsibilities have included supervision of archaeological monitoring, evaluation and data recovery projects, as well as the preparation of technical reports (assessment, evaluation and mitigation), cultural resources management plans and EIS/EIR sections.

Mr. Glenn received B.A. degrees in Geography and Anthropology from the University of California, Santa Barbara and an M.A. in Archaeology from the University of California, Los Angeles. He was been awarded a certificate in Geographic Information Systems from San Diego Mesa College and is listed on the Register of Professional Archaeologists (RPA).

His professional foci concern the San Dieguito and Campbell prehistoric cultural traditions and the graphic display of data with emphases in geographical information systems (GIS), and exploratory data analyses. He has training in typological, spatial and faunal analyses, obsidian source and hydration studies. He has identified, evaluated and investigated historic era resources ranging in age from a 1792 Spanish gun emplacement on Ballast Point overlook San Diego Bay to late 19th to mid-20th century household and commercial deposits.

Central Coast Project Experience in chronological order

Dos Pueblos Pipeline Removal Project
City of Goleta, County of Santa Barbara, CA
2011
Conducted cultural resources monitoring during oil pipeline removal projects in and around CA-SBA-73 for British Petroleum.

Ausra CESF
County of San Luis Obispo, CA
2008
Archaeological project support during AFC data request submissions, public hearings and alternative analysis.

San Lawrence Terrace Cultural Resource Assessment
County of San Luis Obispo, CA
2005
Archaeological and paleontological assessment of the 55-acre residential subdivision project in San Miguel for Cogstone Resource Management and Kirk Consulting.

Santa Ysabel Ranch, Construction Phase 2, Cultural Resource Monitoring Report
County of San Luis Obispo, CA
2005
Archaeological and paleontological monitoring report for the 200-acre construction phase 2 of the Santa Ysabel Ranch development project, Paso Robles for Cogstone Resource Management and Weyrich Development.

Santa Ysabel Ranch, The Lake Construction Phase, Cultural Resource Monitoring Report
County of San Luis Obispo, CA
2005
Archaeological and paleontological monitoring report for the 10-acre "The Lake" construction phase of the Santa Ysabel Ranch development project, Paso Robles for Cogstone Resource Management and Weyrich Development.

Data Recovery Research Design for CA-SLO-2077, The Hot Springs Site
City of Paso Robles, County of San Luis Obispo, CA
2005
Editing and expansion of a previously developed data recovery research design for the Hot Springs Site (CA-SLO2077) within the Santa Ysabel Ranch project area for Cogstone Resource Management and Weyrich Development.

CA-SBA-42 Site Indexing
County of Santa Barbara, CA
2001
Field Director/Co-Principal Investigator during site indexing excavations on a Middle Period and Historic Period archaeological site in Santa Barbara County.

Space Shuttle and MX Missile Projects, Vandenberg Air Force Base
Santa Barbara County, California
1988-1991
Typological analysis of projectile points recovered from excavations at sixty-three sites on Vandenberg Air Force Base. Michael Glassow, Director.

Mescalitan Island, CA-SBA-46
County of Santa Barbara, CA
1988-1990

Species identification and analysis of fish remains recovered during Phase III excavations of a Late Period village, and report section preparation.

White Property Survey, Santa Barbara County
County of Santa Barbara, CA
1988
Field Director for a Phase I reconnaissance survey of 600 acres located in the Santa Ynez Valley.

CA-SBA-46 (Mescalitan Island)
County of Santa Barbara, CA
1988
Preparation of house-floor contour maps using AutoCad. Lynn Gamble, Director.

Archaeological Testing at CA-SLO-993
City of Paso Robles, County of San Luis Obispo, CA.
1990
Field technician responsible for excavation of site evaluation units for C.A. Singer and Associates.

Hammonds Meadow, CA-SBA-1213
County of Santa Barbara, CA
1987-1988
Laboratory Director for Phase II excavations of a Late Period village on the Santa Barbara coast near Montecito, California

New Frontiers in the Archaeology of the Pacific Coast of Southern Mesoamerica
County of Santa Barbara, CA
1987
Preparation of maps representing site location and environmental data. Social Processes Research Institute, University of California, Santa Barbara. Frederick Bove and Lynette Heller, eds.

Wilson Land Exchange, Los Padres National Forest
County of Santa Barbara, CA
1986
Field Director for a Phase I reconnaissance survey of isolated National Forest properties slated for exchange.

Santa Barbara Island, Channel Islands National Park
County of Santa Barbara, CA
1986

Field Director during test excavations at various sites throughout the island. Excavations were carried out as part of a comprehensive management plan for the cultural resources of the park.

CA-SBA-245, Las Cruces, Gaviota State Park
County of Santa Barbara, CA
1986
Photo documentation of Las Cruces adobe and analysis of impacts through historical reconstruction via aerial photographs 1929 to 1979.

Archeomagnetic Evaluation.
County of Santa Barbara, CA
1986
Prepared and processed archaeomagnetic samples from various Mesoamerican sites using the UCSB, Department of Geology cryogenic magnetometer. Social Processes Research Institute, University of California, Santa Barbara. Dan Wolfman, Project Director.

San Miguel Island Survey Map, Channel Islands National Park
County of Santa Barbara, CA
1985
Preparation of AutoCAD basemap depicting site survey information from Greenwood and Rosaire surveys. Don Morris, Project Director.

Other California Project Experience in chronological order

Termo North Aliso Canyon Cultural Resources Assessment and Evaluation
County of Los Angeles, CA
2012
Conducted a cultural resources assessment (records search and survey) and historic structures evaluation at three locations within the Santa Susana Mountains.

Desert Butte Due-Diligence/Fatal Flaw Analysis
County of Los Angeles, CA
2012
Conducted a cultural resources preliminary survey and records search of a 2,070-acre parcel and adjacent proposed transmission corridors in eastern Los Angeles county to evaluate the property with regards to fatal flaws related to cultural resources.

PG&E Gasworks Remediation Cultural Resources Monitoring
City of Sacramento, CA
2012

Monitored excavation of contaminated soils for archaeological and architectural materials relevant to old Sacramento.

Rugged Solar Cultural Resources Assessment
County of San Diego, CA
2011
Mr. Glenn supervised cultural resources survey of the 852-acre project area in Boulevard, San Diego County, California in compliance with CEQA and San Diego County regulations. Assessment included 11 site record updates and recording of 34 newly identified resources.

Tierra del Sol Solar Project Cultural Resources Assessment
County of San Diego, CA
2011
Mr. Glenn supervised cultural resources survey of the 444-acre project area in Tierra del Sol, San Diego County, California in compliance with CEQA and San Diego County regulations. Assessment included one site record update and recording of 11 newly identified resources.

LanWest Solar Cultural Resources Assessment
County of San Diego, CA
2011
Mr. Glenn supervised cultural resources survey of the 35-acre project area in Boulevard, San Diego County, California in compliance with CEQA and San Diego County regulations. Assessment included 5 site record updates and recording of 3 newly identified resources.

LanEast Solar Cultural Resources Assessment
County of San Diego, CA
2011
Mr. Glenn supervised cultural resources survey of the 225-acre project area in Boulevard, San Diego County, California in compliance with CEQA and San Diego County regulations. Assessment included 11 site record updates and recording of 11 newly identified resources.

Copley Property Cultural Resources Monitoring
City of San Diego, County of San Diego, CA
2011
Mr. Glenn supervised cultural resources monitoring during geologic testing on a 25-acre project area in La Jolla (City of San Diego), California. Two historic era dump sites were located, but determined to represent surface scatters only and therefore not significant.

LA Plaza de Cultura y Artes
City of Los Angeles, County of Los Angeles, CA
2010-2011
Mr. Glenn directed excavations of a portion of the La Placita Cemetery subject to impacts from

Imagine the result

PHILLIPS 66

Botanical Assessment

Santa Maria Refinery Rail Project, San Luis Obispo County, California

APNs: #092-401-011, #092-401-013, #092-411-005

ARCADIS

Greg McGowan
Principal Ecologist

Mary Carroll
Senior Ecologist

Mitch Siemens
Wildlife Biologist

"As a County –approved biologist, I hereby certify that this Biological Resources Assessment was prepared according to the Guidelines established by the County of San Luis Obispo Department of Planning and Building and that the statements furnished in the report and associated maps are true and correct to the best of my knowledge and belief; and I further certify that I was present throughout the site visit(s) associated with this report."

Biological Assessment

Santa Maria Refinery Rail Project, San Luis Obispo County, California

Prepared for:
Phillips 66

Prepared by:
ARCADIS U.S., Inc.
301 South Miller
Suite 210
Santa Maria
93454
Tel 805.349.7180

Date:
June 13, 2013

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Appendices

A Site Photographs

Acronyms and Abbreviations

CDFW	California Department of Fish and Wildlife
cm	centimeter
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CSC	California Special Concern Species
CE	California-listed Endangered Species
CT	California-listed Threatened Species
ºF	degrees Fahrenheit
FE	Federally-listed Endangered Species
FSC	Federal Special Concern Species
FT	Federally-listed Threatened Species
GPS	Global Positioning System
ha	hectare
km	kilometer
m	meter
USGS	United States Geological Survey

1. Executive Summary

This Biological Assessment presents the findings of biological surveys of a portion of the Phillips 66 Santa Maria Refinery (SMR). This assessment focused on the proposed construction area (the Site) proposed for extension of an existing rail spur to facilitate rail delivery of crude oil to the refinery. The SMR is located near Highway 1 on the Nipomo Mesa in Arroyo Grande, San Luis Obispo County, California. The purpose of the ARCADIS biological surveys was to identify existing or potentially occurring sensitive plant species, sensitive habitat, or other botanical-related issues of concern occurring on the Site. This report also addresses potential coastal access routes as discussed in Section 8. Note that "the Site" includes all of the disturbance areas associated with the rail spur project, but does not include the potential coastal access routes which are considered separately.

The Site supports degraded central dune scrub habitat that has experienced moderate to heavy disturbance from various land uses. Invasive veldt grass (*Ehrharta calycina*), a non-native perennial grass, predominates in many open disturbed portions of the Site. No federal or state listed plant or wildlife species were observed in the project area during the surveys, and none are likely to occur within the project footprint. Three sensitive plant species (California spineflower [*Mucronea californica*], Blochman's groundsel [*Senecio blochmaniae*], and sand almond [*Prunus fasciculata* var. *punctata*]) were observed on the Site during the ARCADIS survey. These species occur on the California Native Plant Society (CNPS) List 4 (a 'Watch List').

The potential coastal access routes occur in high quality central dune scrub vegetation supporting a variety of sensitive plant species, including the Federal and State-listed Endangered Nipomo Mesa lupine, Blochman's leafy daisy, crisp monardella, Blochman's groundsel, California spineflower, and sand almond. The entire area is designated as critical habitat for La Graciosa thistle, which has been reported from nearby Jack Lake. Proposed Coastal Access Route B occurs within the 100-foot buffer around the wetlands and riparian habitat at Jack Lake. Either option would result in significant impacts to biological resources along the Coastal Access Route corridor.

This report addresses the potential botanical impacts associated with the rail spur project. This report conservatively considered that the proposed rail spur pathway would be completely disturbed when in fact a significant portion of the disturbance envelope will only be temporarily disturbed during grading and will be reseeded with a native seed mix to restore pre-disturbance conditions. Accurate differentiation between the total permanent impacts and temporary impacts was not feasible at the time this report was prepared. To avoid and minimize the potential for impacts to sensitive botanical resources, a number of resource protection measures are proposed in Section 7 of this report.

2. Introduction

This report provides a Botanical Assessment of the Phillips 66 Santa Maria Refinery (SMR) Rail Project Site (the Site). The SMR property consists of three assessor's parcels within the South County Planning Area of San Luis Obispo County (APN #092-401-011, #092-401-013, #092-411-005). The approximately 1,875-acre (758.8 ha) property is located on Highway 1 approximately 5 miles (8.05 km) south of the intersection of Highway 1 and Halcyon Road on the Nipomo Mesa in Arroyo Grande, San Luis Obispo County, California (Figure 1). The project Site is a small portion of the SMR property and is currently used for industrial operations and cattle grazing. The current land use designation is "Industrial"; this designation is not expected to change as a result of the proposed project.

The SMR property is bordered to the north by agriculture fields, industrial facilities, and residential housing. It is bordered to the south by agriculture, by residential development to the east, and by undeveloped coastal dunes to the west. The proposed rail spur extends the existing spur through the coke processing area and to the east through the grazing area. Additionally, a covered offloading rack will be constructed and an above ground pipeline will convey material from the offloading rack to the existing storage tanks at the SMR (Figure 2). The impact areas associated with the proposed development are provided below.

The approximate construction areas are summarized below:

- 2305 yards (2110 m) – Length of spur extension (including approximately 815 yards within the existing industrial coke plant area).

- 270-feet (82m) – Approximate width of construction area for rail extension (note that much of the area would only be affected temporarily).

- 775-yards (710 m) – Length of new pipeline from the unloading facility to the internal refinery (note that an additional 400 yards will be constructed within the existing refinery connecting to the existing storage tanks).

- 25-feet (7.5 m) – Approximate width of temporary construction area for pipeline installation

Acreage Breakdown (including temporary and permanent):

- 38.6 acres – Rail Spur and Unloading Facility

- 4.1 acres – New Pipeline (mostly temporary impacts)

- 1.7 acres – Secondary Emergency Vehicle Access
- 4.5 acres – Internal Refinery Piping and Existing Track Upgrade

Collectively, the entire project, including temporary and permanent impacts, would affect approximately 48.9 acres. Of this area, a significant portion occurs within the existing refinery:

- 21.9 acres (45% of total) occurs within the existing industrial refinery area
- 27 acres occur in undeveloped areas and include portions of the rail extension, the new pipeline, and the secondary emergency vehicle access road.

3. Methods

ARCADIS conducted fall and winter sensitive species surveys of the project area on October 9 and November 13, 2012 and spring and summer surveys on April 29 and June 11, 2013; the spring survey was timed to facilitate observations of the maximum number of native annuals during peak blooming season. Surveys were conducted under clear, calm, weather conditions and lasted approximately 5, 3, and 4 hours, respectively. The personnel conducting the October 9, 2012 and April 29, 2013 surveys consisted of ARCADIS Senior Ecologist Mary Carroll and ARCADIS Wildlife Biologist Mitch Siemens. The November 13, 2012 survey was conducted by Mr. Siemens. The June 11, 2012 survey was conducted by Ms. Carroll. The Site was accessed on foot along the survey boundaries shown on Figures 2 and 3 as well as in a buffer area around the footprint, which included adjacent areas that might be potentially affected by project construction activity. The site was also revisited on several additional occasions to review smaller areas where project elements had changed.

Desktop Data Search: Prior to performing the field work, ARCADIS reviewed documents concerning the Site and the surrounding areas, including a search of the California Natural Diversity Database (CNDDB; California Department of Fish and Wildlife [CDFW] 2013) for the United States Geological Survey (USGS) 7.5-minute series Oceano topographic quadrangle and the adjacent quadrangles (Arroyo Grande NE, Guadalupe, Nipomo, Santa Maria, Tar Spring Ridge, Orcutt, Casmalia, and Pismo Beach). The California Native Plant Society's (CNPS) Electronic Inventory of Rare and Endangered Vascular Plants (CNPS 2013) was also queried for appropriate habitat within the Oceano quadrangle and adjacent quadrangles. Aerial photographs from approximately the last 20 years were also reviewed to better understand the history of the Site. Other resources employed for this assessment included various state and federal regulations, consultation with other local botanists about issues in the area, and ARCADIS' direct experience on the Site and in the surrounding area including a previous biological site assessment nearby for a ConocoPhillips

project (LFR 2005). ARCADIS biologists also interviewed a local rancher who has a long history tending cattle on the Site.

Botanical Surveys: ARCADIS botanical surveys encompass documentation of species composition, abundance, relative distribution, and community composition (including dominants, associates, and uncommon elements). The survey is intended to characterize the vegetation types, record all plant species observed, and ascertain the likelihood for the occurrence of sensitive species in areas not observed during the survey by ARCADIS. Physiographic features are noted and correlated with plant distributions. The survey area encompassed the proposed rail line extension options and surrounding areas, which were verified using global positioning system (GPS) coordinates of the route options in the field.

All plant species found in a recognizable condition during ARCADIS' surveys were recorded and are listed in Table 1. Nomenclature follows the Jepson Manual: Vascular Plants of California*,* Second Edition (Baldwin et al. 2012). In addition, pertinent volumes of the Flora of North America (Flora of North America Editorial Committee, eds. 1993+) and a regional flora (Hoover 1970) were also used for plant identification. It is important to note that the list of vascular plant species on the Site presented in this report may not be comprehensive.

Vegetation Mapping: ARCADIS mapped and characterized all vegetation in the study areas based on direct field observations and with aerial photograph interpretation for surrounding buffer areas. Vegetation was mapped at the both the community and alliance level, according to CNPS/CDFW mapping protocols described in the CNPS A Manual of California Vegetation (Sawyer et al. 2009) and digitized using ArcGIS software. Vegetation types are characterized by using Sawyer et al. (2009), Holland (1986), and the CDFW natural communities list (2010); vegetation types are discussed in Section 4.2.

4. Habitat Description

The Nipomo Mesa and the Central Coast region in general occur in an important biological transition zone between the moister communities of central and northern California and the more arid communities of southern California.

A total of 73 vascular plant species were observed during the 2012 and 2013 surveys, including 49 native plant species and 24 non-native species. In addition, three vegetation types were mapped. General site characteristics, land use history, and observed vegetation types are described below. The Site location is shown in Figure 1. An aerial image of the Site is provided in Figure 2. Vegetation types based on ARCADIS field surveys are overlain on this 2012 aerial photograph in Figure 4. Mapped sensitive resources are shown on Figure 5. Alternative routes considered during the review process are shown on Figure 3. California Natural Diversity Database sensitive resource locations, coupled with sensitive resources mapped by others (e.g., the San Luis Obispo Land Conservancy)

and during the current surveys are shown in Figure 6. Figure 7 indicates the extent of designated critical habitat for La Graciosa thistle in the project area. Two potential coastal access routes are shown in Figure 8.

Representative photographs of the different communities and features of the Site are provided in Appendix A.

4.1 Site Description and Surrounding Natural Resource Areas

The topography of the Site consists of relatively flat to gradually undulating terrain. Oceano sands underlay the Site (well drained) and predominate in old, stabilized sand dunes in several locations along the Central Coast. Elevations at the Site average about 60 feet.

Yearly precipitation is estimated at 17.14 inches (Western Region Climate Center 2012), falling primarily between October and April. The local weather pattern of mild, wet winters and warm, dry summers is characteristic of Mediterranean climate regions, and the effect of the dry summers on plant life is ameliorated somewhat by the presence of summer fog.

Temperatures at the Site are generally mild, with a mean annual temperature of 58.0 degrees Fahrenheit (°F), with an average maximum August temperature of 71.0°F and an average January minimum temperature of 42.4 °F (Western Regional Climate Center 2005).

The Oceano Dunes State Park is located along the beach immediately west of the SMR property. The 3,600-acre (1456 ha) park has 5.5 miles (8.8 km) of beach access with 1,500 acres (607 ha) of sand dunes open for vehicle and recreational vehicle use. The park is the only California State Park facility that allows vehicles to be driven on the beach. The Oso Flaco Lake Natural Area is also part of the Oceano Dunes State Park. The Lake area is off-limits to vehicles and is primarily used by the public for viewing plants, wildlife, and scenic landscapes. The Oso Flaco Lake Natural Area offers a 1.5-mile (2.4 km) boardwalk path, including a span that crosses over the lake itself that connects the parking lot at the west end of Oso Flaco Lake Road to the beach. Portions of the SMR facility are visible from Oso Flaco Lake Road.

The County of Santa Barbara Parks Department manages the Rancho Guadalupe Dunes Preserve, located approximately 5 miles south of the Site. The Rancho Guadalupe Dunes Preserve supports pristine sand dunes and offers fishing, hiking, wildlife viewing, picnicking, and other activities for the public.

Black Lake Canyon is located approximately 1 mile north of the Site. Black Lake Canyon represents a significant natural resource, containing habitat for a number of rare plant and wildlife species, including two federally listed endangered plants: marsh sandwort (*Arenaria paludicola*) and Gambel's watercress (*Rorippa gambellii*).

4.2 Vegetation Types

The Site supports three main vegetation communities within the boundaries of the project study area as described below and depicted in Figure 4: two upland communities – central dune scrub and non-native veldt grassland, and one wetland community – arroyo willow scrub. In addition, industrial areas, non-native planted trees, and bare dune sand are also located within the general project area (Figures 2, 3, and 4).

4.2.1 Upland Communities

The Site supports a mosaic of native, weedy, and planted vegetation that will be described more fully in the ensuing sections. The distribution of vegetation types on the Site is determined by topography, soils and geology, hydrology, slope exposure, climate, and land use history.

4.2.1.1 Central Dune Scrub

Central Dune Scrub is the predominant native shrub community on the Site and is typical of stabilized dunes along the Central Coast that occur inland from the seaward-facing central foredunes community. This habitat is dominated by a combination of shrubs and perennial herbs, along with a few annuals and biennials. The most common native dominant shrubs at the Site are dune-heather (*Ericameria ericoides*), silver dune lupine (*Lupinus chamissonis*), coyote bush (*Baccharis pilularis* subsp. *consanguinea*), and black sage (*Salvia mellifera*), which form a collection of species-specific plant associations depending on location on Site (Sawyer et al. 2009).

The most common central dune scrub alliances on the Site are the Silver Dune Lupine – Dune-Heather Alliance on the western and southern portions of the Site; the Dune-Heather – Dune Buckwheat – Black Sage Alliance in the central and eastern portions of the Site; the Black Sage – Dune-Heather Association in the eastern portion of the Site; and the Dune-Heather – Black Sage – Blue Elderberry Association in moist pockets near the bases of slopes.

These associations of dominant shrubs also include lower densities of other native shrubs and subshrubs, such as blue elderberry (*Sambucus nigra* subsp. *caerulea*), California coffeeberry (*Frangula californica*), poison-oak (*Toxicondendron diversilobum*), dune buckwheat (*Eriogonum parvifolium*), and the sensitive Blochman's groundsel (*Senecio blochmaniae*); a few individuals of the sensitive sand almond (*Prunus fasciculata* var. *punctata*) are present as well in one location. Native herbaceous perennial associates include California croton (*Croton californicus*), coast horkelia (*Horkelia cuneata* subsp. *cuneata*), California aster (*Corethrogyne filaginifolia* var. *robusta*), and others. Sandy openings support native annuals, including the sensitive California spineflower (*Mucronea californica*).

The Site has been grazed for many years and the invasive veldt grass (*Ehrharta calycina*) and non-native iceplants (*Carpobrotus edulis* and *C. chilensis*) are abundant in many areas at the Site, especially in disturbed areas near slope bottoms. All of the native plant communities are considered degraded to varying degrees due to historic land use and concentrations of non-native species.

Acreage by vegetation type located within the proposed disturbance areas are provided below:

Black Sage - Dune-Heather Association –10.1 acres

Coastal Dune Lupine - Dune-Heather -Silver Bush Lupine Association – 0acres (0 0

Dune-Heather Alliance – 04.6 acres (1.8 ha) in proposed disturbance areas

Dune-Heather - California Coffeeberry - Blue Elderberry Association – 0 acres (0 ha);

Dune-Heather - Seacliff Buckwheat - Black Sage Association –7.3 acres (2.9 ha) in proposed disturbance areas

Silver Dune Lupine and Dune-Heather Association – 0 acres (0 ha)

Degraded Central Dune Scrub –4.5 acres (1.8 ha) in proposed disturbance areas

Central Dune Scrub would be classified as Central Dune Scrub in the Holland legacy classification system (Holland 1986). The Silver Dune Lupine – Dune-Heather Shrubland Alliance has a global rank of G3 and a state rank of S3 (10,000-50,000 acres [4,050-20,235 ha] statewide), as listed by CDFW (2010). No areas dominated the Silver Dune Lupine – Dune-Heather Shrubland Alliance are located in proposed disturbance areas.

4.2.1.2 Non-native Veldt Grassland

Upland portions of the Site have been extensively disturbed by various land uses and are dominated primarily by non-native grasses, especially the invasive veldt grass. The presence of non-native grassland usually suggests prior clearing of native perennial vegetation, which then is largely replaced by invasive non-native grasses and forbs.

Although veldt grass is common in all vegetation types at the Site, only areas with 50% or greater cover by veldt grass were mapped as this grassland type. A total of 0.3 acres (0.1 ha) of non-native veldt grassland is located in proposed disturbance areas.

In general, the grassland areas would be classified as Non-Native Grasslands in the Holland legacy community classification system (Holland 1986) and as California Grassland Herbaceous Alliance within the CNPS Manual of California Vegetation (Sawyer et al. 2009).

4.2.2 Wetland Communities

Areas with standing or flowing water or with seasonally or permanently saturated soils commonly support wetland communities. Freshwater wetlands are extremely complex and variable, and their species composition and overall structure are dependent on a number of factors. One wetland habitat was found at the Site. A jurisdictional wetland delineation was not conducted by ARCADIS during the field survey, nor was one required.

4.2.2.1 Arroyo Willow Scrub

Arroyo Willow Riparian Scrub occurs in a small area adjacent to and south of the southern perimeter access road that follows the chain-link fencing around the south side of the developed refinery boundary (see Figure 4).

The Arroyo Willow Riparian Scrub in this location is dominated by arroyo willow (*Salix lasiolepis*) and includes a few large clumps of California blackberry (*Rubus ursinus*), poison-oak, and coyote bush under the canopy of the arroyo willows. There was no evidence of surface water in this location, and the surface soils were not saturated. The location is not within the project area.

In the Holland legacy community classification system (Holland 1986), the arroyo willow vegetation is classified as Central Willow Scrub. The Arroyo Willow Shrubland Alliance has a global rank of G4 (more than 50,000 acres [20,235 ha]) and a state rank of S4 (more than 50,000 acres [20,235 ha), as listed by CDFW (2010).

5. Results

The Site is dominated by a mosaic of Central Dune Scrub vegetation, as well as Non-native Veldt Grassland. One area outside the project limits supports arroyo willow thickets. No federal or state listed plants were observed within or adjacent to the construction area during the surveys, and none are likely to occur within the project footprint. Sensitive vegetation is described in Section 5.1 and shown on Figures 5 and 6.

Nipomo Mesa lupine (*Lupinus nipomoensis*) is known outside the project footprint on SMR property and all portions of the Site were searched for individuals of this species or any other annual species of *Lupinus* in April 2013, when Nipomo Mesa lupine was blooming elsewhere on Site; no individuals were observed in the project area. Four sensitive plant species were observed on the Site and are described further below; they are shown on Figures 5 and 6.

5.1 Sensitive Vegetation Types

One vegetation type mapped in the general project area has a California state ranking of S3, which is considered a "threat" rank by the CNDDB (CDFW 2013): The Silver Dune Lupine – Dune-Heather Shrubland Alliance. However, this vegetation type occurs outside the proposed disturbance areas.

5.2 Sensitive Plant Species

No state or federally listed or CNPS listed plant species were observed on the Site. Four sensitive plants listed by the CNPS (2013) were observed on or immediately adjacent to the Site. Blochman's leafy daisy is listed by the California Native Plant Society (CNPS) on List 1B.2 for plants fairly endangered in California and the remaining species occur on List 4 (a 'Watch List'). All sensitive species observed at the Site or reported from the area using the CNDDB and CNPS Electronic Inventory search (2013) are included in Table 2 and Figures 5 and 6. In addition, locations of sensitive species recorded nearby outside the project area are shown on Figure 6.

5.2.1 Sensitive Plant Species Observed on the Site (within the Proposed Disturbance Area)

Blochman's Leafy Daisy (*Erigeron blochmaniae*)

Blochman's leafy daisy is an herbaceous perennial that is woody at the base and reaches one meter in height. The intricately-branched slender stems bear narrow leaves; both stems and leaves are lightly covered with small curly hairs. A member of the sunflower family (Asteraceae), Blochman's leafy daisy bears flat-topped sprays of daisy-like heads at the end of the branched inflorescence stalks. The 45-72 ray flowers are lavender and the central disk flowers are yellowish and surrounded by three to five graduated rows of phyllaries that are short-hairy and also glandular.

Blochman's leafy daisy is endemic to the sand sheets of the Central Coast, extending from Vandenberg Air Force Base in Santa Barbara County north to Morro Bay. It is categorized as CNPS 1B.2, a plant of limited distribution that is fairly endangered in California. It is threatened by non-native invasive species, off-road vehicles, and loss of habitat.

Presence on the Site: Blochman's leafy daisy was found in limited numbers along the proposed secondary emergency vehicle access route at the eastern end of the Site during the June survey. It may occur elsewhere on Site but was not flowering and easily recognizable during the earlier surveys.

California Spineflower (*Mucronea californica*)

California spineflower is a distinctive reddish annual in the buckwheat family. It produces wiry branches low to the ground and has a spreading habit, rarely exceeding 10 inches (25 centimeters) in height. The linear to slightly oblanceolate leaves occur in a basal cluster, while flowering stems bear scattered 0.5- to 1-inch (1 to 2.5 centimeters) triangular reddish bracts that are slightly lobed and tipped with awns. One to two white to pinkish flowers emerge from each reddish awn-tipped involucre. California spineflower begins blooming in spring, but is readily visible long into autumn.

This annual herb is known from sandy soils from Atascadero to La Panza Range and south to Pozo. It is found sporadically along the coast from Morro Bay southwards to Nipomo Mesa, and also occurs on the sand sheets of northern Santa Barbara County. It has also been reported from limited localities in the Los Angeles Basin and the Cajon Pass area, and Santa Ana River Wash near Redlands in San Bernardino County.

It is categorized as CNPS 4.2, a plant of limited distribution that is fairly endangered in California.

Presence on the Site: California spineflower occurs in sandy openings in several areas that support Central Dune Scrub. More than 3,000 individuals were observed in mapped areas.

Sand almond (*Prunus fasciculata* var. *punctata*)

Sand almond is an intricately branched shrub that ranges from 2 to 3 feet in height (0.6 to 0.9 meters), although it may sometimes be taller. This winter-deciduous shrub has narrow leaves to 0.5 to 0.75 inches long, with punctuate (sunken) glands on the surface. The tiny white flowers appear in spring and are followed by small, round pubescent fruits. Unlike its desert relative, *Prunus fasciculata* var. *fasciculata*, a desert species native to washes and rocky soils of the western desert regions, sand almond is confined to sandy substrates in coastal Santa Barbara and San Luis Obispo Counties.

Sand almond occurs in Graciosa Canyon on the northern flanks of the Purisima Hills south of Orcutt, northwest of Los Alamos, on San Antonio Terrace (Smith 1998), and in the Solomon Hills in Santa Barbara County. Keil and Holland (1998) also report sand almond on San Antonio Terrace in mixed chaparral and in disturbed areas surrounded by grasses, as well as in the Casmalia Hills north of Barka Slough. One outlying population of sand almond lies far to the east of these more coastal populations, on the easternmost extent of the Purisima Hills west of Ballard Canyon (Smith

1998). Sand almond also extends north into San Luis Obispo County on Nipomo Mesa and in maritime chaparral south of Morro Bay.

Sand almond is listed as CNPS List 4.3, which is a watch list for species with a limited distribution that are not very endangered in California.

Presence on the Site: Three individuals of sand almond were observed at the top of a sandy ridge in the Black Sage – Dune-Heather Association on the Site, as well as along the proposed emergency access route at the eastern end of the Site in the Dune-Heather Alliance vegetation type.

Blochman's Groundsel (*Senecio blochmaniae*)

Blochman's groundsel is a subshrub in the sunflower family that reaches 1.5 meters in height. The leaves are bright green and linear, with dried leaves remaining attached to the plant lower on stems. Like Blochman's leafy daisy, Blochman's groundsel is a member of the sunflower family, with yellow ray and disk flowers. The fruits bear tufts of soft hairs that aid in dispersal.

Blochman's groundsel is distributed on stabilized dunes from Point Conception north to Morro Bay. It is threatened by development, invasive weeds, off-road vehicles, and other human activities. It is categorized as CNPS 4.2, a plant of limited distribution (CNPS watch list) that is fairly endangered in California.

Presence on the Site: Blochman's groundsel is scattered at the Site, especially in the western half in places where veldt grass is sparse. Approximately 50 individuals were observed on the Site.

5.2.2 Sensitive Plant Species NOT Observed on the Site

The following plants were *not* found by ARCADIS at the Site or the surrounding area during the 2012 and 2013 surveys, but are known to occur in the general region and are discussed here for reference and thoroughness. These sensitive species and others known from the region are included on Table 2, along with commentary on habitat preference and the potential for presence at the Site. The plants are listed below by rarity (the rarest first), and then alphabetically by scientific name within a given rarity category.

Marsh sandwort (*Arenaria paludicola*)

Marsh sandwort is an herbaceous perennial member of the pink family (Caryophyllaceae). Marsh sandwort occurs primarily in freshwater wetlands along the Pacific Coast.

Marsh sandwort is listed as a Federal Endangered and California Endangered species, and is categorized as CNPS 1B.1, a plant of limited distribution that is seriously endangered in California. It is threatened by development, agricultural, and ranching activities, and changes to the hydrologic regime of wetlands in which it occurs.

Presence on the Site: Marsh sandwort was not found at the Site, and the Site does not support suitable habitat for this species (standing water forming a freshwater marsh). The species has been reported to occur at Jack Lake and in Black Lake Canyon (CDFW 2013).

La Graciosa thistle (*Cirsium loncholepis*)

La Graciosa thistle is low-growing biennial or short-lived perennial herb with spiny leaves and large white flowers. It is a member of the sunflower family (Asteraceae). The species has a highly localized distribution, endemic to margins of coastal wetland or marsh habitats from southern San Luis Obispo County to northern Santa Barbara County.

La Graciosa thistle is a State Threatened and Federally Endangered listed species, and is categorized as CNPS 1B.1, a plant of limited distribution that is seriously endangered in California. It is threatened by development, agricultural, and ranching activities, and changes to the hydrologic regime of wetlands in which it occurs.

Presence on the Site: La Graciosa thistle was not observed at the Site during ARCADIS surveys. No wetland areas occur within the project footprint. However, designated critical habitat for this species covers most of the Site (see Figure 7; USFWS 2009).

Pismo Clarkia (*Clarkia speciosa* subsp. *immaculata*)

Pismo clarkia is a late spring to early summer-flowering annual herb in the evening-primrose family (Onagraceae). Pismo clarkia is endemic to San Luis Obispo County and grows on dry, sandy, often disturbed soils along the margins of oak woodland in open grassy sites. This plant is known only from the Pismo Beach, Arroyo Grande, and Nipomo Mesa area of San Luis Obispo County. It has been found in an area dominated by veldt grass within 0.25 mile of the Site.

Pismo clarkia is listed as a Federal Endangered and California Rare species and is categorized as CNPS 1B.1, a plant of limited distribution that is seriously endangered in California. Threats include development and agricultural activities.

Presence on the Site: Pismo clarkia was not identified at the Site, and the Site lacks the oak woodland plant community often associated with grasslands in which it occurs. Surveys were conducted at the appropriate time of year when the species was blooming elsewhere in the County. This species was not observed on Site.

Mesa Horkelia (*Horkelia cuneata subsp. puberula*) and Kellogg's Horkelia (*Horkelia cuneata subsp. sericea*)

Mesa horkelia and Kellogg's horkelia are subspecies of the more widespread herbaceous perennial, coast horkelia (*Horkelia cuneata* var. *cuneata*), and a member of the rose family. Both horkelias are characterized by basal leaves divided into leaflets, with flowering stalks bearing reduced leaves and small white flowers at the branched tips. The flowers each produce five narrow white petals and ten stamens with distinctive flattened ribbon-like filaments. Mesa horkelia and Kellogg's horkelia are distinguished by characteristics of leaf and stem hairs as well as diagnostic features found in the flowers.

Mesa horkelia is known from San Luis Obispo County to San Diego County, while the distribution of Kellogg's horkelia encompasses populations in San Mateo, Santa Cruz, San Luis Obispo, and Santa Barbara Counties; it has been extirpated in the San Francisco Bay area. Numerous populations of mesa and Kellogg's horkelia have been eliminated by development, particularly in the northern part of its range. Both species bloom from April to September, and each is listed separately on CNPS List 1B.1 for species that are seriously endangered in California.

Potential Presence on the Site: Mesa and Kellogg's horkelia have not been observed on the Site, but Kellogg's horkelia has been observed nearby.

Nipomo Mesa Lupine (*Lupinus nipomoensis*)

Nipomo Mesa lupine is an annual herb restricted to stabilized back dune habitat on the east side of the Guadalupe Dunes at the southwest base of the Nipomo Mesa in San Luis Obispo County. The entire known distribution of the annual Nipomo Mesa lupine is confined to an area less than 3 square miles that encompasses what is generally considered to be one extended population consisting of five to seven colonies (USFWS 2000; Center for Plant Conservation 2008), including a ruderal roadside area adjacent to Highway 1 south of the Site near the ConocoPhillips refinery. Nipomo Mesa lupine has been known from swales between or at the bases of stabilized dunes and seems to prefer pockets of open sand between widely spaced individuals of dune-heather, often mixed with other annuals and herbaceous perennials. Currently, it is also known from areas dominated by the invasive veldt grass. The Nipomo Mesa lupine blooms from March to May. Nipomo Mesa lupine is Federally listed as Endangered and is State listed as Endangered, and is categorized as CNPS 1B.1, a plant of limited distribution that is seriously endangered in California.

Presence on the Site: Nipomo Mesa lupine was not identified on the Site. Targeted searches were conducted during the blooming period for this species. The surveys were scheduled based on the observation of blooming individuals in known populations elsewhere on the SMR property. Figure 6 shows locations of nearby populations of Nipomo Mesa lupine on the SMR property. The nearest known population of Nipomo Mesa lupine is located approximately 0.25 miles north of the offloading facility east of the existing storage tanks.

Gambel's water cress (*Rorippa gambelii*)

Gambel's watercress is an herbaceous perennial in the mustard family that closely resembles the more widespread common watercress (*Rorippa nasturtium-aquaticum*); it differs by having toothed leaflets, a smaller terminal leaflet, more leaflets, and bracts around flower pedicels. It is listed as a Federally Endangered species, and is categorized as CNPS 1B.1, a plant of limited distribution that is seriously endangered in California.

Presence on the Site: Gambel's watercress was not found at the Site, and the Site does not support suitable habitat for this species. The lack of standing water forming a freshwater marsh severely limits the likelihood of its occurrence. However, it is discussed here because of a report of its presence at Black Lake Canyon by CNDDB (CDFW 2013).

Leafy Tarplant (*Deinandra* [*Hemizonia] increscens* subsp*. foliosa*)

Leafy tarplant is an annual herb in the sunflower family (Asteraceae) that blooms from June to September. It often produces eight ray flowers and 18 to 30 disk flowers, and bears branches midstem or higher. It is found in grassland habitat, especially in the interior portion of San Luis Obispo County, and is on the CNPS List 1B.2, a plant of limited distribution that is fairly endangered in California. There is no report of this species within the Oceano quadrangle in the CNDDB, but it is found in nearby quadrangles and could be potentially present.

Bruce Baldwin, of the UC Jepson Herbarium, has recently revised the taxonomy of *Deinandra increscens*, including subsp. foliosa (Baldwin and Strother 2006). Molecular data indicate that subsp. foliosa is more closely aligned with a different species of *Deinandra, Deinandra paniculata*. *D. paniculata* is primarily found in the southern part of California (Orange, Riverside, San Bernardino, and San Diego Counties), as well as in northern Baja California. It is on the CNPS List 4.2.

Presence on the Site: The leafy tarplant was not observed on the Site. Specimens of a related subspecies, coast tarplant (*Deinandra increscens* subsp. *increscens*), were identified during the survey.

6. Impacts

The following discussion addresses anticipated project-related botanical and plant community impacts. All biological impacts on the Site associated with the development occur on the undeveloped expanse of disturbed native habitat located east of the fenced refinery boundary (or in association with the potential coastal access route described below in Section 8. The disturbance areas within the existing coke facility and within the existing refinery are not anticipated to present ecological impacts. This report conservatively combined both temporary and permanent impacts for the purpose of impact assessment (Table 3). At this time, the project is anticipated to result in minor botanical and plant community impacts that can be mitigated to a less than significant level, and as such, resource protection and enhancement measures are proposed in section 7.

6.1 Direct Loss of Vegetation

The majority of the Site supports central dune scrub habitat degraded by long-term cattle grazing. The expected direct impacts associated with the project are primarily the loss of native plant species that may be present during clearing and grading of the Site. No direct impacts to federal or state listed species are anticipated as a result of this project. An estimated 26.5 acres (10.7ha) of central dune scrub habitat of varying quality on the Site will be impacted by the project as currently designed and shown on Figure 4. However, no sensitive vegetation associations occur within the project footprint.

Individuals of California spineflower, Blochman's groundsel, Blochman's leafy daisy, and sand almond occur within the disturbance envelope and would be impacted by project activities.

6.2 Indirect Loss of Vegetation

The final project footprint will consist of up to five parallel linear rail tracks that extend east from the refinery. The tracks will continue out through central dune scrub habitat, allowing rail cars to be staged for off-loading before returning to the main Southern Pacific track. By itself, the modified rail spur infrastructure will occupy/ impact relatively few acres compared to the total amount of native habitat present on the Site. The proposed project is not anticipated to result in erosion, sedimentation, or alteration of any jurisdictional (or non-jurisdictional) wetlands. The project could exacerbate the already significant invasion of veldt grass within the surrounding native habitat and all disturbance areas should be returned to pre-disturbance conditions to prevent an increase the presence of invasive botanical species in the area.

7. Recommended Impact Avoidance and Minimization Measures

The following measures are recommended to help prevent or reduce impacts to sensitive biological resources occurring on the Site. Because these measures protect both botanical and wildlife resources, a general discussion on resource protection measures for all biological resources at the Site is included below.

- Limit disturbance of upland habitat – To the extent feasible, the disturbance areas should be minimized.

- Construction protection plan – A concise plan that details the resource protection measures and provides maps of protected areas shall be prepared prior to the start of construction. The plan shall be specifically written for the construction personnel.

- Pre-construction surveys - To help protect plant species in the vicinity of the project, pre-construction reconnaissance-level biological surveys shall occur prior to initial clearing for the construction activities. The pre-construction surveys shall occur no more than two weeks prior to initial clearing activity and shall allow sufficient time for work schedule changes or addition of protection measures (i.e. additional fencing, wildlife exclusion measures) that may be necessary to avoid impacts to common and sensitive biological resources. The goal of the surveys shall be to identify common or sensitive status wildlife and plant species in the work area and, if possible, determine methods by which impacts to these species can be further avoided. Additionally, pre-construction surveys for Nipomo Mesa lupine should be conducted each spring prior to construction between January and June to confirm that no individuals occur within or adjacent to the work areas.

  Pre-construction surveys shall occur prior to initial clearing activity for each phase of construction if construction is phased. An approved biologist shall conduct pre-construction reconnaissance level surveys of the disturbance area during each phase of the construction project to determine the presence of common species, the potential capture and relocation of individual animals, and to determine a likely escape route for these species.

  It is critical that all construction personnel involved in clearing activities are aware that pre-construction biological surveys must be completed prior to each and every phase of initial clearing associated with the project. Good communication between the project manager and the project biologist is essential to ensure that surveys are conducted at the proper time.

- Temporary fencing and work site delineation - The boundaries of all work areas, including access roads and staging areas, shall be delineated on the grading plans. Sensitive habitats and resources adjacent to work areas shall be clearly delineated for avoidance on grading plans and in the field. All disturbance areas shall be clearly delineated in the field with fencing or flagging prior to any disturbance activities, including grading, grubbing, and clearing. Any native shrublands located within 25 feet (8 m) of proposed disturbance shall be temporarily fenced prior to any ground disturbance and such fencing is to remain in place throughout all grading and construction. Fencing shall be shown on all grading plans. No earth disturbance shall occur outside of the approved construction activities envelope.

- Temporary access roads – Temporary access roads should be limited to the fewest number possible to reduce impacts to biological resources. Temporary access roads and staging areas should be restored to pre-project conditions following project completion.

- Staging and stockpiling - All staging and stockpiling shall be limited to the existing paved or disturbed surfaces to the maximum extent feasible. No staging shall occur within the sensitive habitats or the designated buffer zones.

- Equipment maintenance – Equipment/vehicle maintenance/repairs shall be performed off-site or restricted to pre-designated areas.

- Spill protection measures – Engineering design shall include measures for spill containment such as berms and other structures to contain any released fluids or combinations of released fluids and other materials.

- Restoration plan - Any sensitive resources that are disturbed during construction will be restored using appropriate native species in consultation with a qualified restoration manager. These restoration measures may be implemented in areas subjected to temporary impacts, such as cut and fill slopes, or elsewhere on the SMR property. A written restoration plan shall be prepared detailing the steps, methodology, and performance criteria for passive or active restoration. Active restoration efforts shall be overseen by a qualified restoration manager after the preparation of a restoration plan detailing methods for implementation, monitoring requirements, and quantifiable performance standards. All seed and/or propagules shall be locally collected from sources as close to the project area as possible. Applicable restoration techniques may include weed abatement and natural recruitment of natives in some areas and may require active planting in others. Appropriate erosion control measures will be utilized for slope stabilization where necessary.

- Pre-construction training - A qualified biologist familiar with the project area shall conduct a training session for project personnel prior to implementation of construction activities. At a minimum, the training shall include: a description of sensitive habitat, plants, and wildlife on in the area; the provisions of the Endangered Species Act and other relevant regulatory criteria; the necessity for adhering to the Conditions of Approval; the specific measures that are being implemented to conserve sensitive resources while construction is occurring; and the boundaries within which the project activities are to be accomplished.

- Construction monitoring - A Construction Monitor who is a qualified biologist familiar with the project area shall be present during initial site preparation and all initial ground disturbance activities, such as vegetation removal and grading, as well as for initiation of each phase of the project to ensure that sensitive species are not present in the project area.

- Capture and release of wildlife during construction - Whenever possible, common wildlife and wildlife species of special concern may be captured and immediately re-located by a qualified biologist to similar habitat outside the working area. If federal or state-listed species are identified, then work shall cease in that location until the appropriate agencies can be contacted for further instruction.

7.1 Construction Monitoring and Reporting

Construction monitoring during initial disturbance is required to protect resources during construction and to identify any feasible impact avoidance, minimization, and erosion control measures that may be implemented in addition to the existing requirements.

To ensure that the minimum amount of habitat is disturbed during construction, initial flagging, fencing, and grading shall be inspected by the Construction Monitor. The Construction Monitor shall be on site to sufficiently monitor the protection measures detailed in this document. It is anticipated that monitoring will be most frequent during preparatory and initial site clearing work then will decrease in frequency once the mass grading has disturbed all of the topsoil within the construction activities area or a particular phase of work. The monitor shall be on-site (or shall spot check) during initial site-walks with contractors and crew orientation meeting(s) and during oak tree/native habitat/sensitive species protective fence installation. The Construction Monitor will be consulted regarding any necessary modifications to protection measures or modifications to grading design or infrastructure alignment.

Monthly and quarterly reports shall be prepared by the Construction Monitor throughout the construction project to document the status of construction activities, status of conditions, incidents of non-compliance (if any) and their results, as well as any other pertinent or requested data.

8. Potential Coastal Access Routes

Two potential routes to provide coastal access across the SMR from Highway 1 to Oceano Dunes State Vehicular Area are shown in Figure 8. This area was surveyed on June 11, 2013 by Senior Ecologist Mary Carroll. The survey area characterized the botanical resources through an approximately 300 foot wide corridor along the two routes. Both routes generally follow the existing dirt maintenance road used by Phillips 66 for outfall maintenance. Note that the coastal access routes would not include the road itself as it would remain an internal operational maintenance road for Phillips 66 and would not be appropriate for shared public access. Any coastal access would be an entirely new disturbance.

Route A closely follows the road whereas Route B diverges from the road to avoid existing mapped populations of Nipomo Mesa lupine.Coastal Access Route A supports high quality native habitat including sensitive plant communities and sensitive species. Route A traverses central dune scrub habitat (Figure 8 and Figure 9). Vegetation is dominated by the Dune-Heather - Silver Dune Lupine Association, which has a sensitive plant ranking of S3 in the CNDDB (CDFW 2013). Among the sensitive plant species observed along this access route are the state and federally listed endangered Nipomo Mesa lupine (FE / CE / CNPS 1B.1), Blochman's leafy daisy (*Erigeron blochmaniae*, CNPS 1B.2), crisp monardella (*Monardella undulata* subsp. *crispa*, CNPS 1B.2), Blochman's groundsel (*Senecio blochmaniae*, CNPS 4.2), and sand almond (*Prunus fasciculata* var. *punctata*, CNPS 4.3); see Tables 4 and 5. Significant impacts to native botanical resources are anticipated from installation of Coastal Access Route A due to the presence of colonies of Nipomo Mesa lupine and other sensitive resources along this route.

Coastal Access Route B also supports high quality central dune scrub. A portion of Coastal Access Route B occurs immediately adjacent to the southern margins of Jack Lake within 100 feet of arroyo willow thickets (*Salix lasiolepis* Woodland Alliance) and a freshwater marsh dominated by slough sedge (*Carex obnupta*). Two federal and state-endangered plant species have been reported historically from Jack Lake: marsh sandwort (*Arenaria paludicola*, FE/CE/1B.1) and La Graciosa thistle (*Cirsium scariosum* var. *loncholepis,* FE/CT/1B.1). Sensitive species observed along this route include Blochman's leafy daisy, Blochman's groundsel, California spineflower (*Mucronea californica*, CNPS 4.2), and sand almond. This route also occurs immediately adjacent to a mapped colony of Nipomo Mesa lupine at its northeastern terminus, and the likelihood of future Nipomo Mesa lupine individuals occurring within the mapped route is high.

Both coastal access routes occur within designated critical habitat for La Graciosa Thistle (USFWS 2009), although neither route passes directly through suitable wetland habitat. Route B occur immediately adjacent to suitable habitat however, well within a 100-foot buffer around Jack Lake and its associated wetlands. Either option would result in significant impacts to biological resources along the Coastal Access Route corridor.

As evidenced in historical aerial photographs, uncontrolled coastal access in this area was used heavily by off-road vehicle enthusiasts and the dunes were significantly impacted with an extensive destabilizing road and trail network. This access was closed by Tosco in the mid-1990s and the dune ecosystems have recovered through significant passive and active restoration efforts. A new uncontrolled coastal access route in this location could result in similar usage and similar degradation of the area as off-road vehicle users seek an alternate entry to the State Vehicular Use Area.

9. Conclusion

Central dune scrub vegetation occurs over most of the Site and supports at least four plant species regarded as sensitive by the CNPS -- California spineflower, sand almond, Blochman's groundsel, and Blochman's leafy daisy. While regarded as limited in range in California and in some cases locally endangered by CNPS, none of these species have formal listing status with federal or state agencies. Most of the project area is designated as critical habitat for La Graciosa thistle, which has been reported from nearby Jack Lake though suitable habitat is not present within the proposed disturbance areas.

ARCADIS reviewed and surveyed the proposed project area for the rail project, and concludes that anticipated impacts can be mitigated to a less than significant level. No federal or state listed plant species, wetlands, or sensitive native habitats are anticipated to be impacted by the proposed project.

Potential Coastal Access Routes A and B occur in high quality central dune scrub vegetation supporting a variety of sensitive plant species, including the Federal and State-listed Endangered Nipomo Mesa lupine, Blochman's leafy daisy, crisp monardella, Blochman's groundsel, California spineflower, and sand almond. The entire area is designated as critical habitat for La Graciosa thistle, which has been reported from nearby Jack Lake. Proposed Coastal Access Route B occurs within the 100-foot buffer around the wetlands and riparian habitat at Jack Lake. Either option would result in significant impacts to biological resources along the Coastal Access Route corridor.

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Tables

TABLE 1
OBSERVED VASCULAR PLANT SPECIES AT PROJECT SITE

Scientific Name	Common Name	Vegetation Type	Abundance in Vegetation Type Where Found
TREES			
Eucalyptus globulus	Tasmanian blue gum	planting	scarce
Pinus radiata	Monterey pine	planting	scarce
Quercus agrifolia	**coast live oak**	**central dune scrub**	**single tree near east end of large loop**
Salix lasiolepis	**arroyo willow**	**arroyo willow thickets**	**common in one area**
SHRUBS/SUBSHRUBS			
Acmispon glaber	**deerweed**	**central dune scrub**	**occasional**
Artemisia californica	**California sagebrush**	**central dune scrub**	**occasional**
Baccharis pilularis* subsp. *consanguinea	**coyote bush**	**central dune scrub**	**occasional to scattered**
Ericameria ericoides	**dune-heather**	**central dune scrub**	**common**
Erigonum parvifolium	**coastal buckwheat, seacliff buckwheat**	**central dune scrub**	**scattered**
Frangula californica	**coffee berry**	**central dune scrub**	**occasional at bottoms of slopes**
Lupinus arboreus	**coastal bush lupine**	**central dune scrub**	**occasional**
Lupinus chamissonis	**silver dune lupine**	**central dune scrub**	**occasional to scattered**
Mimulus aurantiacus	**bush monkeyflower**	**central dune scrub**	**occasional**
Prunus fasciculata* var. *punctata	**sand almond, dune almond**	**central dune scrub**	**scarce**
Rubus ursinus	**California blackberry**	**arroyo willow thickets**	**occasional**
Salvia mellifera	**black sage**	**central dune scrub**	**common**
Sambucus nigra* subsp. *caerulea	**elderberry**	**central dune scrub**	**occasional**
Senecio blochmaniae	**Blochman's groundsel, Blochman's ragwort**	**central dune scrub**	**uncommon**
Toxicodendron diversilobum	**poison-oak**	**central dune scrub**	**occasional**
HERBS (ANNUALS, BIENNIALS, HERBACEOUS PERENNIALS)			
Acmispon wrangelianus	**annual lotus**	**central dune scrub**	**scarce**
Amsinckia spectabilis* var. *microcarpa	**small-fruited seaside fiddleneck**	**central dune scrub**	**occasional**
Artemisia douglasiana	**mugwort**	**central dune scrub**	**occasional**
Avena barbata	slender wild oat	central dune scrub	uncommon
Bromus carinatus	**California brome**	**central dune scrub**	**uncommon**
Bromus diandrus	ripgut brome	central dune scrub	uncommon
Bromus madritensis subsp. *rubens*	red brome	central dune scrub	uncommon
Camissoniopsis micrantha	**sun cups**	**central dune scrub**	**occasional**
Camissonia strigulosa	**strigose sun cups**	**central dune scrub**	**uncommon**
Cardionema ramosissimum	**sandmat**	**central dune scrub**	**occasional**
Carduus pycnocephalus	Italian thistle	arroyo willow thickets	uncommon
Carpobrotus edulis	Hottentot fig (iceplant)	central dune scrub	near road
Castilleja exserta* subsp. *exserta	**owl's clover**	**central dune scrub**	**uncommon**
Centaurea melitensis	tocalote	central dune scrub	uncommon
Chenopodium californicum	**California goosefoot**	**central dune scrub**	**uncommon**
Chenopodium murale	nettleleaf goosefood	disturbed areas, openings in central dune scrub	uncommon
Chorizanthe angustifolia	**narrowleaf spineflower**	**central dune scrub**	**occasional to scattered**
Chorizanthe diffusa	**diffuse spineflower**	**central dune scrub**	**occasional**
Conicosia pugioniformis	pig root	central dune scrub	occasional, especially in disturbed areas
Conium maculatum	poison-hemlock	arroyo willow thickets	scattered
Corethrogyne filaginifolia	**California aster**	**central dune scrub**	**occasional**
Cortaderia jubata	pampas grass	ruderal	uncommon
Crassula connata	**pygmy weed**	**central dune scrub**	**occasional**
Croton californicus	**California croton**	**central dune scrub**	**occasional to scattered**
Cryptantha clevelandii	**common cryptantha**	**central dune scrub**	**scarce**
Deinandra increscens* subsp. *increscens	**coast tarweed**	**central dune scrub**	**occasional**
Distichlis spicata	**salt grass**	**central dune scrub**	**uncommon**
Dudleya lanceolata	**lance-leaved live forever**	**central dune scrub**	**scarce**
Ehrharta calycina	veldt grass	disturbed areas, openings in central dune scrub	abundant
Erigeron blochmaniae	**Blochman's leafy daisy**	**central dune scrub**	**scarce**
Eriophyllum multicaule	**many-stemmed woolly sunflower**	**central dune scrub**	**scarce**
Erodium botrys	storkbill filaree	central dune scrub	occasional
Erodium cicutarium	redstem filaree	central dune scrub	uncommon
Eschscholzia californica	**California poppy**	**central dune scrub**	**occasional**
Festuca myuros	rattail fescue	central dune scrub	occasional
Galium californicum* subsp. *maritimum	**coastal California bedstraw**	**central dune scrub**	**scarce**
Heterotheca grandiflora	**telegraph weed**	**ruderal**	**scarce**

TABLE 1
OBSERVED VASCULAR PLANT SPECIES AT PROJECT SITE

Scientific Name	Common Name	Vegetation Type	Abundance in Vegetation Type Where Found
Heterotheca sessiliflora* subsp. *echioides	**bristly goldenaster**	**central dune scrub**	**occasional**
Hirschfeldia incana	summer mustard, Mediterranean mustard	central dune scrub	scarce
Hordeum murinum	foxtail barley	arroyo willow thickets, disturbed areas	scarce
Horkelia cuneata* subsp. *cuneata	**coast horkelia**	**central dune scrub**	**occasional**
Hypochaeris glabra	smooth cat's ear	central dune scrub	occasional
Lamarckia aurea	goldentop	central dune scrub	scarce
Lastarriaea coriacea	**leather spineflower**	**central dune scrub**	**occasional**
Lasthenia californica	**goldfields**	**central dune scrub**	**uncommon**
Lessingia pectinata* var. *pectinata	**valley lessingia**	**central dune scrub**	**occasional**
Logfia californica	**California**		
Logfia gallica	slender weedy filago	central dune scrub	scarce
Malva nicaaensis	bull mallow	disturbed area	uncommon
Mucronea californica	**California spineflower**	**central dune scrub**	**occasional**
Navarretia atractyloides	**holly-leaved navarretia**	**central dune scrub**	**occasional**
Nuttalanthus texanus	**blue toadflax**	**central dune scrub**	**scarce**
Penstemon centranthifolius	**scarlet bugler**	**central dune scrub**	**scarce**
Pholisma arenarium	**sand food**	**central dune scrub**	**occasional**
Plantago erecta	**California plantain**	**central dune scrub**	**occasional**
Polygonum aviculare subsp. *depressum*	knotweed	ruderal	occasional
Pseudognaphalium ramosissima	**pink everlasting**	**central dune scrub**	**uncommon**
Pterostegia drymarioides	**fairy mist**	**central dune scrub**	**occasional**
Silene gallica	windmill pink	central dune scrub	scarce
Spergularia villosa	hairy sand spurrey	ruderal	scarce
Stephanomeria exigua	**wire-lettuce**	**central dune scrub**	**occasional**
Stylocline gnaphaloides	**everlasting neststraw**	**central dune scrub**	**occasional**
Uropappus lindleyi	**silver puffs**	**central dune scrub**	**occasional**
Native species are in **bold** print			

TABLE 2
PRESENT OR CNDDB RECORDED SENSITIVE ELEMENTS OF BIOLOGICAL DIVERSITY
FOR THE PHILLIPS 66 PROPERTY AND SURROUNDING AREA

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Amphibians		**USFWS / CDFG**		
Ambystoma californiense	California tiger salamander	FE / CSC	Grasslands, woodland; slow moving or ponded aquatic features for breeding	Not observed. Marginal to poor habitat present / No known breeding ponds in project vicinity
Rana aurora draytonii	California red-legged frog	FT / CSC	Lakes, ponds, marshes, slow-moving streams, riparian environments	Not observed. Species known to occur in aquatic features within one mile of the site. Potentially present in Oso Flaco Creek.
Spea hammondii	Western spadefoot toad	- / CSC	Foothills, woodlands, grasslands; temporary ponds and vernal pools for breeding	Not observed; marginally suitable upland habitat present. Aquatic habitat for breeding unlikely to occur on the site.
Taricha torosa torosa	Coast Range newt	FSC / CSC	Foothills, woodlands, riparian environments; moving clear water streams for breeding	Not observed; suitable habitat absent on site.
Birds		**USFWS / CDFG**		
Accipiter cooperii	**Cooper's hawk**	**- / CSC**	**Variety of habitats suitable; oak woodlands, forests, riparian areas for nesting.**	**Observed on site; Likely to forage on the site and occur intermittently on the site throughout the year.**
Aquila chrysaetos	Golden eagle	- / CSC (Fully Protected)	Open savannahs, grasslands, foothills and woodlands; nests in large trees or on cliff faces	Not observed; Species may occur intermittently on the site. Not likely to nest on the site.
Agelaius tricolor (nesting colony)	Tricolored blackbird	(FSC) MNBMC / CSC	Ponds, marshes, lakes	Not observed; species not likely to occur on the site; no suitable aquatic habitat on the site.
Amphispiza belli	**Bell's sage sparrow**	**- / CSC**	**coastal sage scrub,chamise chaparral**	**Observed on site; one male observed singing. The species could potentially nest on the site.**
Athene cunicularia	**Western burrowing owl**	**(FSC) MNBMC / CSC**	**Open savannahs, grasslands, foothills and barren areas; nests in small mammal burrows**	**Observed on site; suitable scrub habitat available on site; over-winters on the site.**
Buteo regalis	**Ferruginous hawk**	**(FSC) MNBMC / CSC**	**Open savannahs, grasslands, foothills and fields; may potentially over-winter on the site**	**Observed on site; suitable foraging habitat present.**
Charadrius alexandrinus nivosus (nesting)	Western snowy plover	FT / CSC	Sandy beaches, open mud-flats and dunes	Not observed; suitable habitat absent for this species.
Circus cyaneus	**Northern harrier**	**- / CSC**	**Open fields, grasslands, savannahs, and scrub habitat**	**Observed on site; suitable foraging habitat on the site for this species**
Elanus leucurus	White-tailed kite	MNBMC / CSC (Fully Protected)	FIelds, grasslands, oak woodlands, coastal scrub	Not observed; suitable habitat available for this species; species likely to occur on the site intermittently throughout the year.
Eremophila alpestris	California horned lark	- / CSC	Open fields, agricultural fields, barren areas, coastal dune scrub	Not observed; suitable open scrub and dune habitat present
Falco mexicanus	Prairie falcon	FSC / CSC	Deserts, foothills, grasslands and open savannahs; nests on cliff faces	Not observed; species may occur infrequently on the site while foraging
Gymnogyps californianus	California condor	FE/SE	Mountains, foothills, woodlands, grasslands	Not observed; potential foraging habitat on the site for this species
Laterallus jamaicensis coturniculus	California black rail	ST/ CDFG-FP	Marsh, estuary habitats	Not observed; no suitable habitat present for this species.
Lanius ludovicianus	**Loggerhead shrike**	**- / CSC**	**Deserts, foothills, grasslands and open savannahs; nests on cliff faces**	**Observed on the site; suitable habitat available for this species; species likely to occur on the site intermittently throughout the year.**
Sternula antillarum browni	California least tern	FE/SE	Coastal dunes, estuaries, beaches	Not observed; very limited dune habitat available on Site. No foraging habitat on Site
Fish		**USFWS / CDFG**		
Eucyclogobius newberryi	Tidewater goby	FE / CSC	Coastal lagoons and streams	Not expected; no suitable aquatic habitat present
Gasterosteus aculeatus williamsoni	Unarmored threespine stickleback	FE/SE	Clear water streams	Not expected; no suitable aquatic habitat present
Oncorhynchus mykiss irideus	Steelhead trout	FT / CSC	Coastal streams and rivers	Not expected; no suitable aquatic habitat present
Invertebrates		**USFWS / CDFG**		
Ablautus schlingeri	Oso Flaco robber fly	- / -	Sand dunes	Not observed; species last reported in 1962
Areniscythris brachypteris	Oso Flaco flightless moth	- / -	Coastal dunes	Not observed; species last reported in 1972
Chlosyne leanira elegans	Oso Flaco patch butterfly	- / -	**Coastal dunes**	Not observed; species last reported in 1983
Cincindela hirticollis gravida	sandy beach tiger beetle	- / -	Coast sand beaches	Not observed; no suitable habitat present

TABLE 2
PRESENT OR CNDDB RECORDED SENSITIVE ELEMENTS OF BIOLOGICAL DIVERSITY
FOR THE PHILLIPS 66 PROPERTY AND SURROUNDING AREA

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Danaus plexippus	**Monarch butterfly**	**- / -**	**Winter roosts occur in canopy of Monterey pine, eucalyptus and other large tree groves**	**Observed; Species likely to occur intermittently on the site; no winter roost locations known to occur on the site**
Lichnanthe albipilosa	White sand bear scarab beetle	- / -	Coastal dunes	Not observed; species last reported in 1972
Plebejus icarioides moroensis	Morro Bay blue butterfly	- / -	Coastal dunes	Not observed; found at Oso Flaco Lake in 2004; *Lupinus chamissonis* (present at the project site) is host plant for this butterfly
Mammals		**USFWS / CDFG**		
Antroxous pallidus	Pallid bat	- / CSC	Variety of habitats including woodlands, fields, coastal scrub and grasslands for foraging	Not observed; suitable foraging habitat present
Corynorhinus townsendii	Townsend's big-eared bat	- / CSC	Occurs in a variety of different habitat types; roosts in the open hanging from walls, ceilings	Not observed; suitable foraging habitat present
Lasionycteris noctivagans	Silver-haired bat	- / -	Lower montane coniferous forests; riparian corridors	Not observed; marginal to poor habitat suitability for this species
Lasiurus blossevillii	Western red bat	- / CSC	Cismontane woodland, lower montane coniferous forests, riparian forests - woodlands	Not observed; marginal to poor habitat suitability for this species
Lasiurus cinereus	Hoary bat	- / -	Broadleaved upland forest, cismontane woodland, lower montane coniferous forests, woodlands	Not observed; potentially suitable foraging habitat present
Myotis yumanensis	Yuma myotis	- / -	Cismontane woodland, lower montane coniferous forests, riparian forests - woodlands	Not observed; potentially suitable foraging habitat present
Taxidea taxus	American badger	- / CSC	Grasslands, woodlands, chaparral, coastal scrub, foothills	Not observed; suitable habitat present; species likely to occur on the site periodically.
Reptiles		**USFWS / CDFG**		
Anniella pulchra	Silvery legless lizard	FSC / CSC	Coastal dune scrub, woodlands with friable soil	Not observed; suitable habitat present on the site. Species is likely to occur within the project area.
Actinemys marmorata	Pacific pond turtle	FSC / CSC	Aquatic environments of lakes, streams, marshes, ponds and riparian systems	Not observed; known to occur in Oso Flaco Creek and other aquatic environments nearby.
Phrynosoma coronatum	Coast horned lizard	FSC / CSC	Coastal scrub, coastal dune scrub, woodlands, chaparral and grasslands	Not observed; suitable habitat present on the site. Species is likely to occur within the project area.
Thamnophis hammondii	Two-striped gartern snake	- / CSC	Marshes, ponds, lakes, streams, riparian systems	Not observed; not suitable aquatic habitat on site
Plants		**USFWS / CDFG / CNPS**		
Agrostis hooveri	Hoover's bent grass	- / - / 1B.2	Central maritime chaparral, woodlands, grasslands	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Aphanisma blitoides	Aphanisma	SOC / - / 1B.2	Coastal dunes, coastal bluff scrub, coastal scrub	Not observed; suitable habitat present.
Arctostaphylos cruzensis	Arroyo de la Cruz manzanita	- / - / 1B.1	Chaparral, coastal scrub, grassland, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to the Central Coast (San Luis Obispo and Monterey Counties).
Arctostaphylos luciana	Santa Lucia manzanita	- / - / 1B.2	Chaparral, woodlands	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Arctostaphylos morroensis	Morro manzanita	FT/-/1B.1	Central maritime chaparral, scrub, woodlands with sandy soils	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Arctostaphylos obispoensis	San Luis Obispo manzanita, Bishop manzanita	- / - / 4.3	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to the Central Coast (San Luis Obispo and Monterey Counties).

TABLE 2
PRESENT OR CNDDB RECORDED SENSITIVE ELEMENTS OF BIOLOGICAL DIVERSITY
FOR THE PHILLIPS 66 PROPERTY AND SURROUNDING AREA

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Arctostaphylos pechoensis	Pecho manzanita	- / - / 1B.2	Chaparral, coastal scrub, closed cone conifer forests	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Arctostaphylos pilosula	Santa Margarita manzanita	- / - / 1B.2	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent, known from La Panza Range. Endemic to the Central Coast (San Luis Obispo and Monterey Counties).
Arctostaphylos purissima	La Purisima manzanita	- / - / 1B.1	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Arctostaphylos rudis	Sand mesa manzanita	- / - / 1B.2	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Arctostaphylos tomentosa subsp. *daciticola*	dacite manzanita	- / - / 1B.1	Chaparral, woodland	Not observed; suitable habitat absent, known only from Hollister Peak. Endemic to San Luis Obispo County.
Arenaria paludicola	marsh sandwort	FE/SE/1B.1	Freshwater marshes and adjacent areas.	Not observed, suitable habitat absent. Known from only two occurrences in Black Lake Canyon and Oso Flaco Lake.
Astragalus didymocarpus var. *milesianus*	Mile's milk-vetch	- / - / 1B.2	Coastal scrub, often on serpentine clay soils	Not observed; suitable coastal scrub habitat with clay soils absent. Endemic to Ventura, Santa Barbara, and San Luis Obispo Counties.
Atriplex serenana var. *davidsonii*	Davidson's saltscale	- / - / 1B.2	Coastal bluff scrub, coastal scrub	Not observed; suitable habitat present.
Calochortus obispoensis	San Luis mariposa lily	- / - / 1B.2	Chaparral, coastal scrub, grasslands, often on serpentine soils	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Calochortus simulans	San Luis Obispo mariposa lily	- / - / 1B.3	Chaparral, coastal scrub, woodlands, lower montane coniferous forests, often on granitic soils, sometimes serpentine soils	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Calystegia subacaulis subsp. *episcopalis*	Cambria morning-glory	- / - / 1B.2	Chaparral, woodlands.	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Carex obispoensis	San Luis Obispo sedge	- / - / 1B.2	Chaparral, coastal scrub, closed cone conifer forests, coastal prairie and grasslands	Not observed, suitable habitat potentially present.
Castilleja densiflora subsp. *obispoensis*	San Luis Obispo owl's-clover	- / - / 1B.2	Grassland, meadows, and seeps	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Ceanothus cuneatus var. *fascicularis*	Lompoc ceanothus	- / - / 4.2	Central maritime chaparral, central coastal scrub	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Ceanothus impressus subsp. *nipomensis*	Nipomo ceanothus	Local Concern	Central maritime chaparral, central coastal scrub	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Centromadia parryi subsp. *congdonii*	Congdon's tarplant	- / - / 1B.2	Grasslands and wetland fringes, often in alkaline soils	Not observed; suitable habitat absent.
Chenopodium littoreum	coastal goosefoot	- / - / 1B.2	Coastal dunes	Not observed; suitable habitat present.
Chlorogalum pomeridianum var. *minus*	dwarf soaproot	- / - / 1B.2	Chaparral in serpentine soils	Not observed, suitable habitat absent.
Chorizanthe breweri	Brewer's spineflower	- / - / 1B.3	Chaparral, coastal scrub, grassland, closed cone conifer forests, woodlands in serpentine soils	Not observed; suitable habitat absent.
Chorizanthe rectispina	Straight-awned spineflower	-/-/1B.3	Chaparral, coastal scrub, woodlands	Not observed; suitable habitat potentially present.
Cicuta maculata var. *bolanderi*	Bolander's water-hemlock	- / - /2.1	Coastal marshes	Not observed; suitable marsh habitat absent.
Cirsium fontinale var. *obispoense*	Chorro Creek bog thistle	FE/SE/1B.2	Chaparral, coastal scrub, woodlands, grasslands in serpentine seeps and drainages	Not observed; suitable serpentine substrate absent. Endemic to San Luis Obispo County.
Cirsium rhothophilum	Surf thistle	-/CT/1B.2	Coastal dunes, coastal bluff scrub	Not observed; unlikely on project site; known from dunes at Pismo Beach, Nipomo, and Santa Barbara County. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Cirsium scariosum var. *loncholepis*	La Graciosa thistle	FE/CT/1B.1	Coastal dunes, coastal bluff scrub, moist habitats such as marshes	Not observed; suitable marsh habitat absent.
Cladium californicum	California saw-grass	- / - / 2.2	Marshes	Not observed; suitable marsh habitat absent.
Clarkia speciosa subsp. *immaculata*	Pismo clarkia	FE/CR/1B.1	Chaparral, coastal scrub, woodlands, grasslands	Not observed. Endemic to San Luis Obispo County.
Cordylanthus rigidus subsp. *littoralis*	Seaside bird's-beak	- / SE / 1B.1	Chaparral, coastal scrub, woodlands, grasslands	Not observed. Endemic to Central Coast.

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Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Dudleya abramsii subsp. *murina*	San Luis Obispo dudleya	- / - / 1B.3	Chaparral, woodlands, rocky places	Not observed; suitable habitat absent. Endemic to San Luis Obispo County.
Dudleya blochmaniae subsp. *blochmaniae*	Blochman's dudleya	- / - / 1B.1	Chaparral, coastal scrub, grasslands, often on clay or serpentine soils in bare rocky places	Not observed; suitable habitat absent.
Deinandra increscens subsp. *villosa*	Gaviota tarplant	FE/CE/1B.1	coastal bluff scrub, coastal scrub, valley and foothill grassland	Not observed; suitable scrub habitat present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Deinandra increscens subsp. *foliosa*	leafy tarplant	- / - / 1B.2	Grassland, often sandy	Not observed; suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Delphinium parryi subsp. *eastwoodiae*	Eastwood's larkspur	- / - / 1B.2	Chaparral, valley and foothill grassland	Not observed, suitable habitat absent.
Delphinium parryi subsp. *blochmaniae*	dune larkspur	- / - / 1B.2	Coastal dunes, coastal scrub, central maritime chaparral	Not observed, suitable habitat present. Endemic to Ventura, Santa Barbara, and San Luis Obispo Counties.
Delphinium umbraculorum	Umbrella larkspur	- / - / 1B.3	Cismontane woodland	Not observed, suitable habitat absent.
Dithyrea maritima	Beach spectacle pod	-/CT/1B.1	Coastal dunes	Not observed; known from low sand dunes from Morro Bay sand spit southward
Dudleya abramsii subsp. *murina*	mouse-gray dudlea	- / - / 1B.3	Chaparral, coastal scrub, grasslands, often on serpentine soils in bare rocky places	Not observed; suitable habitat present although serpentine soils absent. Endemic to San Luis Obispo County.
Erigeron blochmaniae	**Blochman's leafy daisy**	**- / - / 1B.2**	**Coastal dunes, coastal scrub**	**Present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).**
Erigeron sanctarum	Saint's daisy	- / - / 4.2	Central maritime chaparral, central coastal scrub, woodlands	Not observed, suitable habitat present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Eriodictyon altissimum	Indian Knob mountain balm	FE/CE/1B.1	Central maritime chaparral, central coastal scrub, woodlands	Not observed; suitable habitat absent. Known from Indian Knob and Irish Hills. Endemic to San Luis Obispo County.
Eryngium aristulatum var. *hooveri*	Hoover's button celery	- / - / 1B.1	Vernal pools	Not observed; suitable habitat absent. Known from Laguna Lake near San Luis Obispo.
Erysimum capitatum var. *lompocense*	San Luis Obispo wallflower	- / - / 4.2	Central maritime chaparral, central coastal scrub in sandy soils	Not observed; suitable habitat absent.
Erysimum suffrutescens	Suffrutescent wallflower	- / - / 4.2	Coastal dunes, coastal dune scrub, coastal scrub	Not observed; suitable sandy soils present.
Fritillaria viridea	San Benito fritillary	- / - / 1B.2	Chaparral, serpentine soils.	Not observed; chaparral habitat with serpentine substrate absent. Endemic to Central Coast (San Luis Obispo, Monterey, Fresno, San Benito Counties).
Horkelia cuneata subsp. *puberula*	mesa horkelia	- / - / 1B.1	Chaparral, coastal scrub, and woodlands, especially in sandy or gravelly soils	Not observed; suitable coastal scrub, maritime chaparral, and woodland habitat present.
Horkelia cuneata subsp. *sericea*	Kellogg's horkelia	- / - / 1B.1	Closed-cone coniferous forest, chaparral, coastal dunes, coastal scrub	Not observed; suitable habitat present.
Layia heterotricha	pale-yellow layia	- / - / 1B.1	Grassland, coastal scrub, woodlands	Not observed; suitable habitat present.
Layia jonesii	Jones' layia	- / - / 1B.2	Chaparral, grasslands in clay or serpentine soils	Not observed; suitable clay soils absent.
Lupinus ludovicianus	San Luis Obispo County lupine	- / - / 1B.2	Chaparral, woodlands, grasslands in sandy or sandstone-derived soils	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Lupinus nipomoensis	Nipomo Mesa lupine	FE / SE / 1B.1	Coastal dunes	Not observed; suitable habitat present. Endemic to San Luis Obispo County.
Monardella frutescens	San Luis Obispo manardella	- / - / 1B.2	Coastal dunes, coastal scrub	Not observed; suitable habitat present.
Monardella palmeri	Palmer's monardella	- / - / 1B.2	Chaparral, woodlands in serpentine soils	Not observed; suitable habitat absent. Endemic to Central Coast (San Luis Obispo and Monterey Counties.)
Monardella undulata subsp. *crispa*	Crisp monardella	- / - / 1B.2	Coastal dunes, coastal scrub, coastal prairie, central maritime chaparral, Bishop pine forest, ponderosa pine forest (sandy soils at low elevations)	Not observed; suitable habitat present.

TABLE 2
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FOR THE PHILLIPS 66 PROPERTY AND SURROUNDING AREA

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Mucronea californica	**California spineflower**	**- / - / 4.2**	**Coastal dunes, coastal scrub, central maritime chaparral, woodlands, grasslands (sandy)**	**Present.**
Nasturtium gambelii	Gambel's water cress	FE / SE / 1B.1	Coastal marshes	Not observed; suitable marsh habitat absent.
Nemacaulis denudata var. *denudata*	coast wooly-heads	- / - / 1B.2	Coastal dunes	Not observed; suitable habitat present.
Nemacladus secundiflorus var. *robbinsii*	Robbins' nemacladus	- / - / 1B.2	Chaparral, valley and foothill grassland	Not observed; suitable habitat absent.
Orobanche parishii subsp. *brachyloba*	Short-lobed broomrape	**- / - / 4.2**	Coastal bluff scrub, coastal dunes, coastal scrub	Not observed; suitable habitat present.
Prunus fasciculata* var. *punctata	**Sand almond**	**- / - / 4.3**	**Coastal dunes, coastal scrub, central maritime chaparral, woodlands**	**Present.**
Sanicula maritima	Adobe sanicle	- / Rare / 1B.1	Chaparral, coastal prairie, grasslands, seeps in clay and serpentine soils	Not observed; suitable habitat absent.
Scrophularia atrata	black-flowered figwort	SOC / - / 1B.2	Coastal dunes, coastal scrub, chaparral, woodlands, Bishop pine forest	Not observed, suitable habitat potentially present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Senecio aphanactis	Rayless ragwort	- / - / 2.2	Coastal scrub, chaparral, woodlands	Not observed; potential suitable habitat present.
Senecio blochmaniae	**Blochman's groundsel**	**- / - / 4.2**	**Coastal dunes, coastal scrub**	**Present.**
Sidalcea hickmanii subsp. *anomala*	Cuesta Pass checkerbloom	- / Rare / 1B.2	Chaparral, closed cone conifer forests in serpentine soils	Not observed; suitable habitat of closed-cone coniferous forest on serpentine substrate absent. Endemic to San Luis Obispo County.
Streptanthus albidus subsp. *peramoenus*	Most beautiful jewel-flower	- / - / 1B.2	Chaparral, woodlands, grasslands in serpentine soils	Not observed; suitable serpentine substrate absent
Symphyotrichum defoliatum	San Bernardino aster	- / - / 1B.2	Cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, valley and foothill grassland	Not observed; potential suitable habitat present.
Trifolium depauperatum var. *hydrophilum*	Saline clover	- / - / 1B.2	Marshes, vernal pools, moist grasslands, often in alkaline soil	Not observed; suitable habitat absent.
Tropidocarpum capparideum	Caper-fruited tropidocarpum	- / - / 1B.1	Grasslands, often in alkaline soils	Not observed; suitable habitat absent.

Based on CNPS Inventory of Rare and Endangered Plants (online edition 2013) and CNDDB (2013) search results for the Nipomo, Guadalupe, Santa Maria, Orcutt, Arroyo Grande NE, Oceano, Pismo Beach, Casmalia and Tar Spring Ridge quadrangles.

Status Codes

United States Fish and Wildlife Service (USFWS)
FE Federal Endangered
FT Federal Threatened
SOC Species of Concern as listed by Sacramento Office (USFWS, 2004)
MNBMC Migratory nongame bird of management concern
FSC Federal special concern species
BCC Birds of Conservation Concern

California Department of Fish and Game (CDFG)
CE California Endangered
CT California Threatened
CR California Rare
CSC California Species of Concern

California Native Plant Society (CNPS)
Lists
List 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
List 2: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
List 3: Plants About Which We Need More Information - A Review List
List 4: Plants with limited distribution (Watch List)
Extensions to List Categories
.1 - Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 – Fairly endangered in California (20-80% occurrences threatened)
.3 – Not very endangered in California (<20% of occurrences threatened or no current threats known)

TABLE 3

POTENTIAL PROJECT IMPACTS TO VEGETATION TYPES AT THE SITE

Plant Community Type	Impacts for New Pipeline (Acres)	Impacts for Rail Spur and Unloading Facility (Acres)	Impacts for Secondary Emergency Vehicle Access Route (Acres)	Impacts for Internal Refinery Piping and Existing Track Repair (Acres)	Total Potential Impacts for Proprosed Coastal Access Route A (Acres)	Total Potential Impacts for Proprosed Coastal Access Route B (Acres)
Sensitive Habitats						
Arroyo Willow Wetland	0.00	0.00	0.00	0.00	0.00	0.00
Central Dune Scrub - Silver Dune Lupine and Dune-Heather (& Dune-Heather and Silver Dune Lupine) Association	0.00	0.00	0.00	0.00	5.99	5.07
Dune Sheet	0.00	0.00	0.00	0.00	0.00	0.00
Freshwater Marsh	0.00	0.00	0.00	0.00	0.00	0.00
Non- Sensitive Habitats						
Central Dune Scrub - Black Sage, Dune-Heather Association	0.00	10.11	0.03	0.00	0.00	0.00
Central Dune Scrub - Coastal Dune Lupine, Dune-Heather, Silver Bush Lupine Association	0.00	0.00	0.00	0.00	0.00	0.00
Central Dune Scrub - Dune-Heather Alliance	0.00	4.57	0.01	0.00	0.00	0.00
Central Dune Scrub - Dune-Heather, California Coffeeberry, Blue Elderberry Association	0.00	0.00	0.00	0.00	0.00	0.00
Central Dune Scrub - Dune-Heather, Seacliff Buckwheat, Black Sage Association	0.00	7.26	0.00	0.00	0.00	0.00
Degraded Central Dune Scrub	2.22	2.32	0.00	0.00	0.00	0.00
Industrial/Existing Refinery	1.88	13.92	1.62	4.48	0.00	0.00
Nonnative Veldt Grassland	0.00	0.30	0.01	0.00	0.00	0.00
Planted Trees	0.00	0.14	0.00	0.00	0.00	0.00
Total Sensitive Habitat Impacts	**0.00**	**0.00**	**0.00**	**0.00**	**5.99**	**5.07**
Total Non-Sensitive Habitat Impacts	**4.10**	**38.62**	**1.67**	**4.48**	**0.00**	**0.00**
TOTALS	**4.10**	**38.62**	**1.67**	**4.48**	**5.99**	**5.07**

Note: To provide comprehensive acreages, this table includes a category for Industrial/Existing Refinery; however, no impacts to ecological resources are anticipated within this area.

TABLE 3

POTENTIAL PROJECT IMPACTS TO VEGETATION TYPES AT THE SITE

Plant Community Type	Total Rail Spur Project (excluding coastal access)
Sensitive Habitats	
Arroyo Willow Wetland	0.00
Central Dune Scrub - Silver Dune Lupine and Dune-Heather (& Dune-Heather and Silver Dune Lupine) Association	0.00
Dune Sheet	0.00
Freshwater Marsh	0.00
Non- Sensitive Habitats	
Central Dune Scrub - Black Sage, Dune-Heather Association	10.14
Central Dune Scrub - Coastal Dune Lupine, Dune-Heather, Silver Bush Lupine Association	0.00
Central Dune Scrub - Dune-Heather Alliance	4.58
Central Dune Scrub - Dune-Heather, California Coffeeberry, Blue Elderberry Association	0.00
Central Dune Scrub - Dune-Heather, Seacliff Buckwheat, Black Sage Association	7.26
Degraded Central Dune Scrub	4.54
Industrial/Existing Refinery	21.90
Nonnative Veldt Grassland	0.31
Planted Trees	0.14
Total Sensitive Habitat Impacts	**0.00**
Total Impact Area (including existing industrial refinery areas and roads)	**48.87**
TOTAL	**48.87**

TABLE 4
OBSERVED VASCULAR PLANT SPECIES ALONG PROPOSED COASTAL ACCESS ROUTE

Scientific Name	Common Name	Vegetation Type	Abundance in Vegetation Type Where Found
TREES			
Salix lasiolepis	**arroyo willow**	**arroyo willow thickets**	**common in one area**
SHRUBS/SUBSHRUBS			
Acmispon glaber	**deerweed**	**central dune scrub**	**occasional**
Artemisia californica	**California sagebrush**	**central dune scrub**	**occasional**
Baccharis pilularis* subsp. *consanguinea	**coyote bush**	**central dune scrub**	**occasional to scattered**
Ericameria ericoides	**dune-heather**	**central dune scrub**	**common**
Erigonum parvifolium	**coastal buckwheat, seacliff buckwheat**	**central dune scrub**	**scattered**
Frangula californica	**coffee berry**	**central dune scrub**	**occasional at bottoms of slopes**
Linanthus californicus	**prickly phlox**	**central dune scrub**	**scarce**
Lupinus arboreus	**coastal bush lupine**	**central dune scrub**	**occasional**
Lupinus chamissonis	**silver dune lupine**	**central dune scrub**	**occasional to scattered**
Mimulus aurantiacus	**bush monkeyflower**	**central dune scrub**	**occasional**
Prunus fasciculata* var. *punctata	**sand almond, dune almond**	**central dune scrub**	**scarce**
Ribes divaricatum	**straggly gooseberry**	**arroyo willow thickets, freshwater marsh**	**occasional**
Rubus ursinus	**California blackberry**	**arroyo willow thickets**	**occasional**
Salvia mellifera	**black sage**	**central dune scrub**	**common**
Sambucus nigra* subsp. *caerulea	**elderberry**	**central dune scrub**	**occasional**
Senecio blochmaniae	**Blochman's groundsel, Blochman's ragwort**	**central dune scrub**	**uncommon**
Toxicodendron diversilobum	**poison-oak**	**central dune scrub**	**occasional**
HERBS (ANNUALS, BIENNIALS, HERBACEOUS PERENNIALS)			
Abronia umbellata	**purple sand verbena**	**central dune scrub**	**occasional**
Achillea millefolium	**white yarrow**	**central dune scrub**	**occasional**
Acmispon wrangelianus	**annual lotus**	**central dune scrub**	**scarce**
Amsinckia spectabilis* var. *microcarpa	**small-fruited seaside fiddleneck**	**central dune scrub**	**occasional**
Artemisia douglasiana	**mugwort**	**arroyo willow thickets**	**occasional**
Avena barbata	slender wild oat	central dune scrub	uncommon
Bromus carinatus	**California brome**	**central dune scrub**	**uncommon**
Bromus diandrus	ripgut brome	central dune scrub	uncommon
Bromus madritensis subsp. *rubens*	red brome	central dune scrub	uncommon
Camissoniopsis micrantha	**sun cups**	**central dune scrub**	**occasional**
Camissonia strigulosa	**strigose sun cups**	**central dune scrub**	**uncommon**
Cardionema ramosissimum	**sandmat**	**central dune scrub**	**occasional**
Carduus pycnocephalus	Italian thistle	arroyo willow thickets	uncommon
Carex obnupta	**slough sedge**	**freshwater marsh**	**common**
Carex pansa	**dune sedge**	**central dune scrub**	**scarce**
Carpobrotus edulis	Hottentot fig (iceplant)	central dune scrub	near road
Castilleja affinis* subsp. *affinis	**Indian paintbrush**	**central dune scrub**	**occasional**
Castilleja exserta subsp. exserta	**owl's clover**	**central dune scrub**	**uncommon**
Centaurea melitensis	tocalote	central dune scrub	uncommon
Chenopodium californicum	**California goosefoot**	**central dune scrub**	**uncommon**
Chenopodium murale	nettleleaf goosefood	disturbed areas, openings in central dune scrub	uncommon
Chorizanthe angustifolia	**narrowleaf spineflower**	**central dune scrub**	**occasional to scattered**
Chorizanthe diffusa	**diffuse spineflower**	**central dune scrub**	**occasional**
Conicosia pugioniformis	pig root	central dune scrub	occasional, especially in disturbed areas
Conium maculatum	poison-hemlock	arroyo willow thickets	scattered
Corethrogyne filaginifolia	**California aster**	**central dune scrub**	**occasional**
Cortaderia jubata	pampas grass	ruderal	uncommon
Crassula connata	**pygmy weed**	**central dune scrub**	**occasional**
Croton californicus	**California croton**	**central dune scrub**	**occasional to scattered**
Cryptantha clevelandii	**common cryptantha**	**central dune scrub**	**scarce**
Deinandra increscens* subsp. *increscens	**coast tarweed**	**central dune scrub**	**occasional**
Descurainea pinnata	**tansy mustard**	**central dune scrub**	**occasional**
Distichlis spicata	**salt grass**	**central dune scrub**	**uncommon**
Dudleya lanceolata	**lance-leaved live forever**	**central dune scrub**	**scarce**
Ehrharta calycina	veldt grass	disturbed areas, openings in central dune scrub	abundant
Erigeron blochmaniae	**Blochman's leafy daisy**	**central dune scrub**	**occasional**
Erodium botrys	storkbill filaree	central dune scrub	occasional
Erodium cicutarium	redstem filaree	central dune scrub	uncommon
Eschscholzia californica	**California poppy**	**central dune scrub**	**occasional**

TABLE 4
OBSERVED VASCULAR PLANT SPECIES ALONG PROPOSED COASTAL ACCESS ROUTE

Scientific Name	Common Name	Vegetation Type	Abundance in Vegetation Type Where Found
Festuca myuros	rattail fescue	central dune scrub	occasional
Galium californicum* subsp. *maritimum	**coastal California bedstraw**	**central dune scrub**	**scarce**
Hirschfeldia incana	summer mustard, Mediterranean mustard	central dune scrub	scarce
Hordeum murinum	foxtail barley	arroyo willow thickets, disturbed areas	scarce
Horkelia cuneata* subsp. *cuneata	**coast horkelia**	**central dune scrub**	**occasional**
Hypochaeris glabra	smooth cat's ear	central dune scrub	occasional
Juncus lescurii	**dune rush**	**arroyo willow thickets**	**uncommon**
Lamarckia aurea	goldentop	central dune scrub	scarce
Lastarriaea coriacea	**leather spineflower**	**central dune scrub**	**occasional**
Lessingia pectinata* var. *pectinata	**valley lessingia**	**central dune scrub**	**occasional**
Logfia gallica	slender weedy filago	**central dune scrub**	scarce
Lupinus nipomensis	**Nipomo Mesa lupine**	**central dune scrub**	**scarce**
Monardella undulata subsp. crispa	**crisp monardella**	**central dune scrub**	**occasional**
Mucronea californica	**California spineflower**	**central dune scrub**	**occasional**
Navarretia atractyloides	**holly-leaved navarretia**	**central dune scrub**	**occasional**
Phacelia distans	**wild heliotrope**	**central dune scrub**	**occasional**
Phacelia ramosissima* var. *montereyensis	**branching phacelia**	**central dune scrub**	**occasional**
Pholisma arenarium	**sand food**	**central dune scrub**	**occasional**
Plantago erecta	**California plantain**	**central dune scrub**	**occasional**
Salvia columbariae	**chia sage**	**central dune scrub**	**scarce**
***Schoenoplectus* species (not collected)**	**bulrush**	**freshwater marsh**	**common**
Silene gallica	windmill pink	central dune scrub	scarce
Sonchus olearaceus	sow-thistle	ruderal	scarce
Spergularia villosa	hairy sand spurrey	ruderal	scarce
Stephanomeria exigua	**wire-lettuce**	**central dune scrub**	**occasional**
Stylocline gnaphaloides	**everlasting neststraw**	**central dune scrub**	**occasional**
Urtica dioica	**giant creek nettle**	**freshwater marsh**	**occasional**
Native species are in **bold** print			

TABLE 5
PRESENT OR CNDDB RECORDED SENSITIVE PLANT SPECIES
ALONG THE PROPOSED COASTAL ACCESS ROAD

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Plants		**USFWS / CDFG / CNPS**		
Agrostis hooveri	Hoover's bent grass	- / - / 1B.2	Central maritime chaparral, woodlands, grasslands	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Aphanisma blitoides	Aphanisma	SOC / - / 1B.2	Coastal dunes, coastal bluff scrub, coastal scrub	Not observed; suitable habitat present.
Arctostaphylos cruzensis	Arroyo de la Cruz manzanita	- / - / 1B.1	Chaparral, coastal scrub, grassland, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to the Central Coast (San Luis Obispo and Monterey Counties).
Arctostaphylos luciana	Santa Lucia manzanita	- / - / 1B.2	Chaparral, woodlands	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Arctostaphylos morroensis	Morro manzanita	FT/-/1B.1	Central maritime chaparral, scrub, woodlands with sandy soils	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Arctostaphylos obispoensis	San Luis Obispo manzanita, Bishop manzanita	- / - / 4.3	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to the Central Coast (San Luis Obispo and Monterey Counties).
Arctostaphylos pechoensis	Pecho manzanita	- / - / 1B.2	Chaparral, coastal scrub, closed cone conifer forests	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Arctostaphylos pilosula	Santa Margarita manzanita	- / - / 1B.2	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent, known from La Panza Range. Endemic to the Central Coast (San Luis Obispo and Monterey Counties).
Arctostaphylos purissima	La Purisima manzanita	- / - / 1B.1	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Arctostaphylos rudis	Sand mesa manzanita	- / - / 1B.2	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Arctostaphylos tomentosa subsp. *daciticola*	dacite manzanita	- / - / 1B.1	Chaparral, woodland	Not observed; suitable habitat absent, known only from Hollister Peak. Endemic to San Luis Obispo County.
Arenaria paludicola	**marsh sandwort**	**FE/CE/1B.1**	**Freshwater marshes and adjacent areas.**	**Not observed but previously reported from Jack Lake immediately adjacent to coastal access route (CNDDB 2013).**

TABLE 5
PRESENT OR CNDDB RECORDED SENSITIVE PLANT SPECIES
ALONG THE PROPOSED COASTAL ACCESS ROAD

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Astragalus didymocarpus var. *milesianus*	Mile's milk-vetch	- / - / 1B.2	Coastal scrub, often on serpentine clay soils	Not observed; suitable coastal scrub habitat with clay soils absent. Endemic to Ventura, Santa Barbara, and San Luis Obispo Counties.
Atriplex serenana var. *davidsonii*	Davidson's saltscale	- / - / 1B.2	Coastal bluff scrub, coastal scrub	Not observed; suitable habitat present.
Calochortus obispoensis	San Luis mariposa lily	- / - / 1B.2	Chaparral, coastal scrub, grasslands, often on serpentine soils	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Calochortus simulans	San Luis Obispo mariposa lily	- / - / 1B.3	Chaparral, coastal scrub, woodlands, lower montane coniferous forests, often on granitic soils, sometimes serpentine soils	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Calystegia subacaulis subsp. *episcopalis*	Cambria morning-glory	- / - / 1B.2	Chaparral, woodlands.	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Carex obispoensis	San Luis Obispo sedge	- / - / 1B.2	Chaparral, coastal scrub, closed cone conifer forests, coastal prairie and grasslands	Not observed, suitable habitat potentially present.
Castilleja densiflora subsp. *obispoensis*	San Luis Obispo owl's-clover	- / - / 1B.2	Grassland, meadows, and seeps	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Ceanothus cuneatus var. *fascicularis*	Lompoc ceanothus	- / - / 4.2	Central maritime chaparral, central coastal scrub	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Ceanothus impressus subsp. *nipomensis*	Nipomo ceanothus	Local Concern	Central maritime chaparral, central coastal scrub	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Centromadia parryi subsp. *congdonii*	Congdon's tarplant	- / - / 1B.2	Grasslands and wetland fringes, often in alkaline soils	Not observed; suitable habitat absent.
Chenopodium littoreum	coastal goosefoot	- / - / 1B.2	Coastal dunes	Not observed; suitable habitat present.
Chlorogalum pomeridianum var. *minus*	dwarf soaproot	- / - / 1B.2	Chaparral in serpentine soils	Not observed, suitable habitat absent.

