

Draft EIR
Upper Llagas Creek Project

APPENDIX

A

2012 SCOPING LETTERS

DEPARTMENT OF TRANSPORTATION

111 GRAND AVENUE
P. O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 286-6053
FAX (510) 286-5559
TTY 711



*Flex your power!
Be energy efficient!*

October 18, 2012

Mr. David Dunlap
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3614

SCL101894
SCH#2012102032

Dear Mr. Dunlap:

The Upper Llagas Creek Flood Protection Project/Notice of Preparation

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the project referenced above. As the lead agency, the Santa Clara Valley Water District is responsible for all project mitigation, including any needed improvements to State highways. The project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully discussed for all proposed mitigation measures. This information should also be presented in the Mitigation Monitoring and Reporting Plan of the environmental document.

Cultural Resources

Caltrans requires that a project environmental document include documentation of a current archaeological record search from the Northwest Information Center of the California Historical Resources Information System if construction activities are proposed within State right-of-way. Current record searches must be no more than five years old. Caltrans requires the records search, and if warranted, a cultural resource study by a qualified, professional archaeologist, and evidence of Native American consultation to ensure compliance with CEQA, Section 5024.5 and 5097 of the California Public Resources Code, and Volume 2 of Caltrans' Standard Environmental Reference (<http://ser.dot.ca.gov>). These requirements, including applicable mitigation, must be fulfilled before an encroachment permit can be issued for project-related work in State ROW; these requirements also apply to National Environmental Policy Act (NEPA) documents when there is a federal action on a project. Work subject to these requirements includes, but is not limited to: lane widening, channelization, auxiliary lanes, and/or modification of existing features such as slopes, drainage features, curbs, sidewalks and driveways within or adjacent to State ROW.

Bridges, Trestles, Culverts and Other Structures in Riparian Environments

Some project level activities may affect riparian flow patterns upstream of bridges, trestles, culverts or other structures for which Caltrans holds responsibility. Please ensure your project level environmental documents include hydrological studies to determine whether such impacts will occur, and to identify appropriate mitigation measures.

Dike and Levee Maintenance, Repair and Upgrade

Activities involving demolition, reinforcement or rehabilitation of dikes or levees on which transportation facilities are built may potentially affect State transportation facilities. Also, built features on top of dikes and levees may contribute additional engineering considerations related to weight loading or compaction. These factors must be addressed through geotechnical and hydrological studies conducted in coordination with Caltrans at the project level.

Habitat Restoration and Management

Project level activities related to habitat restoration and management should be done in coordination with local and regional Habitat Conservation Plans, and with Caltrans where our programs share stewardship responsibilities for habitats, species and/or migration routes.

Encroachment Permit

Please be advised that any work or traffic control that encroaches onto the State ROW requires an encroachment permit that is issued by Caltrans. To apply, a completed encroachment permit application, environmental documentation, and five (5) sets of plans clearly indicating State ROW must be submitted to the address below. Michael Condie, District Office Chief, Office of Permits, California Department of Transportation, District 4, P.O. Box 23660, Oakland, CA 94623-0660. Traffic-related mitigation measures should be incorporated into the construction plans prior to the encroachment permit process. See the website linked below for more information.

<http://www.dot.ca.gov/hq/traffops/developserv/permits/>

Should you have any questions regarding this letter, please contact Keith Wayne of my staff by telephone at (510) 286-5737, or by email at keith_wayne@dot.ca.gov.

Sincerely,



ERIK ALM, AICP
District Branch Chief
Local Development – Intergovernmental Review

c: Scott Morgan, State Clearinghouse

Central Coast Regional Water Quality Control Board

November 26, 2012

David Dunlap
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3614
email: ddunlap@valleywater.org

BY ELECTRONIC MAIL

CENTRAL COAST WATER BOARD COMMENTS ON THE OCTOBER 2012 NOTICE OF PREPARATION FOR THE UPPER LLAGAS CREEK FLOOD PROTECTION PROJECT DRAFT ENVIRONMENTAL IMPACT REPORT, SANTA CLARA COUNTY, FILE NUMBER 431012CQ1

Dear Mr. Dunlap:

Thank you for the opportunity to provide comments on the scope and content of the Draft Environmental Impact Report (DEIR) for the Upper Llagas Creek Flood Protection Project (Project). Central Coast Regional Water Quality Control Board (Central Coast Water Board) staff understands that the Santa Clara Valley Water District (District) proposes the Project to achieve the following objectives:

- Provide 100-year flood protection for urban areas of the City of Morgan Hill;
- Provide 10-year flood protection for the semi-urban area around East Little Llagas Creek downstream of Corralitos Creek; and
- Avoid induced flooding elsewhere on Llagas Creek.

The Central Coast Water Board is charged with the protection of the Waters of the State of California in the Central Coast Region. The Central Coast Water Board is a responsible agency under the California Environmental Quality Act (CEQA), and administers regulations established by the Federal Clean Water Act and the California Water Code (Porter-Cologne Water Quality Control Act). The Central Coast Water Board also administers regulations, plans, and policies established by the Central Coast Region Water Quality Control Plan and the State Water Resources Control Board to protect watersheds, their resources, and their beneficial uses. The Central Coast Water Board administers these regulations, in part, through issuance of water quality certifications under Clean Water Act (CWA) section 401. The Project proposes to discharge dredged or fill materials within Waters of the United States and Waters of the State and will require CWA section 401 water quality certification.

Central Coast Water Board staff understands that the Project, as proposed, involves the following:

- Deepening the bed and widening at least one bank of approximately 10.9 miles of West Little Llagas Creek, Llagas Creek, and East Little Llagas Creek (Reaches 4, 5, 6, 7B, and 14), with removal of all vegetation on the modified bed and bank(s);
- Altering hydraulic conditions in 1.1 miles of West Little Llagas Creek (Reach 8) by diverting flows into bypass tunnels and culverts;

- Abandoning approximately 1.5 miles of West Little Llagas Creek by diverting flows into a proposed bypass channel; and
- Altering hydraulic conditions in approximately 4 miles of East Little Llagas Creek as a result of diverting flows from West Little Llagas Creek.

As we stated in our August 23, 2012 comment letter on the Project 30% design, Central Coast Water Board staff does not find that the Project, as proposed, is protective of water quality and beneficial uses. Therefore Central Coast Water Board staff recommends that the Project DEIR address the following issues. Our August 23, 2012 comments are incorporated into this letter by reference.

Project Objectives

1. The Project includes significant environmental impact to a large portion of the Llagas Creek watershed, with the potential for permanent degradation of water quality and beneficial uses in the watershed, in order to achieve the flood protection levels identified in the Project objectives. As a result, Central Coast Water Board staff finds the Project objectives identify an unreasonably high level of flood protection for the urban areas of the City of Morgan Hill. Flooding has become a frequent occurrence in Morgan Hill due to land development practices which encroached on West Little Llagas Creek's historic floodplain, constricted the creek's historic flow path, and significantly increased runoff to the creek due to increased imperviousness. As such, controlling the flooding that has resulted from these large scale historic land development practices at the level proposed by the Project will likely result in unmitigable environmental impacts. However, it is possible to provide a level of flood protection that is significantly better than Morgan Hill currently experiences without creating these environmental impacts associated with 100-year flood protection. Central Coast Water Board staff recommends that the District identify a more reasonable objective for the Project, such as 50-year or 75-year flood protection for the urban areas of Morgan Hill.
2. The complex causes of flooding in the City of Morgan Hill and the extent of environmental impact associated with the Project require a more comprehensive approach than simply modifying stream channels to increase flow capacity. Such an approach fails to address the real causes of flooding in Morgan Hill. This approach also fails to avoid environmental impacts adequately because it places the "burden" of the solution entirely on the waterbodies. Much has been learned about developing more comprehensive and balanced solutions to flooding problems since the Project objectives were first formulated in 1968. As they are currently stated, the Project objectives prevent the Project from benefitting from that learning process and result in unnecessary environmental impacts. Central Coast Water Board staff recommends that the District adopt a Project objective such as the following: "Balance flood protection needs with environmental protection to provide a reasonable level of flood protection for the urban areas of the City of Morgan Hill."
3. A comprehensive and balanced solution to the flooding problems in Morgan Hill will require a cooperative effort involving the District, the City of Morgan Hill, Santa Clara County, property owners, and regulatory agencies. Therefore the DEIR should include a strategy for developing an advisory committee consisting of representatives from these and other relevant parties.
4. Where stream channels must be modified, the District should use channel designs that provide the following characteristics of healthy, functioning streams:

- a. Preservation of existing stream alignments (e.g., West Little Llagas Creek instead of Reach 7A);
- b. Preservation of existing vegetation (mature and emergent);
- c. Preservation/restoration of floodplain connectivity;
- d. Preservation/restoration of geomorphic functions (e.g., sediment transport, channel formation events, etc.);
- e. Preservation/restoration of hydrologic functions that support habitat and beneficial uses (e.g., time of concentration, base flow);
- f. Sufficient channel width to allow for robust, multi-level canopy riparian vegetation;
- g. Adequate benches to support optimal riparian vegetation, at an elevation convenient to the water;
- h. Minimizing or eliminating the use of rock slope protection (RSP);
- i. Maximizing use of bridges instead of culverts, and of open-bottom culverts where bridges are infeasible;
- j. Sizing culverts to avoid creating backwater effects or localized raising of the hydraulic grade line; and
- k. Sinuosity and meander.

Alternatives Analysis

5. The District should thoroughly evaluate alternatives that provide a lesser degree of flood protection where doing so would reduce the environmental impacts of the Project.
6. The list of alternatives included in the Notice of Preparation (NOP) does not include alternatives which address the real causes of flooding. As a result, the list does not include alternatives capable of reducing environmental impacts by combining channel modifications with other approaches. The DEIR should include an alternatives analysis that examines the following approaches:
 - Providing a lower level of flood protection (e.g., 50-year): Central Coast Water Board staff finds that the Project's goal to provide 100-yr flood protection to development in a historic floodplain fails to balance flood control with environmental protection.
 - Floodplain restoration: Natural floodplains attenuate flood flows. Much of the area draining to reaches 7B and 8 was historic floodplain ("wet meadows," *South Santa Clara Valley Historical Ecological Study*, p. 168). Restoring floodplain capacity in this area through land acquisition and dedication would reduce the need for channel modifications. The Project should maximize avoidance of environmental impacts by restoring historic floodplains, floodplain connectivity, and natural flood attenuation capacity. Central Coast Water Board staff understands that this will involve hard decisions about land acquisition, but is reasonable and warranted given the degree of flood protection desired by the citizens of the City of Morgan Hill and the extent of environmental impacts resulting from the Project.
 - Runoff reduction: Development has increased imperviousness in areas historically identified as well-drained soils (*South Santa Clara Valley Historical Ecological Study*, p. 176). Increased imperviousness has significantly increased runoff to West Little Llagas Creek, exceeding its natural capacity and resulting in flooding. Measures to reduce runoff, such as retrofitting existing development or constructing off-channel storage, would reduce the need for channel modifications. The Project should maximize avoidance of environmental impacts by maximizing off-line (out of stream) modifications designed to store runoff and urban retrofits designed to reduce runoff before it enters the creek channel.

- Combination: Solutions which combine all of the above approaches could provide significant flood protection improvements over existing conditions, while significantly reducing the Project's environmental impacts.
7. The alternatives analysis appears to have been influenced by available funding sources and the type of flood protection improvements eligible for funding under each source. The DEIR should consider alternatives regardless of funding considerations in order to identify the least environmentally damaging alternative that is technically achievable. Financial feasibility should be considered only after identifying the least environmentally damaging alternative that is technically achievable.
 8. The channel modifications proposed by the Project are linked to flow rate objectives. As a result, reducing the flow rate in a reach can reduce the channel modifications necessary to convey the flow. Therefore the DEIR should include a sensitivity analysis that identifies the extent to which proposed channel modifications could be reduced in each reach for given reductions in flow rate (e.g., How much could channel deepening activities be reduced in reach 7B if flow entering reach 7B is reduced 20%?). The sensitivity analysis should then be used to answer the following questions:
 - How much flow reduction is needed in reach 8 to avoid the need for bypass measures, or for deepening and/or widening reach 8?
 - How much flow reduction is needed in reaches 7B and 8 to avoid the need to deepen and/or widen reach 7B?
 - How much flow reduction is needed in reaches 7B and 8 to avoid the need for the bypass channel (reach 7A)?
 - How much flow reduction is needed in reaches 7B and 8 to avoid the need to deepen and/or widen reaches 5 and 6?
 - How much flow reduction is needed in reaches 7B and 8 to preserve areas of riparian vegetation that will be lost under the proposed Project?
 - How much flow reduction is needed in East Little Llagas Creek and Madrone Channel to avoid the need to deepen and/or widen reach 14?
 - How much flow reduction is needed to avoid the need to deepen and/or widen reach 4?
 9. The DEIR should use the answers to the questions posed in Comment 8, above, to design alternatives using the approaches described in Comment 6.

Models and Assumptions

10. To enable a complete review of the Project's impacts and determination of whether the Project is the least environmentally damaging alternative that is technically feasible, the DEIR should explain and support the rationale and assumptions used to develop the Project.
 - a. The DEIR should clearly explain and support the rationale for selecting 100-year flood protection for reaches 7B and 8.
 - b. The DEIR should clearly explain and support the rationale for selecting 100-year flood protection for reach 7A. In addition, the DEIR should clearly explain whether this means there will be enough capacity in reach 7A to handle 100-yr flows from upstream (similar to the design objective for reaches 4, 5, and 6), or that 100-yr flood protection will be provided to the lands adjacent to reach 7A. If the latter, the DEIR should explain why the Project provides a higher degree of flood protection for this area than it does for similarly-developed lands adjacent to reach 14.

- c. The Project includes significant modifications to reach 14 to provide 10-yr flood protection. The DEIR should clearly explain and support the rationale for selecting 10-year flood protection for reach 14. In addition, the DEIR should explain why such extensive modifications are needed, particularly considering that the Project diverts flow from West Little Llagas Creek (a tributary of East Little Llagas Creek) into the main stem of Llagas Creek.
 - d. The DEIR should clearly state whether flood protection objectives (i.e., 10-yr, 100-yr) are based on current or "built out" conditions. The Project should be designed only for current conditions, and local stakeholders should be expected to incorporate riparian corridor protections and post-construction stormwater management control measures that eliminate the need for subsequent channel modifications. The DEIR should also include a comparison between the 100-year design flow rate currently proposed and the design flow rate originally proposed in 1968. If the design flow rate has increased, the DEIR should clearly identify how the increase affects the impacts of the Project.
 - e. The DEIR should clearly explain the hydrologic model used to determine the 100-year and 10-year return period flows for each reach, including the assumptions made (e.g., rainfall, runoff coefficients, stage-discharge data, development conditions, etc.) and the rationale for each assumption. The DEIR should also explain how the hydrologic model was calibrated using empirical data, and when it was last calibrated.
 - f. The DEIR should clearly explain and support assumptions used in the hydraulic model to determine proposed channel dimensions (e.g., active channel width and depth, flowline elevation and slope, etc.). The DEIR should address at least the following:
 - Channel vegetation and roughness assumptions;
 - Features (such as existing culverts) that act as elevation controls; and
 - Features affecting the hydraulic grade line (e.g., flow constrictions).
 - g. The DEIR should clearly explain the objectives of the hydraulic model (e.g., to stabilize incision and sediment transport, to maximize revegetation in each reach, to facilitate fish passage, etc.), and the rationale and appropriateness of each objective.
 - h. The DEIR should clearly state and support the assumptions, policies, calculations, etc., which guide where and how much rock slope protection or other channel armoring is proposed. Use of RSP and other "hard" armoring methods must be limited to locations where design flow conditions make all other forms of bank stabilization infeasible.
 - i. The DEIR should clearly state and support the assumptions, policies, calculations, etc., which guide all design decisions, including, but not limited to, the width and number of maintenance/access roads, channel side slopes, channel alignments, and placement of grade controls and drop structures.
11. The DEIR should clearly state District, United States Army Corps of Engineers, and/or FEMA policies that influenced the objectives or design of the Project, including an explanation of the authority of each agency to set policy for the Project.