TABLE 5
PRESENT OR CNDDB RECORDED SENSITIVE PLANT SPECIES
ALONG THE PROPOSED COASTAL ACCESS ROAD

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Chorizanthe breweri	Brewer's spineflower	- / - / 1B.3	Chaparral, coastal scrub, grassland, closed cone conifer forests, woodlands in serpentine soils	Not observed; suitable habitat absent.
Chorizanthe rectispina	Straight-awned spineflower	-/-/1B.3	Chaparral, coastal scrub, woodlands	Not observed; suitable habitat potentially present.
Cicuta maculata var. *bolanderi*	Bolander's water-hemlock	- / - /2.1	Coastal marshes	Not observed; suitable marsh habitat absent.
Cirsium fontinale var. *obispoense*	Chorro Creek bog thistle	FE/CE/1B.2	Chaparral, coastal scrub, woodlands, grasslands in serpentine seeps and drainages	Not observed; suitable serpentine substrate absent. Endemic to San Luis Obispo County.
Cirsium rhothophilum	Surf thistle	-/CT/1B.2	Coastal dunes, coastal bluff scrub	Not observed; known from dunes at Pismo Beach, Nipomo, and Santa Barbara County. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Cirsium scariosum* var. *loncholepis	**La Graciosa thistle**	**FE/CT/1B.1**	**Coastal dunes, coastal bluff scrub, moist habitats such as marshes**	**Not observed but previously reported from Jack Lake immediately adjacent to coastal access route (CNDDB 2013). Entire area for proposed coastal access routes lie within designated critical habitat for this species.**
Cladium californicum	California saw-grass	- / - / 2.2	Marshes	Not observed; suitable marsh habitat absent.
Clarkia speciosa subsp. *immaculata*	Pismo clarkia	FE/CR/1B.1	Chaparral, coastal scrub, woodlands, grasslands	Not observed. Endemic to San Luis Obispo County.
Cordylanthus rigidus subsp. *littoralis*	Seaside bird's-beak	- / CE / 1B.1	Chaparral, coastal scrub, woodlands, grasslands	Not observed. Endemic to Central Coast.
Dudleya abramsii subsp. *murina*	San Luis Obispo dudleya	- / - / 1B.3	Chaparral, woodlands, rocky places	Not observed; suitable habitat absent. Endemic to San Luis Obispo County.
Dudleya blochmaniae subsp. *blochmaniae*	Blochman's dudleya	- / - / 1B.1	Chaparral, coastal scrub, grasslands, often on clay or serpentine soils in bare rocky places	Not observed; suitable habitat absent.

TABLE 5
PRESENT OR CNDDB RECORDED SENSITIVE PLANT SPECIES
ALONG THE PROPOSED COASTAL ACCESS ROAD

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Deinandra increscens subsp. *villosa*	Gaviota tarplant	FE/CE/1B.1	coastal bluff scrub, coastal scrub, valley and foothill grassland	Not observed; suitable scrub habitat present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Deinandra increscens subsp. *foliosa*	leafy tarplant	- / - / 1B.2	Grassland, often sandy	Not observed; suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Delphinium parryi subsp. *eastwoodiae*	Eastwood's larkspur	- / - / 1B.2	Chaparral, valley and foothill grassland	Not observed, suitable habitat absent.
Delphinium parryi subsp. *blochmaniae*	dune larkspur	- / - / 1B.2	Coastal dunes, coastal scrub, central maritime chaparral	Not observed, suitable habitat present. Endemic to Ventura, Santa Barbara, and San Luis Obispo Counties.
Delphinium umbraculorum	Umbrella larkspur	- / - / 1B.3	Cismontane woodland	Not observed, suitable habitat absent.
Dithyrea maritima	Beach spectacle pod	-/CT/1B.1	Coastal dunes	Not observed; known from low sand dunes from Morro Bay sand spit southward
Dudleya abramsii subsp. murina	mouse-gray dudlea	- / - / 1B.3	Chaparral, coastal scrub, grasslands, often on serpentine soils in bare rocky places	Not observed; suitable habitat present although serpentine soils absent. Endemic to San Luis Obispo County.
Erigeron blochmaniae	**Blochman's leafy daisy**	**- / - / 1B.2**	**Coastal dunes, coastal scrub**	**Present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).**
Erigeron sanctarum	Saint's daisy	- / - / 4.2	Central maritime chaparral, central coastal scrub, woodlands	Not observed, suitable habitat present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Eriodictyon altissimum	Indian Knob mountain balm	FE/CE/1B.1	Central maritime chaparral, central coastal scrub, woodlands	Not observed; suitable habitat absent. Known from Indian Knob and Irish Hills. Endemic to San Luis Obispo County.
Eryngium aristulatum var. *hooveri*	Hoover's button celery	- / - / 1B.1	Vernal pools	Not observed; suitable habitat absent. Known from Laguna Lake near San Luis Obispo.
Erysimum capitatum var. *lompocense*	San Luis Obispo wallflower	- / - / 4.2	Central maritime chaparral, central coastal scrub in sandy soils	Not observed; suitable habitat absent.
Erysimum suffrutescens	Suffrutescent wallflower	- / - / 4.2	Coastal dunes, coastal dune scrub, coastal scrub	Not observed; suitable sandy soils present.

TABLE 5
PRESENT OR CNDDB RECORDED SENSITIVE PLANT SPECIES
ALONG THE PROPOSED COASTAL ACCESS ROAD

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Fritillaria viridea	San Benito fritillary	- / - / 1B.2	Chaparral, serpentine soils.	Not observed; chaparral habitat with serpentine substrate absent. Endemic to Central Coast (San Luis Obispo, Monterey, Fresno, San Benito Counties).
Horkelia cuneata subsp. *puberula*	mesa horkelia	- / - / 1B.1	Chaparral, coastal scrub, and woodlands, especially in sandy or gravelly soils	Not observed; suitable coastal scrub, maritime chaparral, and woodland habitat present.
Horkelia cuneata subsp. *sericea*	Kellogg's horkelia	- / - / 1B.1	Closed-cone coniferous forest, chaparral, coastal dunes, coastal scrub	Not observed; suitable habitat present.
Layia heterotricha	pale-yellow layia	- / - / 1B.1	Grassland, coastal scrub, woodlands	Not observed; suitable habitat present.
Layia jonesii	Jones' layia	- / - / 1B.2	Chaparral, grasslands in clay or serpentine soils	Not observed; suitable clay soils absent.
Lupinus ludovicianus	San Luis Obispo County lupine	- / - / 1B.2	Chaparral, woodlands, grasslands in sandy or sandstone-derived soils	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Lupinus nipomoensis	**Nipomo Mesa lupine**	**FE / CE / 1B.1**	**Coastal dunes**	**Present. Endemic to San Luis Obispo County.**
Monardella frutescens	San Luis Obispo manardella	- / - / 1B.2	Coastal dunes, coastal scrub	Not observed; suitable habitat present.
Monardella palmeri	Palmer's monardella	- / - / 1B.2	Chaparral, woodlands in serpentine soils	Not observed; suitable habitat absent. Endemic to Central Coast (San Luis Obispo and Monterey Counties.)
Monardella undulata* subsp. *crispa	**Crisp monardella**	**- / - / 1B.2**	**Coastal dunes, coastal scrub, coastal prairie, central maritime chaparral, Bishop pine forest, ponderosa pine forest (sandy soils at low elevations)**	**Present along coastal access route.**
Mucronea californica	**California spineflower**	**- / - / 4.2**	**Coastal dunes, coastal scrub, central maritime chaparral, woodlands, grasslands (sandy)**	**Present along coastal access route.**

TABLE 5
PRESENT OR CNDDB RECORDED SENSITIVE PLANT SPECIES
ALONG THE PROPOSED COASTAL ACCESS ROAD

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Nasturtium gambelii	Gambel's water cress	FE / CE / 1B.1	Coastal marshes	Not observed; suitable marsh habitat absent.
Nemacaulis denudata var. *denudata*	coast wooly-heads	- / - / 1B.2	Coastal dunes	Not observed; suitable habitat present.
Nemacladus secundiflorus var. *robbinsii*	Robbins' nemacladus	- / - / 1B.2	Chaparral, valley and foothill grassland	Not observed; suitable habitat absent.
Orobanche parishii subsp. *brachyloba*	Short-lobed broomrape	**- / - / 4.2**	Coastal bluff scrub, coastal dunes, coastal scrub	Not observed; suitable habitat present.
Prunus fasciculata* var. *punctata	**Sand almond**	**- / - / 4.3**	**Coastal dunes, coastal scrub, central maritime chaparral, woodlands**	**Present along coastal access route.**
Sanicula maritima	Adobe sanicle	- / Rare / 1B.1	Chaparral, coastal prairie, grasslands, seeps in clay and serpentine soils	Not observed; suitable habitat absent.
Scrophularia atrata	black-flowered figwort	SOC / - / 1B.2	Coastal dunes, coastal scrub, chaparral, woodlands, Bishop pine forest	Not observed, suitable habitat potentially present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Senecio aphanactis	Rayless ragwort	- / - / 2.2	Coastal scrub, chaparral, woodlands	Not observed; potential suitable habitat present.
Senecio blochmaniae	**Blochman's groundsel, dune ragwort**	**- / - / 4.2**	**Coastal dunes, coastal scrub**	**Present along coastal access route.**
Sidalcea hickmanii subsp. *anomala*	Cuesta Pass checkerbloom	- / Rare / 1B.2	Chaparral, closed cone conifer forests in serpentine soils	Not observed; suitable habitat of closed-cone coniferous forest on serpentine substrate absent. Endemic to San Luis Obispo County.
Streptanthus albidus subsp. *peramoenus*	Most beautiful jewel-flower	- / - / 1B.2	Chaparral, woodlands, grasslands in serpentine soils	Not observed; suitable serpentine substrate absent
Symphyotrichum defoliatum	San Bernardino aster	- / - / 1B.2	Cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, valley and foothill grassland	Not observed; potential suitable habitat present.

TABLE 5
PRESENT OR CNDDB RECORDED SENSITIVE PLANT SPECIES
ALONG THE PROPOSED COASTAL ACCESS ROAD

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Trifolium depauperatum var. *hydrophilum*	Saline clover	- / - / 1B.2	Marshes, vernal pools, moist grasslands, often in alkaline soil	Not observed; suitable habitat absent.
Tropidocarpum capparideum	Caper-fruited tropidocarpum	- / - / 1B.1	Grasslands, often in alkaline soils	Not observed; suitable habitat absent.

Based on CNPS Inventory of Rare and Endangered Plants (online edition 2013) and CNDDB (2013) search results for the Nipomo, Guadalupe, Santa Maria, Orcutt, Arroyo Grande NE, Oceano, Pismo Beach, Casmalia and Tar Spring Ridge quadrangles.

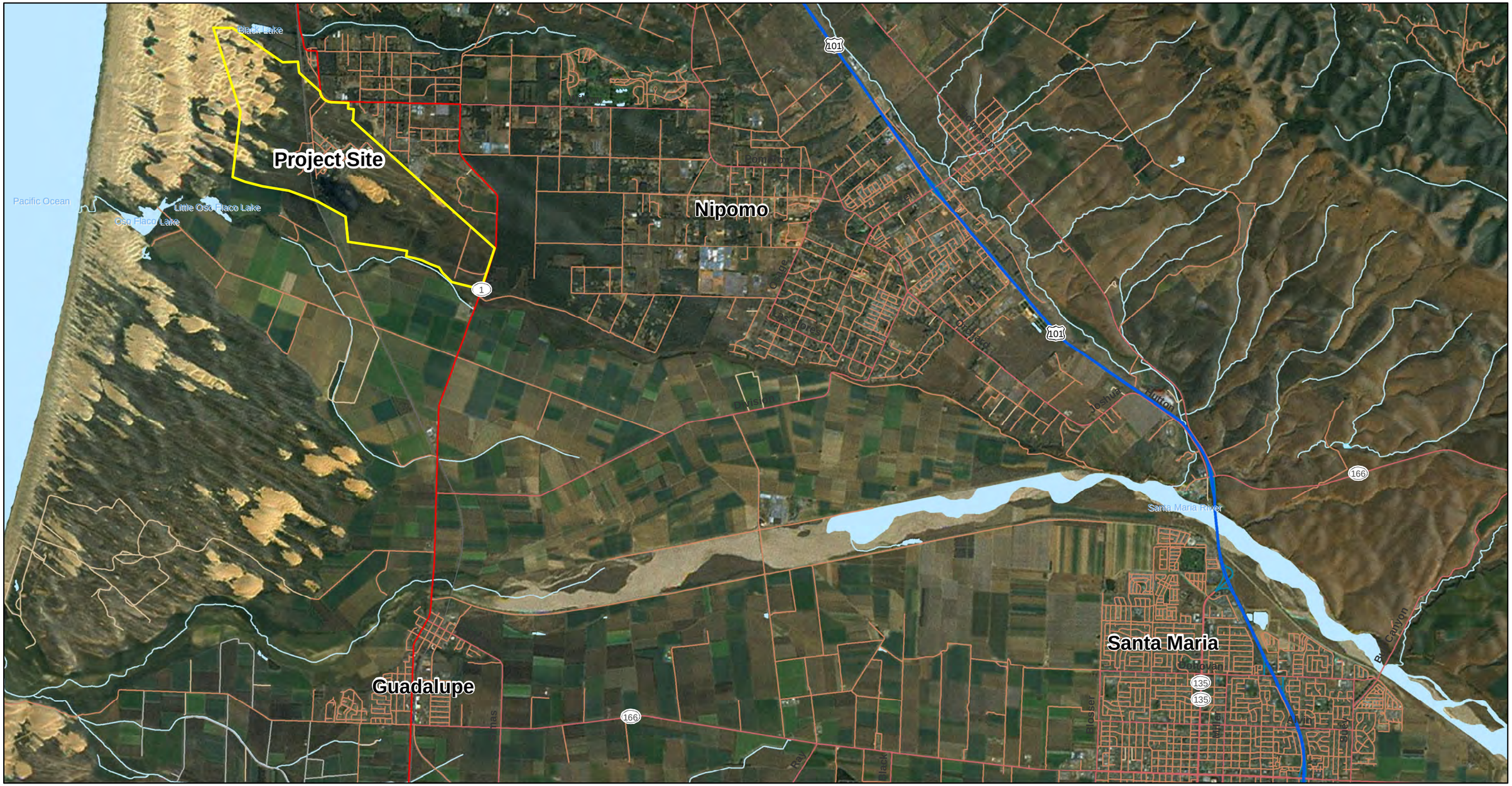
Status Codes

United States Fish and Wildlife Service (USFWS)
FE Federal Endangered
FT Federal Threatened
SOC Species of Concern as listed by Sacramento Office (USFWS, 2004)
MNBMC Migratory nongame bird of management concern
FSC Federal special concern species
BCC Birds of Conservation Concern

California Department of Fish and Wildlife (CDFW)
CE California Endangered
CT California Threatened
CR California Rare
CSC California Species of Concern

California Native Plant Society (CNPS)
Lists
List 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
List 2: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
List 3: Plants About Which We Need More Information - A Review List
List 4: Plants with limited distribution (Watch List)
Extensions to List Categories
.1 - Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 – Fairly endangered in California (20-80% occurrences threatened)
.3 – Not very endangered in California (<20% of occurrences threatened or no current threats known)

Figures



Legend

Property Boundary

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

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SCALE IN FEET

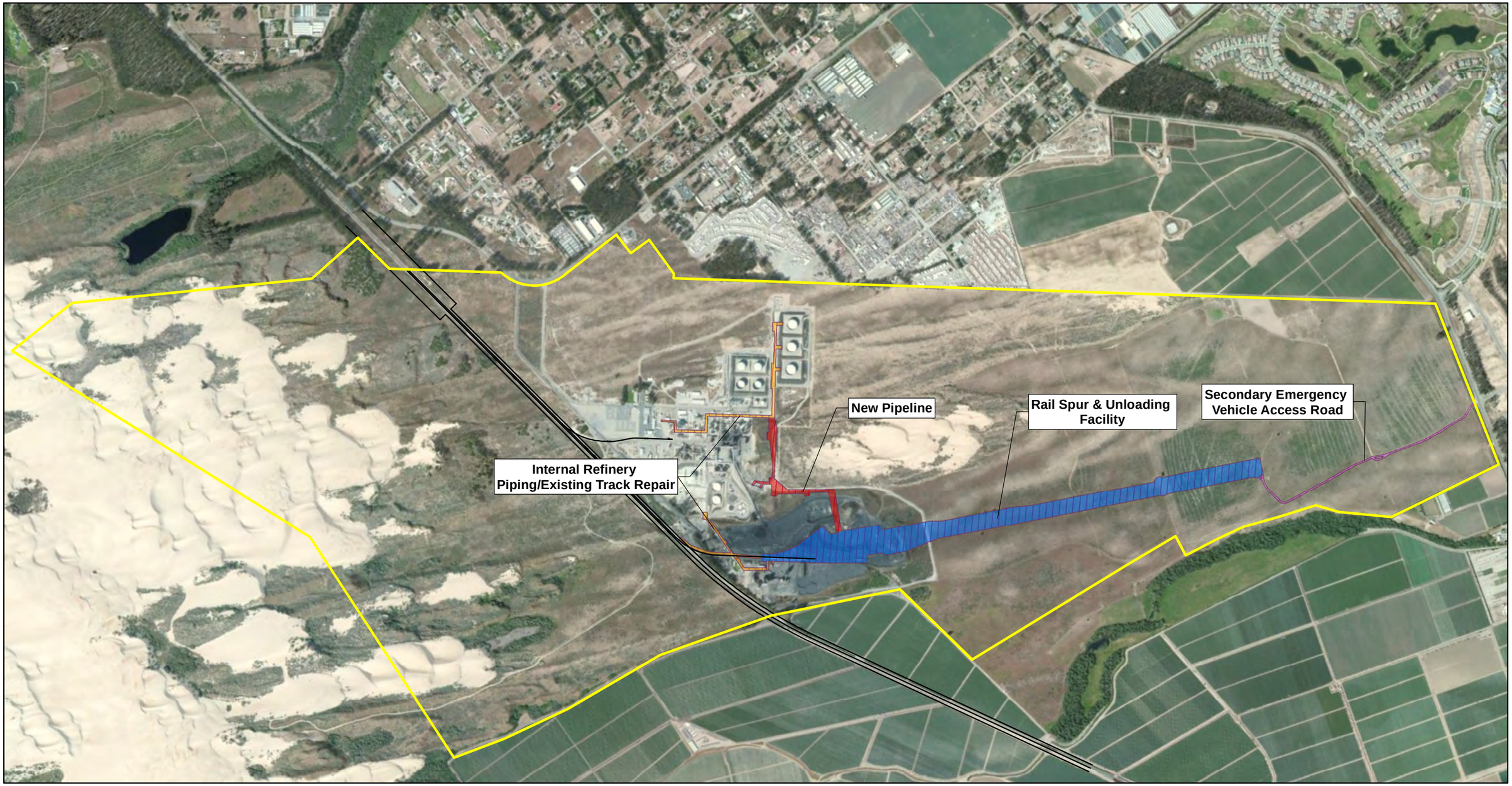
Phillips 66
Santa Maria Refinery Rail Project

PROJECT AREA

ARCADIS

FIGURE
1

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 1 ProjectArea.mxd 6/14/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



Legend

- Property Boundary
- Existing Rail Line
- Limits of Disturbance

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

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SCALE IN FEET

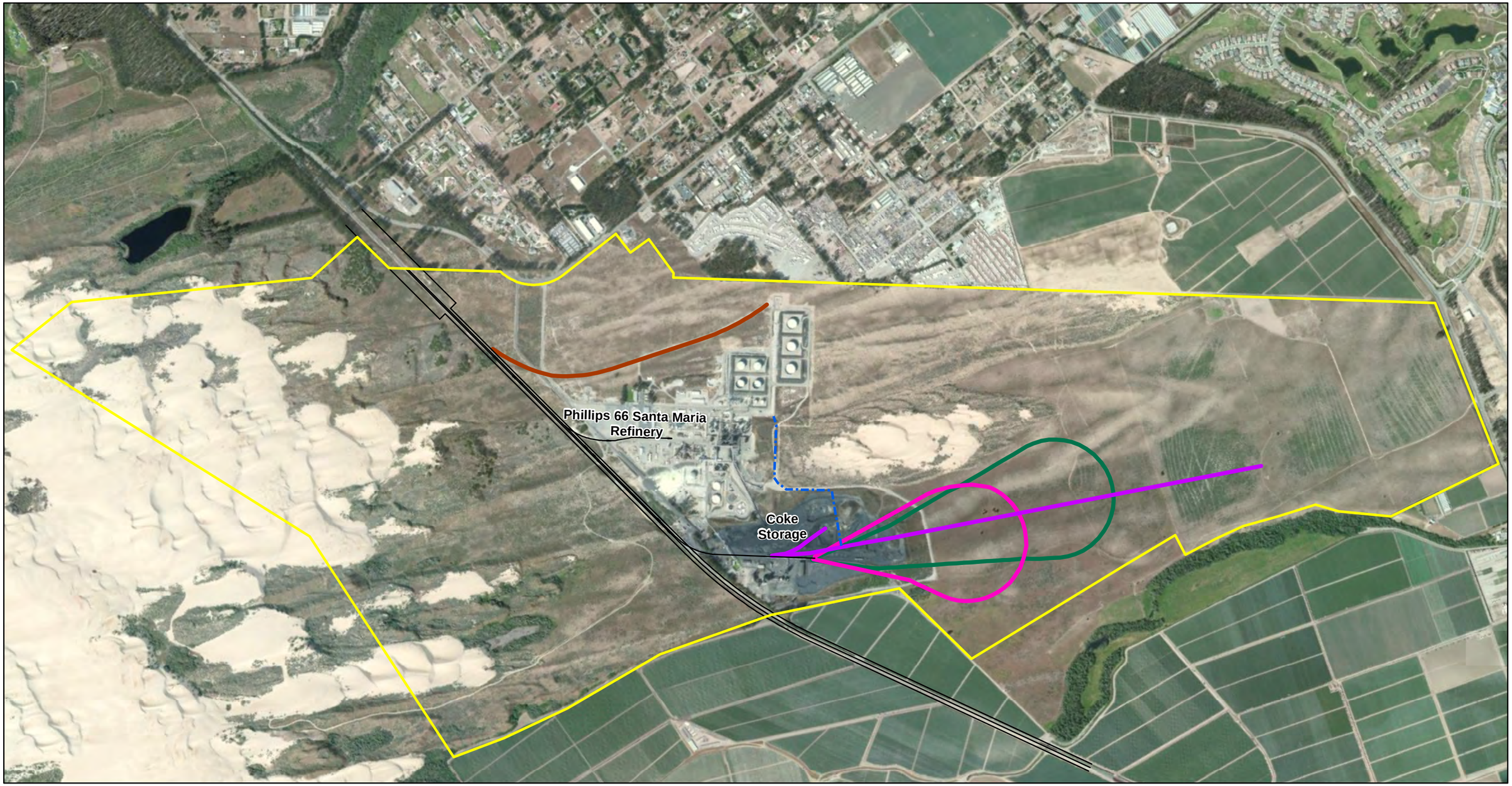
Phillips 66
Santa Maria Refinery Rail Project

PROPOSED PROJECT SITE ON PHILLIPS 66 PROPERTY

ARCADIS

FIGURE
2

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 2 ProposedProjectSite_rev1.mxd 6/17/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



Legend

- Property Boundary
- Existing Rail Line
- Pipe Routing
- Northern Access Track
- Small Loop Track
- Large Loop Track
- Straight Track (Proposed Project)

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

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SCALE IN FEET

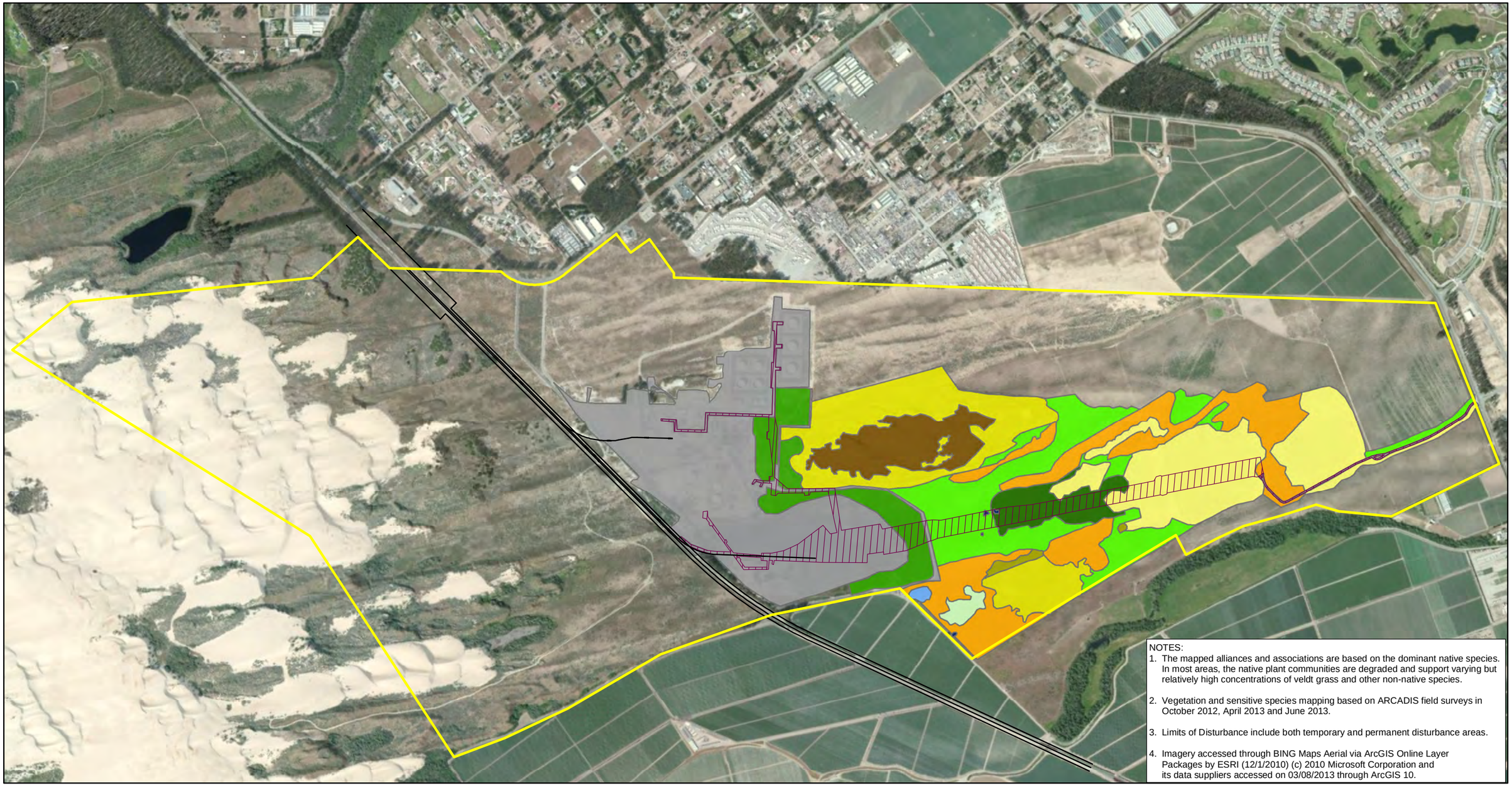
Phillips 66
Santa Maria Refinery Rail Project

TRACK LAYOUT ALTERNATIVES

ARCADIS

FIGURE
3

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 3 TrackLayoutAlternatives.mxd 6/14/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



NOTES:
1. The mapped alliances and associations are based on the dominant native species. In most areas, the native plant communities are degraded and support varying but relatively high concentrations of veldt grass and other non-native species.
2. Vegetation and sensitive species mapping based on ARCADIS field surveys in October 2012, April 2013 and June 2013.
3. Limits of Disturbance include both temporary and permanent disturbance areas.
4. Imagery accessed through BING Maps Aerial via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

Legend

- Property Boundary
- Existing Rail Line
- Limits of Disturbance
- Arroyo Willow Scrub (Wetland)
- Central Dune Scrub - Coastal Dune Lupine, Dune-Heather, Silver Bush Lupine Association
- Central Dune Scrub - Dune-Heather Alliance
- Central Dune Scrub - Dune-Heather, Seacliff Buckwheat, Black Sage Association
- Degraded Central Dune Scrub
- Central Dune Scrub - Black Sage, Dune-Heather Association
- Central Dune Scrub - Silver Dune Lupine and Dune-Heather Association
- Central Dune Scrub - Dune-Heather, California Coffeeberry, Blue Elderberry Association
- Dune
- Industrial/Road
- Nonnative Veldt Grassland
- Planted Trees

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SCALE IN FEET

Phillips 66
Santa Maria Refinery Rail Project

EXISTING HABITATS

ARCADIS

FIGURE
4

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 4 ExistingHabitats.mxd 6/14/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

NOTES:
1. The mapped alliances and associations are based on the dominant native species. In most areas, the native plant communities are degraded and support varying but relatively high concentrations of veldt grass and other non-native species.
2. Vegetation and sensitive species mapping based on ARCADIS field surveys in October 2012, April 2013, and June 2013.
3. Limits of Disturbance include both temporary and permanent disturbance areas.
4. Imagery accessed through BING Maps Aerial via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

Legend

- Property Boundary
- Existing Rail Line
- Limits of Disturbance
- California Spineflower *(Mucronea californica)*
- California Spineflower *(Mucronea californica)*
- Sand almond *(Prunus fasciculata* var. *punctata)*
- Blochman's Groundsel *(Senecio blochmaniae)*
- Blochman's Leafy Daisy *(Erigeron blochmaniae)*
- Burrowing Owl *(Athene cunicularia)*
- Bell's Sage Sparrow *(Amphispiza belli* ssp. *belli)*

Sensitive Habitat

- Arroyo Willow Scrub (Wetland)
- Central Dune Scrub - Coastal Dune Lupine, Dune-Heather, Silver Bush Lupine Association
- Central Dune Scrub - Silver Dune Lupine and Dune-Heather Association
- 100-ft Riparian Buffer

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SCALE IN FEET

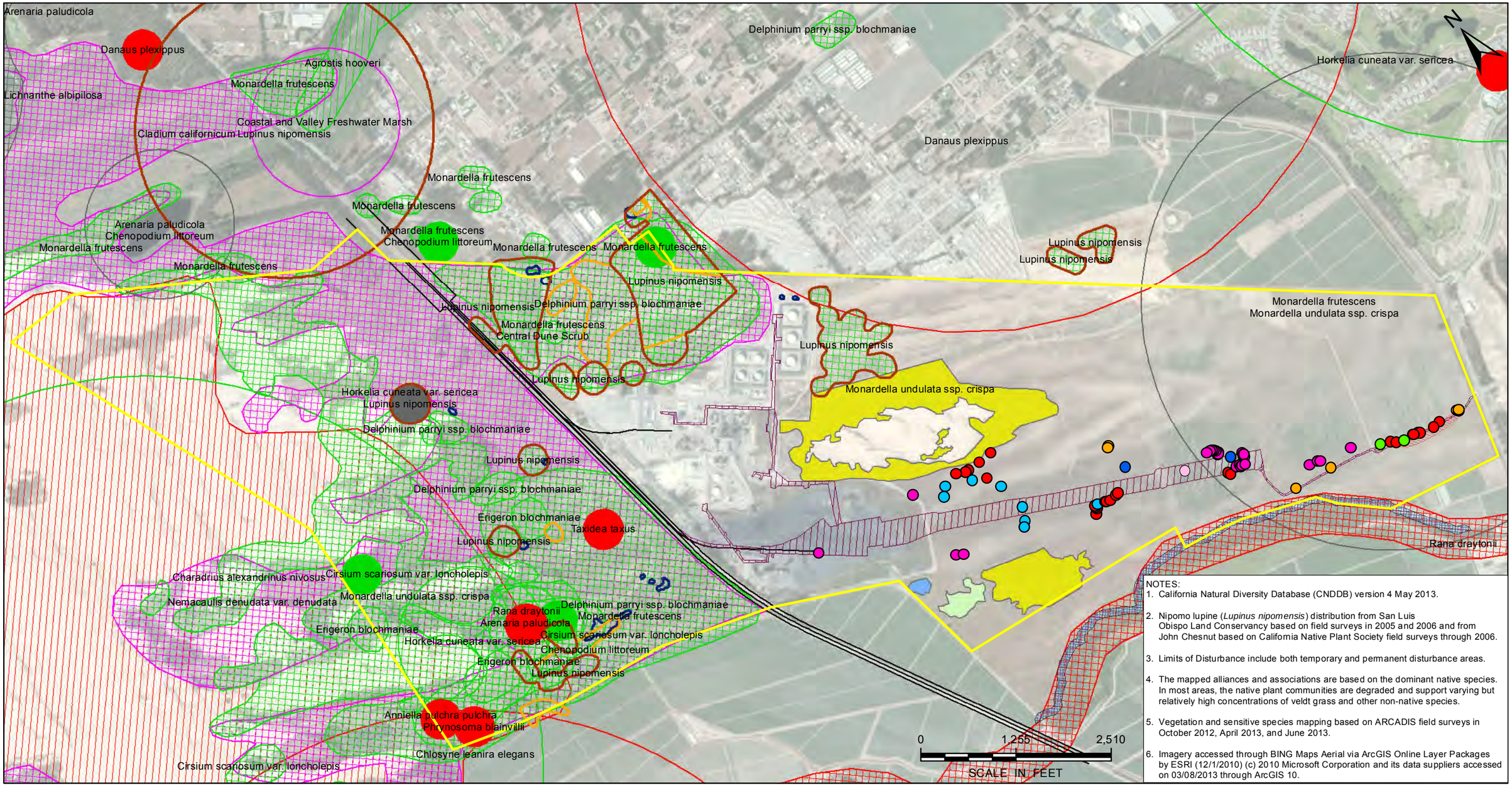
Phillips 66
Santa Maria Refinery Rail Project

SURVEYED SENSITIVE SPECIES AND HABITATS

ARCADIS

FIGURE
5

H:\GISPROJECTS_ENV\Phillips66\GIS\Projects\060613\Fig 5 SensitiveSpecies_Habitat.mxd 6/18/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



NOTES:

1. California Natural Diversity Database (CNDDB) version 4 May 2013.
2. Nipomo lupine (*Lupinus nipomensis*) distribution from San Luis Obispo Land Conservancy based on field surveys in 2005 and 2006 and from John Chesnut based on California Native Plant Society field surveys through 2006.
3. Limits of Disturbance include both temporary and permanent disturbance areas.
4. The mapped alliances and associations are based on the dominant native species. In most areas, the native plant communities are degraded and support varying but relatively high concentrations of veldt grass and other non-native species.
5. Vegetation and sensitive species mapping based on ARCADIS field surveys in October 2012, April 2013, and June 2013.
6. Imagery accessed through BING Maps Aerial via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

Property Boundary
Existing Rail Line
Limits of Disturbance
Mapped Nipomo Lupine from CNDDB
Mapped Nipomo Lupine from SLO Land Conservancy
Mapped Nipomo Lupine from John Chesnut

CNDDB Distributions
Plant (80m)
Plant (specific)
Plant (non-specific)
Plant (circular)
Animal (80m)
Animal (specific)
Animal (non-specific)
Animal (circular)
Terrestrial Comm. (80m)
Terrestrial Comm. (specific)
Terrestrial Comm. (non-specific)
Terrestrial Comm. (circular)
Aquatic Comm. (80m)
Aquatic Comm. (specific)
Aquatic Comm. (non-specific)
Aquatic Comm. (circular)
Multiple (80m)
Multiple (specific)
Multiple (non-specific)
Multiple (circular)

Sensitive Species
California Spineflower *(Mucronea californica)*
California Spineflower *(Mucronea californica)*
Sand almond *(Prunus fasciculata* var. *punctata)*
Blochman's Groundsel *(Senecio blochmaniae)*
Blochman's leafy daisy *(Erigeron blochmaniae)*
Burrowing Owl *(Athene cunicularia)*
Bell's Sage Sparrow *(Amphispiza belli* ssp. *belli)*

Sensitive Habitats
Arroyo Willow Scrub (Wetland)
Central Dune Scrub - Coastal Dune Lupine, Dune-Heather, Silver Bush Lupine Association
Central Dune Scrub - Silver Dune Lupine and Dune-Heather Association
100-ft Riparian Buffer

Phillips 66
Santa Maria Refinery Rail Project.

ALL MAPPED SENSITIVE RESOURCE LOCATIONS

ARCADIS

FIGURE
6

H:\GISPROJECTS_ENV\Phillips66\GIS\Projects\060613\Fig 6 CNDDB.mxd 6/18/2013 DFischer
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

Legend

- Property Boundary
- Existing Rail Line
- Limits of Disturbance
- Designated Critical Habitat for La Graciosa Thistle

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

N

0 1,255 2,510

SCALE IN FEET

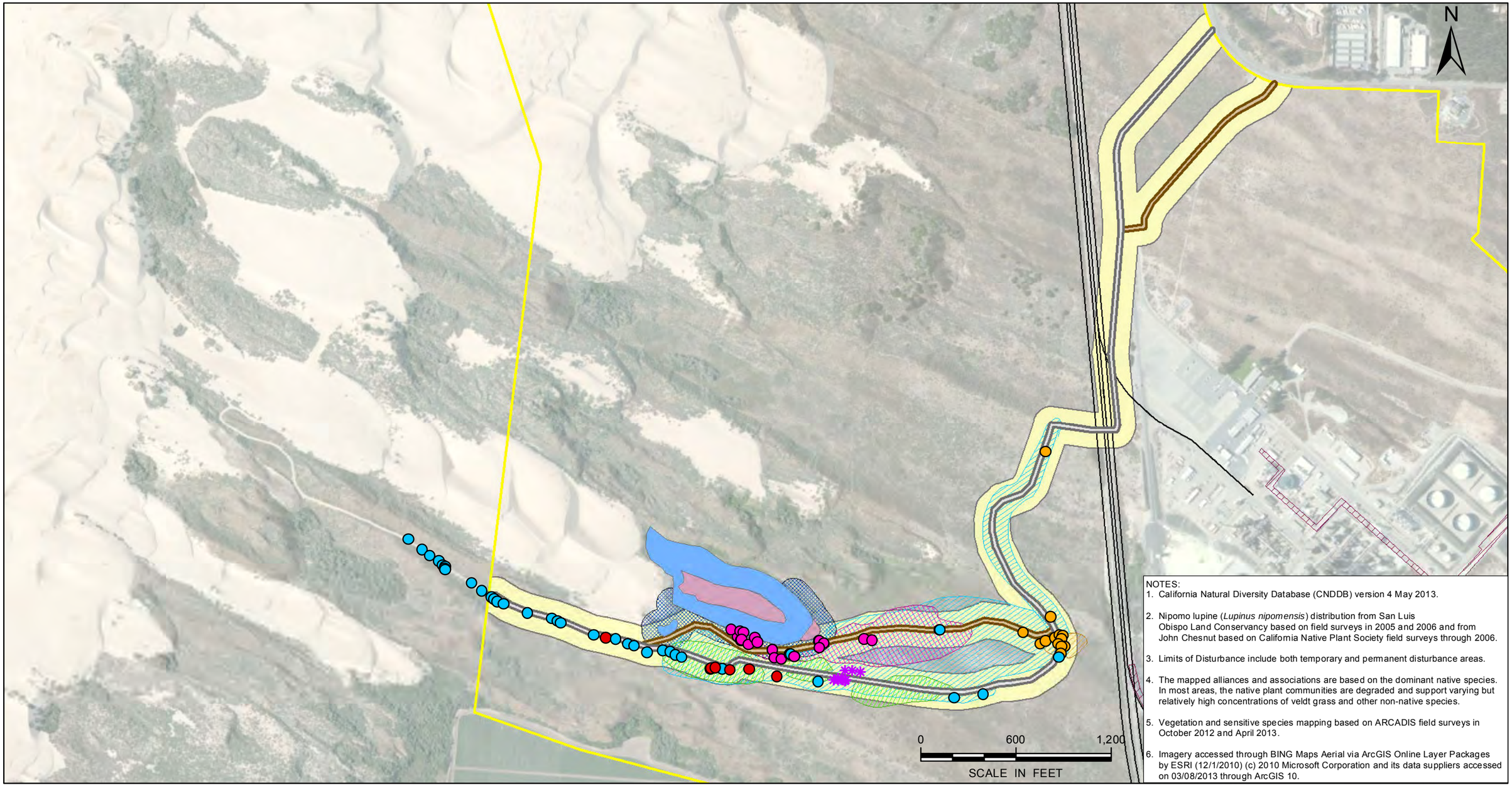
Phillips 66
Santa Maria Refinery Rail Project

DESIGNATED CRITICAL HABITAT FOR LA GRACIOSA THISTLE

ARCADIS

FIGURE
7

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 7 CriticalHabitat_LaGraciosaThistle.mxd 6/17/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



NOTES:
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6. Imagery accessed through BING Maps Aerial via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

Property Boundary
Existing Rail Line
Limits of Disturbance
Potential Coastal Access Route A
Potential Coastal Access Route B

Sensitive Species Observed in June 2013
California Spineflower *(Mucronea californica)*
Sand almond *(Prunus fasciculata* var. *punctata)*
Blochman's Groundsel *(Senecio blochmaniae)*
Blochman's leafy daisy *(Erigeron blochmaniae)*
California Spineflower *(Mucronea californica)*
Sand almond*(Prunus fasciculata* var. *punctata)*
Blochman's Groundsel *(Senecio blochmaniae)*
Blochman's leafy daisy *(Erigeron blochmaniae)*
Crisp monardella *(Monardella undulata* ssp. *crispa)*
Nipomo Mesa Lupine *(Lupinus nipomoensis)*

Sensitive Habitats (2013)
Central Dune Scrub Dune-Heather and Silver Bush Lupine Association
Arroyo Willow Scrub (Wetland)
Freshwater Marsh - Coast Carex Herbaceous Alliance
100-ft Riparian Buffer

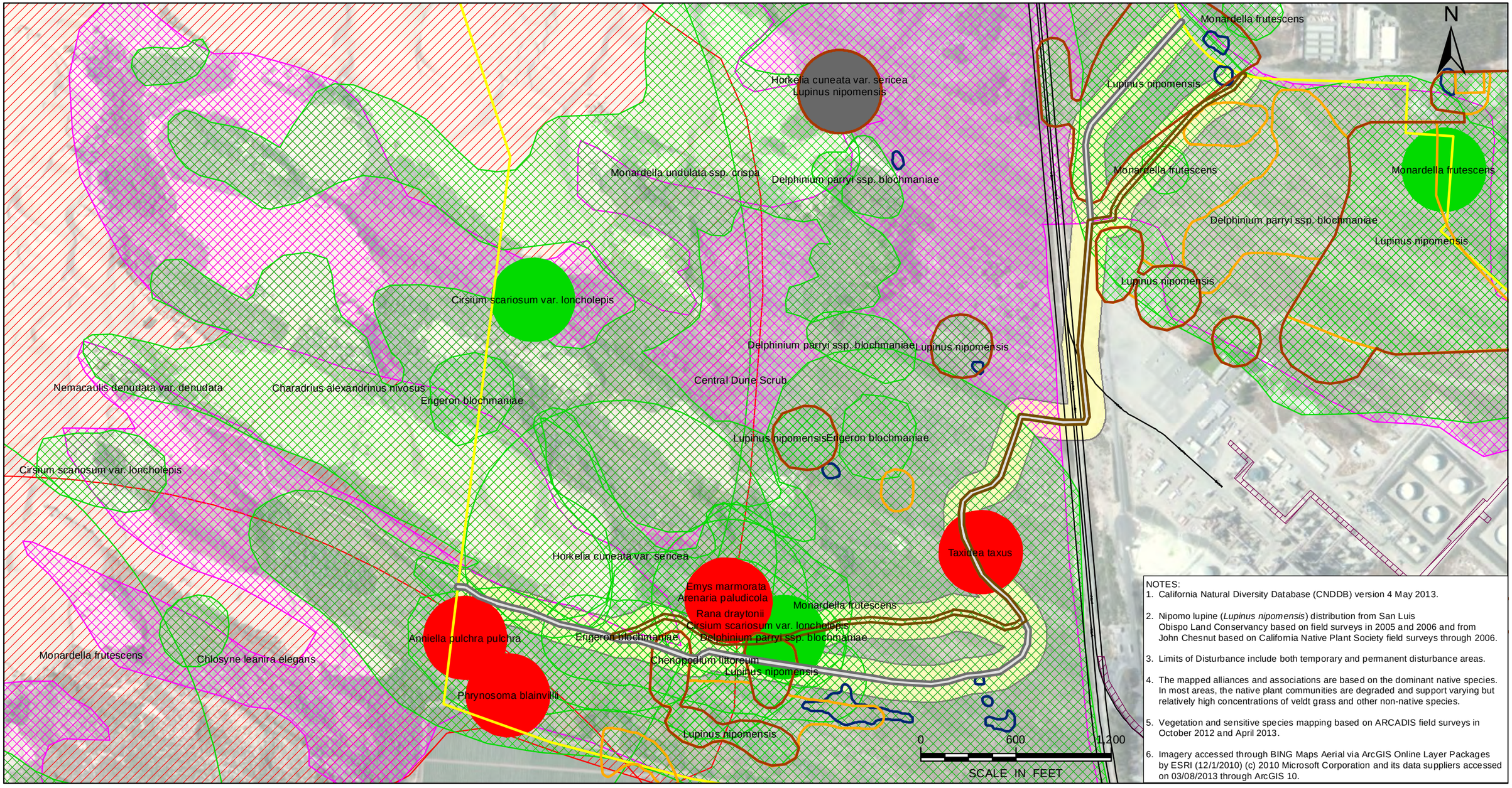
Phillips 66
Santa Maria Refinery Rail Project.

POTENTIAL COASTAL ACCESS ROUTES SURVEYED SENSITIVE RESOURCES

ARCADIS

FIGURE
8

H:\GISPROJECTS_ENV\Phillips66\GIS\Projects\060613\Fig_8B_PotentialCoastalAccess.mxd 6/18/2013 DFischer
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



NOTES:

1. California Natural Diversity Database (CNDDB) version 4 May 2013.
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Property Boundary
Existing Rail Line
Limits of Disturbance
Potential Coastal Access Route A
Potential Coastal Access Route B
Mapped Nipomo Lupine from CNDDB
Mapped Nipomo Lupine from SLO Land Conservancy
Mapped Nipomo Lupine from John Chesnut

CNDDB Distributions
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Plant (specific)
Plant (non-specific)
Plant (circular)
Animal (80m)
Animal (specific)
Animal (non-specific)
Animal (circular)

Terrestrial Comm. (80m)
Terrestrial Comm. (specific)
Terrestrial Comm. (non-specific)
Terrestrial Comm. (circular)
Aquatic Comm. (80m)
Aquatic Comm. (specific)
Aquatic Comm. (non-specific)
Aquatic Comm. (circular)
Multiple (80m)
Multiple (specific)
Multiple (non-specific)
Multiple (circular)

Phillips 66
Santa Maria Refinery Rail Project.

POTENTIAL COASTAL ACCESS ROUTES PRIOR BIOLOGICAL SURVEYS

ARCADIS

FIGURE
9

H:\GIS\PROJECTS_ENV\Phillips66\GIS\Projects\060613\Fig 9 PotentialCoastalAccess.mxd 6/18/2013 DFischer
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

Appendix A

Photographs

Photograph 0633 **10/2/12**

The site supports central dune scrub that exhibits varying degrees of disturbance. The proposed rail extension would be constructed in the general vicinity shown here, in an area dominated by dune-heather. Looking north.

Photograph 0222 **10/2/12**

Silver dune lupine and dune-heather predominate in central dune scrub on site. Looking south.

Photograph 0228 **10/2/12**

Sensitive plants such as Blochman's groundsel occur in scattered locations on site.

Photograph 0626 **10/2/12**

The site has been used to graze cattle and supports few large shrubs or trees. A small number of elderberry shrubs occur sporadically on the Site. Looking west.

Photograph 0630 **10/9/12**

Most of the site supports central dune scrub and invasive veldt grass vegetation (foreground). However, a narrow willow- dominated drainage (Oso Flaco Creek – red arrow) occurs southeast of the Site on neighboring the property. The proposed rail line extension is not expected to impact the drainage. Looking east.

Photograph 1157 **6/11/13**

Dune-heather alliance along coastal access routes (both A and B at west end). Note that the access routes would not include the existing road and would occur in the adjacent area.

Photograph 1164 **6/11/13**

Arroyo willow thickets around Jack Lake (near Coastal Access routes) with freshwater marsh in foreground, dominated by slough sedge

Imagine the result

PHILLIPS 66

Wildlife and Habitat Assessment

Santa Maria Refinery Rail Project
San Luis Obispo County, California

APNs: #092-401-011, #092-401-013, #092-411-005, #092-401-005

ARCADIS

Greg McGowan
Principal Ecologist

Mary Carroll
Senior Ecologist

Mitch Siemens
Wildlife Biologist

"As a County –approved biologist, I hereby certify that this Biological Resources Assessment was prepared according to the Guidelines established by the County of San Luis Obispo Department of Planning and Building and that the statements furnished in the report and associated maps are true and correct to the best of my knowledge and belief; and I further certify that I was present throughout the site visit(s) associated with this report."

Wildlife & Habitat Assessment

Santa Maria Refinery Project Site,
San Luis Obispo County,
California

Prepared for:
Phillips 66

Prepared by:
ARCADIS U.S., Inc.
301 South Miller
Suite 210
Santa Maria, CA 93454Tel 805.349.7180

Date:
June 17, 2013

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6 All Mapped Sensitive Resource Locations

Appendices

A Site Photographs

Acronyms and Abbreviations

AOU	American Ornithologists' Union
CDFW	California Department of Fish and Wildlife
cm	centimeter
CNDDB	California Natural Diversity Database
CSC	California Special Concern Species
CT	California-listed Threatened Species
ºF	degrees Fahrenheit
FE	Federally-listed Endangered Species
FSC	Federal Special Concern Species
FT	Federally-listed Threatened Species
ha	hectare
km	kilometer
MBTA	Migratory Bird Treaty Act
m	meter
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1. Executive Summary

This Biological Assessment presents the findings of a biological survey of a portion of the Phillips 66 Santa Maria Refinery (SMR) property proposed for modification of an existing rail spur and construction of an unloading facility designed to facilitate rail delivery of crude oil to the refinery. The survey included the approximately 40-acre construction area (the Site) and the surrounding area. The SMR property is located near Highway 1 on the Nipomo Mesa in Arroyo Grande, San Luis Obispo County, California. The purpose of the October 2012 ARCADIS biological survey was to identify existing or potentially occurring sensitive animal species, sensitive habitat, or other wildlife related issues of concern occurring on the Site or the surrounding area.

The Site supports degraded central coastal dune scrub habitat that has experienced moderate to heavy disturbance from various land uses. Four sensitive wildlife species (western burrowing owl, loggerhead shrike, northern harrier, and Cooper's hawk) were observed in the general project area during biological surveys. Two sensitive wildlife species (coast horned lizard and silvery legless lizard) are assumed to occupy the Site, although they were not observed during the surveys. Two additional sensitive species (white-tailed kite and American badger) are assumed to periodically be in the project area, though they were not observed during the surveys.

This report addresses the potential wildlife impacts associated with the proposed rail project. This report conservatively considered that the proposed rail spur pathway would be permanently disturbed. Differentiation between the total permanent impacts and temporary impacts was not feasible at this time. ARCADIS conservatively combined both temporary and permanent impacts for the purpose of impact assessment. Measures to avoid and minimize potential impacts to wildlife are proposed in Section 7 of this report.

2. Introduction

This report provides a Biological Assessment of the Phillips 66 Santa Maria Refinery (SMR) Rail Project Site (the Site). The SMR property consists of four assessor's parcels within the South County Planning Area of San Luis Obispo County (APN #092-401-011, #092-401-013, #092-411-005, and #092-401-005). The approximately 1,650-acre (668 ha) SMR property is located on Highway 1 approximately 5 miles (8.05 km) south of the intersection of Highway 1 and Halcyon Road on the Nipomo Mesa in Arroyo Grande, San Luis Obispo County, California (Figure 1). The project Site is a small portion of the SMR property and is currently used for industrial operations and cattle grazing. The current land use designation is "Industrial"; this designation is not expected to change as a result of the proposed project.

The SMR property is bordered to the north by agriculture fields, industrial facilities, and residential housing. It is bordered to the south by agriculture, by residential development to the east, and by undeveloped coastal dunes to the west. The proposed rail spur extends the existing spur through

the coke processing area and to the east through the grazing area. Additionally, a covered offloading rack will be constructed and an above ground pipeline will convey material from the offloading rack to the existing storage tanks at the SMR. The proposed development consists of extending the existing rail spur by approximately 2305 yards (2110 m). The width of the rail spur disturbance envelope is expected to be approximately 270-feet (82m). The length of the pipeline is approximately 775-yards (710 m). The width of the pipeline disturbance envelope varies but is approximately 25 feet (7.5 m). However, the above ground pipeline installation follows an existing road is not likely to actually require disturbance of that entire area. The total area of anticipated temporary and permanent disturbance is expected to be approximately 48.9 acres (19.8 ha). Note that this includes areas within the existing industrial refinery as is delineated below and shown on Figure 2. As previously noted, it is anticipated that a significant portion of the disturbance envelope outside the developed refinery in the natural area will be subject only to temporary disturbance during site grading and prep and that the area will be restored to pre-disturbance conditions following completion of construction.

The approximate construction areas are summarized below and shown on Figure 2:

- 2305 yards (2110 m) – Length of spur extension (including approximately 815 yards within the existing industrial coke plant area)
- 270-feet (82m) – Approximate width of construction area for rail extension (note that much of the area would only be affected temporarily).
- 775-yards (710 m) – Length of new pipeline from the unloading facility to the internal refinery (note that an additional 400 yards will be constructed within the existing refinery connecting to the existing storage tanks).
- 25-feet (7.5 m) – Approximate width of temporary construction area for pipeline installation

Acreage Breakdown (includes temporary and permanent):

- 38.6 acres – Rail Spur and Unloading Facility
- 4.1 acres – New Pipeline (mostly temporary impacts)
- 1.7 acres – Secondary Emergency Vehicle Access
- 4.5 acres – Internal Refinery Piping and Existing Track Upgrade

Collectively, the entire project, including temporary and permanent impacts, would affect approximately 48.9 acres (19.8 ha). Of this area, a significant portion occurs within the existing refinery:

- 21.9 acres (45% of total) occurs within the existing industrial refinery area
- 27 acres occur in undeveloped areas and include portions of the rail extension, the new pipeline, and the secondary emergency vehicle access road (Figure 2).

As noted above, a significant portion of the impacts would be temporary during construction and affected plant communities would be returned to pre-project conditions following completion of construction.

The purpose of this analysis is to identify sensitive animal species and sensitive habitat that occur or have the potential to occur on the property, or other potential environmental issues of concern for the Site.

3. Methods

ARCADIS conducted a sensitive species survey of the project area on October 9 and November 13, 2012. Surveys were conducted under clear, calm weather conditions and lasted approximately 5 and 3 hours, respectively. The personnel conducting the October 9 survey consisted of ARCADIS Senior Ecologist Mary Carroll and ARCADIS Wildlife Biologist Mitch Siemens. The November 13 survey was conducted by Mr. Siemens. The Site was accessed on foot throughout the area shown on Figure 4 as well as in a buffer area around the footprint, which included adjacent areas that might be potentially affected by project construction activity.

Desktop Data Search: Prior to performing the field work, ARCADIS reviewed documents concerning the Site and the surrounding areas, including a search of the California Natural Diversity Database (CNDDB; California Department of Fish and Wildlife [CDFW] 2012) for the United States Geological Survey (USGS) 7.5-minute series Oceano topographic quadrangle and the adjacent quadrangles (Arroyo Grande NE, Guadalupe, Nipomo, Santa Maria, Tar Spring Ridge, Orcutt, Casmalia, and Pismo Beach). Aerial photographs from approximately the last 20 years were also reviewed to better understand the history of the Site. Other resources employed for this assessment included various state and federal regulations, consultation with other local biologists about issues in the area, and ARCADIS's direct experience on the Site and in the surrounding area including a previous biological site assessment conducted for a ConocoPhillips project (LFR 2005). ARCADIS biologists also interviewed a local rancher who has a long history tending cattle on the Site.

Wildlife Diversity: All wildlife species observed or assumed present from sign (e.g., tracks, burrows, scat, nests) during the surveys are listed in Table 1. Nomenclature for bird species follows the most recent taxonomy as reflected in the 1983 American Ornithologists' Union (AOU) Check-List of North American Birds and published supplements through 1998. The list of wildlife species also may not be comprehensive. In order to create a more comprehensive wildlife list, multiple surveys would be required in order to enable observation of species both during the day and at night, during different seasons, and during weather conditions when some species are more likely to be detected. Sensitive wildlife species observed at the Site are discussed in Section 5.

4. Habitat Description

The Nipomo Mesa and the Central Coast region in general occur in an important biological transition zone between the moister communities of central and northern California and the more arid communities of southern California.

4.1 Site Description and Surrounding Natural Resource Areas

The topography of the Site and surrounding area consists of relatively flat to gradually undulating terrain. Oceano sands underlay the Site, which are well drained and predominate in old stabilized sand dunes in several locations along the Central Coast. Elevations at the Site average about 60 feet.

Yearly precipitation is estimated at 17.14 inches (Western Regional Climate Center 2012), falling primarily between October and April. The local weather pattern of mild, wet winters and warm, dry summers is characteristic of Mediterranean climate regions, and the effect of the dry summers on plant life is ameliorated somewhat by the presence of summer fog.

Temperatures at the Site are generally mild, with a mean annual temperature of 58.0 degrees Fahrenheit (°F), with an average maximum August temperature of 71.0°F and an average January minimum temperature of 42.4 °F (Western Regional Climate Center 2005).

The Oceano Dunes State Park is located along the beach immediately west of the SMR property. The 3,600-acre (1456 ha) park has 5.5 miles (8.8 km) of beach access with 1,500 acres (607 ha) of sand dunes open for vehicle and recreational vehicle use. The park is the only California State Park facility that allows vehicles to be driven on the beach. The Oso Flaco Lake Natural Area is also part of the Oceano Dunes State Park. The Lake area is off-limits to vehicles and is primarily used by the public for viewing plants, wildlife, and scenic landscapes. The Oso Flaco Lake Natural Area offers a 1.5-mile (2.4 km) boardwalk path, including a span that crosses over the lake itself, that connects the parking lot at the west end of Oso Flaco Lake Road to the beach.

The County of Santa Barbara Parks Department manages the Rancho Guadalupe Dunes Preserve located approximately 5 miles south of the Site. The Rancho Guadalupe Dunes Preserve supports pristine sand dunes and offers fishing, hiking, wildlife viewing, picnicking, and other activities for the public. The preserve is used as a breeding location by two federal and state listed wildlife species; the snowy plover (*Charadrius alexandrines*) and California least tern (*Sterna antillarum*). Certain human activities within the park are seasonally restricted during the breeding season (March 1 through October 1) of these two listed wildlife species.

Black Lake Canyon is located approximately 1 mile north of the SMR property. Black Lake Canyon represents a significant natural resource, containing habitat for a number of rare plant and wildlife

species including federally listed threatened California red-legged frog (*Rana draytonii*; the Site does not support suitable habitat for this species).

4.2 Vegetation Types

The Site and surrounding area supports three main vegetation communities within the boundaries of the project study area as described below and depicted in Figures 4 and 5: two upland communities – Central Dune Scrub and Non-native Veldt Grassland, and one wetland community – Arroyo Willow Scrub. Note that the wetland community occurs outside the Site approximately 1500-feet to the southwest and no impacts are anticipated. A jurisdictional wetland delineation was not conducted by ARCADIS during the field survey nor was one considered necessary given avoidance of the area. The distribution of vegetation types on the Site is determined by topography, soils and geology, hydrology, slope exposure, climate, and land use history. Impact acreages by plant community are provided in Table 3.

5. Results

No federal or state listed wildlife species were observed during the surveys, and none are likely to occur within the project footprint. Four sensitive wildlife species were observed on or near the Site and are described further below. Several other sensitive wildlife species are expected to occur or periodically occur in the project area though they were not observed during the ARCADIS surveys. These species are all discussed below. The Site is dominated by a mosaic of central dune scrub vegetation, as well as non-native veldt grass grassland. One area supports arroyo willow thickets.

5.1 Sensitive Wildlife

The project area supports a mosaic of primarily central dune scrub and non-native veldt grass grassland vegetation that provides habitat of good functional value for many wildlife species including several species of special concern. Oso Flaco Creek, a narrow willow-dominated riparian corridor, occurs to the south of the Site at the bottom of the mesa but is not in the immediate vicinity of the proposed project footprint. This habitat has the potential to support two sensitive wildlife species: the California red-legged frog (federal listed threatened species), and Pacific pond turtle (*Actinemys marmorata*, state species of concern). Both of these species are highly dependent upon, and associated with, aquatic environments and neither is likely to occur in the much more xeric central dune scrub habitat occurring within the proposed project area.

Some of the sensitive species listed in the CNDDB for the Oceano and surrounding quadrangles are not discussed below due to the lack of species-specific habitat needs on the Site (although they are addressed in Table 2). Species such as the Western snowy plover (*Charadrius alexandrinus nivosus*), California least tern (*Sterna antillarum browni*), and steelhead (*Oncorhynchus mykiss irideus*) are examples of species whose habitat requirements are not met by the existing conditions

on the Site. Other species, such as the California horned lizard (*Phrynosoma coronatum*) and American badger (*Taxidea taxus*), are more likely to be encountered on the Site and therefore are discussed in more detail below.

The Site and surrounding area provides foraging opportunities for several raptor species including but not limited to the northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), Cooper's hawk (*Accipiter cooperii*), great horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), western screech owl (*Otus trichopsis*), white-tailed kite (*Elanus leucurus*), and loggerhead shrike (*Lanius ludovicianus*) to the extent that prey species are present. ARCADIS noted the presence of tracks, scat, burrows, and other sign indicating that common raptor prey species (small mammals, birds, lizards, and invertebrates) occur on the Site in good numbers. The open space on the SMR property is considered an important foraging location for both sedentary and migratory raptor species in the area.

All birds included on the federal list of migratory non-game birds, and their active nests, are protected by law under the federal Migratory Bird Treaty Act (MBTA). This includes all of the birds observed on the Site listed in Table 1 with the exception of the European starling (*Sturnus vulgaris*). All raptors and their active nests are protected under CDFW code (Section 3503.5) and the MBTA. Impacts as defined in the MBTA are more strictly defined than the broadly defined term of "take" used in the Endangered Species Act and are generally limited to direct harm to individuals or active nests.

A review of aerial photographs and maps of the area indicate that the open areas on the SMR property likely serve as a dispersal corridor for wildlife, providing passage between the inland Nipomo Mesa areas and the coastal dunes and beaches to the west. Infrastructure associated with the proposed rail spur is not anticipated to be a significant barrier to wildlife traveling through the Site or to hinder the normal activities of wildlife in the area as the east/west alignment of the tracks does not block the corridor between the coast and inland areas and does not isolate one portion of the property from another.

ARCADIS' search of the CNDDB revealed that several sensitive wildlife species have been reported from the Oceano and/or neighboring quadrangles. The following is a summary of sensitive wildlife species whose habitat requirements fit conditions existing on or near the Site and are, therefore, species that may occur on the Site. Five sensitive wildlife species were observed on the Site during the ARCADIS biological survey; these include the western burrowing owl (*Athene cunicularia*), loggerhead shrike, northern harrier, ferruginous hawk (*Buteo regalis*), and Cooper's hawk (*Accipiter cooperii*). The California horned lizard and legless lizard (*Anniella pulchra*) are assumed to be present on the Site, although none were observed during the ARCADIS survey. No federal or state listed wildlife species were observed on the Site or are considered to have a moderate to high probability of occurring within the project area.

Abbreviations used:

United States Fish and Wildlife Service
FE – Federally Endangered
FT – Federally Threatened
FSC – Federal Special Concern Species

California Department of Fish and Wildlife
CE – California Endangered
CT – California Threatened
CSC – California Species of Concern
WL – Watch List

California Red-legged Frog (*Rana draytonii*)

The California red-legged frog (FT/CSC) is a comparatively large frog, though not as big as the bullfrog, and measures up to 13.1 cm in length. The lower abdomen and underside of the hind legs are red, and this frog usually has a dark mask bordered by a white jaw stripe. The legs have dark bands, and the back has many small dark flecks and larger, irregular dark blotches (some individuals lack blotches and are more uniform in color). Dorsal lateral folds on this frog are prominent. The eyes are turned outward and are well covered by the lids when viewed from above. Juveniles sometimes show yellow on the undersides of the hind legs (Stebbins 1985).
The red-legged frog's historical range extended from the vicinity of Point Reyes National Seashore, Marin County, California, coastally, and from the vicinity of Redding, Shasta County, California, inland, south to northwestern Baja California, Mexico (USFWS 2000).

Breeding for the California red-legged frog takes place from late November to late April. Males usually show up at breeding pools 2 to 4 weeks ahead of females and commence vocalizations. Egg masses containing from 2,000 to 5,000 dark, reddish-brown eggs are laid in pools among emergent vegetation. Eggs hatch in 6 to 14 days, and tadpoles metamorphose in 3.5 to 7 months. Juvenile frogs reach maturity in 3 to 4 years. California red-legged frogs may live up to 10 years (Storer 1925; Jennings and Hayes 1990).

Red-legged frogs reside in and around deep, cold, still, or slow-moving water of ponds, reservoirs, marshes, streams, and other typically permanent bodies of water, especially where cattails or other plants provide good cover (Stebbins 1985). The absence of bullfrogs and non-native predatory fish is essential in order for these microhabitats to sustain viable populations of red-legged frogs (Hayes and Jennings 1988).

California red-legged frogs are known to exist in the Black Lake Canyon drainage located approximately 1 mile north of the Site (personal observation) and have been recorded from other aquatic features near the Site (CNDDB 2012). Oso Flaco Creek, a narrow willow-dominated riparian drainage that flows from the east through the Site east of the proposed project area may also support California red-legged frogs, although ARCADIS found no CNDDB records from this location. However, the more xeric coastal dune scrub habitat occurring at the project Site is not considered optimal for California red-legged frogs, and the species is highly unlikely to occur there.

Presence on the Site: California red-legged frogs have not been observed on the Site or surrounding area. The SMR property in the vicinity of the proposed project does not have aquatic or optimal upland habitat for the California red-legged frogs, and the species is not expected to occur in the project area.

Western spadefoot toad (*Spea hammondii*)

The western spadefoot toad (FSC/CSC) prefers habitat where the soil is sandy or gravelly, and vegetation is short and open. Typically, habitat types include grasslands, pine-oak woodlands, open chaparral, and scrubland. Dry periods are spent in self-made burrows, or those of small rodents such as gophers, kangaroo rats, and ground squirrels. Spadefoot toads are active mainly at night during spring and summer rains. Breeding and egg laying occur almost exclusively in shallow, temporary pools, formed by late winter and spring rains during January through May (Stebbins 1985).

ARCADIS found no aquatic habitat on the Site to support breeding by the Western spadefoot toad. Upland habitat on the Site is not likely to be occupied by this species due to the lack of vernal pools or other temporary or seasonal aquatic features at the Site.

Presence on the Site: Not observed during ARCADIS surveys. The Site does not have aquatic habitat to support the Western spadefoot toad, although potentially suitable upland habitat is present for this species. No suitable aquatic habitat that could provide breeding conditions for the Western spadefoot toad was found during the ARCADIS field survey.

Bell's Sage Sparrow (*Amphispiza belli*)

The sage sparrow (-/CSC) is a distinctive species found in barren sage brush deserts and dry open habitat types including the grassland/chaparral interface. The pacific population or Bell's sage sparrow typically occurs in dense coastal chaparral and sagebrush scrub. The Bell's sage sparrow can often be seen running between bushes with its tail raised high. It is a medium sized sparrow with a relatively long tail. It has a dark central spot on a mostly white breast and has a complete

white eye-ring and a gray head. The Bell's sage sparrow builds a cuplike nest of twigs, grasses, bark, lined with finer materials, placed on the ground or up to 3-feet high in a shrub. Typically 3 to 4 bluish eggs are laid in the spring; incubation lasts approximately 13 days and young fledge in 9 to 11 days (Ehrlich et al. 1988, Stokes 1996).

Presence on the Site: A singing male Bell's sage sparrow was observed on the Site during ARCADIS spring surveys. The Site has suitable foraging and nesting habitat to support Bell's sage sparrow.

Pacific Pond Turtle (*Actinemys marmorata*)

The Pacific pond turtle (-/CSC) inhabits permanent or nearly permanent bodies of water in a variety of habitat types. Lakes, rivers, streams, and ponds are typical habitats where the Pacific pond turtle can be found. It requires basking sites such as rock islands, partially submerged logs, vegetation mats, or open mud banks. The Pacific pond turtle feeds primarily on insects, worms, fish, and carrion. A clutch of 3 to 11 eggs is laid April through August in soft, sandy soils near waterways (Stebbins 1985).

Site location information contained in the CNDDB for the Pacific pond turtle shows no records from Oso Flaco Creek. However, the species has been observed there (personal observation, 2005) and is also commonly observed at Oso Flaco Lake.

Presence on the Site: The Pacific pond turtle was not observed during ARCADIS surveys. The species has been observed in Oso Flaco Creek located south of the proposed project location. However, the project area can be described as xeric and supports central dune scrub habitat that is not considered conducive for the Pacific pond turtle. The Pacific pond turtle is highly unlikely to occur in the project area.

Coast Horned Lizard (*Phrynosoma coronatum*)

The coast horned lizard (FSC/CSC) is found in a variety of habitats including grassland, oak woodland, and maritime chaparral. The coast horned lizard requires loose, sandy soils, preferably in the presence of low shrubs that can provide cover from predators. Additional requirements are open areas used for sunning, and the presence of ants and other insect prey. Eggs are laid in sandy soils from April through June (Stebbins 1985).

Coast horned lizards are known to occur in dune scrub habitat south of Oso Flaco Lake (personal observation). The species was not observed on the Site by ARCADIS; however, sandy soil conditions and an adequate prey base indicate that the Site is well suited for the coast horned lizard.

Presence on the Site: Not observed during ARCADIS surveys. The Site has fair to good habitat conditions for the coast horned lizard, and it is reasonable to assume the species can be found on the Site. ARCADIS biologists spoke with a cattle rancher on the Site during the field survey who commented that he has observed coast horned lizards on the SMR property on numerous occasions.

Silvery Legless Lizard (*Anniella pulchra* subsp. *pulchra)*

The silvery legless lizard (-/CSC) prefers loose sand or loamy soils with some vegetation cover, and can be found in chaparral, beach foredunes, pine-oak woodland, and streamside growth of sycamores, cottonwoods, and oaks. The right amount of soil moisture is believed to be a critical microhabitat feature for this species. The silvery legless lizard favors the loose litter under sycamore, oak, and cottonwood trees (Stebbins 1985). The understory of oak thickets is a prime habitat for this species.

The silvery legless lizard may occur on the Site. Sandy soil conditions on the Site are suitable, and the presence of an adequate prey base is assumed. In addition, silver dune lupine (*Lupinus chamissonis*) and mock heather (*Ericameria ericoides*) are two native plant species present on the Site that are closely associated with the presence of silvery legless lizards. Silvery legless lizards are often found where these two plants occur in undisturbed, Coastal Dune Scrub habitats.

Presence on the Site: Not observed during ARCADIS surveys. The soil composition at the Site and the remnant central dune scrub habitat on the Site provide good to excellent conditions for this species. It is reasonable to assume that the silvery legless lizard occurs on the Site.

Western Burrowing Owl (*Athene cunicularia*)

The western burrowing owl (-/CSC) can be found in dry, open grasslands and fields. Burrowing owls are capable of creating their own burrows, but typically occupy burrows abandoned by California ground squirrels (*Otospermophilus beecheyi*) and badger. Abandoned pipes and debris piles are also commonly used by burrowing owls for shelter. Burrowing owls feed on a wide range of animals including insects, small mammals, birds, and reptiles. The breeding season can start as early as late February and is typically over by late August. Up to nine eggs are laid, and incubation is complete in 28 to 30 days. Young owls fledge in 44 days.

Western burrowing owls commonly winter and historically have nested in San Luis Obispo and Santa Barbara Counties. They utilize open fields with low vegetation cover. The availability of small mammal burrows, particularly California ground squirrel burrows, is a critical component of burrowing owl habitat.

Presence on the Site: The western burrowing owl was observed during both ARCADIS field surveys. Although California ground squirrels were not observed on the Site, both small mammal and medium-sized mammal burrows are occasionally encountered that can provide shelter for the western burrowing owl. Conditions on the Site are considered to be moderately to well suited for the western burrowing owl, and the Site provides refuge for this species as indicated by the sighting of two individual burrowing owls during the ARCADIS surveys.

Loggerhead Shrike (*Lanius ludovicianus*)

The loggerhead shrike (-/CSC) is found in dry, open habitat types including the grassland/chaparral interface. This bird is known for its habit of impaling prey items such as lizards, small mice, and large insects on the spines of thorn bushes or on barbed wire fencing. It generally hunts from low perches such as fence posts, wires, and the tops of low bushes. Shrikes lay five to six eggs in an open cup-shaped nest well hidden in the crotch of a tree branch. Egg laying commonly begins in April, and young fledge in about 34 days (Ehrlich et al. 1988).

Presence on the Site: One individual loggerhead shrike was observed on the SMR property during ARCADIS surveys. The Site and surrounding area has suitable foraging and nesting habitat to support the loggerhead shrike.

Northern Harrier (*Circus cyaneus*)

The northern harrier (-/CSC) is a slender raptor with long wings and tail. It spends much of its time coursing back and forth low over open fields, marshlands, savannahs, and grassland prairies in search of food, which typically includes small birds, mammals, reptiles, and insects. The northern harrier typically builds a stick nest on the ground or in low shrubs (Ehrlich et al. 1988).

Presence on the Site: The northern harrier was observed during both ARCADIS surveys, and the species is expected to forage regularly on the SMR property in the fall and winter months. The northern harrier is unlikely to nest on the Site.

White-tailed Kite (*Elanus leucurus*)

The white-tailed kite (-/CSC; “Fully protected”) requires large, open fields and relatively undisturbed oak woodland, grassland, and/or coastal sage scrub for successful breeding. Small mammals are the normal prey item of this species. Eggs are laid as early as mid-March and as late as the end of May. White-tailed kite habitat usually requires a stretch of riparian corridor in which to nest (particularly cottonwoods, but including eucalyptus, willows, and live oaks), and adjacent fields in which to hunt. Nests are usually well hidden in the tree canopy (Dixon et al. 1957).

The white-tailed kite occurs in the area, and it is reasonable to assume this species utilizes the Site for foraging purposes at least periodically.

Presence on the Site: Not observed on the Site during ARCADIS surveys. The Site and SMR property offers good to excellent foraging habitat for the white-tailed kite, and the species is assumed to occur in the area periodically.

Cooper's hawk (*Accipiter cooperii*)

The Cooper's hawk (-/WL) feeds predominantly on small to medium-sized birds, but will also take reptiles and mammals such as wood rats and small rabbits. The breeding season for this species begins in mid-March to early April. Nests are built in the upper canopy of a dense stand of trees such as live oak or cottonwood. Nests are occasionally built atop a wood rat or squirrel nest (Meng and Rosenfield 1988). After completion of the nest, three to five eggs are laid, and incubation lasts about 1 month. Young Cooper's hawks fledge at about 4 weeks of age (Reynolds & Wight 1978). The Cooper's hawk is a secretive species, but is known to breed within urban settings.

The Cooper's hawk was not observed on the Site during the ARCADIS survey. However, like the white-tailed kite, the Cooper's hawk is almost certain to forage on the Site periodically.

Presence on the Site: The Cooper's hawk was observed on the Site during ARCADIS surveys. The Site and surrounding area has adequate foraging habitat for the Cooper's hawk, which is likely to use the SMR property for foraging throughout the year.

American badger (*Taxidea taxus*)

The American badger (- / CSC) is found in open grassland, coastal scrub, chaparral, and oak woodland. California ground squirrels and other small rodents, such as the kangaroo rat (*Dipodomys* spp), are common prey items of the badger. The American badger is generally nocturnal, but is sometimes observed active in the daytime. Burrow openings of this species are elliptical and approximately 8 to 12 inches wide. Young are born in March and April (Whitaker 1996).

Subdivision and development of properties on the Nipomo Mesa is occurring at an accelerated rate, making it increasingly difficult for larger carnivore species such as the American badger to survive. Mortality due to car strikes is a common end for badgers caught in development areas. Other pressures include loss of prey species (e.g., California ground squirrels, kangaroo rats, pocket gophers) due to land clearing and or poisoning, and clearing of suitable denning locations. American badgers are known from the area and have been observed dead from vehicle strikes on Hwy 1 less than 1 mile from the Site (personal observation).

Presence on the Site: The Site and surrounding SMR property provides good habitat for the American badger, although no badger or badger diggings or burrows were observed during the ARCADIS survey. California ground squirrels, an important prey species of the American badger, were also not observed by ARCADIS; however, other small mammal badger prey species are present. ARCADIS biologists spoke with a cattle rancher on the Site during the October 9 field survey who commented that he has observed badger on the Site on one or two occasions.

Monarch Butterfly (*Danaus plexippus*)

The Monarch butterfly does not have federal or state listing status, but is included as a sensitive species in the CNDDB. Winter roost sites extend from Northern Mendocino to Baja California, Mexico. The listing by CDFW is based on limited wintering roost sites within the Central California coast portion of the butterfly's West Coast wintering range. The Monarch butterfly can be found in a variety of habitats, especially those supporting milkweed plants (*Asclepias* sp.), the primary food source of the caterpillars. These butterflies frequent grasslands, prairies, meadows, and wetlands, but avoid dense forests. In the winter, Monarchs cluster together in large numbers forming winter roost locations in eucalyptus, cypress, and Monterey pine trees, often on the edges of open areas.

The closest CNDDB reports of wintering Monarch butterflies come from the vicinity of Hwy 1 and Willow Street less than 1 mile north of the Site. Adult Monarch butterflies were observed on the Site during the survey by ARCADIS, but no winter roost sites are expected to occur on the Site.

Presence on the Site: Adult Monarch butterflies were observed on the Site by ARCADIS; however, The Site is not likely to support a winter roost location for this species, as there are few potential roost trees present on the SMR property, and those that are present are typically single trees or a small number of associated trees exposed to prevailing on-shore winds and the elements.

6. Impacts

The following discussion addresses anticipated project-related biological impacts. All biological impacts on the Site associated with the development occur on the undeveloped expanse of native central dune scrub habitat located east of the fenced refinery boundary. Wildlife impacts within the industrial areas are not anticipated. This report conservatively combines both temporary and permanent impacts for the purpose of the impact assessment. It is recognized that the majority of the disturbance envelope will be subject to temporary impacts associated with construction, however, accurate delineation between temporary and permanent impacts areas was not feasible at the time of this writing. At this time, the project is anticipated to result in minor ecological impacts to wildlife that can be mitigated to a less than significant effect, and as such, resource protection measures are proposed in Section 7.

6.1 Direct Loss of Wildlife Habitat and Species

The majority of the Site supports central dune scrub habitat impacted by cattle grazing and other land use operations. The expected direct impacts associated with the project are primarily the loss of open foraging/dispersal ground for wildlife and loss of fossorial wildlife species that may be present during clearing and grading of the Site. No direct impacts to federal or state listed species are anticipated as a result of this project.

6.2 Indirect Loss of Vegetation and Wildlife Habitat

The final project footprint will consist of up to five parallel linear rail tracks that extend east from the refinery. The rail tracks will continue out through the current grazing area, allowing rail cars to be staged for off-loading before returning to the main Southern Pacific track. The modified rail spur infrastructure will occupy/impact relatively few acres compared to the total amount of surrounding native habitat present on the SMR property. The proposed project is not anticipated to result in erosion, sedimentation, or alteration of any jurisdictional (or non-jurisdictional) wetlands.

Cumulatively, an overall increase in noise, light, and human activity are anticipated to result from this project. Development of the Site will marginally add to impacts already occurring in association with other nearby development and is likely to have a cumulative impact on biological resources in the area by increasing human activities in open dispersal corridors and foraging areas.

7. Recommended Resource Protection Measures

The following measures are recommended to help prevent or reduce impacts to sensitive biological resources occurring on the Site.

- Project scheduling – Project managers should consider scheduling construction work, especially clearing of natural habitat, to occur outside of important breeding and dispersal periods for wildlife. Clearing of vegetation should take place outside of the recognized bird breeding season (March 15 to August 31) if feasible to avoid impacts to nesting birds.

- Pre-construction wildlife surveys – Preconstruction wildlife surveys should be conducted no more than 14 days prior to the start of anticipated clearing activities. The purpose of the surveys is to identify any wildlife, especially sensitive wildlife species such as badger or burrowing owls, that might occur in the proposed clearing area and that can be passively or actively relocated away from the area to avoid project-related impacts.

- Work area delineation – The work area, including the proposed rail line route, access roads, and equipment staging areas, shall be delineated with orange construction fencing (or equivalent) in order to consolidate anticipated disturbance areas resulting from vehicle and foot traffic by construction personnel entering and leaving the project area, as well as to prevent unnecessary impacts to vegetation and wildlife areas outside of the project footprint.

- Biological monitoring – A biological monitor should be present during initial clearing to assist with keeping project work within the delineated work area footprint, to help reduce impacts to sensitive vegetation/habitat where feasible, to identify wildlife in or near the work area and to help determine impact avoidance measures for such species, and to relocate wildlife species away from the work area if necessary.

- Traffic control / car pool – To the greatest extent feasible, construction personnel should carpool from the Phillips 66 SMR paved parking lot located on the west side of the refinery to the work area. Temporary access roads should be limited to the fewest number possible to reduce impacts to biological resources. Temporary access roads and staging areas located in central dune scrub habitat should be restored to pre-project conditions following completion of construction.

- Construction personnel requirements – Construction personnel should be required to break and eat lunch in designated, fenced areas. Trash should be removed from the work area daily. Smoking should be limited to designated smoking areas. Personnel should be required to remain inside the designated work area (orange fenced areas) at all times as a means of preventing disturbance to sensitive biological resources in the area.

8. Conclusion

The Site offers potentially suitable habitat for several sensitive wildlife species known to occur in the area. It is either known or reasonable to assume from observations of habitat conditions that the Site supports (continually or periodically) the following species of concern: silvery legless lizard, California horned lizard, American badger, white-tailed kite, western burrowing owl, loggerhead shrike, Bell's sage sparrow, northern harrier, ferruginous hawk, and Cooper's hawk. The Site is not anticipated to support any federal or state listed wildlife species. It is foreseeable that build-out of the rail spur will result in direct impacts to fossorial species such as the silvery legless lizard and California horned lizard that cannot feasibly move away from project disturbance. Notwithstanding the highly lit, heavy industry already on the property, the SMR property provides a relatively large, undisturbed natural corridor for wildlife to move between the Nipomo Mesa and areas further inland, and the undeveloped coastline west of the Site. However, the proposed project is not considered a complete deterrent to such wildlife utilization, as the linear rail spur infrastructure does not block the corridor.

ARCADIS reviewed and surveyed the proposed rail spur route being considered and concludes that anticipated impacts can be mitigated to a less than significant level. No federal or state-listed wildlife species, wetlands, or sensitive native wildlife habitats are anticipated to be impacted by the proposed project.

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Tables

TABLE 1
OBSERVED WILDLIFE SPECIES AT THE
PHILLIPS 66 SANTA MARIA REFINERY PROPERTY

Compiled from ARCADIS October 9, 2012 and May 1st 2013 field surveys

Scientific Name	Common Name
MAMMALS	
Canis latrans	**Coyote**
***Dipodomys* sp.**	**Kangaroo rat**
Lepus californicus	**Black-tailed jackrabbit**
Mephitis mephitis	**Striped skunk**
Mustela frenata	Long-tailed weasel
Peromyscus sp.	Deer mouse
Procyon lotor	Raccoon
Sylvilagus audubonii	Cottontail rabbit
Thomomys bottae	**Botta's pocket gopher**
REPTILES AND AMPHIBIANS	
Anniella pulchra	Silvery legless lizard
Crotalus viridis	Pacific rattlesnake
Lampropeltis getula	California king snake
Masticophis lateralis	Striped racer snake
Phrynosoma coronatum	Coast horned lizard
Pituophis catenifer	Gopher snake
Sceloporus occidentalis	**Western fence lizard**
Uta stansburiana	**Side-blotched lizard**
INVERTEBRATES	
Danaus plexippus	**Monarch butterfly**
BIRDS	
Accipiter cooperii	**Cooper's hawk**
Amphispiza belli	**Bell's sage sparrow**
Athene cunicularia	**Western burrowing owl**
Bubo virginianus	**Great horned owl**
Buteo Jamaicensis	**Red-tailed hawk**
Buteo regalis	**Ferruginous hawk**
Callipepla californica	**California quail**
Calypte anna	**Anna's hummingbird**
Carduelis lawrencei	**Lesser goldfinch**
Carpodacus mexicanus	**House finch**
Cathartes aura	**Turkey vulture**
Circus cyaneus	**Northern harrier**
Dendroica coronata	**Yellow-rumped warbler**
Falco sparverius	**American kestrel**
Lanius ledovicianus	**Loggerhead shrike**
Passerculus sandwichensis	**savannah sparrow**
Picoides nuttallii	**Nuttall's woodpecker**
Pipilo crissalis	**California towhee**
Sayornis nigricans	**Black phoebe**
Sayornis saya	**Say's phoebe**
Zonotrichia leucophrys	**White-crowned sparrow**

Note: List includes wildife species not observed during the survey but anticipated to be found commonly on the Site. Species observed or identified by sign during the October 9th survey are listed in bold print.

TABLE 2
PRESENT OR CNDDB RECORDED SENSITIVE ELEMENTS OF BIOLOGICAL DIVERSITY
FOR THE PHILLIPS 66 PROPERTY AND SURROUNDING AREA

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Amphibians		**USFWS / CDFG**		
Ambystoma californiense	California tiger salamander	FE / CSC	Grasslands, woodland; slow moving or ponded aquatic features for breeding	Not observed. Marginal to poor habitat present / No known breeding ponds in project vicinity
Rana aurora draytonii	California red-legged frog	FT / CSC	Lakes, ponds, marshes, slow-moving streams, riparian environments	Not observed. Species known to occur in aquatic features within one mile of the site. Potentially present in Oso Flaco Creek.
Spea hammondii	Western spadefoot toad	- / CSC	Foothills, woodlands, grasslands; temporary ponds and vernal pools for breeding	Not observed; marginally suitable upland habitat present. Aquatic habitat for breeding unlikely to occur on the site.
Taricha torosa torosa	Coast Range newt	FSC / CSC	Foothills, woodlands, riparian environments; moving clear water streams for breeding	Not observed; suitable habitat absent on site.
Birds		**USFWS / CDFG**		
Accipiter cooperii	**Cooper's hawk**	**- / CSC**	**Variety of habitats suitable; oak woodlands, forests, riparian areas for nesting.**	**Observed on site; Likely to forage on the site and occur intermittently on the site throughout the year.**
Aquila chrysaetos	Golden eagle	- / CSC (Fully Protected)	Open savannahs, grasslands, foothills and woodlands; nests in large trees or on cliff faces	Not observed; Species may occur intermittently on the site. Not likely to nest on the site.
Agelaius tricolor (nesting colony)	Tricolored blackbird	(FSC) MNBMC / CSC	Ponds, marshes, lakes	Not observed; species not likely to occur on the site; no suitable aquatic habitat on the site.
Amphispiza belli	**Bell's sage sparrow**	**- / CSC**	**coastal sage scrub,chamise chaparral**	**Observed on site; one male observed singing. The species could potentially nest on the site.**
Athene cunicularia	**Western burrowing owl**	**(FSC) MNBMC / CSC**	**Open savannahs, grasslands, foothills and barren areas; nests in small mammal burrows**	**Observed on site; suitable scrub habitat available on site; over-winters on the site.**
Buteo regalis	**Ferruginous hawk**	**(FSC) MNBMC / CSC**	**Open savannahs, grasslands, foothills and fields; may potentially over-winter on the site**	**Observed on site; suitable foraging habitat present.**
Charadrius alexandrinus nivosus (nesting)	Western snowy plover	FT / CSC	Sandy beaches, open mud-flats and dunes	Not observed; suitable habitat absent for this species.
Circus cyaneus	**Northern harrier**	**- / CSC**	**Open fields, grasslands, savannahs, and scrub habitat**	**Observed on site; suitable foraging habitat on the site for this species**
Elanus leucurus	White-tailed kite	MNBMC / CSC (Fully Protected)	FIelds, grasslands, oak woodlands, coastal scrub	Not observed; suitable habitat available for this species; species likely to occur on the site intermittently throughout the year.
Eremophila alpestris	California horned lark	- / CSC	Open fields, agricultural fields, barren areas, coastal dune scrub	Not observed; suitable open scrub and dune habitat present
Falco mexicanus	Prairie falcon	FSC / CSC	Deserts, foothills, grasslands and open savannahs; nests on cliff faces	Not observed; species may occur infrequently on the site while foraging
Gymnogyps californianus	California condor	FE/SE	Mountains, foothills, woodlands, grasslands	Not observed; potential foraging habitat on the site for this species
Laterallus jamaicensis coturniculus	California black rail	ST/ CDFG-FP	Marsh, estuary habitats	Not observed; no suitable habitat present for this species.
Lanius ludovicianus	**Loggerhead shrike**	**- / CSC**	**Deserts, foothills, grasslands and open savannahs; nests on cliff faces**	**Observed on the site; suitable habitat available for this species; species likely to occur on the site intermittently throughout the year.**
Sternula antillarum browni	California least tern	FE/SE	Coastal dunes, estuaries, beaches	Not observed; very limited dune habitat available on Site. No foraging habitat on Site
Fish		**USFWS / CDFG**		
Eucyclogobius newberryi	Tidewater goby	FE / CSC	Coastal lagoons and streams	Not expected; no suitable aquatic habitat present
Gasterosteus aculeatus williamsoni	Unarmored threespine stickleback	FE/SE	Clear water streams	Not expected; no suitable aquatic habitat present
Oncorhynchus mykiss irideus	Steelhead trout	FT / CSC	Coastal streams and rivers	Not expected; no suitable aquatic habitat present
Invertebrates		**USFWS / CDFG**		
Ablautus schlingeri	Oso Flaco robber fly	- / -	Sand dunes	Not observed; species last reported in 1962
Areniscythris brachypteris	Oso Flaco flightless moth	- / -	Coastal dunes	Not observed; species last reported in 1972
Chlosyne leanira elegans	Oso Flaco patch butterfly	- / -	**Coastal dunes**	Not observed; species last reported in 1983
Cincindela hirticollis gravida	sandy beach tiger beetle	- / -	Coast sand beaches	Not observed; no suitable habitat present

TABLE 2
PRESENT OR CNDDB RECORDED SENSITIVE ELEMENTS OF BIOLOGICAL DIVERSITY
FOR THE PHILLIPS 66 PROPERTY AND SURROUNDING AREA

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Danaus plexippus	**Monarch butterfly**	**- / -**	**Winter roosts occur in canopy of Monterey pine, eucalyptus and other large tree groves**	**Observed; Species likely to occur intermittently on the site; no winter roost locations known to occur on the site**
Lichnanthe albipilosa	White sand bear scarab beetle	- / -	Coastal dunes	Not observed; species last reported in 1972
Plebejus icarioides moroensis	Morro Bay blue butterfly	- / -	Coastal dunes	Not observed; found at Oso Flaco Lake in 2004; *Lupinus chamissonis* (present at the project site) is host plant for this butterfly
Mammals		**USFWS / CDFG**		
Antroxous pallidus	Pallid bat	- / CSC	Variety of habitats including woodlands, fields, coastal scrub and grasslands for foraging	Not observed; suitable foraging habitat present
Corynorhinus townsendii	Townsend's big-eared bat	- / CSC	Occurs in a variety of different habitat types; roosts in the open hanging from walls, ceilings	Not observed; suitable foraging habitat present
Lasionycteris noctivagans	Silver-haired bat	- / -	Lower montane coniferous forests; riparian corridors	Not observed; marginal to poor habitat suitability for this species
Lasiurus blossevillii	Western red bat	- / CSC	Cismontane woodland, lower montane coniferous forests, riparian forests - woodlands	Not observed; marginal to poor habitat suitability for this species
Lasiurus cinereus	Hoary bat	- / -	Broadleaved upland forest, cismontane woodland, lower montane coniferous forests, woodlands	Not observed; potentially suitable foraging habitat present
Myotis yumanensis	Yuma myotis	- / -	Cismontane woodland, lower montane coniferous forests, riparian forests - woodlands	Not observed; potentially suitable foraging habitat present
Taxidea taxus	American badger	- / CSC	Grasslands, woodlands, chaparral, coastal scrub, foothills	Not observed; suitable habitat present; species likely to occur on the site periodically.
Reptiles		**USFWS / CDFG**		
Anniella pulchra	Silvery legless lizard	FSC / CSC	Coastal dune scrub, woodlands with friable soil	Not observed; suitable habitat present on the site. Species is likely to occur within the project area.
Actinemys marmorata	Pacific pond turtle	FSC / CSC	Aquatic environments of lakes, streams, marshes, ponds and riparian systems	Not observed; known to occur in Oso Flaco Creek and other aquatic environments nearby.
Phrynosoma coronatum	Coast horned lizard	FSC / CSC	Coastal scrub, coastal dune scrub, woodlands, chaparral and grasslands	Not observed; suitable habitat present on the site. Species is likely to occur within the project area.
Thamnophis hammondii	Two-striped gartern snake	- / CSC	Marshes, ponds, lakes, streams, riparian systems	Not observed; not suitable aquatic habitat on site
Plants		**USFWS / CDFG / CNPS**		
Agrostis hooveri	Hoover's bent grass	- / - / 1B.2	Central maritime chaparral, woodlands, grasslands	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Aphanisma blitoides	Aphanisma	SOC / - / 1B.2	Coastal dunes, coastal bluff scrub, coastal scrub	Not observed; suitable habitat present.
Arctostaphylos cruzensis	Arroyo de la Cruz manzanita	- / - / 1B.1	Chaparral, coastal scrub, grassland, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to the Central Coast (San Luis Obispo and Monterey Counties).
Arctostaphylos luciana	Santa Lucia manzanita	- / - / 1B.2	Chaparral, woodlands	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Arctostaphylos morroensis	Morro manzanita	FT/-/1B.1	Central maritime chaparral, scrub, woodlands with sandy soils	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Arctostaphylos obispoensis	San Luis Obispo manzanita, Bishop manzanita	- / - / 4.3	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to the Central Coast (San Luis Obispo and Monterey Counties).