Analysis of Environmental Impacts

12. Llagas Creek is geomorphically unstable as a result of development and channelization activities over the last century. According to data collected by the District, the creek has down-cut approximately ten feet in the last 100 years. This downcutting threatens remaining historic riparian vegetation and hinders natural recruitment of riparian vegetation. In addition, the creek bed and lower banks are now located in soil strata that do not readily support healthy, robust, and multi-layered riparian vegetation. Data suggests that Llagas Creek geomorphology remains unstable, so these problems are likely to continue without

intervention. The dynamic nature of the Llagas Creek system makes it difficult to determine the impact of the Project on the future of Llagas Creek. Therefore the DEIR should contain an analysis that includes the following:

- a. An assessment of geomorphic stability within the Llagas Creek watershed, and an assessment of how the Project will affect this stability (positively or negatively). The assessment should compare existing conditions, future conditions without the Project, and future conditions with the Project;
 - b. An assessment of sediment transport characteristics within the Llagas Creek watershed and the environmental functions and beneficial uses affected by these characteristics, and an assessment of how the Project will affect sediment transport and these functions and uses (positively or negatively). The assessment should compare existing conditions, future conditions without the Project, and future conditions with the Project;
 - c. An assessment of aquatic and riparian habitat within the Llagas Creek watershed and the environmental functions and beneficial uses supported by the habitat, and an assessment of how the Project will affect habitat functions and beneficial uses (positively or negatively). The assessment should compare existing conditions, future conditions without the Project, and future conditions with the Project;
 - d. An assessment of water quality and biotic conditions within the Llagas Creek watershed and the environmental functions and beneficial uses supported by these factors, and an assessment of how the Project will affect water quality and biotic conditions (positively or negatively). The assessment should compare existing conditions, future conditions without the Project, and future conditions with the Project; and
 - e. An assessment of wildlife within the Llagas Creek watershed, and an assessment of how the Project will affect wildlife (positively or negatively). The assessment should compare existing conditions, future conditions without the Project, and future conditions with the Project.
13. The long-term environmental impact of the Project is directly linked to the revegetation potential of the modified channels. However, the revegetation potential of the modified channels is uncertain due to the soil quality and groundwater access available at the proposed channel widths and depths. Therefore it is uncertain whether vegetation impacted by the Project could be replaced, or that the modified channels could support robust riparian vegetation. Central Coast Water Board staff will not be able to recommend water quality certification of the Project objectives or design until the revegetation potential is clear. The DEIR should fully analyze the revegetation potential of the modified channels, provide an analysis of habitat functions and beneficial uses that would be impacted, and compare these losses with the functions and beneficial uses that can be restored.
14. Central Coast Water Board staff understands that channel modification and alignment decisions are influenced, in part, by the desire to use existing constructed features. These features include existing culverts in reaches 7B and 8 and culverts constructed in the past along the anticipated alignment of proposed reach 7A. The project should be designed to achieve a minimum of environmental impact, rather than to match flowlines and cross sections of previously constructed features. The DEIR should identify how the use of each feature affects channel width, depth, and slope. In addition, the DEIR should compare the impact of using previously constructed features, replacing the features, and avoiding them altogether.
15. Lengthy tunnels and culverts can become habitat for roosting bats, which can be a significant source of bacteria to the Llagas Creek watershed. In light of the fact that Llagas Creek is already addressed by a bacteria Total Maximum Daily Load (TMDL), the DEIR

should identify and analyze the environmental impact of the bypass culverts and tunnel proposed in reach 8, and identify and propose mitigation for bats or any other potential new sources of bacteria. The Project must not contribute to Llagas Creek's impairment for bacteria.

16. The Project includes constructing, in the midst of active agricultural fields, a new channel directly connected to Llagas Creek. Agricultural fields are significant sources of nutrients, pesticides, and sediment, and Llagas Creek is already impaired for these pollutants, with nutrient and sediment TMDLs in place. The DEIR should identify and analyze the environmental impact of constructing and operating reach 7A on the nutrient, pesticide, and sediment conditions in Llagas Creek, and identify and propose mitigation for any new or potential new sources of these pollutants. The Project (and subsequent operation by the District) must not contribute to Llagas Creek's impairment for nutrients, pesticides, and sediment.
17. The Project includes intercepting West Little Llagas Creek at a point north of Watsonville Road and diverting it to Llagas Creek. West Little Llagas Creek currently flows into East Little Llagas Creek. The DEIR should identify and analyze the environmental impact of decreased flows on lower West Little Llagas Creek, Madrone Channel, and East Little Llagas Creek; the impact of increased flows in Llagas Creek; and the impact of constructing and operating the diversion channel itself.

Restoration

18. Projects of this scope provide opportunities to restore lost hydrologic and environmental functions and beneficial uses. Environmental impacts have accumulated in Llagas Creek watershed streams for over the last century as a result of development, flood protection improvement projects, and capacity maintenance efforts, resulting in degradation of water quality and beneficial uses. The Project should include measures designed to restore these lost functions and beneficial uses approaching historical conditions, rather than merely pre-project conditions. Therefore the DEIR should include a thorough evaluation of opportunities to provide better protection of water quality and beneficial uses than is provided by current conditions.

Cumulative Impacts

19. The analysis of cumulative impacts in the DEIR should include all channel modification work conducted in the Llagas Creek system by the District and others for the purpose of flood management, especially modifications made since 1973 associated with the Llagas Creek Watershed Project Plan and its subsequent iterations.

Thank you again for the opportunity to influence the scope and content of the DEIR. If we may clarify any of our comments or be of further assistance, please contact **Jon Rohrbough** at (805) 549-3458 or via email at jrohrbough@waterboards.ca.gov or Phil Hammer at (805) 549-3882.

Sincerely,



Phil Hammer

2012.11.26 13:07:27 -08'00'

for

Kenneth A. Harris, Jr.
Interim Executive Officer

S:\CEQA\Comment Letters\Santa Clara County\Upper Llagas Creek Flood Protection NOP_431012CQ1_final.doc

cc:

Luisa Valiela
US Environmental Protection Agency
Valiela.Luisa@epamail.epa.gov

Doug Weinrich
US Fish and Wildlife Service
Douglas_Weinrich@fws.gov

Christopher Eng
US Army Corps of Engineers
Christopher.K.Eng@usace.army.mil

Joseph Terry
US Fish and Wildlife Service
Joseph_Terry@fws.gov

Terry Marks
US Army Corps of Engineers
Terry.L.Marks@usace.army.mil

Tami Schane
California Department of Fish and Game
tschane@dfg.ca.gov

Jon Ambrose
National Marine Fisheries Service
Jonathan.ambrose@noaa.gov

Karl Bjarke
City of Morgan Hill
Karl.bjarke@morganhill.ca.gov

Jon Rohrbough
Central Coast Water Board
jrohrbough@waterboards.ca.gov

County of Santa Clara

Parks and Recreation Department

298 Garden Hill Drive
Los Gatos, California 95032-7669
(408) 355-2200 FAX 355-2290
Reservations (408) 355-2201
www.parkhere.org



November 1, 2012

David Dunlap
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Subject: Notice of Preparation for a Draft Subsequent Environmental Impact Report for the Upper Llagas Creek Flood Protection Project

Dear Mr. Dunlap:

The County of Santa Clara Parks and Recreation Department (County Parks) is in receipt of a Notice of Preparation (NOP) for a Draft Subsequent Environmental Impact Report (DEIR) for the Upper Llagas Creek Flood Protection Project.

It is understood that the Llagas Creek Watershed Project Plan (LCWPP) was originally proposed by the Santa Clara Valley Water District (SCVWD) in 1968 and approved by three local sponsoring agencies, that included the County of Santa Clara, the State of California and U.S. Congress. Construction began in 1973 but halted in 1974 in order to re-evaluate potential environmental impacts, and subsequently, an EIR/EIS was completed in 1982 on a revised project. It is understood that the revised project subdivided the project area into 14 reaches, with reaches from Buena Vista Avenue downstream to the confluence of the Pajaro River completed between 1973 and 1994. The current project is designated as the Upper Llagas Creek Flood Protection Project, and Draft Subsequent EIR pertains to the remaining reaches (reach 4, 5, 6, 7A, 7B, 8, and 14) along sections of Little Llagas Creek and Llagas Creek.

County Parks' concerns and comments are primarily focused on potential impacts to County parklands, park resources and recreational facilities, public access, and countywide trail routes relative to the *Santa Clara County Countywide Trails Master Plan Update (Countywide Trails Master Plan)*, an element of the County of Santa Clara General Plan (1995-2010) adopted by the County of Santa Clara Board of Supervisors on November 14, 1995.

Land Use & Policies - County

The DEIR should discuss and consider potential impacts to County parklands, including mitigation strategies/measures, park resources and recreational facilities, and countywide trails, including public access, relative to the Parks and Recreation Element of the County of Santa Clara General Plan (1990-2010) and the *Countywide Trails Master Plan*.



Board of Supervisors: Mike Wasserman, George Shirakawa, Dave Cortese, Ken Yeager, Liz Kniss

County Executive: Jeffrey V. Smith

The *Countywide Trails Master Plan* identifies the following regional trail routes within and adjacent to the project area which may be impacted by the proposed project.