TABLE 2
PRESENT OR CNDDB RECORDED SENSITIVE ELEMENTS OF BIOLOGICAL DIVERSITY
FOR THE PHILLIPS 66 PROPERTY AND SURROUNDING AREA

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Arctostaphylos pechoensis	Pecho manzanita	- / - / 1B.2	Chaparral, coastal scrub, closed cone conifer forests	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Arctostaphylos pilosula	Santa Margarita manzanita	- / - / 1B.2	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent, known from La Panza Range. Endemic to the Central Coast (San Luis Obispo and Monterey Counties).
Arctostaphylos purissima	La Purisima manzanita	- / - / 1B.1	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Arctostaphylos rudis	Sand mesa manzanita	- / - / 1B.2	Chaparral, closed cone conifer forests, woodlands and forests	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Arctostaphylos tomentosa subsp. *daciticola*	dacite manzanita	- / - / 1B.1	Chaparral, woodland	Not observed; suitable habitat absent, known only from Hollister Peak. Endemic to San Luis Obispo County.
Arenaria paludicola	marsh sandwort	FE/SE/1B.1	Freshwater marshes and adjacent areas.	Not observed, suitable habitat absent. Known from only two occurrences in Black Lake Canyon and Oso Flaco Lake.
Astragalus didymocarpus var. *milesianus*	Mile's milk-vetch	- / - / 1B.2	Coastal scrub, often on serpentine clay soils	Not observed; suitable coastal scrub habitat with clay soils absent. Endemic to Ventura, Santa Barbara, and San Luis Obispo Counties.
Atriplex serenana var. *davidsonii*	Davidson's saltscale	- / - / 1B.2	Coastal bluff scrub, coastal scrub	Not observed; suitable habitat present.
Calochortus obispoensis	San Luis mariposa lily	- / - / 1B.2	Chaparral, coastal scrub, grasslands, often on serpentine soils	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Calochortus simulans	San Luis Obispo mariposa lily	- / - / 1B.3	Chaparral, coastal scrub, woodlands, lower montane coniferous forests, often on granitic soils, sometimes serpentine soils	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Calystegia subacaulis subsp. *episcopalis*	Cambria morning-glory	- / - / 1B.2	Chaparral, woodlands.	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Carex obispoensis	San Luis Obispo sedge	- / - / 1B.2	Chaparral, coastal scrub, closed cone conifer forests, coastal prairie and grasslands	Not observed, suitable habitat potentially present.
Castilleja densiflora subsp. *obispoensis*	San Luis Obispo owl's-clover	- / - / 1B.2	Grassland, meadows, and seeps	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Ceanothus cuneatus var. *fascicularis*	Lompoc ceanothus	- / - / 4.2	Central maritime chaparral, central coastal scrub	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Ceanothus impressus subsp. *nipomensis*	Nipomo ceanothus	Local Concern	Central maritime chaparral, central coastal scrub	Not observed, suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Centromadia parryi subsp. *congdonii*	Congdon's tarplant	- / - / 1B.2	Grasslands and wetland fringes, often in alkaline soils	Not observed; suitable habitat absent.
Chenopodium littoreum	coastal goosefoot	- / - / 1B.2	Coastal dunes	Not observed; suitable habitat present.
Chlorogalum pomeridianum var. *minus*	dwarf soaproot	- / - / 1B.2	Chaparral in serpentine soils	Not observed, suitable habitat absent.
Chorizanthe breweri	Brewer's spineflower	- / - / 1B.3	Chaparral, coastal scrub, grassland, closed cone conifer forests, woodlands in serpentine soils	Not observed; suitable habitat absent.
Chorizanthe rectispina	Straight-awned spineflower	-/-/1B.3	Chaparral, coastal scrub, woodlands	Not observed; suitable habitat potentially present.
Cicuta maculata var. *bolanderi*	Bolander's water-hemlock	- / - /2.1	Coastal marshes	Not observed; suitable marsh habitat absent.
Cirsium fontinale var. *obispoense*	Chorro Creek bog thistle	FE/SE/1B.2	Chaparral, coastal scrub, woodlands, grasslands in serpentine seeps and drainages	Not observed; suitable serpentine substrate absent. Endemic to San Luis Obispo County.
Cirsium rhothophilum	Surf thistle	-/CT/1B.2	Coastal dunes, coastal bluff scrub	Not observed; unlikely on project site; known from dunes at Pismo Beach, Nipomo, and Santa Barbara County. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Cirsium scariosum var. *loncholepis*	La Graciosa thistle	FE/CT/1B.1	Coastal dunes, coastal bluff scrub, moist habitats such as marshes	Not observed; suitable marsh habitat absent.
Cladium californicum	California saw-grass	- / - / 2.2	Marshes	Not observed; suitable marsh habitat absent.
Clarkia speciosa subsp. *immaculata*	Pismo clarkia	FE/CR/1B.1	Chaparral, coastal scrub, woodlands, grasslands	Not observed. Endemic to San Luis Obispo County.
Cordylanthus rigidus subsp. *littoralis*	Seaside bird's-beak	- / SE / 1B.1	Chaparral, coastal scrub, woodlands, grasslands	Not observed. Endemic to Central Coast.

TABLE 2
PRESENT OR CNDDB RECORDED SENSITIVE ELEMENTS OF BIOLOGICAL DIVERSITY
FOR THE PHILLIPS 66 PROPERTY AND SURROUNDING AREA

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Dudleya abramsii subsp. *murina*	San Luis Obispo dudleya	- / - / 1B.3	Chaparral, woodlands, rocky places	Not observed; suitable habitat absent. Endemic to San Luis Obispo County.
Dudleya blochmaniae subsp. *blochmaniae*	Blochman's dudleya	- / - / 1B.1	Chaparral, coastal scrub, grasslands, often on clay or serpentine soils in bare rocky places	Not observed; suitable habitat absent.
Deinandra increscens subsp. *villosa*	Gaviota tarplant	FE/CE/1B.1	coastal bluff scrub, coastal scrub, valley and foothill grassland	Not observed; suitable scrub habitat present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Deinandra increscens subsp. *foliosa*	leafy tarplant	- / - / 1B.2	Grassland, often sandy	Not observed; suitable habitat absent. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Delphinium parryi subsp. *eastwoodiae*	Eastwood's larkspur	- / - / 1B.2	Chaparral, valley and foothill grassland	Not observed, suitable habitat absent.
Delphinium parryi subsp. *blochmaniae*	dune larkspur	- / - / 1B.2	Coastal dunes, coastal scrub, central maritime chaparral	Not observed, suitable habitat present. Endemic to Ventura, Santa Barbara, and San Luis Obispo Counties.
Delphinium umbraculorum	Umbrella larkspur	- / - / 1B.3	Cismontane woodland	Not observed, suitable habitat absent.
Dithyrea maritima	Beach spectacle pod	-/CT/1B.1	Coastal dunes	Not observed; known from low sand dunes from Morro Bay sand spit southward
Dudleya abramsii subsp. *murina*	mouse-gray dudlea	- / - / 1B.3	Chaparral, coastal scrub, grasslands, often on serpentine soils in bare rocky places	Not observed; suitable habitat present although serpentine soils absent. Endemic to San Luis Obispo County.
Erigeron blochmaniae	**Blochman's leafy daisy**	**- / - / 1B.2**	**Coastal dunes, coastal scrub**	**Present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).**
Erigeron sanctarum	Saint's daisy	- / - / 4.2	Central maritime chaparral, central coastal scrub, woodlands	Not observed, suitable habitat present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Eriodictyon altissimum	Indian Knob mountain balm	FE/CE/1B.1	Central maritime chaparral, central coastal scrub, woodlands	Not observed; suitable habitat absent. Known from Indian Knob and Irish Hills. Endemic to San Luis Obispo County.
Eryngium aristulatum var. *hooveri*	Hoover's button celery	- / - / 1B.1	Vernal pools	Not observed; suitable habitat absent. Known from Laguna Lake near San Luis Obispo.
Erysimum capitatum var. *lompocense*	San Luis Obispo wallflower	- / - / 4.2	Central maritime chaparral, central coastal scrub in sandy soils	Not observed; suitable habitat absent.
Erysimum suffrutescens	Suffrutescent wallflower	- / - / 4.2	Coastal dunes, coastal dune scrub, coastal scrub	Not observed; suitable sandy soils present.
Fritillaria viridea	San Benito fritillary	- / - / 1B.2	Chaparral, serpentine soils.	Not observed; chaparral habitat with serpentine substrate absent. Endemic to Central Coast (San Luis Obispo, Monterey, Fresno, San Benito Counties).
Horkelia cuneata subsp. *puberula*	mesa horkelia	- / - / 1B.1	Chaparral, coastal scrub, and woodlands, especially in sandy or gravelly soils	Not observed; suitable coastal scrub, maritime chaparral, and woodland habitat present.
Horkelia cuneata subsp. *sericea*	Kellogg's horkelia	- / - / 1B.1	Closed-cone coniferous forest, chaparral, coastal dunes, coastal scrub	Not observed; suitable habitat present.
Layia heterotricha	pale-yellow layia	- / - / 1B.1	Grassland, coastal scrub, woodlands	Not observed; suitable habitat present.
Layia jonesii	Jones' layia	- / - / 1B.2	Chaparral, grasslands in clay or serpentine soils	Not observed; suitable clay soils absent.
Lupinus ludovicianus	San Luis Obispo County lupine	- / - / 1B.2	Chaparral, woodlands, grasslands in sandy or sandstone-derived soils	Not observed, suitable habitat absent. Endemic to San Luis Obispo County.
Lupinus nipomoensis	Nipomo Mesa lupine	FE / SE / 1B.1	Coastal dunes	Not observed; suitable habitat present. Endemic to San Luis Obispo County.
Monardella frutescens	San Luis Obispo manardella	- / - / 1B.2	Coastal dunes, coastal scrub	Not observed; suitable habitat present.
Monardella palmeri	Palmer's monardella	- / - / 1B.2	Chaparral, woodlands in serpentine soils	Not observed; suitable habitat absent. Endemic to Central Coast (San Luis Obispo and Monterey Counties.)
Monardella undulata subsp. *crispa*	Crisp monardella	- / - / 1B.2	Coastal dunes, coastal scrub, coastal prairie, central maritime chaparral, Bishop pine forest, ponderosa pine forest (sandy soils at low elevations)	Not observed; suitable habitat present.

TABLE 2
PRESENT OR CNDDB RECORDED SENSITIVE ELEMENTS OF BIOLOGICAL DIVERSITY
FOR THE PHILLIPS 66 PROPERTY AND SURROUNDING AREA

Scientific Name	Common Name	Status	Habitat	Occurrence of Element on Project Site
Mucronea californica	**California spineflower**	**- / - / 4.2**	**Coastal dunes, coastal scrub, central maritime chaparral, woodlands, grasslands (sandy)**	**Present.**
Nasturtium gambelii	Gambel's water cress	FE / SE / 1B.1	Coastal marshes	Not observed; suitable marsh habitat absent.
Nemacaulis denudata var. *denudata*	coast wooly-heads	- / - / 1B.2	Coastal dunes	Not observed; suitable habitat present.
Nemacladus secundiflorus var. *robbinsii*	Robbins' nemacladus	- / - / 1B.2	Chaparral, valley and foothill grassland	Not observed; suitable habitat absent.
Orobanche parishii subsp. *brachyloba*	Short-lobed broomrape	**- / - / 4.2**	Coastal bluff scrub, coastal dunes, coastal scrub	Not observed; suitable habitat present.
Prunus fasciculata* var. *punctata	**Sand almond**	**- / - / 4.3**	**Coastal dunes, coastal scrub, central maritime chaparral, woodlands**	**Present.**
Sanicula maritima	Adobe sanicle	- / Rare / 1B.1	Chaparral, coastal prairie, grasslands, seeps in clay and serpentine soils	Not observed; suitable habitat absent.
Scrophularia atrata	black-flowered figwort	SOC / - / 1B.2	Coastal dunes, coastal scrub, chaparral, woodlands, Bishop pine forest	Not observed, suitable habitat potentially present. Endemic to Central Coast (Santa Barbara and San Luis Obispo Counties).
Senecio aphanactis	Rayless ragwort	- / - / 2.2	Coastal scrub, chaparral, woodlands	Not observed; potential suitable habitat present.
Senecio blochmaniae	**Blochman's groundsel**	**- / - / 4.2**	**Coastal dunes, coastal scrub**	**Present.**
Sidalcea hickmanii subsp. *anomala*	Cuesta Pass checkerbloom	- / Rare / 1B.2	Chaparral, closed cone conifer forests in serpentine soils	Not observed; suitable habitat of closed-cone coniferous forest on serpentine substrate absent. Endemic to San Luis Obispo County.
Streptanthus albidus subsp. *peramoenus*	Most beautiful jewel-flower	- / - / 1B.2	Chaparral, woodlands, grasslands in serpentine soils	Not observed; suitable serpentine substrate absent
Symphyotrichum defoliatum	San Bernardino aster	- / - / 1B.2	Cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, valley and foothill grassland	Not observed; potential suitable habitat present.
Trifolium depauperatum var. *hydrophilum*	Saline clover	- / - / 1B.2	Marshes, vernal pools, moist grasslands, often in alkaline soil	Not observed; suitable habitat absent.
Tropidocarpum capparideum	Caper-fruited tropidocarpum	- / - / 1B.1	Grasslands, often in alkaline soils	Not observed; suitable habitat absent.

Based on CNPS Inventory of Rare and Endangered Plants (online edition 2013) and CNDDB (2013) search results for the Nipomo, Guadalupe, Santa Maria, Orcutt, Arroyo Grande NE, Oceano, Pismo Beach, Casmalia and Tar Spring Ridge quadrangles.

Status Codes

United States Fish and Wildlife Service (USFWS)
FE Federal Endangered
FT Federal Threatened
SOC Species of Concern as listed by Sacramento Office (USFWS, 2004)
MNBMC Migratory nongame bird of management concern
FSC Federal special concern species
BCC Birds of Conservation Concern

California Department of Fish and Game (CDFG)
CE California Endangered
CT California Threatened
CR California Rare
CSC California Species of Concern

California Native Plant Society (CNPS)
Lists
List 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
List 2: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
List 3: Plants About Which We Need More Information - A Review List
List 4: Plants with limited distribution (Watch List)
Extensions to List Categories
.1 - Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 – Fairly endangered in California (20-80% occurrences threatened)
.3 – Not very endangered in California (<20% of occurrences threatened or no current threats known)

TABLE 3

POTENTIAL PROJECT IMPACTS TO VEGETATION TYPES AT THE SITE

Plant Community Type	Impacts for New Pipeline (Acres)	Impacts for Rail Spur and Unloading Facility (Acres)	Impacts for Secondary Emergency Vehicle Access Route (Acres)	Impacts for Internal Refinery Piping and Existing Track Repair (Acres)
Sensitive Habitats				
Arroyo Willow Wetland	0.00	0.00	0.00	0.00
Central Dune Scrub - Silver Dune Lupine and Dune-Heather (& Dune-Heather and Silver Dune Lupine) Association	0.00	0.00	0.00	0.00
Dune Sheet	0.00	0.00	0.00	0.00
Freshwater Marsh	0.00	0.00	0.00	0.00
Non- Sensitive Habitats				
Central Dune Scrub - Black Sage, Dune-Heather Association	0.00	10.11	0.03	0.00
Central Dune Scrub - Coastal Dune Lupine, Dune-Heather, Silver Bush Lupine Association	0.00	0.00	0.00	0.00
Central Dune Scrub - Dune-Heather Alliance	0.00	4.57	0.01	0.00
Central Dune Scrub - Dune-Heather, California Coffeeberry, Blue Elderberry Association	0.00	0.00	0.00	0.00
Central Dune Scrub - Dune-Heather, Seacliff Buckwheat, Black Sage Association	0.00	7.26	0.00	0.00
Degraded Central Dune Scrub	2.22	2.32	0.00	0.00
Industrial/Existing Refinery	1.88	13.92	1.62	4.48
Nonnative Veldt Grassland	0.00	0.30	0.01	0.00
Planted Trees	0.00	0.14	0.00	0.00
Total Sensitive Habitat Impacts	**0.00**	**0.00**	**0.00**	**0.00**
Total Non-Sensitive Habitat Impacts	**4.10**	**38.62**	**1.67**	**4.48**
TOTALS	**4.10**	**38.62**	**1.67**	**4.48**

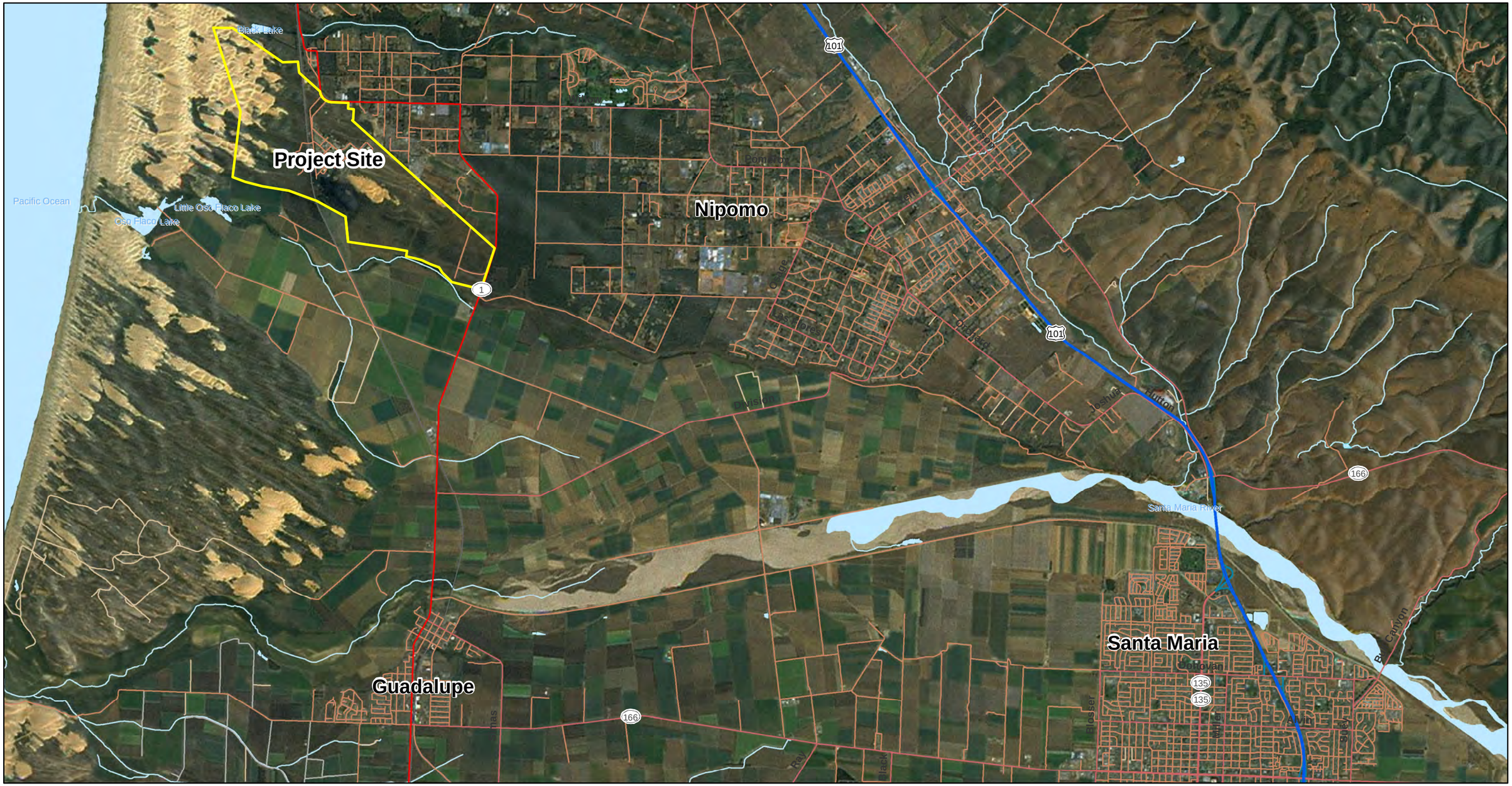
Note: To provide comprehensive acreages, this table includes a category for Industrial/Existing Refinery; however, no impacts to ecological resources are anticipated within this area.

TABLE 3

POTENTIAL PROJECT IMPACTS TO VEGETATION TYPES AT THE SITE

Plant Community Type	Total Rail Spur Project (excluding coastal access)
Sensitive Habitats	
Arroyo Willow Wetland	0.00
Central Dune Scrub - Silver Dune Lupine and Dune-Heather (& Dune-Heather and Silver Dune Lupine) Association	0.00
Dune Sheet	0.00
Freshwater Marsh	0.00
Non- Sensitive Habitats	
Central Dune Scrub - Black Sage, Dune-Heather Association	10.14
Central Dune Scrub - Coastal Dune Lupine, Dune-Heather, Silver Bush Lupine Association	0.00
Central Dune Scrub - Dune-Heather Alliance	4.58
Central Dune Scrub - Dune-Heather, California Coffeeberry, Blue Elderberry Association	0.00
Central Dune Scrub - Dune-Heather, Seacliff Buckwheat, Black Sage Association	7.26
Degraded Central Dune Scrub	4.54
Industrial/Existing Refinery	21.90
Nonnative Veldt Grassland	0.31
Planted Trees	0.14
Total Sensitive Habitat Impacts	**0.00**
Total Impact Area (including existing industrial refinery areas and roads)	**48.87**
TOTAL	**48.87**

Figures



Legend

Property Boundary

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

N

0 5,000 10,000

SCALE IN FEET

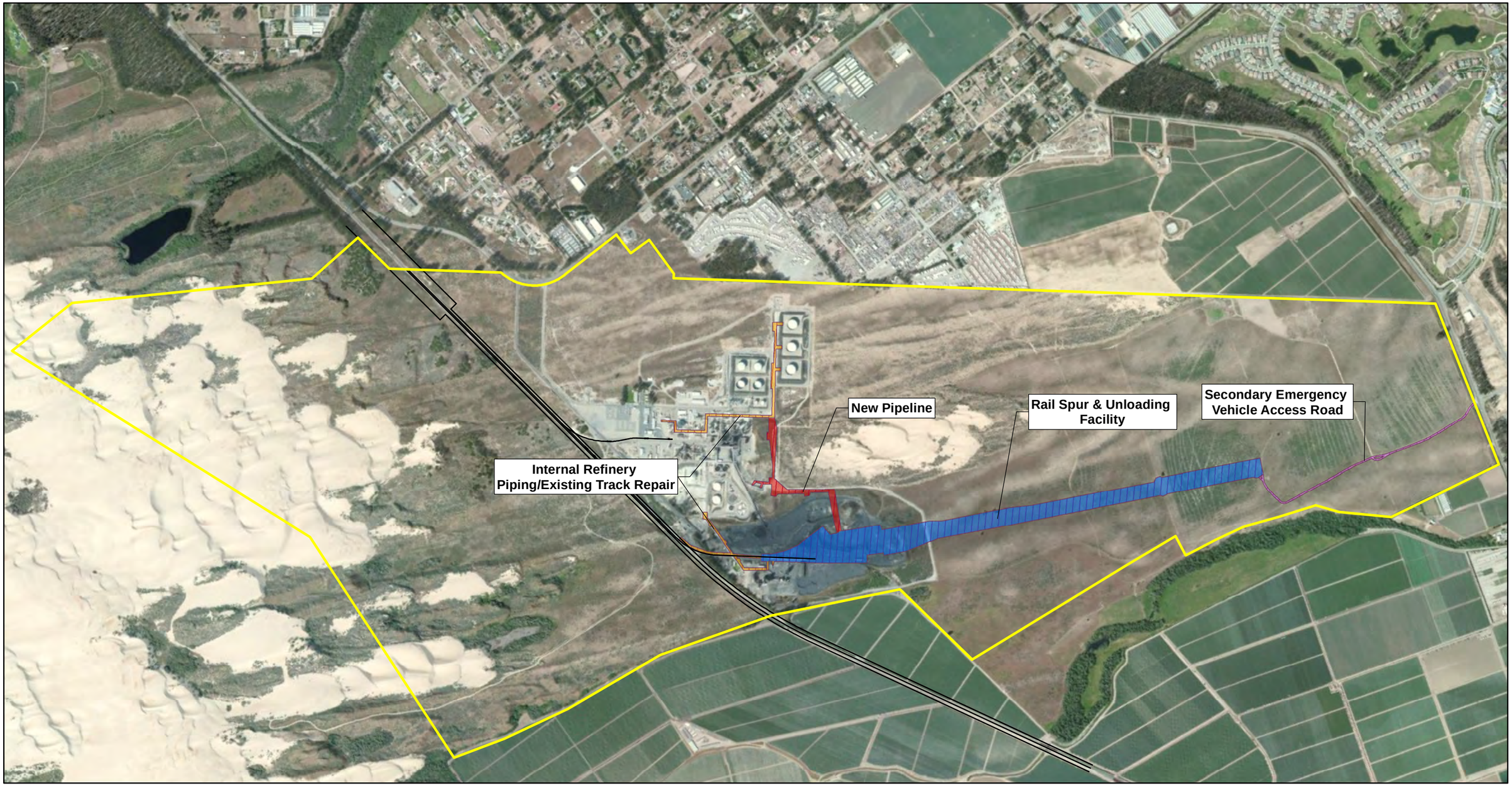
Phillips 66
Santa Maria Refinery Rail Project

PROJECT AREA

ARCADIS

FIGURE
1

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 1 ProjectArea.mxd 6/14/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



Legend

- Property Boundary
- Existing Rail Line
- Limits of Disturbance

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

N

0 1,255 2,510

SCALE IN FEET

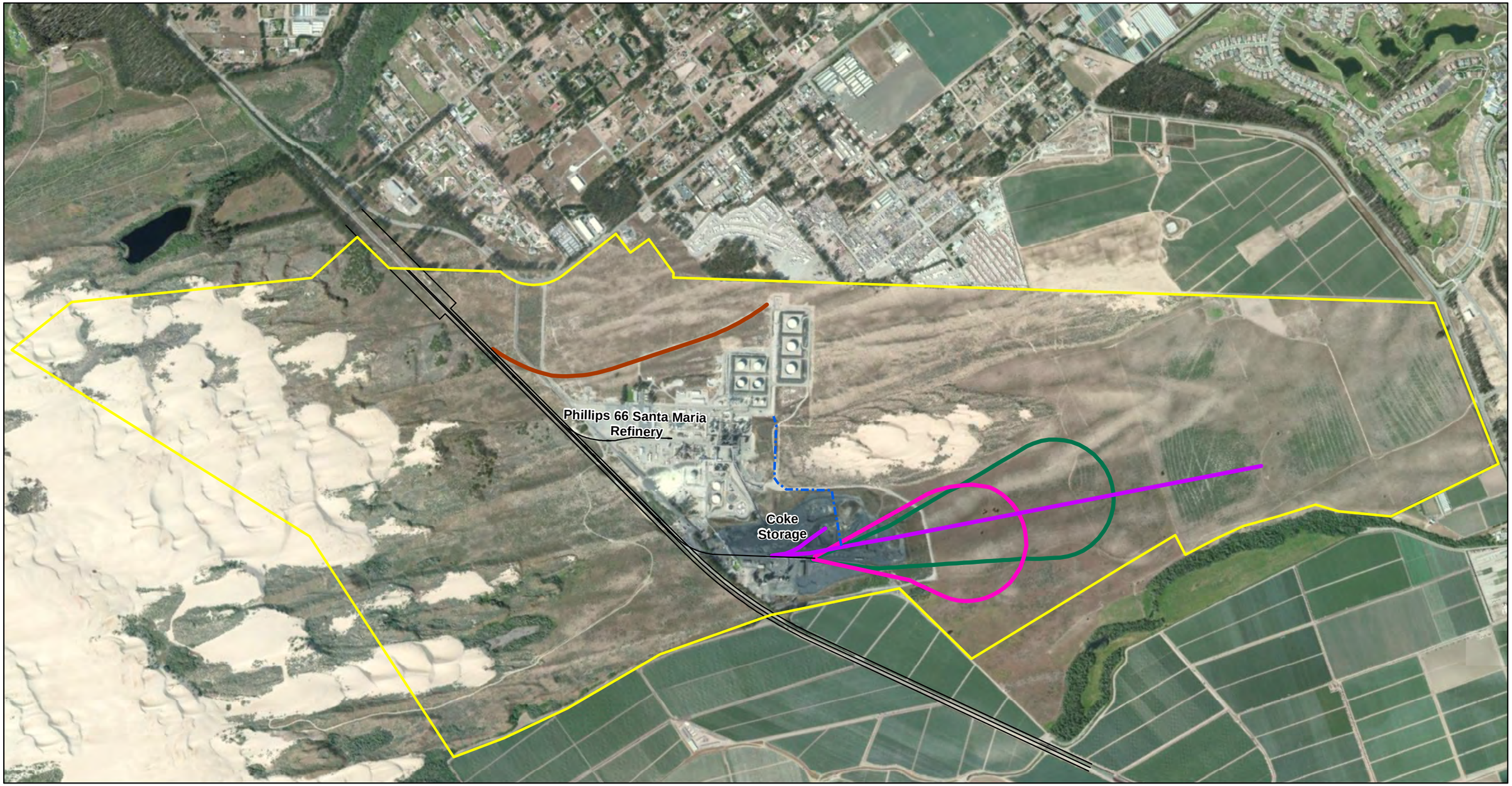
Phillips 66
Santa Maria Refinery Rail Project

PROPOSED PROJECT SITE ON PHILLIPS 66 PROPERTY

ARCADIS

FIGURE
2

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 2 ProposedProjectSite_rev1.mxd 6/17/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



Legend

- Property Boundary
- Existing Rail Line
- Pipe Routing
- Northern Access Track
- Small Loop Track
- Large Loop Track
- Straight Track (Proposed Project)

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

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SCALE IN FEET

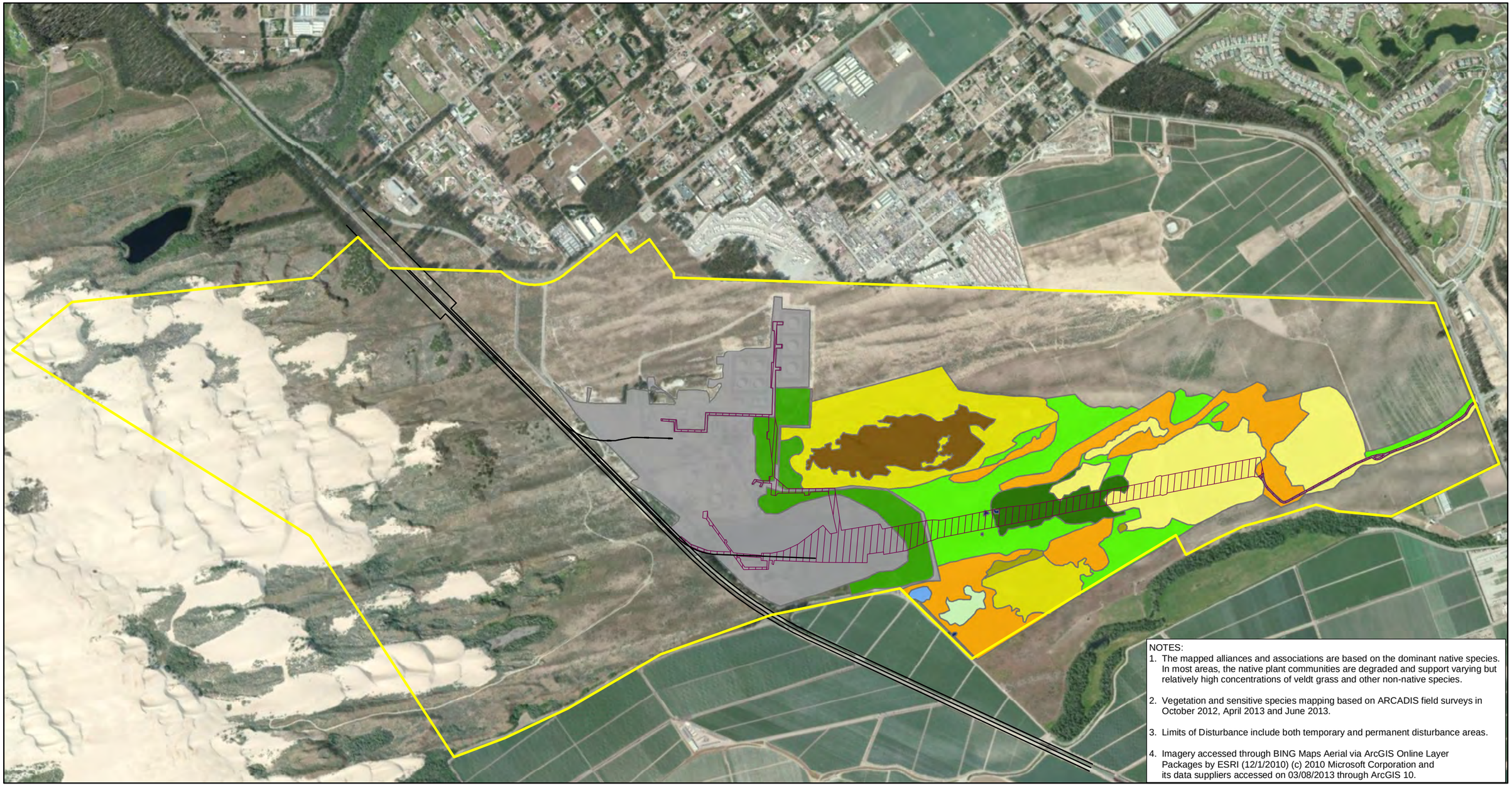
Phillips 66
Santa Maria Refinery Rail Project

TRACK LAYOUT ALTERNATIVES

ARCADIS

FIGURE
3

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 3 TrackLayoutAlternatives.mxd 6/14/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



NOTES:
1. The mapped alliances and associations are based on the dominant native species. In most areas, the native plant communities are degraded and support varying but relatively high concentrations of veldt grass and other non-native species.
2. Vegetation and sensitive species mapping based on ARCADIS field surveys in October 2012, April 2013 and June 2013.
3. Limits of Disturbance include both temporary and permanent disturbance areas.
4. Imagery accessed through BING Maps Aerial via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

Legend

- Property Boundary
- Existing Rail Line
- Limits of Disturbance
- Arroyo Willow Scrub (Wetland)
- Central Dune Scrub - Coastal Dune Lupine, Dune-Heather, Silver Bush Lupine Association
- Central Dune Scrub - Dune-Heather Alliance
- Central Dune Scrub - Dune-Heather, Seacliff Buckwheat, Black Sage Association
- Degraded Central Dune Scrub
- Central Dune Scrub - Black Sage, Dune-Heather Association
- Central Dune Scrub - Silver Dune Lupine and Dune-Heather Association
- Central Dune Scrub - Dune-Heather, California Coffeeberry, Blue Elderberry Association
- Dune
- Industrial/Road
- Nonnative Veldt Grassland
- Planted Trees

N

0 1,255 2,510

SCALE IN FEET

Phillips 66
Santa Maria Refinery Rail Project

EXISTING HABITATS

ARCADIS

FIGURE
4

I:\BCG_Misc\Phillips\GIS\Projects\060613\Fig 4 ExistingHabitats.mxd 6/14/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

NOTES:
1. The mapped alliances and associations are based on the dominant native species. In most areas, the native plant communities are degraded and support varying but relatively high concentrations of veldt grass and other non-native species.
2. Vegetation and sensitive species mapping based on ARCADIS field surveys in October 2012, April 2013, and June 2013.
3. Limits of Disturbance include both temporary and permanent disturbance areas.
4. Imagery accessed through BING Maps Aerial via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

Legend

- Property Boundary
- Existing Rail Line
- Limits of Disturbance
- California Spineflower *(Mucronea californica)*
- California Spineflower *(Mucronea californica)*
- Sand almond *(Prunus fasciculata* var. *punctata)*
- Blochman's Groundsel *(Senecio blochmaniae)*
- Blochman's Leafy Daisy *(Erigeron blochmaniae)*
- Burrowing Owl *(Athene cunicularia)*
- Bell's Sage Sparrow *(Amphispiza belli* ssp. *belli)*

Sensitive Habitat

- Arroyo Willow Scrub (Wetland)
- Central Dune Scrub - Coastal Dune Lupine, Dune-Heather, Silver Bush Lupine Association
- Central Dune Scrub - Silver Dune Lupine and Dune-Heather Association
- 100-ft Riparian Buffer

N

0 1,255 2,510

SCALE IN FEET

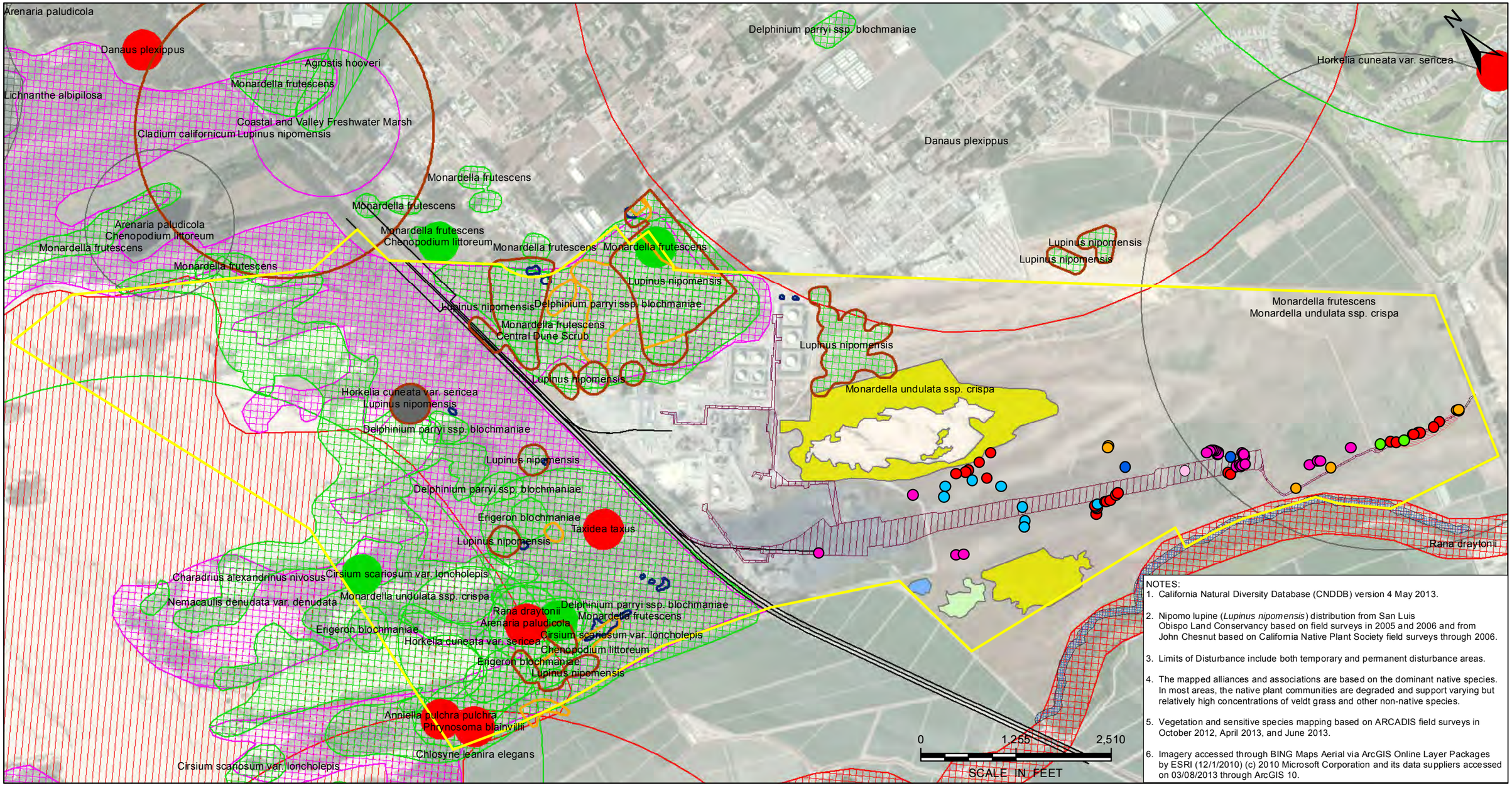
Phillips 66
Santa Maria Refinery Rail Project

SURVEYED SENSITIVE SPECIES AND HABITATS

ARCADIS

FIGURE
5

H:\GISPROJECTS_ENV\Phillips66\GIS\Projects\060613\Fig 5 SensitiveSpecies_Habitat.mxd 6/18/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



NOTES:

1. California Natural Diversity Database (CNDDB) version 4 May 2013.
2. Nipomo lupine (*Lupinus nipomensis*) distribution from San Luis Obispo Land Conservancy based on field surveys in 2005 and 2006 and from John Chesnut based on California Native Plant Society field surveys through 2006.
3. Limits of Disturbance include both temporary and permanent disturbance areas.
4. The mapped alliances and associations are based on the dominant native species. In most areas, the native plant communities are degraded and support varying but relatively high concentrations of veldt grass and other non-native species.
5. Vegetation and sensitive species mapping based on ARCADIS field surveys in October 2012, April 2013, and June 2013.
6. Imagery accessed through BING Maps Aerial via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

Property Boundary
Existing Rail Line
Limits of Disturbance
Mapped Nipomo Lupine from CNDDB
Mapped Nipomo Lupine from SLO Land Conservancy
Mapped Nipomo Lupine from John Chesnut

CNDDB Distributions
Plant (80m)
Plant (specific)
Plant (non-specific)
Plant (circular)
Animal (80m)
Animal (specific)
Animal (non-specific)
Animal (circular)
Terrestrial Comm. (80m)
Terrestrial Comm. (specific)
Terrestrial Comm. (non-specific)
Terrestrial Comm. (circular)
Aquatic Comm. (80m)
Aquatic Comm. (specific)
Aquatic Comm. (non-specific)
Aquatic Comm. (circular)
Multiple (80m)
Multiple (specific)
Multiple (non-specific)
Multiple (circular)

Sensitive Species
California Spineflower *(Mucronea californica)*
California Spineflower *(Mucronea californica)*
Sand almond *(Prunus fasciculata* var. *punctata)*
Blochman's Groundsel *(Senecio blochmaniae)*
Blochman's leafy daisy *(Erigeron blochmaniae)*
Burrowing Owl *(Athene cunicularia)*
Bell's Sage Sparrow *(Amphispiza belli* ssp. *belli)*

Sensitive Habitats
Arroyo Willow Scrub (Wetland)
Central Dune Scrub - Coastal Dune Lupine, Dune-Heather, Silver Bush Lupine Association
Central Dune Scrub - Silver Dune Lupine and Dune-Heather Association
100-ft Riparian Buffer

Phillips 66
Santa Maria Refinery Rail Project.

ALL MAPPED SENSITIVE RESOURCE LOCATIONS

ARCADIS

FIGURE
6

H:\GISPROJECTS_ENV\Phillips66\GIS\Projects\060613\Fig 6 CNDDB.mxd 6/18/2013 DFischer
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

Appendix A

Photographs

Photograph 0653

10/9/12

The site provides a foraging and denning location for wildlife in the area as indicated by the many small to moderately sized burrows encountered during the ARCADIS survey.

Photograph 0654

10/9/12

Many of the small mammal burrow spoil piles showed sign of recent activity. The foot prints and tail-drag marks left by a kangaroo rat (*Dipodomys* sp.) are shown here to the left of the field note book.

A healthy small mammal population often indicates the presence of associated predators such as coyote, fox, weasel, raptors, and snakes all of which are present or likely to be present in the area.

Photograph 0655

Looking east: A western burrowing owl was inadvertently flushed from the burrow in the foreground during the ARCADIS field survey.

Imagine the result

Phillips 66 Santa Maria Refinery

Technical Noise Study

Santa Maria Refinery Rail Project
San Luis Obispo County, California

04597003.0000

April 26, 2013
Updated June 18, 2013

Prepared by:

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Santa Maria Refinery Rail Project

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April 26, 2013
Updated June 18, 2013

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Executive Summary

This technical noise study provides an analysis of the potential noise impacts associated with the Santa Maria Refinery Rail Project proposed by Phillips 66 Company (Phillips 66). The project includes the modification of an existing rail spur to provide access to a new crude unloading rack facility and the construction of a new, on-site connecting pipeline. The project is located in unincorporated San Luis Obispo County, California, on Phillips 66 property.

The nearest sensitive residential receptors potentially affected by the project are single-family residences on Louise Lane located approximately 3,300 feet to the east and on Olivera Avenue located approximately 4,200 feet to the north of the proposed rail tracks, respectively. This report also examines potential noise impacts to residential areas at rail crossings for trains conveying crude oil to the refinery.

The County of San Luis Obispo exempts noise sources associated with construction, provided such activities do not take place before 7 a.m. or after 10:00 p.m. any day except Saturday or Sunday, or before 8 a.m. or after 5 p.m. on Saturday or Sunday. Furthermore, the County noise ordinance limits the hourly equivalent noise levels (Leq) associated with project operations to 50 decibels A-weighted (dBA Leq) during the daytime period and 45 dBA Leq during the nighttime period at residential property lines.

Construction would not occur outside the daytime hours of 7:00 a.m. to 10:00 p.m. Construction is exempt from the established noise limits under San Luis Obispo County noise regulations. Furthermore, the modeling results presented herein demonstrate that noise impacts from construction activities would not exceed County of San Luis Obispo noise threshold limits of 50 dBA Leq at the nearest residential noise sensitive receptors located to the east and north.

Project operational noise sources encompass train operations, including the coupling and decoupling of cars, as well as noise associated with pumps, electrical substation, alarm system, and mechanical ventilation equipment. Computer model calculations indicate that the worst-case noise impacts associated with these operations would range from 36.9 - dBA Leq at the eastern residential community to 44.2 dBA at the northern residential community. The combined noise impacts from project operations would not exceed the County of San Luis Obispo's worst-case nighttime noise threshold limit of 45 dBA Leq and the daytime noise threshold limit of 50 dBA Leq at the defined sensitive residential receptor locations. The noise levels associated with

project operations would increase the existing ambient noise levels, as measured at the sensitive receptor locations, by approximately 0.6 dB at the eastern residential community to 5.3 dB at the northern residential community. This increase would not constitute a substantial increase in the existing ambient noise level. Industry standards notate that a 3 to 5 dB increase to background ambient noise levels is considered barely noticeable by humans. Therefore, a 5.3 dB increase would also be perceived as a barely noticeable change with regards to the ambient baseline conditions due to these noise levels being defined on a logarithmic scale.

The proposed project would add approximately 5 trains per week to existing rail traffic, which would result in 10 train events per week due to return roundtrip travels. These trains would originate at the oil source, which could include multiple locations, and would travel along existing freight rail mainlines. This report evaluates potential noise impacts from trains on noise sensitive receptors along the potential route. The analysis concentrates on train volumes along the coastal Union Pacific Railroad (UPRR) corridor using representative data samples from the cities of Santa Margarita and Guadalupe, California, which are located to the north and south of the proposed project site.. The highest volume of project-related train traffic would travel along this single track coastal mainline rail corridor because it is directly connected to the project.

For residential areas located along the portion of the UPRR rail line that extends along the central and southern California coast, the existing train noise levels at residences located 50 feet from the open track and not in the vicinity of a railway crossing signal are approximately 73.4 dBA Leq. With the project-related increase of 2 train events per day, rail-related noise would increase from 73.4 dBA to 73.7 dBA resulting in an increase of 0.3 dB. Along the same UPRR tracks but adjacent to a road crossing signal with crossing alarms and trains sounding their horns, a residence at 50 feet would experience noise levels of approximately 78.3 dBA Leq. With the project-related increase of approximately 2 train events per day rail-related noise would increase to 78.6 dBA and result in an increase of 0.3 dB. This minimal increase in noise levels produced by project-related rail traffic would be insignificant to these residences located 50 feet from the tracks. Residences located greater than 50 feet from the tracks would experience a lower noise levels due to distance.

This evaluation considers that there may be a cumulative increase in the amount of crude oil shipped by rail to California in response to refinery capacity. However, the amount of crude oil shipped to California is driven by market demand and not by the number of refineries. Therefore, the proposed project may not increase the number of trains bringing crude oil to California and, in result, would not increase the existing

noise levels. The increase in noise levels along railway corridors depend upon several variables including project related trains per day, route to the project site, and the demand of crude oil. Therefore, this analysis is based on typical project operations with consistent demand for crude oil.

The source of the crude oil is uncertain and could be obtained from a number of locations, it would be speculative to conduct detailed evaluations along a single route (e.g., coastal California to Upper Midwest) and impractical to evaluate potential noise impacts along all of the railway lines entering the State of California. This analysis provides a sample based evaluation of potential noise impacts associated with project-related rail traffic on sections of tracks located in select locations to the east outside of the State of California boundaries. The following snap-shot sample is based on 3 major train corridors that have a potential for crude oil shipping. These tracks would have higher baseline noise levels due to the higher train traffic volumes compared to the tracks located in the California coastal corridor in the region of the proposed project site. An increase of 2 train events per day through these corridors would result in an increase of 0.3 dB to the existing noise levels. Therefore, project-specific rail traffic would make little contribution to the overall noise environment in these locations outside the region of the proposed project. Furthermore, project approval would not substantially increase movement of trains or the type of materials transported on state or regional rail lines, and would not allow construction of new facilities outside the project site, and would not change the current track system.

The Federal Transit Authority (FTA) has developed a guideline for defining a vibration damage criterion involving considerable construction equipment operations. The purpose of this criterion is to identify potentially problematic construction areas so that they can be addressed during final design and avoid potential damage to nearby residential structures. According to the FTA guidelines, a vibration level of 65 VdB is the threshold of perceptibility for humans. For a significant impact to occur, vibration levels must exceed 80 VdB. The vibration threshold for damaging a structure is 90 VdB.

The construction activities associated with the project may occur as close as 3,200 feet to the eastern residential community and 3,500 feet to the northern residential community. Vibration levels from construction equipment at all identified sensitive receptors would be below the 80 VdB threshold.

The FTA has established criteria for assessing vibration impacts from railway operations. This criterion is based on conducting a general vibration assessment,

which accounts for train speed, type of track, type of wheels, ground-borne propagation, and structures. Based on the FTA criteria, a vibration impact of 72 VdB or greater to a residential structure is considered the threshold for a significant impact.

Calculations show that project operational activity vibration levels would be below the threshold level of 72 VdB at all identified sensitive receptors and would not likely be detected by humans or cause structural damage.

1. Introduction

This technical noise study provides an analysis of the potential noise and vibration impacts associated with the construction and operational activities for the new proposed Phillips 66 Santa Maria Refinery Rail Project. The project is located in an unincorporated portion of San Luis Obispo County, California, on Phillips 66 property just south of the existing refinery (see Figure 1).

This report provides an analysis of the noise and vibration levels associated with the new railcar unloading facility; a summary of the existing noise environment at the Santa Maria Refinery and at area sensitive residential receptors; a discussion of the San Luis Obispo County noise limits; and a comparison of the construction and operational noise levels with applicable limits.

A summary of Noise Fundamentals and Acoustical Terms used in this report is presented in Appendix A.

1.1 Project Background

The project consists of an extension modification to the existing rail spur located on the southwest side of the refinery, which would provide access to a new crude unloading rack facility. The project would include the installation of five new parallel ladder tracks. Two tracks would surround an unloading rack and then would come together to form a common tail track at the east end. The tail track would allow the diesel locomotives to return to the common entrance and leave the facility, if required, and would also allow switching the tank cars onto and off of the unloading rack.

Phillips 66 plans to receive five unit trains per week, each unit incorporating 80 cars and 3 diesel engines. The unloading operation would occur over a 24 hour period w. The unloading facility would be equipped with a 20-car unloading system including 20 individual positive displacement pumps. An emergency alarm horn would be located at

each positive displacement pump station to alert workers of potential operational issues. Three drain tank pumps located near the facility would transfer any contained oil/water to the refinery oily water system. A 24-inch diameter pipeline, approximately 1,750 feet long, would be used to convey the crude oil to the refinery's storage tanks (see Figure 2).

Furthermore, new substations, including a single transformer, would provide electricity to run the pumps, ventilation system, lighting, telephones, and fire alarm system. A 5-ton outdoor heating, ventilation, and air conditioning (HVAC) unit would service the substation.

The project would be constructed within an approximate 9-month period. All construction activities would occur only during daytime hours (7:00 a.m. to 10:00 p.m.). Operational noise would occur whenever a train arrived on site. The construction equipment and activities are based on the construction equipment and workforce estimates provided by Phillip 66 engineers.

2. Methodology and Equipment

2.1 Methodology

2.1.1 Long-term Noise Monitoring Measurement

To document the existing noise conditions at the Phillips 66 Santa Maria Refinery, an 8-day ambient noise monitoring measurement was conducted between Wednesday, October 10, 2012 and Thursday, October 18, 2012. The field noise monitor was programmed to log data every hour during the continuous weeklong time period. The microphone at the monitoring location was placed approximately 8 feet above the existing site grade. During the on-site ambient noise measurements, start and end times were recorded along with existing background noise sources to accurately account for the community noise environment (see Figure 3).

2.1.2 Short-term Noise Measurements

To further document the existing noise levels at identified residential sensitive receptor locations a series of 30-minute equivalent sound level measurements (dBA Leq) was conducted during the daytime and nighttime hours of Thursday, October 18, 2012 and Friday, October 19, 2012. The microphones at all noise measurement locations (see Figure 3) were placed approximately 5 feet above ground level. During the ambient

short-term noise measurements, start and end times were recorded, along with existing ambient noise sources to accurately account for the noise environment in the project area.

2.1.3 Noise Model Software

Modeling of the proposed railcar unloading facility and surrounding community environment was accomplished using CadnaA (Computer Aided Noise Abatement), which is a model-based computer program developed by DataKustik for predicting noise impacts in a wide variety of conditions. CadnaA assists in the calculation, presentation, assessment, and mitigation of all types of environmental noise exposure conditions. All predicted noise impacts are based on the International Standards Organization (ISO) 9613 standard. The algorithm allows input of project information such as noise source data, sound barriers, intervening structures, ground absorption, and topography to create a detailed computer-aided drafting (CAD) model.

2.2 Measurement Equipment

Some or all of the following equipment was used to measure existing noise levels:

- Larson Davis Model 820 Sound Level Meter
- Larson Davis Model 824 Sound Level Meter
- Larson Davis Model CA200 Microphone Calibrator
- Hand-held global positioning system (GPS) unit, microphone with windscreen, tripods
- Distance measurement wheel, digital camera

The sound level meter was field-calibrated prior to and following the noise measurement to ensure accuracy. All sound level measurements conducted and presented in this report, in accordance with the regulations, were made with a sound level meter that conforms to the American National Standards Institute (ANSI) specifications for sound level meters ANSI SI.4-1983 (R2001). All instruments are maintained with National Bureau of Standards traceable calibrations per the manufacturers' standards.

3. Existing Environmental Setting

3.1 Existing Noise Environment

The Phillips 66 Santa Maria Refinery Rail Project would be located on Phillips 66 property. The surrounding adjacent land uses include agriculture to the south, residential communities to the east and north, and salvage yards located along the Phillip 66 northern property line. Existing noise sources identified in proximity to the Phillips 66 property include operations from the salvage yards to the north, vehicular traffic from Cabrillo Highway 1 to the east, and railway noise associated with the Union Pacific railroad to the west and south. No commercial or private airports are located within a 2-mile radius of the refinery.

3.1.1 Noise Sensitive Receptors

Overall, the noise sensitive receptors in the area are single-family residences located to the east of Cabrillo Highway 1 and to the north along Olivera Avenue. The nearest sensitive residential receptors potentially affected by the project are single-family residences on Louise Lane located approximately 3,500 feet to the east and on Olivera Avenue located approximately 3,200 feet to the north.

3.1.2 Long-term Noise Monitoring Measurements

The results from the 8-day monitoring period are shown in Table 1 below. Appendix B presents a detailed summary of the results.

The noise monitoring data provided in Table 1 show that the average daytime noise levels range from 40.9 to 50.9 dBA Leq, and the average nighttime noise levels range from 37.5 to 42.8 dBA Leq. The average Leq over the week-long noise monitoring period during the daytime was 44.9 dBA and during the nighttime was 41.0 dBA.

Table 1 Long-term Noise Monitor – October 2012 Noise Monitoring Data Summary

Date	Daytime Leq (dBA) 7:00 a.m. to 10:00 p.m.	Nighttime Leq (dBA) 10:00 p.m. to 7:00 a.m.
October 10, 2012	40.9	37.5
October 11, 2012	44.5	42.7
October 12, 2012	42.6	42.7
October 13, 2012	45.3	40.2
October 14, 2012	43.1	38.5
October 15, 2012	44.9	42.8
October 16, 2012	50.9	41.7
October 17, 2012	45.7	41.0

October 18, 2012	46.2	42.0

3.1.3 Short-term Noise Level Measurements

The results of the 30-minute noise measurements conducted at four off-site potential noise sensitive receptor locations are presented in Table 2. The measurement locations included single-family residences located on Olivera Avenue as well as locations along Cabrillo Highway 1. A measurement north of the refinery at the salvage yard was also conducted at the intersection of Alley Oop Way and Gasoline Alley Place (see Figure 3) to document the noise from the existing refinery operations. Appendix C presents a detailed summary of these short-term noise measurements.

Table 2 Short-term Noise Measurements on October 18, 2012 and October 19, 2012

Receptor	Noise Measurement Location (Coordinates)	Daytime 30-minute Leq (dBA)	Nighttime 30-minute Leq (dBA)
1	35.027507°N, 120.560325°W	54.5	45.6
2	35.039948°N, 120.563988°W	51.0	40.0
3	35.040125°N, 120.572990°W	49.5	40.4
4	35.040290°N, 120.580060°W	56.1	41.7

The ambient noise measurement data provided in Table 2 show that daytime noise levels in the project area range from 49.5 to 56.1 dBA Leq, and nighttime noise levels range from 40.0 to 45.6 dBA Leq.

4. Applicable Noise and Vibration Criteria

A number of Laws, Ordinances, Regulations, and Standards (LORS) are related to noise quality during and following construction. This section provides a summary of the applicable regulatory criteria. Appendix D (Relevant Excerpts from Applicable Noise and Vibration Criteria) provides more information.

4.1 Federal Transit Authority

The FTA has developed a guideline for defining vibration damage criterion involving considerable construction equipment operations. The purpose of this criterion is to

avoid vibration damage. According to the FTA guidelines, a vibration level of 65 VdB is the threshold of perceptibility for humans. For a significant impact to occur, vibration levels must exceed 80 VdB. The threshold for damage to occur to structures is 90 VdB. Table 3 summarizes the construction vibration damage criteria.

Table 3 FTA Construction Damage Criteria

Building Category	PPV* (in/sec)	Approximate L_v**
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

* Peak Particle Velocity
** RMS velocity in decibels (VdB) re 1 micro-inch/second

4.2 County of San Luis Obispo

The County of San Luis Obispo noise regulations, as set forth by Section 23.06.044 Exterior Noise Level Standards in the County Noise Ordinance, regulates noise impacts on residential areas. Table 4 represents the County's exterior noise regulations for residential land use.

Table 4 San Luis Obispo County Exterior Noise Level Standards

Parameter	Daytime (7 a.m. to 10 p.m.)	Nighttime* (10 p.m. to 7 a.m.)
Hourly Equivalent Sound Level (Leq, dB)	50	45
Maximum Level, dB	70	65

* Applies only to uses that operate or are occupied during nighttime hours.

Accordingly, the operational activities associated with the project are limited to 50 dBA Leq during the daytime period and 45 dBA Leq during the nighttime period at residential property lines.

The County's noise regulations exempts noise sources associated with construction, provided such activities do not take place before 7 a.m. or after 10 p.m. or any day except Saturday or Sunday or before 8 a.m. or after 5 p.m. on Saturday or Sunday.

5. Noise Impact Analysis

5.1 Construction Noise Analysis

The noise analysis evaluates different construction phases, some of which would overlap. The phases included:

- Demolition (Replacement of the existing turnout, if needed)
- Grading and Soil Transport
- Site Preparation for Pipeline and Rail

The phased construction activities, as well as the associated equipment incorporated within this analysis, are based on the construction equipment and workforce estimates provided by Phillip 66 engineers. Construction would employ a variety of equipment. Table 5 identifies equipment type, quantity, utilization percentage, and noise level for each major type of construction equipment.

Table 5 Phillips 66 Santa Maria Refinery Rail Project Proposed Construction Equipment

Phase	Equipment Type	Equipment Quantity	Utilization Percentage	Noise Source Level at 50 feet (dBA)
Demolition	Dump Truck	2	40	84
	Bulldozer	2	40	85
	Backhoe w/ Chipper	1	40	85
	Water Truck	1	40	84
	Excavator	1	40	85
Grading and Soil Transport	Scraper	2	40	85
	Grader	2	40	85
	Water Truck	2	40	84
	Bulldozer	4	40	85
	Dump Truck	8	40	84
	Excavator	1	40	85
Site Preparation for Pipeline and Rail	Compactor	2	20	80
	Paver	2	50	85
	Concrete Truck	2	40	85
	Backhoe (trench)	2	40	80
	Flatbed Truck	3	40	84
	Crane (mobile)	2	16	85
	Water Truck	2	40	84
	Diesel Welder/Generator	2	50	82
	Grinder	1	20	85

Phase	Equipment Type	Equipment Quantity	Utilization Percentage	Noise Source Level at 50 feet (dBA)
	Bulldozer	1	40	85
	Dump Truck	2	40	84
	Air Compressor	1	40	80

Source: FHWA 2009

The noise prediction calculations for construction equipment assume operations for 10 hours per day, Monday thru Friday. The calculated noise impacts range from 27.1 dBA at the eastern residential community to 44.2 dBA at the northern residential community. The calculated noise impacts at the receptor locations for each construction phase are provided in Table 6. These results demonstrate that the noise impacts from construction would not exceed 50 dBA Leq at the sensitive residential receptors.

Table 6 Phillips 66 Santa Maria Refinery Rail Project Construction Noise Impacts

Receptor	Receptor Location	Construction Operations Noise Impacts (dBA Leq)		
		Demolition	Grading and Soil Transport	Site Preparation for Pipeline and Rail
2	Eastern Residential Community (Short-term Measurement Location 1)	27.1	42.7	40.5
3	Northeastern Residential Community (Short-term Measurement Location 2)	29.7	38.8	38.2
4	Northern Residential Community (Short-term Measurement Location 3)	35.7	42.8	44.2

Note: As a comparison, to support model validation, the model determined the noise on the Phillips 66 property near the construction site (at the selected on-site monitoring location) would increase from 50.9 dBA Leq to 51.7 dBA. This location is not subject to noise regulations.

Appendix E provides CadnaA noise model data and results for our construction noise analysis of the proposed Phillips 66 project.

5.2 Operational Noise Analysis

Operational noise sources are associated with the train operations, including the coupling and decoupling of railway cars, as well as the associated pumps, electrical substation, alarm system, and mechanical ventilation equipment.

This analysis evaluated the arrival, unloading, and departure of a single train consisting of 80 cars and 3 diesel engines during a24-hour period. It assumes all major stationary mechanical equipment would operate at 100 percent utilization during the 24-hour period. Phillips 66 engineers provided all noise emission data for the stationary mechanical equipment. Table 7 provides a summary of all significant mechanical equipment required for operations.

Table 7 Phillips 66 Santa Maria Refinery Rail Project Operational Noise Emission Data

Equipment Description	Quantity	Referenced Distance (feet)	Sound Level (dBA)
Diesel Train Engine	2	20	81.6
Drain Tank Pump	3	32	78.0
Positive Displacement Pump	20	32	78.0
Alarm Horn	20	5	85.0
Transformer	2	5	85.0
HVAC (5-Ton) Unit	1	5	85.0
Air Compressor System	51	50	80.0
Tank Truck	1	50	88.0

Additionally, as presented in Table 8 below, computer model calculations indicate that the worst-case noise impacts from the operations associated with the project range from 36.9 dBA Leq at the eastern residential community to 44.2 dBA at the northern residential community.

Table 8 Phillips 66 Santa Maria Refinery Rail Project Noise Impacts

Receptor	Receptor Location	Noise Threshold Limit (dBA)	Noise Level (dBA Leq)
2	Eastern Residential Community (Short-term Measurement Location 1)	45	36.9
3	Northeastern Residential Community (Short-term	45	38.7

Receptor	Receptor Location	Noise Threshold Limit (dBA)	Noise Level (dBA Leq)
	Measurement Location 2)		
4	Northern Residential Community (Short-term Measurement Location 3)	45	44.2

Note: As a comparison, to support model validation, the model determined the noise on the Phillips 66 property near the construction site (at the selected on-site monitoring location) would increase from 50.9 dBA Leq to 52.1 dBA Leq. This location is not subject to noise regulations.

The noise impacts from project operations would not exceed the San Luis Obispo County worst-case nighttime noise threshold limit of 45 dBA Leq or the daytime noise threshold limit of 50 dBA LEQ at the sensitive residential receptors. Figure 4 depicts the resulting predicted noise contours.

To determine potential noise impacts on the existing community, existing noise levels measured at each sensitive receptor location were compared with the future noise model results reflecting project operations. This comparison is summarized in Table 9 below.

Table 9 Phillips 66 Santa Maria Refinery Rail Project Increase to the Existing Ambient Noise Levels

Receptor	Receptor Location	Measured Nighttime Noise Level (dBA Leq)	Calculated Noise Level (dBA Leq)	Combined Noise Level (dBA Leq)	Operational Noise Level Increase (dB)
2	Eastern Residential Community (Short-term Measurement Location 1)	45.6	36.9	46.2	0.6
3	Northeastern Residential Community (Short-term Measurement Location 2)	40.0	38.7	42.4	2.4
4	Northern Residential Community (Short-term Measurement Location 3)	40.4	44.2	45.7	5.3

The results of the comparison show that the increase in ambient noise levels would range from 0.6 dB at the eastern residential community to 5.3 dB at the northern

residential community. This increase would not generate a substantial increase in the existing ambient noise level. A 3 dB increase is considered to be barely noticeable to a human. A 5.3 dB increase would also be considered as noticeable, but would not result in a substantial increase because of the logarithmic scale used to define noise levels. Appendix E provides CadnaA noise model data and results for our operational noise analysis of the proposed Phillips 66 project.

5.3 Train Corridor Analysis

This section evaluates potential train noise impacts on noise sensitive receptors along the potential rail route. The analysis concentrates on train volumes along the coastal Union Pacific Railroad corridor using representative data samples from the cities of Santa Margarita and Guadalupe, California, which are located to the north and south of the proposed project site. The highest volume of project-related train traffic would travel along the tracks within this rail corridor because it is directly connected to the project.

The assessment was completed using CadnaA and assumptions regarding the type of locomotive, the number of rail cars, speed, distance to receptors, crossing signal configuration (i.e., crossing alarm bells), volume of train horns, and other factors. CadnaA allows simulation of a noise source (train) moving along a linear feature (train tracks) and accounts for stationary noise sources such as crossing alarms. Using this data, CadnaA computes resulting noise levels in areas adjacent to the railway sources.

Exisitng noise levels were not available for the many roadway crossings along the UPRR corridor, CadnaA was used to create a baseline noise profile for existing conditions considering the existing volume of train traffic. For the UPRR corridor, the existing noise profile was calculated by using the published training volumes at the 11th Street, Guadalupe, CA rail crossing which is located south of the project site. These volumes can be found in the U.S. Department of Transportation (DOT) rail crossing inventory information database. The published train volumes established 19 freight trains. No commuter trains were published for this railway crossing, so a worst-case 6 Amtrak commuter trains were added to the published data for a total of 25 trains per day.

For areas along the UPRR rail line that extends along the central and southern California coast, the existing train noise levels for residences located 50 feet from open track and not in the vicinity of a railway crossing signal are approximately 73.4 dBA Leq. With the project-related increase of 2 train events per day, rail-related noise would increase from 73.4 dBA to 73.7 dBA resulting in an increase of 0.3 dB. Along the same

UPRR tracks but adjacent to a road crossing signal with crossing alarms and trains sounding their horns, a residence at 50 feet would experience approximately 78.3 dBA Leq. With the project-related increase of approximately 2 train events per day, rail-related noise would increase to 78.6 dBA resulting in an increase of 0.3 dB. Residences located greater than 50 feet from the tracks would experience lower increase to the existing noise levels. Therefore, with 3 dBA as the threshold for human perception of noise changes, project rail traffic would not result in a substantial noise increase. These results are summarized in Table 10 below.

Table 10 Train Noise Impacts at Residences Located 50 feet from Rail Corridor

No Train Crossing Signal in Vicinity			Train Crossing Signal in Vicinity		
Existing Noise Level (dBA Leq)	**Incorporation of Project Train Operation Noise Impacts (dBA Leq)**	**Noise Level Increase (dB)**	**Existing Noise Level (dBA Leq)**	**Incorporation of Project Train Operation Noise Impacts (dBA Leq)**	**Noise Level Increase (dB)**
73.4	73.7	0.3	78.3	78.6	0.3

This evaluation considers that there may be a cumulative increase in the amount of crude oil shipped by rail to California in response to refinery capacity. However, the amount of crude oil shipped to California is driven by market demand and not by the number of refineries. Therefore, the proposed project may not increase the number of trains bringing crude oil to California and in result would not increase the existing noise levels. The increase in noise levels along railway corridors depend on several variables including project related train events per day, route to the project site, and the demand of crude oil. Therefore, this analysis is based on typical project operations with consistent demand for crude oil.

The source of the crude oil is uncertain and could be obtained from a number of locations, it would be speculative to conduct detailed evaluations along a single route (e.g., coastal California to Upper Midwest) and impractical to evaluate potential noise impacts along all of the railway lines entering the State of California. This analysis provides a sample based evaluation of potential noise impacts associated with project-related rail traffic on sections of tracks located in select locations to the north and east outside of the State of California boundaries. The sample is based on 3 major train corridors that have a potential for crude oil shipping. These sample railway crossings are documented in the U.S. DOT railway crossing inventory database. This sample area includes corridors located in Salem, Oregon, Salt Lake City, Utah, and near Gila Bend, Arizona. Train volumes for these locations can be found in the U.S. crossing

inventory information database. All 3 chosen railway crossings are classified as main branches for the UPRR Company and include one main track to stay consistent with the track that runs parallel and in the vicinity of the proposed project site. The rail crossing located at Hines Street SE in Salem, Oregon contains an existing train volume of 27, the rail crossing located at Fulton Street (550 S) in Salt Lake City, Utah contains an existing train volume of 32, and the rail crossing located at 83rd Avenue near Gila Bend, Arizona contains an existing train volume of 25.

Calculations show that these sample corridors have similar or higher existing noise levels due to higher train traffic volumes when compared to tracks located in the California coastal corridor in the region of the proposed project site. An increase of 2 train events per day at these railway crossings would result in an increase to the existing noise levels ranging from 0.3 dB. A summary of sampled calculated railway crossings noted above are provided in Table 11 below.

Table 11 Train Noise Impacts at Sample UPRR Railway Crossings

Railway Crossing Location	Existing Train Volume	Existing Noise Level (dBA Leq)	Noise Level with Project-Related Train Events (dBA Leq)	Increase to Existing Noise Level (dB)
Salem, OR – Hines St. SE	27	78.6	78.9	0.3
Salt Lake City, UT – Fulton St. (550S)	32	79.3	79.6	0.3
Gila Bend, AZ – 83rd Ave.	25	78.3	78.6	0.3

Furthermore, project approval would not substantially increase movement of trains or the type of materials transported on state or regional rail lines, would not allow construction of new facilities outside the project site, and would not change the current use or capacity of the trains or the tracks.

The increase in noise levels along the existing train corridors within California, as well as north and east of the State of California boundaries would be less than 1 decibel. Therefore, the increased train events associated with the proposed project operations would be considered less than significant.

6. Vibration Impact Analysis

6.1 Construction Vibration Analysis

Construction would include the use of heavy equipment that would generate ground-borne vibrations. Possible sources of vibration may include excavators, dump trucks, backhoes, and other heavy construction equipment.

According to the FTA guidelines, a vibration level of 65 VdB is the threshold of perceptibility for humans. For a significant impact to occur, vibration levels must exceed 80 VdB during infrequent events (FTA 1995). The vibration calculations are based on the FTA published vibration levels provided in Table 12.

Table 12 Vibration Source Levels for Construction Equipment

Equipment		PPV* at 25 feet (in/sec)	Approximate L_v ** at 25 feet
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	In soil	0.008	66
	In rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large Bulldozer		0.089	87
Caisson Drilling		0.089	87
Loaded Trucks		0.076	86
Jack Hammer		0.035	79
Small Bulldozer		0.003	58

*Peak Particle Velocity

*RMS velocity in decibels (VdB) re 1 micro-inch/second

Construction activities associated with the project would occur at a distance of 3,200 feet from the eastern residential community and 3,500 feet from the northern residential community. Calculations show that distance to these adjacent residential receptors would attenuate the vibration impact levels to approximately 48.8 VdB at the eastern residential community and 47.6 VdB at the northern residential community. These impacts are summarized below in Table 13.

This analysis shows that vibration levels at all identified sensitive receptors would be below the 80 VdB threshold.

Table 13 Phillips 66 Santa Maria Refinery Rail Project Construction Vibration Impacts

Receptor	Receptor Location	Approximate Distance to Receptor (feet)	Calculated Vibration Level (VdB)
2	Eastern Residential Community (Short-term Measurement Location 1)	3,200	48.8
3	Northeastern Residential Community (Short-term Measurement Location 2)	5,500	41.7
4	Northern Residential Community (Short-term Measurement Location 3)	3,500	47.6
5	Industrial Area (Short-term Measurement Location 4)	2,400	52.5

6.2 Operational Vibration Analysis

The FTA has established criteria for assessing vibration impacts from railway operations. This criterion is based on conducting a general vibration assessment, which accounts for train speed, type of track, type of wheels, ground-borne propagation, and structures. Based on the FTA criteria, a vibration impact of 72 VdB or greater to a residential structure is considered the threshold for potential damage.

This analysis evaluates the worst-case operational vibration impacts. The nearest residential receptor is located approximately 3,200 feet from the project site. Because of the distance to the nearest receptor, vibration levels would be reduced to 18.8 VdB, which is below the threshold for effects on humans and damage to structures. Table 14 summarizes the calculated railway vibration levels for all defined sensitive receptor locations.

Table 14 Phillips 66 Santa Maria Refinery Rail Project Operational Vibration Impacts

Receiver	Receiver Location	Approximate Distance to Receptor (feet)	Calculated Vibration Level (VdB)
1	Long-term Noise Monitor Location	492	43.2
2	Eastern Residential Community (Short-term Measurement Location 1)	3,200	18.8
3	Northeastern Residential Community (Short-term	5,500	11.8

Receiver	Receiver Location	Approximate Distance to Receptor (feet)	Calculated Vibration Level (VdB)
	Measurement Location 2)		
4	Northern Residential Community (Short-term Measurement Location 3)	3,500	17.7
5	Industrial Area (Short-term Measurement Location 4)	2,400	22.6

The FTA general vibration assessment shows that vibration levels at all identified sensitive receptors would be below the threshold level of 72 VdB. Therefore, these impacts would not likely be detected by residents or result in structural damage.

7. Document Preparers

This document was prepared by Kevin Fowler, INCE, under the supervision of and review by Michael Burrill, INCE and Senior Acoustical Scientist for ARCADIS Inc. Mr. Fowler and Mr. Burrill have over 30 years a combined experience in the field of acoustics and vibration. Their experience includes mechanical equipment noise impact evaluations as well as railway noise and vibration studies. Appendix F presents resumes for Mr. Fowler and Mr. Burrill.

8. References

Beranek, Leo L. 1988. Noise and Vibration Control, Revised Edition. INCE.

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Federal Transit Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment.

Harris, Cyril M. 1998. Handbook of Acoustical Measurements and Noise Control, 3rd Edition. Acoustical Society of America.

International Standard (ISO) 9613.1996. Acoustics – Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation.

Raichel, Daniel R. 2000. The Science and Applications of Acoustics.

U.S. Department of Transportation Federal Highway Administration (FHWA). 2009. Section 9.0 Construction Equipment Noise Levels and Ranges.

Figures

Legend

- Pipe Routing
- Property Boundary
- Existing Rail Line
- Proposed Rail Alignment
- Project Site

NOTES:
1. Imagery accessed through ESRI World Imagery via ArcGIS Online Layer Packages by ESRI (12/1/2010) (c) 2010 Microsoft Corporation and its data suppliers accessed on 03/08/2013 through ArcGIS 10.

2. Projection: CA State Plane Zone 5, NAD83
Source: Point data as of 4 October 2012

N

0 1,250 2,500

SCALE IN FEET

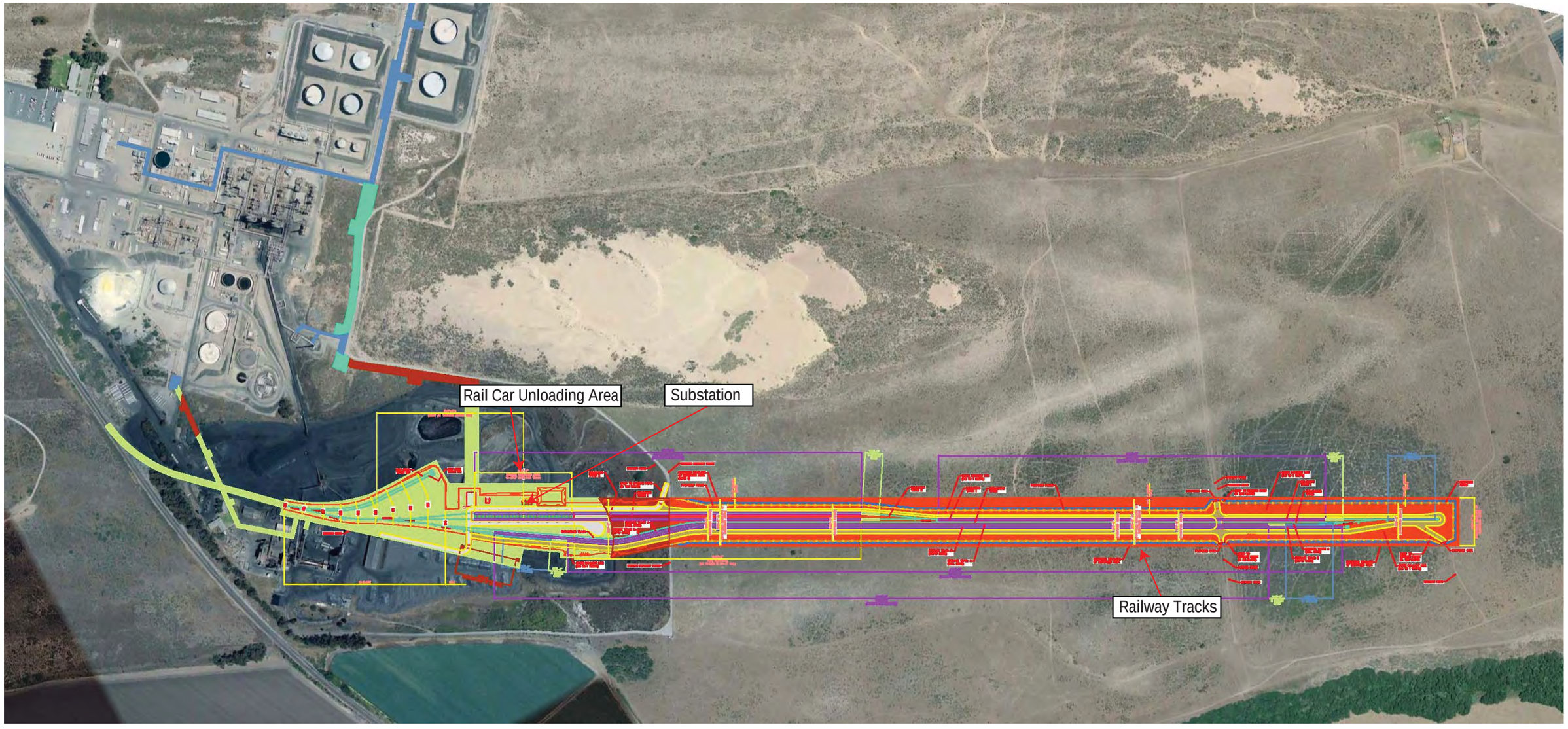
Phillips 66
Santa Maria Refinery Rail Project
REPORT

PROPOSED PROJECT SITE ON PHILLIPS 66 PROPERTY

ARCADIS

FIGURE
1

I:\BCG_Misc\Phillips\GIS\Projects\042613\Fig 1 ProposedProjectSite.mxd 4/26/2013 BGriffith
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



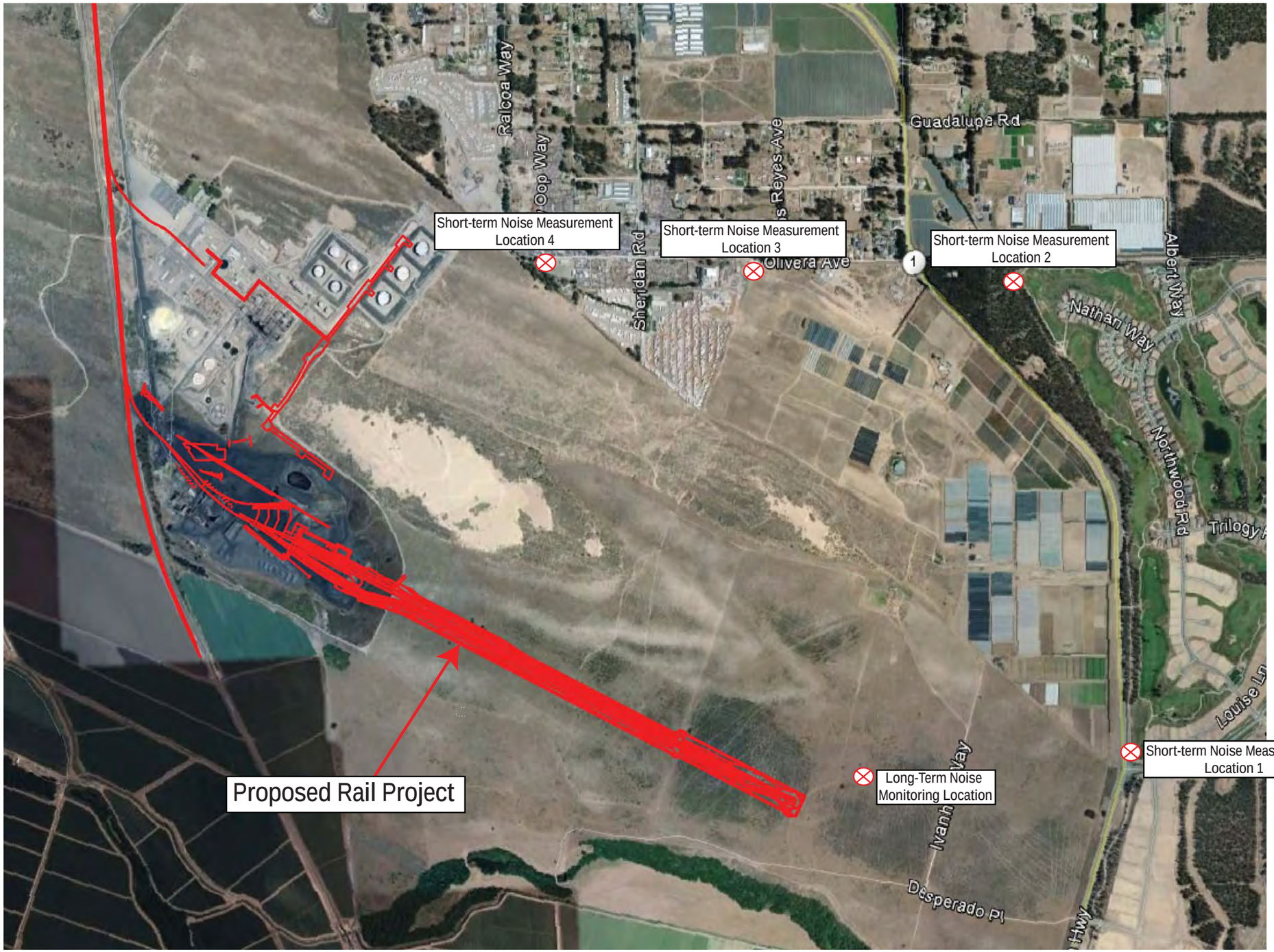
No Scale

Phillips 66 Santa Maria Refinery
San Luis Obispo County, California

Project Site Plan

ARCADIS

FIGURE
2



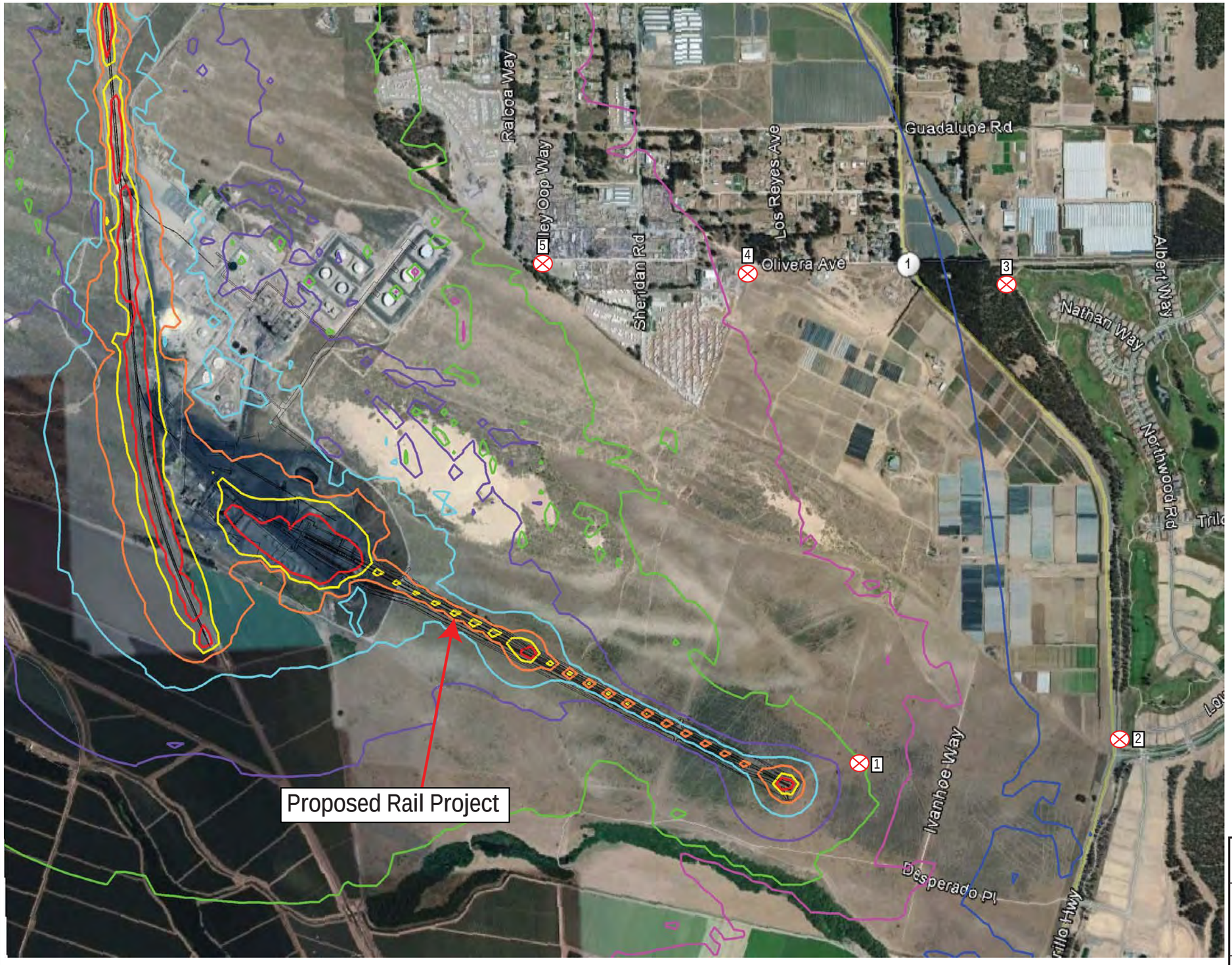
No Scale

Phillips 66 Santa Maria Refinery
San Luis Obispo County, California

Aerial Image Showing Noise Measurement Locations

ARCADIS

FIGURE
3



Noise Contour Legend

- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA

No Scale

Phillips 66 Santa Maria Refinery
San Luis Obispo County, California

Aerial Image Showing Operational Noise Contours

ARCADIS

FIGURE
4

Appendix A

Summary of Noise Fundamentals and Acoustical Terms

Subject: Summary of Noise Fundamentals and Acoustical Terms

Noise Background

Noise is a physical disturbance in a medium, such as air, that is capable of being detected by the human ear. Sound waves in air are caused by variations in pressure above and below the static value of atmospheric pressure. Sound is measured in units of decibels (dB) on a logarithmic scale. The “pitch” (high or low) of the sound is a description of frequency, which is measured in Hertz (Hz). Most common environmental sounds are composed of a composite of frequencies.

Human Perception of Noise

A normal human ear can usually detect sounds within frequencies from 20 Hz to about 20,000 Hz. However, humans are most sensitive to frequencies from 500 Hz to 4000Hz. Certain frequencies are given more “weight” during assessment because human hearing is not equally sensitive to all frequencies of sound. The dBA scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA. A noise level change of 3 dBA or less is barely perceptible to average human hearing and is considered “less than significant”. However, a 5 dBA change in noise level is clearly noticeable and is considered to be “substantial”. A 10 dBA change in noise level is considered a “significant impact” and is perceived as a doubling or halving of noise loudness, while a 20 dBA change is considered a “dramatic change” in loudness. Table 1 provides typical instantaneous noise levels of common activities in dBA.