- **Regional Trail Route C25 Main Street Connecting Trail** designated as on-street bicycle trail with parallel trail route; route within road right-of-way (ROW) for hiking, off-road cycling.
- **Regional Trail Route R1-A Juan Bautista de Anza NHT (bicycle route)** designated as on-street bicycle trail within the road ROW for on-road cycling only.
- **Regional Trail Route S5 Juan Bautista de Anza NHT (Coyote Creek – Llagas sub-regional trail)** designated as trail within other public lands for hiking, off-road cycling, equestrian.
- **Regional Trail Route S7 Morgan Hill Cross Valley Sub-regional trail** designated as on-street bicycle trail with parallel trail route; route within the road ROW for hiking, off-road cycling.
- **Regional Trail Route R3 Benito Clara Trail** designated as trail within other public lands for hiking, off-road cycling, equestrian.
- **Regional Trail Route C31 Buena Vista Day Connector** designated as on-street bicycle trail with parallel trail route; route within ROW for hiking, on-road cycling, equestrian.

The County of Santa Clara (Parks and Recreation Department) owns property within the project area (Silveira property) that would be impacted by the project. As such, the DEIR should identify the County as a responsible agency and coordinate with County Parks on the development of the proposed flood protection designs and mitigation measures within this area. In addition, the DEIR should consider and address potential impacts, including project mitigation strategies, to the Silveira property.

Land Use & Policies – other agencies

The DEIR should consider and address adopted land use goals and policies for the regional/citywide trails system, and address proposed trail routes that have been approved by the City of Gilroy in their Parks and Recreation System Master Plan (2001).

The DEIR should consider and address adopted land use goals and policies, for regional/citywide trail routes that have been approved by the City of Morgan Hill in the City of Morgan Hill Bikeways Master Plan (2001), Draft Trails and Natural Resource Study, and Bikeways Master Plan Update (2008).

Hydrology

The DEIR should discuss and consider the project's impacts to the hydrology, riparian corridor and habitats, particularly in reaches where there are extensive segments of box culverts and to the riparian habitats in segments where maintenance roads are proposed on both sides of the creek.

In reach 7a where West Little Llagas Creek is proposed to be disconnected from main stream flows as a result of the proposed diversion channel, the DEIR should consider and address the short term and long term impacts to the hydrology, riparian corridor and habitat of West Little Llagas Creek as well as impacts downstream and upstream of the diversion, and to the hydrology and riparian habitat along the Silveira property.

Recreation

The DEIR should consider and address the goals, policies and recreational opportunities, including trails, within and adjacent to the project area, consistent with the Parks and Recreation chapter of the County of Santa Clara General Plan (1990–2010) and Countywide Trails Master Plan.



Board of Supervisors: Mike Wasserman, George Shirakawa, Dave Cortese, Ken Yeager, Liz Kniss

County Executive: Jeffrey V. Smith

Non-motorized circulation within the project area should be analyzed in the context of potential connectivity with all nearby trail routes. Per Policy PR-TS 6.3 of the Parks and Recreation chapter of the County General Plan, public Improvement projects such as road widening, bridge construction and flood control projects that may impact existing or proposed trails should be designed to facilitate provisions of shared use. County Parks encourages SCVWD to incorporate planning of recreation facilities particularly trails and amenities for public access into the project early in the design development process.

County Parks is encouraged by SCVWD commitment to work with cities and the County to incorporate recreation opportunities such as creekside trails into the project, and would welcome the opportunity to work with SCVWD, cities and other agencies on the development of public trails within the project area.

County Parks looks forward to continued collaboration with SCVWD on this project. We thank you for the opportunity to respond to this NOP and request that our agency continues to receive timely information on the project. We look forward to reviewing the DEIR and other environmental documents when they become available. If you have any questions regarding these comments, please feel free to contact me at (408) 355-2235 or via email at Antoinette.Romeo@prk.sccgov.org.

Sincerely,



Antoinette Romeo

Park Planner III

Cc: Jane Mark, Senior Planner;
Tim Heffington, Senior Real Estate Agent;
Ian Champeny, Real Estate Agent



Board of Supervisors: Mike Wasserman, George Shirakawa, Dave Cortese, Ken Yeager, Liz Kniss
County Executive: Jeffrey V. Smith

County of Santa Clara

Department of Planning and Development
Planning Office

County Government Center, East Wing, 7th Floor
70 West Hedding Street
San Jose, California 95110-1705
(408) 299-5770 FAX (408) 288-9198
www.sccplanning.org



November 6, 2012

Mr. David Dunlap
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

**RE: Comments regarding Notice of Preparation (NOP) of a Draft
Environmental Impact Report (DEIR) for the Upper Llagas Creek Flood
Protection Project**

Dear Mr. Dunlap:

Please find enclosed comments from the County regarding the Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) for the Upper Llagas Creek Flood Protection Project. These include comments from Roads & Airports Dept., Parks & Recreation Dept., and Dept. of Environmental Health.

The attached comments include concerns the County has regarding traffic during construction, compliance with County Roads's Dept. future width line standards for bridge and road construction, impacts to recreational trails, and riparian corridors and associated habitat, and impacts to septic systems, groundwater, surface water, and perchlorate plume, and wells.

If you have any questions regarding coordination of comments on the NOP from the County, please contact Janice Spuller at (408) 573-2462, in Roads & Airports Dept. , Antoinette Romeo at (408) 355-2235 in Parks & Recreation Dept. , or Scott Bourdon at (408) 918-1955 in Dept. of Environmental Health.

Sincerely,

Ignacio Gonzalez
Director of Planning and Development

cc:

Janice Spuller –Roads & Airports Dept.
Antoinette Romeo -- Parks & Recreation Dept.
Scott Bourdon – Dept. of Environmental Health
Roland Velasco, Mike Wasserman - Board of Supervisors District 1
Sylvia Gallegos – Deputy County Executive, County Executive Office

County of Santa Clara

Roads and Airports Department

101 Skyport Drive
San Jose, California 95110-1302
(408) 573-2400



October 31, 2012

David Dunlap
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

SUBJECT: Notice of Preparation – The Upper Llagas Creek Flood Protection Project Draft Subsequent Environmental Impact Report

Dear Mr. Dunlap:

The County of Santa Clara Roads and Airports Department is submitting the following comments regarding the preparation of an environmental impact report for the project cited above.

The following items should be included in the Draft Subsequent Environmental Impact Report.

1. Provide a discussion of construction-related impacts on local roads and bridges and identify mitigation measures for significant impacts. Potential impacts to consider include pavement degradation from construction vehicles, traffic from road closures and detours, and accommodating bicyclists through construction zones.
2. Identify impacts of project on existing road and bridges considering factors such as alignment, design, and height. Identify mitigation measures for significant impacts, including as applicable bridge replacements. Any bridge replacements and road modifications identified as mitigation measures must be consistent with County standards and the road's future width line.

Thank you for the opportunity to comment on the NOP. If you have any questions about these comments, or require more information on the County's local roads and bridges, please contact me at 408-573-2462 or janice.spuller@rda.sccgov.org.

Sincerely,

Janice Spuller
Transportation Planner

c: MA, DC, AP, TP, NC

County of Santa Clara

Parks and Recreation Department

298 Garden Hill Drive
Los Gatos, California 95032-7669
(408) 355-2200 FAX 355-2290
Reservations (408) 355-2201
www.parkhere.org



November 1, 2012

David Dunlap
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Subject: Notice of Preparation for a Draft Subsequent Environmental Impact Report for the Upper Llagas Creek Flood Protection Project

Dear Mr. Dunlap:

The County of Santa Clara Parks and Recreation Department (County Parks) is in receipt of a Notice of Preparation (NOP) for a Draft Subsequent Environmental Impact Report (DEIR) for the Upper Llagas Creek Flood Protection Project.

It is understood that the Llagas Creek Watershed Project Plan (LCWPP) was originally proposed by the Santa Clara Valley Water District (SCVWD) in 1968 and approved by three local sponsoring agencies, that included the County of Santa Clara, the State of California and U.S. Congress. Construction began in 1973 but halted in 1974 in order to re-evaluate potential environmental impacts, and subsequently, an EIR/EIS was completed in 1982 on a revised project. It is understood that the revised project subdivided the project area into 14 reaches, with reaches from Buena Vista Avenue downstream to the confluence of the Pajaro River completed between 1973 and 1994. The current project is designated as the Upper Llagas Creek Flood Protection Project, and Draft Subsequent EIR pertains to the remaining reaches (reach 4, 5, 6, 7A, 7B, 8, and 14) along sections of Little Llagas Creek and Llagas Creek.

County Parks' concerns and comments are primarily focused on potential impacts to County parklands, park resources and recreational facilities, public access, and countywide trail routes relative to the *Santa Clara County Countywide Trails Master Plan Update (Countywide Trails Master Plan)*, an element of the County of Santa Clara General Plan (1995-2010) adopted by the County of Santa Clara Board of Supervisors on November 14, 1995.