Table 1. Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Concert
Jet Fly-over at 1,000 feet	100	
Gas Lawn Mower at 3 feet	90	
Diesel Truck at 50 feet, at 50 miles per hour (mph)	80	Food Blender at 3 feet
Noisy Urban Area, Daytime Gas Lawn Mower at 100 feet	70	Vacuum Cleaner at 10 feet
Commercial Area Heavy Traffic at 300 feet	60	Normal Speech at 3 feet
Quiet Urban Daytime	50	Large Business Office, Dishwasher in Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	30	Library
Quiet Rural Nighttime	20	Bedroom at Night
	10	Broadcast/Recording Studio (background level)
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans Technical Noise Supplement, October 1998

Sound Propagation and Attenuation

Sound from a source spreads out as it travels away from the source, and the sound pressure level diminishes with distance in accordance with the “inverse square law.” Individual sound sources are considered “point sources” when the distance from the source is large compared to the size of the source, for example: transformer bank, construction equipment, and turbines. Sound from a point source radiates hemispherically, which yields a 6 dB sound level reduction for each doubling of the distance from the source. If the sound source is quite long in one dimension the source is considered a “line source”, for example: roadways and railroads. Sound from a line source radiates cylindrically, which typically yields a 3 dB sound level reduction for each doubling of the distance from the source.

In addition to distance attenuation, the air absorbs a certain amount of sound energy, and atmospheric effects (wind, temperature, precipitation), and terrain/vegetation effects also influence the sound propagation and attenuation over large distances from the source.

Community Noise

An individual’s sound exposure is valued based on a measurement of the noise that the individual experiences over a specified time interval. A sound level is a measurement of noise that occurs during a specified period of time. A continuous source of noise is rare for long periods of time and is typically not a characteristic of community noise. Community noise refers to outdoor noise in the vicinity of a community and most commonly originates from transportation vehicles or stationary mechanical equipment. A community noise environment varies continuously over time with respect to the contributing sources. Within a community, ambient noise levels gradually change throughout a typical day and the changes can be correlated to the increase and decrease of transportation noise or to the daytime/nighttime operation of stationary mechanical equipment. The variation in community noise throughout a day is also due to the addition of short-duration single-event noise sources, such as aircraft and sirens as well as various natural sources.

The metrics for evaluating the community noise environment are based on measurements of the noise exposure over a period of time in order to characterize and evaluate the cumulative noise impacts. These metrics are time-varying and are defined as statistical noise descriptors.

Definitions

A-Weighted Sound Levels: Decibels (referenced to 20 micro-Pascals) as measured with an A-weighting network of a standard sound level meter, abbreviated dB(A).

Ambient Noise Level: The measured ambient noise level associated with all existing environmental, transportation, and community noise sources, in the absence of any audible construction activity.

Leq: The equivalent sound level, or the time-integrated continuous sound level, that represents the same sound energy as the varying sound levels, logarithmically averaged over a specified monitoring period.

Lmax: The instantaneous greatest noise level measured on a sound level meter during a designated time interval.

Lmin: The instantaneous lowest noise level measured on a sound level meter during a designated time interval.

Noise Level Measurements: Unless otherwise indicated, the use of A-weighted and "slow" response of a noise monitoring instrument complying with at least Type 2 requirements as defined by the latest revision of American National Standard Institute (ANSI) S1.4 Specification for Sound Level Meters.

Sensitive Receptor Location: A location of regulatory compliance where particular sensitivities to noise exist, such as residential areas, institutions, hospitals, parks, or other environmentally sensitive areas.

Sound Pressure Level (SPL): The observable effect of acoustic energy radiation, quantifying the sound level as perceivable by the receiver. When Sound Pressure is used to describe a noise source, the distance between source and receiver must be known in order to yield useful information about the power rating of the source.

References

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Appendix B

Long-term Noise Monitoring Data

ARCADIS
Infrastructure, environment, buildings

Project Name: Phillips 66 - Rail Project - Santa Maria Refinery
Project Number: 04597003.0000

Long-term Noise Monitor Location - October 2012 Monitor Data

Date	Leq (dBA)		Lmin (dBA)		Lmax (dBA)	
	Daytime*	Nighttime**	Daytime*	Nighttime**	Daytime*	Nighttime**
10-Oct	40.9	37.5	36.5	33.3	54.3	48.6
11-Oct	44.5	42.7	34.2	32.5	63.9	63.5
12-Oct	42.6	42.7	34.7	36.1	61.7	59.7
13-Oct	45.3	40.2	35.4	31.8	60.9	59.8
14-Oct	43.1	38.5	37.4	33.3	59.7	48.2
15-Oct	44.9	42.8	39.3	35.0	61.9	61.9
16-Oct	50.9	41.7	40.1	35.8	66.6	55.1
17-Oct	45.7	41.0	38.1	35.1	64.9	55.8
18-Oct	46.2	42.0	35.7	36.3	59.8	55.8

* Daytime noise levels are averaged over 1-hour time periods from 7:00 a.m. to 10:00 p.m.
** Nighttime noise levels are averaged over 1-hour time periods from 10:00 p.m. to 7:00 a.m.

Appendix C

Short-term Noise Measurement Data

ARCADIS
Infrastructure, environment, buildings

Project Name: Phillips 66 - Rail Project - Santa Maria Refinery
Project Number: 04597003.0000

Short-term Measurement Locations - October 2012 Monitor Data

Measurement Location	Date	Duration	Leq (dBA)		Lmin (dBA)		Lmax (dBA)	
			Daytime*	Nighttime**	Daytime*	Nighttime**	Daytime*	Nighttime**
1	18-19-Oct	30 min	54.5	45.6	40.9	33.9	73.6	65.8
2	18-19-Oct	30 min	51.0	40.0	44.2	35.1	64.8	50.0
3	18-19-Oct	30 min	49.5	40.4	42.0	34.4	59.8	61.9
4	18-19-Oct	30 min	56.1	41.7	40.2	38.3	78.6	51.2

* Daytime noise levels are averaged over 1-hour time periods from 7:00 a.m. to 10:00 p.m.
** Nighttime noise levels are averaged over 1-hour time periods from 10:00 p.m. to 7:00 a.m.

Appendix D

Relevant Excerpts from Applicable Noise and Vibration Criteria

San Luis Obispo County, CA Noise Ordinance

(NPC posted this March 2004)

23.06.040 - Noise Standards:

Sections 23.06.044-050 establish standards for acceptable exterior and interior noise levels and describe how noise is to be measured. These standards are intended to protect persons from excessive noise levels, which are detrimental to the public health, welfare and safety and contrary to the public interest because they can: interfere with sleep, communication, relaxation and the full enjoyment of one's property; contribute to hearing impairment and a wide range of adverse physiological stress conditions; and adversely affect the value of real property. It is the intent of this chapter to protect persons from excessive levels of noise within or near various residential development and other specified noise-sensitive land uses.

[Amended 1992, Ord. 2546]

23.06.042 - Exceptions to Noise Standards:

The standards of Sections 23.06.044-050 are not applicable to noise from the following sources:

a. Activities conducted in public parks, public playgrounds and public or private school grounds, including but not limited to school athletic and school entertainment events;

b. The use of any mechanical device, apparatus or equipment related to or connected with emergency activities or emergency work to protect life or property;

c. Safety signals, warning devices, and emergency pressure relief valves;

d. Noise sources associated with construction, provided such activities do not take place before seven a.m. or after nine p.m. any day except Saturday or Sunday, or before eight a.m. or after five p.m. on Saturday or Sunday;

e. Noise sources associated with the maintenance of a residential use as listed in Table O, Framework for Planning of the Land Use Element and Local Coastal Plan, provided that such activities take place between the hours of seven a.m. and nine p.m.;

f. Noise sources associated with agricultural land uses as listed in Table O, Framework for Planning of the Land Use Element and Local Coastal Plan, including but not limited to wind machines used for direct climate control, water well pumps and pest-repelling devices, provided that such pest-repelling devices are used in accordance with accepted standards and practices;

g. Noise sources associated with a lawful use which is other than a residential use as listed in Table O, Framework for Planning of the Land Use Element and Local Coastal Plan, caused by mechanical devices or equipment, including air conditioning or refrigeration systems, installed prior to the effective date of this chapter; this exemption shall expire one year after the effective date of this chapter;

h. Noise sources associated with work performed by private or public utilities in the maintenance or modification of its facilities;

i. Noise sources associated with the collection of waste or garbage from property devoted to other than residential uses listed in Table O, Framework for Planning of the Land Use Element and Local Coastal Plan.

j. Traffic on public roadways, railroad line operations, aircraft in flight, and any other activity to the extent regulation

thereof has been preempted by state or federal law.

[Amended 1992, Ord. 2546; 1993, Ord. 2591; 1995, Ord. 2715]

23.06.044 - Exterior Noise Level Standards:

The exterior noise level standards of this section are applicable when a land use affected by noise is one of the following noise-sensitive uses which are defined in the Land Use Element and Local Coastal Plan: residential uses listed in Table O, Framework for Planning, except for residential accessory uses and temporary dwellings; health care services (hospitals and similar establishments only); hotels and motels; bed and breakfast facilities; schools (pre-school to secondary, college and university, specialized education and training); churches; libraries and museums; public assembly and entertainment; offices, and outdoor sports and recreation.

a. No person shall create any noise or allow the creation of any noise at any location within the unincorporated areas of the county on property owned, leased, occupied or otherwise controlled by such person which causes the exterior noise level when measured at any of the preceding noise-sensitive land uses situated in either the incorporated or unincorporated areas to exceed the noise level standards in the following table. When the receiving noise-sensitive land use is outdoor sports and recreation, the following noise level standards shall be increased by 10dB.

EXTERIOR NOISE LEVEL STANDARDS		
	Daytime (7 a.m. to 10 p.m.)	Nighttime[1] (10 p.m. to 7 a.m.)
Hourly Equivalent Sound Level (L_{eq}, dB)	50	45
Maximum level, dB	70	65

[1.] Applies only to uses that operate or are occupied during nighttime hours

b. In the event the measured ambient noise level exceeds the applicable exterior noise level standard in subsection (a), the applicable standard shall be adjusted so as to equal the ambient noise level plus one dB.

c. Each of the exterior noise level standards specified in subsection (a) shall be reduced by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises.

d. If the intruding noise source is continuous and cannot reasonably be discontinued or stopped for a time period whereby the ambient noise level can be measured, the noise level measured while the source is in operation shall be compared directly to the exterior noise level standards.

[Amended 1992, Ord. 2546]

23.06.046 - Interior Noise Level Standards:

The interior noise level standards of this section are applicable when the land use which is the source of noise and the land use which is affected by noise are both residential uses as listed in Table O, Framework for Planning of the Land Use Element and Local Coastal Plan, except for residential accessory uses and temporary dwellings.

a. No person shall operate or cause to be operated a source of noise within a residential use in any location in the unincorporated areas of the county or allow the creation of any noise which causes the noise level when measured inside a residential use located in either the incorporated or unincorporated area to exceed the interior noise level standards in the following table:

INTERIOR NOISE LEVEL STANDARDS		
	Daytime	Nighttime

	(7 a.m. to 10 p.m.)	(10 p.m. to 7 a.m.)
Hourly Equivalent Sound Level (L_{eq}, dB)	40	35
Maximum level, dB	60	55

b. In the event the measured ambient noise level exceeds the applicable interior noise level standard in subsection (a), the applicable standard shall be adjusted so as to equal the ambient noise level plus one dB.

c. Each of the interior noise level standards specified in subsection (a) shall be reduced by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises.

d. If the intruding noise source is continuous and cannot reasonably be discontinued or stopped for a time period whereby the ambient noise level can be measured, the noise level measured while the source is in operation shall be compared directly to the interior noise level standards.

[Added 1992, Ord. 2546]

23.06.048 - Other Noise Sources:

The noise level standards in this section apply to the following noise sources:

a. **Air conditioning and refrigeration:** Notwithstanding the provisions of Section 23.06.044, when the intruding noise source is an air conditioning or refrigeration system or associated equipment installed prior to the effective date of this chapter, the exterior noise level as measured as provided in Section 23.06.050 shall not exceed 55 dB, except where such equipment is exempt from the provisions of this chapter. The exterior noise level shall not exceed fifty dB for such equipment installed or in use after one year after the effective date of this chapter.

b. **Waste and garbage collection equipment:** Notwithstanding the provisions of Section 23.06.044, noise sources associated with the collection of waste or garbage from a residential use (as listed in Table O, Framework for Planning of the Land Use Element and Local Coastal Plan) by persons authorized to engage in such activity, and who are operating truck-mounted loading or compacting equipment, shall not take place before seven a.m. or after seven p.m., and the noise level created by such activities when measured at a distance of fifty feet (50) in an open area shall not exceed the following standards:

(1) Eighty-five (85) dB for equipment in use, purchased or leased within six months from the effective date of this chapter.

(2) Eighty (80) dB for that equipment set forth in subsection a(l) after five years from the effective date of this chapter.

(3) Eighty (80) dB for new equipment purchased or leased after six months from the effective date of this chapter.

(4) Seventy-five (75) dB for new equipment purchased or leased after thirty-six months from the effective date of this chapter.

c. **Electrical substations:** Notwithstanding the provisions of Section 23.06.044, noise sources associated with the operation of the following electrical substations shall not exceed an exterior noise level of fifty dB between 10 p.m. and 7 a.m. and fifty-five dB between 7 a.m. and 10 p.m., as determined at the property line of the receiving land use: theCholame, San Miguel, Templeton, Cambria, Perry, Cayucos, Baywood, Highway 1 between Morro Bay and the California Men's Colony, Goldtree, Foothill, San Luis Obispo, Oceano, Mesa, Union Oil, Callendar, and Mustang electrical substations. If any of these existing electrical substations undergo modifications that increase noise levels, they shall be mitigated in accordance with the policies of the Noise Element Document.

[Added 1992, Ord. 2546]

23.06.050 - Noise Level Measurement:

For the purpose of evaluating conformance with the standards of this chapter, noise levels shall be measured as follows:

a. **Use of meter:** Any noise measurement made pursuant to the provisions of Sections 23.06.044-048 shall be made with a sound level meter using the A-weighted network (scale). Calibration of the measurement equipment utilizing an acoustical calibrator shall be performed immediately prior to recording any noise data.

b. **Measuring exterior noise levels:** Except as otherwise provided in Sections 22.06.044-048, exterior noise levels shall be measured at the property line of the affected noise-sensitive land use listed in Section 23.06.044. Where practical, the microphone shall be positioned five feet above the ground and away from reflective surfaces.

c. Measuring interior noise levels: Interior noise levels shall be measured within the affected residential use listed in Section 23.06.046, at points at least four (4) feet from the wall, ceiling or floor nearest the noise source, with windows in the normal seasonal configuration. The reported interior noise level shall be determined by taking the arithmetic average of the readings taken at the various microphone locations.

[Added 1992, Ord. 2546]

TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT

FTA-VA-90-1003-06 **May 2006**

Office of Planning and Environment
Federal Transit Administration

8. VIBRATION IMPACT CRITERIA

Because of the relatively rare occurrence of annoyance due to ground-borne vibration and noise, there has been only limited sponsored research of human response to building vibration and structure-borne noise. However, with the construction of new rail rapid transit systems in the past 30 years, considerable experience has been gained as to how people react to various levels of building vibration. This experience, combined with the available national and international standards,[1,2,3] represents a good foundation for predicting annoyance from ground-borne noise and vibration in residential areas as well as interference with vibration-sensitive activities.

The criteria for environmental impact from ground-borne vibration and noise are based on the maximum root-mean-square (rms) vibration levels for repeated events of the same source. The criteria presented in Table 8-1 account for variation in project types as well as the frequency of events, which differ widely among transit projects. Most experience is with the community response to ground-borne vibration from rail rapid transit systems with typical headways in the range of 3 to 10 minutes and each vibration event lasting less than 10 seconds. It is intuitive that when there will be many fewer events each day, as is typical for commuter rail projects, it should take higher vibration levels to evoke the same community response. This is accounted for in the criteria by distinguishing between projects with varying numbers of events, where *Frequent Events* are defined as more than 70 events per day, *Occasional Events* range between 30 and 70 events per day, and *Infrequent Events* are fewer than 30 events per day. Most commuter rail branch lines will fall into the infrequent events category, although the trunk lines of some commuter rail lines serving major cities are in the occasional events category.

The criteria are primarily based on experience with passenger train operations with only limited experience from freight train operations. The difference is that passenger train operations, whether rapid transit, commuter rail, or intercity passenger railroad, create vibration events that last less than about 10 seconds. A typical line-haul freight train is about 5000 feet long. At a speed of 30 mph, it will take a 5000-foot freight train approximately two minutes to pass. Even though the criteria are primarily based on experience with shorter vibration events and this manual is oriented to transit projects, there will be

situations where potential impacts from freight train ground-borne vibration will need to be evaluated. The prime example is when freight train tracks must be relocated to provide space for a transit project within a railroad right-of-way. Some guidelines for applying these criteria to freight train operations are given later in this chapter.

8.1 VIBRATION IMPACT CRITERIA FOR GENERAL ASSESSMENT

8.1.1 Sensitive-Use Categories

The criteria for acceptable ground-borne vibration are expressed in terms of rms velocity levels in decibels and the criteria for acceptable ground-borne noise are expressed in terms of A-weighted sound levels. The limits are specified for the three land-use categories defined below:

- **Vibration Category 1 - High Sensitivity:** Included in Category 1 are buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance. Concert halls and other special-use facilities are covered separately in Table 8-2. Typical land uses covered by Category 1 are: vibration-sensitive research and manufacturing, hospitals with vibration-sensitive equipment, and university research operations. The degree of sensitivity to vibration will depend on the specific equipment that will be affected by the vibration. Equipment such as electron microscopes and high resolution lithographic equipment can be very sensitive to vibration, and even normal optical microscopes will sometimes be difficult to use when vibration is well below the human annoyance level. Manufacturing of computer chips is an example of a vibration-sensitive process.

  The vibration limits for Vibration Category 1 are based on acceptable vibration for moderately vibration-sensitive equipment such as optical microscopes and electron microscopes with vibration isolation systems. Defining limits for equipment that is even more sensitive requires a detailed review of the specific equipment involved. This type of review is usually performed during the Detailed Analysis associated with the final design phase and not as part of the environmental impact assessment. Mitigation of transit vibration that affects sensitive equipment typically involves modification of the equipment mounting system or relocation of the equipment rather than applying vibration control measures to the transit project.

  Note that this category does not include most computer installations or telephone switching equipment. Although the owners of this type of equipment often are very concerned about the potential of ground-borne vibration interrupting smooth operation of their equipment, it is rare for computer or other electronic equipment to be particularly sensitive to vibration. Most such equipment is designed to operate in typical building environments where the equipment may experience occasional shock from bumping and continuous background vibration caused by other equipment.

- **Vibration Category 2 - Residential:** This category covers all residential land uses and any buildings where people sleep, such as hotels and hospitals. No differentiation is made between different types of residential areas. This is primarily because ground-borne vibration and noise are experienced indoors and building occupants have practically no means to reduce their exposure. Even in a noisy

urban area, the bedrooms often will be quiet in buildings that have effective noise insulation and tightly closed windows. Moreover, street traffic often abates at night when transit continues to operate. Hence, an occupant of a bedroom in a noisy urban area is likely to be just as exposed to ground-borne noise and vibration as someone in a quiet suburban area. The criteria apply to the transit-generated ground-borne vibration and noise whether the source is subway or surface running trains.

- **Vibration Category 3 - Institutional:** Vibration Category 3 includes schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment, but still have the potential for activity interference. Although it is generally appropriate to include office buildings in this category, it is not appropriate to include all buildings that have any office space. For example, most industrial buildings have office space, but it is not intended that buildings primarily for industrial use be included in this category.

Table 8-1. Ground-Borne Vibration (GBV) and Ground-Borne Noise (GBN) Impact Criteria for General Assessment

Land Use Category	GBV Impact Levels (VdB re 1 micro-inch /sec)			GBN Impact Levels (dB re 20 micro Pascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
5. Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

12.2.2 Vibration Source Levels from Construction Equipment

Ground-borne vibration related to human annoyance is generally related to root mean square (rms) velocity levels expressed in VdB. However, a major concern with regard to construction vibration is building damage. Consequently, construction vibration is generally assessed in terms of peak particle velocity (PPV), as defined in Chapter 7.1.2. The relationship of PPV to rms velocity is expressed in terms of the "crest factor," defined as the ratio of the PPV amplitude to the rms amplitude. Peak particle velocity is typically a factor of 1.7 to 6 times greater than rms vibration velocity.

Various types of construction equipment have been measured under a wide variety of construction activities with an average of source levels reported in terms of velocity as shown in Table 12-2. In this table, a crest factor of 4 (representing a PPV-rms difference of 12 VdB) has been used to calculate the approximate rms vibration velocity levels from the PPV values. Although the table gives one level for each piece of equipment, it should be noted that there is a considerable variation in reported ground vibration levels from construction activities. The data provide a reasonable estimate for a wide range of soil conditions.

Table 12-2. Vibration Source Levels for Construction Equipment (From measured data.[7,8,9,10])

Equipment		PPV at 25 ft (in/sec)	Approximate L_v† at 25 ft
Pile Driver (impact)	upper range	1.518	112
	typical	0.644	104
Pile Driver (sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

† RMS velocity in decibels (VdB) re 1 micro-inch/second

12.2.2 Construction Vibration Criteria

For evaluating potential annoyance or interference with vibration-sensitive activities due to construction vibration, the criteria for General Assessment in Chapter 8 can be applied. In most cases, however, the primary concern regarding construction vibration relates to potential damage effects. Guideline vibration damage criteria are given in Table 12-3 for various structural categories.[10] In this table, a crest factor of 4 (representing a PPV-rms difference of 12 VdB) has been used to calculate the approximate rms vibration velocity limits from the PPV limits. These limits should be viewed as criteria that should be used during the environmental impact assessment phase to identify problem locations that must be addressed during final design.

Table 12-3. Construction Vibration Damage Criteria[11]

Building Category	PPV (in/sec)	Approximate L_v †
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

† RMS velocity in decibels (VdB) re 1 micro-inch/second

12.2.3 Construction Vibration Mitigation

After using the above methods to locate potential human impacts or building damage from construction vibrations, the next step is to identify control measures. Similar to the approach for construction noise, mitigation of construction vibration requires consideration of equipment location and processes, as follows:

1. *Design considerations and project layout:*
   - Route heavily-loaded trucks away from residential streets, if possible. Select streets with fewest homes if no alternatives are available.
   - Operate earth-moving equipment on the construction lot as far away from vibration-sensitive sites as possible.
2. *Sequence of operations:*
   - Phase demolition, earth-moving and ground-impacting operations so as not to occur in the same time period. Unlike noise, the total vibration level produced could be significantly less when each vibration source operates separately.

Appendix E

Cadna Noise Model Data and Results

Project Operations - Point Sources

Name	ID	Result. PWL			Lw / Li		Height		Coordinates		
		Day	Evening	Night	Type	Value			X	Y	Z
		(dBA)	(dBA)	(dBA)			(m)		(m)	(m)	(m)
Transformer east	transformer	99.6	99.6	99.6	Lw	transformer	3.35	r	1764416.24	673235.76	33.84
HVAC (5 ton)	hvac	99.6	99.6	99.6	Lw	hvac	3.05	r	1764408.49	673230.18	33.54
Air Compressor System	aircompressor	114.7	114.7	114.7	Lw	aircompressor	1.22	r	1764336.98	673282.52	31.44
Drain Tank central	draintank	109.0	109.0	109.0	Lw	draintank	1.22	r	1764380.50	673160.74	31.71
Drain Tank west	draintank	109.0	109.0	109.0	Lw	draintank	1.22	r	1764376.57	673163.06	31.71
Drain Tank Pump east	aircompressor	109.0	109.0	109.0	Lw	draintank	1.22	r	1764384.55	673158.38	31.71
PD Pump 1	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764464.79	673179.52	38.41
PD Pump 2	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764457.89	673184.60	36.89
PD Pump 3	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764449.81	673186.94	36.89
PD Pump 4	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764442.91	673192.02	36.89
PD Pump 5	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764434.84	673194.34	36.89
PD Pump 6	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764427.92	673199.44	36.89
PD Pump 7	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764419.86	673201.75	36.89
PD Pump 8	aircompressor	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764412.37	673205.46	36.89
PD Pump 9	dppump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764404.88	673209.17	36.89
PD Pump 10	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764397.94	673214.27	36.89
PD Pump 12	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764382.97	673221.68	36.89
PD Pump 13	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764374.92	673224.02	36.89
PD Pump 14	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764367.98	673229.10	36.89
PD Pump 15	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764359.94	673231.43	36.89
PD Pump 16	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764353.01	673236.52	36.79
PD Pump 17	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764344.86	673238.89	36.59
PD Pump 18	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764338.02	673243.94	36.40
PD Pump 19	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764329.87	673246.30	36.20
PD Pump 20	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764323.02	673251.38	36.01
PD Pump 11	pdpump	109.0	109.0	109.0	Lw	pdpump	6.40	r	1764389.90	673216.59	36.89
Alarm 19	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764330.52	673247.66	38.65
Alarm 18	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764337.37	673242.60	38.83
Alarm 17	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764345.51	673240.23	39.04
Alarm 16	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764352.35	673235.19	39.22
Alarm 15	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764360.49	673232.81	39.33
Alarm 14	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764367.43	673227.72	39.33
Alarm 13	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764375.48	673225.39	39.33
Alarm 12	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764382.42	673220.30	39.33
Alarm 11	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764390.45	673217.98	39.33
Alarm 10	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764397.39	673212.87	39.33
Alarm 9	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764405.45	673210.56	39.33
Alarm 7	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764420.42	673203.15	39.33
Alarm 8	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764412.94	673206.85	39.33
Alarm 6	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764427.36	673198.04	39.33
Alarm 4	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764442.33	673190.64	39.33
Alarm 5	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764435.42	673195.72	39.33
Alarm 3	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764450.40	673188.31	39.33
Alarm 2	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764457.30	673183.23	39.52
Alarm 1	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764465.35	673180.90	40.85
Alarm 20	alarmhorn	99.6	99.6	99.6	Lw	alarmhorn	8.84	r	1764322.39	673250.01	38.44
Existing Boiler	existing_boiler	99.6	99.6	99.6	Lw	existing_boiler	3.66	r	1764067.94	673369.24	30.39
Train Engine	locomotive_engine	108.3	108.3	108.3	Lw	train	3.66	r	1765823.32	672503.47	39.99
Train Engine	locomotive_engine	108.3	108.3	108.3	Lw	train	3.66	r	1765015.63	672902.45	31.10
Train Engine	existing_boiler	108.3	108.3	108.3	Lw	train	3.66	r	1763795.83	673722.88	26.53
Train Engine	locomotive_engine	108.3	108.3	108.3	Lw	train	3.66	r	1765801.69	672514.20	39.93
Train Engine	locomotive_engine	108.3	108.3	108.3	Lw	train	3.66	r	1764992.81	672913.80	31.41
Train Engine		108.3	108.3	108.3	Lw	train	3.66	r	1764229.15	673290.52	32.62

Project Operations - Line Sources

Name	M.	ID	Result.	Result. PWL'	Lw / Li		Moving Pt. Src			
			Day	Day	Type	Value	Number			Speed
			(dBA)	(dBA)			Day	Evening	Night	(km/h)
Tank Truck		tanktruck	122.7	97.2	PWL-Pt	tanktruck	45.7	0.0	0.0	16.0

Project Operations - Railways

Name	M.	ID	Lm,E		Train Class	Add.Level				Vmax
			Day	Night		Dfb	Dbr	Dbü	Dra	
			(dBA)	(dBA)		(dB)	(dB)	(dB)	(dB)	(km/h)
Train - Main Track		train1	81.6	0.0	(local)	0.0	0.0	0.0	0.0	
Train 1 - unloading		train1	63.0	0.0	(local)	0.0	0.0	0.0	0.0	
Train 2 - unloading		train1	63.0	0.0	(local)	0.0	0.0	0.0	0.0	

Project Operations - Receivers

Name	M.	ID	Level Lr	Land Use			Height		Coordinates		
			Day	Type	Auto	Noise Type			X	Y	Z
			(dBA)				(m)		(m)	(m)	(m)
Receptor 1 (Receptor C)			36.9		x	Total	1.52	r	1766848.76	672645.09	73.01
Receptor 2 (Receptor D)			38.7		x	Total	1.52	r	1766498.00	674006.41	58.93
Receptor 3 (Receptor B)			44.2		x	Total	1.52	r	1765693.15	674035.55	59.32
Receptor 4 (Receptor A)			49.0		x	Total	1.52	r	1765061.90	674060.38	48.00
Noise Monitor Location			52.1		x	Total	1.52	r	1766039.65	672575.71	47.14

Demolition - Point Sources

Name	M.	ID	Result. PW	Lw / Li		Operating Time	Height		Coordinates		
			Day	Type	Value	Day			X	Y	Z
			(dBA)			(min)	(m)		(m)	(m)	(m)
Dump Truck east		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1764136.32	673327.36	32.00
Dump Truck west		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1763858.36	673582.37	27.01
Excavator		excavator	119.7	Lw	excavator	240.00	3.66	r	1763993.88	673490.66	29.57
Bulldozer west		bulldozer	119.7	Lw	bulldozer	240.00	4.57	r	1763934.12	673515.20	29.46
Bulldozer east		bulldozer	119.7	Lw	bulldozer	240.00	4.57	r	1764070.38	673382.64	31.28
Backhoe w/ Chipper		backhoe_chipper	119.7	Lw	backhoe_chipper	240.00	3.66	r	1764158.50	673349.53	31.51

Demolition - Line Sources

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li		Operatir
			Day	Evening	Night	Day	Evening	Night	Type	Value	Day
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			(min)
Water Truck		watertruck	118.7	118.7	118.7	92.2	92.2	92.2	Lw	watertruck	240.00

Demolition - Receivers

Name	M.	ID	Level Lr	Land Use			Height		Coordinates		
			Day	Type	Auto	Noise Type			X	Y	Z
			(dBA)				(m)		(m)	(m)	(m)
Noise Monitor Location			32.7		x	Total	1.52	r	1766039.65	672575.71	47.14
Receptor 1 (Receptor C)			27.1		x	Total	1.52	r	1766848.76	672645.09	73.01
Receptor 2 (Receptor D)			29.7		x	Total	1.52	r	1766508.92	674006.41	58.91
Receptor 3 (Receptor B)			35.7		x	Total	1.52	r	1765693.15	674035.55	59.32
Receptor 4 (Receptor A)			40.6		x	Total	1.52	r	1765061.90	674060.38	48.00

Grading - Point Sources

Name	M.	ID	Result. PWL	Lw / Li		Operating Ti	Height		Coordinates		
			Day	Type	Value	Day			X	Y	Z
			(dBA)			(min)	(m)		(m)	(m)	(m)
Dump Truck Far West - Grading		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1764260.18	673317.37	32.40
Bulldozer West - Grading		bulldozer	119.7	Lw	bulldozer	240.00	4.57	r	1764488.22	673276.91	35.06
Dump Truck West - Grading		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1764685.10	673091.14	34.07
Water Truck - Grading		watertruck	118.7	Lw	watertruck	240.00	3.66	r	1765593.38	672810.38	41.65
Bulldozer east - Grading		bulldozer	119.7	Lw	bulldozer	240.00	4.57	r	1765304.38	672743.19	32.24
Dump Truck far east - Grading		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1765789.91	672486.14	38.58
Dump Truck east - Grading		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1765541.26	672617.18	36.20
Dump Truck far west - Soil Transport		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1764191.44	673257.13	33.92
Bulldozer west - Soil Transport		bulldozer	119.7	Lw	bulldozer	240.00	4.57	r	1764451.60	673320.42	36.20
Water Truck - Soil Transport		watertruck	118.7	Lw	watertruck	240.00	3.66	r	1764992.88	672816.02	31.10
DumpTruck far east - Soil Transport		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1765756.94	672388.56	36.08
DumpTruck west - Soil Transport		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1764824.11	673015.11	30.62
DumpTruck east - Soil Transport		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1765126.52	672837.02	31.81
Bulldozer east - Soil Transport		bulldozer	119.7	Lw	bulldozer	240.00	4.57	r	1765544.93	672701.57	38.43

Grading - Line Sources

Name	M.	ID	Result. PWL	Result. PWL'	Lw / Li		Operatir	Moving Pt. Src			
			Day	Day	Type	Value	Day	Number			Speed
			(dBA)	(dBA)			(min)	Day	Evening	Night	(km/h)
Scraper - Grading		scraper	119.6	84.1	PWL-Pt	scraper	240.00	4.5	0.0	0.0	16.0
Grader - Grading		grader	119.7	83.4	PWL-Pt	grader	240.00	3.8	0.0	0.0	16.0
Excavator - Grading		excavator	119.7	82.8	PWL-Pt	excavator	240.00	3.3	0.0	0.0	16.0

Grading - Receivers

Name	M.	ID	Level Lr	Land Use			Height		Coordinates		
			Day	Type	Auto	Noise Type			X	Y	Z
			(dBA)				(m)		(m)	(m)	(m)
Noise Monitor Location			59.1		x	Total	1.52	r	1766039.65	672575.71	47.14
Receptor 1 (Receptor C)			42.7		x	Total	1.52	r	1766848.76	672645.09	73.01
Receptor 2 (Receptor D)			38.8		x	Total	1.52	r	1766508.92	674006.41	58.91
Receptor 3 (Receptor B)			42.8		x	Total	1.52	r	1765693.15	674035.55	59.32
Receptor 4 (Receptor A)			45.0		x	Total	1.52	r	1765061.90	674060.38	48.00

Site Preparation - Point Sources

Name	M.	ID	Result. PWL	Lw / Li		Operating Time	Height		Coordinates		
			Day	Type	Value	Day			X	Y	Z
			(dBA)			(min)	(m)		(m)	(m)	(m)
Compactor west		compactor	114.7	Lw	compactor	120.00	1.52	r	1764317.61	673711.58	39.89
Water Truck west		watertruck	118.7	Lw	watertruck	240.00	3.66	r	1764256.22	673621.61	43.29
Paver west		paver	119.7	Lw	paver	300.00	1.52	r	1764140.13	673361.48	28.96
Dump Truck west		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1764170.71	673316.43	32.15
Flatbed Truck west		flatbed_truck	118.7	Lw	flatbed_truck	240.00	3.66	r	1764430.70	673454.32	36.54
Concrete Truck		concretetruck	119.7	Lw	concretetruck	240.00	3.66	r	1764343.35	673547.00	35.68
Paver east		paver	119.7	Lw	paver	300.00	1.52	r	1764382.01	673310.63	32.80
Air Compressor		aircompressor	114.7	Lw	aircompressor	240.00	1.22	r	1764456.97	673225.87	31.71
Pile Driver		piledriver	129.7	Lw	piledriver	120.00	4.57	r	1764532.16	673212.33	33.53
Concrete Truck		concretetruck	119.7	Lw	concretetruck	240.00	3.66	r	1764574.25	673155.89	35.67
Water Truck east		watertruck	118.7	Lw	watertruck	240.00	3.66	r	1764958.58	672939.31	31.49
Compactor east		compactor	114.7	Lw	compactor	120.00	1.52	r	1764320.11	673200.30	32.01
Grinder		grinder	119.7	Lw	grinder	120.00	1.22	r	1764373.45	673183.63	31.71
Generator west		generator	116.7	Lw	generator	300.00	1.22	r	1764494.47	673111.28	28.96
Flatbed Truck central		flatbed_truck	118.7	Lw	flatbed_truck	240.00	3.66	r	1764562.83	673086.00	29.83
Dump Truck east		dumptruck	118.7	Lw	dumptruck	240.00	3.66	r	1765553.29	672517.00	34.87
Flatbed Truck east		flatbed_truck	118.7	Lw	flatbed_truck	240.00	3.66	r	1765110.97	672773.87	29.57
Generator east		generator	116.7	Lw	generator	300.00	1.22	r	1765416.90	672689.55	32.00
Crane north		crane_mobile	119.7	Lw	crane_mobile	96.00	4.57	r	1764764.98	674044.18	50.16
Backhoe north		backhoe	114.7	Lw	backhoe	240.00	3.66	r	1764522.45	673776.77	40.60
Backhoe south		backhoe	114.7	Lw	backhoe	240.00	3.66	r	1765411.30	672596.18	32.04
Crane south		crane_mobile	119.7	Lw	crane_mobile	96.00	4.57	r	1765655.04	672551.36	41.07

Site Preparation - Line Sources

Name	M.	ID	Result. PWL			Result. PWL'	Lw / Li		Operating Time	Moving Pt. Sr	
			Day	Evening	Night	Day	Type	Value	Day	Numbe	Speed
			(dBA)	(dBA)	(dBA)	(dBA)			(min)	Day	(km/h)
Bulldozer		dulldozer	119.7	11.4	11.4	85.9	PWL-Pt	bulldozer	240.00	6.7	16.0

Site Preparation - Receivers

Name	M.	ID	Level Lr	Land Use			Height		Coordinates		
			Day	Type	Auto	Noise Type			X	Y	Z
			(dBA)				(m)		(m)	(m)	(m)
Receptor 1 (Receptor C)			40.5		x	Total	1.52	r	1766848.76	672645.09	73.01
Receptor 2 (Receptor D)			38.2		x	Total	1.52	r	1766508.92	674006.41	58.91
Receptor 3 (Receptor B)			44.2		x	Total	1.52	r	1765693.15	674035.55	59.32
Receptor 4 (Receptor A)			51.1		x	Total	1.52	r	1765061.90	674060.38	48.00
Noise Monitor Location			51.7		x	Total	1.52	r	1766039.65	672575.71	47.14

Appendix F

Noise Analyst Resumes

Education
BA, Applied Physics with Emphasis on Theoretical Acoustics, University of California, San Diego, 0

Years of Experience
Total - 25
With ARCADIS - 6

Professional Associations
Institute of Noise Control Engineering of the USA (INCE)

Michael Burrill, INCE

Director, Senior Acoustical Scientist

Mr. Burrill is a Certified Noise Professional with 25 years of varied acoustical consulting experience. Specializing in land use noise and vibration compatibility, and the environmental issues that surround complex operational compliance and permit applications, Mr. Burrill's project experience includes permitting compliance for CEQA, NEPA, Federal Transit Administration (FTA) and Federal Highway Administration (FHWA) noise and vibration impact assessments ranging from a variety of power and energy transmission projects (conventional and renewable), to railway and roadway corridor designs, to complex environmental projects encompassing construction sites, airports, residential subdivisions, pump stations, manufacturing facilities, and the protection of sensitive and endangered fish and biological resources.

CEQA/NEPA studies require that all major action projects be analyzed for all physical environmental impacts including noise pollution. Mr. Burrill's environmental noise control team brings over 30 years of highly specialized consulting experience focused on the mitigation of noise and vibration issues to satisfy local permitting regulatory requirements for the improvement of our living and work environments. Environmental regulation applies to a ny unnecessary noises or sounds generated by means of construction and/or project operation, where he is fully capable of conducting construction noise and vibration assessments to mitigate even the most sensitive of historic structures. His team has in-house capabilities to theoretically model and calculate impacts to sensitive noise receptors generated by mechanical equipment systems due to construction activities as well as design, setup, and manage a construction noise monitoring and mitigation program, including complex field noise monitoring to assess and protect endangered biological habitats during all phases of construction. Mr. Burrill has obtained a well rounded and substantial background in practical construction noise emission applications, along with theoretical computer programming and modeling, and comprehensive investigative work to conduct accurate baseline studies to define current conditions for applying proper and effective noise and vibration mitigation measures.

Project Experience

Acoustical Compliance Analysis for a PV Solar Facility – California
Prepared an Initial Study using significant noise impact criteria defined within CEQA for assessing a DTE Energy photovoltaic solar facility in Tulare County

Environmental Impact Analysis for a Solar Trough Facility – Nevada
Conducted a variety of acoustical consulting services for the proposed Solar Millennium – Amargosa Valley Facility, involving construction and operation of two large commercial solar parabolic trough stations.

Noise Analysis for the Expansion of an Electrical Substation – California
Conducted the Southern California Edison (SCE) Down Substation CEQA acoustical analysis to evaluate potential noise impacts to surrounding land use areas from various construction and operational phases.

Environmental Noise Analysis of an Energy Facility – California
Performed the necessary permitting acoustical services for the Bull Moose Energy – Otay Mesa Facility located within the community of Otay Mesa, County of San Diego, California. An acoustical model was prepared to evaluate worst-case operational mechanical equipment noise levels in order to develop land use compatibility noise emission contours at surrounding and adjacent commercial and industrial communities.

Landfill Electrical Generation Environmental Impact Analysis – California
Sunshine Gas Producers is proposing to develop and operate a gas turbine electrical generation facility at the existing Sunshine Canyon Landfill in northern Los Angeles County, California. Four consecutive days of ambient noise monitoring was conducted on the project site around the perimeter boundary lines at noise sensitive receptor locations. Acoustical modeling and land use compatibility operational power plant equipment noise contours were evaluated for determining specific localized worst-case exterior noise levels and mitigation measures necessary to attenuate proposed operational noise levels at neighboring residential areas.

Environmental Noise Impact Analysis, Electric Transmission Line – California
Conducted noise propagation calculations for worst-case "blasting" operations to determine the effects to known ambient noise levels in the area. A robust noise model was created to evaluate worst-case noise impacts from blasting operations to surrounding noise sensitive areas over a continuous 12-hour time period to determine how many blasts could occur in a single day for compliance with CEQA noise regulations.

Bridge Widening Construction Noise & Vibration Monitoring – California
A CEQA acoustical analysis was performed to determine compliance with permitting regulations from construction noise and vibration operations, where a sound barrier mitigation design was developed in compliance with the Metropolitan Transportation Authority (MTA) and City of Los Angeles regulations to attenuate construction noise and vibration impacts. Continuous noise and vibration monitoring was conducted throughout the duration of the project to verify that the construction activity was in compliance with all applicable regulations.

Kevin Fowler, INCE

Acoustics & Vibration - Operations Manager - Senior Acoustical Scientist

Education
B.A. Audio and Acoustics
Columbia College Chicago
2005

Years of Experience
Total - 8
With ARCADIS - 5

Professional Qualifications
Member, Acoustical Society of America (ASA)
Member, Institute of Noise Control Engineering (INCE)

Professional Registrations
County of San Diego CEQA Approved Noise Consultant

Training
DataKustik, CadnaA Advanced Noise Modeling, 2008
NAVCON Engineering Network, Hands On Modal Testing and Analysis, 2011
National Transit Institute, Transit Noise and Vibration Impact Assessment, 2011

Mr. Fowler is a Certified Noise Professional with over 8 years of varied theoretical and field-practical acoustical consulting experience. He specializes in acoustical studies analyzing air-borne noise and vibration impacts on the human and biological environments. Mr. Fowler has experience in the deployment of complex long term data acquisition systems for the purpose of measuring and monitoring complex noise and vibration sources. Furthermore, he has experience in data analysis for identifying impacts to humans and sensitive species.

Mr. Fowler is certified for conducting vibration analysis studies for the Federal Transit Authority. He has experience conducting vibration impact assessments for railway and roadway corridors, as well as for a wide variety of construction activities. Mr. Fowler is also certified to conduct evaluations for vibration dynamics including modal testing and analysis.

Mr. Fowler also has extensive experience in the development and deployment of remote long-term monitors located in variety of environments, including arctic conditions. Mr. Fowler is technically trained and certified as an advance user for the internationally recognized state-of-the-art CadnaA noise modeling software. He has extensive experience in developing large complex three dimensional noise models for evaluating a variety of environmental noise sources. His noise modeling endeavors have included assessments of noise propagation associated with helicopters, roadways, railways, construction equipment, wind turbines, commercial/industrial facilities, playgrounds, etc. on humans, sensitive biological habitats, and the surrounding environment.

Mr. Fowler is the operations manager for the ARCADIS Acoustics and Vibration Practice where his technical responsibilities include technical expert for acoustics and vibration, field investigation work, management of field teams, deployment of measurement equipment, management of data acquisition systems, data analysis, and conducting a proficient level of computer modeling applications and techniques. Mr. Fowler has assisted clients with satisfying their permitting needs involving NEPA/CEQA requirements, as well as other various governing international, federal, state and local noise and vibration requirements. Mr. Fowler has presented his work at the Acoustical Society of America (ASA) and the American Wind Energy Association (AWEA) conferences. He has also participated as an expert in beta testing the development of noise prediction software and field noise measurement hardware. He has conducted numerous field tests to evaluate product performance which resulted in feedback on development flaws to improve and meet industry designed standards.

PROJECT EXPERIENCE

New Orleans Streetcar/Bus Terminal Project

The New Orleans Regional Transit Authority (NORTA) proposed to extend the existing street car system located in the center of Canal Boulevard, New Orleans, Louisiana. Performed a noise and vibration analysis for the proposed expansion project to comply with the Federal Transit Authority (FTA) noise regulations. The analysis included site measurements and an evaluation of the construction and railway operations of the proposed project, which included the development of several complex noise models. The project also included an evaluation and design of appropriate noise mitigation measures to reduce railway noise and vibration impacts to below the maximum allowable sound level required by the FTA for historical preservation, where the analysis followed the FTA guidelines for evaluating noise and vibration impacts.

Construction Review and Design Analyses for 86-Unit Condominium Project - San Diego, California

The project contains 12 single-level unit and 74 townhouses in separate 3- and 4-story buildings with two levels of basement parking. Evaluated the construction design elements of the common wall, back-to-back laundry supply boxes, and plumbing isolation; conducted an evaluation of the proposed railway sound attenuation barrier; evaluated the exterior wall-mounted HVAC units to determine any transmission of railway noise through the units; evaluated the exterior wall and window configuration facing the railway to determine the need for any design enhancements to reduce low-frequency railway noise within the units; and evaluated noise emission data from exterior ground-mounted A/C units for impacts to adjacent residential units.

Land Use Compatibility Acoustical Analysis for Three Two-Story Duplexes - Del Mar, California

The project consists of the development of three separate lots each containing a single multi-family two-story duplex building with attached garages. Evaluated roadway and railway noise impacting the project site; noise impacts to common outdoor use areas; and the typical interior common wall assembly for reducing sound between adjacent residential units. Determined necessary noise mitigation measures required for compliance within the City of Del Mar's Noise Code Regulations.

Oak Springs Ranch Master Community Development – Riverside County, California

Conducted an acoustical analysis of 18 newly constructed two- and three-story residential buildings comprising 312 apartment units with attached garages. The analysis was required to determine compliance with the County of Riverside Noise Element, and included FHWA Traffic Noise Modeling of the current and future noise evaluation of a nearby freeway and FTA noise and vibration analysis of a main commercial and public railway system impacting the entire project site, including a sensitive clubhouse area, pool/spa facility with picnic/BBQ areas, and tot lots.

APPENDIX J

View Simulations

View Simulation – Train from Trilogy Entrance (HWY 1)

View Simulation – Train from Highway 1

View Simulation – Train from Oso Flaco Road

APPENDIX K

Consumer Confidence Report (Water Quality)

2011 Consumer Confidence Report

Water System Name: **Phillips 66 (Formerly ConocoPhillips)** Report Date: 6/29/12

We test the drinking water quality for many constituents as required by state and federal regulations. This report shows the results of our monitoring for the period of January 1 - December 31, 2011.

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo ó hable con alguien que lo entienda bien.

Santa Maria Refinery's water met all primary drinking water standards. The tables below list all the constituents that were detected and show how they compare to the State and Federal standards. The Department of Environmental Health requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, are more than one year old. All the results are from the most recent sampling event for each listed constituent.

The samples are collected at the source (well water) and at the distribution points. The distribution water is a blend of reverse osmosis (RO) water and well water. The blended stream goes through the UV filters and activated carbon filters. Tables 1 and 2 show results for samples collected at various distribution points. Tables 3, 4 and 5 show results for samples collected at the source water: well #2, well #4 and well #5. Although the report includes data from the water source in Tables 3, 4 and 5, the potable water that the consumer contacts is from the distribution system.

Phillips 66 is committed to keeping you informed and providing this annual review of the water supply. Employees, visitors, and other water users may communicate concerns and other issues regarding the water system to Kristen Kopp at (805) 343-3241. Any issues regarding changes to the potable water system would involve the facility managers and supervisors and be discussed in facility operations meetings.

If you need copies of this report or have any questions concerning the potable water system, please contact Patrick Sidun at (805) 343-3620 or email at Patrick.Sidun@P66.com.

Type of water source(s) in use: Well Water

Name & location of source(s):

Well #2, #4, and #5 are located within the Santa Maria Refinery. Well #2 is near Tank 553, Well #4 is between "F" Street and Tank 800, and Well #5 is between the Carbon Plant access road and the Maintenance contractor building.

Drinking Water Source Assessment information:

A source water assessment was conducted for Wells 02, 04 and 05 of the Phillips 66 (ConocoPhillips /Phillips 66/Tosco Refining) water system in November 2002. No contaminants have been detected in the water supply, however the source is considered most vulnerable to the following activities:

Chemical/petroleum processing/storage.

A copy of the complete assessment may be viewed at:

County of San Luis Obispo, Environmental Health Services
2156 Sierra Way, San Luis Obispo, CA 93401

You may request a summary of the assessment be sent to you by contacting Environmental Health Services at 805-781-5544.

TERMS USED IN THIS REPORT

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency (USEPA).

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Primary Drinking Water Standards (PDWS): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

Secondary Drinking Water Standards (SDWS): MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDWSs do not affect the health at the MCL levels.

Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

Regulatory Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

Variances and Exemptions: Department permission to exceed an MCL or not comply with a treatment technique under certain conditions.

ND: not detectable at testing limit

ppm: parts per million or milligrams per liter (mg/L)

ppb: parts per billion or micrograms per liter (ug/L)

ppt: parts per trillion or nanograms per liter (ng/L)

ppq: parts per quadrillion or picogram per liter (pg/L)

pCi/L: picocuries per liter (a measure of radiation)

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- *Microbial contaminants*, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- *Inorganic contaminants*, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- *Pesticides and herbicides*, that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- *Organic chemical contaminants*, including synthetic and volatile organic chemicals, that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems.
- *Radioactive contaminants*, that can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the USEPA and the state Department of Public Health (Department) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. Department regulations also establish limits for contaminants in bottled water that provide the same protection for public health.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Santa Maria Refinery is responsible for providing high quality drinking water, but cannot control the variety of materials

used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://ww.epa.gov/safewater/lead.

Tables 1, 2, 3, 4, 5, 7, and 8 list all of the drinking water contaminants that were detected during the most recent sampling for the constituent. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The Department allows us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not change frequently. Some of the data, though representative of the water quality, are more than one year old.

TABLE 1 – SAMPLING RESULTS SHOWING THE DETECTION OF COLIFORM BACTERIA

Microbiological Contaminants (complete if bacteria detected)	Highest No. of Detections	No. of months in violation	MCL	MCLG	Typical Source of Bacteria
Total Coliform Bacteria	(In a mo.) 3	0	More than 1 sample in a month with a detection	0	Naturally present in the environment
Fecal Coliform or *E. coli*	(In the year) 0	0	A routine sample and a repeat sample detect total coliform and either sample also detects fecal coliform or *E. coli*	0	Human and animal fecal waste

TABLE 2 – SAMPLING RESULTS SHOWING THE DETECTION OF LEAD AND COPPER

Lead and Copper (complete if lead or copper detected in the last sample set)	No. of samples collected	90th percentile level detected	No. sites exceeding AL	AL	PHG	Typical Source of Contaminant
Lead (ppb)	15	13.0	1*	15	0.2	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits
Copper (ppm)	15	0.130	0	1.3	0.3	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives

TABLE 3 – SAMPLING RESULTS FOR SODIUM AND HARDNESS

Chemical or Constituent (and reporting units)	Sample Date	Level Detected	Range of Detections	MCL	PHG (MCLG)	Typical Source of Contaminant
Sodium (ppm)	3/2/11	86	67 - 110	none	none	Salt present in the water and is generally naturally occurring
Hardness (ppm)	3/2/11	497	380 - 640	none	none	Sum of polyvalent cations present in the water, generally magnesium and calcium, and are usually naturally occurring

**Any violation of an MCL or AL is asterisked. Additional information regarding the violation is provided later in this report.*

TABLE 4 – DETECTION OF CONTAMINANTS WITH A PRIMARY DRINKING WATER STANDARD

Chemical or Constituent (and reporting units)	Sample Date	Level Detected	Range of Detections	MCL [MRDL]	PHG (MCLG) [MRDLG]	Typical Source of Contaminant
Nitrate (as NO3) (ppm)	3/2/11	11	2.4 – 23	45	45	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits.
Gross Alpha Activity (pCi/L)	3/20/08 5/28/08 8/2/08	3.5	<3.000-6.36	15	(0)	Erosion of natural deposits

TABLE 5 – DETECTION OF CONTAMINANTS WITH A SECONDARY DRINKING WATER STANDARD						
Chemical or Constituent (and reporting units)	**Sample Date**	**Level Detected**	**Range of Detections**	**MCL**	**PHG (MCLG)**	**Typical Source of Contaminant**
Color (Units)	3/2/11	1.0	1.0	15	N/A	Naturally-occurring organic materials
Iron (ppb)	3/2/11	83	<50 - 140	300	N/A	Leaching from natural deposits; industrial wastes
Manganese (ppb)	3/2/11	21	<10 - 43	50	N/A	Leaching from natural deposits
Turbidity (NTU)	3/2/11	0.7	0.47 - 1.2	5	N/A	Soil runoff
Total Dissolved Solids (TDS) (ppm)	3/2/11	830	730 - 1000	1000	N/A	Runoff/leaching from natural deposits
Specific Conductance (micromhos)	3/2/11	1117	972 - 1290	1600	N/A	Substances that form ions when in water; seawater influence
Chloride (ppm)	3/2/11	84	40 - 170	500	N/A	Runoff/leaching from natural deposits; seawater influence
Sulfate (ppm)	3/2/11	363	250 - 500	500	N/A	Runoff/leaching from natural deposits; industrial wastes

TABLE 6 – DETECTION OF UNREGULATED CONTAMINANTS					
Chemical or Constituent (and reporting units)	**Sample Date**	**Level Detected**	**Range of Detections**	**Notification Level**	**Health Effects Language**
NONE	---	n/a	---	---	n/a

**Any violation of an MCL, MRDL, or TT is asterisked. Additional information regarding the violation is provided later in this report.*

Additional General Information on Drinking Water

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline (1-800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Summary Information for Violation of a MCL, MRDL, AL, TT, or Monitoring and Reporting Requirement

Routine samples collected between January and September 2011 from Santa Maria Refinery's (SMR) potable water distribution system routinely tested negative for Total Coliform and E. Coli. Unfortunately, on October 10/10/2011 the Well #2 non-routine quarterly duplicate sample had a positive result for Total Coliform. This sample tested negative for E. Coli. SMR initiated a special investigation to evaluate the potable water system and collected extra samples at multiple distribution sites and upstream of treatment. The water the consumer contacts, the potable water is a blend of well water and RO water that is run through UV lamps and carbon canisters. Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present.

For the remainder of October and through December 2011, SMR continued the special investigation into the physical condition of Well # 2 and the potable water distribution system. The investigation responded to isolated positive results for Total Coliform at Well # 2 and a singular event that had positive results for Total Coliform at the potable water distribution. All well and distribution sample results were negative for E. Coli. SMR undertook projects to repair and bleach Well #2. The repair of the well was followed by bacteriological testing, which was negative for Total Coliform and E. Coli.

Tests were also conducted to ensure the proper operation of the potable water treatment system. Additional monthly sampling and routine monthly sampling were conducted for the first half of 2012 at the potable water distribution system; all results were negative for Total Coliform or E. Coli.

In 2009, fifteen sites at SMR were tested for Lead. The results ranged from 0.71 to 170 ppb with one site exceeding the AL of 15 ppb. Infants and children are typically more vulnerable to lead in drinking water than the general population. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. It is possible that the lead levels at SMF may be high as a result of the materials used in SMR's plumbing. If you are concerned about elevated levels in your home's water, you may wish to have your water tested and/or flush your tap for 30 seconds to 2 minutes before using tap water. Additional information is available from the USEPA Safe Drinking Water Hotline (1-800-426-4791).

Compliance with Other Regulations

The State required the Refinery to test the water on a regular basis to ensure its safety. In the previous year, we met all sampling, treatment, and reporting requirements.

Appendix L

Nipomo Mesa Area
Annual Water Report

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Nipomo Mesa Management Area

5th Annual Report

Calendar Year 2012

Prepared by

NMMA Technical Group

Submitted April 2013

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Acronyms

AF	-	acre-feet
AF/yr	-	acre-feet per year
ALERT	-	Automated Local Evaluation in Real Time
C.E.G.	-	Certified Engineering Geologist
C.H.G.	-	Certified Hydrogeologist
CCAMP	-	Central Coast Ambient Monitoring Program
CDF	-	California Department of Forestry (now Cal Fire)
CIMIS	-	California Irrigation Management Information System
CPUC	-	California Public Utilities Commission
CU	-	consumptive use
D	-	day
DPH	-	California Department of Public Health
DWR	-	California Department of Water Resources
ES	-	Executive Summary
Ft	-	feet
ft^2	-	square feet
ft msl	-	feet above mean sea level
Gpd	-	gallons per day
GSWC	-	Golden State Water Company
K	-	hydraulic conductivity
MCL		Maximum Contaminant Level
mg/L	-	milligrams per Liter
Msl	-	mean sea level
NCSD	-	Nipomo Community Services District
NMMA	-	Nipomo Mesa Management Area
NSWP		Nipomo Supplemental Water Project
TG	-	Nipomo Mesa Management Area Technical Group
P.E.	-	Professional Engineer
P.G.	-	Professional Geologist
PG&E		Pacific Gas & Electric
RF	-	return flow
RP	-	reference point
RWC	-	Rural Water Company
SCWC		Southern California Water Company (now Golden State Water Company)
SLO	-	San Luis Obispo County
SLO DPW	-	San Luis Obispo County Department of Public Works
SWP	-	State Water Project
TDS	-	Total Dissolved Solids
U.S.	-	United States
WWTF	-	wastewater treatment facility
WY	-	Water Year
Yr	-	year

Abbreviations

Blacklake WWTF	-	Blacklake Reclamation Facility
Cypress Ridge WWTF	-	Rural Water Company's Cypress Ridge Wastewater Facility
Judgment	-	Judgment After Trial dated January 25, 2008
Phase III	-	Santa Maria Groundwater Litigation Phase III
Program	-	Nipomo Mesa Management Area Monitoring Program
Santa Maria Groundwater Litigation	-	*Santa Maria Valley Water Conservation District vs. City of Santa Maria, et al.* Case No. 770214
Southland WWTF	-	Southland Wastewater Treatment Facility
Stipulation	-	Stipulated Judgment dated June 30, 2005
Temp	-	Temperature
Woodlands	-	Woodlands Mutual Water Company
Woodlands WWTF	-	Woodlands Mutual Water Company Wastewater Reclamation Facility

Executive Summary

This 5th Annual Report, covering calendar year 2012 for the Nipomo Mesa Management Area (NMMA), is prepared in accordance with the Stipulation and Judgment for the Santa Maria Groundwater Litigation (Lead Case No. 1-97-CV-770214). The Annual Report provides an assessment of hydrologic conditions for the NMMA based on an analysis of the data accruing each calendar year. Each Annual Report is submitted to the court annually in accordance with the Stipulation in the year following that which is assessed in the report. This Executive Summary contains three sections: ES-1 Background; ES-2 Findings; and ES-3 Recommendations.

ES-1 Background

The NMMA Technical Group (TG) is one of three management areas committees established by the Court and charged with developing the technical bases for sustainable management of the surface and groundwater supplies available to each of the management areas. The TG is the committee for the NMMA. The NMMA lies between the Northern Cities Management Area to the north and the Santa Maria Valley Management Area to the south. The goal of each management area is to promote monitoring and management practices so that present and future water demands are satisfied without causing long-term damage to the underlying groundwater resource.

The TG, a committee formed to administer the relevant provisions of the Stipulation regarding the NMMA, prepared this 5th Annual Report Calendar Year 2012. Phillips66, Golden State Water Company, Nipomo Community Services District, and Woodlands Mutual Water Company are responsible for appointing the members of the committee, and along with an agricultural overlying landowner, who is also a Stipulating Party, are responsible for the preparation of this Annual Report.

The TG collected and compiled data and reports from numerous sources including the NMMA Monitoring Parties, Counties of San Luis Obispo and Santa Barbara, California Department of Water Resources and Department of Public Health, the U. S. Geologic Survey and the Management Area Engineers for the Northern Cities and Santa Maria Valley Management Areas. The TG developed an electronic database to aid in the evaluation of the long-term sustainability of the NMMA portion of the Santa Maria Groundwater Basin. The TG reviewed these data and reports and concluded that the development of additional data and evaluations will be on-going to aid the understanding of the hydrogeologic conditions of the NMMA and to make comprehensive recommendations for the long-term management of the NMMA.

The TG evaluated the available compiled data to reach the findings presented in the following section of this Executive Summary. The TG recognizes that the data used in the evaluations are not equally reliable but represent what is currently available. In some cases, additional analysis will be required for an adequate characterization of the physical setting within NMMA to develop an appropriately detailed model of the stratigraphy, defining the location and thickness of production aquifers and confining layers. Refinements in the understanding of the physical setting will improve upon estimates of groundwater in storage available for pumping to meet water demands. Such work is an important goal for the TG and mirrors the TG's desire to characterize groundwater storage in the NMMA. The TG has developed specific recommendations to address these issues for the next Annual Report.

ES-2 Findings

Presented in this section of the Executive Summary are brief descriptions of the findings by the TG for calendar year 2012. Presented in the body of this report are the details and bases for these findings.

1. Potentially Severe Water Shortage Conditions continue to exist in the NMMA as indicated by the Key Wells Index and coastal groundwater elevation measured in sentry well 12N/36W 36L1 (see Section 7.2 Water Shortage Conditions). Coastal water quality continues to be better than thresholds for Water Shortage Conditions (i.e., chloride concentrations are less than threshold concentrations). Potentially Severe Water Shortage Conditions trigger a voluntary response plan as presented in the Water Shortage Conditions and Response Plan (see Section 7.2.3 Status of Water Shortage Conditions).

2. Spring groundwater elevations underlying the NMMA, indicated by the Key Wells Index of eight (8) wells, rose sharply from 2011 levels after a three consecutive year decline (see Section 7.1.1 Groundwater Conditions). Groundwater elevations observed in several of the Key Wells that had been declining have remained generally unchanged since 2010 (see Section 6.1.1 Results from Key Wells).

3. There are a number of direct measurements that indicate that demand exceeds the ability of the supply to replace the water pumped from the aquifers (see Section 7.1.2 Hydrologic Inventory).

4. The Nipomo Supplemental Water Project is recommended by the Nipomo Community Services District for a phased design. Construction of Phase 1 is scheduled to begin in May 2013 and be complete by fall 2014. (see Section 1.1.7 Supplemental Water).

5. Total rainfall for Water Year 2012 (October 1, 2011 through September 30, 2012) is approximately 70 percent of the long-term average (see Section 3.1.3 Rainfall).

6. The period of analysis (1975-2012) used by the TG is roughly 9 percent "wetter" on average than the long-term record (1920-2012) indicating there is a slight bias toward overstating the amount of local water supply resulting from percolation of rainfall (see Section 7.3.1 Climatological Trends).

7. The total estimated 2012 calendar year groundwater production is 11,250 acre-feet (AF). The breakdown by user and type of use is shown in the following table (see Section 3.1.9 Groundwater Production (Reported and Estimated)).

Agriculture	2,912 AF
Urban/Industrial	8,347 AF
Total Production	**11,259 AF**

8. The total Waste Water Treatment Facility effluent discharged in the NMMA was 798 AF for Calendar Year 2012 (see Section 3.1.10 Wastewater Discharge and Reuse).

9. Contour maps prepared using Spring and Fall 2012 groundwater elevations suggests subsurface flow is generally from east to west (toward the ocean). They also show a nearly flat gradient in a localized area near the coast (see Section 6.1.3 Groundwater Contours and Pumping Depressions).

10. The acreage for land use classification of Urban is 10,246 acres; of Agriculture is 2,587 acres; and, of Native is 8,314 acres (see Section 3.1.8 Land Use).

11. There is no evidence of any water quality contamination including seawater intrusion that significantly restrict current use of groundwater to meet the current water demands. However, there are local water quality impairments, particularly for nitrate, and in the shallow aquifer. In 2012, nitrate concentrations greater than the drinking water MCL were observed for wells in the NMMA, in both the shallow and deep aquifers (see Section 6.2.2 Results of Inland Water Quality Monitoring).

12. There is a lack of understanding of the contribution of Los Berros and Nipomo Creeks to the NMMA water supplies (see Section 3.1.5 Streamflow).

13. There is a lack of understanding about confined and unconfined aquifer conditions in the NMMA, except near the coast and locally adjacent areas where the deep aquifers are known to be confined (see Section 2.3.2 Groundwater Flow Regime).

14. There is a lack of understanding of the flow path of rainfall, applied water, and treated wastewater to specific aquifers underlying the NMMA (see Section 3.1.10 Wastewater Discharge and Reuse).

ES-3 Recommendations

A list of recommendations were developed and published in each of the previous NMMA Annual Reports. The TG will address past and newly developed recommendations along with the implementation schedule based on future budgets, feasibility, and priority. The recommendations are subdivided into three categories: (1) Draft capital and operation expenditure plan, (2) Achievements from earlier NMMA Annual Report recommendations accomplished in 2012; and (3) Technical Recommendations – to address the needs of the TG for data collection and compilation.

ES-3.1 Funding Recommendations

The TG acknowledges that the work items and budget presented below represent a consensus view that additional technical work is necessary beyond that covered under the current annual budget limit. Completing this broader scope of work will require a formal adjustment to the NMMA TG budget limit.

NMMA 5-Year Cost Analysis

Task Description	Total Cost	Targeted Completion Year	Projected 5-year Cash Flow				
			2013	2014	2015	2016	2017
Yearly Tasks							
Annual Report preparation			$50,000	$50,000	$50,000	$50,000	$50,000
Grant funding efforts			$10,000	$10,000	$10,000	$10,000	$10,000
Confining layer definition			$10,000	$10,000	$10,000	$10,000	$10,000
Well head surveying			$3,000	$3,000	$3,000	$3,000	$3,000
Analytical testing			$5,000	$5,000	$5,000	$5,000	$5,000
Long Term Studies							
Groundwater model (NMMA share)	$250,000	2016	$33,300	$33,300	$33,300	$75,000	$75,000
Capital Projects							
Oso Flaco monitoring well	$130,000	2014	$43,300	$43,300	$43,300	- -	- -
Automatic monitoring equipment	$25,000	2016	- -	- -	- -	$12,500	$12,500
Total Projected Annual Cost			$154,600	$154,600	$154,600	$165,500	$165,500

ES-3.2 Achievements from Previous NMMA Annual Report Recommendations

The TG worked diligently to address several of the recommendations outlined in the previous Annual Reports. Accomplishments and/or progress made during 2012 include:

- Development of refined cross sections through key areas of the basin.
- Evaluated the impacts of the Nipomo Supplemental Water Project on the Santa Maria Groundwater Basin and commented, and
- Met with representatives from Northern Cities Management Area and Santa Maria Valley Management Area to discuss groundwater modeling possibilities, groundwater monitoring activities, methodology to estimate percolation, and sea water intrusion findings.

ES-3.3 Technical Recommendations

The following technical recommendations are not organized in their order of priority because the monitoring parties, considering their own particular funding constraints and authorities, will determine the implementation strategies and priorities. However, the TG has suggested a priority for some of the technical recommendations.

- **Supplemental Water Supply –** An additional water supply that would allow for reduced pumping within the NMMA is the most effective method of reducing the stress on the aquifers and allow for groundwater elevations to recover, and provide means for long-term basin management. The NSWP (see Section 1.1.7-Supplemental Water) is the fastest and most viable method of obtaining alternative water supplies in the next ten years. Given the Potentially Severe Water Shortage Conditions within the NMMA and the other risk factors discussed in this Report, the TG recommends that this project be implemented as soon as possible.

- **Subsurface Flow Estimates – C**ontinue to develop and evaluate geologic cross-sections along NMMA boundaries and make estimates of subsurface flow.

- **Installation of Groundwater Monitoring Equipment –** When a groundwater level is measured in a well, both the length of time since the measured well is shut off and the effect of nearby pumping wells modify the static water level in the well being measured. For the Key Wells, the installation of transducers and data loggers will largely solve this problem. Installation of transducers is also recommended for purveyors' wells that pump much of the time.

- **Changes to Monitoring Points or Methods –** The coastal monitoring wells are of great importance in the Monitoring Program. The inability to locate the monitoring well cluster under the sand dunes proximally north of Oso Flaco Lake renders the southwestern coastal portion of the NMMA without adequate coastal monitoring. During 2009 and 2010, the NMMA TG reviewed options for replacing this lost groundwater monitoring site. The TG was given written support of the concept from the State Parks Department to allow replacement of the well, and the TG has also had discussions with San Luis Obispo County, which may be able to provide some financial assistance for the project. The NMMA TG has incorporated replacement of this monitoring well in its long-term capital project planning and will investigate possible State or Federal grants for financial assistance with the construction of this multi-completion monitoring well.

- **Well Management Plan –** It is recommended that for calendar year 2013, purveyors compile and present to the TG a Well Management Plan status update.

- **County of San Luis Obispo Monitoring Locations –** Review proposed County of San Luis Obispo monitoring well and stream gauge locations.

- **Well Reference Point Elevations –** It is recommended that all the wells used for monitoring have an accurate RP elevation established over time. This could be accomplished by surveying a few wells every year or by working with the other Management Areas and the two counties in the Santa Maria Groundwater Basin to obtain LIDAR data for the region; the accuracy of the LIDAR method allows one-foot contours to be constructed and/or spot elevations to be determined to similar accuracy.

- **Groundwater Production –** Estimates of total groundwater production are based on a combination of measurements provided freely from some of the parties, and estimates based on land use. The TG recommends developing a method to collect groundwater production data from all stipulating parties. The TG recommends updating the land use classification on an interval commensurate with growth and as is practical with the intention that the interval is more frequent than DWR's 10-year cycle of land use classification.

- **Increased Collaboration with Agricultural Producers –** To better estimate agricultural groundwater production where data is incomplete, it is recommended that the TG work with a subset of farmers to measure groundwater production. This measured groundwater production can then be used to calibrate models and verify estimates of agricultural groundwater production where data are not available.

- **Hydrogeologic Characteristics of NMMA –** Further defining the continuity of confining conditions within the NMMA remains a topic of investigation by the TG. The locations of confined and unconfined conditions is important – they control to a significant degree both the NMMA groundwater budget as to the quantity of recharge from overlying sources and any

calculation of changes in groundwater storage. Further review of well screen intervals, lithology, groundwater level, and other relevant information to segregate wells into the different aquifers groups (e.g. shallow versus deep aquifers) for preparation of groundwater elevation contour maps for different aquifers. In addition, the NMMA will be requesting geologic information obtained during the PG&E long-term seismic studies program.

- **Modifications of Water Shortage Conditions Criteria –** The Water Shortage Conditions and Response Plan was submitted to the Court in 2008. The TG will review the plan on a regular basis.

- **Groundwater Modeling –** The TG continues to recommend the advancement of a groundwater model as presented in the NMMA 5-year Cost Analysis. This may include collaboration with the Northern Cities Management Area, the Santa Maria Valley Management Area or both.

1. Introduction

The rights to extract water from the Santa Maria Groundwater Basin have been in litigation since the late 1990s. By stipulation and Court action three separate management areas were established, the Northern Cities Management Area, the Nipomo Mesa Management Area (NMMA) and the Santa Maria Valley Management Area. Each management area was directed to form a group of technical experts to continue to study and evaluate the characteristics and conditions of each management area and present their findings to the Court in the form of an Annual Report.

This 5th Annual Report - Calendar Year 2012 is a joint effort of the NMMA Technical Group (TG). The requirement contained in the Judgment for the production of an Annual Report is as follows:

> Within one hundred and twenty days after each Year, the Management *Area Engineers will file an* Annual Report with the Court. The Annual *R*eport will summarize the results of the Monitoring Program, changes in groundwater supplies, and any threats to Groundwater supplies. The Annual Report shall also include a tabulation of Management Area water use, including Imported Water availability and use, Return Flow entitlement and use, other Developed Water availability and use, and Groundwater use. Any Stipulating Party may object to the Monitoring Program, the reported results, or the Annual Report by motion.

This Annual Report is organized into ten sections that presents: the general background of the litigation and some of the requirements imposed by the Court, a description of the Basin, Data Collection, Water Supply and Demand, Hydrologic Inventory, Groundwater Conditions, Analysis of Groundwater Conditions, Other Considerations, Recommendations; and References.

Six appendices are also included: Appendix A – NMMA Monitoring Program, Appendix B – NMMA Water Shortage Conditions and Response Plan, Appendix C – Well Management Plan, Appendix D – Data Acquisition Protocols for Groundwater Level Measurements for the NMMA, Appendix E – Additional Data, and Appendix F – Nipomo Supplemental Water Project (NSWP) Technical Memorandum.

1.1. *Background*

Presented in this subsection is the history of the litigation process and general discussions of activities that have been undertaken to date or are underway to manage the water resources of the NMMA.

1.1.1. History of the Litigation Process

The Santa Maria Groundwater Basin has been the subject of ongoing litigation since July 1997. Collectively called the Santa Maria Groundwater Litigation (*Santa Maria Valley Water Conservation District vs. City of Santa Maria, et al.* Case No. 770214), over 1,000 parties were involved with competing claims to pump groundwater from within the boundary of the Santa Maria Groundwater Basin (Figure 1-1).

The Santa Maria Valley Water Conservation District was originally concerned that banking of State Water Project (SWP) water in the groundwater basin by the City of Santa Maria would give the City

priority rights to the groundwater. The lawsuit was broadened to address groundwater management of the entire Santa Maria Groundwater Basin.

On June 30, 2005, the Stipulating Parties entered a Stipulated Judgment ("Stipulation") in the case that was approved by the Court on August 3, 2005. The Stipulation divides the Santa Maria Groundwater Basin into three separate management sub-areas (the Northern Cities Management Area, the Nipomo Mesa Management Area (NMMA), and the Santa Maria Valley Management Area). The Stipulation contains specific provisions with regard to rights to use groundwater, development of groundwater monitoring programs, and development of plans and programs to respond to Potentially Severe and Severe Water Shortage Conditions.

The TG was formed pursuant to a requirement contained in the Stipulation. Sections IV D (All Management Areas) and Section VI (C) (Nipomo Mesa Management Area) contained in the Stipulation were independently adopted by the Court in the Judgment After Trial (herein "Judgment"). The Judgment is dated January 25, 2008, and was entered and served on all parties on February 7, 2008.

It is noted that pursuant to paragraph 5 of the Judgment, the TG retains the right to seek a Court Order requiring non-stipulating parties to monitor their well production, maintain records thereof, and make the data available to the Court or the Court's designee. The compilation and evaluation of existing data, and the aggregation of additional data, are ongoing processes. Given its limited budget and resources, the TG has focused its efforts on the evaluation of readily accessible data. The TG does intend to slowly integrate into its assessment new data that may be collected from stipulating parties and other sources that were not previously compiled as part of the existing database.

1.1.2. Description of the Nipomo Mesa Management Area Technical Group

The TG is composed of representatives of the Nipomo Community Services District (NCSD), Golden State Water Company (GSWC) (formerly named Southern California Water Company), Phillips66 (formerly named ConocoPhillips), Woodlands Mutual Water Company (Woodlands), and an agricultural user that is also a Stipulating Party. In addition, Rural Water Company (RWC) is responsible for funding a portion of the TG's efforts, but does not appoint a representative to the TG. Conversely, the agricultural user representative is not responsible for funding a portion of the TG's efforts. The TG is responsible for conducting and funding the Monitoring Program. In-lieu contributions through engineering services may be provided, subject to agreement by those parties. The budget of the TG shall not exceed $75,000 per year without prior approval of the Court. The TG is responsible for preparing the Monitoring Program, conducting the Monitoring Program, and preparing the Annual Reports. The TG attempts to develop consensus on all material issues. If the TG is unable to reach a consensus, the matter may be taken to the court for resolution.

The TG may hire individuals or consulting firms to assist in the preparation of the Monitoring Program and Annual Reports (the Judgment describes these individuals or consulting firms as the "Management Area Engineer"). The representatives to the TG, as a group, function as the Management Area Engineer (Table 1-1). The TG Monitoring Parties have the sole discretion to select, retain, and replace the Management Area Engineer.

Table 1-1. NMMA Technical Group

Monitoring Parties	Management Area Engineers
Agricultural Users	Jacqueline Frederick, J.D.
Phillips66	Steve Bachman, Ph.D., P.G.
Phillips66	Norm Brown, Ph.D., P.G.
Golden State Water Company	Robert Collar, P.G., C.H.G.
Golden State Water Company	Toby Moore, Ph.D., P.G., C.H.G.
Golden State Water Company	Ken Petersen, P.E.
Nipomo Community Services District	Brad Newton, Ph.D., P.G.
Woodlands	Tim Cleath, P.G., C.H.G., C.E.G.
Woodlands	Rob Miller, P.E.

1.1.3. Coordination with Northern Cities and Santa Maria Valley Management Areas

The NMMA is bounded on the north by the Northern Cities Management Area and on the south by the Santa Maria Valley Management Area (Figure 1-1). Subsurface Flows are monitored in all three Management Areas by comparing groundwater elevation data on each side of the management area boundary to determine the gradient and direction of flow. Groundwater elevation data is collected within the boundaries and shared with the others to allow estimates of the quantity and direction of flow. The TG has incorporated this concept in its monitoring program submitted to the court and described in the next section. It is understood that the neighboring subareas will do the same.

One of the sources of uncertainty is the subsurface quantity of groundwater that crosses the NMMA boundaries. The TG recognizes that collaborative technical efforts with the Northern Cities Management Area and Santa Maria Valley Management Area technical groups will be important to the appropriate management of the basin. Examples of current collaborative efforts include:

- Sharing of technical data throughout the year, and during the preparation of Annual Reports,
- Opportunities for review and comment on technical work products,
- Sharing of protocols and standards for data collection and analysis, and
- Consideration of jointly-pursued projects and grant opportunities.

As the conditions of the existing basin underlying the NMMA are described in subsequent sections, periodic reference will be made to the Annual Reports produced by the two neighboring technical groups. The aerial extent of groundwater contours has also been limited to the immediate vicinity of the NMMA.

1.1.4. Development of Monitoring Program

In 2008, the TG developed and the Court approved the NMMA Monitoring Program ("Monitoring Program"), attached as Appendix A, to ensure systematic monitoring of important information in the basin. This Monitoring Program includes information such as groundwater elevations, groundwater quality, and pumping amounts. The Monitoring Program also identifies a number of wells in the NMMA to be monitored (Figure 1-3) and discusses the methods of analysis of the data.

A large areal extent within the NMMA receives water service from the major water purveyors (Figure 1-2). The majority of the lands within the NMMA obtain water by means other than from a

purveyor. A fraction of these property owners are Stipulating Parties. All of the larger purveyors are also Stipulating Parties. All Stipulating Parties are obligated to make available relevant information regarding groundwater elevations and water quality data necessary to implement the NMMA Monitoring Program.

1.1.5. Development of Water Shortage Conditions and Response Plan

Pursuant to the Stipulation, the TG developed a Water Shortage Conditions and Response Plan that is included as part of the Monitoring Program. The Water Shortage Conditions are characterized by two different criteria – those for Potentially Severe Water Shortage Conditions and those for Severe Water Shortage Conditions. The Response Plan for these conditions includes voluntary and mandatory actions by the parties to the Stipulation. The Court approved the Water Shortage Conditions and Response Plan on April 22, 2009, and the document is attached as Appendix B to this report.

1.1.6. Well Management Plan

The Stipulation requires the preparation of a Well Management Plan when Potentially Severe Water Shortage Conditions or Severe Water Shortage Conditions exist prior to the completion of a Supplemental Water project. The Well Management Plan provides for steps to be taken by the NCSD, GSWC, Woodlands and RWC under these water shortage conditions. The Well Management Plan has no applicability to either Phillips66 or Overlying Owners as defined in the Stipulation. The Well Management Plan was adopted by the TG in January 2010 and is attached as Appendix C to this report.

There are currently no facilities to transfer water between RWC and the other purveyors. Beginning in 2010, NCSD and RWC began discussing the planning and design related to establishing facilities to convey water.

1.1.7. Supplemental Water

The provisions in the Stipulation regarding Supplemental Water provide in relevant part:

> "The NCSD agrees to purchase and transmit to the NMMA a minimum of 2,500 acre-feet of Nipomo Supplemental Water each Year. However, the NMMA Technical Group may require NCSD in any given Year to purchase and transmit to the NMMA an amount in excess of 2,500 acre-feet and up to the maximum amount of Nipomo Supplemental Water which the NCSD is entitled to receive under the MOU if the Technical Group concludes that such an amount is necessary to protect or sustain Groundwater supplies in the NMMA. The NMMA Technical Group also may periodically reduce the required amount of Nipomo Supplemental Water used in the NMMA so long as it finds that groundwater supplies in the NMMA are not endangered in any way or to any degree whatsoever by such a reduction."

> "Once the Nipomo Supplemental Water is capable of being delivered, those certain Stipulating Parties listed below shall purchase the following portions of the Nipomo Supplemental Water Yearly:
>
> NCSD - 66.68%
> Woodlands - 16.66%
> SCWC (i.e. GSWC) - 8.33%
> RWC - 8.33%"

The final Judgment entered on January 24, 2008, states: "The court approves the Stipulation, orders the Stipulating Parties only to comply with each and every term thereof, and incorporates the same herein as though set forth in full." Thus, the terms of the Stipulation as herein stated must be complied with in accordance with the order of the Court.

The NCSD is developing a project (i.e. the NSWP) to bring Supplemental Water to the above referenced Stipulating Parties within the NMMA. The NSWP involves the construction of approximately five miles of new water main to transport up to 3,000 AF of water from the City of Santa Maria. Phase 1 of the project is at 100% design completion. NCSD's Board of Directors is scheduled to approve bidding the project in February 2013 and awarding the construction contract in April 2013, leading to the first delivery of water in September 2014. In the first year of operation, NCSD expects to deliver ~650 AF of water from the City. The current construction cost estimate for Phase 1 of the project is $14,100,000. NCSD's approved funding plan for the project includes a combination of grant monies, reserves, and new monies secured with existing property tax funds. DWR has awarded the NSWP a grant of $2,200,000 in support of the project.

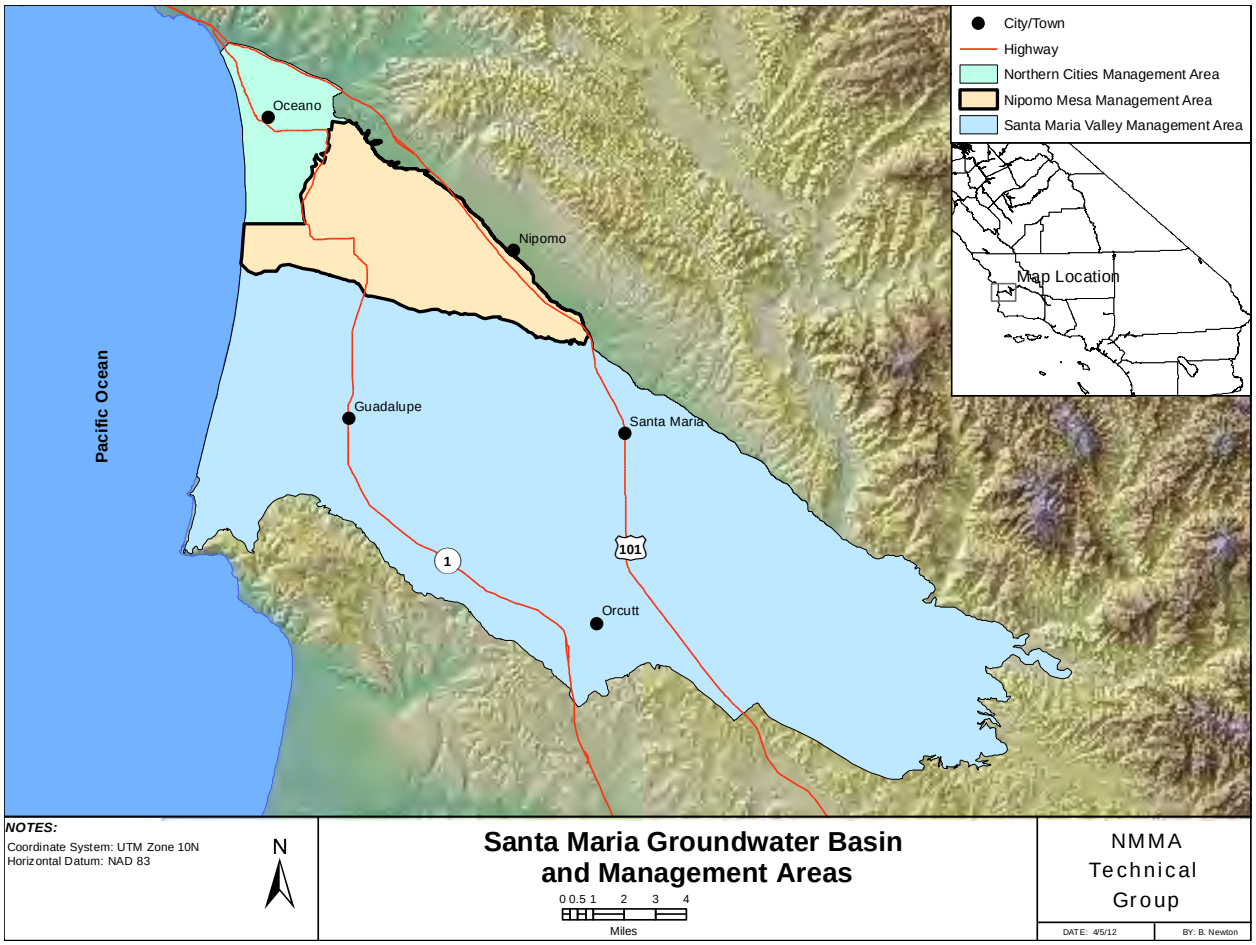

Figure 1-1. Santa Maria Groundwater Basin and Management Areas

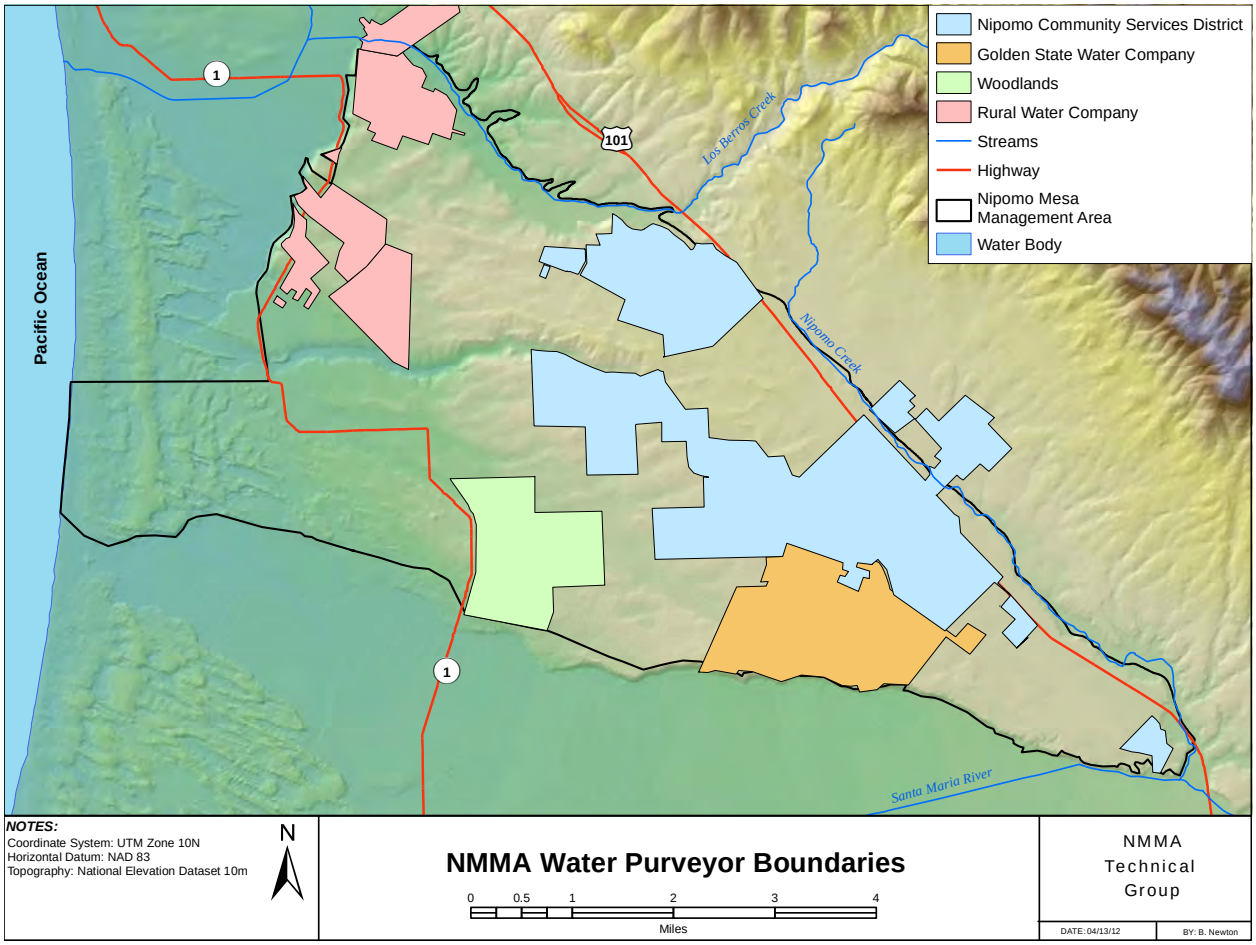

Figure 1-2. NMMA Water Purveyor Boundaries

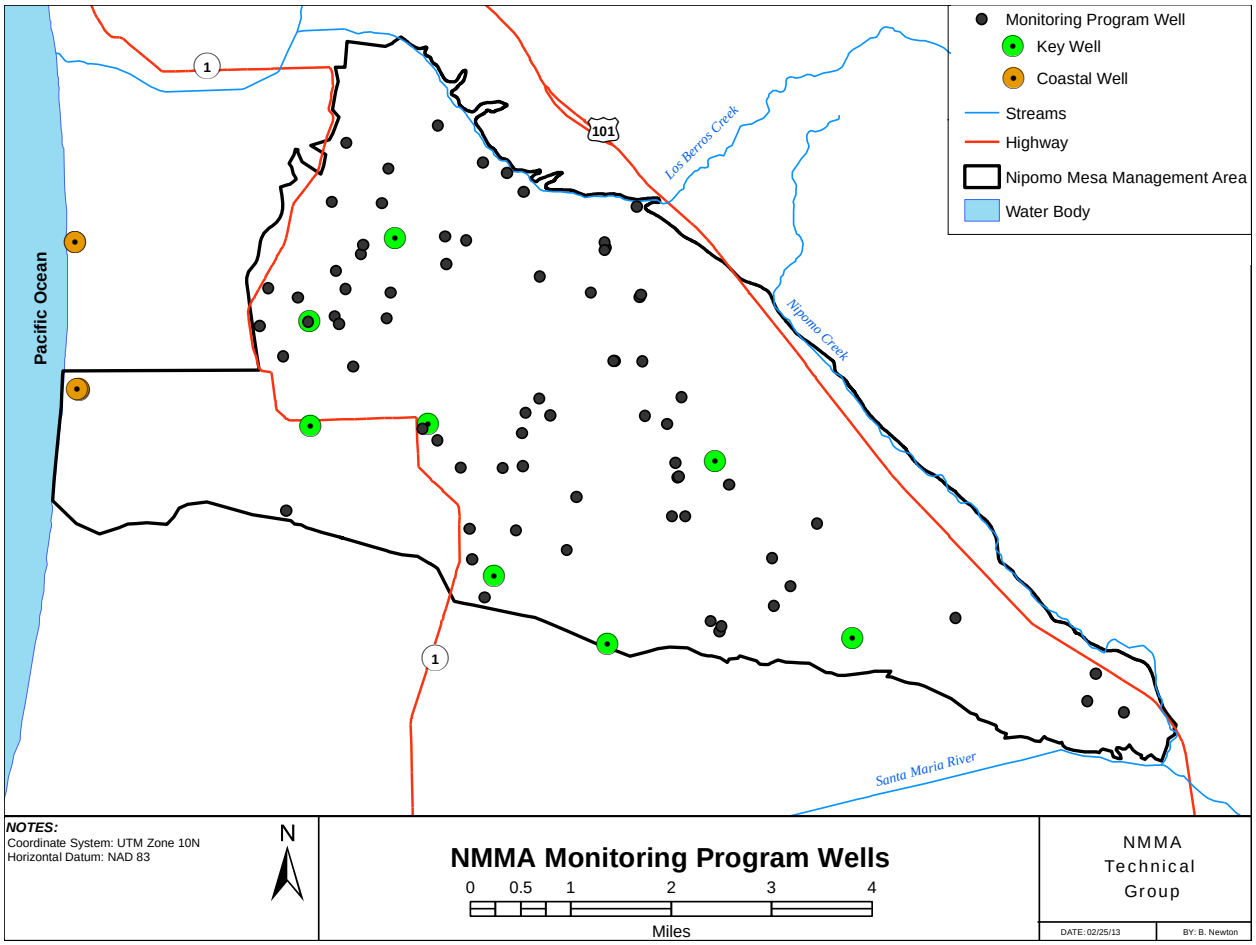

Figure 1-3. NMMA Monitoring Program Wells

2. Basin Description

The Santa Maria Groundwater Basin, covering a surface area of approximately 256 square miles, is bounded on the north by the San Luis and Santa Lucia mountain ranges, on the south by the Casmalia-Solomon Hills, on the east by the San Rafael Mountains, and on the west by the Pacific Ocean. The basin receives water from rainfall directly and runoff from several major watersheds drained by the Cuyama River, Sisquoc River, Arroyo Grande Creek, and Pismo Creek, as well as many minor tributary watersheds. Sediment eroded from these nearby mountains and deposited in the Santa Maria Valley formed beds of unconsolidated alluvium, averaging 1,000 feet in depth, with maximum depths up to 2,800 feet and comprise the principal production aquifers from which water is produced to supply the regional demand. Three management areas were defined to recognize that the development and use of groundwater, State Water Project water, surface water storage, and treatment and distribution facilities have historically been financed and managed separately, yet they are all underlain by or contribute to the supplies within the same groundwater basin.