Land Use & Policies - County

The DEIR should discuss and consider potential impacts to County parklands, including mitigation strategies/measures, park resources and recreational facilities, and countywide trails, including public access, relative to the Parks and Recreation Element of the County of Santa Clara General Plan (1990-2010) and the *Countywide Trails Master Plan*.



Board of Supervisors: Mike Wasserman, George Shirakawa, Dave Cortese, Ken Yeager, Liz Kniss

County Executive: Jeffrey V. Smith

The *Countywide Trails Master Plan* identifies the following regional trail routes within and adjacent to the project area which may be impacted by the proposed project.

- **Regional Trail Route C25 Main Street Connecting Trail** designated as on-street bicycle trail with parallel trail route; route within road right-of-way (ROW) for hiking, off-road cycling.
- **Regional Trail Route R1-A Juan Bautista de Anza NHT (bicycle route)** designated as on-street bicycle trail within the road ROW for on-road cycling only.
- **Regional Trail Route S5 Juan Bautista de Anza NHT (Coyote Creek – Llagas sub-regional trail)** designated as trail within other public lands for hiking, off-road cycling, equestrian.
- **Regional Trail Route S7 Morgan Hill Cross Valley Sub-regional trail** designated as on-street bicycle trail with parallel trail route; route within the road ROW for hiking, off-road cycling.
- **Regional Trail Route R3 Benito Clara Trail** designated as trail within other public lands for hiking, off-road cycling, equestrian.
- **Regional Trail Route C31 Buena Vista Day Connector** designated as on-street bicycle trail with parallel trail route; route within ROW for hiking, on-road cycling, equestrian.

The County of Santa Clara (Parks and Recreation Department) owns property within the project area (Silveira property) that would be impacted by the project. As such, the DEIR should identify the County as a responsible agency and coordinate with County Parks on the development of the proposed flood protection designs and mitigation measures within this area. In addition, the DEIR should consider and address potential impacts, including project mitigation strategies, to the Silveira property.

Land Use & Policies – other agencies

The DEIR should consider and address adopted land use goals and policies for the regional/citywide trails system, and address proposed trail routes that have been approved by the City of Gilroy in their Parks and Recreation System Master Plan (2001).

The DEIR should consider and address adopted land use goals and policies, for regional/citywide trail routes that have been approved by the City of Morgan Hill in the City of Morgan Hill Bikeways Master Plan (2001), Draft Trails and Natural Resource Study, and Bikeways Master Plan Update (2008).

Hydrology

The DEIR should discuss and consider the project's impacts to the hydrology, riparian corridor and habitats, particularly in reaches where there are extensive segments of box culverts and to the riparian habitats in segments where maintenance roads are proposed on both sides of the creek.

In reach 7a where West Little Llagas Creek is proposed to be disconnected from main stream flows as a result of the proposed diversion channel, the DEIR should consider and address the short term and long term impacts to the hydrology, riparian corridor and habitat of West Little Llagas Creek as well as impacts downstream and upstream of the diversion, and to the hydrology and riparian habitat along the Silveira property.

Recreation

The DEIR should consider and address the goals, policies and recreational opportunities, including trails, within and adjacent to the project area, consistent with the Parks and Recreation chapter of the County of Santa Clara General Plan (1990–2010) and Countywide Trails Master Plan.



Board of Supervisors: Mike Wasserman, George Shirakawa, Dave Cortese, Ken Yeager, Liz Kniss

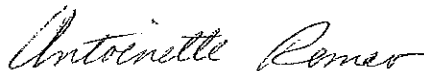
County Executive: Jeffrey V. Smith

Non-motorized circulation within the project area should be analyzed in the context of potential connectivity with all nearby trail routes. Per Policy PR-TS 6.3 of the Parks and Recreation chapter of the County General Plan, public Improvement projects such as road widening, bridge construction and flood control projects that may impact existing or proposed trails should be designed to facilitate provisions of shared use. County Parks encourages SCVWD to incorporate planning of recreation facilities particularly trails and amenities for public access into the project early in the design development process.

County Parks is encouraged by SCVWD commitment to work with cities and the County to incorporate recreation opportunities such as creekside trails into the project, and would welcome the opportunity to work with SCVWD, cities and other agencies on the development of public trails within the project area.

County Parks looks forward to continued collaboration with SCVWD on this project. We thank you for the opportunity to respond to this NOP and request that our agency continues to receive timely information on the project. We look forward to reviewing the DEIR and other environmental documents when they become available. If you have any questions regarding these comments, please feel free to contact me at (408) 355-2235 or via email at Antoinette.Romeo@prk.sccgov.org.

Sincerely,



Antoinette Romeo

Park Planner III

Cc: Jane Mark, Senior Planner;
Tim Heffington, Senior Real Estate Agent;
Ian Champeny, Real Estate Agent



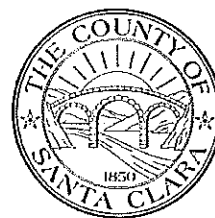
Board of Supervisors: Mike Wasserman, George Shirakawa, Dave Cortese, Ken Yeager, Liz Kniss

County Executive: Jeffrey V. Smith

County of Santa Clara

Department of Environmental Health

1555 Berger Drive, Suite 300
San Jose, California 95112-2716
(408) 918-3400
www.EHinfo.org



November 6, 2012

Mr. David Dunlap
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Re: CEQA Referrals – SCVWD The Upper Llagas Creek Flood Project

Dear Mr. Dunlap:

This letter is in reference to the above subject project requesting our department to respond to the CEQA referrals.

For The Upper Llagas Creek Flood Protection Project, the Department of Environmental Health (DEH) would like to see the impact on existing onsite wastewater treatment systems (septic systems) and any impact on groundwater or surface water addressed in the EIR. Also, DEH would like more information on any effects on the perchlorate plume (or the mitigation thereof). Please also address any impacts on existing or proposed drinking water wells.

If you have any questions, please feel free to give me a call at (408) 918-1955 or email me at scott.bourdon@deh.sccgov.org. Thank you.

Sincerely,

Scott Bourdon, Director
Department of Environmental Health

cc: Colleen A. Oda, Planner III
Santa Clara County Planning Office, 70 W. Hedding St., E. Wing, 7th Floor, San Jose, CA 95110



State of California – The Natural Resources Agency
DEPARTMENT OF FISH AND GAME
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558
(707) 944-5500
www.dfg.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director



November 9, 2012

Mr. David Dunlap
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Dear Mr. Dunlap:

Subject: Upper Llagas Creek Flood Protection Project, Notice of Preparation,
SCH #2012102032, Santa Clara County

The Department of Fish and Game (DFG) has reviewed the Santa Clara Valley Water District's (District) Notice of Preparation (NOP) provided for the subject project, and we have the following recommendations for issues to be addressed in development of the California Environmental Quality Act (CEQA) document:

The CEQA document should describe how the flood design criteria were derived and why those criteria are appropriate for Upper Llagas Creek.

The NOP describes installation of a bypass channel in Reach 7A to bypass a 1.9-mile segment of West Little Llagas Creek, and installation of a weir and two bypass culverts in Reach 8 to bypass high flows. The CEQA document should describe how processes such as sediment transport, scouring of fines, minimization of channel vegetation encroachment, and introduction and transport of woody material will be supported with the bypassing of high flows typically associated with channel maintenance flows and channel forming flows.

The CEQA document should explain whether and how the proposed project will reduce maintenance needs in the project area and the justification for the number and size of maintenance roads included in the project.

The CEQA document should clearly define the impacts to vegetation, differentiating between impacts to native and non-native species, disclosing number, size distribution, and species identification of trees removed as a result of the project, and providing impacts to riparian vegetation in linear feet and percent canopy cover. In addition, the document should discuss what types of riparian vegetation the channel may have supported historically, and describe limitations of revegetation (due to soils, hydrology, etc.) and describe what type of riparian vegetation can reasonably be expected to be successful in replanting and restoration.

Mr. David Dunlap
November 9, 2012
Page 2

The CEQA document should clearly define potential project-related impacts to sensitive species, including but not limited to least Bell's vireo (*Vireo bellii pusillus*), South-Central California Coast steelhead (*Oncorhynchus mykiss*), California tiger salamander (*Ambystoma californiense*), California red-legged frog (*Rana aurora draytonii*), western pond turtle (*Emys marmorata*), burrowing owl (*Athene cunicularia*), yellow warbler (*Dendroica petechia*), and San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*).

The CEQA document should clearly describe whether there will be an increase or decrease in the length of stream that will be day-lighted as a result of this project. The document should provide clear justification for any reduction in day-lighted stream length (resulting from culverts, tunnel, etc.) and describe how this will be mitigated for in-kind.

The CEQA document should describe any net benefits of the project to native species, both listed and non-listed. Mitigation site(s) should be disclosed and as much information as possible should be provided that describes how specific mitigation will adequately compensate for project-related impacts.

DFG appreciates the opportunity to comment on the District's NOP for the Upper Llagas Creek Flood Protection Project. Questions regarding this letter and further coordination on this project should be directed to Ms. Tami Schane, Environmental Scientist, at (415) 831-4640; or Mr. Liam Davis, Senior Environmental Scientist, at (707) 944-5529.

Sincerely,



Scott Wilson
Acting Regional Manager
Bay Delta Region

cc: State Clearinghouse

Draft EIR
Upper Llagas Creek Project

APPENDIX

B

2012-2022 STREAM MAINTENANCE
PROGRAM BMPS

Table 2-12. BMPs Listings**A. SECTION A –Pre-Project Planning and General BMPs**

General BMPs are applicable program-wide, for most routine SMP maintenance activities. These measures include standard construction practices and impact avoidance measures that will minimize potential environmental impacts. These BMPs will be implemented by the stream maintenance crew, as appropriate and as overseen by site managers, for all activities associated with the maintenance program. The majority of these BMPs are implemented prior to and during maintenance operations, though the level of activity varies depending on the work type.

Other General BMPs are conducted prior to implementing maintenance activities on site. This group of measures includes procedures to identify site or maintenance constraints, such as biological or cultural resource surveys which coincide with permit compliance requirements. Site design constraints for sediment and bank stabilization activities in particular are also identified as part of the pre-project planning process.

BMP Number	BMP Title	BMP Description
GEN-1	In-Channel Work Window	<p>All ground-disturbing maintenance activities (i.e., sediment removal, bank stabilization, tree removal, and mechanized vegetation management) occurring in the channel (below bankfull) will take place between June 15 and October 15. Requests for work window extensions must be submitted to the regulatory agencies by October 1st, listing the creek names and reaches where a work extension will occur. Work extensions vary per work activity. The agencies will provide a single response within one week. Significant rainfall applies after October 15. An extension through December 31 may apply if the following requirements are met and regulatory agency approval is received:</p> <p>For ground-disturbing activities:</p> <ul style="list-style-type: none"> ▪ Work may continue if no significant rainfall, defined as greater than 0.5 inches per 24 hours within a local watershed, is either forecasted¹ or observed. Following October 15th, maintenance work shall cease for the season if such a rain event is forecasted or observed. <p>Sediment removal</p> <ul style="list-style-type: none"> ▪ Extended Work Window: <ol style="list-style-type: none"> 1. Creeks supporting anadromous fish: An extended work window may occur from October 15 through October 31, or until local rainfall of 0.5 inches or greater falls within the subject watershed within a 24-hour period, whichever occurs first. 2. Creeks not supporting anadromous fish: An extended work window may occur from October 15 through November 30th, or until local rainfall of 0.5 inches or greater falls within the subject watershed within a 24-hour period, whichever occurs first. ▪ Extended Work Window in Lower Quality Areas: <ol style="list-style-type: none"> 1. Sediment removal work may occur until December 31. 2. Work will only occur on Berryessa Creek (0+88+80; 232+70-236+00; 284+30-288+00), Lower Silver Creek (Reach 3 between Stations 37+40 and 381+19), Thompson Creek (0+00-10+00), Canoas Creek (0+00-390+00), Ross Creek (0+00-86+30), Calabazas Creek (35+00-105+00), and San Tomas

¹ Weather Forecasts. No phase of the project may be started if that phase and its associated erosion control measures cannot be completed prior to the onset of a storm event if that construction phase may cause the introduction of sediments into the stream. Seventy-two-hour weather forecasts from the National Weather Service or other localized and more detailed weather forecast service will be consulted prior to start up of any phase of the project that may result in sediment runoff to a stream.

BMP Number	BMP Title	BMP Description
		<p>Aquino Creek (80+00-100+00) can continue with the following conditions:</p> <ul style="list-style-type: none"> ○ site conditions are dry and access for all construction equipment and vehicles will not impact waterways; and ○ all work will stop if any rainfall is forecast for the next 72 hour period. <p>3. Work may occur after a significant rainfall event but no later than December 31.</p> <p>4. Sites must be maintained in a rapidly winterizable² state (implement control measures BMP GEN-20). Bank stabilization projects may continue until the approved date stated below. Prior to a forecasted significant rainfall event (0.5 in/24 hrs), all incomplete bank stabilization projects must be winterized.</p> <ol style="list-style-type: none"> 1. In Creeks Supporting Anadromous Fish <ul style="list-style-type: none"> ○ An extended work window may occur until October 31st for bank stabilization projects that will be 50% complete by October 15th. 2. In Creeks Not Supporting Anadromous Fish <ul style="list-style-type: none"> ○ An extended work window may occur until November 30th for projects that will be 50% complete by October 15th or until significant rainfall. ○ An extended work window may occur until November 30th for new bank stabilization projects that will be completed in five (5) days or less, or until significant rainfall. <ul style="list-style-type: none"> ▪ Instream hand pruning and hand removal of vegetation will occur year round, except when: <ul style="list-style-type: none"> ○ Wheeled or tracked equipment needs to access the site by crossing a creek, ponded area, or secondary channel; or ○ Work occurs in streams that support steelhead. In these streams instream vegetation maintenance will cease on December 31 or when local rainfall greater than 0.5 inches is predicted within a 24-hour period of planned activities, whichever happens first. <p>Modification and removal of instream large woody debris will occur at any time of the year, and as further described in the NMFS Biological Opinion.</p>
GEN-2	Instream Herbicide Application Work Window	<p>Instream herbicide applications will take place between June 15 and October 31 for streams with steelhead, and June 15 to December 31 for non-steelhead streams or until the first occurrence of any of the following conditions; whichever happens first:</p> <ul style="list-style-type: none"> ▪ local rainfall greater than 0.5 inches is forecasted within a 24-hour period from planned application events; or ▪ when steelhead begin upmigrating and spawning in the 14 steelhead creeks, as determined by a qualified biologist (typically in November/December), <ul style="list-style-type: none"> ○ A qualified biologist will determine presence/absence of sensitive resources in designated herbicide use areas and develop site-specific control methods (including the use of approved herbicide and surfactants). Proposed herbicide use would be limited to the aquatic formulation of glyphosate (Rodeo or equal). Surfactant use would be limited to non-ionic products, such as Agri-dex, Competitor, or another brand name using the same ingredients. Any modifications to these materials would require review and approval by NMFS and CDFG.

² Winterization is the process to maintain work sites with the appropriate BMP's to prevent erosion, sediment transport, and protect water quality. Winterization occurs upon completion of bank repairs or on incomplete projects after October 15 and prior to the forecast of significant rainfall, 0.5 inches or greater of local watershed rainfall within 24 hours. Winterization shall be completed prior to the occurrence of such actual significant rainfall.

BMP Number	BMP Title	BMP Description
		<ul style="list-style-type: none"> ○ A qualified fisheries biologist will review proposed herbicide application methods and stream reaches. The fisheries biologist would conduct a pre-construction survey (and any other appropriate data research) to determine whether the proposed herbicide application is consistent with SMP approvals concerning biological resources and determine which BMPs would be instituted for work to proceed. <p>In addition, herbicide application requirements are as follows:</p> <ul style="list-style-type: none"> ▪ no direct application into water; ▪ herbicide application shall not occur when wind conditions may result in drift; ▪ herbicide shall only be applied after the surfactant has a “wet” appearance on the target plants in order to avoid run off; and ▪ where permitted, surfactants shall be added to the spray solution prior to application.
GEN-3	Avoid Exposing Soils with High Mercury Levels	<p>Sediment removal and bank stabilization projects in portions of the Guadalupe River watershed affected by historic mercury mining may expose soils containing mercury.</p> <ol style="list-style-type: none"> 1. In specified maintenance reaches in the Guadalupe River Basin, soils that are likely to be disturbed or excavated shall be tested for mercury (Hg). Soils shall be remediated if: <ol style="list-style-type: none"> a. disturbed or excavated soils exposed to streamflow below the elevation of the 2.33-year flow event exceed 1 ppm Hg; or b. disturbed or excavated soils above the 2.33-year flow level exceed 20 ppm Hg. 2. Remediation may be accomplished either by: <ol style="list-style-type: none"> a. treating the site so that contaminated soils excavated for the purpose of bank stabilization shall not be susceptible to erosion; or b. further excavating contaminated soils and replacing them with clean fill or other bank stabilization materials that are free from contaminants. c. Soils with mercury concentrations exceeding 20 mg/kg shall be removed and disposed of in a Class I landfill following established work practices and hazard control measures. Soils with mercury concentrations less than 20 mg/kg will remain at the project site. 3. To ensure worker safety during sediment removal and bank stabilization projects with elevated mercury concentrations in the exposed surfaces, personal protective equipment will be required during project construction to maintain exposure below levels established by the Occupational Safety and Health Agency (OSHA).