2.1. *Physical Setting*

The NMMA has physical characteristics which are distinct from the other two management areas. It is largely a mesa area that is north of the Santa Maria River, west of the San Luis Range and south of the Arroyo Grande Creek, with a lower lying coastal environment to the west. The mesa was formed when the Santa Maria River and Arroyo Grande Creek eroded the surrounding area. The current coastal environment developed subsequently, is composed of beach dunes and lakes, and is currently a recreational area with sensitive species habitat. Locally, hummocky topography on the mesa area reflects the older dune deposits. Black Lake Canyon is an erosional feature north-central in the NMMA and where the dune deposit thickness is exposed.

2.1.1. Area

The NMMA covers approximately 33 square miles or 21,100 acres, which accounts for approximately 13 percent of the overall Santa Maria Groundwater Basin (164,000 acres). Approximately 13,000 acres on the NMMA, or 60 percent, is developed land requiring water pumped from the underground aquifers to sustain the agricultural and urban development.

2.1.2. General Land Use

Land uses include agricultural, urban (residential/commercial), and native or undeveloped areas. There are also three golf courses and one oil-processing facility. The crop types grown in the order of largest acreage were strawberries, nursery, avocado, and rotational vegetables (broccoli, lettuce, etc.) based on a survey in year 2009.

2.2. *Climate*

A Mediterranean-like climate persists throughout the area with cool moist winters and warm dry summers. During the summer months, the warm air inland rises and draws in the relatively cooler marine layer near the coastline keeping summer cooler and providing moisture for plant growth, while in the winter months the relatively warmer ocean temperature keeps the winter warmer. The average annual maximum temperature is 69 degrees Fahrenheit, and the average annual minimum temperature is 46 degrees Fahrenheit. Precipitation normally occurs as rainfall between November and April when cyclonic storms originating in the Pacific Ocean move onto the continent. The long-term (1959 to 2012) average annual rainfall reported at CDF Nipomo Rain Gauge #151.1 is 15.9 inches and is representative of the larger area of the NMMA. Rainfall variability exists across the NMMA and rainfall increases in the foothills and mountains due to the orographic (elevation) effect. The average annual evapotranspiration from standard turf (a well-watered actively growing closely clipped grass that is completely shading the soil) is 52 inches, and is referred to as the reference evapotranspiration (Table 2-1).

Table 2-1. Climate in the Nipomo Mesa Area

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max Temp (Fahrenheit)[1]	63.2	64.3	64.8	66.9	68.3	70.6	72.8	73.2	74.4	73.4	69.2	64.3	68.8
Average Min Temp (Fahrenheit)[1]	39.0	40.9	42.0	43.4	46.9	50.1	53.1	53.6	52.2	48.0	42.6	38.7	45.9
Average Rainfall (inches)[2]	3.26	3.38	2.73	1.11	0.24	0.05	0.02	0.04	0.20	0.73	1.57	2.53	15.87
Monthly Average Reference Evapotranspiration (inches)[3]	2.21	2.50	3.80	5.08	5.70	6.19	6.43	6.09	4.87	4.09	2.89	2.28	52.13
Monthly Average Reference Evapotranspiration (inches)[4]	2.13	2.31	3.63	4.63	5.03	4.26	4.98	4.54	3.75	3.41	2.43	1.89	42.99

Notes:
1. Data from Santa Maria Airport - Nearest long-term temperature record to the NMMA in the Western Regional Climate Center is from the Santa Maria Airport, station #47946. The average is from 1948 through 2012. Source: http://www.wrcc.dri.edu/climsum.html2.
2. Data from CDF Nipomo Rain Gauge 151.1 (1959 to 2012).
3. Data from California Irrigation Management Information System (CIMIS) - Records at Nipomo (202) are less than 5 years; therefore, CIMIS reports the regional average for Central Coast Valleys for Station #202. Source: http://www.cimis.water.ca.gov/cimis/data.jsp
4. Data from California Irrigation Management Information System (CIMIS), calculated from monthly evapotranspiration (ET_o) for the period of record at Station 202 Nipomo (June 2006 to December 2012). Source: http://www.cimis.water.ca.gov/cimis/data.jsp

2.3. *Hydrogeology*

Groundwater management is founded upon an understanding of the geology and the groundwater flow regime specific to the NMMA.

2.3.1. Geology

The NMMA overlies part of the northwest portion of and is contiguous with the Santa Maria Groundwater Basin (Figure 1-1). The unconsolidated sedimentary deposits comprising the main aquifers of the groundwater basin underlying the NMMA include the Pliocene age Careaga Formation and the Plio-Pleistocene age Paso Robles Formation. These basin sedimentary formations are overlain by Quaternary age dune sands on the Mesa (Figure 2-1), and by the Quaternary age alluvium in Los Berros Valley and in Nipomo Valley (on the eastern perimeter of the NMMA) which, where saturated, are also aquifers. These sedimentary beds have been deposited within the Santa Maria Valley synclinal basin. The pre-Quaternary age sedimentary beds have been displaced by faults within and on the perimeter of the basin. The extent of the geologic formations and the faulting within the NMMA area are shown on the following geologic map. Further information on these geologic formations and the geologic structure is available in the 2nd Annual Report Calendar Year 2009.

The deep aquifers within the Paso Robles and Careaga Formations underlying the Nipomo Mesa comprise the main source of water for municipal and agricultural wells. The shallow aquifers in the Los Berros Valley alluvium and Nipomo Mesa dune sands are tapped by lower capacity domestic and

agricultural wells. These deep and shallow aquifers are in places separated vertically by relatively low hydraulic conductivity layers (i.e. aquitards), which act locally as confining layers within the NMMA.

A cross section generally following the northwestern boundary of the NMMA from Los Berros Creek and Nipomo Hill in the north to Black Lake Canyon and State Route 1 (Figure 2-1) has been prepared based on well logs and geologic maps as a foundation for evaluating groundwater flow in this area. The cross section (Figure 2-2) was developed primarily using 19 wells distributed from north to south along, and located within roughly one half mile east (primarily) and west of, the approximately 4-mile-long cross section. The wells and associated lithology are not included on the cross section because they are considered confidential according to the California Water Code. It should be noted that this cross section represents a little more than about 10 percent of the roughly 30-mile-long boundary of the NMMA.

The cross section generally shows the land surface, relatively permeable aquifers tapped by many wells in the area, underlying relatively impermeable bedrock, and the Oceano fault. Aquifers include the Younger Alluvium, Dune Sand deposits, Paso Robles Formation (clay and gravel beds), and underlying marine sands of the Careaga Formation. The base of the Dune Sand slopes to the southwest from where it laps onto the Nipomo Hill bedrock at an elevation of more than 100 feet above sea level to an elevation of about 100 feet below sea level at the southern end of the cross section. The Paso Robles/Careaga Formation beds also slope to the southwest from Nipomo Hill toward Black Lake Canyon, where the base of these formations drops to an elevation of at least about 400 feet below sea level (Figure 2-2).

The relatively impermeable bedrock, which is tapped by very few wells, is comprised of the Cretaceous and Jurassic age Franciscan Complex rock and older sedimentary beds (early Pliocene age Sisquoc Formation). Franciscan Complex bedrock is exposed at the base of Nipomo Hill at Los Berros Road and remains at relatively shallow depths, within a few hundred feet of the land surface, toward the south to Woodland Hills Road (Figure 2-2). As the sedimentary beds thicken toward the coast, older low permeability sedimentary beds underlie the water-bearing formations. These older sedimentary beds, though not as impermeable as the Franciscan Complex rock, are less permeable and contain poorer quality groundwater than the overlying Paso Robles and Careaga Formations.

The Oceano fault (U.S. Geological Survey and California Geological Survey, 2006) trends northwest-southeast as it crosses the NMMA boundary near Woodland Hills Road and Kip Lane. Displacement of the Paso Robles and Careaga Formations is evident, whereas displacement of the Dune Sands is not known. Movement on the fault has down-dropped aquifers to the southwest and the fault may be an impediment to groundwater flow within the Paso Robles and Careaga Formations.

2.3.2. Groundwater Flow Regime

Groundwater flows within the NMMA from recharge sources toward areas of groundwater discharge. Groundwater flow is controlled by:

- hydraulic head (e.g., recharge and pumping),
- barriers to flow (e.g., faults),
- preferential flow paths (e.g., buried gravel channel deposits), and
- geology (e.g., geologic facies contacts or leakage through fine grained beds).

Groundwater elevation hydrographs show measured groundwater elevations over time within the specific aquifers tapped by a well and are site-specific for specific times. Groundwater elevation measurements

within an aquifer are mapped and interpreted to develop groundwater contours. Groundwater contour maps provide an interpreted understanding of the hydraulic head conditions within specific aquifer zones.

The following paragraphs present our current understanding of the groundwater flow regime. This understanding includes groundwater flow along the boundaries of the NMMA and groundwater flow within the NMMA.

Groundwater flow at the NMMA Boundary

The NMMA area encompasses only part of the Santa Maria Groundwater Basin. Groundwater flow between adjacent portions of the basin can be expected to occur, but less subsurface flow is likely to occur along bedrock basin edges than between areas where there is continuity of the aquifers.

The eastern boundary of the NMMA is approximately coincident with Nipomo Creek in Nipomo Valley. Groundwater recharge from the creek may occur through the shallow creek deposits but minimal subsurface inflow into the NMMA area occurs from the bedrock underlying the creek alluvium.

The northern boundary of the NMMA is coincident with the creek alluvium – Paso Robles Formation boundary within Los Berros Creek Valley. It is underlain by alluvium that receives recharge from Los Berros Creek which may be a significant source of groundwater recharge. Formations north of the Los Berros Valley include sedimentary deposits and underlying Franciscan Complex, where groundwater flow from these formations to the NMMA is likely negligible.

The northwest boundary of the NMMA is at the base of the Mesa along the Cienega Valley of Arroyo Grande Creek. Groundwater flow across this boundary can occur, and may be impeded by the Oceano fault and the bedrock outcrop at Nipomo Hill. A cross section along the north edge of the Mesa was developed to aid in characterization of the subsurface geology (Figure 2-2). Hydrogeologic parameters have subsequently been used, along with groundwater level contour maps, to evaluate the amount of groundwater flow that occurs across this interface between the NMMA and the Northern Cities Management Area (see Section 5.2 Subsurface Flow).

The southern boundary of the NMMA is at the base of the Mesa along the Santa Maria River Valley. Groundwater flow across this boundary can occur and may be impeded by the Oceano fault. A cross section along this boundary is being developed to aid in characterization of the subsurface geology. Hydrogeologic parameters can then be used, along with groundwater level contour maps, to estimate the amount of flow that occurs at this interface between the NMMA and the Santa Maria Valley Management Area.

The western boundary of the NMMA is a combination of the east-west R3 administrative line (San Luis Obispo County land use zoning) from the Cienega Valley to the coast and south along the coastline. Groundwater flow has historically occurred from land to the ocean across this boundary. This boundary is particularly important because a reversal of flow across this boundary may result in seawater intrusion.

Along the coastal portion of the NMMA, there is a potential for seawater intrusion to occur. The risk of seawater intrusion to NMMA water supply is a function of the groundwater elevation, the depth of the aquifers, the structural geology and stratigraphy, and the location of a seawater-fresh groundwater interface. It is not known if the principal aquifers are exposed on the seafloor along the coastal portion of the NMMA. The nearest known aquifer exposure on the seafloor occurs to the north of the NMMA area. A further risk of seawater intrusion to NMMA water supply could exist along vertical migration pathways in a near coastal zone or lateral intrusion from the adjacent management areas. Seawater intrusion is

minimized where offshore gradients exist, and could occur most rapidly if the onshore aquifers are pumped in excess of fresh water replenishment.

Groundwater flow within the NMMA

Groundwater flow within the NMMA is influenced by geologic features, and recharge and discharge points. Aquitards within the Nipomo Mesa restrict vertical groundwater flow particularly between the shallow and deep aquifers. Recharge sources include major point sources (Los Berros Creek, stormwater runoff basins and wastewater percolation ponds) and distributed recharge sources (septic systems, percolation of rainfall and irrigation return flows). Discharge locations include pumping wells, areas of surface outflow, and phreatophyte consumption.

Groundwater flow from the Los Berros Creek alluvium toward the Mesa can occur where the alluvium overlies or is in contact with the shallow and deep aquifers along the southern edge of the Los Berros Valley. A cross section along this alignment is being developed to aid in characterization of the subsurface geology. Hydrogeologic parameters can then be used, along with groundwater levels, to estimate the amount of flow that occurs at Los Berros Valley alluvium and Mesa basin sediments interface.

Faults have been identified by the California Department of Water Resources (2002) and by previous geological studies (Figure 2-1). These studies identify multiple faults that cross the NMMA. These faults have been interpreted to vertically displace the pre-Holocene geologic units. The overlying dune sands do not appear to be displaced along these faults. The faults could impede flow within basin sedimentary beds. Current seismic studies are being performed for Pacific Gas and Electric Company as mandated by the Nuclear Regulatory Commission for permitting operation of the Diablo Nuclear Power Plant. These studies can be expected to provide additional information that can be used to improve the definition of faulting and its impact on groundwater flow in the NMMA.

Aquitards that influence vertical migration of groundwater between aquifers have varying thicknesses and hydraulic conductivities (Figure 2-3). A significant aquitard exists in some areas near the base of the dune sand deposits that confines groundwater in underlying aquifers. Locally groundwater may be perched above the aquitard. Some leakage is likely to occur where the aquitard hydraulic conductivity increases and thickness decreases. The extent and thickness of the aquitards have been defined in some places based on well logs and correlations or inferred based on groundwater levels.

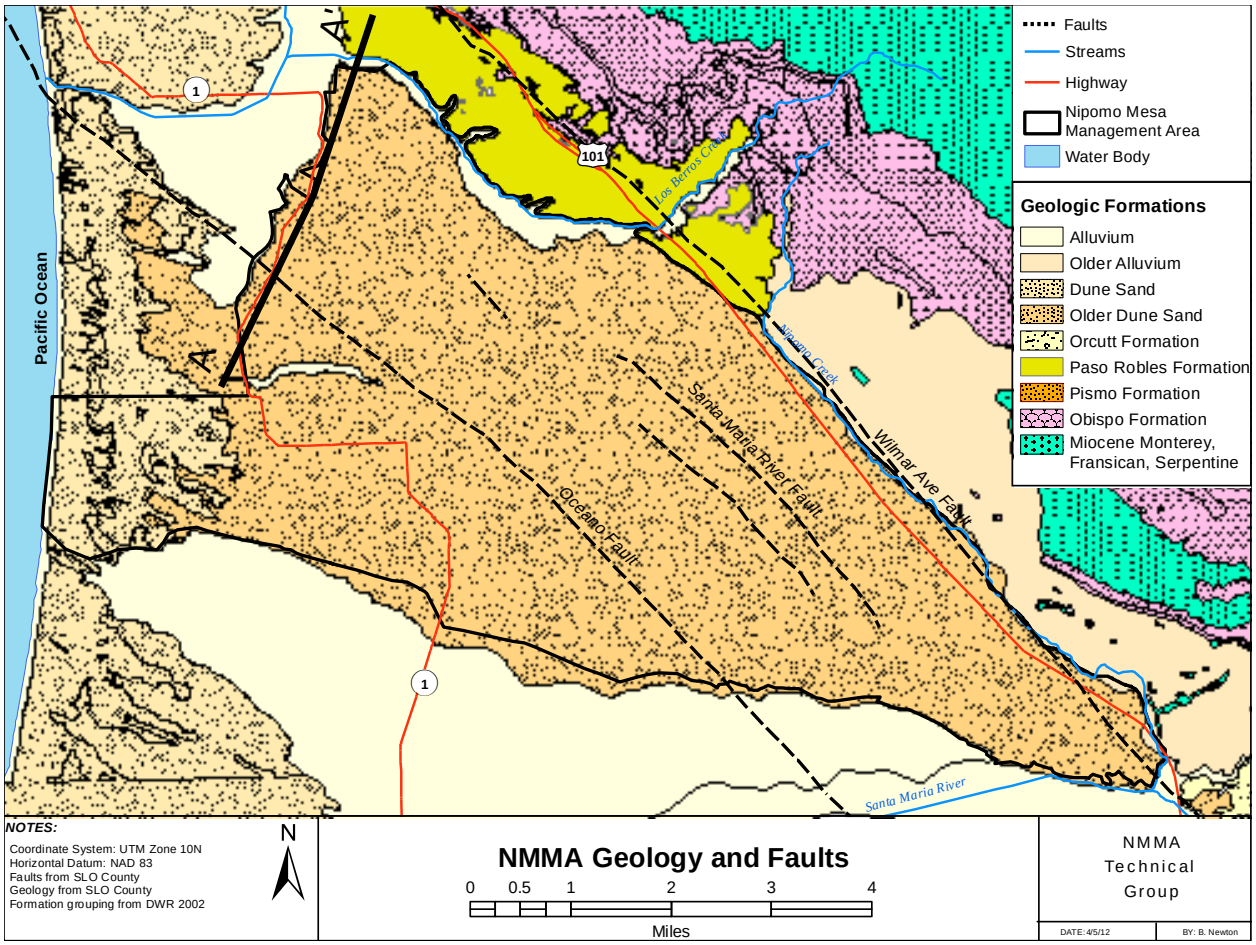

Figure 2-1. NMMA Geology and Faults with Cross-Section A-A' Location

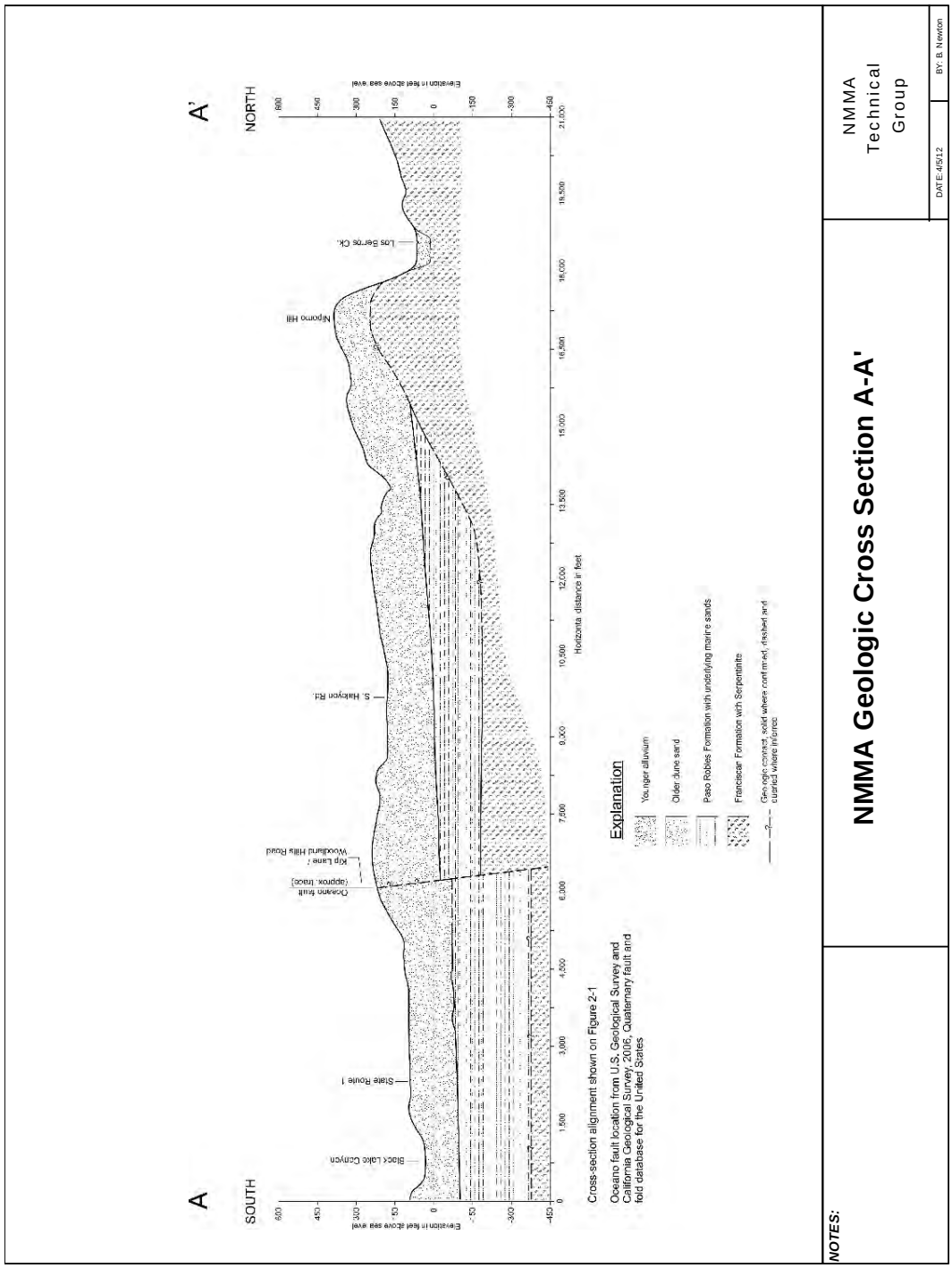

Figure 2-2. NMMA Geologic Cross Section A-A'

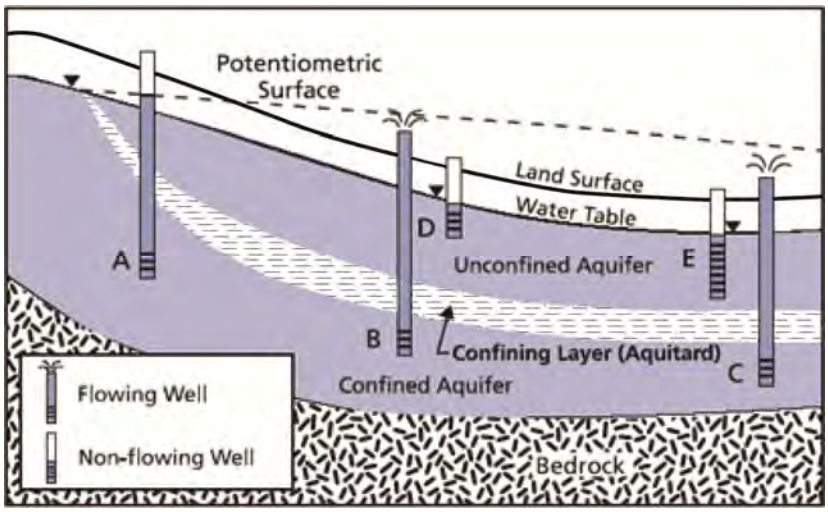

Figure 2-3. Schematic of Confining Layer and Confined Aquifer (Bachman et al., 2005)

3. Data Collection

The TG is monitoring and analyzing water conditions in the NMMA in accordance with the requirements of the Stipulation and Judgment. The Stipulating Parties are required to provide monitoring and other production data at no charge, to the extent that such data are readily available. The TG has developed protocols concerning measuring devices in order to obtain consistency with the Monitoring Programs of other Management Areas. Discussions of these subjects are presented in the following sub sections of this 5th Annual Report Calendar Year 2012.

3.1. *Data Collected*

The data presented in this section of the Annual Report were measured during the calendar year 2012 and are the subject of this Annual Report. Groundwater elevations, water quality, rainfall, surface water, land use, groundwater production and wastewater discharge data were compiled and are presented in the following sections.

3.1.1. Groundwater Elevations in Wells

Groundwater elevation is determined by measuring the depth to water in a well from a reference point at the top of the well casing. The reference point and depth to water data are collected from each agency and input into a TG database that includes groundwater elevation determinations. The date, depth to water, measuring agency, pumping condition, and additional comments are recorded. When the database is updated with new data, an entry is posted in the database log describing the changes that have been made to the database. The groundwater elevation measurements are subjected to Quality Assurance Quality Control procedures adopted by the TG in part by reviewing historical hydrographs to determine if the measurements are within the historical range for the given well.

The accuracy of the groundwater elevations depends on measurement protocols, the reference point and local drawdown effects at that well. The TG surveyed the elevation for all the reference points at each Key Well in February of 2009. Additional elevation surveys for all monitoring program wells are

scheduled for the continued improvement of groundwater elevations accuracy. Furthermore, protocol standards were developed by the TG regarding the length of time for well shut down before a groundwater elevation measurement is taken, and a notation of whether nearby wells are known to be concurrently pumping.

Depth-to-water measurements were collected in the April and October of 2012 by the County of San Luis Obispo. In addition Nipomo Community Services District, Phillips66, Woodlands, Golden State Water Company, Cypress Ridge Golf Course, and the USGS collected depth-to-water measurements in calendar year 2012 (Figure 3-1, Figure 3-2).

3.1.2. Water Quality in Wells

Water quality of the NMMA and adjacent areas is summarized from a wide range of data sources, including:

- California Department of Public Health water quality records of water supply system groundwater sources;
- Regional Water Quality Control Board waste discharge reports, site assessments, remediation project reports and related materials;
- State Water Resources Control Board site assessments, remediation project reports and related materials (GeoTracker database);
- California Department of Toxic Substances Control site assessments and related materials;
- US Geological Survey ambient groundwater monitoring program (GAMA) data and reports; and
- Other NMMA groundwater production monitoring data.

Data reported in this Annual Report are derived from samples obtained using standard professional sampling protocols and analyzed at certified laboratories. The TG maintains these data in a digital database. In the NMMA, historical data from approximately 200 wells can be used to map groundwater quality conditions in both the shallow and deep aquifers. In some cases, water quality records consist of only one or two sampling events from a well, and with only a few water quality parameters, such as total dissolved solids or chloride. In other cases such as wells within the potable water systems, regular groundwater quality testing for a wide range of constituents is conducted.

Groundwater quality in wells near the ocean is of considerable importance because this is the most likely area where intrusion of seawater would first be detected. The southern coastal nested monitoring wells are monitored under agreement with SLO County and are scheduled to provide quarterly water quality sampling of general mineral and physical water quality constituents subject to access constraints for the protection of endangered species (Figure 1-3). In addition to monitoring this coastal site for water quality, the TG has assessed the cost of updating coastal monitoring near the former nested well site 13K2-K6 adjacent to Oso Flaco Lake and recommends replacement.

Locally, shallow groundwater quality is impacted by high concentrations of total dissolved solids, chloride and nitrate, and municipal supply wells and may require treatment or blending because of high nitrate concentrations. No other contaminants are known to impact local use of groundwater supplies for domestic or irrigation purposes.

3.1.3. Rainfall

There are six active rainfall gauges available to estimate the NMMA rainfall (Figure 3-4). Three gauges are part of the ALERT Storm Watch System, Nipomo East (728), Nipomo South (730), and Oceano (795). One gauge is a California Irrigation Management Information System (CIMIS station), CIMIS (202). The other two gauges are active volunteer gauges and include Mehlschau (38), and Nipomo CDF (151.1). The data are collected by the County of San Luis Obispo Department of Public Works (SLO DPW) and CIMIS. The TG obtains these data by filing a data request with County Public Works at the beginning of the calendar year for the rainfall data from the preceding year. SLO DPW staff collects volunteer gauge data once each year in the month of July for the previous year, July through June. Rainfall data are often compiled on a water year basis. A water year typically begins October 1st and ends September 30st of the following year, and the year referenced is that of September (i.e., WY2003 is defined as October 1, 2002, through September 30, 2003). For the volunteer gauges, data collected from July 2012 to December 2012 is unavailable until July 2013, when County staff collects and compiles the rainfall data.

The WY2012 rainfall totals are approximately 69 percent of the long-term average (Table 3-1). Reference evapotranspiration for water year 2012 is 44.2 inches, as compared to 42.3 inches in water year 2011 (see Section 2.2).

Table 3-1. Rainfall Gauges and 2012 Rainfall Totals

Name	Period of Record	Period of Record Mean	Water Year 2012[1]	Calendar Year 2012	Percent of Normal[2]
Nipomo East (728)	2005-2012	17.23	12.60	11.85	79%
Nipomo South (730)	2005-2012	15.88	10.94	11.85	69%
Oceano (795)	2005-2012	13.90	9.53	10.71	60%
CIMIS Nipomo (202)	2006-2012	13.72	10.53	8.88	66%
Nipomo CDF (151.1)	1958-2012	15.86	15.35*	NA	97%
Mehlschau (38)	1920-2012	16.78	12.04*	NA	76%

Notes:
NA - Data not available from July 2012 to December 2012 until July 2013.
1. Water Year is defined as Oct. 1 of previous year through Sept. 30 of the current year.
2. Percent of Normal, calculated using the period of record annual mean for gauge #151.1.
* Voluntary gauge data collection occurs in July of each year, and rainfall is assumed to be zero for the remainder of the WY (July, August, and September).

3.1.4. Rainfall Variability

Quantifying the temporal and spatial variability is critical where rainfall is a large portion of the water supply. Spatial variability in the volume of rainfall across the NMMA is apparent when comparing the WY2012 rainfall totals from these gauges. The WY2012 total rainfall ranges from 9.53 inches (Oceano #795) to 15.35 inches (Nipomo CDF #151).

Climatic trends and interannual variability also impact the water supply to the NMMA. The cumulative departure from the mean was prepared for two rain gauge stations Mehlschau (38) and Nipomo CDF (151.1) over the period from water year 1975 to water year 2012 (Figure 3-5). Periods of

wetter than average and drier than average conditions are coincident at both gauges. The most pronounced dry period occurred from 1983 to 1994, followed by a wetter than average period from 1994 to 1998. From 1998 to present, there have been several years of alternating wet and dry conditions.

3.1.5. Streamflow

Currently, there are some records of streamflow within the NMMA. On Los Berros Creek, the Los Berros (757) streamflow sensor is located 0.8 miles downstream from Adobe Creek and 3.7 miles north of Nipomo on Los Berros Road, and the Valley Road (731) streamflow sensor is located on at the Valley Road bridge over Los Berros Creek (Figure 3-6). The data at the Los Berros gauge are compiled by San Luis County Department of Public Works. Nipomo Creek streamflow is not currently gauged.

3.1.6. Surface Water Usage

There are no known diversions of surface water within the NMMA.

3.1.7. Surface Water Quality

Surface water quality samples were taken in Nipomo Creek in 2001 and 2002 and in Los Berros Creek in 2002 and 2003 for the Central Coast Ambient Monitoring Program (www.ccamp.org). Nipomo Creek was listed as an impaired water body because of fecal coliform counts in exceedance of the basin plan standard. There are no known surface water quality samples taken since the CCAMP sampling.

3.1.8. Land Use

Land use data historically have been collected for the NMMA by the DWR at approximately ten year intervals from 1959 to 1996. DWR periodically performs land use surveys of the Southern Central Coast area (which includes the NMMA). Ideally, DWR will update the land use for the South Central Coast area (which includes the NMMA) in the near future. The status of the DWR land use program for the Southern District can be accessed at (http://www.dpla.water.ca.gov/sd/land_use/landuse_surveys.html).

The 2007 NMMA land use was classified by applying the DWR methodology to a June 2007 one-foot resolution aerial photograph. Land use was classified into four main categories based on the methodology used by DWR in 1996; agriculture, urban, golf course and native vegetation (undeveloped lands). Agricultural lands for 2009 were further subdivided using the San Luis Obispo County Agriculture Commissioner survey of the 2009 crop types and acreage for San Luis Obispo County. The major crops grown on in the NMMA are strawberries, vegetable rotational, avocados, and nursery plants.

Urban lands were classified following the DWR methodology with additional sub categories based on San Luis Obispo County land use categories from land use zoning maps. The categories for urban include (1) Commercial-Industrial; (2) Commercial-office, (3) Residential Multi-family; (4) Residential-Single Family; (5) Residential-Suburban; (6) Residential-Rural; (7) Recreational grass; (8) Vacant. Golf courses were classified separately from Agricultural or Urban Lands.

Native vegetation lands were classified following the 1996 DWR methodology. In the DWR methodology, all undeveloped land was classified as native vegetation and includes groves of non-native eucalyptus and fields of non-native grasses. The lands classified as native vegetation were further broken down into two categories: grasses; and trees and shrubs; to better estimate deep percolation of rainfall required for the hydrologic inventory (see Section 5 Hydrologic Inventory).

The land use acreage for Urban is 10,246 acres; for Agriculture is 2,587 acres; and for Native is 8,314 acres. Sub categorical land use acreage is also defined and will subsequently be utilized to compute the groundwater productions and consumptive use of water for each subcategory (Table 3-2).

Table 3-2. Land Use Summary

Land Use Category	Year of Data	Acreage
Urban		
Commercial – Industrial	2007	472
Commercial – Office	2007	118
Golf Course	2007	549
Residential Multi-family	2007	24
Residential Single Family	2007	821
Residential Suburban	2007	3,597
Residential Rural	2007	4,629
Recreational grass	2007	36
Urban Total	**2007**	**10,246**
Agriculture		
Deciduous	2009	2
Pasture	2009	2
Vegetable rotational	2009	225
Avocado and Lemons	2009	277
Strawberries	2009	1,393
Nursery	2009	332
Non-irrigated farmland	2007	356
Agriculture Total	**2007**	**2,587**
Native Vegetation		
Fallow Ag Land	2007	234
Native Trees and Shrubs	2007	2,657
Native Grasses	2007	4,579
Urban Vacant	2007	765
Water Surface	2007	9
Unclassified	2007	70
Native Total	**2007**	**8,314**
Total Land Use		**21,147**

3.1.9. Groundwater Production (Reported and Estimated)

The groundwater production data presented in this section of the Annual Report were collected for calendar year 2012. Where groundwater production records were unavailable, the groundwater production was estimated for calendar year 2012 (Figure 3-7).

Reported Groundwater Production

Individual landowners, public water purveyors, and industry all rely on groundwater pumping from the aquifers underlying the NMMA. Data were requested by the TG from the public water purveyors and individual pumpers and incorporated in this calendar year 2012 Annual Report. Stipulating Parties to the Judgment are required to provide monitoring and other production data at no charge, to the extent that such data have been generated and are readily available.

Stipulating parties provided production records that report a total of 6,295 acre feet (AF) of groundwater produced in calendar year 2012 (Table 3-3) , an increase of 62 AF from last year. GSWC (+60 AF) and RWC (+35 AF) increased production in 2012 compared to 2011. NCSD (-16 AF) and Woodlands (-7 AF), production is lower this year as compared to last year.

Table 3-3. Calendar Year 2012 Reported Groundwater Production

Stipulating Parties	Production (AF/yr)
NCSD	2,472
GSWC	1,103
Woodlands	857
Phillips66	1,100
RWC	763
Total	**6,295**

Estimated Production

The estimated production for agricultural crops in the NMMA is 2,912 AF computed on a daily time-step by multiplying the crop area and the crop specific water demand met by either soil moisture, rainfall, or groundwater production, thus developing the unit production for calendar year 2012 (Table 3-4). A detailed explanation of the methodology used for this estimate is presented in an appendix to this Annual Report (see Appendix E).

Table 3-4. Calendar Year 2012 Estimated Groundwater Production for Agriculture

Crop Type	2012 Area (Acres)	2012 Unit Production (AF/acre)	2012 Production (AF/yr)
Deciduous	2	2.5	5
Pasture	2	3.0	6
Vegetable Rotational	225	2.4	537
Avocado and Lemon	277	1.6	440
Strawberries	1,393	1.1	1545
Nursery	332	1.1	379
Un-irrigated Ag Land	356	0.0	0
Total	**2,587**		**2,912**

Groundwater production for urban use was estimated for rural landowners not served by a purveyor. The estimated production for the rural landowners is 2,052 AF for calendar year 2012 (Table 3-5).

Table 3-5. Calendar Year 2012 Estimated Groundwater Production for Rural Landowners

Land Use Type	Water Use Area (acres)	Unit Production (AF/acre)[1]	Production (AF/yr)
Golf Course	549	1.8	963
451RS Zoned Parcels	172	2.6	452
616 RR Zoned Parcels	243	2.6	637
Total	**414.75**		**2,052**

Note:

1. Unit production values from NCSD 2007, Water and Sewer Master Plan Update

Combining the estimates of groundwater production for Stipulating Parties (Table 3-3), for Agriculture (Table 3-4) and Rural Landowners (Table 3-5) results in an estimated total groundwater production of 11,249 AF for calendar year 2012 (Table 3-6).

Table 3-6. Calendar Year 2012 Measured and Estimated Groundwater Production (AF/yr)

Measured	
NCSD	2,472
GSWC	1,103
Woodlands	857
Phillips66	1,100
RWC	763
Subtotal	**6,285**
Estimated	
Rural Landowners	2,052
Agriculture	2,912
Total NMMA Production	**11,259**

3.1.10. Wastewater Discharge and Reuse

Five wastewater treatment facilities (WWTF) discharge treated effluent within the NMMA: the Southland Wastewater Works (Southland WWTF), the Blacklake Reclamation Facility (Blacklake WWTF), Rural Water Company's Cypress Ridge Wastewater Facility (Cypress Ridge WWTF), the Woodlands Mutual Water Company Wastewater Reclamation Facility (Woodlands WWTF) (Figure 3-8). The Golden State Water Company iron and manganese removal treatment facilities at La Serena and Osage groundwater production wells discharge filter backwash to percolation ponds. The total waste water discharge in the NMMA was 798 AF for calendar year 2012 (Table 3-7).

Table 3-7. 2012 Wastewater Volumes

WWTF	Influent (AF/yr)	Effluent (AF/yr)	Re-use
Southland	727	639 (1)	Infiltration
Blacklake	61.9	52 (1)	Irrigation
Cypress Ridge	69..2	50	Irrigation
Woodlands	Not Reported	52	Irrigation
La Serena	Not Applicable	5 (2)	Infiltration
Osage	Not Applicable	2 (2)	Infiltration
Total		**800**	

Notes:

1. Effluent was estimated as the sum of Influent - Evaporation from Aeration Ponds - 10% of Influent to account for biosolid removal. For the Nipomo Mesa calendar year 2012, the annual evapotranspiration measured at CIMIS 202 gage is 44.2 inches and the rainfall measured at CIMIS 202 gage is 8.88 inches (CIMIS, 2012). This results in a net evaporation from a pond of 35.32 inches per year.
2. GSWC's La Serena and Osage iron and manganese removal treatment facilities treat water from GSWC's La Serena and Osage wells. Filter backwash water is discharged to percolation ponds, where water infiltrates into the basin.

3.2. *Database Management*

The database of monitoring data is an entirely digital database and is maintained in Microsoft Excel as a confidential document. The database is broken into five datasets: Groundwater elevation, groundwater production, wastewater treatment, stream flow, groundwater quality, climate, and land use.

NCSD's technical representative is currently designated as the database steward and is responsible for maintaining and updating the digital files and for distributing any updated files to other members of the TG. A "change log" is maintained for each database. The date and nature of the change, along with any special features, considerations or implications for linked or related data are recorded in the change log. The Stipulation and Judgment require that absent a Court order or written consent, the confidentiality of well data from individual owners and operators is to be preserved.

3.3. *Data and Estimation Uncertainties*

Uncertainties exist in data, and therefore uncertainties exist in derivatives of data including interpretations and estimations made from direct measurements. Uncertainties arise from errors in measurements, missing measurements, and inaccurate methodologies and generalizing assumptions. For example, rainfall is measured at a few locations across the NMMA. However, it is well known that the spatial and temporal variability in rainfall deposition in a storm is much greater than that which the density of rainfall gauges can represent. Ground surface elevation across the NMMA is known to be in error at places and may be reported incorrectly by amounts as large as 20 feet. This affects the accuracy of groundwater elevations and contours. There exists missing data from both groundwater elevations and rainfall records. Estimations are made to fill in these data gaps with the understanding that the accuracy of these estimates is reduced. Derivatives from these data therefore contain inaccuracies. Additionally, precision issues arise when interpretations are made from data, in that individuals make decisions during the process of interpreting data that are subjective and therefore not documentable. For example, aerial

image classification is a subjective process as is the preparation of groundwater elevation contours. Estimations are made for parameters that are not measurable or very difficult to measure. The methodologies used to make estimates represent a simplified numerical representation of the environment and are based on assumptions defining these simplifications. Quantifying the uncertainty in data or data derivatives is a rigorous and ongoing process.

The measured groundwater production values are reliable and are considered precise to the tens place for NCSD, GSWC, and Woodlands, RWC and the hundreds place for Phillips66. The estimated production values are less reliable and precise for the rural residence groundwater production. The unit production factors used to estimate the rural residence groundwater production were developed for the NCSD Water and Sewer Master Plan (see Section 3.1.8 Land Use). For the estimated agricultural production, there is no measured data available in the NMMA to verify the precision or reliability of the agricultural production.

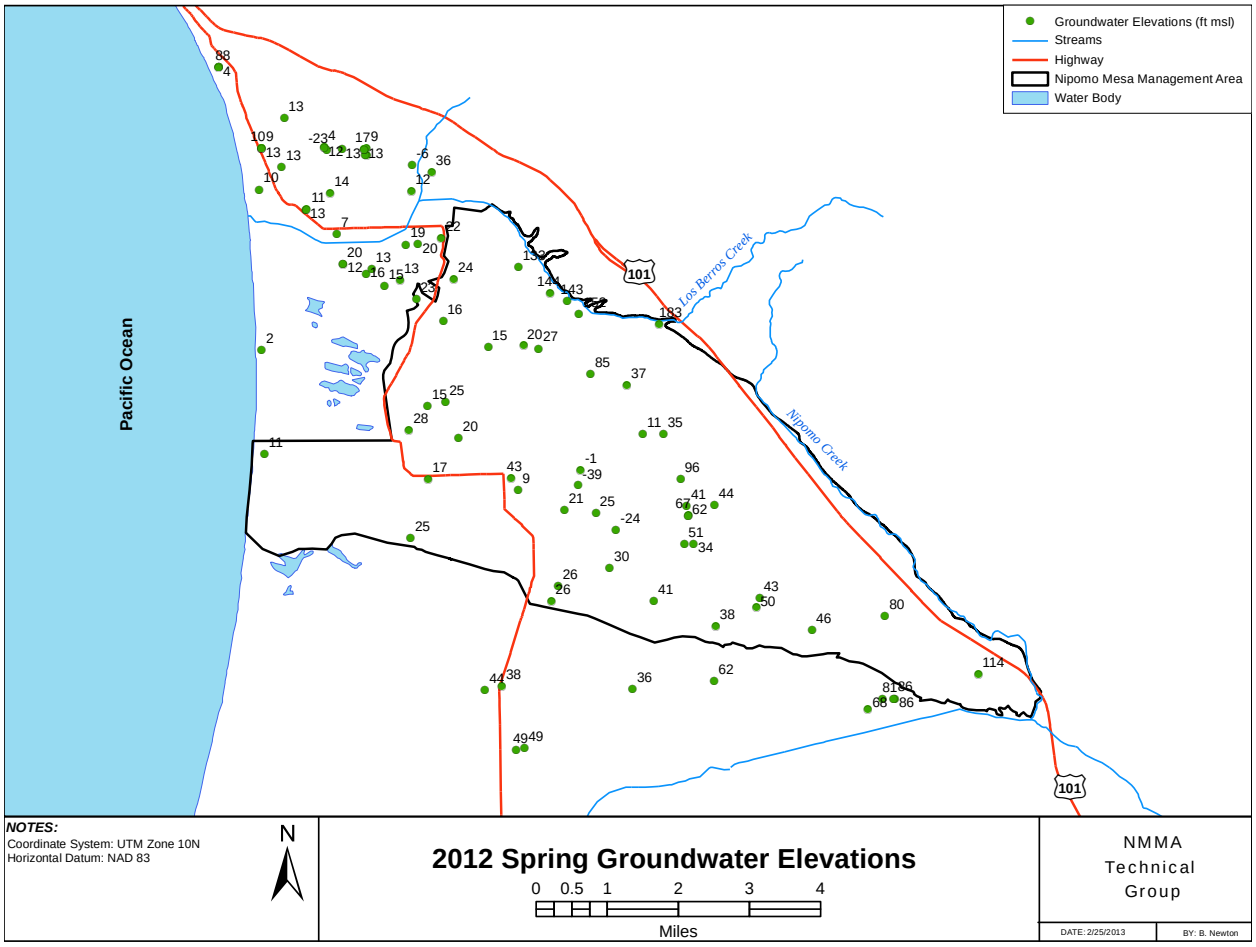

Figure 3-1. 2012 Spring Groundwater Elevations

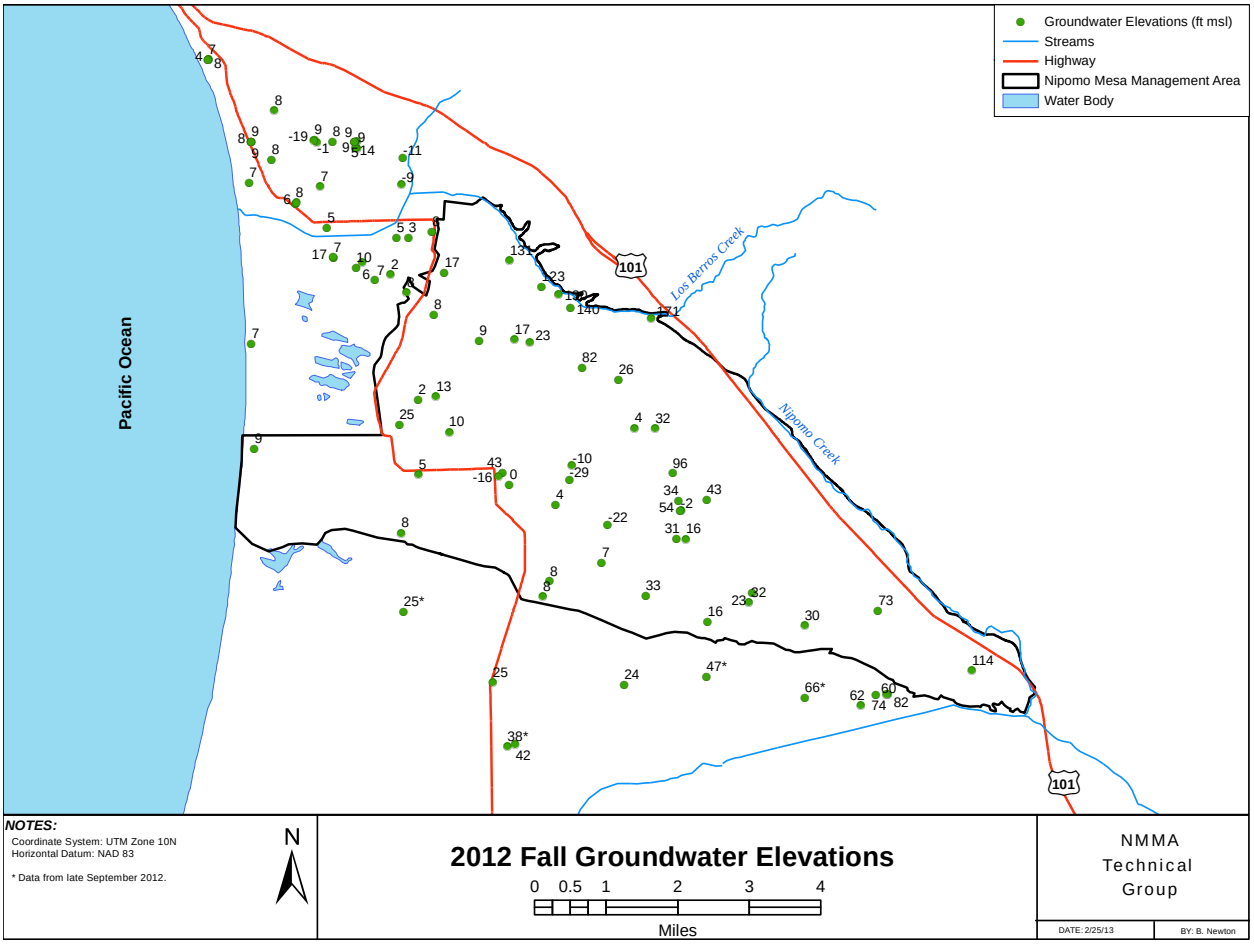

Figure 3-2. 2012 Fall Groundwater Elevations

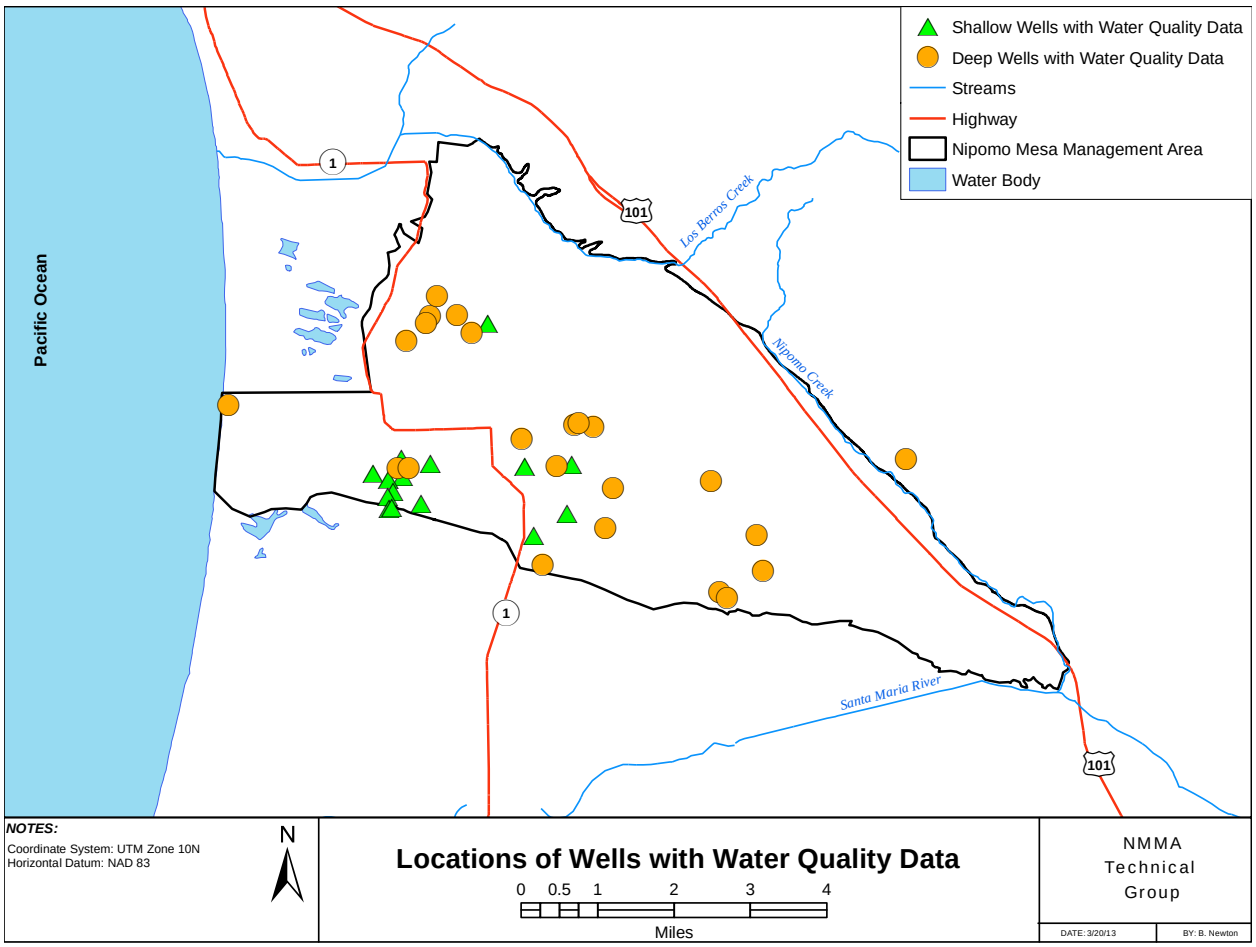

Figure 3-3. Locations of Wells with Water Quality Data

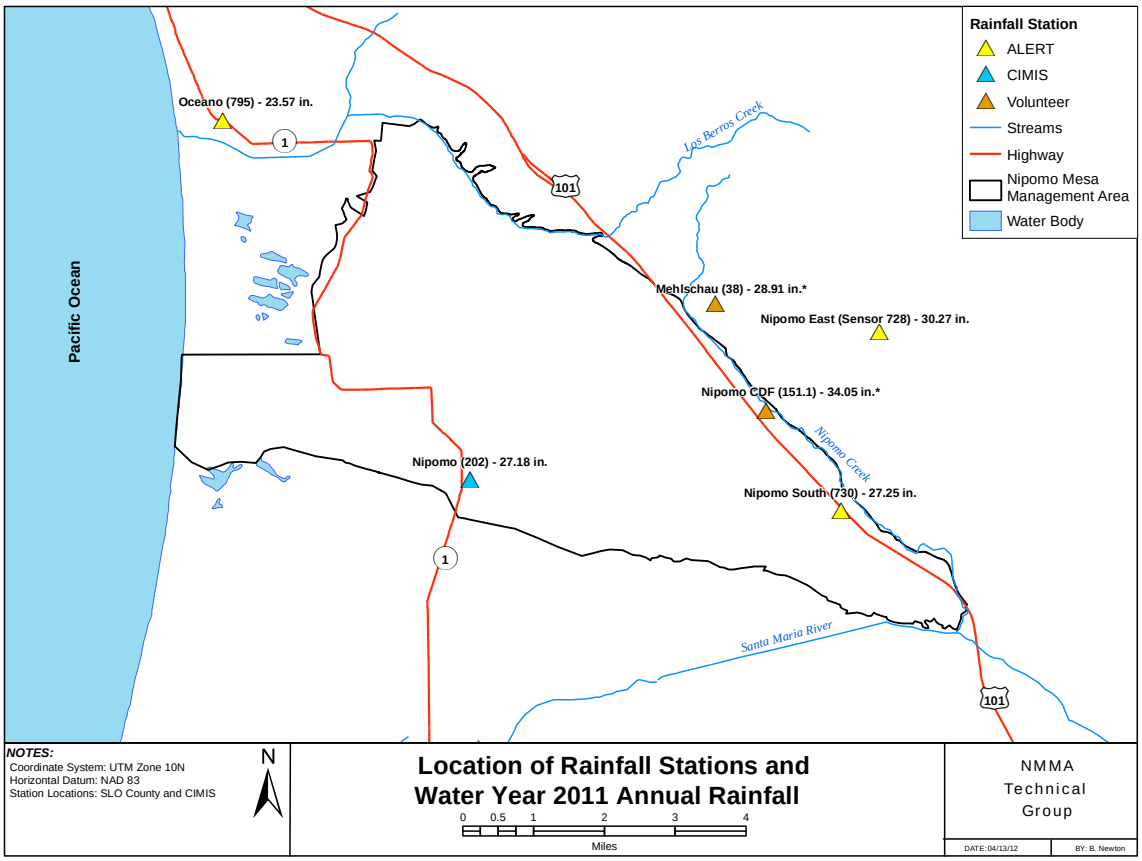

Figure 3-4. Rainfall Station Location and Water Year 2012 Annual Rainfall

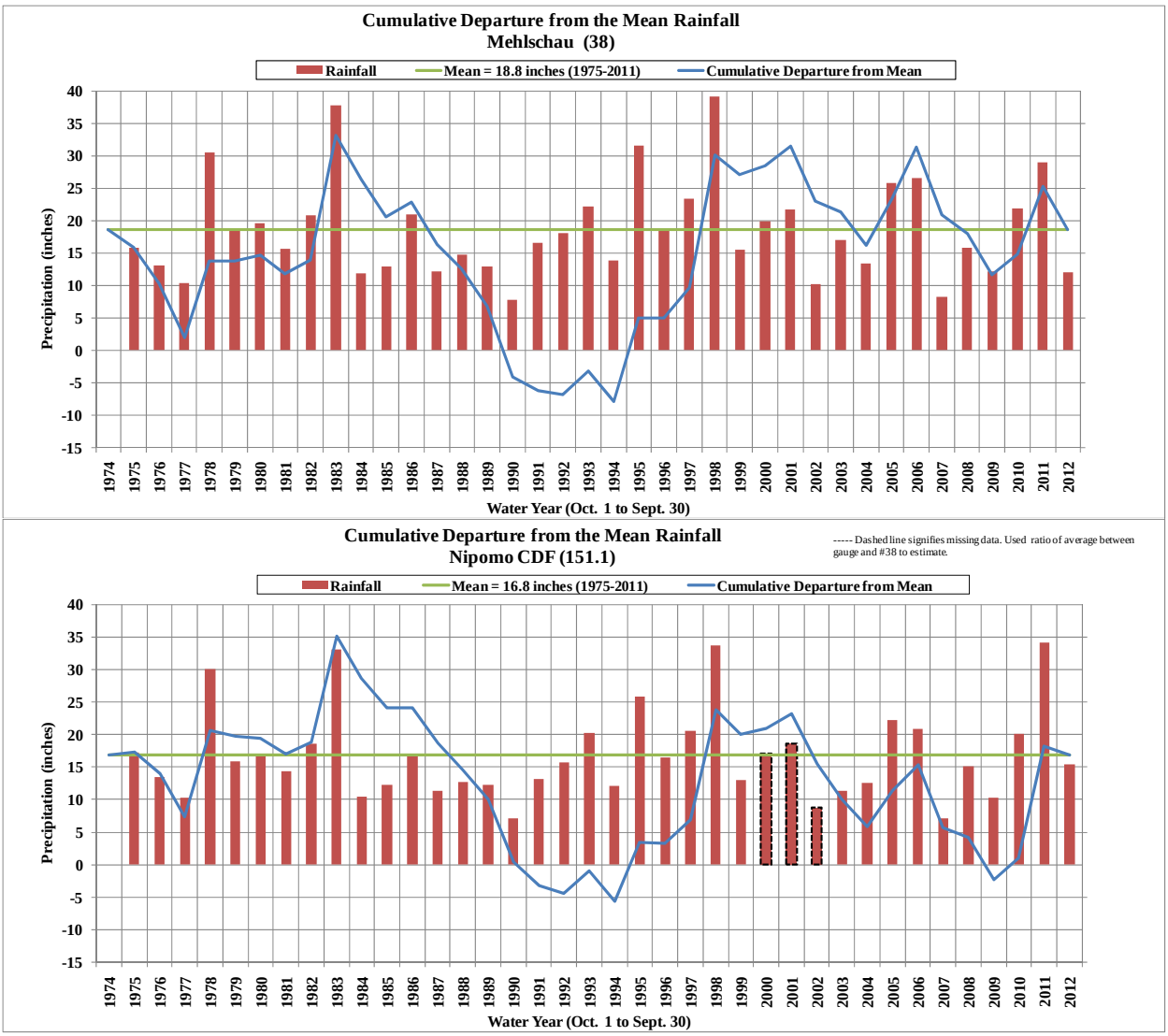

Figure 3-5. Cumulative Departure from the Mean for the following rain gauges: Mehlschau (38) and Nipomo CDF (151.1)

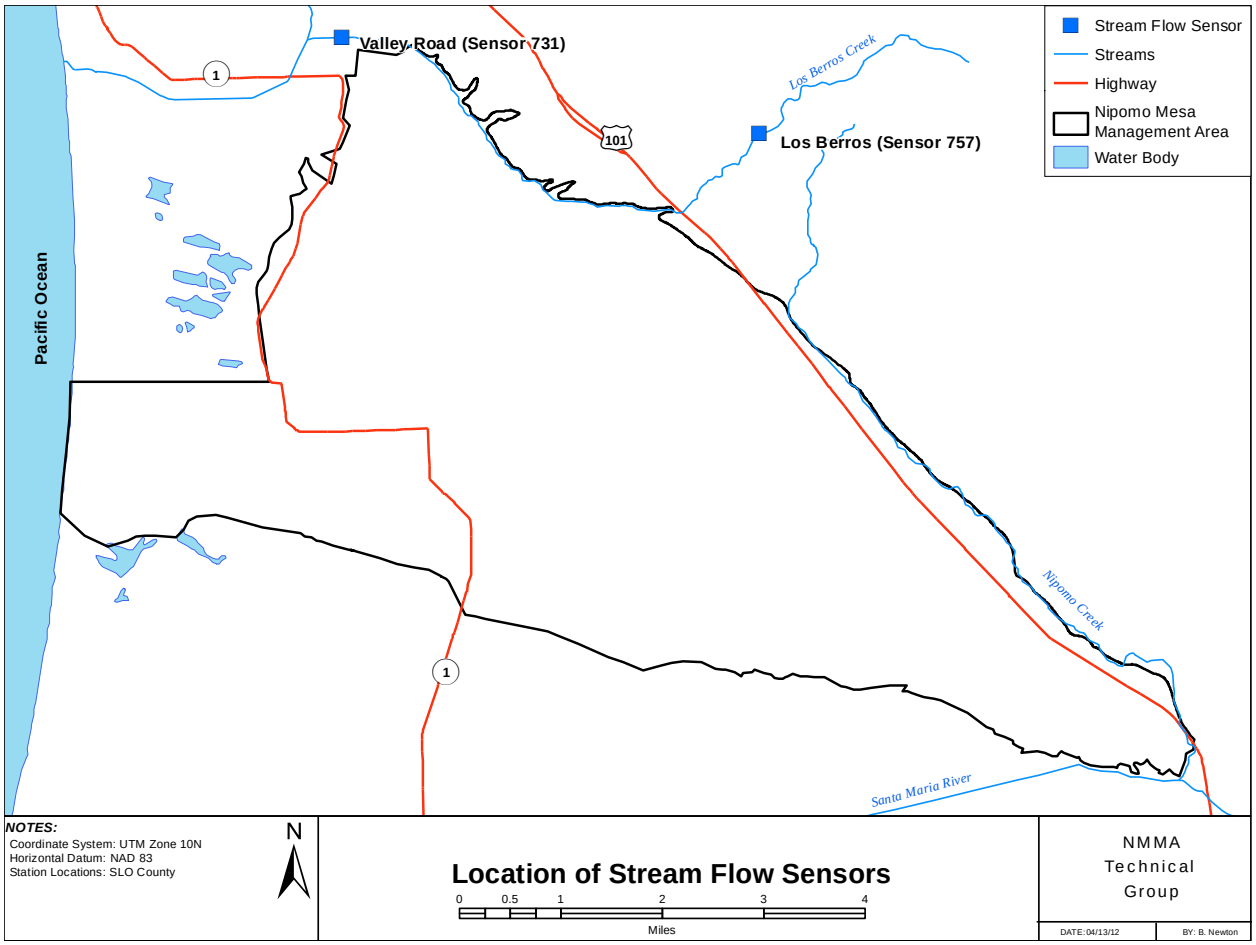

Figure 3-6. Location of Stream Flow Sensors

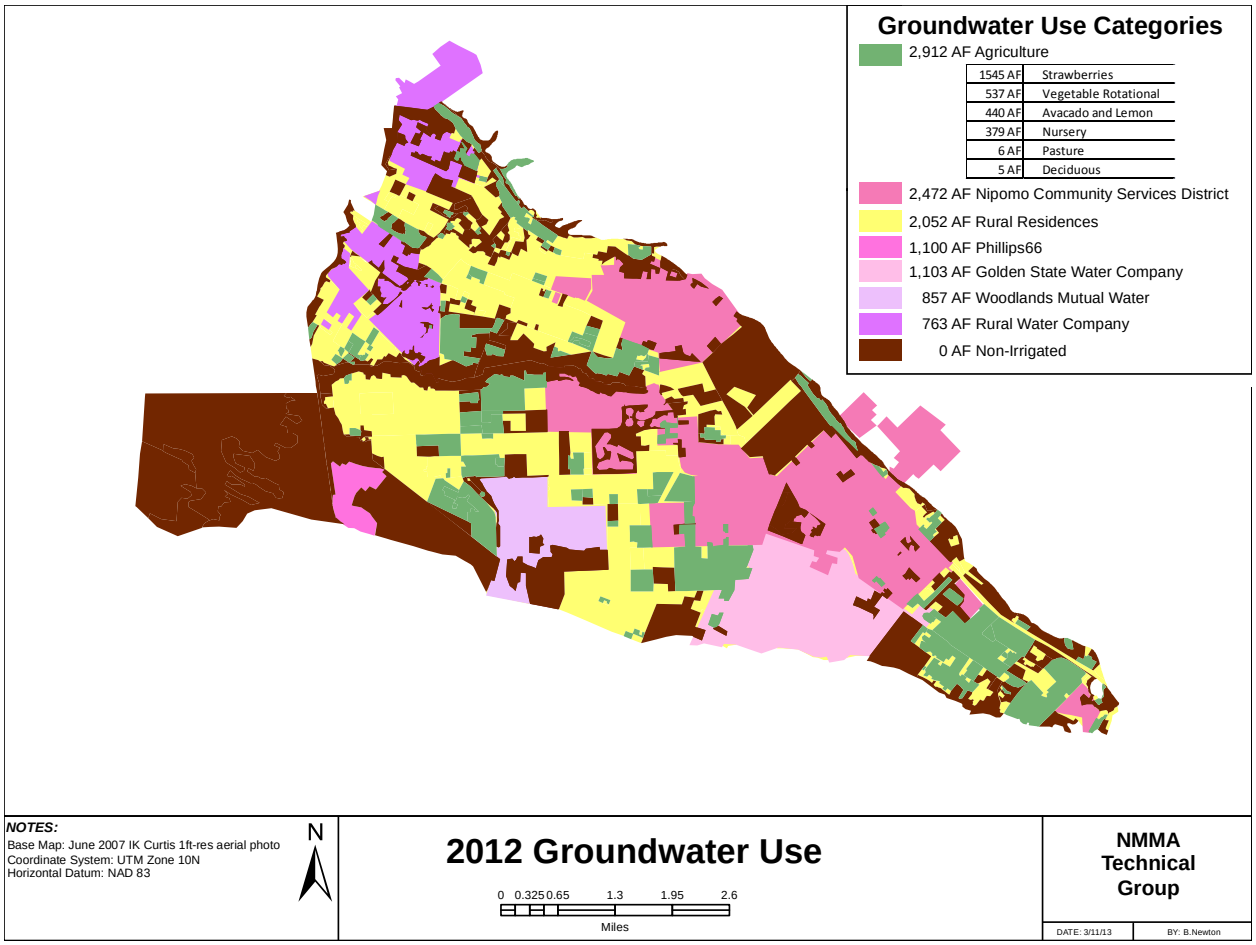

Figure 3-7. 2012 Groundwater Use

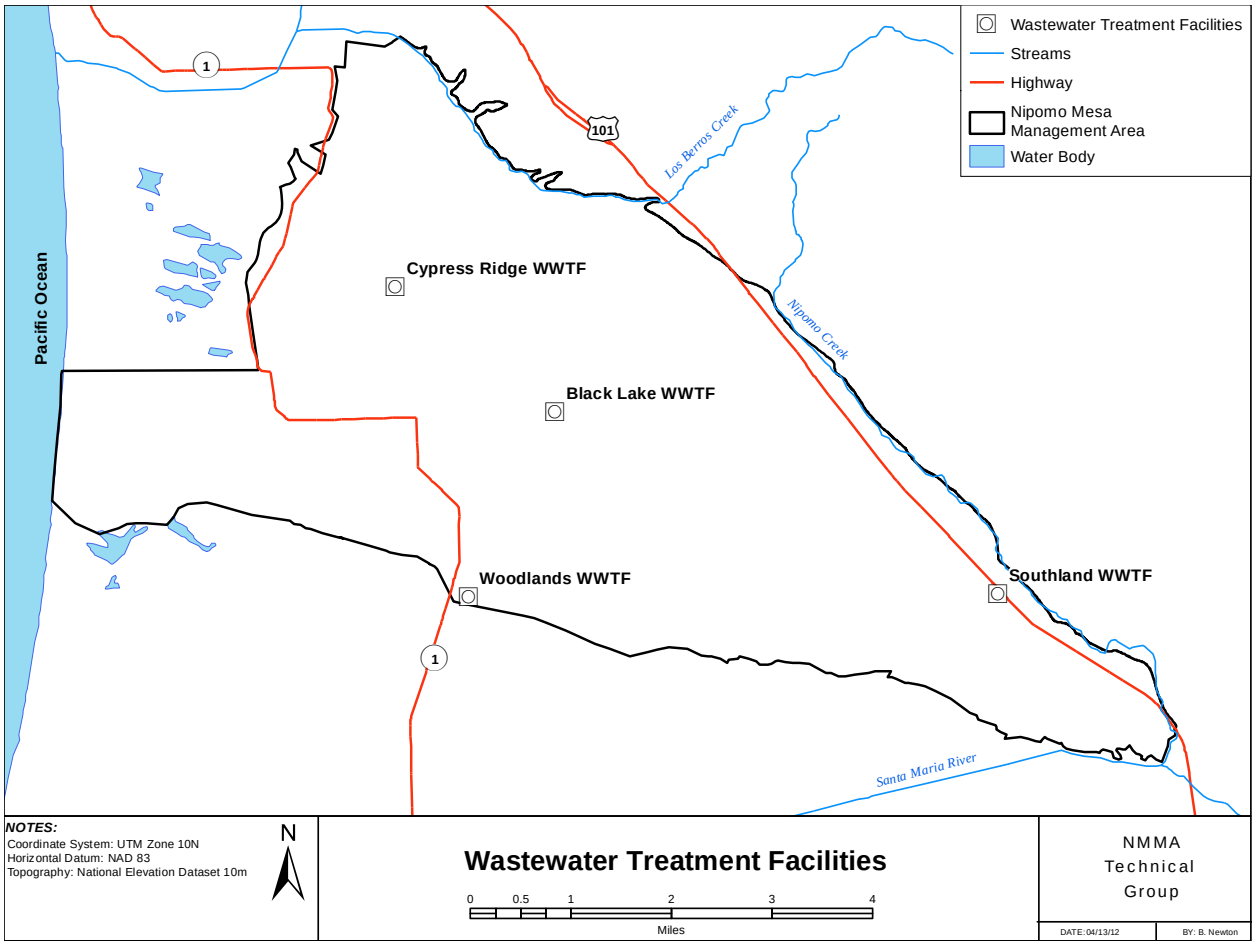

Figure 3-8. Wastewater Treatment Facilities

4. Water Supply & Demand

Presented in this section are discussions of the various components of current and projected estimates of water supplies and demands for the NMMA.

4.1. *Water Supply*

The water supplies supporting the activities within the NMMA are met primarily from groundwater production with a minor amount of recycled water. No surface water diversions exist, nor is there currently any imported water. Supplemental Water, as defined by the Stipulation, is being developed and delivery is expected within the next few years. A brief description of the groundwater production, recycled water, Supplemental Water, and surface water diversion is presented in the following sections.

4.1.1. Groundwater Production

Currently, groundwater pumping is not differentiated between various strata, shallow or deep aquifers. The specifics of shallow and deep aquifer production are better known by the TG for purveyor wells which produce primarily from the deep aquifers, but this information is not available for many more private wells in the NMMA.

Shallow Aquifers

Domestic production by rural landowners was estimated to be about 1,089 AF/yr (see Table 3-5). The majority of this production may be from the shallow aquifers. A portion of the estimated 2,912 AF agricultural pumping may also be from the shallow aquifers.

Deep Aquifers

All production from wells used for public drinking water and industrial water is likely pumped from the deep Aquifers (primarily the Paso Robles Formation). This pumping is estimated to be about 7,258 AF (see Table 3-4 and Table 3-5). In addition, a portion of the estimated 2,912 AF/yr of agricultural pumping may also be from the deep aquifers.

4.1.2. Recycled Water

Wastewater effluent from the golf course developments at Blacklake Village, Cypress Ridge, and Woodlands is recycled and utilized for golf course irrigation. The amount of recycled water used in calendar year 2012 for irrigation at Blacklake Village, Cypress Ridge and Woodlands are 52 AF, 50 AF, and 52 AF, respectively (see Section 3.1.10 Wastewater Discharge and Reuse).

4.1.3. Supplemental Water

There was no Supplemental Water delivered to the NMMA in calendar year 2012.

4.1.4. Surface Water Diversions

There are no known surface water diversions within the NMMA.

4.2. *Water Demand*

The water demands in the NMMA include urban (residential, commercial, industrial), golf course, and agricultural demands. The TG used a variety of methods to estimate the water demands of the respective categories (see Section 3.1.9 Groundwater Production (Reported and Estimated)).

4.2.1. Historical Demand

The historical data from 1975 to 2008 was compiled from available information. The TG has continued the historical data compilation with information from Annual Reports for 2008 to present. The historical demand estimated for urban (including golf course and industrial) and agricultural land uses has been steadily increasing since 1975 with urban accounting for the largest increase in total volume and percentage (Figure 4-1).

4.2.2. Current Demand

The estimated demand is 11,250 AF for Calendar Year 2012, based on annual groundwater production records provided by the water purveyors on the Nipomo Mesa, an estimated groundwater production by land use area (see Section 3.1.8 Land Use), and recycled water use (see 3.1.10 Wastewater Discharge and Reuse). This amount of demand represents an increase of 860 AF from the previous year, as reported in the 4nd Annual Report Calendar Year 2011. The TG has not differentiated the causes of this increase; possible causes include increased potential evapotranspiration and decreased rainfall, conservation measures, and economic forces.

4.2.3. Potential Future Production (Demand)

The projected future demand for NCSD is an increase from 2,293 AF/yr in calendar year 2010 to 3,400 AF/yr in 2030 (NCSD, UWMP 2010 – Table 21 and 23). The Phillips66 refinery expects future production to be similar to recent years' production amounts of approximately 1,200 AF/yr. The projected water demand for Woodlands at build-out according to the Woodlands Specific Plan EIR is 1,600 AF/yr (SLO, 1998). The projected water demand for the GSWC at full build-out of current service area is estimated to potentially increase to approximately 1,940 AF/yr in 2030 (GSWC, 2008). Currently, no estimate of potential future production for agriculture has been developed. Future production from the Groundwater Basin is restricted by San Luis Obispo County Ordinance §3090 (adopted May 2006) which provides that Land Divisions authorized by the current South County Area Plan (Inland) pay a supplemental water charge Not-to-Exceed $13,200 for each dwelling unit equivalent and further provides that future General Plan Amendments will not be approved unless supplemental water to offset the proposed development's estimated increase in non-agricultural demand has been specifically allocated for exclusive use of the development resulting from the General Plan Amendment and is available for delivery to the Nipomo Mesa Water Conservation Area. In the future, it is expected that all new urban demand will be met by delivery of supplemental water, and possibly better utilization of recycled water. It should be noted that the County of San Luis Obispo has yet to formally adopt a supplemental water in-lieu fee; and absent the adoption, there is some uncertainty about the supplemental water in-lieu fee to be applied in accordance with County Ordinance §3090. The Stipulation has requirements for provisions to support new growth (see Section 1.1.7 Supplemental Water)

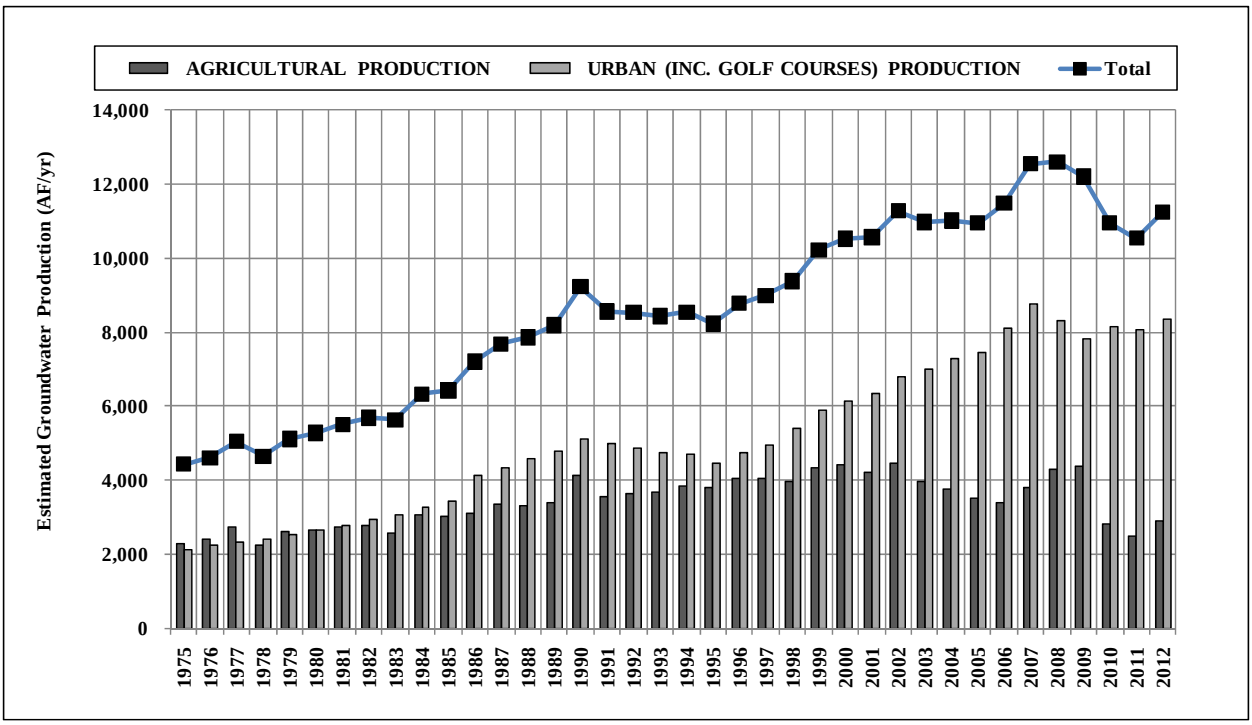

Figure 4-1. Historical NMMA Groundwater Production. Starting in 2010, the methodology used to estimate the agricultural pumping was modified; thus, a direct comparison between agricultural pumping pre-2010 and from 2010 onward is not appropriate.

5. Hydrologic Inventory

The hydrologic inventory accounts for the volumes of water that flow in to and out of the aquifers in the NMMA resulting in the change in storage. A conceptual schematic depicts the inflows and outflows to the aquifers underlying the NMMA (Figure 5-1). The hydrologic inventory can be formalized in the following equation:

$$\text{Change in Storage } (\Delta S) = \text{Inflow} - \text{Outflow}.$$

In the following sections the components of the 2012 hydrologic inventory are presented and discussed. The principal sources of inflow are rainfall, streamflow, wastewater, groundwater (i.e. subsurface flow across the boundaries of the NMMA) inflow, and return flow. The principal outflows are groundwater production and groundwater outflow. Supplemental Water is also discussed as a potential future supplemental source of inflow.

5.1. *Rainfall and Percolation Past Root Zone*

Rainfall measurements made during calendar year 2012 range from 9.5 to 15.3 inches for water year 2012, and are approximately 69 percent of the average long-term annual rainfall (see Section 3.1.3 Rainfall). Rainfall on the NMMA infiltrates the soil surface and is either stored in the soil profile until it is evaporated or transpired by overlying vegetation, or percolates downward into shallow or deep aquifers. Rainfall on hardscape surfaces flows to local depressions where infiltration occurs. Locally

rainfall may generate runoff from the NMMA to places adjacent to the NMMA boundary; however, the amount of runoff out of the NMMA is negligible. The TG has estimated the portion of rainfall that percolates past the root zone is 970 AF in water year 2012.

5.2. *Subsurface Flow*

The groundwater subsurface flow is the volume of water that flows into and out of the NMMA groundwater system. Typical methods used to estimate subsurface flow is Darcy's equation (using hydraulic conductivity, groundwater gradient, and aquifer thickness) or flow equations that are part of a regional groundwater model. In the NMMA, the three areas with the most potential for subsurface flow are at the northwestern boundary with the Northern Cities Management Area, the southern boundary with the Santa Maria Valley Management Area, and the seaward edge of the basin. Contours of groundwater elevations in this report (see Section 6.1.4 Groundwater Gradients) suggest that there is net inflow from the Santa Maria Valley Management Area, net outflow at the coast (required to prevent seawater intrusion), and subsurface flow into or out of the Northern Cities Management Area. The amount of inflow across the eastern boundary is not well understood.

The nature and extent of the confining layer(s) beneath the NMMA and the extent that faults in the NMMA may act as barriers to subsurface flow are not well understood. The TG has not yet quantified the subsurface flows; however, the TG is currently evaluating detailed hydrogeologic cross-sections along portions of the NMMA boundary necessary to make estimates of subsurface flow (see Section 9 Recommendations).

5.3. *Streamflow and Surface Runoff*

Streamflow and surface runoff are the volumes of water that flow into and out of the NMMA through surface water channels or as overland flow. Streamflow includes water within the Los Berros Creek, Nipomo Creek, and Black Lake Creek (Figure 5-2). Surface runoff occurs during major rainfall events and could occur in locations where local conditions near the NMMA boundary are sufficient to promote overland flow out of the area, and where shallow subsurface flow contributes to streamflow that is conveyed out of the NMMA, or to coastal dune lakes where it evaporates. This may occur in the following areas (Figure 5-2):

- Los Berros Creek streamflow into and out of the NMMA,
- Nipomo Creek streamflow into and out of NMMA,
- Black Lake Canyon streamflow out of the NMMA,
- Surface runoff from steep bluffs adjacent to Arroyo Grande Valley, and
- Surface runoff from steep bluffs adjacent to Santa Maria River Valley.

The volume of streamflow which enters and leaves the NMMA is not well understood. The TG continues to analyze where it might be appropriate to install temporary or permanent stream gauging sites to determine the volume of water that percolates beneath streams in the NMMA.

5.4. *Groundwater Production*

The groundwater production component of the Hydrologic Inventory is calculated using metered production records where available and estimated from land use data where measurements are unavailable. The calendar year 2012 groundwater production is approximately 11,250 AF (see Section 4.2.2 Current Demand).

5.5. *Supplemental Water*

Supplemental Water is the volume of water produced outside the NMMA and delivered to the NMMA. There was no supplemental water delivered to the NMMA in calendar year 2012. Future deliveries of supplemental water will be measured and subsequent Annual Reports will present the volume and disposition of the supplemental water delivered to the NMMA. An evaluation of the basin impacts from the potential future importation of the proposed NSWP water is presented in an appendix to this Annual Report (see Appendix F).

5.6. *Wastewater*

Wastewater discharges include the volumes of wastewater effluent discharged by the five wastewater treatment facilities located within the NMMA, and individual septic tanks where centralized sewer service is not provided. Wastewater discharges are estimated for the calendar year 2012. The WWTFs include the Southland Wastewater Works (Southland WWTF), the Blacklake Reclamation Facility (Blacklake WWTF), Rural Water Company's Cypress Ridge Wastewater Facility (Cypress Ridge WWTF), the Woodlands Mutual Water Company Wastewater Reclamation Facility (Woodlands WWTF), and La Serena (GSWC). The Southland WWTF discharges treated wastewater into infiltration basins (see Section 3.1.10 Wastewater Discharge and Reuse). A portion of the water percolates and returns to the groundwater system and the remaining portion evaporates. The estimated percolation from Southland WWTF is 639 AF. The treated effluent from Blacklake WWTF (52 AF), Cypress Ridge WWTF (48 AF), and Woodlands WWTF (52 AF) is used to irrigate golf course landscaping, reducing the demand for groundwater production. La Serena discharged 5 AF and Osage discharged 2 AF. The total WWTF effluent in the NMMA was 798 AF (Table 3-7). The wastewater discharged in septic systems percolates downward and may recharge the shallow aquifers, the deep aquifers, or become shallow subsurface flow outside the NMMA. The estimated amount of return flow from indoor use by rural residences is 180 AF.

5.7. *Return Flow of Applied Water and Consumptive Use*

Return flow is defined as the amount of recharge to the aquifers resulting from applied water that percolates past the root zone to recharge the aquifer(s). This functional definition differs somewhat from that used in the Stipulation to apportion the right to use water that was imported to the basin. However, the physical process of recharge by return flow of applied water is the same regardless of where the water originated.

The TG currently assumes that with the exception of NCSD, Woodlands, GSWC, Phillips66, and RWC, all other groundwater produced for outdoor use is attributable to sustaining plant life and replenishing soil profile storage, and that only rainfall generates percolation. Rural residences produce groundwater for indoor use in addition to outdoor use. The estimated amount of return flow from indoor use by rural residences is 180 AF. The estimated amount of return from urban outdoor water use is 44 percent of the water supplied by NCSD, Woodlands, GSWC, and RWC. The amount of return flow from outdoor water use is thus 44 percent of 5,185 AF (Table 3-3), or about 2,280 AF, because no return flow occurs from Phillips66's groundwater production. The estimated total return flow, which includes 2,280 AF from urban outdoor use, 646 AF from infiltration at WWTPs, and 180 AF of recharge from septic systems (see Section 5.6 Wastewater), is 3,110 AF in calendar year 2012.

The estimated consumptive use of water in the NMMA, computed by subtracting the return flow from the groundwater production, is approximately 8,150 AF.

5.8. *Change in Groundwater Storage*

The change in groundwater storage from the hydrologic inventory reflects the difference between inflow and outflow for a period of time. Typically, this change in storage is compared to a change in storage computed from groundwater contours, cross-checking the results of each. Storage changes from groundwater contours are typically calculated by measuring change in groundwater elevation and multiplying that change by a storage factor. The TG's current understanding of confining conditions within the NMMA precludes calculating change in groundwater storage from groundwater contours at this time for the management area.

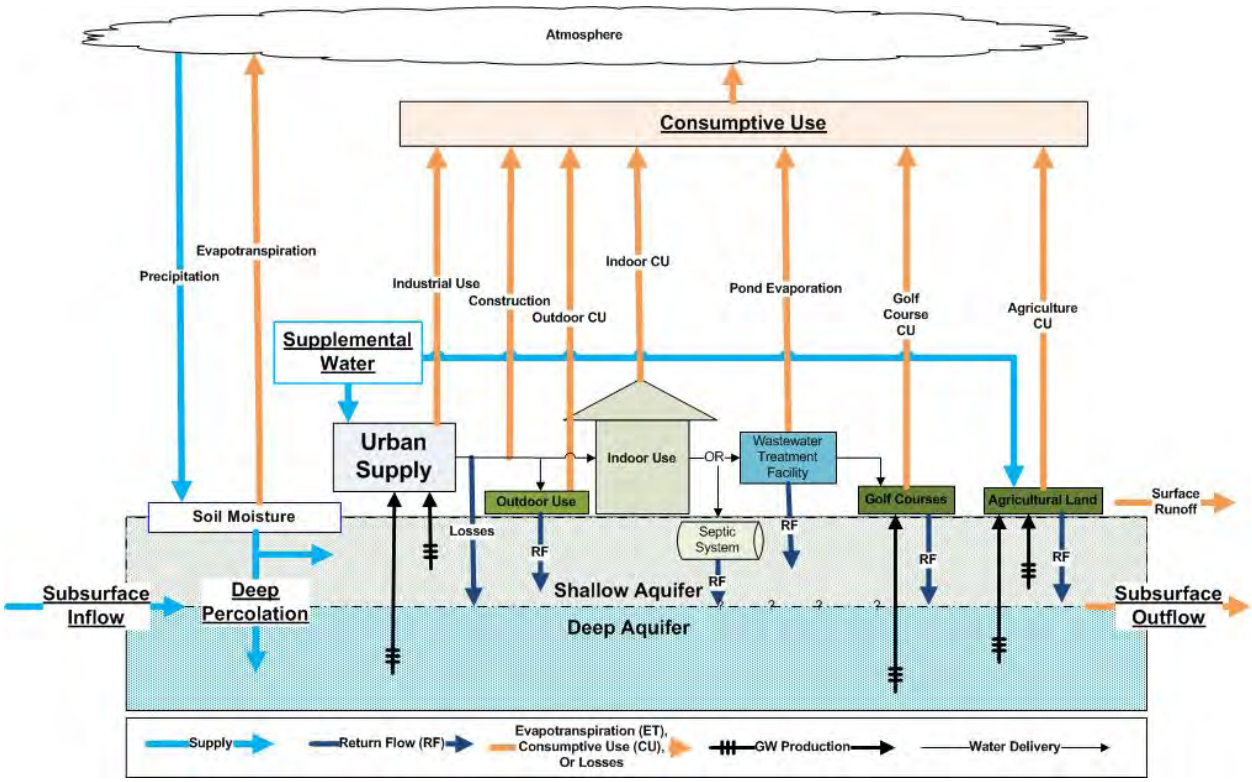

Figure 5-1. Schematic of the Hydrologic Inventory

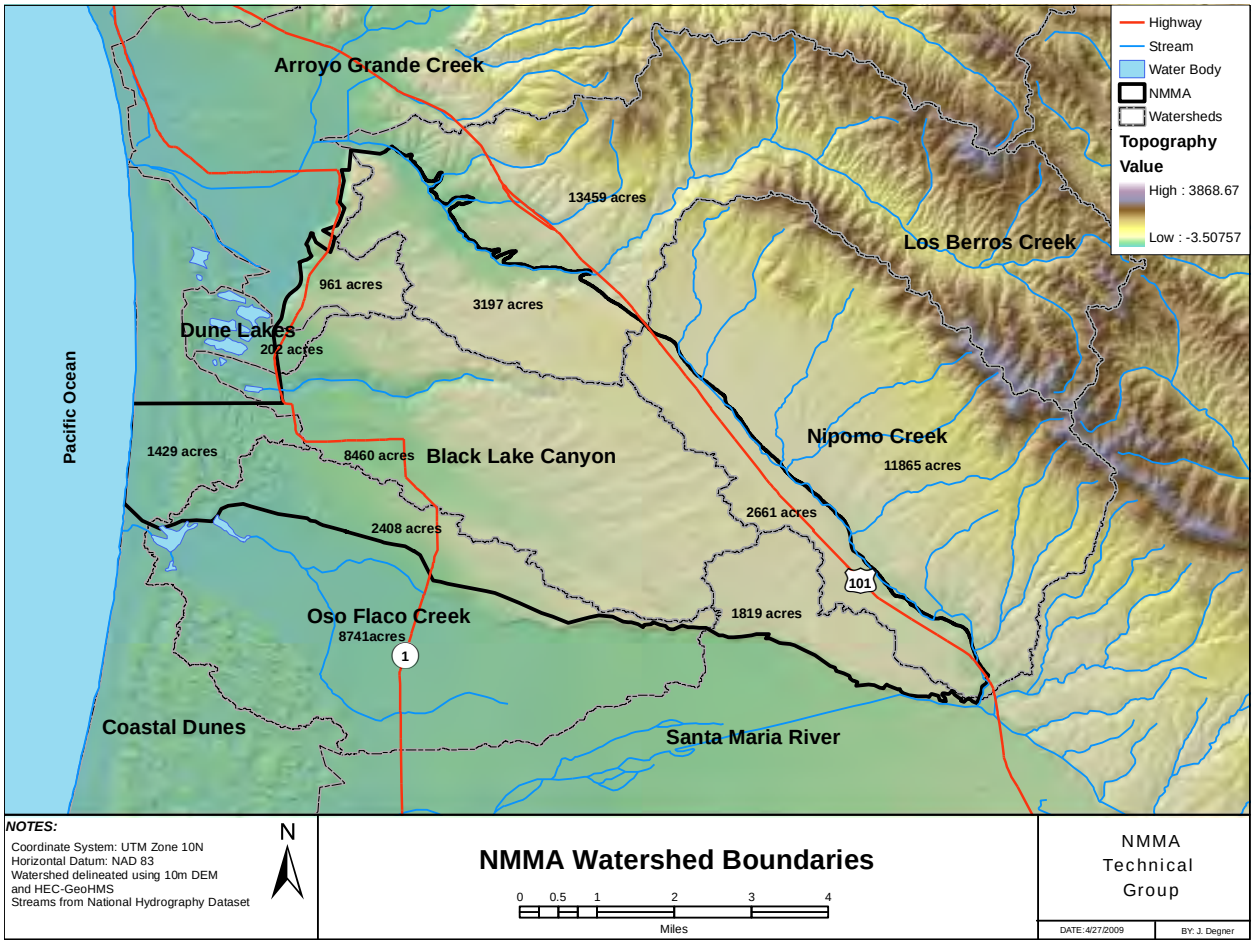

Figure 5-2. NMMA Watershed Boundaries

6. Groundwater Conditions

Groundwater conditions are principally characterized by measurements of groundwater elevations and groundwater quality, and interpretations such as groundwater elevation contours, groundwater gradients, and historical trends in elevations and water quality.

6.1. *Groundwater Elevations*

Groundwater elevations are analyzed using several methods. Hydrographs (graphs of groundwater elevation through time) for wells within and adjacent to the NMMA were updated through calendar year 2012. Hydrographs were constructed for a number of wells, particularly all the Key Wells. The Key Wells generally represent overall groundwater elevations of the principal production aquifers in the inland areas. In coastal monitoring wells, groundwater elevations were graphed for each well completion within a nested site to compare to sea level. Finally, the aggregate of groundwater elevation measurements was used to construct groundwater contour maps for the Spring and Fall of 2012.

6.1.1. Results from Key Wells

Hydrographs were prepared for the Key Wells (Figure 6-1, Figure 6-2). Groundwater elevations in 2012 were above sea level in all Key Wells, though the trend in groundwater elevations varies. Groundwater elevations in the South-East and North-West portions of the NMMA have generally declined since about 2000, although there has been some flattening of the downward trend during the last three years. Groundwater elevations are generally within their historical range, although several of the Key Wells with long historical records are at or near their historical lows (e.g., well 11/35-13C1 [Figure 6-1]) and wells 12/35-33L1 and 11/35-5L1 [Figure 6-2]).

6.1.2. Results from Coastal Monitoring Wells

The elevation of groundwater in the coastal monitoring wells is very important because it is required to determine whether there is an onshore or offshore gradient to the ocean. In only one of two coastal monitoring sites adjacent to the NMMA, groundwater elevations are above the criteria defines the Potentially Severe Water Shortage Conditions (Figure 6-3). In Spring 2012, the groundwater elevation measured in the deeper well at site 12C was above ground surface. The groundwater elevation measured in 12N/36W – 36L1 is below the criteria that defines the Potentially Severe Water Shortage Conditions (

Figure 6-4).

6.1.3. Groundwater Contours and Pumping Depressions

Groundwater elevation data for the deep aquifers were plotted on two separate maps for Spring and Fall of 2012 and contoured by hand. Groundwater elevation contours were constructed for both Spring and Fall of 2012 so that high and low groundwater conditions could be analyzed (Figure 6-5, Figure 6-6).

Spring 2012 contours show an extension of the pumping depression (southeastern shaded area of Figure 6-5) farther to the south compared to Spring 2011, although this extension partly represents an attempt to have conformity of contours between spring and fall maps. The groundwater divide separating the pumping depression from the coast near the southern coastal monitoring well (southwestern shaded areas of Figures 6-5 and 6-6) was some five feet higher in Spring 2012 compared to Spring 2011, as reflected by the 20-ft contours. However, this higher groundwater divide does not carry over to Fall 2012 contours, where the divide is about five feet lower than it was in 2011. In fact, the Fall 2012 divide is low enough that there is a landward gradient from the coastal monitoring wells to the pumping depression.

The pumping depression shown in the Spring and Fall of 2012 (southwestern shaded areas of Figures 6-5 and 6-6) trends in a northwest-southeast direction, parallel to the Santa Maria River and Oceano faults. DWR (2002) suggested that the Santa Maria River fault affected flow in the deep aquifers, with groundwater elevation contours offset by several tens of feet. However, the more-extensive groundwater elevation data set used in this Annual Report could not support this conclusion – the data are too variable from well to well in the eastern portion of the NMMA to detect offset of groundwater contours in the range of tens of feet.

Of additional interest is the area along the northwesterly boundary of the NMMA, adjacent to the Northern Cities Management Area (southwestern shaded areas of Figures 6-5 and 6-6). There continues to be a low-relief “saddle” between the NMMA and the Northern Cities Management Area to the north,

where groundwater elevations are a few feet higher near the boundary between the Management Areas. A new monitoring well drilled in the area has assisted in better-defining the saddle.

Near the coastline, groundwater elevations within the NMMA are above sea level. As in earlier years, there is an area of higher groundwater elevations in the aquifers (groundwater elevations 20 feet or more feet above sea level) between the northern coastal monitoring well site and the pumping depression in the north-central portion of the NMMA (southwestern shaded areas of Figures 6-5 and 6-6). Relief across this area of higher groundwater elevations was 10 to 20 feet in 2012. The highest elevation along the ridge is coincident with the Black Lake Canyon and west from where the Oceano fault crosses Black Lake Canyon.

The groundwater contours along the eastern portion of the NMMA are sub-parallel to the eastern NMMA boundary indicating flow southwest into the NMMA. Besides the possibility of recharge from rainfall and seepage from adjacent older sediments along and to the east of the edge of the NMMA, Los Berros Creek flows across the shallow alluvium, which suggests local recharge may occur.

6.1.4. Groundwater Gradients

Groundwater gradients, direction and magnitude, can be calculated directly from the groundwater elevation contour maps; however, numerical computations are not presented herein (Figure 6-5, Figure 6-6). The discussion of gradients is separated into coastal gradients that could affect potential seawater intrusion and gradients to/from adjacent management areas.

Coastal Gradients

In the coastal portions of the NMMA, there was an offshore gradient in Spring 2012, but in Fall 2012 there was a landward gradient between the southern coastal monitoring well and the inland pumping depression. The groundwater ridge that normally separates the coastal area from inland areas is a transient feature formed because of the inland pumping depression. It is during a relatively dry year that the ridge is most likely to disappear. Although groundwater elevations at the southern coastal monitoring well are above those defined for water shortage conditions, having such a landward gradient from coastal to inland increases the potential for sweater intrusion. This condition is not prudent for the long-term and will continue to be monitored carefully.

Gradients to/from Adjacent Management Areas

As discussed earlier in this section, the groundwater elevation contours between the NMMA and the Northern Cities Management Area consists of a saddle or divide in the groundwater elevations that separate the two management areas. The groundwater elevations near the divide are in the range of several feet higher than adjacent areas.

The northwest groundwater gradient along the southern boundary of the NMMA creates flow into the NMMA from the Santa Maria Valley Management Area (Figure 6-5, Figure 6-6). This northwest gradient is limited to the area between the river and the NMMA boundary. Thus, the groundwater elevation beneath the river represents a boundary, where groundwater flows toward the NMMA north of the river and into the main Santa Maria basin south of the river. This pattern of gradients suggests that the Santa Maria River is a source of supply to both management areas. If the deep aquifers are confined in the area between the river and the NMMA boundary, then recharge from the river to these aquifers must be largely occurring up-gradient in places where no confining conditions exist.

6.2. *Groundwater Quality*

Water quality is a concern for all groundwater producers, although the specific concerns vary by water use. Water quality is somewhat different in different portions of the NMMA because:

- the source of recharge varies for different portions of the aquifer system,
- groundwater can develop different mineral signatures from the rock it flows through, and
- percolation of surface water mobilizes constituents of concern and carries these into the aquifers.

Water quality conditions in the NMMA during calendar year 2012 were relatively unchanged from 2011. The following sections describe coastal water quality and inland water quality conditions.

6.2.1. Results of Coastal Water Quality Monitoring

Quarterly coastal water quality monitoring within the NMMA boundary is currently limited to a single group of monitoring intervals at well 11N/36W-12C1, 2, 3, but the TG is also aware of published data for coastal water quality conditions in the NCMA. Limited historical water quality data are also available for other coastal monitoring wells to either side of the NMMA. Most chloride concentrations in the coastal wells are less than 100 mg/L, and do not show evidence of significant change over time (Figure 6-7). Coastal water quality monitoring at 11N/36W-12C1, 2 & 3 in 2012 also shows consistent results with respect to other common water quality characteristics such as TDS and electrical conductivity (specific conductance; Figure 6-8). Values for these constituents confirm relatively high dissolved ion content in groundwater, but at historically consistent values that are mostly within limits for existing uses.

6.2.2. Results of Inland Water Quality Monitoring

Water quality from inland wells is variable, both between wells (with similar groundwater elevations) and over time within a single well. Neither chloride nor total dissolved solids concentrations have experienced large temporal changes in samples from inland wells. In 2012, localized nitrate concentration measurements continue to be a cause for concern.

Nitrate: Elevated nitrate concentrations in groundwater generally result from anthropogenic causes. Nitrate is principally a potable water concern (as compared to a concern for irrigation water), with a primary drinking water standard of 45 mg/L (nitrate as NO_3, which is used throughout this report).

In calendar year 2012, nitrate concentration measurements within the principal aquifers were mostly below the drinking water standard, but at least two potable water supply wells were impacted by nitrate concentrations in groundwater requiring treatment, blending or substitution from higher quality sources.

Chloride: A primary concern for both drinking water and irrigation use is high chloride concentrations. Depending upon the crop, chloride concentrations well below the drinking water standard of 500 mg/L can cause leaf burn, plant stunting, and plant death. Elevated chloride concentrations can occur in groundwater from the recharge by return flows of water applied to overlying land uses, tidal waters, and shallow lakes, especially in unconfined aquifers.

In calendar year 2012, chloride concentrations were largely unchanged from the previous year. Most of the samples collected had measured concentrations of 60 mg/l chloride or less in the deep aquifer. Shallow wells near industrial and wastewater facilities have the highest chloride concentrations, but the concentrations are below the water quality standards.

Total Dissolved Solids (TDS): In calendar year 2012, TDS concentrations were similar to 2011 results. Based on limited sampling in calendar year 2012, all deep aquifer production and monitoring wells contained TDS at or below 1,000 mg/l, with most wells below 600 mg/l. Groundwater samples from several shallow wells contained total dissolved solids at or above the 1,000 mg/l California recommended secondary standard for TDS. The NMMA TG will continue to monitor the water quality of these wells.

Hydrocarbons. Several local sites of known or potential soil and shallow groundwater contamination are described by environment assessments or ongoing remediation and monitoring activity at sites within the NMMA. These sites are associated with an oil pipeline along Nipomo Creek and a gas station in the eastern portion of the NMMA. The sites are in various stages of assessment or corrective action and are regulated by the RWQCB or other state agencies. Four sites are currently undergoing study or remedial action in the NMMA (see Table 6-1 below).

Table 6-1. State Water Resources Control Board GeoTracker Active Sites

Site Name	Address	Status	Notes
Chevron Station 9-5867	460 West Tefft St	Open; Site Assessment	Leaking underground tank site. In 1998, a release of gasoline was discovered impacting soil.
Nipomo Creek Pipeline, Line 300	671 Oakglen Ave	Open; Post-Cleanup Monitoring	Petroleum hydrocarbon impacted soil and shallow groundwater adjacent to petroleum pipeline at two sites approximately ½ mile apart. Monitoring continues in 2012, following site cleanup in 2011.
Phillips66, Line 300	Tefft St at Carillo St intersection	Open; Site Assessment	Petroleum hydrocarbon impacts to soil and shallow groundwater adjacent to two petroleum pipelines (Phillips66 & Unocal). Site assessment and work plan development ongoing in 2012.
Phillips66 Refinery, Santa Maria Facility	2555 Willow Rd	Open; Site Assessment	Case opened in 1999 to investigate potential soil and shallow groundwater impacts from a coke pile area. Groundwater monitoring ongoing in 2012.
Source: http://geotracker.swrcb.ca.gov			

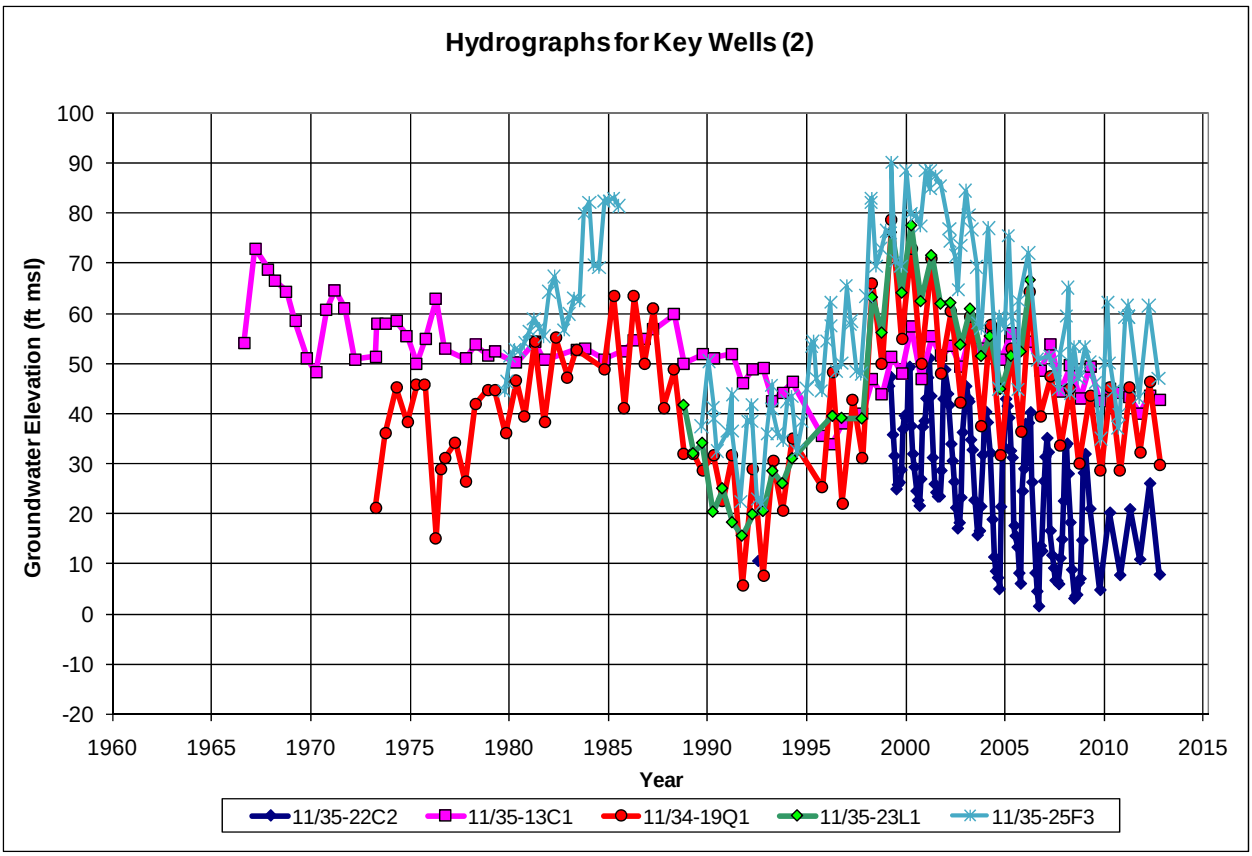

Figure 6-1. Key Wells Hydrographs, South-East Portion of NMMA. Note: Lines between data values are included to track the sequence of points and do not represent measurements**.**

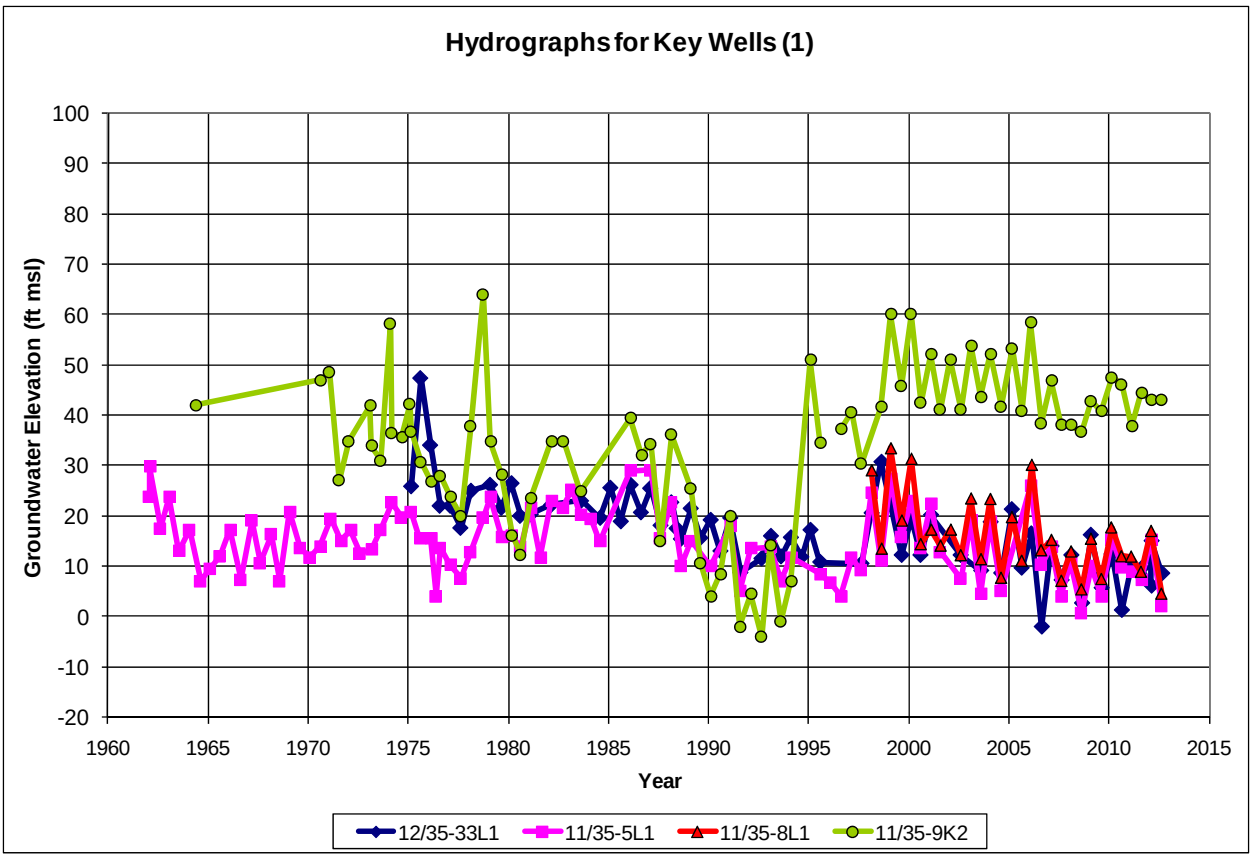

Figure 6-2. Key Wells Hydrographs, North-West Portion of NMMA

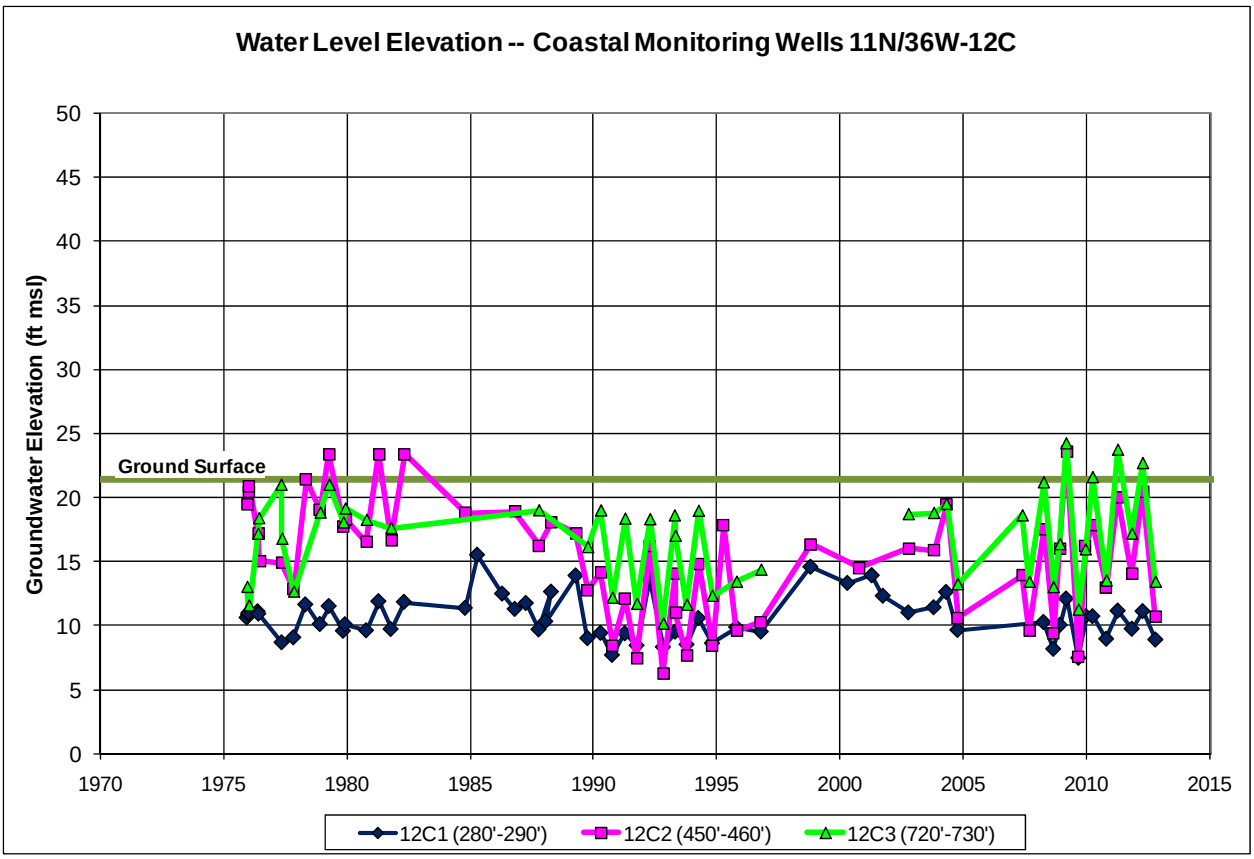

Figure 6-3. Hydrograph for Coastal Monitoring Well Clusters 11N/36W-12C. Note: Water levels measured under artesian flow prior to 2008 were observed without measuring the hydraulic head and recorded as a default value of 2 feet above the casing.

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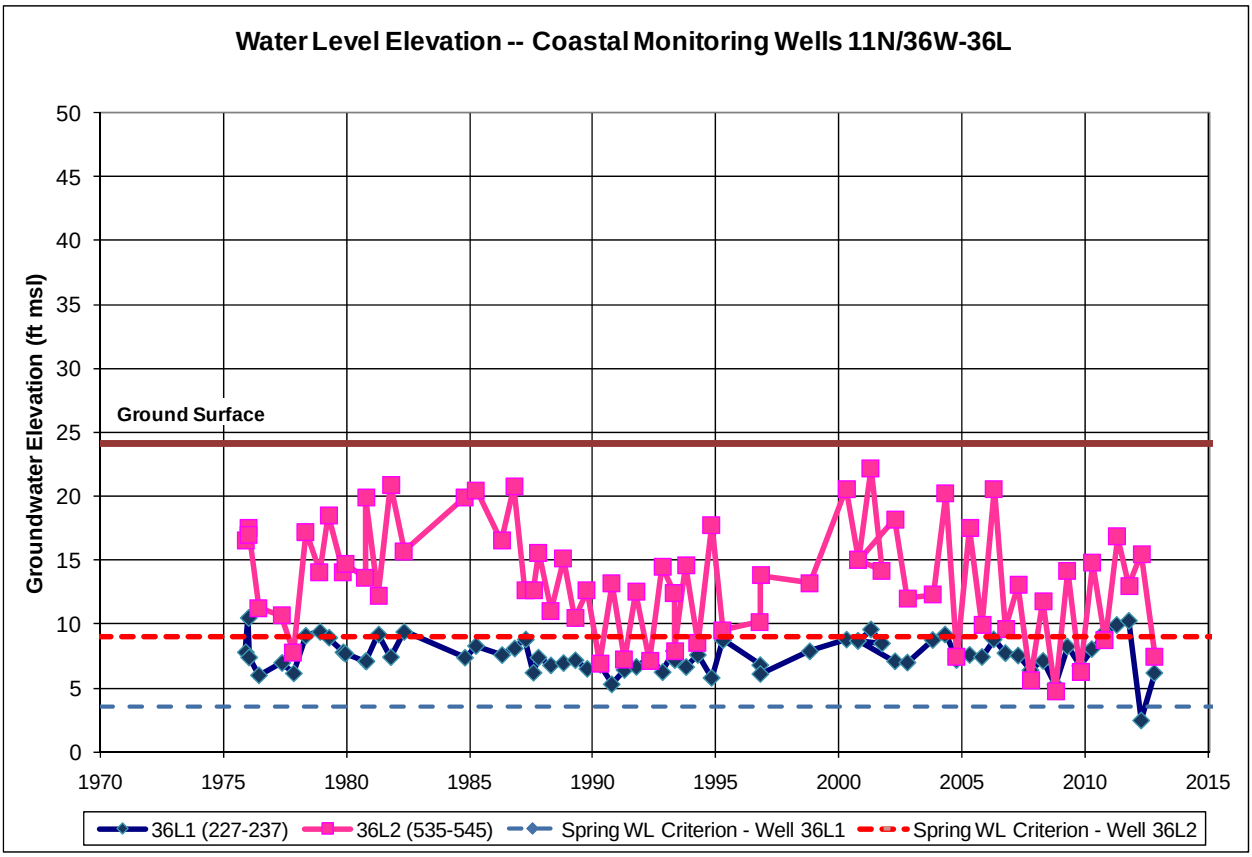

Figure 6-4. Hydrograph for Coastal Monitoring Well Clusters 12N/36W-36L

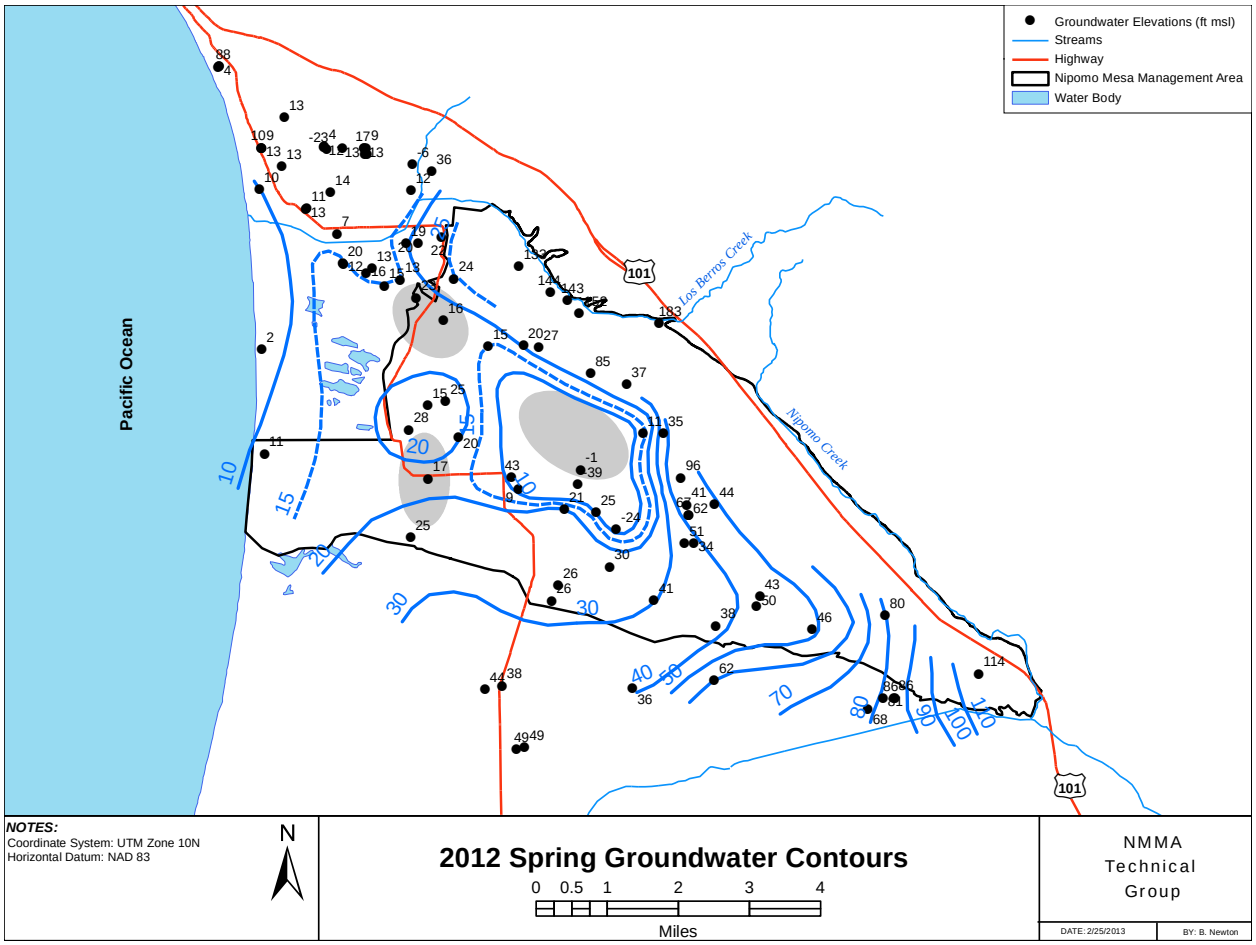

Figure 6-5. 2012 Spring Groundwater Contours

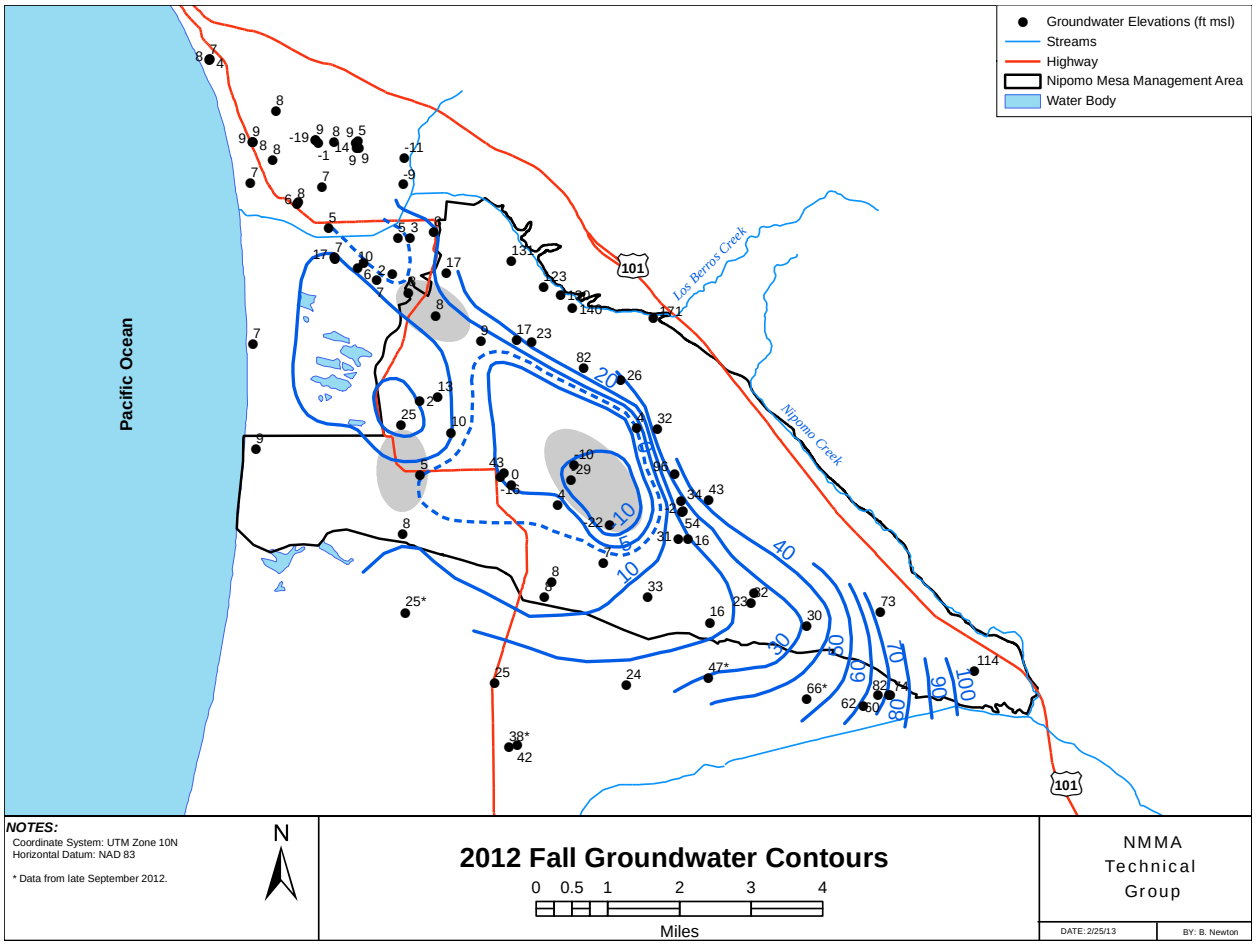

Figure 6-6. 2012 Fall Groundwater Contours

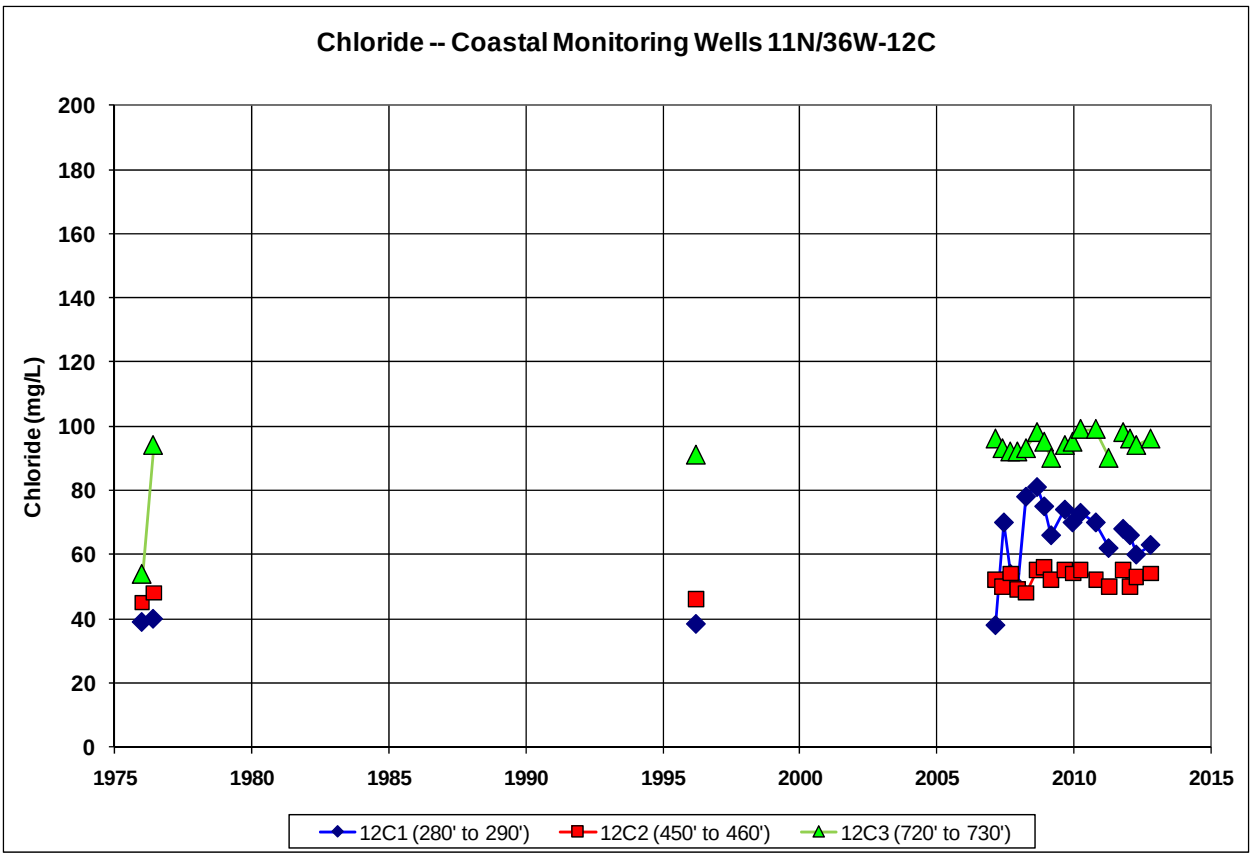

Figure 6-7. Chloride in Coastal Well 11N/36W-12C

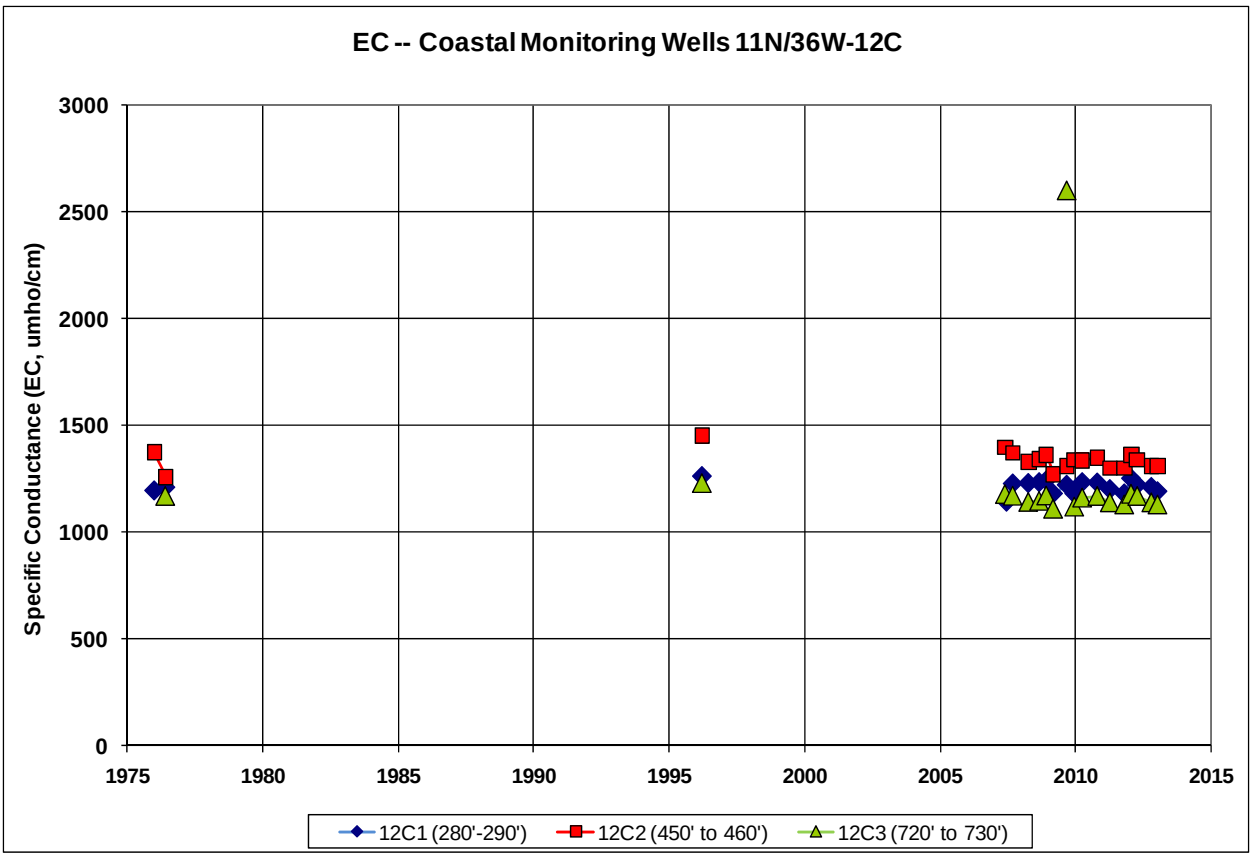

Figure 6-8. Electrical Conductivity in Coastal Well 11N/36W-12C

7. Analyses of Water Conditions

Current groundwater conditions, water shortage conditions, and long-term trends are presented in the following sections, with emphasis on the primary areas of concern.

7.1. *Current Conditions*

7.1.1. Groundwater Conditions

The primary areas of focus in evaluating the conditions of groundwater within the NMMA are: 1) groundwater elevations and water chemistry of coastal monitoring wells, 2) the coastal groundwater gradient, 3) the overall groundwater elevations within the NMMA, as measured by the Key Wells Index, and 4) the extent of the pumping depression.

Coastal Monitoring Wells **– Both groundwater elevations and chloride concentrations in the coastal coastal well cluster within the NMMA have been stable for some years. However, groundwater elevations in the coastal well cluster 12N/36W - 36L have declined the last decade, and currently below the criterion that defines the Potentially Severe Water Shortage Conditions (**

Figure 6-4).

Coastal Groundwater Gradient – There is currently a westward component of flow toward the ocean beneath the coastal dunes, separated from the inland groundwater depression by a transient groundwater divide (see Section 6.1.4 Groundwater Gradients). If the inland groundwater depression continues to expand, a landward gradient from the coastal monitoring wells to the inland groundwater depression may develop. In Spring and Fall 2012, the coastal gradient near Black Lake was towards the offshore with a slight northward component of flow that is more pronounced in the fall.

Key Wells Index – The Key Wells Index indicates trends in groundwater elevations within inland areas of the NMMA, and is intended to reflect whether there is a general balance between inflows and outflows in the NMMA. The 2012 Key Well Index rose sharply from 2011, even though rainfall was 69 percent of long-term average conditions and percolation past the root zone was 970 AF, substantially less than the typical amount. One hypothesis to explain why last year the KWI declined during wetter than normal conditions and this year the KWI rose during drier than normal conditions is that the rainfall last year occurred later than normal in the season. Therefore for last year, the groundwater elevation data collected in April does not represent the impact of the late season rainfall, and the impact of the rainfall is observed in this year groundwater elevation data. Groundwater elevations in several of the wells that make up the Key Wells Index have generally declined since about 2000, whereas groundwater elevations in some of these wells have increased over the past two to three years (see Section 6.1.1 Results from Key Wells). The 2012 Key Wells Index value remains below the threshold criterion for Potentially Severe conditions (Figure 7-2).

Pumping Depression – The groundwater depression within the inland portion of the NMMA was evident in both Spring and Fall 2012 groundwater elevation contours (Figure 6-5, Figure 6-6). This depression creates a transient groundwater divide between both coastal areas and the Northern Cities Management Area. If this groundwater depression widens to the west or lengthens to the north, the groundwater divide may dissipate, resulting in a lack of groundwater gradients from the inland portion of the NMMA toward the coast. This potential reversal of groundwater gradients could create conditions favorable for seawater intrusion. Thus, the TG will carefully monitor this for future reports, in cooperation with the Northern Cities Management Area TG.

The other effect of the groundwater depression could be compaction and dewatering of fine-grained sediments within and adjacent to the aquifers of the NMMA, with subsequent land subsidence. There is currently no evidence of land subsidence within the NMMA, although small amounts of subsidence might go undetected. During dewatering and compaction, it is typically the finer grained sediments that are most impacted rather than the main water-producing horizons.

7.1.2. Hydrologic Inventory

The hydrologic inventory is currently incomplete due to ongoing efforts of the TG to develop an improved understanding of subsurface flow across the NMMA boundaries. Although the hydrologic inventory cannot be used directly to calculate the potential imbalance between inflow and outflow for calendar year 2012, there are a number of observed conditions that indicate that outflow continues to exceed the ability of the inflow to replace groundwater pumped from the aquifers. These indicators include: 1) continued presence of the pumping depression in the NMMA, a portion of which is below sea level; 2) a limited component of seaward flow at the coast; 3) a continued groundwater divide between coastal and inland wells; and, 4) a historical occurrence to the north of seawater intrusion in the deep aquifers.

7.2. *Water Shortage Conditions*

The Stipulation requires the determination of the water shortage condition as part of the Annual Report. Water shortage conditions are characterized by criteria designed to reflect that groundwater levels beneath the NMMA as a whole are at a point at which a response would be triggered to avoid further declines in groundwater levels (Potentially Severe), and to declare that the lowest historic groundwater levels beneath the NMMA as a whole have been reached or that conditions constituting seawater intrusion have been reached (Severe). Potentially Severe Water Shortage Conditions exist in calendar year 2012 based on the groundwater elevation measured in the coastal sentinel well 12N/36W – 36L1 and the KWI.

Potentially Severe Water Shortage Conditions

The Stipulation, page 25, defines Potentially Severe Water Conditions as follows:

Caution trigger point (Potentially Severe Water Shortage Conditions)

(a) Characteristics. The NMMA Technical Group shall develop criteria for declaring the existence of Potentially Severe Water Shortage Conditions. These criteria shall be approved by the Court and entered as a modification to this Stipulation or the judgment to be entered based upon this Stipulation. Such criteria shall be designed to reflect that water levels beneath the NMMA as a whole are at a point at which voluntary conservation measures, augmentation of supply, or other steps may be desirable or necessary to avoid further declines in water levels.

Severe Water Shortage Conditions

The Stipulation, page 25, defines Severe Water Conditions as follows:

Mandatory action trigger point (Severe Water Shortage Conditions)

(a) Characteristics. The NMMA Technical Group shall develop the criteria for declaring that the lowest historic water levels beneath the NMMA as a whole have been reached or that conditions constituting seawater intrusion have been reached. These criteria shall be approved by the Court and entered as a modification to this Stipulation or the judgment to be entered based upon this Stipulation.

7.2.1. Coastal Criteria

The groundwater elevation measured in 12N/36W – 36L1 is below the criterion that defines the Potentially Severe Water Shortage Conditions (

Figure 6-4). However, the fall measurement of groundwater elevation at 36L1 rose to an elevation consistent with historical trends. All other coastal groundwater elevation and water quality criteria for Water Shortage Conditions are at acceptable levels (Table 7-1).

Table 7-1. Criteria for Potentially Severe Water Shortage Conditions

Well	Perforations Elevations (ft msl)	Aquifer	Spring 2012 Elevations (ft msl)	Elevation Criteria (ft msl)	2012 Highest Chloride (mg/L)	Chloride Concentration Criteria (mg/L)
11N/36W-12C1	-261 to -271	Paso Robles	11.1	**5.0**	60	**250**
11N/36W-12C2	-431 to -441	Pismo	20.4	**5.5**	53	**250**
11N/36W-12C3	-701 to -711	Pismo	22.7	**9.0**	94	**250**
12N/36W-36L1	-200 to -210	Paso Robles	2.5	**3.5**	47	**250**
12N/36W-36L2	-508 to -518	Pismo	15.5	**9.0**	130	**250**

7.2.2. Inland Criteria

The inland criteria for Water Shortage Conditions use the Key Wells Index as a basis. The Spring 2012 Key Wells Index was 28.7 ft msl, at a lower elevation than the criterion for Potentially Severe Water Shortage Conditions of 31.5 ft msl, but higher than the Key Wells Index for 2011 (Figure 7-2).

7.2.3. Status of Water Shortage Conditions

The Key Wells Index went below the elevation criterion for Potentially Severe Water Shortage Conditions with the Spring 2008 water level measurements, and has remained so through to Spring 2012. Exiting the Potentially Severe Water Shortage Conditions requires two consecutive years where the Key Wells Index is above the level of Potentially Severe Water Shortage Condition.

The responses required by the Stipulation are set forth as follows:

VI(D)(1b) Responses [Potentially Severe]. *If the NMMA Technical Group determines that Potentially Severe Water Shortage Conditions have been reached, the Stipulating Parties shall coordinate their efforts to implement voluntary conservation measures, adopt programs to increase the supply of Nipomo Supplemental Water if available, use within the NMMA other sources of Developed Water or New Developed Water, or implement other measures to reduce Groundwater use.*

VI(A)(5). …In the event that Potentially Severe Water Shortage Conditions or Severe Water Shortage Conditions are triggered as referenced in Paragraph VI(D) before Nipomo Supplemental Water is used in the NMMA, NCSD, [GSWC], Woodlands and RWC agree to develop a well management plan that is acceptable to the NMMA Technical Group, and which may include such steps as imposing conservation measures, seeking sources of supplemental water to serve new customers, and declaring or obtaining approval to declare a moratorium on the granting of further intent to serve or will serve letters.

Nipomo Mesa groundwater management options to address water shortage conditions include responses required under the Stipulation as well as other possible groundwater management actions to address a range of resource concerns associated with the current Potentially Severe Water Shortage Condition. TG concerns directly relating to groundwater conditions include:

- Depressed groundwater elevations, both as measured by the Key Wells Index and in specific portions of the management area;
- Very limited offshore gradient for a large area of the coastal and central portions of the NMMA;
- Very limited gradient separating the management area with the coastal area of seawater intrusion to the north.

Potential actions to address the above concerns include a range of projects and activities already in place, in progress, or contemplated for future consideration. Many of these possibilities have been reviewed previously in water supply evaluations (SAIC, 2006; Kennedy-Jenks, 2001; Bookman-Edmonston, 1994).

Existing Actions in the NMMA reviewed by the TG include

- Adoption in calendar year 2010 of a purveyor Well Management Plan, which includes conservation, public outreach, and facilities upgrades to allow greater distribution of pumping stresses away from areas of concern (see Section 1.1.6 Well Management Plan)
- Continued progress in 2012 on a NSWP (see Section 1.1.7 Supplemental Water)

Potential actions to be reviewed by the TG include

- Increased development of reclaimed water for certain NMMA water supply needs in lieu of pumping from the deep aquifers.

Different management options have different potential capacity to reduce demand or increase supply, and each has its own technical considerations. By way of example and assuming regulatory agency approval and the establishment of an appropriate cost benefit that meets the requirements of Prop 218 or the PUC, wastewater effluent that is not already reclaimed may be discharged in locations where wastewater effluent would have a beneficial effect on the deep aquifers and in areas closer to the coast.

Areas of special concern with regard to potential shortage conditions have special significance if they experience beneficial results from projects to manage groundwater demands and overall supply. For example, the coastal portion of the NMMA has a limited component of seaward flow, and is threatened on the north by the occurrence of seawater intrusion in the deep aquifers. Actions that maintain a healthy ocean-ward component of flow protect the basin from potential seawater intrusion. Similarly, the pumping depression in the central portion of the NMMA has transient groundwater levels below sea level and is a pronounced feature of the main producing aquifers in the NMMA (see Figures 6-5 and 6-6). Allowing water levels to rebound in this area would also help to maintain protective groundwater gradients.

7.3. *Long-term Trends*

Long-term trends in climate, land use, and water use are presented in the following sections.

7.3.1. Climatological Trends

Climatological trends have been identified through the use of cumulative departure from mean analyses. A cumulative departure from the mean represents the accumulation, since the beginning of the period of record, of the differences (departures) in annual total rainfall volume from the mean value for the period of record. Each year's departure is added to or subtracted from the previous year' cumulative total, depending on whether that year's departure was above or below the mean annual rainfall depth. When the slope of the cumulative departure from the mean is negative (i.e. downward), the sequence of years is drier than the mean, and conversely when the slope of the cumulative departure from the mean is positive (i.e. upward), the sequence of years is wetter than the mean. The cumulative departures from the mean were computed for the rainfall station Mehlschau (38), the longest rainfall record for the NMMA (Figure 7-3).

Historical rainfall records for the Nipomo Mesa begin in 1920. There are three significant long-term dry periods in the record, from 1921 to 1934, from 1944 to 1951, and from 1984 to 1991. Long-term dry periods have occurred in the last 90 years that are longer in duration than the 1987 to 1992 drought (Figure 7-3). Between each large dry period, three wetting periods have occurred. These wetting periods are from 1935 to 1943, from 1977 to 1983, and from 1994 to 2001.

The period of analyses (1975-2012) used by the TG is roughly 9 percent "wetter" on average than the long-term record (1920-2012) indicating a slight bias toward overestimating the amount of local water supply resulting from percolation of rainfall. The Water Years 2007, 2008, and 2009 have had less than average rainfall. Water Year 2007 was approximately 45 percent to 50 percent of average rain fall, Water Year 2008 was approximately 94 percent to 97 percent of average rain fall, and Water Year 2009 was approximately 67 percent to 73 percent of average rain fall. For the past two years, (WY 2010 and WY2011), rainfall was approximately 130 percent and 180 percent of average conditions (Table 3-1).

7.3.2. Land Use Trends

The DWR periodically has performed land use surveys of the South Central Coast, which includes the NMMA, in 1958, 1969, 1977, 1985, and 1996. A land use survey for only the NMMA was performed in 2007 based on 2007 aerial photography (see Section 3.1.8 Land Use). Based on these surveys, land use in the NMMA has changed dramatically over the past half-century (Table 7-2, Figure 7-4, and Figure 7-5). Urban development has replaced native vegetation at an increasing rate, especially over the past 10 years. Agriculture land use has remained relatively constant (see Section 3.1.8 Land Use).

Table 7-2. NMMA Land Use – 1959 to 2007 (acres)

	1959	**1968**	**1977**	**1985**	**1996**	**2007**
Agricultural	1,600	2,000	2,000	2,200	2,000	2,600
Urban	300	700	2,200	3,300	5,800	10,200
Native	19,200	18,400	16,900	15,600	13,300	8,300
Total	21,100	21,100	21,100	21,100	21,100	21,100

7.3.3. Water Use and Trends in Basin Inflow and Outflow

DWR (2002) estimated the Dependable Yield (DWR, 2002. page ES21) for their study area to be between 4,800 and 6,000 AF/yr. Their study area is approximately equivalent to the NMMA.

The estimated groundwater production is 11,250 AF for calendar year 2012, which is about two times the groundwater production in 1975 (Figure 4-1), confirming a trend of increased groundwater production over the last 35 years or so, although, there was a downward trend observed in the past few years. The estimated consumptive use of water for urban, agricultural and golf course, and industrial use for calendar year 2012 is 8,150 AF. Contours of groundwater elevations in this report suggest that there is likely inflow from the Santa Maria Valley Management Area, outflow at the coast (required to prevent seawater intrusion), and subsurface flow into or out of the Northern Cities Management Area. The net subsurface flow to the NMMA is therefore likely to be positive.

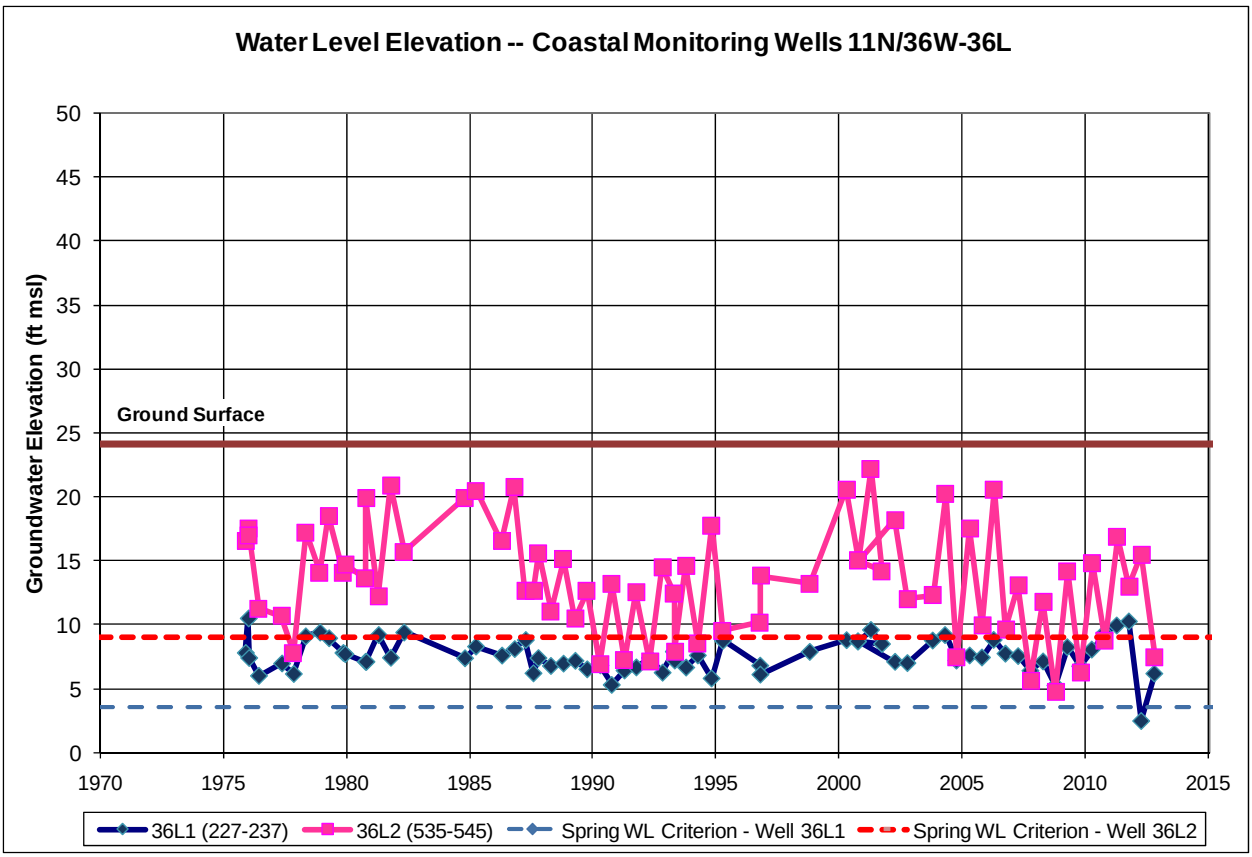

Figure 7-1. Coastal monitoring well cluster 36L. *The criterion for Potentially Severe Water Shortage Conditions indicated by dashed line.*

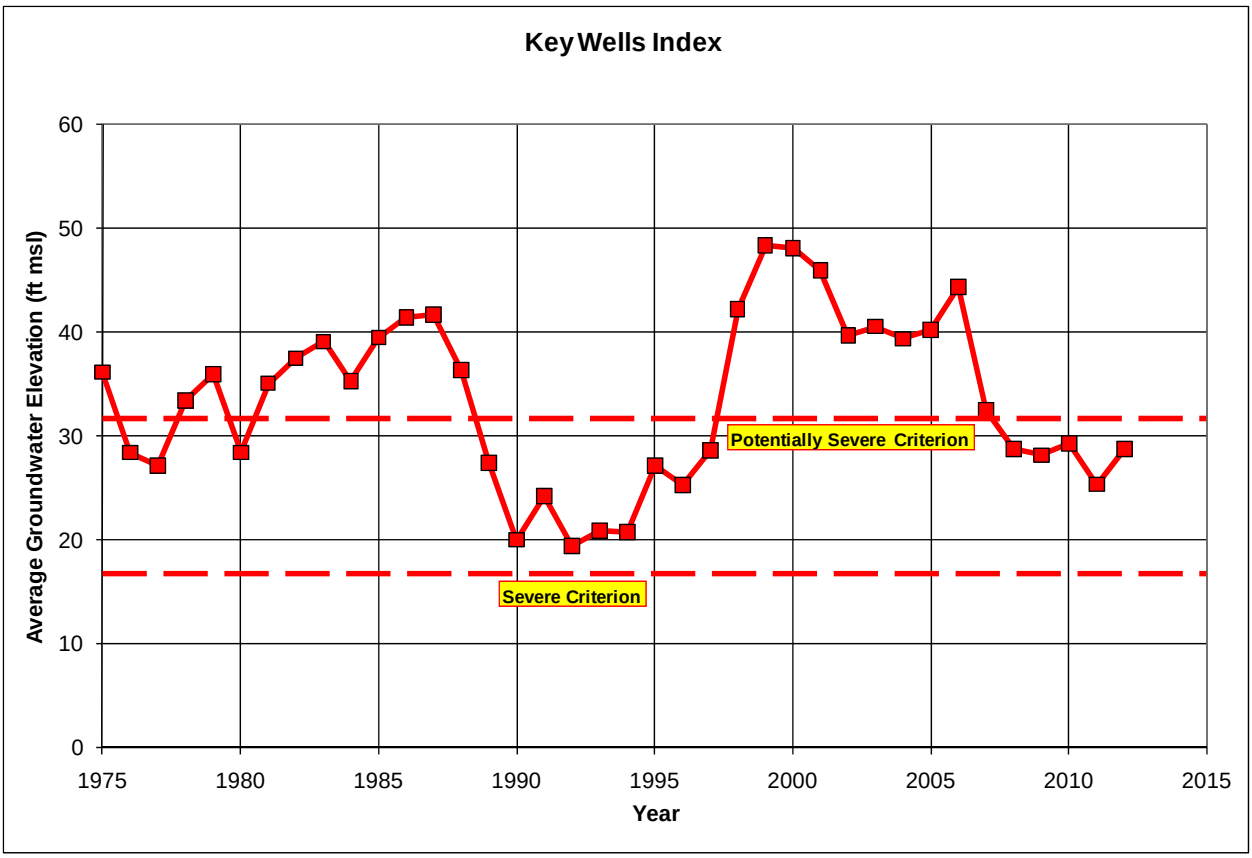

Figure 7-2. Key Wells Index. *The upper dashed line is the criterion for Potentially Severe Water Shortage Conditions and the lower dashed line is the criterion for Severe Water Shortage Conditions.*

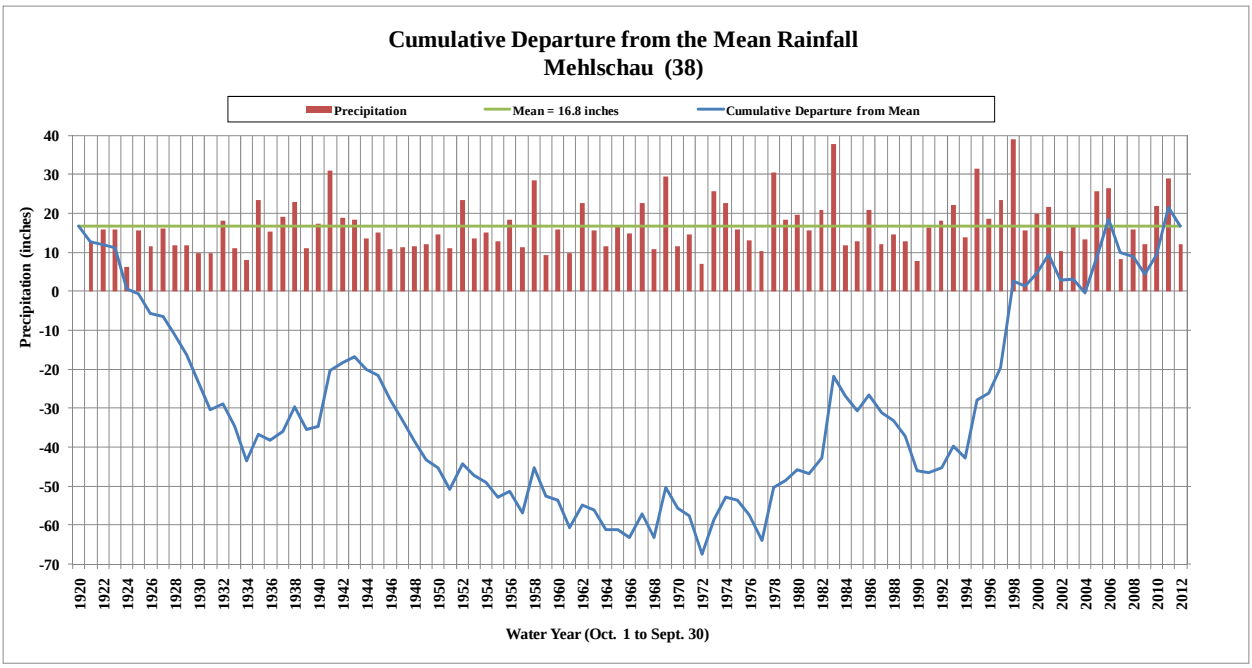

Figure 7-3. Rainfall: Cumulative Departure from the Mean – Rainfall Gauge Mehlschau (38)

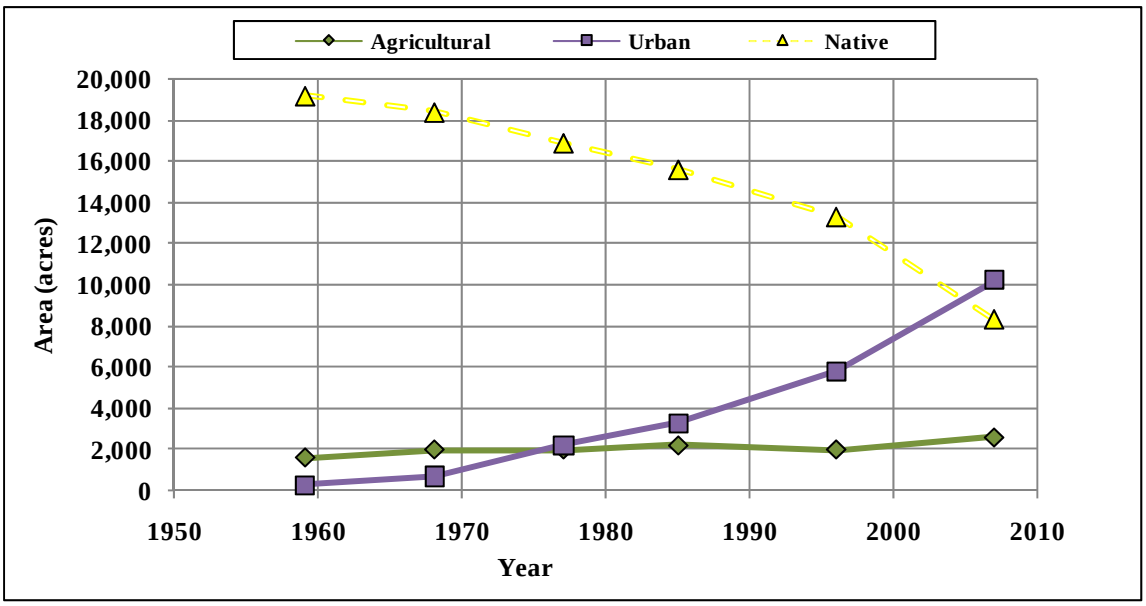

Figure 7-4. NMMA Land Use – 1959 to 2007

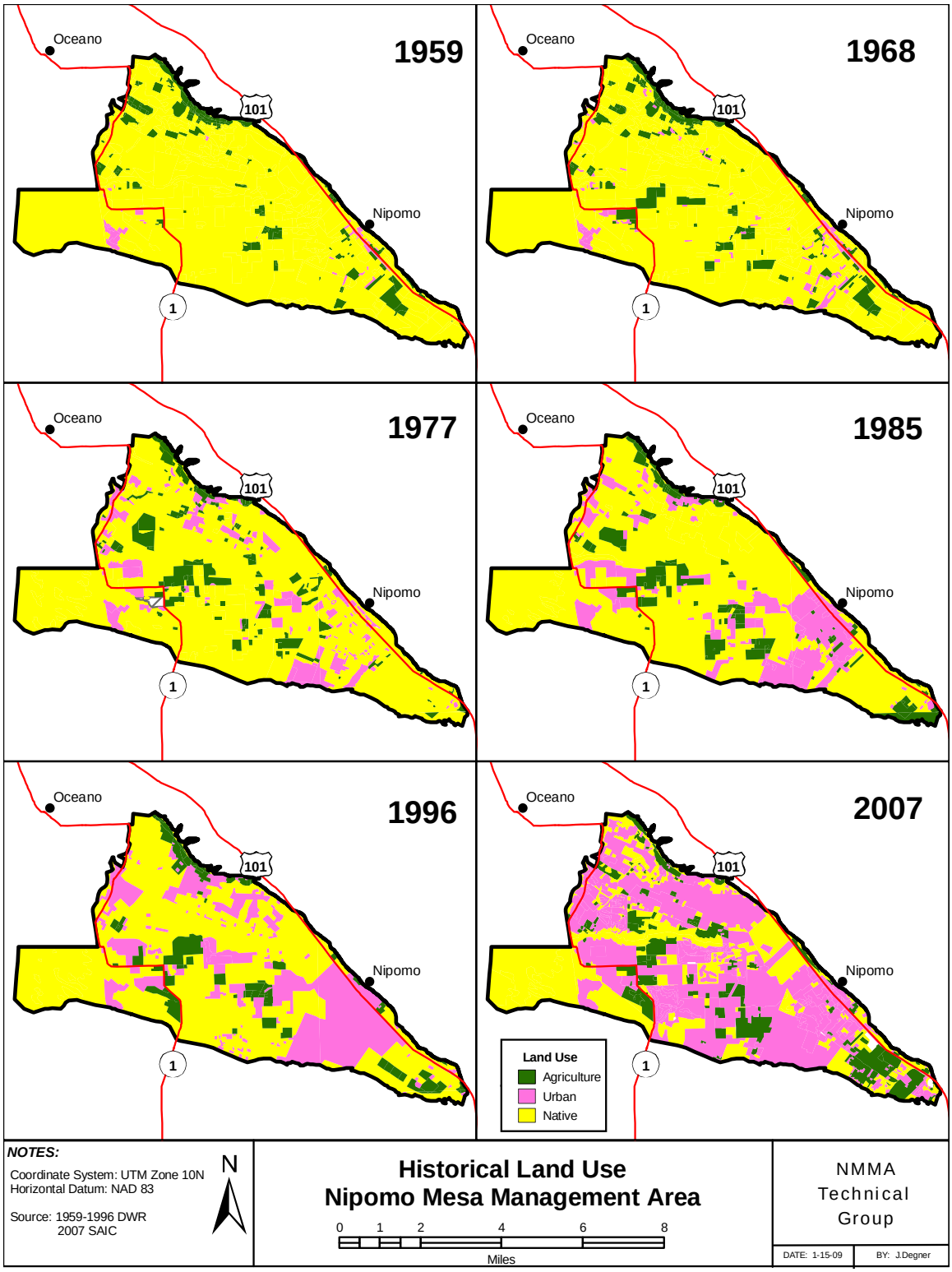

Figure 7-5. Historical Land Use in the NMMA

8. Other Considerations

8.1. *Institutional or Regulatory Challenges to Water Supply*

Several types of entities and individual landowners extract water from aquifers underlying the NMMA to meet water demands and no single entity is responsible for the delivery and management of available water supplies. Each entity must act in accordance with the powers and authorities granted under California law.

The powers and authorities for the Woodlands Mutual Water Company and Nipomo Community Services District are set forth in the California Water Code. The CPUC regulates Golden State Water Company and Rural Water Company. This diversity of the public water purveyors' powers and the locations of their respective service areas (Figure 1-1) must be taken into account in attempting to develop consistent water management strategies that can be coupled with enforceable measures to ensure timely compliance with recommendations made by the TG, or mandatory Court orders. This is particularly true when there are legal requirements relating to the timing of instigating changes in water rates, implementation of mandatory water conservation practices or forcing a change in pumping patterns which may require one entity to deliver water to a location outside its service area.

A cooperative effort among the purveyors and other parties is the only expedient means to meet these institutional and regulatory challenges relating to the water supply and overall management of the NMMA. The purveyors developed a Well Management Plan (WMP) in calendar year 2010 which outlines steps to take in "potentially severe water shortage conditions" as well as in "severe water shortage conditions"[1]. The WMP identifies a list of recommended water use restrictions to limit prohibited, nonessential and unauthorized water uses. For each condition, the WMP also identifies both voluntary and mandatory actions such as conservation goals, shifts in pumping patterns, and potential additional use and pumping restrictions. NCSD is developing the engineering design of the NSWP, which will provide for the delivery of supplemental water within the NMMA.

9. Recommendations

A list of recommendations were developed and published in each of the previous NMMA Annual Reports. The TG will address past and newly developed recommendations along with the implementation schedule based on future budgets, feasibility, and priority. The recommendations are subdivided into three categories: (1) Draft capital and operation expenditure plan, (2) Achievements from earlier NMMA Annual Report recommendations accomplished in 2012; and (3) Technical Recommendations – to address the needs of the TG for data collection and compilation.

9.1. *Funding of Capital and Operating Expenditure Program*

The TG acknowledges that the work items and budget presented below represent a consensus view that additional technical work is necessary beyond that covered under the current annual budget

[1] See Appendix B- "NMMA Water Shortage Conditions and Response Plan" which defines these conditions.

limit. Completing this broader scope of work will require a formal adjustment to the NMMA TG budget limit.

Table 9-1. NMMA 5-Year Cost Analysis

Task Description	Total Cost	Targeted Completion Year	Projected 5-year Cash Flow				
			2013	2014	2015	2016	2017
Yearly Tasks							
Annual Report preparation			$50,000	$50,000	$50,000	$50,000	$50,000
Grant funding efforts			$10,000	$10,000	$10,000	$10,000	$10,000
Confining layer definition			$10,000	$10,000	$10,000	$10,000	$10,000
Well head surveying			$3,000	$3,000	$3,000	$3,000	$3,000
Analytical testing			$5,000	$5,000	$5,000	$5,000	$5,000
Long Term Studies							
Groundwater model (NMMA share)	$250,000	2016	$33,300	$33,300	$33,300	$75,000	$75,000
Capital Projects							
Oso Flaco monitoring well	$130,000	2014	$43,300	$43,300	$43,300	- -	- -
Automatic monitoring equipment	$25,000	2016	- -	- -	- -	$12,500	$12,500
Total Projected Annual Cost			$154,600	$154,600	$154,600	$165,500	$165,500

9.2. *Achievements from previous NMMA Annual Report Recommendations*

The TG worked diligently to address several of the recommendations outlined in the previous Annual Reports. Accomplishments and/or progress made during 2012 include:

- Development of refined cross-sections through key areas of the basin,
- Evaluated the impacts of the Nipomo Supplemental Water Project on the Santa Maria Groundwater Basin and commented, and
- Met with representatives from Northern Cities Management Area and Santa Maria Valley Management Area to discuss groundwater modeling possibilities, groundwater monitoring activities, methodology to estimate percolation, and sea water intrusion findings.

9.3. *Technical Recommendations*

The following technical recommendations are not organized in their order of priority, because the monitoring parties, considering their own particular funding constraints and authorities, will determine the implementation strategies and priorities. However, the TG has suggested a priority for some of the technical recommendations.

- **Supplemental Water Supply –** An additional water supply that would allow for reduced pumping within the NMMA is the most effective method of reducing the stress on the aquifers and allow for groundwater elevations to recover, and provide means for long-term basin management. The NSWP (see Section 1.1.7-Supplemental Water) is the fastest and most viable

method of obtaining alternative water supplies in the next ten years. Given the Potentially Severe Water Shortage Conditions within the NMMA and the other risk factors discussed in this Report, the TG recommends that this project be implemented as soon as possible.

- **Subsurface Flow Estimates – C**ontinue to develop and evaluate geologic cross-sections along NMMA boundaries and make estimates of subsurface flow.

- **Installation of Groundwater Monitoring Equipment –** When a groundwater level is measured in a well, both the length of time since the measured well is shut off and the effect of nearby pumping wells modify the static water level in the well being measured. For the Key Wells, the installation of transducers and data loggers will largely solve this problem. Installation of transducers is also recommended for purveyors' wells that pump much of the time.

- **Changes to Monitoring Points or Methods –** The coastal monitoring wells are of great importance in the Monitoring Program. The inability to locate the monitoring well cluster under the sand dunes proximally north of Oso Flaco Lake renders the southwestern coastal portion of the NMMA without adequate coastal monitoring. During 2009 and 2010, the NMMA TG reviewed options for replacing this lost groundwater monitoring site. The TG was given written support of the concept from the State Parks Department to allow replacement of the well, and the TG has also had discussions with San Luis Obispo County, which may be able to provide some financial assistance for the project. The NMMA TG has incorporated replacement of this monitoring well in its long-term capital project planning and will investigate possible State or Federal grants for financial assistance with the construction of this multi-completion monitoring well.

- **Well Management Plan –** It is recommended that for calendar year 2013, purveyors compile and present to the TG a Well Management Plan status update.

- **County of San Luis Obispo Monitoring Locations –** Review proposed County of San Luis Obispo monitoring well and stream gauge locations.

- **Well Reference Point Elevations –** It is recommended that all the wells used for monitoring have an accurate RP elevation established over time. This could be accomplished by surveying a few wells every year or by working with the other Management Areas and the two counties in the Santa Maria Groundwater Basin to obtain LIDAR data for the region; the accuracy of the LIDAR method allows one-foot contours to be constructed and/or spot elevations to be determined to similar accuracy.

- **Groundwater Production –** Estimates of total groundwater production are based on a combination of measurements provided freely from some of the parties, and estimates based on land use. The TG recommends developing a method to collect groundwater production data from all stipulating parties. The TG recommends updating the land use classification on an interval commensurate with growth and as is practical with the intention that the interval is more frequent than DWR's 10-year cycle of land use classification.

- **Increased Collaboration with Agricultural Producers –** To better estimate agricultural groundwater production where data is incomplete, it is recommended that the TG work with a subset of farmers to measure groundwater production. This measured groundwater production can then be used to calibrate models and verify estimates of agricultural groundwater production where data are not available.

- **Hydrogeologic Characteristics of NMMA –** Further defining the continuity of confining conditions within the NMMA remains a topic of investigation by the TG. The locations of confined and unconfined conditions is important – they control to a significant degree both the NMMA groundwater budget as to the quantity of recharge from overlying sources and any calculation of changes in groundwater storage. Further review of well screen intervals, lithology, groundwater level, and other relevant information to segregate wells into the different aquifers groups (e.g. shallow versus deep aquifers) for preparation of groundwater elevation contour maps for different aquifers. In addition, the NMMA will be requesting geologic information obtained during the PG&E long-term seismic studies program.

- **Modifications of Water Shortage Conditions Criteria –** The Water Shortage Conditions and Response Plan was submitted to the Court in 2008. The TG will review the plan on a regular basis.

- **Groundwater Modeling –** The TG continues to recommend the advancement of a groundwater model as presented in the NMMA 5-year Cost Analysis. This may include collaboration with the Northern Cities Management Area, the Santa Maria Valley Management Area or both.

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Appendices

Appendix A: Monitoring Program

Nipomo Mesa Monitoring Program

Prepared by

Nipomo Mesa Management Area Technical Group

August 2008

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1 INTRODUCTION

1.1 Background

This Monitoring Program is a joint effort of the Nipomo Mesa Management Area ("NMMA") Technical Group ("Technical Group"). The Technical Group was formed pursuant to a requirement contained in the 2005 Stipulation ("Stipulation") for the Santa Maria Basin Adjudication. Sections IV D (All Management Areas) and Section VI (C) (Nipomo Mesa Management Area) contained in the Stipulation were independently adopted by the Court in the Judgment After Trial[1] (herein "Judgment"). The Monitoring Program is a key component of the portions of the Judgment that involve the NMMA and forms the basis for subsequent analyses of the basin to be included in Annual Reports for the NMMA.

This Monitoring Program includes a discussion of the various parameters to be monitored within the NMMA, and a discussion of data analysis methods and water shortage triggers. The Monitoring Program provides a permanent foundation for the type of information to be regularly monitored and collected. However, the Technical Group is expected periodically to evaluate and update the Monitoring Program to ensure it provides comprehensive information sufficient to assess the integrity of water resources within the NMMA. For example, the Technical Group may change or expand monitoring points or types of data to be collected and otherwise periodically amend the Monitoring Program. Material amendments will be submitted for court approval.

1.2 Judgment

As a component of the physical solution for the Santa Maria groundwater basin, the Judgment requires the development and implementation of comprehensive monitoring and reporting in each of three Management Areas in the basin – Northern Cities Management Area, Nipomo Mesa Management Area, and Santa Maria Valley Management Area (Figure 1). For each of these Management Areas the Judgment specifies:

"A Monitoring Program shall be established in each of the three Management Areas to collect and analyze data regarding water supply and demand conditions. Data collection and monitoring shall be sufficient to determine land and water uses in the Basin, sources of supply to meet those uses, groundwater conditions including groundwater levels and quality, the amount and dispositions of Developed Water supplies, and the amount and disposition of any sources of water supply in the Basin.

[1] The Judgment is dated January 25, 2008 and was entered and served on all parties on February 7, 2008. This Monitoring Program is to be submitted for court approval on or before August 6, 2008.

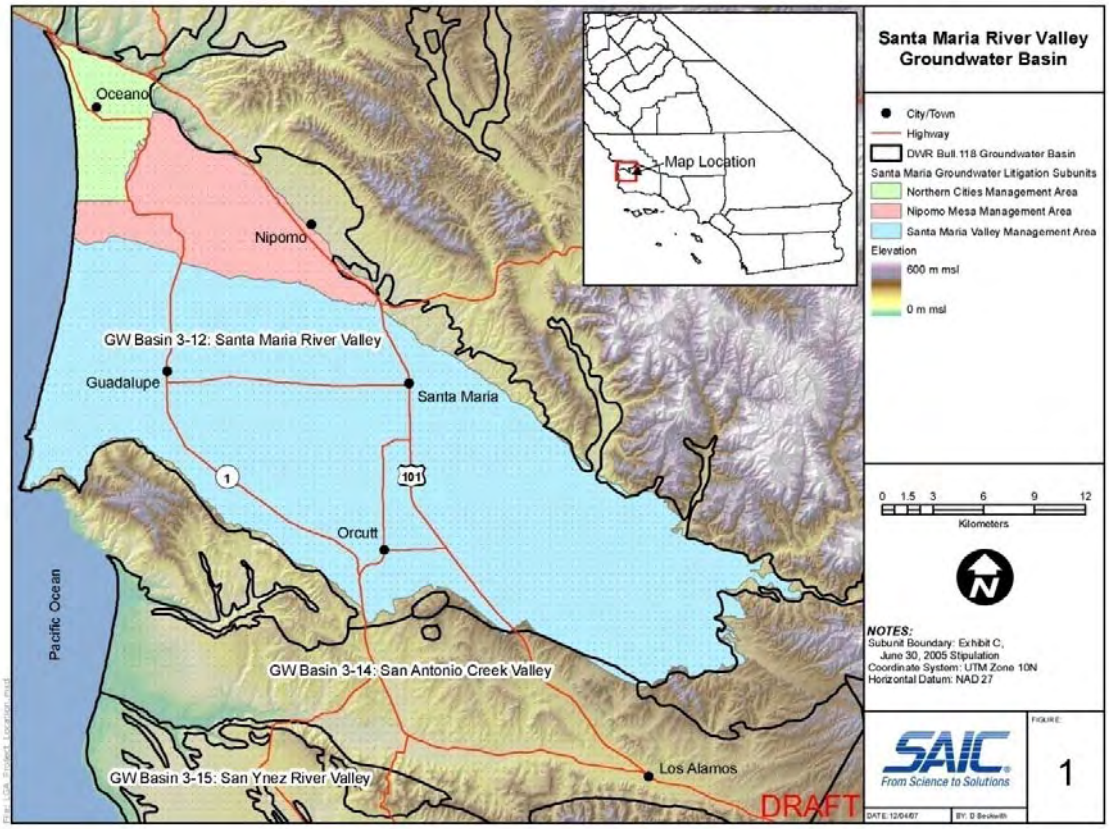

Figure 1. Santa Maria groundwater basin location map.

Within one hundred and eighty days after entry of judgment, representatives of the Monitoring Parties from each Management Area will present to the Court for its approval their proposed Monitoring Program."

The Judgment also requires the NMMA and the Santa Maria Valley management area technical committees to submit for court approval the criteria that trigger responses to "potentially severe and severe shortage conditions" that are specified in the Judgment.

An additional requirement of the Judgment is an Annual Report:

"Within one hundred and twenty days after each Year, the Management Area Engineers will file an Annual Report with the Court. The Annual Report will summarize the results of the Monitoring Program, changes in groundwater supplies, and any threats to Groundwater supplies. The Annual Report shall also include a tabulation of Management Area water use, including Imported Water availability and use, Return Flow entitlement and use, other Developed Water availability and use, and Groundwater use. Any Stipulating Party may object to the Monitoring Program, the reported results, or the Annual Report by motion."

Each Management Area Monitoring Plan will provide the basis for the preparation of the annual reports and the data to support the evaluations for the potentially severe and severe water shortage conditions relevant to the NMMA and the Santa Maria Valley management area.

1.3 Technical Group

The NMMA Technical Group is designated as the Monitoring Party for the NMMA.

Membership

The NMMA Technical Group is designated in the Judgment as including representatives appointed by Nipomo Community Services District, Southern California Water Company (now known as Golden State Water Company), ConocoPhillips, Woodlands Mutual Water Company, and an agricultural overlying owner who is also a Party to the Stipulation. The service areas of purveyors in the Technical Group are indicated in Figure 2.

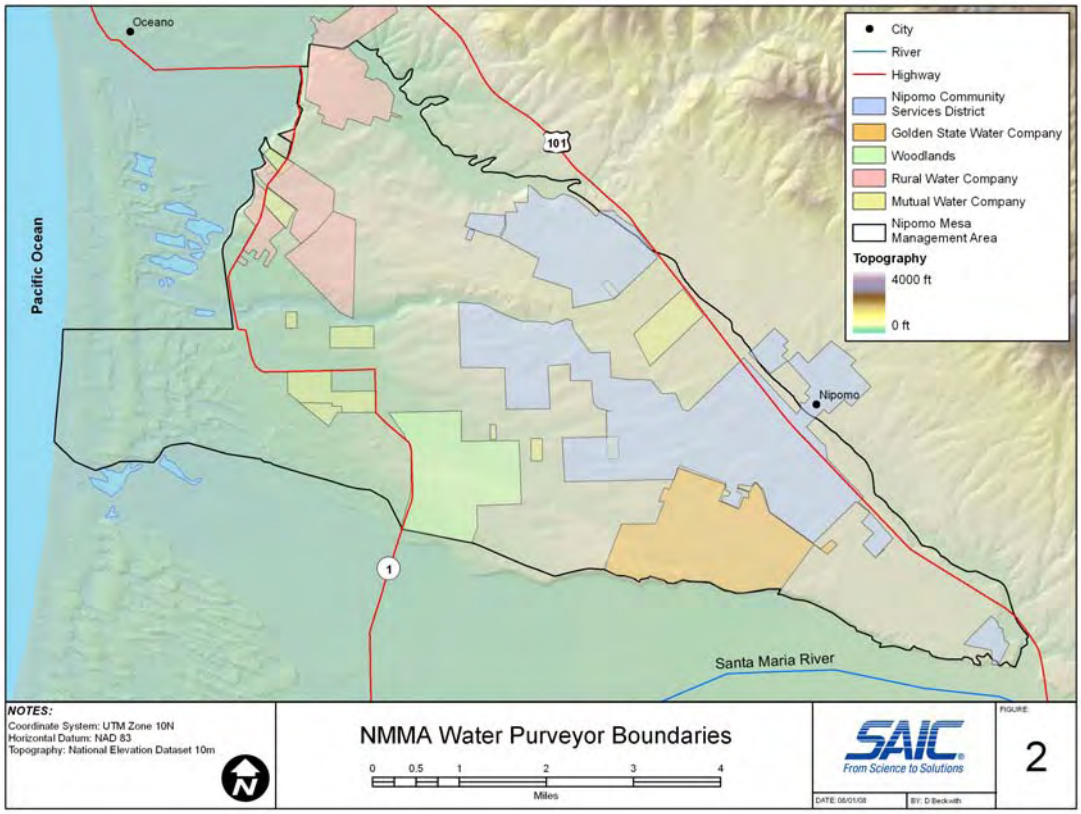

Figure 2. Water purveyors within the NMMA.

Role

The Technical Group is responsible for preparing the Monitoring Program, conducting the Monitoring Program, and preparing the Annual Reports. The Technical Group may hire individuals or consulting firms to assist in the preparation of the Monitoring Program and Annual Reports (the Judgment describes these individuals or consulting firms as the "Management Area Engineer"). The Technical Group has the sole discretion to select, retain, and replace the Management Area Engineer.

To assist the Technical Group in monitoring and analyzing water conditions in the NMMA, Stipulating Parties are required to provide monitoring and other production data at no charge, to the extent that such data have been generated and are readily available. The Technical Group is required to adopt rules and regulations concerning measuring devices that are consistent with the Monitoring Programs of other Management Areas when feasible.

If the Technical Group is unable to agree on any aspect of the Monitoring Program, the matter may be taken to the Court for resolution.

Cost Sharing

The Technical Group functions are to be funded by contribution levels negotiated by Nipomo Community Services District, Golden State Water Company, Rural Water Company, ConocoPhillips, and Woodlands Mutual Water Company. In-lieu contributions through engineering services may be provided, subject to agreement by those parties. The budget of the Technical Group shall not exceed $75,000 per year without prior approval of the Court.

1.4 Objectives Of Monitoring Program

The objectives of the Monitoring Program are to establish appropriate data collection criteria and analytical techniques to be used within the NMMA so that groundwater conditions, changes in groundwater supplies, threats to groundwater supplies, water use, and sources of water can be documented and reported on an annual basis. In addition, data developed through the Monitoring Program will be relied upon to provide the criteria for potentially severe and severe water shortage conditions.

1.5 Reporting Requirements

The Monitoring Program shall be presented for Court approval consistent with the Judgment. The Annual Report shall be submitted to the Court by April 30 of each year (April 29 on leap years).

2 MONITORING PARAMETERS

To satisfy the objectives of the Monitoring Program (section 1.4), data need to be collected from a variety of sources. The data to be collected include:

- Groundwater elevations measured in wells
- Water quality measured in wells
- Precipitation
- Streamflow
- Surface water usage
- Surface water quality
- Land use to the extent differential uses impact the NMMA water budget
- Groundwater pumping (measured)
- Groundwater pumping (estimated)
- Wastewater discharge and reuse amounts and locations

2.1 Groundwater Elevations

The San Luis Obispo County Department of Public Works, the U.S. Geological Survey, the California Department of Water Resources, and some groundwater users within the NMMA periodically gather groundwater elevation data on a large number of wells within the NMMA. Various members of the NMMA Technical Group already maintain these data in digital databases.

Current monitoring of groundwater elevations is conducted primarily by the County of San Luis Obispo, and additionally by Nipomo Community Services District, ConocoPhillips, Woodlands, Golden State Water Company, and Rural Water Company. The Monitoring Program will include compilation of groundwater elevations for a large number (93 initially) of groundwater wells located throughout the NMMA. Typically, groundwater elevations are measured during the fall and spring of each year. The initial list of the wells to be included in the Monitoring Program are shown in the Appendix.

The extensive current monitoring of groundwater elevations within the NMMA is sufficient to provide initial information on groundwater trends. However, there are four additional issues that the Technical Group will consider for further monitoring or analysis over the first years of implementation of the Monitoring Program:

- Additional existing coastal nested monitoring wells will be considered for inclusion in the groundwater elevation monitoring program. These include the 13K2-K6 nested site near Oso Flaco Lake (currently not being monitored) and the 36L1-L2 nested site in the coastal dunes west of Black Lake Canyon (outside the NMMA, currently monitored for groundwater elevations by SLO County).

- The wells used in the Monitoring Program will be investigated as necessary to ensure that the aquifer penetrated by the wells is verified.

- Additional wells may be added as necessary to the Monitoring Program in a phased approach to fill in data gaps recognized during preparation of the Annual Reports.

- The Technical Group may recommend that additional dedicated monitoring well(s) need to be installed at critical locations where no other information is available.

2.2 Groundwater Quality

As an element of compliance with their drinking water reporting responsibilities, public water purveyors within the NMMA have historically gathered and reported groundwater quality data (filed with the California Department of Public Health). In addition, the U.S. Geological Survey, the California Department of Water Resources, and SLO County have also gathered some water quality data within the NMMA. Members of the NMMA Technical Group maintain these data in digital databases.

Of considerable importance is groundwater quality in wells near the ocean, the most likely site where any intrusion of seawater would first be detected. Because there was no current monitoring of groundwater quality in any of the coastal nested monitoring wells, the Monitoring Program will include the following:

- Coastal nested monitoring well site 11N/36W-12C (west of the ConocoPhillips refinery) is now monitored under agreement with SLO County and provides quarterly water quality sampling. Samples are collected for chloride, sulfate, and sodium lab analyses and pH, EC, and temperature are measured in the field.

Regular sampling and analyses of groundwater quality is an important component of the Monitoring Program, because of the potential threat of seawater intrusion at the coastline and potential water quality changes caused by pumping stress in other portions of the NMMA and the basin as a whole. Water quality does not change as rapidly as groundwater elevations, so quality monitoring does not have to be as frequent. With the addition of the coastal nested monitoring data, current water quality monitoring appears to be adequate. However, four aspects of the Monitoring Program will be further evaluated to ensure the ongoing adequacy of the Monitoring Program:

- The Technical Group will arrange to receive water quality monitoring results from purveyors within the NMMA, either directly from the purveyors or annually from the Department of Public Health.

- Coastal nested monitoring well site 12C will be evaluated to determine whether current quarterly sampling can be reduced in frequency (or field testing substituted for laboratory analysis), thus allowing funding for water quality monitoring of additional nested site 13K2-K6 near Oso Flaco Lake (not sampled for three decades) and the 36L1-L2 nested site in the coastal dunes west of Black Lake Canyon (last sampled 12 years ago).

- Each well used for monitoring of groundwater elevations will be tested once for general minerals (if such testing is not already conducted) as budgeting allows. This testing will help further define particular aquifer characteristics.

- A water quality monitoring contingency plan will be developed in the event that there are indications of seawater intrusion in coastal monitoring wells. This contingency plan will consider triggers for increased sampling, both in frequency and in added analytes (e.g., iodide, strontium, boron, oxygen/hydrogen isotopes).

2.3 Precipitation

There is a wide choice of existing precipitation stations that can be used to estimate rainfall within the NMMA. Two gauges are part of the ALERT Storm Watch System, Nipomo East (728) and Nipomo South (730). Other gauges include Simas (201.1), Black Lake (222), Runels Ranch (42.1), Oceano Wastewater Plant (194), Nipomo Mesa (152.1), Peny Ranch (175.1), Mehlschau (38), NCSD Shop (223), Nipomo CDF (151.1), and CIMIS Nipomo #202 Station. As part of the analysis for the Annual Reports, data from an appropriate subset of these gauges will be used to estimate precipitation each year.

2.4 Streamflow

Streamflow can be important both as an input and an output of the water balance for an area. Currently, streamflow within the NMMA is partially gauged. The Los Berros Creek gauge (Sensor 757) is located 0.8 miles downstream from Adobe Creek and 3.7 miles north of Nipomo on Los Berros Road. This station is located approximately where Los Berros Creek conveys water out of the NMMA.

Nipomo Creek is not currently being monitored and is observed to convey water out of the NMMA during some of the year. The Technical Group will consider whether monitoring of Nipomo Creek or any other surface water monitoring is necessary or appropriate.

2.5 Surface Water Quality and Usage

There has been limited surface water monitoring of the dune lake complex and in Black Lake Canyon by the San Luis Obispo Land Conservancy and others. The

Technical Group will evalute whether this monitoring is sufficient and will obtain this and any additional related data as necessary and appropriate.

It is not known whether there are surface water diversions within the NMMA. The Technical Group will investigate this issue and determine whether additional monitoring is necessary and appropriate.

2.6 Land and Water Uses Impacting NMMA Water Balance

Land uses within the NMMA include agricultural, residential/commercial, and undeveloped areas. Land use surveys can be useful both in developing an overall water balance assessment and as an aide to estimate water use when such use is not directly measured. The most common method of conducting a land use survey is to obtain current digital aerial photography, classify the land uses, and create GIS mapping of the various land use classifications. In some cases, field checking is also required to confirm information obtained from aerial photography.

Where necessary, water use may be established based on the various types of land use within the NMMA. Information may be obtained from both published data (including San Luis Obispo County WPA-6) and any information compiled from existing stations installed in and around the NMMA that monitor climate data (CIMIS). This is described in greater detail in Section 2.8.

2.7 Groundwater Pumping (Measured)

Individual landowners, public water purveyors, and industry all rely on groundwater pumping from the NMMA. To the extent users measure their volume of use, these data will be reported to the Technical Group on an annual basis. Stipulating Parties to the Judgment are required to provide monitoring and other production data at no charge, to the extent that such data have been generated and are readily available.