Biological Resources

GEN-4	Minimize the Area of Disturbance	To minimize impacts to natural resources, soil disturbance will be kept to the minimum footprint necessary to complete the maintenance operation.
GEN-5	Mitten Crab Control Measure	Sediment from the San Francisco Bay Watershed, including that for reuse, cannot be moved to areas any farther south than Coyote Creek Golf Drive in south San Jose, and the intersection of McKean and Casa Loma Roads.
GEN-6	Minimize Impacts to Nesting Birds via Site Assessments and Avoidance Measures	<ol style="list-style-type: none"> 1. For activities occurring between January 15 and August 31, project areas will be checked by a qualified biologist or Designated Individuals (DI – for limited ground nesting species surveys) for nesting birds within 2 weeks prior to starting work. If a lapse in project-related work of 2 weeks or longer occurs, another focused survey will be conducted before project work can be reinitiated. 2. If nesting birds are found, a buffer will be established around the nest and maintained until the young have

BMP Number	BMP Title	BMP Description
		<p>fledged. Appropriate buffer widths are 0.5 mile for bald and golden eagles; 250 feet for other raptors and the least Bell's vireo, herons, and egrets; 25 feet for ground-nesting non-raptors; and 50 feet for non-raptors nesting on trees, shrubs and structures. A qualified biologist may identify an alternative buffer based on a site specific-evaluation. No work within the buffer will occur without written approval from a qualified biologist, for as long as the nest is active.</p> <ol style="list-style-type: none"> 3. All vegetation management, sediment reuse, road grading, or other SMP activities in or immediately adjacent to suitable California clapper rail or Alameda song sparrow nesting habitat, as determined by a qualified biologist, shall not be conducted prior to September 1 (the non-nesting season). 4. If a pre-activity survey in high-quality San Francisco common yellowthroat breeding habitat (as determined by a qualified biologist) identifies more singing male San Francisco common yellowthroats than active nests, then the inconspicuous nests of this species might have been missed. In that case, maintenance activities in that area shall be delayed until the San Francisco common yellowthroat non-breeding season (i.e., August 16–March 14). 5. The boundary of each buffer zone will be marked with fencing, flagging, or other easily identifiable marking if work will occur immediately outside the buffer zone. 6. All protective buffer zones will be maintained until the nest becomes inactive, as determined by a qualified biologist. 7. If monitoring shows that disturbance to actively nesting birds is occurring, buffer widths will be increased until monitoring shows that disturbance is no longer occurring. If this is not possible, work will cease in the area until young have fledged and the nest is no longer active.
GEN-6.5	Protection of Nesting Least Bell's Vireos	<ol style="list-style-type: none"> 1. To the extent feasible, SMP activities within woody riparian habitat along portions of lower Llagas Creek downstream from Highway 152, the Pajaro River from Llagas Creek downstream, and lower Uvas/Carnadeo Creek downstream from Hecker Pass Road shall be scheduled to occur outside of the least Bell's vireo nesting season (March 15 – July 31). 2. For activities within woody riparian habitat along the aforementioned creek reaches that will occur between March 15 and July 31, any work will be preceded by a focused survey for least Bell's vireos. Pre-activity surveys will consist of two site visits, conducted on separate days within 14 days before the initiation of maintenance activities in the given area, with at least one of these surveys occurring within 7 days before the initiation of such activities. Surveys will be conducted between dawn and 11:00 a.m., during mild weather conditions (i.e., not during excessive cold, heat, wind, or rain), within all riparian habitat in and within 250 feet of any proposed maintenance location along these reaches. The surveys will be conducted by a qualified biologist who is familiar with the visual and auditory identification of this species. 3. To minimize impacts to nesting least Bell's vireos and other birds, the biologist will not initially be looking for Bell's vireo nests during these surveys. Rather, the biologist will look and listen for individual vireos. If a least Bell's vireo is detected, it will be observed to determine whether it is actively nesting. The biologist will note the nest location, or if finding the actual nest could result in excessive disturbance or risk damaging the nest, the biologist will determine the approximate location, based on observation of birds carrying nesting material, carrying food, or repeatedly visiting a certain area. 4. If an active nest is found, a minimum 250-foot no-activity buffer will be established around the nest. If a territorial male is found but no nest can be detected, then the approximate centroid of the bird's area of activity will be the point from which the buffer will be applied. The required buffer may be reduced in areas where

BMP Number	BMP Title	BMP Description
		<p>dense riparian forest occurs between the construction activities and the active nest or where sufficient barriers or topographic relief exists to protect the nest from excessive noise or other disturbance. The biologist will coordinate with the USFWS and CDFG to evaluate exceptions to the minimum no-activity buffer distance on a case-by-case basis.</p> <p>5. No work will occur within the buffer without verification by a biologist that the nest is inactive and until any fledged young are no longer dependent on adults for food.</p>
GEN-7	Protection of Burrowing Owls	<ol style="list-style-type: none"> 1. Work within 250 feet of an occupied burrow will be delayed until after the nesting season. 2. If suitable burrowing owl habitat is identified where mowing is proposed, or active burrows are found, they will be marked in such a way that the mower can identify the locations of such burrows. Mowing can then occur anywhere beyond the 250 foot buffer zone. Within the 250 foot buffer zone mowing may be done to within 10 feet of an active burrow provided there are no burrowing owls active on the surface. An on-site monitor will observe the area in front of the mower from a safe vantage point while it is in operation. In areas within 10 ft of active burrows the vegetation may be removed by hand (e.g., weed-whackers). All mowing and hand-removal of vegetation within 250 ft of a burrow will be done as quickly as possible to minimize disturbance of burrowing owls. 3. All markers will be removed once mowing is complete. 4. For burrow destruction work, all burrows within the 250-foot buffer zone around known, occupied burrows will be inspected with a burrow camera prior to destruction to ensure no entrapment of burrowing owls. Burrows that are difficult to inspect due to intricate subterranean configuration or depth will be inspected in stages where the uninspected section of the burrow will be protected while the previously inspected section is excavated. <p>If maintenance activities will directly impact occupied burrows the District will consult with the DFG and FWS on establishing alternative burrows (including artificial burrows) and a process for removing owls from the active burrow. No burrowing owls will be evicted from burrows during the nesting season.</p>
GEN-8	Protection of Sensitive Fauna Species from Herbicide Use	<p>Approved herbicides and adjuvants may be applied in habitat areas for sensitive wildlife species (including steelhead, California red-legged frog, California tiger salamander, salt marsh harvest mouse, and Bay checkerspot butterfly); all applications will occur in accordance with federal and state regulations.</p> <p>For sprayable or dust formulations: when the air is calm or moving away from sensitive wildlife habitat, applications will commence on the side nearest the habitat and proceed away from the habitat. When air currents are moving toward habitat, applications will not be made within 200 yards by air or 40 yards by ground upwind from occupied habitat. However, these distances may be modified for the control of invasive species on salmonid streams if the following measures are implemented:</p> <ul style="list-style-type: none"> ▪ A qualified biologist will determine presence/absence of sensitive resources in designated herbicide use areas and develop site-specific control methods (including the use of approved herbicide and surfactants). Proposed herbicide use would be limited to the aquatic formulation of glyphosate (Rodeo or equal). Surfactant use would be limited to non-ionic products, such as Agri-dex, Competitor, or another brand name using the same ingredients. Any modifications to these materials would require review and approval by NMFS and CDFG. ▪ A qualified fisheries biologist will review proposed herbicide application methods and stream reaches. The fisheries biologist would conduct a pre-construction survey (and any other appropriate data research) to determine whether the proposed herbicide application is consistent with SMP approvals concerning