Pursuant to paragraph 5 of the Judgment, the Technical Group retains the right to seek a Court Order requiring non-stipulating parties to monitor their well production, maintain records thereof, and make the data available to the Court or the Court's designee.

2.8 Groundwater Pumping (Estimated)

Some groundwater users do not measure the volume of their groundwater production, and thus, this increment of groundwater pumping will have to be estimated each year. There are several methods of estimating groundwater pumping when totalizing meters are not installed. For cooperating pumpers, electrical records for pumping can be used, with the most accuracy obtained when the wells are tested regularly for pump efficiency.

Another method of estimating agricultural pumping is through self-reporting or surveys of crop type and irrigated acreage. For agriculture, water use can then be

estimated using calculations that include crop water demand, effective precipitation, evapotranspiration, irrigation efficiency, and leaching requirements. An active California Irrigation Management Information System (CIMIS) station is located in the southern portion of the Woodlands within the NMMA and provides a useful reference for Nipomo Mesa evapotranspiration. A second active station is located adjacent to the Sisquoc River, above Tepusquet Creek.

For municipal or mixed rural lands, estimates will be based on acreage and development type. In some urban lands, a "unit water use" can be derived from average water consumption recorded from comparable or historical conditions.

To develop a complete picture of groundwater withdrawals for Nipomo Mesa, the Technical Group will develop methods for estimating unmetered groundwater pumping that will likely include some combination of those discussed above.

2.9 Wastewater Discharge and Reuse

Four wastewater treatment facilities discharge treated effluent within the NMMA and include the following: NCSD's Southland Wastewater Treatment Facility in the eastern portion of Nipomo Mesa, NCSD's wastewater treatment plant at Blacklake Village, Cypress Ridge's wastewater treatment facility, and the Woodland's wastewater treatment facilities. The Monitoring Program will include an annual compilation of wastewater treatment plant discharges, any reuse of the treated water (quantities and locations), and available water quality parameters.

3 DATA ANALYSIS & WATER SHORTAGE TRIGGERS

The primary purpose of the Monitoring Program is to detect changes in groundwater conditions that indicate current and future water supply problems within the NMMA. Although the determination of methods of data analysis and subsequent triggers that can indicate negative water supply conditions are not elements of the Monitoring Program, initial assessment of these issues are the responsibility of the Technical Group. A short discussion of potential methodologies follows.

3.1 Data Analysis

The focus of data analysis is to help detect and predict whether any conditions exist that could harm the aquifer, either by excessive drawdown or by degrading water quality. In evaluating the Monitoring Program data, the Technical Group will establish methodologies to use monitoring data to define the "health" of the basin. Among the methodologies that the Technical Group will evaluate in developing potentially severe and severe water shortage triggers are:

- **Coastal monitoring wells** – trends in water quality and groundwater elevations. Establish criteria to recognize both the potential for seawater intrusion and evidence of actual seawater intrusion.

- **Coastal groundwater gradient** – the direction and magnitude of groundwater flow either towards the ocean or in a landward direction. Establish criteria to recognize conditions that could cause seawater intrusion.

- **NMMA-wide groundwater elevation contouring** – establish groundwater flow directions, detect areas of increased drawdown, determine how pumping patterns are affecting the basin and the effects of any changes in the location of pumping that may serve to mitigate negative impacts.

- **Key wells** – indicator wells in key areas that track changes in groundwater elevations and water quality. Establish criteria to determine whether monitored changes could potentially be harmful to the aquifers.

- **Groundwater in storage** – calculation of changes of groundwater in storage and consideration of changes of groundwater storage over time can be used to analyze trends in the basin hydrologic balance.

3.2 Water Shortage Triggers

The Stipulation requires that water level and water quality criteria are to be established that will trigger responses to potential water shortages (the potentially severe and severe water shortage conditions). The Technical Group will rely on the Monitoring Program data and protocol in establishing the proposed criteria for these triggers. The triggers points will be presented for court approval, as required in the Stipulation, prior to or concurrent with the filing of the first Annual Report in 2009. Annual Reports will include an assessment of basin conditions relative to the proposed trigger points.

APPENDIX – MONITORING POINTS

The monitoring points shown on Figure A-1 and in Table A-1 are the 93 initial wells that the NMMA Technical Group determined would provide information to evaluate the health of the Nipomo Mesa portion of the Santa Maria basin. Many of the wells indicated are currently being monitored (see Table A-1), with the remainder planned to be monitored prior to preparation of the first Annual Report.

As discussed in the main text of this Monitoring Program, wells will be added and/or dropped in subsequent years as the basin is evaluated annually. The addition and/or subtraction of monitoring wells will be based on data gaps, areas of special concern that require more monitoring, and data redundancy. Information from some of the wells listed in Table A-1 that are monitored by the County of San Luis Obispo may not be available because of privacy concerns – this issue will be addressed prior to preparation of the first Annual Report.

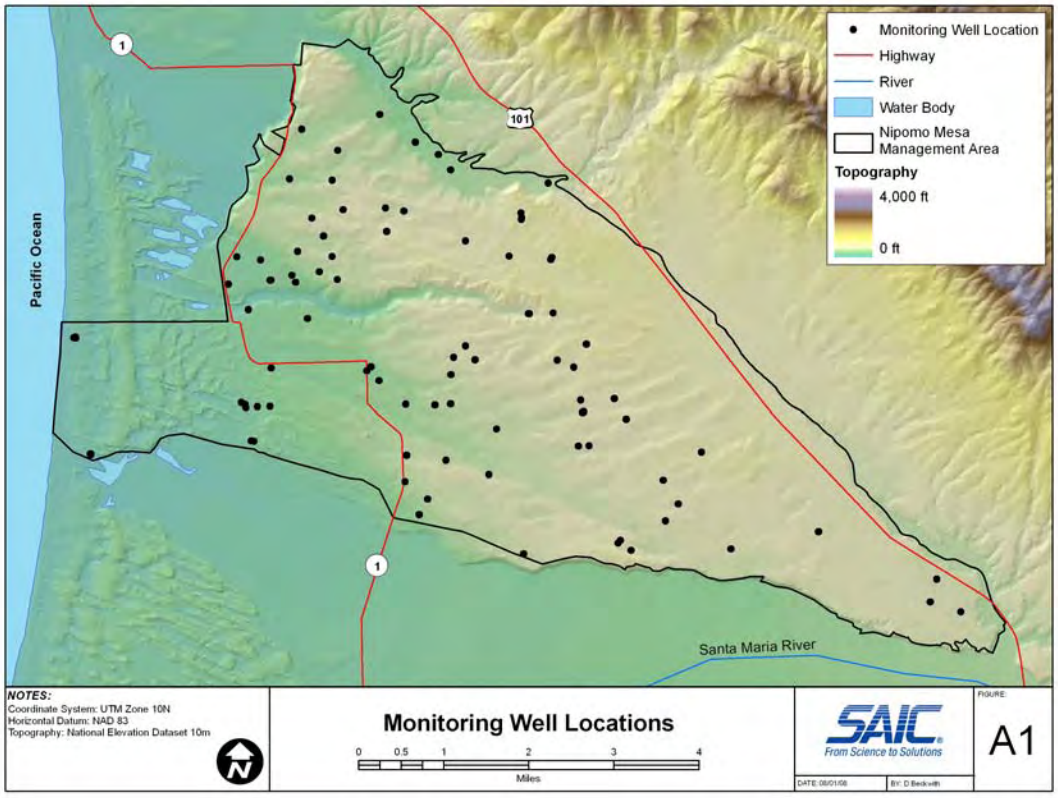

Figure A-1. Locations of monitoring points listed in Table A-1.

Appendix B: Water Shortage Conditions and Response Plan

Nipomo Mesa Management Area

Water Shortage Conditions and Response Plan

Nipomo Mesa Management Area
Technical Group

April 2009

The Santa Maria basin was divided into three management areas as a result of the adjudication of the Santa Maria groundwater basin. The June 30, 2005 Stipulation ("Stipulation"), the terms of which are incorporated into the Court's Judgment dated January 25, 2008 ("Judgment"), established the boundaries of the Nipomo Mesa Management Area ("NMMA"), and provided for a technical group (NMMA Technical Group) to oversee management of the NMMA. As part of the Stipulation, the Technical Group was tasked to develop a Monitoring Program that shall include the setting of well elevations and groundwater quality criteria that trigger the responses set forth in Paragraph VI(D) of the Stipulation.

The NMMA Technical Group prepared a Monitoring Program dated August 5, 2008 that was submitted to the Court in accordance with the Judgment. This Water Shortage Conditions and Response Plan is an addendum to the Monitoring Program and completes the Monitoring Program requirements as defined in the Stipulation.

This document is divided into three sections:

I. Water Shortage Conditions Nipomo Mesa Management Area,
II. Response Plan for Potentially Severe and Severe Water Shortage Conditions, and
III. Discussion of Criteria for Potentially Severe and Severe Water Shortage Conditions.

I. Water Shortage Conditions Nipomo Mesa Management Area

Water shortage conditions are characterized by criteria designed to reflect that groundwater levels beneath the NMMA as a whole are at a point at which a response would be triggered to avoid further declines in groundwater levels (Potentially Severe), and to declare that the lowest historic groundwater levels beneath the NMMA as a whole have been reached or that conditions constituting seawater intrusion have been reached (Severe).

Groundwater levels beneath the NMMA as a whole impact the cost of pumping, the quality of groundwater pumped, and the overall flow of fresh water to the ocean that balances potential seawater intrusion. Lowering of groundwater levels below certain thresholds is to be curtailed by importing supplemental water, increasing conservation, and decreasing consumptive use of groundwater produced.

The NMMA Technical Group has developed criteria for declaring the existence of Potentially Severe and Severe Water Shortage Conditions. These criteria represent the conditions in both coastal and inland wells, and depend upon measurements of groundwater elevation and groundwater quality.

While this Response Plan relies on quantitative measurements of groundwater levels, the Technical Group acknowledges these measurements are subject to many variables so that

any given measurement may only be accurate within a percentage range; no given measurement is exact or precise. For example, water level measurements obtained from groundwater production wells may be influenced by a range of factors, including but not limited to temperature, the method, protocol, and equipment used to obtain the measurement, the condition of the well, the time allowed for water levels in a previously producing well to equilibrate, and any nearby wells that remain pumping while the measurements are taken. As well, the historic data used as the basis to set action levels for Severe and Potentially Severe Water Shortage Conditions may be influenced by these and other factors. Finally, while there is sufficient historical data to reliably set Severe and Potentially Severe Water Shortage Conditions criteria, as more data is gathered pursuant to the NMMA Monitoring Plan, the Technical Group expects its understanding of NMMA characteristics will become increasingly more sophisticated and accurate. As a result of these considerations, the Technical Group acknowledges and expects that it will recommend modifications to the Severe and Potentially Severe Water Shortage Conditions criteria as more data are obtained on a consistent basis and as the Technical Group's understanding of the NMMA characteristics improves over time.

Seawater intrusion is a condition that could permanently impair the use of the principal producing aquifer to meet water demands of the NMMA. For coastal areas, the criteria described here are set either to indicate conditions that, if allowed to persist, may lead to seawater intrusion or increasing chloride concentrations, or that actual seawater intrusion has occurred.

Monitoring Wells

As with the NMMA Monitoring Plan, primary data for this Water Shortage Conditions and Response Plan is derived from a select group of wells located within the NMMA. Identification of these wells and the selection criteria are as follows.

Coastal sentinel wells, installed by the Department of Water Resources in the 1960s, are monitored to characterize any condition for the advancement of seawater into the freshwater aquifer. Specifically, the groundwater elevation and concentration of indicator constituents are evaluated to determine the threat or presence of seawater intrusion to the fresh water aquifer. These coastal monitoring wells are as follows:

Coastal Well	Perforation Elevation (ft msl)	Aquifer
11N/36W-12C1	-261 to -271	Paso Robles
11N/36W-12C2	-431 to -441	Pismo
11N/36W-12C3	-701 to -711	Pismo
12N/36W-36L1	-200 to -210	Paso Robles
12N/36W-36L2	-508 to -518	Pismo

For inland areas, criteria for water shortage conditions are based on annual Spring groundwater elevation measurements made in key wells located inland from the coast (the "Key Wells Index"). The inland Key Wells are as follows:

Key Wells
11N/34W-19
11N/35W-5
11N/35W-8
11N/35W-9
11N/35W-13
11N/35W-22
11N/35W-23
12N/35W-33

Potentially Severe Water Shortage Conditions

The Stipulation, page 25, defines Potentially Severe Water Conditions as follows:

Caution trigger point (Potentially Severe Water Shortage Conditions)[1]

(a) Characteristics. The NMMA Technical Group shall develop criteria for declaring the existence of Potentially Severe Water Shortage Conditions. These criteria shall be approved by the Court and entered as a modification to this Stipulation or the judgment to be entered based upon this Stipulation. Such criteria shall be designed to reflect that water levels beneath the NMMA as a whole are at a point at

[1] The multiple citations to and partial restatements of the Stipulation are intended to provide context to this Water Shortage Conditions and Response Plan. However, neither the restatement of a portion of the Stipulation herein, nor the omission of a portion of a quotation from the Stipulation, is intended to override or alter the mutual obligations and requirements set forth in the Stipulation.

which voluntary conservation measures, augmentation of supply, or other steps may be desirable or necessary to avoid further declines in water levels.

Inland Areas: The NMMA Technical Group set the criteria for a Potentially Severe Water Shortage Condition to the elevation of groundwater as determined by the Key Wells Index. If the Spring groundwater elevations indicate that the Key Wells Index is less than 15 feet above the Severe Water Shortage criterion (equal to **31.5 ft msl**[2]**)**, the Technical Group will notify the Monitoring Parties of the current data, and evaluate the probable causes of this low level as described below. If the Key Wells Index continues to be lower than **31.5 ft msl** in the following Spring, the Technical Group will report to the Court in the Annual Report that Potentially Severe Water Shortage Conditions are present and provide its recommendations regarding the appropriate response measures. During the period a Potentially Severe Water Shortage Condition persists, the NMMA Technical Group shall include in each Annual Report an assessment of the hydrologic conditions and any additional recommended response measures. A discussion of how the groundwater elevations criteria were determined is presented in discussion Section III. Potentially Severe Water Shortage Conditions will no longer be considered to exist when: 1) the Key Well Index is above the Potentially Severe criterion of 31.5 ft msl for two successive Spring measurements, or 2) the Key Well Index is 5 ft or higher above the Potentially Severe criterion (which calculates to 36.5 ft msl) in any Spring measurement. Alternatively, the NMMA Technical Group may determine that the Potentially Severe Water Shortage Condition no longer exists when the Key Well Index is above the Potentially Severe criterion of 31.5 ft msl and conditions warrant this conclusion.

The Key Well Index criteria for Potentially Severe Water Shortage Conditions may be modified in the future by the Technical Group as more data are developed on the accuracy of measured data and Key Well construction or condition.

Coastal Areas: The NMMA Technical Group set the coastal criteria for a Potentially Severe Water Shortage Condition using both groundwater surface elevation and groundwater quality measured in the coastal monitoring wells, as presented in the table below. The groundwater elevation criteria are discussed in Section III. The groundwater quality portion of the coastal criteria is set at **250 mg/L** chloride. There is no water quality criterion for the shallow alluvium. Potentially Severe Water Shortage Conditions are determined if either the Spring groundwater elevation drops below the criteria elevation, or chloride concentration exceeds the criteria concentration, in any of the coastal monitoring wells subject to the Response Plan data analysis and verification described below.

[2] The decimal point does not imply the accuracy of the historical low calculation.

The NMMA Technical Group will report to the Court in the Annual Report that Potentially Severe Water Shortage Conditions are present and provide its recommendations regarding the appropriate response measures. During the period a Potentially Severe Water Shortage Condition persists, the Technical Group shall include in each Annual Report an assessment of the hydrologic conditions and any additional recommended response measures.

When Spring groundwater elevations or groundwater quality subsequently improves so that the criteria threshold for two successive measurements are no longer exceeded, Potentially Severe Water Shortage Conditions will no longer be considered to exist. Alternatively, the Technical Group may determine that the Potentially Severe Water Shortage Condition no longer exists when the Spring groundwater elevation or groundwater quality criteria threshold are no longer exceeded in a single measurement and conditions warrant this conclusion.

The coastal threshold criteria for Potentially Severe Water Shortage Conditions may be modified in the future by the Technical Group as more data are developed on the accuracy and extent of the coastal data, including the potential for inclusion of additional coastal monitoring wells into the Monitoring Plan.

Criteria for Potentially Severe Water Shortage Conditions, Coastal Area

Well	Perforation Elevation (ft msl)	Aquifer	Elevation Criteria (ft msl)	Chloride Concentration Criteria (mg/L)
11N/36W-12C1	-261 to -271	Paso Robles	**5.0**	**250**
11N/36W-12C2	-431 to -441	Pismo	**5.5**	**250**
11N/36W-12C3	-701 to -711	Pismo	**9.0**	**250**
12N/36W-36L1	-200 to -210	Paso Robles	**3.5**	**250**
12N/36W-36L2	-508 to -518	Pismo	**9.0**	**250**

Severe Water Shortage Conditions

The Stipulation, page 25, defines Potentially Severe Water Conditions as follows:

Mandatory action trigger point (Severe Water Shortage Conditions)

(a) Characteristics. The NMMA Technical Group shall develop the criteria for declaring that the lowest historic water levels beneath the NMMA as a whole

have been reached or that conditions constituting seawater intrusion have been reached. These criteria shall be approved by the Court and entered as a modification to this Stipulation or the judgment to be entered based upon this Stipulation.

Inland Areas: A Severe Water Shortage Condition exists when the Key Wells Index is less than **16.5 feet msl**, using Spring groundwater elevation measurements. The Mandatory Response Plan will remain in effect until groundwater elevations as indicated by the Key Wells Index are 10 ft above the Severe criterion (which calculates to **26.5 feet msl**). Alternatively, the NMMA Technical Group may determine that the Severe Water Shortage Condition no longer exists when the Key Well Index is above the Severe criterion of 16.5 ft msl and conditions warrant this conclusion.

The criteria for Severe Water Shortage Conditions may be modified in the future by the Technical Group as more data are developed on the accuracy of measured data and Key Well construction or condition.

Coastal Areas: The NMMA Technical Group set the coastal criteria for Severe Water Shortage Condition to the occurrence of the chloride concentration in groundwater greater than the drinking water standard in any coastal monitoring well. Thus, the coastal criterion for a Severe Water Shortage Condition is the chloride concentration exceeding **500 mg/L** in any of the coastal monitoring wells. If the criterion is exceeded, an additional sample will be collected and analyzed from that well as soon as practicable to verify the result. The response triggered by the measurement will not be in effect until the laboratory analysis has been verified. If the chloride concentration subsequently improves above the criterion threshold for two successive Spring measurements, Severe Water Shortage Conditions will no longer be considered to exist. Alternatively, the Technical Group may determine that the Severe Water Shortage Condition no longer exists when groundwater quality criteria threshold are no longer exceeded in a single measurement and conditions warrant this conclusion.

The coastal threshold criteria for Severe Water Shortage Conditions may be modified in the future by the Technical Group as more data are developed on the accuracy and extent of the coastal data, including the potential for inclusion of additional coastal monitoring wells into the Monitoring Plan.

II. Response Plan for Potentially Severe and Severe Water Shortage Conditions

("Response Plan")

Introduction

This Response Plan is triggered by criteria designed to reflect either Potentially Severe Water Shortage Conditions or Severe Water Shortage Conditions. Nothing in this Response Plan is intended to, nor shall operate so as to reduce, limit or change the rights, duties, and responsibilities of the parties to this Response Plan as those rights, duties, and responsibilities are stated in the Stipulation and the Judgment.

1. Potentially Severe Water Shortage Conditions

The responses required by the Stipulation are set forth as follows:

VI(D)(1b) Responses [Potentially Severe]. *If the NMMA Technical Group determines that Potentially Severe Water Shortage Conditions have been reached, the Stipulating Parties shall coordinate their efforts to implement voluntary conservation measures, adopt programs to increase the supply of Nipomo Supplemental Water*[3] *if available, use within the NMMA other sources of Developed Water or New Developed Water, or implement other measures to reduce Groundwater use.*[4]

VI(A)(5). …In the event that Potentially Severe Water Shortage Conditions or Severe Water Shortage Conditions are triggered as referenced in Paragraph VI(D) before Nipomo Supplemental Water is used in the NMMA, NCSD, [GSWC[5]*], Woodlands and RWC agree to develop a well management plan that is acceptable to the NMMA Technical Group, and which may include such steps as imposing conservation measures, seeking sources of supplemental water to serve new customers, and declaring or obtaining approval to declare a moratorium on the granting of further intent to serve or will serve letters.*[6]

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[3] A defined term in the parties' Stipulation. The following terms, when used in this Response Plan, are terms whose definitions are found in the Stipulation and that definition is specifically incorporated herein and adopted as the meaning of these terms: "Developed Water," "Groundwater," "Native Groundwater," "New Developed Water," "Nipomo Supplemental Water," "Nipomo Supplemental Water Project," "Stipulating Parties" and "Year."
[4] Ibid at p.25.
[5] Name changed from Southern California Water Company (SCWC) in 2005.
[6] Ibid at p.22.

The Response Plan shall be implemented when the Potentially Severe Water Shortage Conditions occur within the NMMA. The Response Plan is a combination of technical studies to better determine the nature of the threat, water supply and demand actions to mitigate overall conditions in the NMMA, and compliance with the Stipulation and the Judgment. The Response Plan includes, where applicable, the following:

1. Coastal Groundwater Elevation and/or Groundwater Quality Conditions:
   a. Verify that the measurement is not an anomaly by retesting at the site(s) of exceedence as soon as practicable and again in the following month.
   b. Characterize the extent of either low groundwater elevation(s) or increased chloride concentration(s) near the coast, which might include adding and/or installing additional monitoring points.
   c. Identify, to the extent practical, factors that contributed to the low groundwater elevations in coastal monitoring wells.
   d. Investigate whether increased chloride concentration(s) indicate intrusion of seawater or other causes through chemistry/geochemistry studies.

2. Inland Groundwater Elevation Condition:
   a. Verify that the measurement is not an anomaly by retesting at the site(s) of exceedence as soon as practicable and again in the following month.
   b. Characterize the extent of the area where groundwater elevation(s) have decreased sufficiently to lower the Key Wells Index.
   c. Identify factors that contributed to the low groundwater elevation(s) in coastal monitoring wells.

3. Implement sections VI(D)1(b) and VI(A)(5) of the Stipulation, as reproduced above.

4. When either the groundwater quality or groundwater elevation conditions are confirmed, the following provisions apply to the Response Plan for Potentially Severe Water Shortage Conditions:

   a. ConocoPhillips shall have the right to the reasonable and beneficial use of Groundwater on the property it owns as of the date of the Stipulation located in the NMMA without limitation.[7]

[7] Ibid at p. 23.

b. Overlying Owners that are Stipulating Parties that own land located in the NMMA as of the date of the Stipulation shall have the right to the reasonable and beneficial use of Groundwater on their property within the NMMA without limitation.[8]

c. Woodlands shall not be subject to restriction in its reasonable and beneficial use of Groundwater, provided it is concurrently using or has made arrangements for other NMMA parties to use within the NMMA, the Nipomo Supplemental Water allocated to Woodlands. Otherwise, Woodlands shall be subject to reductions equivalent to those imposed on NCSD, GSWC, and RWC.[9]

2. Severe Water Shortage Conditions

The responses required by the Stipulation are set forth following:

VI(D)(1b) Responses [Severe]. *As a first response, subparagraphs (i) through (iii) shall be imposed concurrently upon order of the Court. The Court may also order the Stipulating Parties to implement all or some portion of the additional responses provided in subparagraph (iv) below.*

(i) For Overlying Owners other than Woodlands Mutual Water Company and ConocoPhillips, a reduction in the use of Groundwater to no more than 110% of the highest pooled amount previously collectively used by those Stipulating Parties in a Year, prorated for any partial Year in which implementation shall occur, unless one or more of those Stipulating Parties agrees to forego production for consideration received. Such forbearance shall cause an equivalent reduction in the pooled allowance. The base Year from which the calculation of any reduction is to be made may include any prior single Year up to the Year in which the Nipomo Supplemental Water is transmitted. The method of reducing pooled production to 110% is to be prescribed by the NMMA Technical Group and approved by the Court. The quantification of the pooled amount pursuant to this subsection shall be determined at the time the mandatory action trigger point (Severe Water Shortage Conditions) described in Paragraph VI(D)(2) is reached. The NMMA Technical Group shall determine a technically responsible and consistent method to determine the pooled amount and any individual's contribution to the pooled amount. If the NMMA Technical Group cannot agree upon a technically responsible and consistent method to determine the pooled amount, the matter may be determined by the Court pursuant to a noticed motion.

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[8] Ibid.
[9] Ibid at p. 23.

(ii) ConocoPhillips shall reduce its Yearly Groundwater use to no more than 110% of the highest amount it previously used in a single Year, unless it agrees in writing to use less Groundwater for consideration received. The base Year from which the calculation of any reduction is to be made may include any prior single Year up to the Year in which the Nipomo Supplemental Water is transmitted. ConocoPhillips shall have discretion in determining how reduction of its Groundwater use is achieved.

(iii) NCSD, RWC, SCWC, and Woodlands (if applicable as provided in Paragraph VI(B)(3) above) shall implement those mandatory conservation measures prescribed by the NMMA Technical Group and approved by the Court.

(iv) If the Court finds that Management Area conditions have deteriorated since it first found Severe Water Shortage Conditions, the Court may impose further mandatory limitations on Groundwater use by NCSD, SCWC, RWC and the Woodlands. Mandatory measures designed to reduce water consumption, such as water reductions, water restrictions, and rate increases for the purveyors, shall be considered.

(v) During Severe Water Shortage Conditions, the Stipulating Parties may make agreements for temporary transfer of rights to pump Native Groundwater, voluntary fallowing, or the implementation of extraordinary conservation measures. Transfer of Native Groundwater must benefit the Management Area and be approved by the Court.[10]

The following Response Plan for Severe Water Shortage Conditions is premised on the assumption that the Nipomo Supplemental Water Project within the NMMA is fully implemented and yet Severe Water Shortage Conditions exist.

If either the coastal or inland criteria occur for Severe Water Shortage Conditions within the NMMA, a Response Plan shall be implemented. The Response Plan is a combination of technical studies to better determine the nature of the threat, water supply and demand actions to mitigate overall conditions in the NMMA that triggered a Response Plan, and compliance with the terms of the Stipulation and the Judgment. It includes, where applicable, the following NMMA Technical Group actions:

1. Groundwater Quality Condition:
   a. Verify data.

[10] Ibid at pp. 25-27.

b. Investigate whether increased chloride concentration(s) indicate intrusion of seawater or result from other causes through chemistry/geochemistry studies.

c. Characterize the extent of the increase in chloride concentration(s), which may include adding additional monitoring points and/or installing new monitoring points.

d. Given information from sections (a) and (b) above, identify the factors that may have caused the groundwater quality degradation.

2. Groundwater Elevation Condition:

a. Verify that the measurement is not an anomaly by retesting at the site(s) of exceedence as soon as practicable and again in the following month.

b. Characterize the extent of the area where groundwater elevation(s) have decreased sufficiently to lower the Key Wells Index.

c. Identify the factors that contributed to the low groundwater elevation(s) in key wells.

3. As a first response, the NMMA Technical Group shall request the Court to order concurrently sections VI(D)(1b)(i) through (iii) of the Stipulation, as reproduced above.

4. Prepare a semi-annual report on the trend in chloride concentration for the Court. If chloride concentration(s) continue to increase at the coastline, request the Court to implement section VI(D)(1b)(iv) of the Stipulation, as reproduced above.

5. During Severe Water Shortage Conditions, the Stipulating Parties may make agreements for temporary transfer of groundwater pumping rights in accordance with section VI(D)(1b)(v) of the Stipulation, as reproduced above.

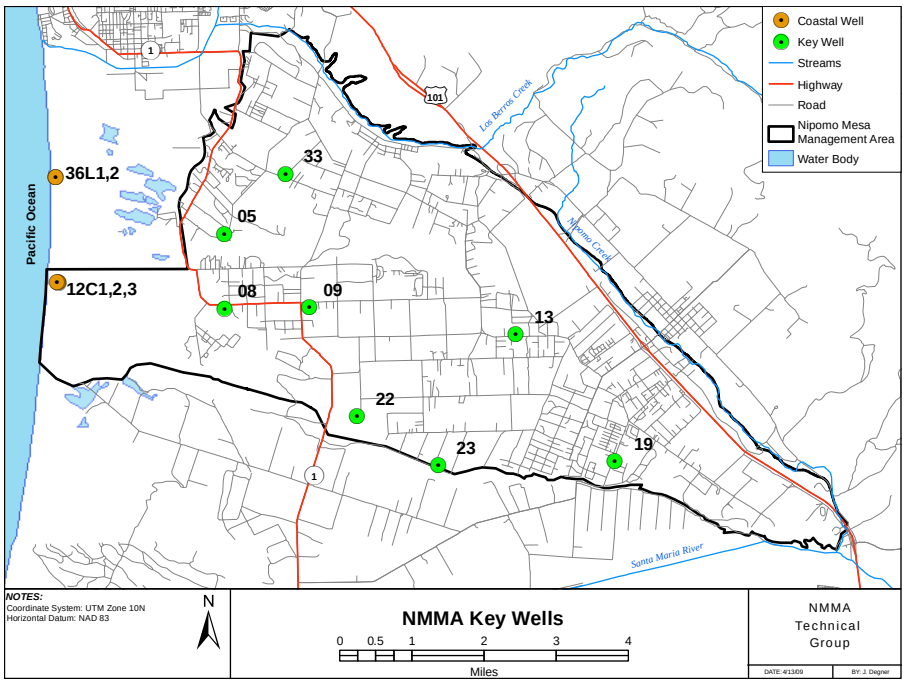
III. Discussion of Criteria for Potentially Severe and Severe Water Shortage Conditions

1. Water Shortage Conditions as a Whole

The Stipulation established that the Severe Water Shortage Conditions is characterized by the lowest historic groundwater levels beneath the NMMA as a whole. The NMMA Technical Group selected the data from eight inland key wells to represent the whole of the NMMA. These wells are listed in the following tabulation and are shown on the

figure entitled “NMMA Key Wells”. The average Spring groundwater elevation of these key wells is used to calculate the Key Wells Index (“Index”).

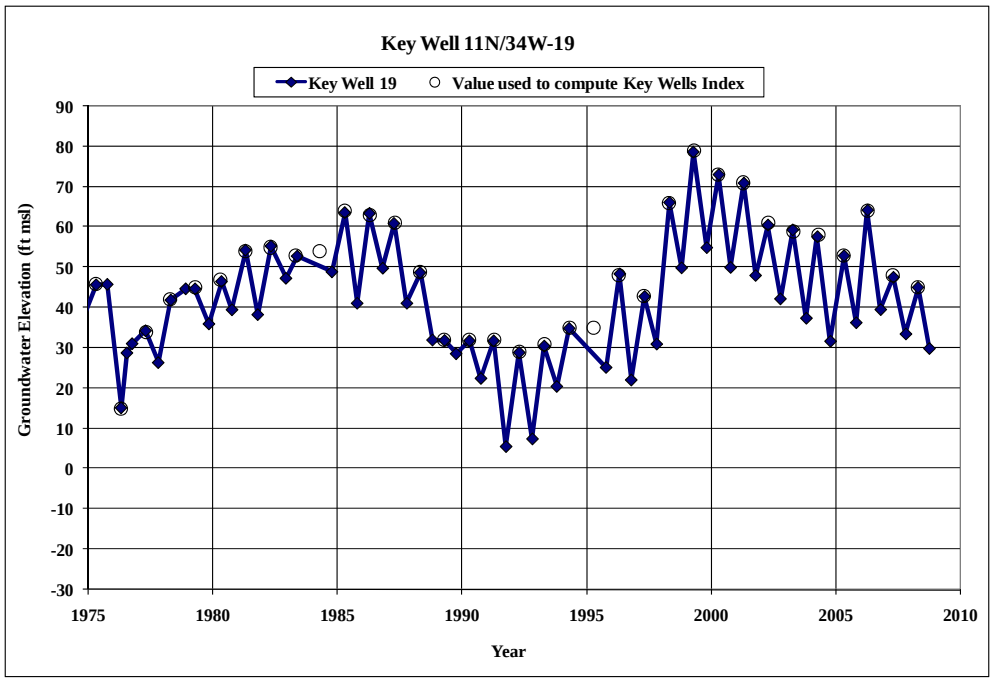
Key Wells For Inland Criterion
11N/34W-19
11N/35W-5
11N/35W-8
11N/35W-9
11N/35W-13
11N/35W-22
11N/35W-23
12N/35W-33

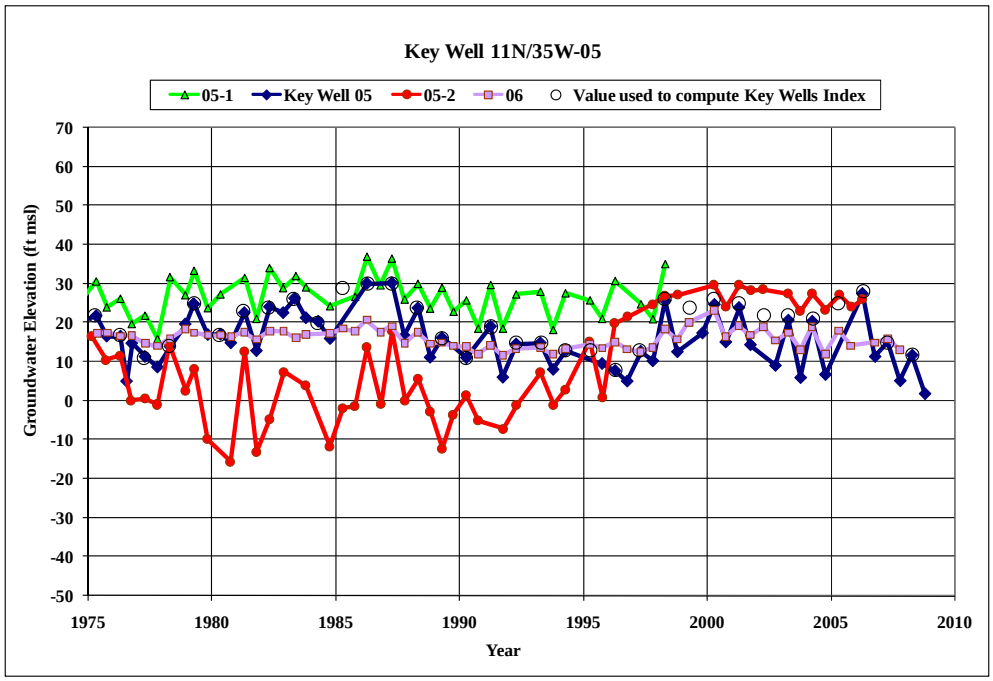


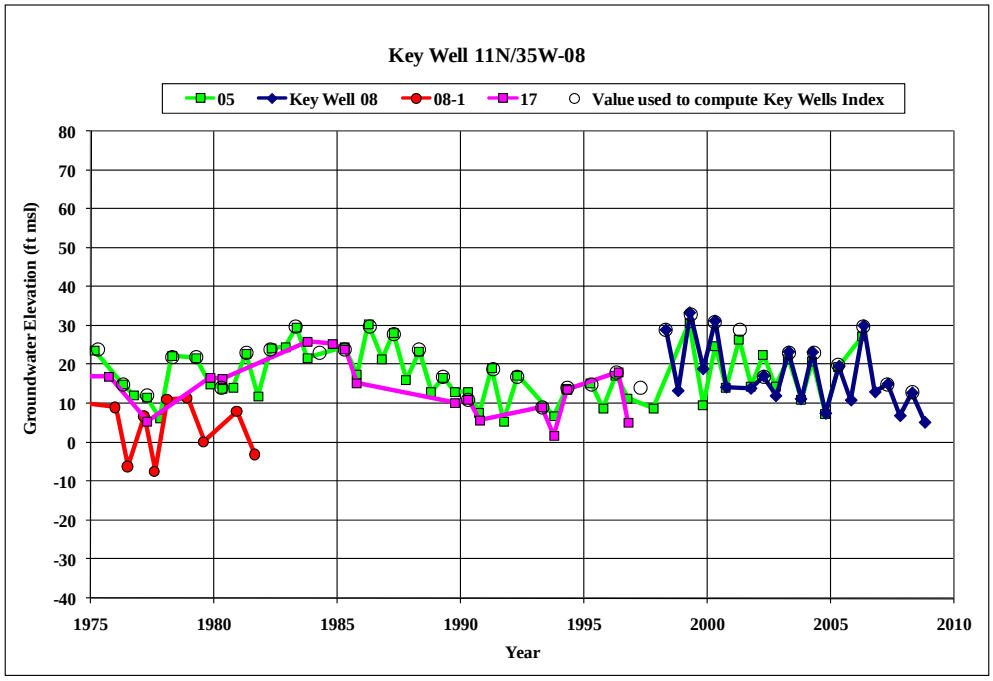
The Index was calculated annually using Spring groundwater elevation measurements from 1975 to 2008. The Key Wells were selected to represent various portions of the groundwater basin within the NMMA. The following charts display the hydrographs for each Key Well and surrounding wells. The open circles represent the actual Spring value for that year or a correlation of that value for each year that was used to compute the Index.

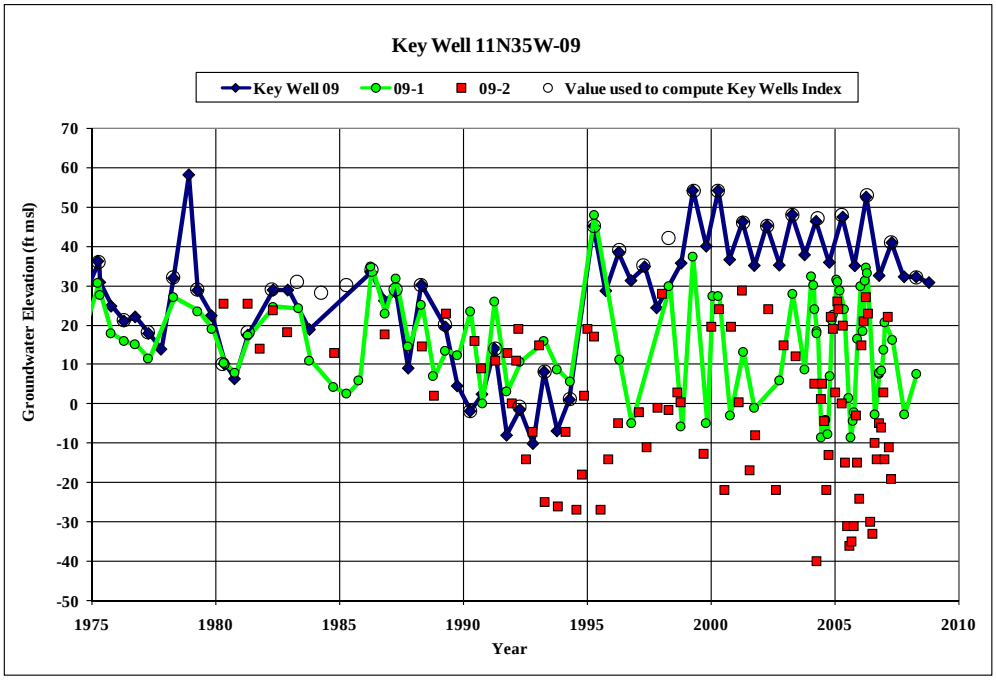
When there was no Spring groundwater elevation measurement for a particular year, the value was determined by either 1) interpolating between Spring measurements in adjacent years or 2) computing the Spring elevation by taking the Fall measurements in adjacent years and increasing the value by the typical increase in groundwater elevations

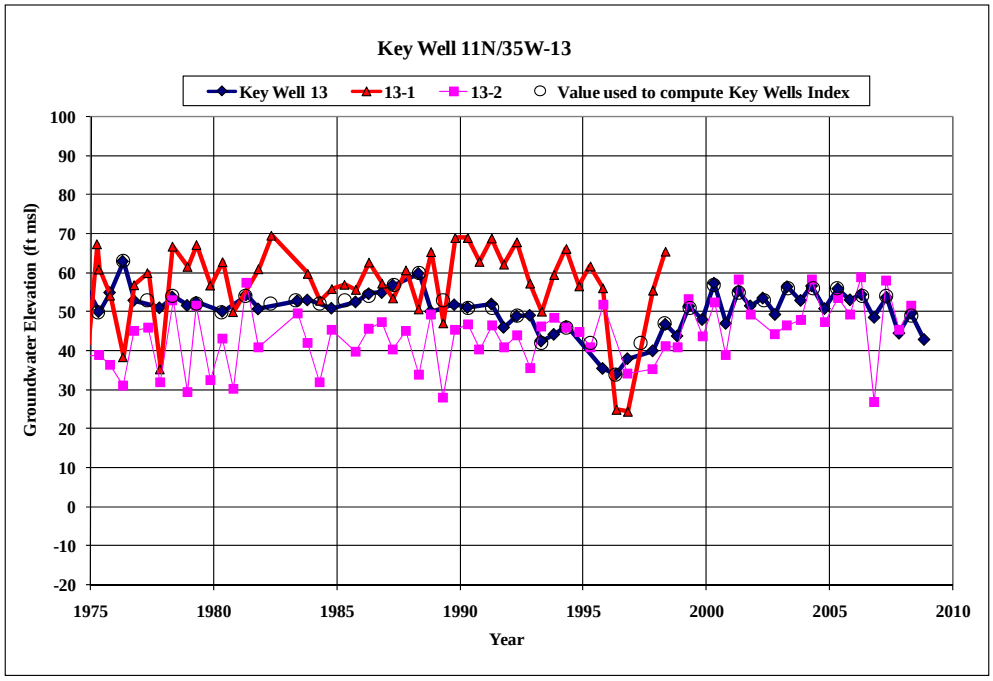
between Spring and Fall measurements in that well. If there is a significant data gap in the record for a particular well (e.g., 22 well below), a nearby well was used to fill the gap.

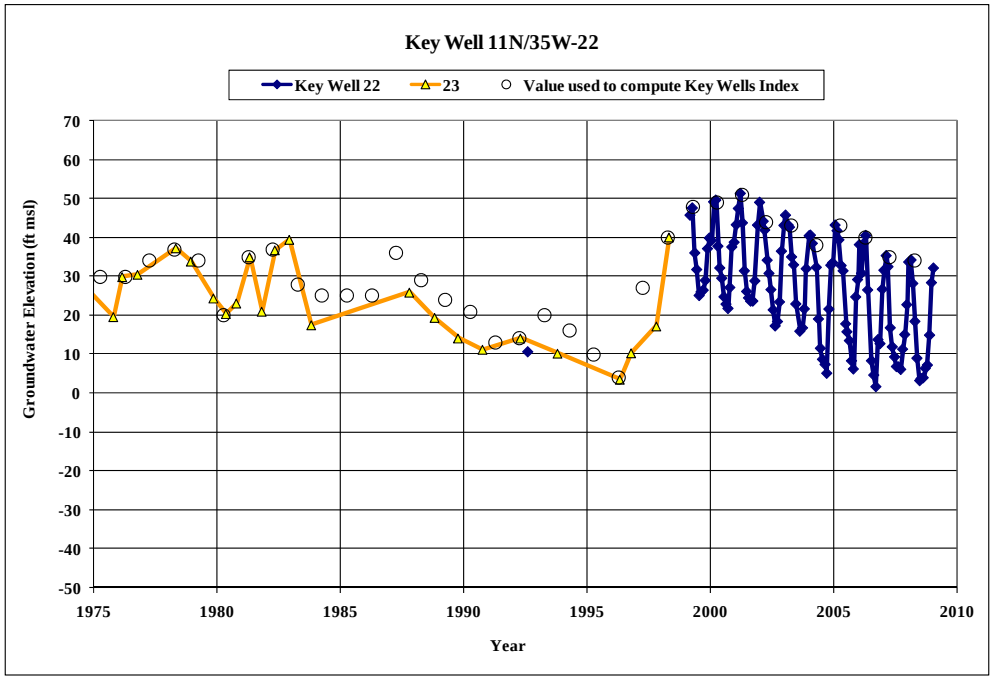


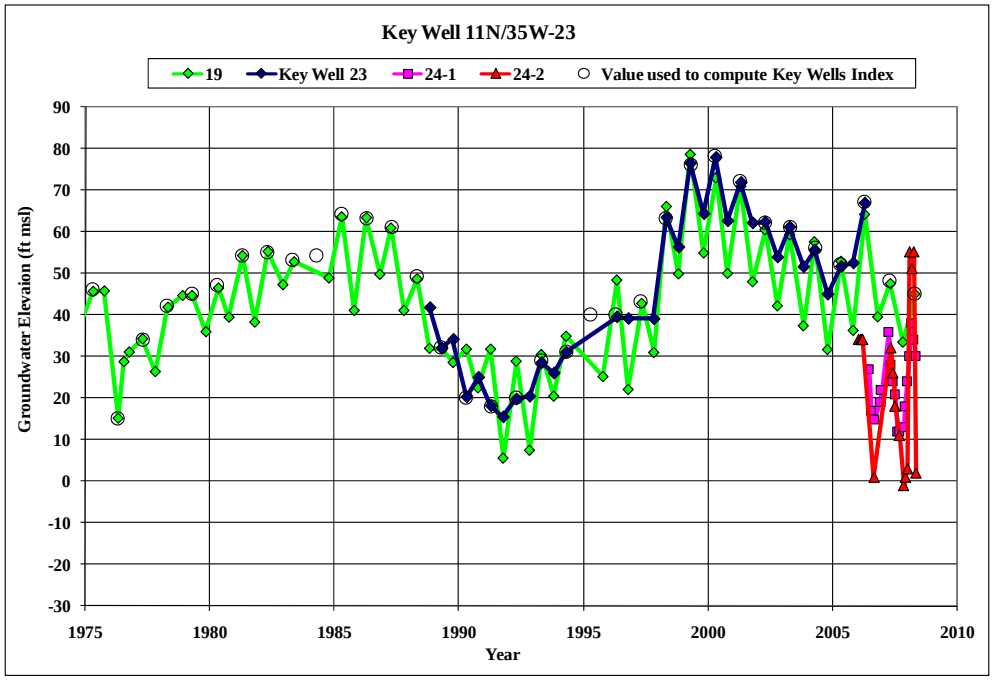


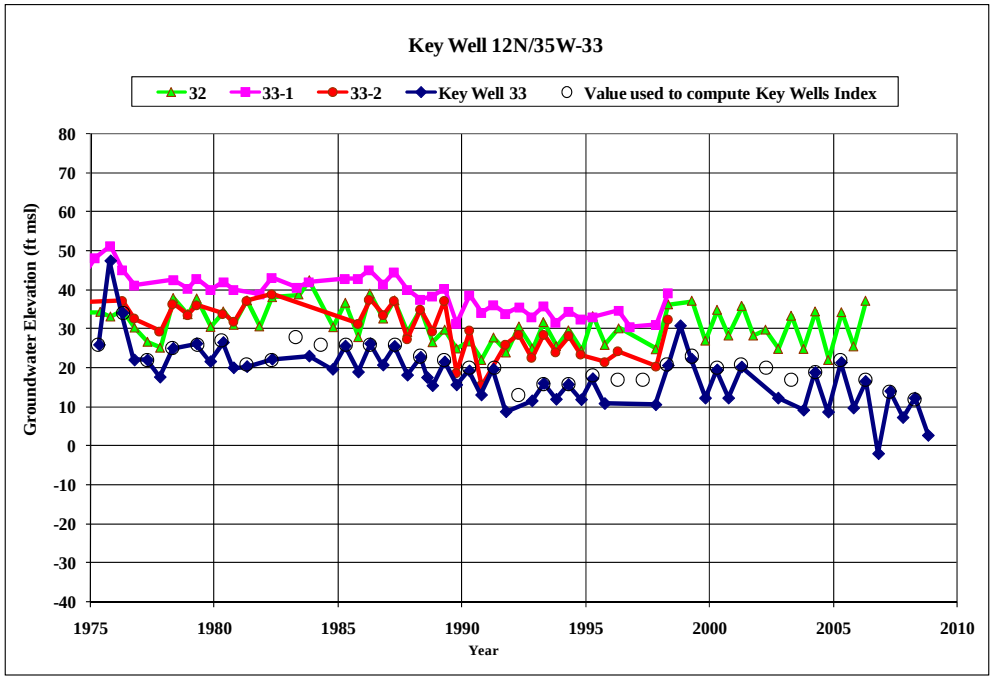

Key Well 11N/35W-08
05
Key Well 08
08-1
17
Value used to compute Key Wells Index
Groundwater Elevation (ft msl)
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
1975
1980
1985
1990
1995
2000
2005
2010
Year


Key Well 11N35W-09
Key Well 09
09-1
09-2
Value used to compute Key Wells Index
Groundwater Elevation (ft msl)
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
1975
1980
1985
1990
1995
2000
2005
2010
Year


Key Well 11N/35W-13
Key Well 13
13-1
13-2
Value used to compute Key Wells Index
Groundwater Elevation (ft msl)
100
90
80
70
60
50
40
30
20
10
0
-10
-20
1975
1980
1985
1990
1995
2000
2005
2010
Year


Key Well 11N/35W-22
Key Well 22
23
Value used to compute Key Wells Index
Groundwater Elevation (ft msl)
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
1975
1980
1985
1990
1995
2000
2005
2010
Year





In selecting the eight key wells, the following criteria were applied so that the wells generally represent the NMMA as a whole:

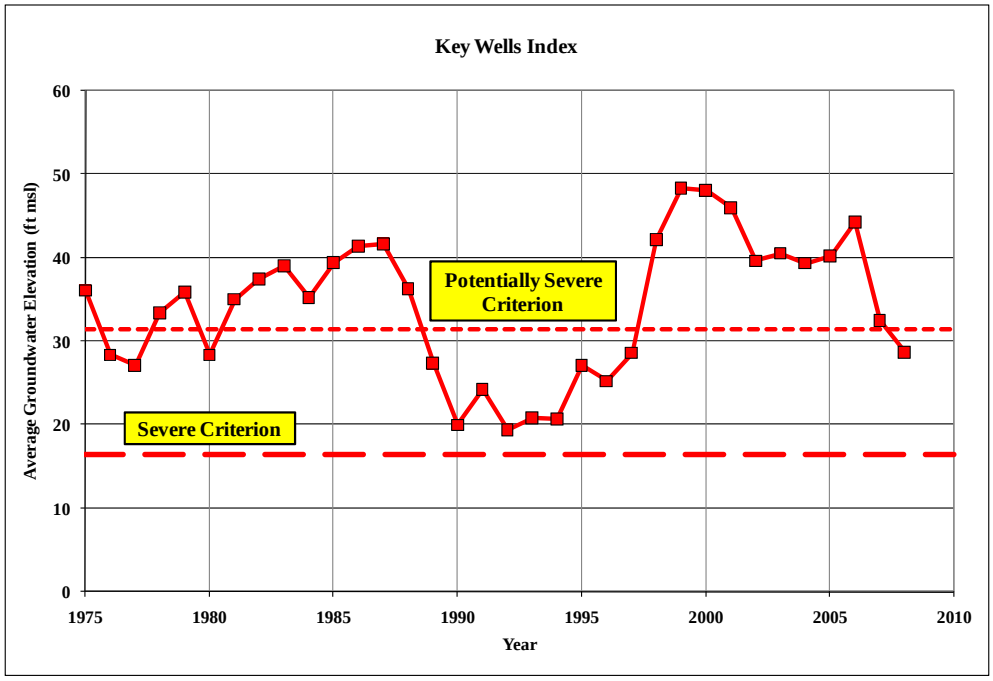
(1) The wells are geographically distributed.

(2) No single well overly influences the Index.

The first criterion was met in the selection of the wells. To meet the second criterion, groundwater elevations from each well were normalized so that any well where elevations were on the average higher or lower than the other wells did not overly influence the overall Index. This normalization was accomplished by dividing each Spring groundwater elevation measurement by the sum of all the Spring groundwater elevation data for that well.

The Index was defined for each year as the average of the normalized Spring groundwater data from each well. The lowest value of the Index could be considered the "historical low" within the NMMA. The sensitivity of that "historical low" was tested by examining the effect of eliminating a well from the Key Wells Index. Eight separate calculations of the Index from 1975 to 2008 were made by excluding the data from one of the eight wells, and computing the average value for each year from the remaining wells' normalized Spring groundwater data.

The criterion for a Potentially Severe Water Shortage Conditions should provide for enough time before the Severe criterion occurs to allow pumpers time to implement voluntary measures to mitigate a falling Key Wells Index. Based on the assumption that two years is adequate for this early warning, then the historical Index can be used to determine the potential rate of fall of the Index. The maximum drop in the historical Index over a two-year period was about 15 feet, during the last two years of the 1986-1991 drought. Thus, the criterion for Potentially Severe Water Shortage Conditions is set at 15 feet above the Severe Water Shortage Condition criterion, which calculates to **31.5 ft msl**. The Key Wells Index for all eight wells, which will be computed each year in the future, will be compared to the Potentially Severe and Severe criteria discussed above. The Index through 2008 is shown below.



Key Wells Index for the period 1975 to 2008. Upper dashed line is criterion for Potentially Severe Water Shortage Conditions and lower dashed line is criterion for Severe Conditions.

The Index generally tracks wet and dry climatic cycles, indicating the importance of natural recharge in the NMMA. Significant deviations from this climatic tracking could occur if supplemental water deliveries reduced pumping, if overlying land use changed the return flows to the aquifer, or if there was a large change in groundwater extractions in addition to those resulting from the introduction of the Supplemental Water.

A. Seawater Intrusion Criteria for Potentially Severe Water Shortage Conditions

The criteria for potentially severe conditions in coastal areas are either gradient conditions that could pull seawater into the principal aquifer, or threshold chloride concentrations detected in coastal monitoring wells. Whereas chloride is the principal indicator for the groundwater quality portion of this criteria, other groundwater quality constituents may be considered for future refinement of this criteria.

To avoid seawater contamination, groundwater elevations in the coastal monitoring wells must be sufficiently high to balance higher-density seawater (about 2.5 of extra head is required for every 100 ft of ocean depth of an offshore outcrop of the aquifer). Thus, if an aquifer is penetrated at 100 ft below sea level in a coastal well, it is assumed that groundwater elevations in that aquifer must be at least 2.5 ft above sea level to counteract the higher density of seawater. Although offshore outcrop areas are not currently defined, it is assumed that some hydraulic connection between the onshore aquifers and seawater at the sea floor is possible or even probable.

Historical groundwater elevation data from these coastal wells indicate that groundwater elevations have not always been higher than the theoretical elevations of fresh water to balance sea water, described in the preceding paragraph. It is not known to what extent (if any) that seawater has advanced toward the land during the periodic depression of groundwater elevation, nor has any groundwater quality data supported the indication that seawater has contaminated the fresh water aquifer at the coastal monitoring well locations. Thus, coastal groundwater elevation criteria must take into account the periodic depression of groundwater elevations. To accommodate these fluctuations and until further understanding is developed, the coastal criteria are presented in the table below, based on the lower of 1) historical low groundwater elevations in the coastal monitoring wells or 2) a calculation of 2.5 ft of elevation for every 100 ft of aquifer depth in the well. If the historical low elevation is used, the value is reduced by one foot and rounded to the nearest half-foot. Similarly, if a calculated value is the lower option, it is rounded to the nearest half-foot. The results of these criteria are indicated in the following table.

Criteria for Potentially Severe Water Shortage Conditions

Well	Perforations Elevation (ft msl)	Aquifer	Historic Low (ft msl)	2.5' per 100' Depth (ft msl)	Elevation Criteria (ft msl)	Highest Chloride (mg/L)	Chloride Concentration Criteria (mg/L)
11N/36W-12C1	-261 to -271	Paso Robles	5.8	6.5	**5.0**	81	**250**
11N/36W-12C2	-431 to -441	Pismo	6.3	10.8	**5.5**	55	**250**
11N/36W-12C3	-701 to -711	Pismo	10.1	17.5	**9.0**	98	**250**
12N/36W-36L1	-200 to -210	Paso Robles	4.3	5.7	**3.5**	38	**250**
12N/36W-36L2	-508 to -518	Pismo	10.1	13.4	**9.0**	127	**250**

The groundwater quality portion of the criteria is set at 250 mg/L chloride. There is no groundwater quality criterion for the shallow alluvium. Although there is no assumption that seawater intrusion has occurred at this concentration, the cause of the rise in chloride concentration must be investigated and appropriate mitigation measures taken. Thus, Potentially Severe Water Shortage Conditions are established if either the groundwater elevation or groundwater quality criteria are met.

B. Seawater Intrusion Criteria for Severe Water Shortage Conditions

One criterion for Severe Water Shortage Conditions is the occurrence of conditions that result in chloride concentration(s) in groundwater greater than the drinking water standard in any of the coastal monitoring wells.

A principal threat for such occurrence is from seawater intrusion. The first evidence of seawater intrusion can occur very quickly or may involve a slower and more subtle change. Because the rate of change for chloride concentrations during seawater intrusion is difficult to predict for the NMMA, the criterion is set to the Maximum Contaminant Level for chloride in drinking water.

The Nipomo Mesa Technical Group set the coastal criterion for Severe Water Shortage Conditions at a chloride concentration at or above **500 mg/L** in any of the coastal monitoring wells. If the criterion is exceeded, an additional sample will be collected and analyzed from that well as soon as practically possible to verify the result. The Severe Water Shortage Condition will not be in effect until the laboratory analysis has been verified.

Appendix C: Well Management Plan

NMMA PURVEYOR

NMMA WELL MANAGEMENT PLAN[1]

Adopted January 21, 2010

Stage 1: Potentially Severe Water Shortage Conditions

- Potentially Severe Water Shortage Conditions Triggered[2];
- Voluntary measures urged by Water Purveyors (NCSD, GSWC, Woodlands, and RWC). See list of "Recommended Water Use Restrictions;"
- Voluntary evaluation of sources of new supplemental water;
- Voluntary purveyor conservation goal of 15% (Baseline to be suggested by the NMMA TG);
- Voluntary/Recommended public information program;
- Voluntary evaluation and implementation of shifting pumping to reduce GW depressions and/or protect the seaward gradient. This includes the analysis and establishment of a potential network of purveyor system interties to facilitate the exchange of water;

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[1] This Well Management Plan is required by the terms of the Stipulation (page 22). The Well Management Plan provides for steps to be taken by the NCSD, GSWC, Woodlands and RWC under a factual scenario where Nipomo Supplemental Water (a defined term in the Stipulation) has not been "used" in the NMMA (page 22). The Well Management Plan, therefore, has no applicability to either ConocoPhillips or Overlying Owners as defined in the Stipulation (page 22).

[2] Water shortage conditions are characterized by criteria designed to reflect that groundwater levels beneath the NMMA as a whole are at a point at which a response would be triggered to avoid further declines in the groundwater levels (potentially severe), and to declare that the lowest historic groundwater levels beneath the NMMA as a whole have been reached or that conditions constituting seawater intrusion have been reached (severe). See current version of Water Shortage Conditions and Response Plan – appendix to Annual Report.

Stage 2: Severe Water Shortage Conditions

- Severe Water Shortage Conditions Triggered and Nipomo Supplemental Water has been used in the NMMA (see footnote 1)[3];
- Overlying landowners other than Woodlands and ConocoPhillips shall reduce groundwater use to no more than 110% of the highest pooled base year prior to the transmittal of Nipomo supplemental water. The NMMA TG will determine a technically responsible and consistent method to determine the pooled amount and an individual's contribution (To be determined when trigger occurs). The method of reducing pooled production to 110% is to be prescribed by the TG and approved by the court. Landowners may consider using less water for consideration received;
- ConocoPhillips shall reduce its yearly groundwater use to no more than 110% of the highest amount it used in a single year prior to the transmittal of Nipomo supplemental water. ConocoPhillips may consider using less water for consideration received and has discretion to determine how its groundwater reduction is achieved;
- Water Purveyors (NCSD, GSWC, Woodlands, and RWC) shall implement mandatory conservation measures. Where possible, institute mandatory restrictions with penalties;
- The mandatory conservation goals will be determined by the NMMA TG when the Severe water shortage trigger is reached. Annually, should conditions worsen; the NMMA TG will re-evaluate the mandatory conservation goal;
- Measures may include water reductions, additional water restrictions, and rate increases. GSWC and RWC shall aggressively file and implement[4] a schedule 14.1 mandatory rationing plan with the CPUC consistent with the mandatory goals;
- Penalties, rates, and methods of allocation under the rationing program shall be at the discretion of each entity and its regulating body;

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[3] [see comment at footnote #1] Water shortage conditions are characterized by criteria designed to reflect that groundwater levels beneath the NMMA as a whole are at a point at which a response would be triggered to avoid further declines in the groundwater levels (potentially severe), and to declare that the lowest historic groundwater levels beneath the NMMA as a whole have been reached or that conditions constituting seawater intrusion have been reached (severe). See current version of Water Shortage Conditions and Response Plan (appendix to Annual Report).

[4] CPUC has the authority to set rates and allow mandatory conservation actions. As CPUC regulated entities, GSWC and RWC cannot implement such programs without CPUC approval.

- Aggressive voluntary public information program which includes discussions with high use water users such as school districts, parks, and golf courses to seek voluntary reductions in potable water irrigation;

List of Recommended Water Use Restrictions

The following provisions are examples of what may be considered prohibited, nonessential, and/or unauthorized water use:

1) Prohibit nonessential and unauthorized water use, including but not limited to:
   a) Use of potable water for more than minimal landscaping, as defined in the landscaping regulated of the jurisdiction or as described in Article 10.8 of the California Government Code in connection with new construction;
   b) Use through any meter when the company has notified the customer in writing to repair a broken or defective plumbing, sprinkler, watering or irrigation system and the customer has failed to effect such repairs within five business days;
   c) Use of potable water which results in flooding or runoff in gutters or streets;
   d) Individual private washing of cars with a hose except with the use of a positive action shut-off nozzle. Use of potable water for washing commercial aircraft, cars, buses, boats, trailers, or other commercial vehicles at any time, except at commercial or fleet vehicle or boat washing facilities operated at a fixed location where equipment using water is properly maintained to avoid wasteful use;
   e) Use of potable water washing buildings, structures, , driveways, patios, parking lots, tennis courts, or other hard-surfaced areas, except in the cases where health and safety are at risk;
   f) Use of potable water to irrigate turf, lawns, gardens, or ornamental landscaping by means other than drip irrigation, or hand watering without quick acting positive action shut-off nozzles, on a specific schedule, for example: 1) before 9:00 a.m. and after 5:00 p.m.; 2) every other day; or 3) selected days of the week;
   g) Use of potable water for watering streets with trucks, except for initial wash-down for construction purposes (if street sweeping is not feasible), or to protect the health and safety of the public;
   h) Use of potable water for construction purposes, such as consolidation of backfill, dust control, or other uses unless no other source of water or other method can be used.

i) Use of potable water for construction purposes unless no other source of water or other method can be used;

j) Use of potable water for street cleaning;

k) Operation of commercial car washes without recycling at least 50% of the potable water used per cycle;

l) Use of potable water for watering outside plants, lawn, landscape and turf areas during the hours of 9:00 am to 5:00 pm;

m) Use of potable water for decorative fountains or the filling or topping off of decorative lakes or ponds. Exceptions are made for those decorative fountains, lakes, or ponds which utilize recycled water;

n) Use of potable water for the filling or refilling of swimming pools.

o) Service of water by any restaurant except upon the request of a patron; and

p) Use of potable water to flush hydrants, except where required for public health or safety.

Appendix D: Data Acquisition Protocol for Groundwater Level Measurement for the Nipomo Mesa Management Area

Data Acquisition Protocol for Groundwater Level Measurement for the Nipomo Mesa Management Area

Introduction

The purpose of this memorandum is to establish a protocol for measuring and recording groundwater levels for Nipomo Mesa Management Area (NMMA) wells, and to describe various methods used for collecting meaningful groundwater data. Static groundwater levels obtained for the NMMA monitoring program are determined by measuring the distance to water in a non-pumping well from a measuring point that has been referenced to sea level. Subtracting the distance to water from the elevation of the measuring point determines groundwater surface elevations above or below sea level. This is represented by the following equation:

$$E_{GW} = E_{MP} - D$$

Where:

E_{GW} = Elevation of groundwater above mean sea level (feet)
E_{MP} = Elevation above sea level at measuring point (feet)
D = Depth to water (feet)

Groundwater elevation data can be used to construct groundwater contour maps, determine groundwater flow direction and hydraulic gradients, show locations of groundwater recharge, determine amount of water in storage, show changes in groundwater storage over time, and identify other aquifer characteristics. Miss-representation of aquifer conditions result from errors introduced during water level measurements, from a changed measuring point, during data recording, from equipment problems, or from using inappropriate measuring equipment or techniques for a particular well.

In an effort to minimize such errors and to standardize the collection of groundwater data, the U.S. Geological Survey (U.S.G.S.) has conducted extensive investigations into methods for measuring groundwater levels. In conjunction with several other federal agencies, the U.S.G.S. published the "National Handbook of Recommended Methods for Water-Data Acquisition" (1977); "Introduction to Field Methods for Hydrologic and Environmental Studies, (2001); and several Stand-alone Procedure Documents (GWPD, 1997). Excerpts from these publications relating to water-level measurements are attached. The following protocol for obtaining and reporting accurate data, including a discussion of potential errors associated with several measurement techniques, are based on these U.S.G.S. documents.

Well Information

To give the most meaningful value to the data obtained in the NMMA monitoring program, each well file should include as much information as is available. Table 1 below lists important well information to be maintained in a well file or in a field notebook. Additional information that should be available to the person collecting water-level data should include a description of access to the

property and the well, the presence and depth of cascading water, or downhole obstructions that could interfere with a sounding cable. San Luis Obispo County Department of Public Works maintains well cards on the wells in the County monitoring network.

Table 1
Well File Information

Well Completion Report	Hydrologic Information	Additional Information to be Recorded
Well name	Map showing basin boundaries and wells	Township, Range, and ¼ ¼ Section
Well Owner	Name of groundwater basin	Latitude and Longitude (Decimal degrees)
Drilling Company	Description of aquifer	Assessor's Parcel Number
Location map or sketch	Confined, unconfined, or mixed aquifers	Description of well head and sounding access
Total depth	Pumping test data	Measuring point & reference point elevations
Perforation interval	Hydrographs	Well use and pumping schedule if known
Casing diameter	Water quality data	Date monitoring began
Date of well completion		Land use

Types of Wells

The monitoring program is likely to include several types of wells with various means of access and pumping schedules. It is important to understand the characteristics of each well type and its downhole conditions to best determine monitoring schedules and appropriate measuring technique. Below is a brief summary of well types and their pumping characteristics. A more detailed description of these well types is included in the attached "National Handbook of Recommended Methods for Water-Data Acquisition".

Existing Wells

These include abandoned wells, irrigation wells, public supply wells, and domestic wells. Existing wells provide convenient and inexpensive measuring sites; however, they should be carefully evaluated to show that they can provide accurate data under static conditions with reliable access.

Abandoned wells are often in poor condition and may have partially collapsed casing or accumulated sediments. Damaged casing may also result in cascading water. An undamaged well with the pump removed, however, can provide easy access and reliable water-level data.

Irrigation wells are generally pumped on a regular schedule, allowing static water-level measurements to be taken during known non-pumping periods. Seasonal changes in the pumping schedules should also be noted when planning monitoring events.

Public supply wells may be part of a monitoring program if sufficient information regarding their operations is available. Hydrographs showing periods or pumping and recovery should be obtained to determine the best time to measure static water levels.

Domestic wells are generally pumped frequently and for short durations, making it difficult to monitor during static conditions. Determining when the lowest domestic water use occurs during the day can facilitate monitoring schedules.

Observation Wells

These wells are designed for specific sites and depths in known hydrogeologic conditions to supply desired information. Typically, there is no permanent pump, making measurements relatively easy.

Piezometers

A piezometer is a small diameter observation well designed to measure the hydraulic head within a small zone. It should have a very short screen and filter pack interval so it can represent the hydraulic head at a single point within the aquifer.

Access to Supply Wells

Access into a well to obtain a water level measurement depends on pump types and wellhead construction. For turbine-pump wells, there is typically an opening between the pump column and the casing either through a port or between the base plate and the casing. The filter-pack fill tube should not be confused with a casing vent or sounding access pipe. In some wells, there is no access for a downhole measuring tape; however, the well may be equipped with an air-line measuring system.

Access to submersible wells is generally through a small diameter plug located in the plate on top of the casing. In wells where there is no sounding tube, caution should be used during water level measurements to minimize the chance of the sounding tape becoming entangled with the power cable. Additional information and wellhead diagrams regarding supply well access is found in the attached "National Handbook of Recommended Methods for Water-Data Acquisition".

Measuring Points and Reference Points

Measuring point (MP) elevations are the basis for determining groundwater elevations relative to sea level. The MP is generally that point on the well head that is the most convenient place to measure the water level in a well. In selecting an MP, an additional consideration is the ease of surveying either by Global Positioning System (GPS) or by leveling.

The MP must be clearly defined, well marked, and easily located. If permissible, the point should be labeled with the letters MP and an arrow. A description, sketch, and photograph of the point should be included in the well file.

The Reference Point (RP) is a surveyed point established near the wellhead on a permanent object. It serves as a benchmark by which the MP can be checked or re-surveyed if the MP is changed. The RP should be marked, sketched, photographed, and described in the well file.

All MPs and RPs for the NMMA monitored wells should be surveyed using the same horizontal and vertical datum by a California licensed surveyor to the nearest tenth of one foot vertically, and the nearest one foot horizontally. The surveyor's report should be maintained in the project file.

In addition to the MP and RP survey, the elevation of the ground surface adjacent to the well should also be surveyed and recorded in the well file. Because the ground surface adjacent to a well is rarely uniform, the average surface level should be estimated. This average ground surface elevation is referred to in the U.S.G.S. Procedural Document (GWPD-1, 1997) as the Land Surface Datum (LSD).

Water-Level Data Collection

Prior to beginning the field work, the field technician should review each well file to determine which well owners require notification of the upcoming site visit, or which well pumps need to be turned off to allow for water level recovery. Because groundwater elevations are used to construct groundwater contour maps and to determine flow direction, all water level measurements should be collected within a 24-hour period or within as short a period as possible. Weather and groundwater conditions are least likely to change significantly during a short period for data collection. For an individual well, the same measuring method and the same sounder should be used during each sampling event where practical.

Prior to taking a measurement, the length of time since a pump has been operating should be determined. If possible, a domestic well should be allowed to recover at least one half hour prior to measuring, whereas an irrigation or public well should recover a minimum of eight hours prior to measuring. If the well is capped but not vented, remove the cap and wait several minutes before measurement to allow water levels to equilibrate to atmospheric pressure.

When there is doubt about whether water levels in a well are continuing to recover, repeated measurements should be made. Or, if an electric sounder is being used, it is possible to hold the sounder level at one point just above the known water level and wait for a signal that would indicate rising water. For each well, the general schedule of pump operation should be determined and noted.

When lowering a graduated steel tape (chalked tape) or electric tape in a well without a sounding tube in an equipped well, the tape should be played out slowly by hand to minimize the chance of the tape end becoming caught in a downhole obstruction. The tape should be held in such a way that any change in tension will be felt. When withdrawing a sounding tape, it should also be brought up slowly so that if an obstruction is encountered, tension can be relaxed so that the tape can be lowered again before attempting to withdraw it around the obstruction.

All water level measurements should be made to an accuracy of 0.1 feet. The field technician should make at least two measurements. If measurements of static levels do not agree within 0.1 feet , the

technician should continue measurements until the reason for the disparity is determined, or the measurements are within 0.1 feet.

Where groundwater levels are found to be above ground surface, a sensitive pressure gage can be used to determine the height above the measuring point or a sealed well could have a manometer tube that would show the height above ground surface. A manometer tube may not be high enough to measure the water level if the groundwater is under more than 5 feet of pressure.

Record Keeping in the Field

The information recorded in the field is often the only remaining evidence of the conditions at the time of the monitoring event. It is important that the field book be protected carefully and that it contains the name of the field technician and appropriate contact information. Because the field book contains original tables of multiple monitoring events, copies of the tables should be made following each monitoring event. The data can be further protected by entering the data electronically as soon as practicable.

All field notes must be recorded during the time the work is being done in the field. Accurate documentation of field conditions cannot be made after the field technician has returned to the office. Because much of the data will be reviewed by office staff, and because more than one field technician may participate in the monitoring program, it is essential that notes be intelligible to anyone without requiring a verbal explanation. As a means to support field information, sketches or digital photos attached to field notes should be encouraged.

All field notes should be made with a sharp pencil with lead appropriate for the conditions. Erasures should not be made when recording data. A single line should be drawn through an error without obscuring its legibility, and the correct value or information should be written adjacent to it or in a new row below it.

During each monitoring event it is important to record any conditions at a well site and its vicinity that may affect groundwater levels, or the field technician's ability to obtain groundwater levels. Table 2 lists important information to record, however, additional information should be included when appropriate. Table 3, The Water Level Measurement Form, is a suggested format for recording field data.

Table 2
Information Recorded at Each Well Site

Well name	Property access conditions	Downhole obstructions
Name and organization of field technician	Changes in land use	Presence of oil in well
Date & time (time in 24-hour notation)	Changes in MP	Cascading water
Measurement method used	Nearby wells in use	Equipment problems
Sounder used	Weather conditions	Physical changes in wellhead
Most recent sounder calibration	Recent rainfall events	Comments

Measurement Techniques

Four standard methods of obtaining water levels are discussed below. The chosen method depends on site and downhole conditions, and the equipment limitations. In all monitoring situations, the procedures and equipment used should be documented in the field notes and in final reporting. Additional detail on manual methods of water level measurement is included in the attached U.S.G.S. Stand-Alone Procedure Documents and the "National Handbook of Recommended Methods for Water-Data Acquisition". The attached "Introduction to Field Methods for Hydrologic and Environmental Studies" includes a discussion of pressure transducers.

Graduated Steel Tape

This method uses a graduated steel tape with a brass or stainless steel weight attached to its end. The tape is graduated in feet. The approximate depth to water should be known prior to measurement.

- Chalk the lower few feet of the tape by applying blue carpenter's chalk.
- Lower the tape to just below the estimated depth to water so that a few feet of the chalked portion of the tape is submerged. Be careful not to lower the tape beyond its chalked length.
- Hold the tape at the MP and record the tape position (this is the "hold" position and should be at an even foot);
- Withdraw the tape rapidly to the surface;
- Record the length of the wetted chalk mark;
- Subtract the wetted chalk number from the "hold" position number and record this number in the "Depth to Water below MP" column;
- Perform a check by repeating the measurement using a different MP hold value;
- All data should be recorded to the nearest 0.01 foot;
- Disinfect the tape by pouring a small amount of chlorine bleach on a clean cloth and wiping down the portion of the tape that was submerged below the water surface.

The graduated steel tape is generally considered to be the most accurate method for measuring static water levels. Measuring water levels in wells with cascading water or with condensing water on the well casing causes potential errors, or can be impossible. The tape should be calibrated against another steel tape that is maintained in the office and is used only for calibration.

Electric Tape

An electric tape operates on the principle that an electric circuit is completed when two electrodes are submerged in water. Most electric tapes are mounted on a hand-cranked reel equipped with batteries and an ammeter, buzzer or light to indicate when the circuit is closed. Tapes are graduated in either one-foot intervals or in hundredths of feet depending on the manufacturer. Like graduated steel tapes, electric tapes are attached with brass or stainless steel weights.

- Check the circuitry of the tape before lowering the probe into the well by dipping the probe into water and observe if the ammeter needle or buzzer/light signals that the circuit is closed;
- Lower the probe slowly and carefully into the well until the signal indicates that the water surface has been reached;

- Place a finger or thumb on the tape at the MP when the water surface is reached;
- If the tape is graduated in one-foot intervals, partially withdraw the tape and measure the distance from the MP mark to the nearest one-foot mark to obtain the depth to water below the MP. If the tape is graduated in hundredths of a foot, simply record the depth at the MP mark as the depth to water below the MP;
- Make all readings using the same needle deflection point on the ammeter scale (if equipped) so that water levels will be consistent between measurements;
- Make check measurements until agreement shows the results to be reliable;
- All data should be recorded to the nearest 0.01 foot;
- Disinfect the tape by pouring a small amount of chlorine bleach on a clean cloth and wiping down the submerged portion of the tape;
- Periodically check the tape for breaks in the insulation. Breaks can allow water to enter into the insulation creating electrical shorts that could result in false depth readings.

<u>The electric tape may give slightly less accurate results than the graduated steel tape.</u> Errors can result from signal "noise" in cascading water, breaks in the tape insulation, or tape stretch. Electric tape products graduated in hundredths of a foot generally give more accurate results than electric tapes graduated in one-foot intervals. This accuracy difference is due to less stretch and ease of measurement in the tapes graduated in hundredths of a foot. All electric tapes should be calibrated periodically against a steel tape that is maintained in the office and used only for calibration.

<u>Air Line</u>

The air line method is usually used only in wells equipped with pumps. This method typically uses a 1/8 or 1/4-inch diameter, seamless copper tubing, brass tubing, or galvanized pipe with a suitable pipe tee for connecting an altitude or pressure gage. Plastic tubing may also be used, but is considered less desirable. An air line must extend far enough below the water level that the lower end remains submerged during pumping of the well. The air line is connected to an altitude gage that reads directly in feet of water, or to a pressure gage that reads pressure in pounds per square inch (psi). The gage reading indicates the length of the submerged air line.

The formula for determining the depth to water below the MP is: $\mathbf{d = k - h}$ where d = depth to water; k = constant; and h = height of the water displaced from the air line. In wells where a pressure gage is used, h is equal to 2.31 ft/psi multiplied by the gage reading. The constant value for k is approximately equivalent to the length of the air line.

- Calibrate the air line by measuring an initial depth to water (d) below the MP with a graduated steel tape. Use a tire pump, air tank, or air compressor to pump compressed air into the air line until all the water is expelled from the line. When all the water is displaced from the line, record the stabilized gage reading (h). Add d to h to determine the constant value for k.
- To measure subsequent depths to water with the air line, expel all the water from the air line, subtract the gage reading (h) from the constant k, and record the result as depth to water (d) below the MP.

The air line method is not as accurate as a graduated steel tape or electric tape. Measurements with an altitude gage are typically accurate to approximately 0.1 foot, and measurements using a pressure

gage are accurate to the nearest one foot at best. Errors can occur with leaky air lines, or when tubing becomes clogged with mineral deposits or bacterial growth.

Submersible Pressure Transducers

Electrical pressure transducers make it possible to collect frequent and long-term water-level or pressure data from wells. These pressure-sensing devices, installed at a fixed depth in a well, sense the change in pressure against a membrane. The pressure changes occur in response to changes in the height of the water column in the well above the transducer. To compensate for atmospheric changes, transducers may have vented cables or they can be used in conjunction with a barometric transducer that is installed in the same well or a nearby observation well above the water level.

Transducers are selected on the basis of expected water-level fluctuation. The smallest range in water levels provides the greatest measurement resolution. Accuracy is generally 0.01 to 0.1 percent of the full scale range.

Retrieving data in the field is typically accomplished by downloading data through a USB connection to a portable "lap-top" computer. A site visit to retrieve data should involve several steps designed to safeguard the data and the continued useful operation of the transducer:

- Inspect the wellhead and check that the transducer cable has not moved or slipped;
- Ensure that the instrument is operating properly;
- Measure and record the depth to water with a graduated steel or electric tape;
- Document the site visit, including all measurements and any problems;
- Retrieve the data and document the process;
- Review the retrieved data by viewing the file or plotting the original data;
- Recheck the operation of the transducer prior to disconnecting from the computer.

A field notebook with a checklist of steps and measurements should be used to record all field observations and the current data from the transducer. It provides an historical record of field activities. In the office, maintain a binder with field information similar to that recorded on the field notebook so that a general historical record is available there and can be referred to before and after a field trip.

Summary and Recommendations

Static groundwater levels obtained for the NMMA monitoring program are determined by measuring the distance to water from wellhead MPs that have been surveyed using an accepted sea level-based datum. Subtracting the distance to water from the elevation of an MP determines groundwater surface elevations above or below sea level. The following items should be considered important to creating and maintaining a successful monitoring program:

- All wells should be surveyed by a licensed surveyor;

- Three survey points should be set for each well: the MP on the wellhead, the RP on a nearby permanent object, and the adjacent ground surface;
- The points should be surveyed to the nearest tenth of one foot vertically, and the nearest one foot horizontally;
- A one-inch diameter water-level sounding tube should be installed in each NMMA monitoring program well;
- Static water levels should always be measured to the nearest 0.01 feet from the same measuring point, using the same measuring techniques for each well;
- Measurement techniques using graduated steel tapes, electric tapes graduated in hundredths of feet, or pressure transducers should be considered appropriate for the monitoring program;
- Because of its lower accuracy and higher potential for errors than other methods, the air-line method should not be used in the program;
- Thorough and accurate field documentation and complete project files are essential to a successful monitoring program.

Appendix E: Additional Data and Maps

Table 1: Addendum to 2nd Annual Report Calendar Year 2009

Groundwater Production		
	AFY	AFY
NCSD	2,560	
GSWC	1,290	
Woodlands	810	
ConocoPhillips	1,200	
RWC	880	
Rural Indoor	203	
Rural Outdoor	885	
Agriculture	4,379	
Total Groundwater Production		12,200
Return Flow		
Rural Return Flow	183	
Delivered RF	2,438	
Total Return Flow		2,600
Consumptive Use of Groundwater		9,600

Table 2: Detailed Calculation of 2010 Estimated Groundwater Production and Percolation by Land Use category.

Land Use Category		Acreage	Precipitation (202)	Crop ET (ETc)	ETc met by Precip	ETc met by Profile	Net Soil Water	Irrigation	Percolation past root zone	Total Percolation (AF)	Total Irrigation (AF)
			Inches								
Native Vegetation	Grasses	5,657	17.61	12.05	2.67	9.36	-1.70	0.00	7.28	3431.06	0.00
	Trees and Shrubs (1) (2657)	7,071	17.61	59.81	4.20	15.10	-1.69	0.00	0.00	0.00	0.00
Agriculture	Deciduous	2	17.61	35.62	3.44	32.19	0.80	29.77	10.96	1.83	4.96
	Pasture	2	17.61	41.14	3.68	37.45	-0.60	33.83	10.90	1.82	5.64
	Vegetable Rotational	225	17.61	32.50	3.99	28.52	-0.29	24.11	9.51	178.27	452.08
	Avocado and Lemon	277	17.61	24.90	2.90	22.00	-0.35	18.96	12.02	277.43	437.65
	Strawberries	1,393	17.61	19.10	2.88	16.22	-0.48	13.30	12.29	1426.56	1544.47
	Nursery	332	17.61	21.37	2.89	18.48	-0.03	16.45	12.72	223.29	363.87
	Un-irrigated Ag Land	356	17.61	8.59	2.09	6.51	0.66	0.00	8.35	247.86	0.00
Residential	Golf Course	549	17.61	25.64	3.13	22.51	-0.01	18.72	10.70	489.34	856.35
	Rural	415	17.61	17.95	2.67	15.28	0.30	25.82	28.50	344.96	892.82
Total		**16,279**								**6,622**	**4,558**

Appendix F: Nipomo Supplemental Water Project Groundwater Impact Review

Nipomo Supplemental Water Project
Groundwater Impact Review

The Nipomo Mesa Management Area (NMMA) Technical Group is one of three management area committees charged with developing the technical bases for sustainable management of surface and groundwater supplies available to each of the management areas. Each management area was established to promote monitoring and management practices so that present and future water demands are satisfied without causing long-term damage to the underlying groundwater resource. The NMMA lies between the Northern Cities Management Area to the north and the Santa Maria Valley Management Area to the south.

The NMMA Technical Group was established as a component of the court judgment in the Santa Maria Groundwater Basin litigation (Judgment). The Judgment incorporates an agreement between most of the parties to the litigation, which is referred to as the Stipulation. The Technical Group includes representatives appointed by the Nipomo Community Services District, Golden State Water Company, Woodlands Mutual Water Company, ConocoPhillips, and agricultural property owners.

The Technical Group has reviewed the proposed Nipomo Supplemental Water Project (Project), which includes a water purchase agreement with the City of Santa Maria (City) for a supplemental water source, and a pipeline for delivery of that supplemental water from the City to the Nipomo Mesa. This document provides a qualitative assessment of potential impacts of the Project on the groundwater resources of the NMMA.

Project Description

The Stipulation includes a requirement for the Nipomo Community Services District to purchase from the City a minimum of 2,500 acre-feet of water each year to supplement and recharge groundwater resources within the NMMA. The Stipulation also requires Nipomo Community Services District, Rural Water Company, Woodlands Mutual Water Company, and Golden State Water Company to share in the cost and use of the supplemental water.

The Project includes the purchase of water from the City and the construction of facilities to deliver (i.e. a pipeline), store, and blend this water with purveyor well water. Supplemental water from the City delivered to the NMMA would be used to reduce groundwater production from wells in the NMMA by the Nipomo Community Services District and other participating purveyors. Of the 3,000 acre-feet per year (AFY) included in a wholesale agreement with the City, 2,500 AFY would be used in compliance with the Stipulation. The remaining 500 AFY would be used to meet a previously planned increase in Nipomo Community Services District demand, as described below.

Of the planned 3,000 AFY of supplemental water, 2,500 AFY would directly offset groundwater production by some proportion of use by each of the funding NMMA purveyors (Figure 1). The

reduction in groundwater production would be principally in the area of the pumping depression near the central portion of the NMMA. A pumping depression is a localized area of lowered groundwater levels that can negatively impact a groundwater basin. A pumping depression may also influence the migration of saline groundwater typically found near the ocean and coast, inland toward or into, purveyor wells located within the area of lowered groundwater levels. This phenomenon is referred to as seawater intrusion.

Existing and planned system connections (i.e. via pipeline) between several purveyors, including Nipomo Community Services District, the Woodlands Mutual Water Company, Rural Water Company, and Golden State Water Company, would allow full use of the supplemental water available from the Project. Depending on the nature and management of these connections, reduced groundwater production would occur at one or more locations within these purveyors' well fields. The implementation and use of such connections for the purpose of groundwater basin management is documented in the January 2010 NMMA Purveyor Well Management Plan.

Some possible pumping scenarios resulting in reduced production from certain wells within each purveyor's well field are summarized in Table 1. These scenarios reflect the delivery of up to 2,500 AF of supplemental water to the Nipomo Mesa, with the amount of water delivered to each purveyor differing depending on the number of purveyor connections considered for each scenario (Table 1). As summarized in Table 1, four scenarios were considered based on current projections.

In all scenarios presented, total groundwater production by purveyors would be reduced to approximately 50 percent of current production. For Scenario 2 through Scenario 4, groundwater production for any one purveyor may be reduced as little as 20 percent (i.e. under Scenario 2, for Golden State Water Company) to as much as 70 percent (i.e. under Scenario 4, for Nipomo Community Services District). If supplemental water is not delivered to any other purveyor, groundwater production from specific wells operated by the Nipomo Community Services District could be reduced by 100 percent (i.e. under Scenario 1, Table 1). It should be noted that the scenarios summarized in Table 1 do not include 500 AFY of the planned 3,000 AFY of supplemental water, which would be used by the Nipomo Community Services District for potential future customers within existing district boundaries, consistent with the current San Luis Obispo County General Plan.

Source of Supplemental Water

The City would supply supplemental water from its potable water distribution system, which contains a combination of groundwater and State Water Project (State) water delivered from northern California. The City produced 10,000 to 12,000 AFY of groundwater from its seven wells in the thirteen years prior to receiving delivery of State water in 1997. Since then, the City's groundwater production has been less than 3,045 AFY.

The City's Urban Water Management Plan confirms that its State contract entitles it to receive up to 17,800 AFY of State water. The Stipulation requires that the City use no less than 10,000 AFY of available State water, or its full allocation of State water, if the amount available is less than 10,000 AF in a given year. The remainder of the City's water supply in any given year would be obtained from local groundwater.

The ratio of groundwater to State water that would be delivered to the NMMA would vary from year to year, in response to water demands, any restrictions in the amount of delivered water, and distribution system constraints. In 2010, the City used 10,207 AF of State water (77 percent of its total water supply) and 3,044 AF of groundwater (23 percent of its total water supply). The City's Urban Water Management Plan forecasts that deliveries of State water will remain at about 10,000-11,000 AFY, assuming a reliability factor of 60 percent. The remainder would come from groundwater as demands increase (including the transfer of water to the Nipomo Community Services District). Forecasted groundwater production by the City in the year 2035 would be 9,070 AF.

The delivery of supplemental water to the NMMA most likely would require the City to increase its groundwater production compared to current levels. However, the City's groundwater use is expected to remain well below its historical maximum. To the extent the City is required to increase its groundwater production to provide supplemental water to the NMMA beyond that required for in-City uses, comparatively lower groundwater levels at the City's well field are expected. However, the City's well field is located six miles southeast of the NMMA, and more than 10 miles east of the ocean.

Impact on NMMA Groundwater Production

The 2,500 AFY of supplemental water delivered to the NMMA amounts to an increase in the overall water supply, and would reduce purveyor groundwater production from the NMMA by that amount within and near the existing pumping depression. In addition, the water that percolates back into the ground after use (termed "return-flow") is an increase in to the NMMA and may be as much as 300 AFY from the 500 AFY of additional water provided to the Nipomo Community Services District. The amount of reduced groundwater production for each purveyor would depend on the nature of any connection to deliver the supplemental water.

The 2,500 AFY of supplemental water delivered to purveyors would offset approximately 50 percent of their local groundwater production, based on 2010 data (Table 1). In response to the reduction in groundwater production and, to a lesser extent, the increased return-flow resulting from the Project, groundwater levels are expected to rise significantly, particularly in the pumping depression in the central portion of the NMMA (Figure 1).

Impact on Potential Seawater Intrusion

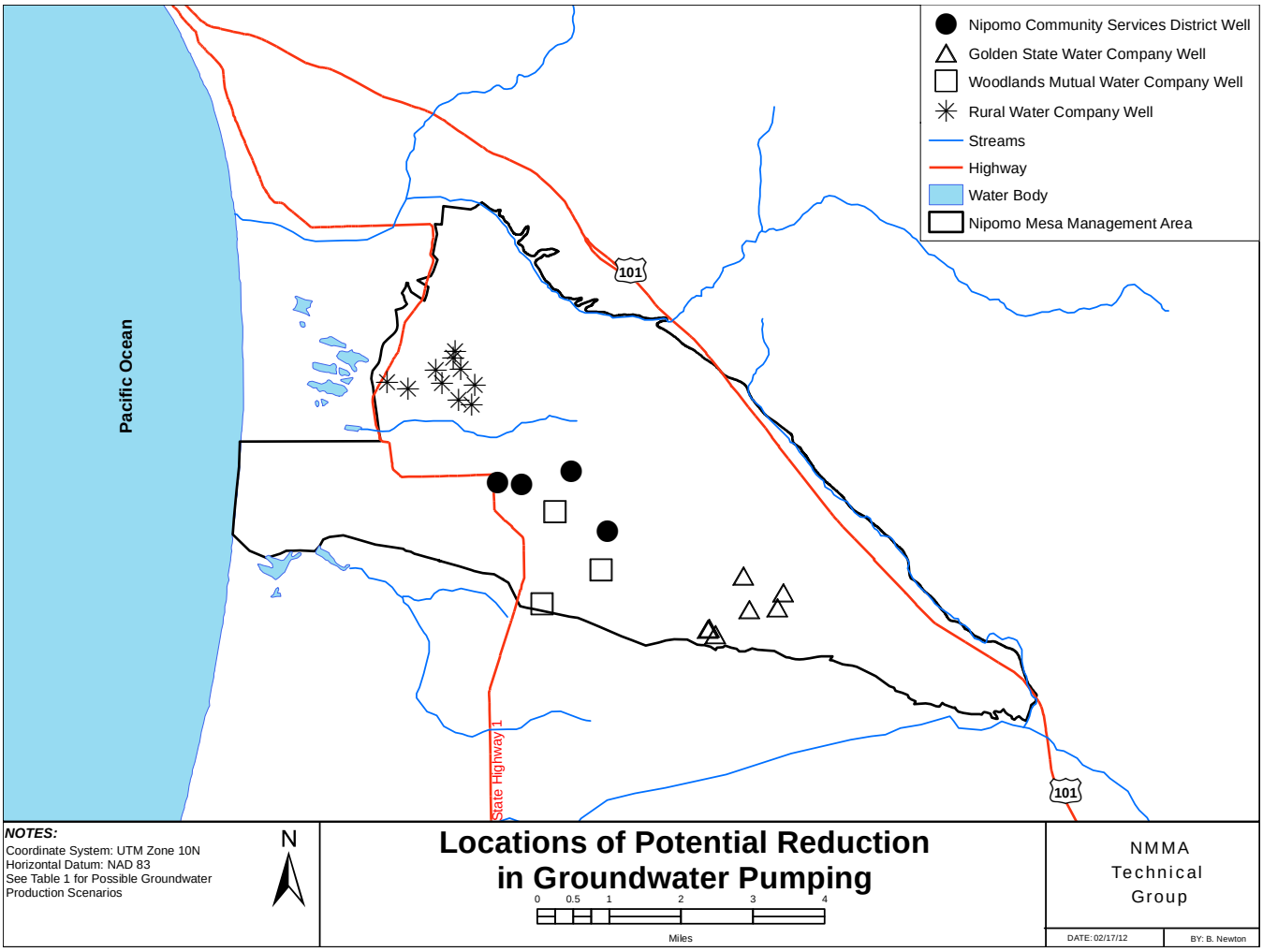
The delivery of supplemental water from the City would reduce the potential for seawater intrusion into the NMMA. This reduction in the potential for seawater intrusion results principally from shrinking of

the area of lowered groundwater levels (i.e. the pumping depression) as groundwater levels rise. The NMMA Technical Group regularly considers seawater intrusion threats in its evaluation of water conditions, such as the threat posed by the documented seawater intrusion event north of the NMMA in 2009.

Table 1
Possible Groundwater Production Scenarios[1]
(Approximate AFY)

	Nipomo Community Services District[2]	Golden State Water Company[2]	The Woodlands Mutual Water Company[2]	Rural Mutual Water Company[2]	Total (Percent of 2010 Production)
Current Scenario (2010 Production)[3]	2,370	1,060	850	720	5,000
Scenario 1:Delivery to Nipomo Community Services District Only - No Connections	0	1,060	850	720	2,630 (52%)
Scenario 2: Add Golden State Water Company Connection	80	850	850	720	2,500 (50%)
Scenario 3: Add Golden State Water Company and Woodlands Mutual Water Company Connections	495	850	435	720	2,500 (50%)
Scenario 4: Add Golden State Water Company, Woodlands Mutual Water Company, and Rural Water Company Connections	705	850	435	510	2,500 (50%)

[1]Based on 2,500 AFY of available supplemental water and 2010 demand met by specific wells.
[2]See Figure 1 for the location of specific wells where reduced production would occur.
[3]For specific wells where reduced production would occur under alternative scenarios.


Nipomo Community Services District Well
Golden State Water Company Well
Woodlands Mutual Water Company Well
Rural Water Company Well
Streams
Highway
Water Body
Nipomo Mesa Management Area
Pacific Ocean
101
State Highway 1
101
NOTES:
Coordinate System: UTM Zone 10N
Horizontal Datum: NAD 83
See Table 1 for Possible Groundwater Production Scenarios
N
Locations of Potential Reduction in Groundwater Pumping
0 0.5 1 2 3 4
Miles
NMMA Technical Group
DATE: 02/17/12
BY: B. Newton

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ConocoPhillips Santa Maria Facility Expansion Project

Water Supply Assessment

May 2012

Prepared for:

San Luis Obispo County Air Pollution Control District

On behalf of

Marine Research Specialists, Inc.

Prepared by:
Science Applications International Corporation

SB 610 Water Supply Assessment Summary

This water supply assessment (WSA) is provided for the ConocoPhillips Santa Maria Facility Expansion Project in the County of San Luis Obispo, pursuant to the requirements of Section 10910 of the State Water Code, as amended by Senate Bill No. 610, Chapter 643 (2001).

The following determination has been made regarding the ConocoPhillips Santa Maria Facility Expansion Project:

> *The total water supplies available during normal, single-dry, and multiple-dry water years, within a 20-year projection, will meet the projected water demand for the Proposed Project, based on the ConocoPhillips groundwater rights in the Nipomo Mesa Management Area, as defined in the Stipulation for the Santa Maria Groundwater Litigation. The County of San Luis Obispo and other major water purveyors in the Nipomo Mesa Management Area are bound by the Superior Court of the County of Santa Clara under the Stipulation to uphold ConocoPhillips rights to use water. The total water supplies for other planned future uses within the Nipomo Mesa Management Area are not sufficient to meet future demands without the addition of supplemental water.*

This determination is based on the following water supply assessment.

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1.0 Introduction

Senate Bill No. 610 (SB 610) requires a city or county which determines that a "project" is subject to the California Environmental Quality Act to identify any public water system that may supply water for the project and request a water supply assessment from the public water system. If there is no public water supply system for the project, the lead agency is responsible for the preparation of the water supply assessment.

The ConocoPhillips Santa Maria Facility (SMF) has its own groundwater wells and predates most of the development on the Nipomo Mesa. The facility does not receive water from a public water system; therefore, this water supply assessment has been prepared for the San Luis Obispo County Air Pollution Control District (lead agency), as required by SB 610. This assessment depends mainly on the Stipulation of the Santa Maria Groundwater Litigation and the technical reports of the Nipomo Mesa Management Area Technical Group, which is responsible for management of the Nipomo Mesa portion of the Santa Maria Groundwater Basin. The location of the ConocoPhillips refinery with respect to the management areas of the Santa Maria Groundwater Basin is shown in Figure 1. The major water purveyors in the Nipomo Mesa Management Area are shown in Figure 2.

This assessment is organized into seven sections:

1.0 Introduction – Provides the purpose of the assessment.

2.0 Project Description –Describes the existing facility and the Proposed Project.

3.0 Water Supply Planning under Senate Bill 610 –Describes the requirements of SB 610 with respect to the Proposed Project.

4.0 Water Supply –Describes the groundwater basin, ConocoPhillips groundwater rights, and ConocoPhillips groundwater supplies based on their groundwater rights.

5.0 Water Demand –Provides the historical water demands, the projected water demands for the Proposed Project, and the projected total water demands for all water users in the Nipomo Mesa Management Area.

6.0 Conclusion –Compares the water supplies to the water demands to determine the sufficiency of the water supplies for the next 20 years.

7.0 References –Provides the references cited in the document.

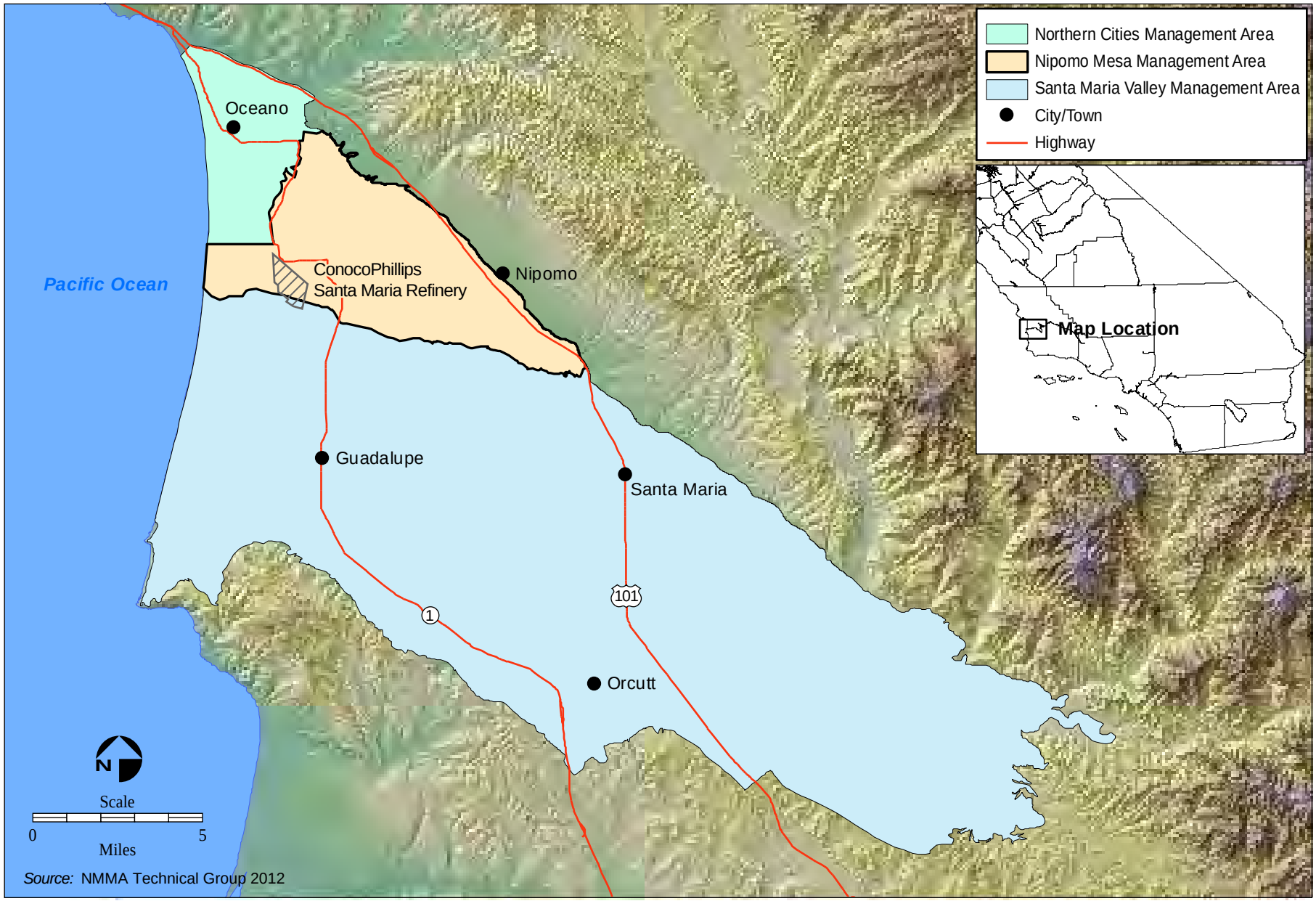

Figure 1. Santa Maria Groundwater Basin and Management Areas

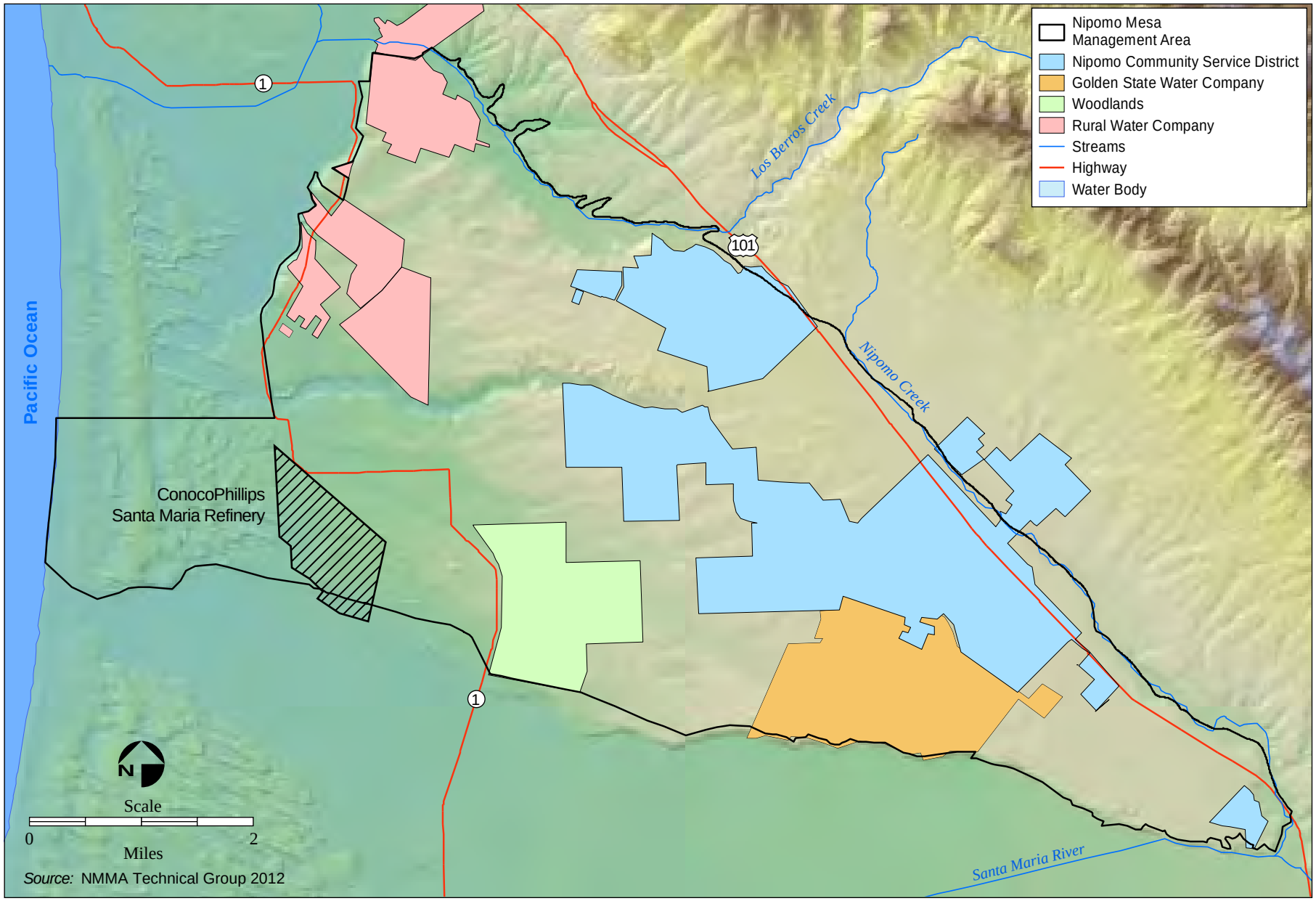

Figure 2. NMMA Water Purveyor Boundaries

2.0 Project Description

This section provides a description of the existing facilities and changes to water use that will occur with the Proposed Project.

2.1 Project Background

The ConocoPhillips Santa Maria Facility (SMF) was built on the Nipomo Mesa in southern San Luis Obispo County (SLOC) in 1955. The SMF mainly processes heavy, high-sulfur crude oil. Semi-refined liquid products from the SMF are sent by pipeline to the Rodeo Refinery for upgrading into finished petroleum products. Currently the SMF processes crude oil into semi-refined liquid products, petroleum coke, elemental sulfur, and fuel gas used onsite.

During recent years, the SMF has been modified and upgraded to modernize the process and comply with changing environmental regulations. Significant upgrades included installing emission control devices, such as the tail gas unit, low nitrogen oxide burners, tank vapor recovery, and flare vapor recovery. The water treatment plant was also upgraded by installing a reverse osmosis system that replaced a water softener unit, which reduced water demand from the SMF well water system. Also, changing the water effluent to a tankage system eliminated storing water in onsite surface impounds. The most recent upgrade, permanently shutting down the petroleum coke calciner in March 2007, decreased criteria pollutants and hazardous air pollutants. In addition, this facility upgrade resulted in reduced water usage.

2.2 Proposed Project

The Proposed Project involves changing the Air Pollution Control District permit for the SMF by increasing the allowable throughout of crude oil by ten percent and allowing the facility to process previously refined gas/petroleum liquid under the definition of crude oil. With the ten percent increase in crude oil throughput, ConocoPhillips estimates that water use may increase by one percent, as the use of water is not directly proportional to crude oil processing rates.

The SMF obtains all of its water from onsite groundwater wells. Water is primarily used for cooling, boiler feed for steam production, and process use such as coke drum cutting. The SMF currently uses less water than it has historically because of two changes:

- The SMF installation of a reverse osmosis water treatment unit, which requires less water than the water softener unit it replaced.
- The March 2007 shutdown of the Carbon Plant (i.e., the calciner) that used water for cooling coke from the calcine process and green coke screening.

Prior to the calciner shutdown, the facility used approximately 459 million gallons of groundwater per year (1,410 acre-feet per year). Currently, usage is estimated to be 358 million gallons of groundwater per year (1,100 acre-feet per year) (ConocoPhillips 2010). A one percent increase in water use would be equivalent to 3.58 million gallons of groundwater per year (11

acre-feet), for a combined total of 362 million gallons per year (1,111 acre-feet per year). This water supply assessment evaluates the sufficiency of available water supplies to meet the increase in water demand associated with the Proposed Project.

3.0 Water Supply Planning under Senate Bill 610

Senate Bill (SB) 610 was passed in 2002 and amended the California Water Code by requiring a water supply assessment (WSA) to be completed for certain projects subject to CEQA. SB 610 involves answering the following questions.

3.1 Is the proposed project subject to CEQA?

Yes. As presented in the Draft EIR, the Proposed Project requires permits issued by a public agency and is, therefore, subject to CEQA.

3.2 Is the proposed project a "Project" under SB 610?

Yes. A proposed project meets the definition of "Project" according to Water Code Section 10912 if it is:

(a)(1) A proposed residential development of more than 500 dwelling units;

(a)(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space;

(a)(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space;

(a)(4 A proposed hotel or motel, or both, having more than 500 rooms;

(a)(5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area;

(a)(6) A mixed-use project that includes one or more of the projects specified in this subdivision; or

(a)(7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project (DWR 2003b).

The Draft EIR for the Proposed Project concluded that a water supply assessment would not be required, based on definition (a)(7), because the water demand for the Proposed Project would not be equivalent to or greater that the amount of water required by a 500 dwelling unit project. In *Center for Biological Diversity v. County of San Bernardino,* the Fourth District Court of Appeal clarified how to apply the statutory criteria to determine whether the project requires a Water WSA under SB 610. The Court ruled that WSAs must be prepared for projects that meet the statutory criteria set forth in definition (a)(2) and (a)(6), regardless of the amount of water those projects will actually use.

The ConocoPhillips SMF is an industrial processing plant occupying more than 40 acres of land. Therefore, under definition (a)(5), a WSA is required.

The SMF is an existing facility and the Proposed Project would not involve the construction of additional facilities. The Proposed Project only involves increasing the throughput of crude oil to the facility by ten percent, which may increase water use by one percent (11 acre-feet per year). Since the Proposed Project does not include additional industrial plant facilities more than 40 acres, an argument could be made that definition (a)(5) would not apply. However, the significance of *Center for Biological Diversity v. County of San Bernardino* is that the courts could liberally interpret the statutory thresholds that require preparation of the WSA. In order to ensure compliance with SB 610, the County has required preparation of a WSA for the Proposed Project.

3.3 Is there a public water system that will service the proposed project?

No. The SMF obtains all of its water from onsite wells and does not receive water service from a public agency. ConocoPhillips extracts water from the Nipomo Mesa Management Area, which is managed by the Nipomo Mesa Management Area Technical Group (NMMA TG), as required in the Stipulation for the Santa Maria Groundwater Litigation (hereafter referred to as the Stipulation and included in Attachment A). ConocoPhillips is a member of the NMMA TG.

3.4 Is there a current UWMP that accounts for the project demand?

No. The nearest public water system is the Nipomo Community Services District, which does not include the ConocoPhillips SMF in its service area. ConocoPhillips water use at the SMF predates most of the development on the Nipomo Mesa and is not in the service area of a public water system.

3.5 Is groundwater a component of the supplies for the project?

Yes. The SMF obtains all its water from groundwater wells, which extract water from the Nipomo Mesa Management Area of the Santa Maria Groundwater Basin. See discussion in Sections 4, 5, and 6.

3.6 Are there sufficient supplies to serve the project for the next 20 years?

Yes. Based on ConocoPhillips groundwater rights and the management of the NMMA, as required by the Stipulation, there is sufficient water supplies for the Proposed Project. See discussion in Sections 4, 5, and 6.

4.0 Water Supply

Conoco Phillips extracts groundwater from the Nipomo Mesa Management Area (NMMA) of the Santa Maria Groundwater Basin. The following sections describe the groundwater in the NMMA, ConocoPhillips groundwater rights according the Judgment after Trial and Stipulation for the Santa Maria Groundwater Basin (hereafter referred to as the Judgment after Trial), and a summary of ConocoPhillips groundwater supplies.

4.1 Groundwater Resources of the Nipomo Mesa Management Area

The NMMA overlies part of the northwest portion of and is contiguous with the Santa Maria Groundwater Basin (Figure 1). The source of groundwater for ConocoPhillips wells are the deep aquifer in the Paso Robles and Careaga formations underlying the Nipomo Mesa. The deep aquifer is also the main source of water for surrounding municipal and agricultural wells. The shallow aquifer in the Nipomo Mesa sand dunes is utilized by lower capacity domestic and agricultural wells. The shallow and deep aquifers underlying the SMF are separated by relatively low hydraulic conductivity layers that act as confining layers in the NMMA (NMMA TG 2012).

One of the main threats to groundwater in the NMMA is the potential for seawater intrusion in the coastal portions of the aquifer. Evaluating seawater intrusion risk depends on knowledge of the groundwater levels, depth of the aquifers, structural geology/stratigraphy, and the location of the seawater-freshwater interface (NMMA TG 2012). The potential for seawater intrusion is minimized when there is sufficient subsurface groundwater flow toward the ocean, which can be monitored using groundwater elevations to determine the offshore gradient. If the onshore aquifers are pumped in excess of replenishment, the groundwater flow direction could reverse and seawater intrusion could eventually occur (NMMA TG 2012). However, a substantial lag time may be present between excessive pumping-induced groundwater gradient reversal and seawater intrusion into the freshwater aquifer.

A series of coastal sentry wells are monitored regularly for seawater intrusion and reported publicly. To date, there has been no increase in chloride concentrations (indicative of seawater intrusion) in the coastal sentry wells. The 2011 NMMA report concluded that there is no evidence of seawater intrusion in the NMMA portion of the SMGB (NMMA TG 2012).

Groundwater quality monitoring in other parts of the NMMA has identified localized areas of the NMMA with nitrate concentrations as high as 90 percent of the Maximum Contaminant Level and rising nitrate concentrations in groundwater. Nitrate contamination can occur beneath agricultural lands as a result of leaching of fertilizer-rich soil into underlying groundwater. One of the ConocoPhillips wells reported a high (1,000 mg/l) total dissolved solids (TDS) concentration, which exceeds secondary drinking water standards. However, the well is used for industrial processing (Carollo 2012).

4.2 ConocoPhillips Groundwater Rights

The rights to extract water from the Santa Maria Groundwater Basin (SMGB) have been in litigation since the late 1990s, culminating with the Stipulation, dated June 30, 2005. The Judgment after Trial, dated January 25, 2008, by the Superior Court of Santa Clara County, approved the Stipulation and ordered the Stipulating Parties to comply with each and every term within the Stipulation. Both ConocoPhillips and the County of San Luis Obispo are Stipulating Parties. This binding water management agreement is only alterable by an order of the Superior Court of the County of Santa Clara. ConocoPhillips water rights, duties, and responsibilities are set forth in the Stipulation as excerpted below:

> *VI (B)(1). ConocoPhillips and its successors-in-interest shall have the right to the reasonable and beneficial use of Groundwater on the property it owns as of the date of this Stipulation located in the NMMA ("ConocoPhillips Property) without limitation, except in the event the mandatory action trigger point (Severe Water Shortage conditions) described in Paragraph VI(D) (2) below is reached. Further, any public water supplier which provides water service to the ConocoPhillips Property may exercise that right subject to the limitation described in Paragraph VI(D)(2).*
>
> *Mandatory action trigger point (Severe Water Shortage Condition)*
> *VI(D)(2).(ii) ConocoPhilips shall reduce its Yearly Groundwater use to no more than 110% of the highest amount it previously used in a single Year, unless it agrees in writing to use less Groundwater for consideration received. The base Year from which the calculation of any reduction is to be made may include any prior single Year up to the Year in which the Nipomo Supplemental Water is transmitted. ConocoPhilips shall have discretion in determining how reduction of its Groundwater use is achieved.*

Therefore, ConocoPhillips has rights to the reasonable and beneficial use of water without limitation, except in the event of a Severe Water Shortage Condition (Carollo 2012). In a severe water shortage condition, ConocoPhillips's production would be reduced to no more than 110% of the highest amount it previously used in a single year.

4.3 ConocoPhillips Projected Water Supplies

Prior to the calciner shutdown in 2007, the facility used a maximum of approximately 459 million gallons of groundwater per year, which equates to 1,410 acre-feet per year (ConocoPhillips 2010). Adding 10% to this prior maximum usage, ConocoPhillips's groundwater production would be limited to 1,550 acre-feet per year in a Severe Water Shortage Condition (Table 1).

Table 1. Annual Amount of Rights, Entitlements and Contracts

Water Source	AFY	Water Rights
NMMA Groundwater – Normal and Potentially Sever Water Shortage Condition	No limit to reasonable and beneficial use of water	Stipulation (June 30, 2005)
NMMA Groundwater - Severe Water Shortage Condition	1,550[1]	Stipulation (June 30, 2005).

1. Based on 1,410 AF as the highest previous water use. This analysis is based on recent water use data (ConocoPhillips 2010) and did not evaluate all historical ConocoPhillips water use data.

5.0 Water Demand

This section provides the prior ConocoPhillips water demand, the projected ConocoPhillips water demand with the Proposed Project, and the NMMA Projected Water Demands and Management requirements.

5.1 Prior ConocoPhillips Water Demand

Currently, usage is estimated to be 358 million gallons of groundwater per year (1,100 acre-feet per year) (ConocoPhillips 2010). Water use from 2008 to 2011 are documented in the Annual Reports by the NMMA TG. Prior to the shutdown of the calciner in 2007, the SMF used approximately 459 millions of gallons per year (1,410 acre-feet per year) (Conoco Phillips 2010).

Table 2. Prior Groundwater Demands

Source	Pre-2007	2008	2009	2010	2011
Groundwater	1,410	1,100	1,200	1,200	1,100

5.2 Projected ConocoPhillips Water Demand

ConocoPhillips estimates that an increase of ten percent in throughput of crude oil to the facility will result in a one percent increase in water use. Based on their current water use, this increase would be 3.58 millions of gallons of groundwater per year (11 acre-feet), for a combined Proposed Project total of 362 million gallons per year (1,111 acre-feet per year). Based on the 4th Annual Report for the NMMA (NMMA TG 2012), ConocoPhillips listed its potential future groundwater demand in 2030 to be 1,200 acre-feet per year (Table 3). Future increases in groundwater production due to ConocoPhillips projects under CEQA may require additional water supply assessments.

Table 3. Projected Water Demands with Proposed Project

Source	2015	2020	2025	2030
Groundwater	1,111	1,111	1,111	1,200

5.3 NMMA Project Water Demand and Management Requirements

In the absence of an Urban Water Management Plan available, SB 610 requires that the CEQA lead agency (County of San Luis Obispo) evaluate the total projected demands in the city or county. While the NMMA is not a city or county, it is the legally recognized groundwater management area from which ConocoPhillips extracts water. The NMMA TG performs the monitoring of the groundwater within the NMMA and compiles the data annually for their annual report. The 2011 production of all users in the NMMA was estimated to be 10,538 AF (Table 4).

Table 4. 2011 Groundwater Production and Potential Future Demand

Water User	2011 Groundwater Production (AFY)	Potential Future Demand at 2030
ConocoPhillips	1,100	1,200[1]
Nipomo Community Services District (NCSD)	2,488	3,400
Golden State Water Company (GSWC)	1,043	1.940
Woodlands	864	1,600
Rural Water Company (RWC)	728	NA
Rural Landowners	1,850	NA
Agriculture	2,465	NA
Total	**10.538**	

Source: NMMA TG 2012

1. Conoco Phillips listed its potential future groundwater demand to be 1,200 acre-feet per year in the 4th Annual Report for the NMMA. The Proposed Project only involves a one percent increase from the current levels or a total demand of 1,111 AFY. Future increases in groundwater production due to ConocoPhillips projects may require additional water supply assessments under CEQA.

The NMMA TG does not estimate an annual safe yield or available water supply for the NMMA. Per the Stipulation, the NMMA TG uses trigger points of Potentially Severe and Severe Water Shortage Conditions to determine if there are adequate groundwater supplies for the NMMA. The Water Shortage Conditions are based on groundwater levels, using a key well index, as well as groundwater elevations and chloride concentrations in the coastal sentinel wells. The NMMA TG determined that Potentially Severe Water Shortage Conditions existed in 2008, 2009, 2010, and 2011 (Figure 3).

Potentially Severe Water Shortage Conditions require voluntary conservation measures from the water purveyors in the NMMA (not including ConocoPhillips). The continued Potentially Severe Water Shortage Conditions suggest that supplies are not sufficient to meet demands. The projected growth in production by 2030 will likely not be possible without the purchase of supplemental water. The NMMA TG has recommended that the Nipomo Supplemental Water Project be implemented as soon as possible. In addition, the County of San Luis Obispo has restricted future production by Ordinance 3090 (adopted May 2006), whereby new dwelling units must pay a supplemental water charge. The voluntary conservation measures required by the Well Management Plan, the Nipomo Supplemental Water Project, and County Ordinance 3090 have been undertaken to prevent Severe Water Shortage Conditions in NMMA.

In the event that Severe Water Conditions develop prior to implementation of the Nipomo Supplemental Water Project, water users other than ConocoPhillips in the NMMA would implement mandatory conservation measures, per the Well Management Plan developed as part of the Stipulation. The Well Management Plan provides the conservation steps to be taken by Nipomo Community Services District, Golden State Water Company, Woodlands, and Rural Water Company to improve the water conditions in the NMMA. The management actions required under the Stipulation, including the Well Management Plan and the Nipomo Supplemental Water Project, protect the overall groundwater resources in the NMMA.

SB 610 requires an evaluation of the available supplies in a normal, single dry year, and multiple dry year period. Groundwater is the sole source of water supply in the NMMA. Groundwater in storage in the NMMA provides a buffer for the water users in single dry years. Based on the single dry years in the historical record, the key well index has declined as much as 10 feet. However, there has been sufficient groundwater in storage to supply water through a single year drought. Of more concern is a multi-year dry period, similar to the one experienced in the late 1980s and early 1990s. This drought resulted in water levels dropping to their lowest levels in the historical record. A repeat of 1987 to 1991 precipitation pattern in the future would likely result in the key well index dropping below the Severe Water Shortage Condition criterion. Water demand has significantly increased since the early 1990s and the additional water demand in a dry period would result in lower water levels. For the purposes of this assessment, the Severe Water Shortage Condition will be used to evaluate the water supplies available in a multi-year dry period.

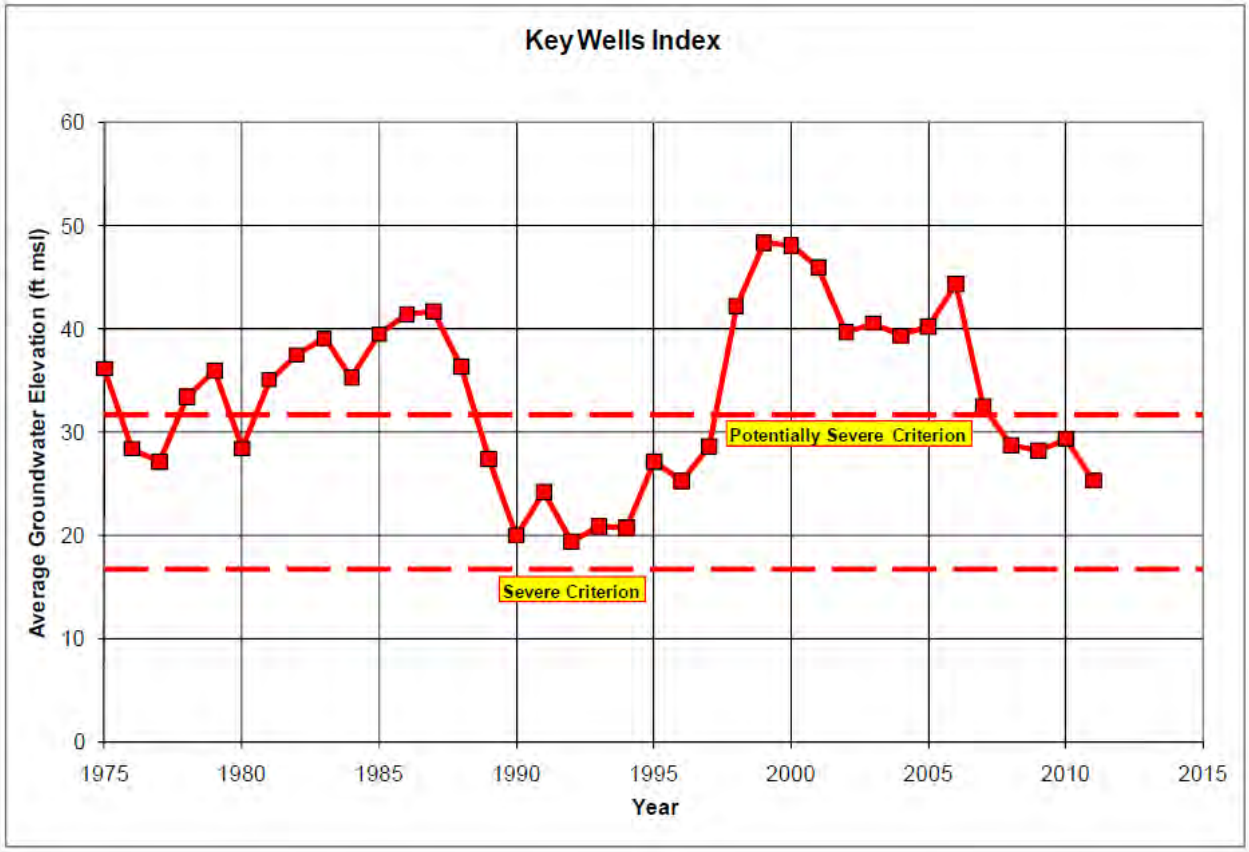

Figure 3. NMMA Key Well Index (NMMA TG 2012)

6.0 Conclusion

The Proposed Project would result in an increase in groundwater use of one percent, or 11 acre-feet per year. The total projected demand of 1,111 acre-feet per year is over 20 percent less than pre-2007 groundwater demand of the ConocoPhillips SMF (1,410 acre-feet per year). According to the Stipulation, ConocoPhillips has no limit to the beneficial and reasonable use of groundwater unless there is a Severe Water Shortage Condition. In the next 20 years, if a Severe Water Shortage Condition occurs, per the Stipulation, ConocoPhillips would have rights to 110 percent of the highest amount of groundwater it utilized (1,550 acre-feet per year). The Proposed Project demand (1,110 acre-feet per year) is less the ConocoPhillips groundwater rights, per the Stipulation. Therefore, there is sufficient water supply for the Proposed Project for the next 20 years (Table 5).

Table 5. Water Demand/Supply Comparison

	2015	2020	2025	2030
Water Demands	1,111	1,111	1,111	1,200
Water Supply – Normal or Potentially Severe Condition (Normal or single dry year)	No Limit	No Limit	No Limit	No Limit
Water Supply –Severe Condition (Multi-year Dry Period)	1,550	1,550	1,550	1,550
Surplus or Deficit in Severe Conditions	439	439	439	350

This Water Supply Assessment is based on the groundwater rights of ConocoPhillips, as defined in the Stipulation. San Luis Obispo County is a signed party to the Stipulation and is bound by the water management agreement to comply with each and every term, which includes upholding ConocoPhillips groundwater rights.

This assessment should not be interpreted that there is sufficient supplies for all purveyors in the NMMA to meet their future demands for the next 20 years. Overall, the NMMA is in a Potentially Severe Water Shortage condition. The Stipulation requires the other water purveyors in the NMMA (i.e., NCSD, GWSC, Woodlands, RWC) to purchase and transmit supplemental water to improve the water conditions in the NMMA. San Luis Obispo County has restricted groundwater production by requiring new developments to pay a supplemental water charge. Due to the current water shortage conditions and the County ordinance, there likely would not be sufficient water supply for additional development in the NMMA without the purchase and transmittal of supplemental water.

7.0 References

Carollo Engineers. 2012. San Luis Obispo County Master Water Plan Draft. Prepared for San Luis Obispo County Flood Control and Water Conservation District. January 2012.

ConocoPhillips. 2010. EIR – Updated Information ConocoPhillips Santa Maria Refinery Throughput Increase Environmental Impact Report. July 27, 2010.

Nipomo Mesa Management Area Technical Group (NMMA TG). 2012. Nipomo Mesa Management Area 4th Annual Report Calendar Year 2011. Submitted April 2012.

Superior Court of the State of California County of Santa Clara. 2005. Stipulation for the Santa Maria Groundwater Litigation. June 30, 2005.

Superior Court of the State of California County of Santa Clara. 2008. Judgment after Trail for the Santa Maria Groundwater Litigation.

Attachment A

Stipulation

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SANTA CLARA

SANTA MARIA VALLEY WATER CONSERVATION DISTRICT, Plaintiff, v. CITY OF SANTA MARIA, et al., Defendants.	SANTA MARIA GROUNDWATER LITIGATION Lead Case No. CV 770214 (CONSOLIDATED FOR ALL PURPOSES) [Consolidated With Case Numbers: CV 784900; CV 785509; CV 785522; CV 787150; CV 784921; CV 785511; CV 785936; CV 787151; CV 784926; CV 785515; CV 786791; CV 787152; CV 036410]
AND RELATED CROSS-ACTIONS AND ACTIONS CONSOLIDATED FOR ALL PURPOSES	San Luis Obispo County Superior Court Case Nos. 990738 and 990739 [Assigned to Judge Jack Komar for All Purposes]

STIPULATION (JUNE 30, 2005 VERSION)

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I. INTRODUCTION -- ALL MANAGEMENT AREAS

The Stipulating Parties hereby stipulate and agree to entry of judgment containing the terms and conditions of this Stipulation.

A. Parties and Jurisdiction

1. Plaintiff and Cross-Defendant Santa Maria Valley Water Conservation District ("District") is a water conservation district organized under California Water Code section 74000, *et seq*. The District does not pump Groundwater from the Basin.

2. Defendants, Cross-Complainants and Cross-Defendants the City of Santa Maria ("Santa Maria"), City of Guadalupe ("Guadalupe"), Southern California Water Company ("SCWC"), Nipomo Community Services District ("NCSD"), Rural Water Company ("RWC"), City of Arroyo Grande ("Arroyo Grande"), City of Pismo Beach ("Pismo Beach"), City of Grover Beach ("Grover Beach") and Oceano Community Services District ("Oceano") rely, in part, on Groundwater to provide public water service to customers within the Basin.

3. Cross-Defendant County of San Luis Obispo ("San Luis Obispo") is a subdivision of the State of California. Cross-Defendant San Luis Obispo County Flood Control and Water Conservation District ("SLO District") is a public entity organized pursuant to the laws of the State of California. Neither San Luis Obispo nor SLO District pumps Groundwater from the Basin.

4. Cross-Defendant County of Santa Barbara ("Santa Barbara") is a subdivision of the State of California. Santa Barbara does not pump Groundwater from the Basin.

5. Numerous other Cross-Defendants and Cross-Complainants are Overlying Owners. Many of these Overlying Owners pump Groundwater from the Basin, while others do not currently exercise their Overlying Rights. Those Overlying Owners who are Stipulating Parties are identified on Exhibit "A".

6. This action presents an *inter se* adjudication of the claims alleged between and among all Parties. This Court has jurisdiction over the subject matter of this action and over the Parties herein.

///

B. Further Trial

The Stipulating Parties recognize that not all Parties have entered into this Stipulation and that a trial will be necessary as to all non-Stipulating Parties. No Stipulating Party shall interfere or oppose the effort of any other Stipulating Party in the preparation and conduct of any such trial. All Stipulating Parties agree to cooperate and coordinate their efforts in any trial or hearing necessary to obtain entry of a judgment containing the terms and conditions of this Stipulation. No Stipulating Party shall have any obligation to contribute financially to any future trial.

C. Definitions

As used in this Stipulation, the following terms shall have the meanings herein set forth:

1. *Annual or Year* – That period beginning January 1 and ending December 31.

2. *Annual Report* – The report prepared and filed with the Court annually for each Management Area.

3. *Appropriative Rights* – The right to use surplus Native Groundwater for reasonable and beneficial use.

4. *Available State Water Project Water* – The amount of SWP Water an Importer is entitled to receive in a given Year based upon the California Department of Water Resources final Table A allocation.

5. *Basin* - The groundwater basin described in the Phase I and II orders of the Court, as modified, and presented in Exhibit "B".

6. *Developed Water* – Groundwater derived from human intervention as of the date of this Stipulation, which shall be limited to Twitchell Yield, Lopez Water, Return Flows, and recharge resulting from storm water percolation ponds.

7. *Groundwater* – Twitchell Yield, Lopez Water, Return Flows, storm water percolation, Native Groundwater and all other recharge percolating within the Basin.

8. *Importer(s)* – Any Party who brings Imported Water into the Basin. At the date of this Stipulation, the Importers are Santa Maria, SCWC, Guadalupe, Pismo Beach, and Oceano.

9. *Imported Water* – Water within the Basin, originating outside the Basin that absent human intervention would not recharge or be used in the Basin.

10. *Lopez Project* – Lopez Dam and Reservoir located on Arroyo Grande Creek, together with the associated water treatment plant, delivery pipeline and all associated facilities, pursuant to State Water Resources Control Board permit No. 12814 (A-18375) and pending application No. A-30826.

11. *Lopez Water* – Groundwater within the Basin derived from the operation of the Lopez Project.

12. *Management Areas* – The three areas within the Basin that have sufficient distinguishing characteristics to permit the water resources and facilities of each area to be individually managed. The Management Areas are: the Northern Cities Management Area, the Nipomo Mesa Management Area, and the Santa Maria Valley Management Area, as shown on Exhibit "C".

13. *Management Area Engineer* – The individual(s) or consulting firm(s) that are hired to prepare the Monitoring Plan(s) and Annual Report(s) for one or more of the Management Areas.

14. *Monitoring Parties* – Those Parties responsible for conducting and funding each Monitoring Program.

15. *Monitoring Program* – The data collection and analysis program to be conducted within each Management Area sufficient to allow the preparation of the Annual Report.

16. *Native Groundwater* – Groundwater within the Basin, not derived from human intervention, that replenishes the Basin through precipitation, stream channel infiltration, tributary runoff, or other natural processes.

17. *New Developed Water* – Groundwater derived from human intervention through programs or projects implemented after the date of this Stipulation.

18. *New Urban Uses* – Municipal and industrial use which may occur on land that, as of January 1, 2005, was located: 1) within the boundaries of a municipality or its sphere of influence, or within the process of inclusion in its sphere of influence; or 2) within the certificated

service area of a publicly regulated utility. The New Urban Use areas are identified in Exhibit "D". New Urban Uses does not include the current DJ Farms development within Guadalupe City limits (including Santa Barbara County APN 113-080-18, 113-080-24).

19. *Nipomo Mesa Management Area or NMMA* – That Management Area shown on Exhibit "C".

20. *Nipomo Mesa Management Area Technical Group* – The committee formed to administer the relevant provisions of the Stipulation regarding the Nipomo Mesa Management Area.

21. *Northern Cities Management Area* – That Management Area which is part of Zone #3 of the San Luis Obispo County Flood Control and Water Conservation District as shown on Exhibit "C".

22. *Northern Cities* – Arroyo Grande, Pismo Beach, Grover Beach and Oceano.

23. *Northern Parties* – The Northern Cities, the Overlying Owners within the Northern Cities Management Area, San Luis Obispo and the SLO District.

24. *Overlying Right* – The appurtenant right of an Overlying Owner to use Native Groundwater for overlying, reasonable and beneficial use.

25. *Overlying Owner(s)* – Owners of land overlying the Basin who hold an Overlying Right.

26. *Party* – Each Person in this consolidated action, whether a Stipulating Party or a non-Stipulating Party.

27. *Person* – Any natural person, firm, association, organization, joint venture, partnership, business, trust, corporation, or public entity.

28. *Public Hearing* – A hearing after notice to all Parties and to any other person legally entitled to notice.

29. *Return Flows* – Groundwater derived from use and recharge within the Basin of water delivered through State Water Project facilities.

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30. *Santa Maria Valley Management Area* – That Management Area shown on Exhibit "C".

31. *Severe Water Shortage Conditions* – Those conditions, as separately defined in a Severe Water Shortage Response Plan for each Management Area, that trigger certain discretionary and mandatory responses by the Stipulating Parties upon order of the Court.

32. *Severe Water Shortage Response Plan* – The discretionary and mandatory responses for each Management Area that are to be implemented when Severe Water Shortage Conditions exist.

33. *State Water Project Water* or *SWP Water* – Water imported through the State of California State Water Resources Development System pursuant to Division 6, Part 6, Chapter 8, of the California Water Code.

34. *Stipulating Party* – A Party that has signed this Stipulation, as listed in Exhibit "A", or its heirs, executors, administrators, trustees, successors, assigns, and agents.

35. *Storage Space* – The portion of the Basin capable of holding water for subsequent reasonable and beneficial uses.

36. *SWP Contract(s)* – Those series of contracts that entitle the Importers to use SWP facilities to bring Imported Water into the Basin.

37. *Twitchell Management Authority* or *TMA* – The committee formed to administer the relevant provisions of the Stipulation regarding the Santa Maria Valley Management Area.

38. *Twitchell Participants* – Those Stipulating Parties holding rights to Twitchell Yield.

39. *Twitchell Project* – Dam and reservoir authorized by Congress as the "Santa Maria Project" on September 3, 1954 (Public Law 774, 83d Congress, ch. 1258, 2d session, 68 Stat. 1190) and located on the Cuyama River, approximately six miles upstream from its junction with the Sisquoc River, pursuant to that certain License For Diversion And Use of Water, License No. 10416, issued by the State Water Resources Control Board.

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40. *Twitchell Water* – Groundwater derived from operation of the Twitchell Project.

41. *Twitchell Yield* – The total amount of Groundwater allocated annually to the Twitchell Participants.

II. EXHIBITS

The following Exhibits are attached to this Stipulation and incorporated herein:

1. *Exhibit "A"*, list identifying the Stipulating Parties and the parcels of land bound by the terms of this Stipulation.

2. *Exhibit "B"*, Phase I and II Orders, as modified, and the attached map depicting the Santa Maria Basin.

3. *Exhibit "C"*, map of the Basin and boundaries of the three Management Areas.

4. *Exhibit "D"*, map identifying those lands as of January 1, 2005: 1) within the boundaries of a municipality or its sphere of influence, or within the process of inclusion in its sphere of influence; or 2) within the certificated service area of a publicly regulated utility; and a list of selected parcels that are nearby these boundaries which are excluded from within these areas.

5. *Exhibit "E"*, 2002 Settlement Agreement between the Northern Cities and Northern Landowners.

6. *Exhibit "F"*, the agreement among Santa Maria, SCWC and Guadalupe regarding the Twitchell Project and the TMA.

7. *Exhibit "G"*, the Court's Order Concerning Electronic Service of Pleadings and Electronic Posting of Discovery Documents dated June 27, 2000.

8. *Exhibit "H"*, the form of memorandum of agreement to be recorded.

III. DECLARATION OF RIGHTS -- ALL MANAGEMENT AREAS

The terms and conditions of this Stipulation set forth a physical solution concerning Groundwater, SWP Water and Storage Space, consistent with common law water rights priorities.

///

A. Recognition of Priority of Overlying Rights

Except as expressly modified by the settlement agreement among the Northern Parties (Exhibit "E"), all Overlying Owners that are also Stipulating Parties have a prior and paramount Overlying Right, whether or not yet exercised.

B. Prescriptive Rights

As to the Stipulating Parties, no Party has proved prescriptive rights to any Native Groundwater. Future use by the Stipulating Parties will not be adverse and will not ripen into a prescriptive right as between the Stipulating Parties.

C. Appropriative Rights

Consistent with the specific provisions governing each Management Area, the Stipulating Parties owning and exercising Appropriative Rights have the right to the reasonable and beneficial use of Native Groundwater that is surplus to the reasonable and beneficial uses of the Stipulating Parties that are Overlying Owners. New appropriative uses shall be subordinate to existing appropriations and shall be prioritized on a first in time, first in right basis.

D. Developed Water Rights

The Stipulating Parties owning Developed Water or New Developed Water have the right to its reasonable and beneficial use, consistent with the specific provisions governing each Management Area. The right to use Developed Water is a right to use commingled Groundwater and is not limited to the corpus of that water.

E. Rights to Storage Space

The Court shall reserve jurisdiction over the use of the Storage Space, and any Party may apply to the Court for the approval of a project using Storage Space. The Court must approve any project using Storage Space before any Party can claim a right to stored water from that project. The Stipulating Parties agree that Groundwater derived from Developed Water is exempt from the Court approval requirements of this Paragraph.

F. Other Surface Water Rights

Nothing in this Stipulation affects or otherwise alters common law riparian rights or any surface water rights, unless expressly provided in this Stipulation.

IV. PHYSICAL SOLUTION – ALL MANAGEMENT AREAS

A. Authority

Pursuant to Article X, section 2 of the California Constitution, the Stipulating Parties agree that the Court has the authority to enter a judgment and physical solution containing the terms and conditions of this Stipulation. Unless the Court imposes this physical solution, potential changes in water use could affect Basin adequacy and integrity. The Declaration of Rights is a component of this physical solution.

B. Purposes and Objectives

The terms and conditions of this Stipulation are intended to impose a physical solution establishing a legal and practical means for ensuring the Basin's long-term sustainability. This physical solution governs Groundwater, SWP Water and Storage Space, and is intended to ensure that the Basin continues to be capable of supporting all existing and future reasonable and beneficial uses. This physical solution is: 1) a fair and equitable basis for the allocation of water rights in the Basin; 2) in furtherance of the mandates of the State Constitution and the water policy of the State of California; and 3) a remedy that gives due consideration to applicable common law rights and priorities to use Groundwater and Storage Space, without substantially impairing any such right.

C. Basin Management Areas

Development and use of Groundwater, SWP Water and Storage Space have historically been financed and managed separately in three Management Areas. For example, only the Northern Parties have paid for, managed, and benefited from the Lopez Project; whereas only Santa Maria Valley parties have paid for, managed, and benefited from the Twitchell Project. In contrast, the Nipomo Mesa parties have not been involved in the funding or management of either the Twitchell or Lopez Projects.

The Stipulating Parties agree that Groundwater, SWP Water and Storage Space can be more efficiently allocated and managed in three Management Areas, given the physical, geographical, political, economic, and historic conditions. The three Management Areas, as shown on Exhibit "C," are as follows: Northern Cities Management Area; Nipomo Mesa Management

Area; and Santa Maria Valley Management Area. The Stipulating Parties intend that management through three Management Areas will preserve the Basin's integrity.

D. Groundwater Monitoring

1. *Monitoring Program*. A Monitoring Program shall be established in each of the three Management Areas to collect and analyze data regarding water supply and demand conditions. Data collection and monitoring shall be sufficient to determine land and water uses in the Basin, sources of supply to meet those uses, groundwater conditions including groundwater levels and quality, the amount and disposition of Developed Water supplies, and the amount and disposition of any other sources of water supply in the Basin. The Northern Cities Management Area shall not be required to include in its Monitoring Program or Annual Reports quantification of groundwater recharge from the Lopez Project or storm water percolation ponds, unless the Court orders inclusion of this information.

Within one hundred and eighty days after entry of judgment, representatives of the Monitoring Parties from each Management Area will present to the Court for its approval their proposed Monitoring Program. The Management Area Engineers shall freely share available well data, groundwater models, and other products and tools utilized in monitoring and analysis of conditions in the three Management Areas, consistent with the confidentiality provisions of this Stipulation.

Absent a Court order to the contrary, all Stipulating Parties shall make available relevant information regarding groundwater elevations and water quality data necessary to implement the Monitoring Program approved for their respective Management Area. The Monitoring Parties shall coordinate with the Stipulating Parties to obtain any needed data on reasonable terms and conditions. Metering may only be imposed on Stipulating Parties upon a Court order following a showing that such data is necessary to monitor groundwater conditions in the Basin, and in the case of an Overlying Owner, that Overlying Owner has failed to provide information comparable to that provided by other Overlying Owners. The confidentiality of well data from individual owners and operators will be preserved, absent a Court order or written consent.

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2. *Monitoring Parties*. The Monitoring Parties are as follows:

(a) Santa Maria Valley Management Area – The Twitchell Management Authority.

(b) Northern Cities Management Area – The Northern Cities.

(c) Nipomo Mesa Management Area – The NMMA Technical Group.

3. *Annual Reports*. Within one hundred and twenty days after each Year, the Management Area Engineers will file an Annual Report with the Court. The Annual Report will summarize the results of the Monitoring Program, changes in groundwater supplies, and any threats to Groundwater supplies. The Annual Report shall also include a tabulation of Management Area water use, including Imported Water availability and use, Return Flow entitlement and use, other Developed Water availability and use, and Groundwater use. Any Stipulating Party may object to the Monitoring Program, the reported results, or the Annual Report by motion.

4. *Management Area Engineer*. The Monitoring Parties may hire individuals or consulting firms to assist in the preparation of the Monitoring Programs and the Annual Reports. Except as provided below for the Santa Maria Valley Management Area, the Monitoring Parties, in their sole discretion, shall select, retain and replace the Management Area Engineer.

E. New Developed Water

1. Stipulating Parties in each Management Area may prepare and implement plans to develop, salvage or import additional water supplies.

2. The Stipulating Parties that pay, or otherwise provide consideration, for New Developed Water are entitled to use it to the extent the New Developed Water augments the water supplies in that Management Area. If more than one Stipulating Party finances or participates in generating New Developed Water, rights to the supply of New Developed Water shall be proportional to each Stipulating Party's financial contribution or other consideration, or as otherwise mutually agreed to by the participating Stipulating Parties. This paragraph does not apply to Return Flows.

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3. The Stipulating Parties who desire to claim New Developed Water supplies must bring a motion, and obtain an order from the Court, quantifying and allocating the rights to the New Developed Water, before they have the prior right to the New Developed Water.

F. Severe Water Shortage Response

This physical solution sets forth a Severe Water Shortage Plan for each Management Area which is intended to provide an effective response to Severe Water Shortage Conditions that may develop within each or all of the Management Areas. The specific Severe Water Shortage Plans for each Management Area are incorporated herein and made a part of the physical solution.

V. PHYSICAL SOLUTION: PROVISIONS SPECIFIC TO SANTA MARIA VALLEY MANAGEMENT AREA

As supplemented by the provisions of this Stipulation that apply to all Management Areas, the following terms govern rights to Groundwater, SWP Water and Storage Space in the Santa Maria Valley Management Area.

A. Water Rights to Sources of Supply

1. *Overlying Rights*. The Stipulating Parties who are Overlying Owners within the Santa Maria Valley Management Area each have the prior and paramount right to use Native Groundwater. Subject to Paragraph V(C)(2)(b)(vi), all Overlying Rights are appurtenant to the overlying land and cannot be assigned or conveyed separate or apart from those lands.

2. *Appropriative Rights*. The Parties listed in Exhibit "A" are the owners of Appropriative Rights exercised in the Santa Maria Valley Management Area. Each Appropriative Right is limited to Native Groundwater that is surplus to reasonable and beneficial uses of the Stipulating Parties that are Overlying Owners in the Santa Maria Valley Management Area. New appropriative uses shall be subordinate to existing Appropriative Rights and shall be prioritized on a first in time, first in right basis.

3. *Developed Water*. The Stipulating Parties owning Developed Water have the right to its reasonable and beneficial use, subject only to the Severe Water Shortage Plan. On an annual basis, the Stipulating Parties shall have the right to the reasonable and beneficial use of Developed Water that is surplus to the reasonable and beneficial uses of the owners of that

Developed Water. The right to use Developed Water is a right to use commingled Groundwater and is not limited to the corpus of that water.

(a) New Developed Water. The ownership and use of New Developed Water shall be subject to Court order.

(b) Twitchell Water.

(i) *Amount.* The Twitchell Project annually provides a variable amount of Developed Water that augments the Groundwater in the Santa Maria Valley Management Area. Twitchell Yield is thirty-two thousand acre-feet per year ("afy").

(ii) *Division of Twitchell Yield.* Twitchell Yield shall be divided as follows: 80% to Santa Maria, SCWC and Guadalupe, and 20% to the Overlying Owners within the District who are Stipulating Parties.

a. The Twitchell Yield allocated to Santa Maria, SCWC and Guadalupe is suballocated pursuant to the agreement among Santa Maria, SCWC and Guadalupe, as attached and incorporated herein as Exhibit "F".

b. The Twitchell Yield allocated to the Overlying Owners who are Stipulating Parties within the District shall be equally allocated to each acre of land within the District owned by these Stipulating Parties. Concurrently with the execution of this Stipulation, each of these Stipulating Parties shall report their acreage of overlying land within the District on a parcel specific basis. Within one hundred and twenty days of the effective date of this Stipulation, the Management Area Engineer shall create a list of all the Stipulating Parties and their respective allocation of the Twitchell Yield.

(iii) *Recapture of Twitchell Yield.* The right to use Twitchell Yield is a right to use commingled Groundwater and is not limited to the corpus of that water.

(iv) *Transfer of Twitchell Yield.* Twitchell Yield may be transferred, temporarily or permanently, only between Stipulating Parties and the transfer market shall be as open and competitive as practical. A memorandum of agreement summarizing each transfer shall be filed with the Court and provided to the TMA. Any such memorandum of agreement shall state the Parties to the transfer, the amount of Twitchell Yield transferred, the price per acre-

foot, and the Party responsible for the financial obligation associated with the Twitchell Yield.

(v) *Carryover*. Any portion of Twitchell Yield that is not used in a given Year shall not be carried over into the following Year.

(c) State Water Project Water.

(i) *Import and Use of State Water Project Water*. Santa Maria, SCWC and Guadalupe all have SWP Contracts. Santa Maria will import and use within the Santa Maria Valley Management Area not less than 10,000 acre-feet each Year of Available SWP Water, or the full amount of Available SWP Water if the amount physically available is less than 10,000 acre-feet in a given Year under Santa Maria's SWP Contract. Guadalupe will import and use within the Santa Maria Valley Management Area a minimum of 75% of its Available SWP Water. SCWC will import and use within the Basin all its Available SWP Water. Santa Maria, SCWC and Guadalupe will not voluntarily relinquish or terminate their current SWP Contracts, and shall seek renewal of these SWP Contracts.

(ii) *Return Flows*.

a. Fixed Amount. The Return Flows available to each Importer is fixed based on a percentage of the annual amount of SWP Water the Importer uses within the Basin. The fixed percentage for each importer is as follows: (a) Santa Maria 65%; (b) SCWC 45%; and (c) Guadalupe 45%. The percentage provided to SCWC and Guadalupe shall be adjusted through a Court order if: a) either entity increases its use of water imported into the Basin, b) the applicable method of wastewater treatment and discharge to the Basin is altered, or c) good cause is shown.

b. Recapture. The right to use Return Flows does not attach to the corpus of SWP water deliveries or the treated SWP wastewater discharged into the Basin but is a right to use the commingled Groundwater. The Importer's right to Return Flows is assignable in whole or in part, subject to necessary accounting.

c. Quantification of Return Flows. Return Flows equal the total amount of SWP Water used by the Importer in the prior five Years, divided by five, and then multiplied by the Importer's percentage as provided in Paragraph V(A)(3)(c)(ii)(a) above.

d. Carryover. Any portion of Return Flows that is not used in a given Year shall not be carried over into the following Year.

B. Monitoring and Management

1. *Status of Management Area*. Current Groundwater and SWP Water supplies are sustaining existing water uses. Changes in land and water use and demographic conditions can be expected to occur, possibly resulting in changes in water supply or demand requirements.

2. *Need for Monitoring*. Monitoring and reporting of changes in land and water use and demographic conditions are necessary to ensure that water supplies continue to be sufficient to support water uses.

3. *Monitoring Program*.

(a) Annual Report: Content and Processing.

The Annual Report shall include an analysis of the relationship between projected water demands and projected water supplies.

(i) The Annual Report shall be prepared and signed by the Management Area Engineer, and shall be simultaneously submitted to the Court and the TMA.

(ii) Within forty-five days of submission, the TMA shall hold a noticed public hearing to take comments on and consider for adoption the Annual Report. No later than forty-five days from the date of the public hearing, the TMA shall submit to the Court its recommendations regarding the Annual Report.

(iii) Within one hundred and twenty days of the date of the submission of the Annual Report to the Court, it shall conduct a noticed hearing on the Annual Report. Any Party may submit comments on the Annual Report. After the hearing, the Court shall accept the Annual Report or direct its modification.

(b) Management Area Engineer

(i) Absent the unanimous consent of the TMA, the Management Area Engineer shall not concurrently be employed by any Party holding rights to use Groundwater in the Santa Maria Valley Management Area.

(ii) The Management Area Engineer shall initially be the engineering firm of Luhdorff & Scalmanini. Luhdorff & Scalmanini shall be the Management Area Engineer for a minimum of the shorter of five years from the date of this Stipulation or the date upon which Mr. Joseph Scalmanini discontinues full time work for that firm.

(iii) The TMA shall employ the following process to replace the Management Area Engineer:

a. The TMA shall solicit candidates for Management Area Engineer through a public process. All submissions and candidate materials shall be available to any Party upon request. The TMA shall conduct its interview through a public process to the extent practical, and include District and Overlying Owner representatives in the candidate review process.

b. Once a short list of candidates (less than five) for Management Area Engineer is obtained, the TMA shall hold a noticed public hearing to take comments on and consider the candidates for Management Area Engineer. The TMA shall make a reasonable effort to select the Management Area Engineer with a unanimous vote. If the TMA unanimously endorses a candidate, that nominee shall be recommended to the Court. Otherwise, the short list of candidates shall be submitted.

c. The Court shall appoint the Management Area Engineer following a noticed hearing.

4. *Funding*. The TMA shall pay for the Monitoring Program for the Santa Maria Valley Management Area, which includes the cost of the Management Area Engineer and the Annual Report. The cost of the Monitoring Program shall be divided among the Twitchell Participants on the same basis as the allocation of their Twitchell Yield.

C. Response to Varying Conditions

1. *Early Response to Avoid Severe Water Shortage Conditions*. If the Management Area Engineer determines that projected demands are expected to materially exceed projected water supplies, then the Management Area Engineer may recommend programs and projects to augment the Management Area's water supplies. The Stipulating Parties will collabo-

rate on a response based upon current conditions, but absent Severe Water Shortage Conditions, implementation of programs and projects will not be mandated.

The Stipulating Parties may voluntarily participate in any recommended program or project, either through financial or other contributions. The Stipulating Parties that contribute to such a program or project shall have a priority to the water supplies generated by that program or project with Court approval. The Stipulating Parties agree to aggressively pursue New Developed Water sources, including necessary funding.

2. *Severe Water Shortage Conditions and Response*.

(a) Determination. Severe Water Shortage Conditions shall be found to exist when the Management Area Engineer, based on the results of the ongoing Monitoring Program, finds the following: 1) groundwater levels in the Management Area are in a condition of chronic decline over a period of not less than five Years; 2) the groundwater decline has not been caused by drought; 3) there has been a material increase in Groundwater use during the five-Year period; and 4) monitoring wells indicate that groundwater levels in the Santa Maria Valley Management Area are below the lowest recorded levels.

(b) Response.

(i) If the Management Area Engineer determines that Severe Water Shortage Conditions exist within the Santa Maria Valley Management Area, the Management Area Engineer shall file and serve, as part of its Annual Report, findings and recommendations to alleviate such shortage conditions or the adverse effects caused by such water shortage.

(ii) Upon the filing of the Annual Report, the Court shall hold a noticed hearing regarding the existence and appropriate response to the Severe Water Shortage Conditions. If, after that hearing, the Court finds that Severe Water Shortage Conditions exist in the Santa Maria Valley Management Area, the Court shall first order all use of Groundwater to be limited to: (a) for Guadalupe, Santa Maria and SCWC, their Developed Water; (b) entitled Stipulating Parties to their New Developed Water; and (c) for the Overlying Owners, the Native Groundwater plus any Developed Water to which individual Overlying Owners are entitled.

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(iii) The Court may also order Stipulating Parties to address specific adverse effects caused by the Severe Water Shortage Conditions. The responses may include, but are not limited to: (a) measures recommended in the Annual Report and the related Court proceedings; and (b) other measures intended to address localized problems in the Santa Maria Valley Management Area directly related to the Severe Water Shortage Conditions.

(iv) The Court may adjust the Groundwater use limitations imposed on any Stipulating Party(ies) who implement programs or projects providing additional water supplies within the Santa Maria Valley Management Area.

(v) If the Court finds that Management Area conditions have deteriorated since it first found Severe Water Shortage Conditions, the Court may impose further limitations on Groundwater use. If the Court imposes further limitations on Groundwater use, a Stipulating Party shall be exempt from those limitations to the extent: (a) the Stipulating Party can demonstrate that it has already implemented limitations in its Groundwater use, equivalent to those ordered by the Court; or (b) the Stipulating Party can demonstrate that further limitations would not avoid or reduce the deteriorating conditions.

(vi) During Severe Water Shortage Conditions, the Stipulating Parties may make agreements for temporary transfer of rights to pump Native Groundwater, voluntary fallowing, or the implementation of extraordinary conservation measures. Transfers of Native Groundwater must benefit the Management Area and be approved by the Court.

D. <u>Management and Administration of the Twitchell Project</u>

1. *<u>Operational Parameters</u>*. All Twitchell Project operations (operation and maintenance and capital projects) will be performed consistent with the following parameters (Operational Parameters):

(a) Maximize recharge of the Santa Maria Valley Management Area from Twitchell Water, including without limitation, the avoidance of impacts on recharge resulting from ongoing accumulation of silt to the maximum extent practical.

(b) Operate the Twitchell Project in accordance with the requirements of applicable law including, without limitation, the requirements of the Bureau of Reclamation

and Army Corps of Engineers.

(c) Operate the Twitchell Project in accordance with industry standards and best management practices.

2. *Twitchell Project Manual.*

(a) The TMA will hire and pay for a professional engineering consulting firm with expertise in dam and reservoir operations and maintenance, acceptable to the District and the TMA, to develop an integrated operation and maintenance procedure manual ("Twitchell Project Manual") and provide recommendations for capital and maintenance projects that are consistent with the Operational Parameters.

(b) The District shall hold one or more public hearings to solicit input regarding the content of the Twitchell Project Manual.

(c) Within eighteen months of entry of the judgment, the TMA and the District shall adopt a final Twitchell Project Manual.

(d) Any disagreement between the District and the TMA regarding the content of the final Twitchell Project Manual shall be presented for Court review and determination pursuant to the judicial review provisions provided in this Stipulation.

(e) The District will exercise its discretionary authority to conduct all its operation and maintenance activities for the Twitchell Project in accordance with the Twitchell Project Manual.

3. *Twitchell Project Funding.*

(a) District will maintain its current operation and maintenance (O&M) assessments. These funds will be used for District staff salaries, property, equipment, rent, expenses, and other day-to-day operations, and will be expended consistent with the Twitchell Project Manual to the extent it is applicable.

(b) The TMA will separately fund, administer, construct and manage any additional Twitchell Project expenses or projects, including Capital Improvement Projects (see below) and O&M, (Extraordinary Project Operations) consistent with the Twitchell Project Manual. The TMA and the District will make reasonable efforts to work cooperatively to imple-

ment Extraordinary Project Operations.

(c) Consistent with the provisions of this Paragraph V(D), the District and the TMA shall be responsible for ensuring the ongoing operational integrity of the Twitchell Project and the maintenance of the Twitchell Yield. The Stipulating Parties expect that this ongoing responsibility may involve significant expenditures. Within 120 days of the effective date of this Stipulation, and annually thereafter, the Twitchell Participants shall establish an operating budget for the TMA to fund its responsibilities set forth in this Stipulation. For the first five years following the PUC approval as provided below, the TMA's annual budget shall be established at an amount between $500,000 to $700,000. Following the initial budgeting period, the TMA shall set its budget in three- to five-year increments, as it deems necessary to meet its obligations to preserve the Twitchell Yield. Any unused revenues shall be segregated into a reserve account, for future funding needs of the Twitchell Project. The Stipulating Parties agree to cooperate and coordinate their efforts to enable the TMA to fulfill its responsibilities as provided in this Stipulation.

4. *Twitchell Management Authority*.

(a) The TMA shall be comprised of one representative of each of the following parties: Santa Maria, Guadalupe, Southern California Water Company, the District, and Overlying Landowners holding rights to Twitchell Yield.

(b) Only those parties holding an allocation of Twitchell Yield shall be voting members of the TMA. Voting shall be based on each party's proportionate allocation of Twitchell Yield.

(c) The TMA shall be responsible for all the Extraordinary Project Operations.

(d) The TMA shall be responsible for developing proposals for Capital Improvement Projects relating to the Twitchell Project. Capital Improvement Projects shall mean projects involving the expenditure of funds for the improvement or enhancement of the Twitchell Project, but shall not include normal operation, maintenance or repair activities.

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(e) Upon the development of a proposal for a Capital Improvement Project, the TMA shall, in cooperation with the District, hold one or more public hearings to solicit input.

(f) Following the public hearing process, the TMA may vote on whether to implement the Capital Improvement Project.

(g) The cost of TMA-sponsored Extraordinary Project Operations and Capital Improvement Projects shall be divided among Twitchell Participants on the same basis as the allocation of their Twitchell Yield.

(h) The District shall assume operation and maintenance responsibility for any TMA sponsored Capital Improvement Project to the extent practical within the District's day-to-day operations.

5. *Regulatory Compliance*. The TMA or the District shall provide advance notice to the Court and all Parties of the initiation of any regulatory proceeding relating to the Twitchell Project.

6. *Existing Contracts*. The Twitchell Reservoir Project will continue to be governed by and subject to the terms and conditions of the December 1955 agreement between the District and the Santa Barbara County Water Agency and nothing in this Stipulation is intended to modify the rights or obligations provided in that agreement. To the extent that the approval of Santa Barbara County Water Agency or the United States Bureau of Reclamation is required in connection with the implementation of this Stipulation, the Stipulating Parties agree to work cooperatively to obtain such approval(s).

E. New Urban Uses – Santa Maria Valley Management Area

1. New Urban Uses shall obtain water service from the local public water supplier. The local public water supplier shall provide water service on a reasonable and non-discriminatory basis.

2. New municipal and industrial uses on land adjacent to or within one-quarter mile of the boundary line depicted in Exhibit D shall comply with any applicable Corporations Code provisions and negotiate in good faith to obtain water service from the local

public water supplier, before forming a mutual water company to provide water service.

3. No modification of land use authority. This Stipulation does not modify the authority of the entity holding land use approval authority over the proposed New Urban Uses.

4. New Urban Uses shall provide a source of supplemental water to offset the water demand associated with that development. For the purposes of this section, supplemental water shall include all sources of Developed Water, except: i) Twitchell Water, ii) storm water percolation ponds existing as of the date of entry of the judgment, or iii) Overlying Owners' right to use of surplus Developed Water.

VI. PHYSICAL SOLUTION: PROVISIONS SPECIFIC TO NIPOMO MESA MANAGEMENT AREA

As supplemented by the provisions of this Stipulation that apply to all Management Areas, the following terms shall apply to the Nipomo Mesa Management Area.

A. Supplemental Water

1. *MOU*. NCSD has entered into a Memorandum of Understanding ("MOU") with Santa Maria which contemplates the wholesale purchase and transmission from Santa Maria to the NMMA of a certain amount of water each Year (the "Nipomo Supplemental Water"). All water delivered pursuant to the MOU for delivery by NCSD to its ratepayers shall be applied within the NCSD or the NCSD's sphere of influence as it exists at the time of the transmission of that water.

2. The NCSD agrees to purchase and transmit to the NMMA a minimum of 2,500 acre-feet of Nipomo Supplemental Water each Year. However, the NMMA Technical Group may require NCSD in any given Year to purchase and transmit to the NMMA an amount in excess of 2,500 acre-feet and up to the maximum amount of Nipomo Supplemental Water which the NCSD is entitled to receive under the MOU if the Technical Group concludes that such an amount is necessary to protect or sustain Groundwater supplies in the NMMA. The NMMA Technical Group also may periodically reduce the required amount of Nipomo Supplemental Water used in the NMMA so long as it finds that groundwater supplies in the NMMA are not

endangered in any way or to any degree whatsoever by such a reduction.

3. The Stipulating Parties agree to support (and, conversely, not to oppose in any way or to encourage or assist any other Person or party in opposing or challenging) the implementation of the MOU, which includes environmental and regulatory permits and approvals, the approval of a wholesale water supply agreement between Santa Maria and NCSD, and the alignment and construction of a pipeline and related infrastructure necessary to deliver the Nipomo Supplemental Water from Santa Maria to the NMMA ("Nipomo Supplemental Water Project"). ConocoPhillips retains the right to object to or provide input on the alignment of any pipelines associated with the Nipomo Supplemental Water Project if they might interfere with the location of existing ConocoPhillips pipelines. The Stipulating Parties retain their rights to be compensated for any interest or property acquired in implementing the Nipomo Supplemental Water Project.

4. NCSD and Santa Maria shall employ their best efforts to timely implement the Nipomo Supplemental Water Project, subject to their quasi-judicial obligations specified for administrative actions and in the California Environmental Quality Act.

5. The enforcement of the provisions of Paragraph VI(D) below is conditioned upon the full implementation of the Nipomo Supplemental Water Project, including the Yearly use of at least 2,500 acre-feet of Nipomo Supplemental Water (subject to the provisions of Paragraph VI(A)(2) above) within the NMMA. In the event that Potentially Severe Water Shortage Conditions or Severe Water Shortage Conditions are triggered as referenced in Paragraph VI(D) before Nipomo Supplemental Water is used in the NMMA, NCSD, SCWC, Woodlands and RWC agree to develop a well management plan that is acceptable to the NMMA Technical Group, and which may include such steps as imposing conservation measures, seeking sources of supplemental water to serve new customers, and declaring or obtaining approval to declare a moratorium on the granting of further intent to serve or will serve letters. In the event that it becomes apparent that the Nipomo Supplemental Water will not be fully capable of being delivered, any Stipulating Party may apply to the Court, pursuant to a noticed motion, for appropriate modifications to this portion of the Stipulation and the judgment entered based upon the

terms and conditions of this Stipulation, including declaring this Paragraph VI to be null and void, and of no legal or binding effect.

6. Once the Nipomo Supplemental Water is capable of being delivered, those certain Stipulating Parties listed below shall purchase the following portions of the Nipomo Supplemental Water Yearly:

NCSD - 66.68%

Woodlands Mutual Water Company - 16.66%

SCWC - 8.33%

RWC - 8.33%

B. <u>Rights to Use Groundwater</u>

1. ConocoPhillips and its successors-in-interest shall have the right to the reasonable and beneficial use of Groundwater on the property it owns as of the date of this Stipulation located in the NMMA ("ConocoPhillips Property") without limitation, except in the event the mandatory action trigger point (Severe Water Shortage conditions) described in Paragraph VI(D) (2) below is reached. Further, any public water supplier which provides water service to the ConocoPhillips Property may exercise that right subject to the limitation described in Paragraph VI(D)(2).

2. Overlying Owners that are Stipulating Parties that own land located in the NMMA as of the date of this Stipulation shall have the right to the reasonable and beneficial use of Groundwater on their property within the NMMA without limitation, except in the event the mandatory action trigger point (Severe Water Shortage Conditions) described in Paragraph VI(D)(2) below is reached.

3. The Woodlands Mutual Water Company shall not be subject to restriction in its reasonable and beneficial use of Groundwater, provided it is concurrently using or has made arrangements for other NMMA parties to use within the NMMA, the Nipomo Supplemental Water allocated to the Woodlands in Paragraph VI(A)(5). Otherwise, the Woodlands Mutual Water Company shall be subject to reductions equivalent to those imposed on NCSD, RWC and SCWC, as provided in Paragraph VI(D)(1-2).

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C. **NMMA Technical Group**

1. The NMMA Technical Group shall include representatives appointed by NCSD, SCWC, ConocoPhillips, Woodlands Mutual Water Company and an agricultural Overlying Owner who is also a Stipulating Party.

2. The NMMA Technical Group shall develop a Monitoring Program for the NMMA ("NMMA Monitoring Program"), which shall be consistent with the Monitoring Program described in Paragraph IV(D). The NMMA Monitoring Program shall also include the setting of well elevation and water quality criteria that trigger the responses set forth in Paragraph D below. The Stipulating Parties shall provide monitoring and other production data to the NMMA Technical Group at no charge, to the extent that such data has been generated and is readily available. The NMMA Technical Group shall adopt rules and regulations concerning measuring devices and production reports that are, to the extent feasible, consistent with the Monitoring Programs for other Management Areas. If the NMMA Technical Group is unable to agree on any aspect of the NMMA Monitoring Program, the matter may be resolved by the Court pursuant to a noticed motion.

3. The NMMA Technical Group meetings shall be open to any Stipulating Party. NMMA Technical Group files and records shall be available to any Stipulating Party upon written request. Notices of the NMMA Technical Group meetings, as well as all its final work product (documents) shall be posted to groups.yahoo.com/group/NipomoCommunity/

4. The NMMA Technical Group functions shall be funded by contribution levels to be negotiated by NCSD, SCWC, RWC, ConocoPhillips, and Woodlands Mutual Water Company. In-lieu contributions through engineering services may be provided, subject to agreement by those parties. The budget of the NMMA Technical Group shall not exceed $75,000 per year without prior approval of the Court pursuant to a noticed motion.

5. Any final NMMA Technical Group actions shall be subject to *de novo* Court review by motion.

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D. Potentially Severe and Severe Water Shortage Conditions

1. Caution trigger point (Potentially Severe Water Shortage Conditions)

(a) Characteristics. The NMMA Technical Group shall develop criteria for declaring the existence of Potentially Severe Water Shortage Conditions. These criteria shall be approved by the Court and entered as a modification to this Stipulation or the judgment to be entered based upon this Stipulation. Such criteria shall be designed to reflect that water levels beneath the NMMA as a whole are at a point at which voluntary conservation measures, augmentation of supply, or other steps may be desirable or necessary to avoid further declines in water levels.

(b) Responses. If the NMMA Technical Group determines that Potentially Severe Water Shortage Conditions have been reached, the Stipulating Parties shall coordinate their efforts to implement voluntary conservation measures, adopt programs to increase the supply of Nipomo Supplemental Water if available, use within the NMMA other sources of Developed Water or New Developed Water, or implement other measures to reduce Groundwater use.

2. Mandatory action trigger point (Severe Water Shortage Conditions)

(a) Characteristics. The NMMA Technical Group shall develop the criteria for declaring that the lowest historic water levels beneath the NMMA as a whole have been reached or that conditions constituting seawater intrusion have been reached. These criteria shall be approved by the Court and entered as a modification to this Stipulation or the judgment to be entered based upon this Stipulation.

(b) Responses. As a first response, subparagraphs (i) through (iii) shall be imposed concurrently upon order of the Court. The Court may also order the Stipulating Parties to implement all or some portion of the additional responses provided in subparagraph (iv) below.

(i) For Overlying Owners other than Woodlands Mutual Water Company and ConocoPhillips, a reduction in the use of Groundwater to no more than 110% of

the highest pooled amount previously collectively used by those Stipulating Parties in a Year, prorated for any partial Year in which implementation shall occur, unless one or more of those Stipulating Parties agrees to forego production for consideration received. Such forbearance shall cause an equivalent reduction in the pooled allowance. The base Year from which the calculation of any reduction is to be made may include any prior single Year up to the Year in which the Nipomo Supplemental Water is transmitted. The method of reducing pooled production to 110% is to be prescribed by the NMMA Technical Group and approved by the Court. The quantification of the pooled amount pursuant to this subsection shall be determined at the time the mandatory action trigger point (Severe Water Shortage Conditions) described in Paragraph VI(D)(2) is reached. The NMMA Technical Group shall determine a technically responsible and consistent method to determine the pooled amount and any individual's contribution to the pooled amount. If the NMMA Technical Group cannot agree upon a technically responsible and consistent method to determine the pooled amount, the matter may be determined by the Court pursuant to a noticed motion.

(ii) ConocoPhillips shall reduce its Yearly Groundwater use to no more than 110% of the highest amount it previously used in a single Year, unless it agrees in writing to use less Groundwater for consideration received. The base Year from which the calculation of any reduction is to be made may include any prior single Year up to the Year in which the Nipomo Supplemental Water is transmitted. ConocoPhillips shall have discretion in determining how reduction of its Groundwater use is achieved.

(iii) NCSD, RWC, SCWC, and Woodlands (if applicable as provided in Paragraph VI(B)(3) above) shall implement those mandatory conservation measures prescribed by the NMMA Technical Group and approved by the Court.

(iv) If the Court finds that Management Area conditions have deteriorated since it first found Severe Water Shortage Conditions, the Court may impose further mandatory limitations on Groundwater use by NCSD, SCWC, RWC and the Woodlands. Mandatory measures designed to reduce water consumption, such as water reductions, water restrictions, and rate increases for the purveyors, shall be considered.

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(v) During Severe Water Shortage Conditions, the Stipulating Parties may make agreements for temporary transfer of rights to pump Native Groundwater, voluntary fallowing, or the implementation of extraordinary conservation measures. Transfer of Native Groundwater must benefit the Management Area and be approved by the Court.

E. New Urban Uses

1. Within the sphere of influence or service area. New Urban Uses shall obtain water service from the local public water supplier. The local public water supplier shall provide water service on a reasonable and non-discriminatory basis.

2. Outside the sphere of influence or service area. New municipal and industrial uses on land adjacent to or within one quarter mile of the boundary line depicted in Exhibit D shall comply with any applicable Corporations Code provisions, including good faith negotiations with the local water purveyor(s), prior to forming a mutual water company to provide water service.

3. The ConocoPhillips property, owned as of the date of this Stipulation and located within the NMMA, is not in the sphere of influence or service area, nor is it in the process of being included in the sphere of influence, of a municipality or within the certificated service area of a publicly regulated utility as of the date of this Stipulation, nor is it adjacent to or in close proximity to the sphere of influence of a municipality or the certificated service area of a publicly regulated utility as of the date of this Stipulation, as those terms are used in Paragraphs VI(E)(1 and 2).

4. No modification of land use authority. This Stipulation does not modify the authority of the entity holding land use approval authority over the proposed New Urban Uses.

5. New Urban Uses as provided in Paragraph VI(E)(1) above and new municipal and industrial uses as provided in Paragraph VI(E)(2) above shall provide a source of supplemental water, or a water resource development fee, to offset the water demand associated with that development. For the purposes of this Paragraph, supplemental water shall include all sources of Developed Water or New Developed Water.

VII. PHYSICAL SOLUTION: PROVISIONS SPECIFIC TO NORTHERN CITIES MANAGEMENT AREA

These terms, supplemented by the provisions of this Stipulation that apply to all Management Areas, govern water rights and resources in the Northern Cities Management Area.

1. Groundwater Monitoring. Groundwater monitoring in the Northern Cities Management Area will be conducted by the Northern Cities in the manner described above.

2. Lopez Project. The Lopez Project will continue to be managed by the SLO District. The Northern Cities and Landowners will continue to bear costs of the Lopez Reservoir and no costs of the Twitchell Reservoir.

3. Independent Management Per Settlement Agreement.

(a) Existing Groundwater, SWP Water and Storage Space in the Northern Cities Management Area will continue to be allocated and independently managed by the Northern Parties in accordance with the Northern Cities and Northern Landowners' 2002 Settlement Agreement (Exhibit "E") for the purpose of preserving the long-term integrity of water supplies in the Northern Cities Management Area. That Settlement Agreement initially allocates 57% of the safe yield of groundwater in Zone 3 to the farmers and 43% to the cities; and it provides *inter alia* that any increase or decrease in the safe yield will be shared by the cities and landowners on a pro rata basis. That Settlement Agreement is reaffirmed as part of this Stipulation and its terms are incorporated into this Stipulation, except that the provisions regarding continuing jurisdiction (¶ 4), groundwater monitoring, reporting, and the Technical Oversight Committee (¶¶ 7-20) are canceled and superseded by the provisions of this Stipulation dealing with those issues.

(b) Without the written agreement of each of the Northern Cities, no party other than Northern Parties shall have any right to:

(i) pump, store, or use Groundwater or surface water within the Northern Cities Management Area; or

(ii) limit or interfere with the pumping, storage, management or usage of Groundwater or surface water by the Northern Parties within the Northern Cities

Management Area.

(c) For drought protection, conservation, or other management purposes, the Northern Parties may engage in contractual transfers, leases, licenses, or sales of any of their water rights, including voluntary fallowing programs. However, no Groundwater produced within the Northern Cities Management Area may be transported outside of the Northern Cities Management Area without the written agreement of each of the Northern Cities.

4. Current and future deliveries of water within the spheres of influence of the Northern Cities as they exist on January 1, 2005 shall be considered existing uses and within the Northern Cities Management Area.

VIII. INJUNCTION – ALL MANAGEMENT AREAS

A. Use Only Pursuant to Stipulation

Each and every Stipulating Party, their officers, agents, employees, successors and assigns, are enjoined and restrained from exercising the rights and obligations provided through this Stipulation in a manner inconsistent with the express provisions of this Stipulation.

B. Injunction Against Transportation From the Basin

Except upon further order of the Court, each and every Stipulating Party and its officers, agents, employees, successors and assigns, is enjoined and restrained from transporting Groundwater to areas outside the Basin, except for those uses in existence as of the date of this Stipulation; provided, however, that Groundwater may be delivered for use outside the Basin as long as the wastewater generated by that use of water is discharged within the Basin, or agricultural return flows resulting from that use return to the Basin.

C. No Third Party Beneficiaries

This Stipulation is intended to benefit the Stipulating Parties and no other Parties. Only a Stipulating Party may enforce the terms of this Stipulation or assert a right to any benefits of, or enforce any obligations contained in this Stipulation.

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IX. RESERVED JURISDICTION – ALL MANAGEMENT AREAS

A. Reserved Jurisdiction; Modifications, Cancellations, Amendments

Jurisdiction, power and authority are retained by and reserved to the Court as set forth in this Paragraph. Nothing in the Court's reserved jurisdiction shall authorize modification, cancellation or amendment of the rights provided under Paragraphs III; V(A, E); VI(A, B, D); VII(2, 3); VIII(A); IX(A, C); and X(A, D) of this Stipulation. Subject to this limitation, the Court shall make such further or supplemental orders as may be necessary or appropriate regarding the following:

1. enforcement of this Stipulation;
2. claims regarding waste/unreasonable use of water;
3. disputes between Stipulating Parties across Management Area boundaries;
4. interpretation and enforcement of the judgment;
5. consider the content or implementation of a Monitoring Program;
6. consider the content, conclusions, or recommendations contained in an Annual Report;
7. consider Twitchell Project operations, including, but not limited to: i) the content of the Twitchell Project Manual; ii) TMA or District compliance with the Twitchell Project Manual; iii) decisions to implement Extraordinary Project Operations; or iv) the maintenance of Twitchell Yield;
8. claims of localized physical interference between the Stipulating Parties in exercising their rights pursuant to this Stipulation; provided, however, rights to use Groundwater under this Stipulation shall have equal status; and
9. modify, clarify, amend or amplify the judgment and the Northern Parties Settlement Agreement; Provided, however, that all of the foregoing shall be consistent with the spirit and intent of this Stipulation.

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B. Noticed Motion

Any party that seeks the Court's exercise of reserved jurisdiction shall file a noticed motion with the Court. Any noticed motion shall be made pursuant to the Court's Order Concerning Electronic Service of Pleadings and Electronic Posting of Discovery Documents dated June 27, 2000, attached and incorporated as Exhibit "G". Any request for judicial review shall be filed within sixty days of the act or omission giving rise to the claim. Upon a showing of good cause, the Court may extend the sixty-day time limitation.

C. *De Novo* Nature of Proceeding

The Court shall exercise *de novo* review in all proceedings. The actions or decisions of any Party, the Monitoring Parties, the TMA, or the Management Area Engineer shall have no heightened evidentiary weight in any proceedings before the Court.

D. Filing and Notice

As long as the Court's electronic filing system remains available, all Court filings shall be made pursuant to Exhibit "G". If the Court's electronic filing system is eliminated and not replaced, the Stipulating Parties shall promptly establish a substitute electronic filing system and abide by the same rules as contained in the Court's Order.

X. MISCELLANEOUS PROVISIONS – ALL MANAGEMENT AREAS

A. Unenforceable Terms

The Stipulating Parties agree that if any provision of this Stipulation or the judgment entered based on this Stipulation is held to be invalid, void, or unenforceable, the remaining provisions shall nevertheless continue in full force and effect; provided, however, any order which invalidates, voids, deems unenforceable, or materially alters those Paragraphs enumerated in Paragraph IX(A) or any of them, shall render the entirety of the Stipulation and the judgment entered based on this Stipulation voidable and unenforceable, as to any Stipulating Party who files and serves a motion to be released from the Stipulation and the judgment based upon the Stipulation within sixty days of entry of that order, and whose motion is granted upon a showing of good cause.

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B. Water Quality

Nothing in the Stipulation shall be interpreted as relieving any Stipulating Party of its responsibilities to comply with state or federal laws for the protection of water quality or the provisions of any permits, standards, requirements, or orders promulgated thereunder.

C. Duty to Cooperate

The Stipulating Parties agree not to oppose, or in any way encourage or assist any other party in opposing or challenging, any action, approval, or proceeding necessary to obtain approval of or make effective this Stipulation or the judgment to be entered on terms consistent with this Stipulation.

D. Stipulating Parties Under Public Utilities Commission Regulation

1. To the extent allowed by law, SCWC and RWC shall comply with this Stipulation, prior to obtaining California Public Utilities Commission ("PUC") approval. If the PUC fails to approve SCWC's and RWC's participation or fails to provide approval of the necessary rate adjustments so that SCWC and RWC may meet their respective financial obligations, including the participation in Developed Water projects, Monitoring Programs, TMA and as otherwise provided in this Stipulation, shall render the entirety of the Stipulation and those terms of any judgment based on this Stipulation invalid, void and unenforceable, as to any Stipulating Party who files and serves a notice of rescission within sixty days of notice by SCWC or RWC of a final PUC Order.

2. Any Party, or its successors or assigns, agreeing to become a new customer of SCWC or RWC, or an existing customer proposing to increase its water use through a change in land use requiring a discretionary land use permit or other form of land use entitlement, that has not executed reservation contracts for supplemental water as specified in Exhibit F will provide the following, once approved by the PUC:

(a) If in the Santa Maria Valley Management Area, a water resource development fee as specified in Exhibit F or a source of supplemental water sufficient to offset the consumptive demand associated with the new use as provided in Paragraph V(E); or

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(b) If in the NMMA, a water resource development fee, or a source of supplemental water sufficient to offset the consumptive demand associated with the new use.

3. Any Person who is not engaged in a New Urban Use and who agrees to become a customer of SCWC or RWC shall retain its right to contest the applicable water resource development fee, should that fee ever become applicable to that Person.

E. Designation of Address, for Notice and Service

Each Stipulating Party shall designate the name, address and e-mail address, if any, to be used for purposes of all subsequent notices and service, either by its endorsement on the Stipulation for entry of judgment or by a separate designation to be filed within thirty days after execution of this Stipulation. This designation may be changed from time to time by filing a written notice with the Court. Any Stipulating Party desiring to be relieved of receiving notices may file a waiver of notice on a form approved by the Court. The Court shall maintain at all times a current list of Parties to whom notices are to be sent and their addresses for purposes of service. The Court shall also maintain a full current list of names, addresses, and e-mail addresses of all Parties or their successors, as filed herein. Copies of such lists shall be available to any Person. If no designation is made, a Stipulating Party's designee shall be deemed to be, in order of priority: i) the Party's attorney of record; ii) if the Party does not have an attorney of record, the Party itself at the address specified.

F. No Loss of Rights

Nothing in this Stipulation shall be interpreted to require or encourage any Stipulating Party to use more water in any Year than is actually required. As between the Stipulating Parties, failure to use all of the water to which a Stipulating Party is entitled hereunder shall not, no matter how long continued, be deemed or constitute an abandonment or forfeiture of such Stipulating Party's rights, in whole or in part.

G. Intervention After Judgment

Any Person who is not a Party or successor to a Party, who proposes to use Groundwater or Storage Space, may seek to become a Party to the judgment through a petition for intervention. The Court will consider an order confirming intervention following thirty days notice to the

Parties. Thereafter, if approved by the Court, such intervenor shall then be a Party bound by the judgment as provided by the Court.

H. Stipulation and Judgment Binding on Successors, Assigns, etc.

The Stipulating Parties agree that all property owned by them within the Basin is subject to this Stipulation and the judgment to be entered based upon the terms and conditions of this Stipulation. This Stipulation and the judgment will be binding upon and inure to the benefit of each Stipulating Party and their respective heirs, executors, administrators, trustees, successors, assigns, and agents. This Stipulation and the judgment to be entered based the terms and conditions of this Stipulation shall not bind the Stipulating Parties that cease to own property within the Basin, or cease to use Groundwater. As soon as practical after the effective date of this Stipulation, a memorandum of agreement referencing this Stipulation shall be recorded in Santa Barbara and San Luis Obispo Counties by Santa Maria, in cooperation with the Northern Cities and SCWC. The document to be recorded shall be in the format provided in Exhibit "H".

I. Costs

No Stipulating Party shall recover any costs or attorneys fees from another Stipulating Party incurred prior to the entry of a judgment based on this Stipulation.

J. Non-Stipulating Parties

It is anticipated that the Court will enter a single judgment governing the rights of all Parties in this matter. The Stipulating Parties enter into this Stipulation with the expectation that the Court will enter, as a part of the judgment, the terms and conditions of this Stipulation. This Stipulation shall not compromise, in any way, the Court's legal and equitable powers to enter a single judgment that includes provisions applicable to the non-Stipulating Parties that may impose differing rights and obligations than those applicable to the Stipulating Parties. As against non-Stipulating Parties, each Stipulating Party expressly reserves and does not waive its right to appeal any prior or subsequent ruling or order of the Court, and assert any and all claims and defenses, including prescriptive claims. The Stipulating Parties agree they will not voluntarily enter into a further settlement or stipulation with non-Stipulating Parties that provides those non-Stipulating Parties with terms and conditions more beneficial than those provided to similarly

situated Stipulating Parties.

K. Counterparts

This Stipulation may be signed in any number of counterparts, including counterparts by facsimile signature, each of which shall be deemed an original, but all of which shall together constitute one and the same instrument. The original signature pages shall be filed with Court.

L. Effective Date

This Stipulation shall be effective when signed by the Stipulating Parties listed on Exhibit "A" and accepted by the Court.

Party	**Signature, title, and date**	**Parcels Subject to Stipulation**
Attorney of Record	**Approved as to form:** By:_____ Date:_____	

PROOF OF SERVICE

I am a resident of the State of California, over the age of eighteen years, and not a party to the within action. My business address is HATCH & PARENT, 21 E. Carrillo Street, Santa Barbara, California 93101.

Pursuant to the Court's Order dated June 28, 2000, I, Gina Lane, did the following:

- Posted the following document at approximately 4:30 p.m. on June 30, 2005.

  STIPULATION (JUNE 30, 2005 VERSION)

- Mailed a Notice of Availability to all parties (designating or defaulting to mail service) on the current website's service list.

I am readily familiar with the firm's practice of collection and processing correspondence for mailing. Under that practice it would be deposited with the U.S. Postal Service on that same day with postage thereon fully prepaid in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

I declare under penalty of perjury under the laws of the State of California that the above is true and correct.

Executed on June 30, 2005, at Santa Barbara, California.

GINA M. LANE