BMP Number	BMP Title	BMP Description
		biological resources and determine which BMPs would be instituted for work to proceed.
GEN-9	Avoid Impacts to Special-Status Plant Species and Sensitive Natural Vegetation Communities	<p>A qualified botanist will identify special status plant species and sensitive natural vegetation communities and clearly map or delineate them as needed in order to avoid and/or minimize disturbance, using the DFG protocols and the <i>CNPS Botanical Survey Guidelines</i> to formulate the following protocols:</p> <ol style="list-style-type: none"> 1. A qualified botanist will use the GIS database, CNDDb, and/or other suitable tools to identify special status plants and sensitive natural vegetation communities located within or near work areas. 2. Surveys of areas identified as sensitive natural communities or suitable habitat for special status plant species will be conducted by a qualified botanist prior to commencement of work. 3. Surveys will be conducted during the appropriate time of the year to adequately identify special-status plants that could occur on the site of proposed maintenance activities. 4. The qualified botanist will ensure avoidance and/or minimize impacts by implementing one or more of the following, as appropriate, per the botanist's recommendation: <ol style="list-style-type: none"> a) Flag or otherwise delineate in the field the special status plant populations and/or sensitive natural community to be protected; b) Allow adequate buffers around plants or habitat; the location of the buffer zone will be shown on the maintenance design drawings and marked in the field with stakes and/or flagging in such a way that exclusion zones are visible to maintenance personnel without excessive disturbance of the sensitive habitat or population itself (e.g., from installation of fencing). c) Time construction or other activities during dormant and/or non-critical life cycle period; d) Store removed sediment off site; and e) Limit the operation of maintenance equipment to established roads whenever possible. 5. No herbicides, terrestrial or aquatic, will be used in areas identified as potential habitat for special status plants species or containing sensitive natural communities, until a qualified botanist has surveyed the area and determined the locations of special status plant species present. 6. If special status plant species or sensitive communities are present, then a qualified botanist will determine if a given type of vegetation management method is ecologically appropriate for a given area. Alternative strategies based on the botanist's recommendations will be coordinated with appropriate staff. 7. All impacts to sensitive natural communities and special status plants identified by the qualified botanist will be avoided and/or minimized
GEN-10	Avoid Impacts to Bay Checkerspot Butterfly and Associated Critical Habitat	<ol style="list-style-type: none"> 1. Areas supporting Bay checkerspot larval host plants will be identified by a qualified botanist and protected from disturbance to the extent feasible, by establishing buffer zones around individual plants or populations. The size of the buffer will be determined by a qualified botanist; the actual distance will depend on the plant species potentially affected and the type of disturbance. No herbicide will be applied to the buffer area, and to the extent feasible, maintenance personnel and equipment will not operate within such areas. 2. Herbicides may be used in serpentine areas that do not contain Bay checkerspot butterfly larval host plants or sensitive plant species and habitat when approved by a qualified botanist and for the following maintenance purposes: <ol style="list-style-type: none"> a) To protect sensitive species and habitat; b) To manage for control of invasive and non-native plants; and/or c) To maintain access to a facility.
GEN-11	Protection of Salt Marsh	<ol style="list-style-type: none"> 1. A District qualified biologist will conduct a desk audit to determine whether suitable Salt Marsh Harvest Mouse

BMP Number	BMP Title	BMP Description
	Harvest Mouse and California Clapper Rail	<p>(SMHM) or California Clapper Rail (CCR) habitat is present in or adjacent to a maintenance activity.</p> <ol style="list-style-type: none"> 2. Within 7 days prior to work within the range of the Salt Marsh Harvest Mouse (SMHM) or California Clapper Rail (CCR), as depicted on the District's GIS layers, the proposed project area will be surveyed by a qualified biologist to identify specific habitat areas. Surveyed areas will include work locations and access routes. 3. To minimize or avoid the loss of individuals, activities within or adjacent to California clapper rail and salt marsh harvest mouse habitat will not occur within two hours before or after extreme high tides (6.5 feet or above) when the marsh plain is inundated, because protective cover for those species is limited and activities could prevent them from reaching available cover. 4. Specific habitat areas are vegetated areas of cordgrass (<i>Spartina</i> spp), marsh gumplant (<i>Grindelia</i> spp.), pickleweed (<i>Sarcocornia pacifica</i>), alkali heath, (<i>Frankenia</i> sp.), and other high marsh vegetation, brackish marsh reaches of creek with heavy accumulations of bulrush thatch (old stands), and high water refugia habitat that may include annual grasses, and shrubs immediately adjacent to channels. 5. Within the identified specific habitat areas, vegetation will be removed by hand from areas to be directly impacted by the work activities if possible (hand removal of vegetation in some channels may not be possible). 6. Prior to the initiation of work each day for all vegetation management work, ground or vegetation disturbance, operation of large equipment, grading, sediment removal, and bank stabilization work and prior to expanding the work area, if suitable habitat occurs within the immediate work area, a qualified biologist will conduct a pre-construction survey of all suitable habitat that may be directly or indirectly impacted by the day's activities (work area, access routes, staging areas). <ol style="list-style-type: none"> a. If during the initial daily survey or during work activities a CCR is observed within or immediately adjacent to the work area (50 feet), initiation of work will be delayed until the CCR leaves the work area. b. If during the initial daily survey or during work activities a SMHM or similar rodent is observed within or immediately adjacent to the work area (50 feet), initiation of work will be delayed until a <i>Site Specific Species Protection Form</i> can be developed and implemented by a qualified biologist to protect the SMHM or similar rodent is developed and implemented by the qualified biologist. Acceptable plan activities may include one or more of the following activities: 1) establishment of a buffer zone at least 50 feet in radius from the rodent; 2) ongoing active monitoring; 3) construction of silt fence barrier between maintenance work and location of the rodent, 4) delay of work activity until the qualified biologist can contact DFG and USFWS for additional direction. 7. Mowing using heavy equipment (tractors, boom mowers, rider mowers) will not be conducted in habitat areas or within 50 feet of habitat areas. If mowing with hand equipment is necessary within 50 feet of habitat areas, an on-site monitor will observe the area in front of the mower from a safe vantage point while it is in operation. If SMHM are detected within the area to be mown, no mowing will occur in that area. If CCR are detected within the area to be mown, the mowing will stop until the individual(s) have left the work area. 8. See ANI-2 for additional restrictions.
GEN-12	Protection of Special-Status Amphibian and Reptile Species	<ol style="list-style-type: none"> 1. A District qualified biologist will conduct a desk audit to determine whether suitable special-status amphibian or reptile habitat is present in or adjacent to a maintenance activity. 2. If the District Wildlife or Fisheries Biologist determines that a special-status amphibian or reptile could occur in the activity area, a qualified biologist will conduct one daytime survey within a 7 day period preceding the onset

BMP Number	BMP Title	BMP Description
		<p>of maintenance activities.</p> <ul style="list-style-type: none"> a. If a special-status amphibian or reptile, or the eggs or larvae of a special status amphibian or reptile, are found within the activity area during a pre-activity survey or during project activities, the qualified biologist shall notify the project proponent about the special-status species and conduct the following work specific activities: <ul style="list-style-type: none"> i. For minor maintenance activities and for vegetation removal activities that will take less than 1 day, the qualified biologist shall conduct a special status species survey on the morning of and prior to the scheduled work. <ul style="list-style-type: none"> A. If no special status species is found, the work may proceed. B. If eggs or larvae of a special status species are found, a buffer will be established around the location of the eggs/larvae and work may proceed outside of the buffer zone. No work will occur within the buffer zone. Work within the buffer zone will be rescheduled until the time that eggs have hatched and/or larvae have metamorphosed. C. If an active western pond turtle nest is detected within the activity area, a 50-foot buffer zone around the nest will be established and maintained during the breeding and nesting season (April 1 – August 31). The buffer zone will remain in place until the young have left the nest, as determined by a qualified biologist. D. If adults or non-larval juveniles of a special status species are found, one of the following two procedures will be implemented: <ul style="list-style-type: none"> i. If, in the opinion of the qualified biologist, capture and removal of the individual to a safe place outside of the work area is less likely to result in adverse effects than leaving the individual in place and rescheduling the work (e.g., if the species could potentially hide and be missed during a follow-up survey), the individual will be captured and relocated by a qualified biologist (with USFWS and/or CDFG approval, depending on the listing status of the species in question), and work may proceed. ii. If, in the opinion of the qualified biologist, the individual is likely to leave the work area on its own, and work can be feasibly rescheduled, a buffer will be established around the location of the individual(s) and work may proceed outside of the buffer zone. No work will occur within the buffer zone. Work within the buffer zone will be rescheduled. ii. For minor maintenance and vegetation removal activities that will take more than 1 day, the qualified biologist shall conduct a special-status species survey on each morning of and prior to the scheduled work commencing. <ul style="list-style-type: none"> E. If eggs or larvae of a special status species are found, a buffer will be established around the location of the eggs/larvae and work may proceed outside of the buffer zone. No work will occur within the buffer zone. Work within the buffer zone will be rescheduled until the time that eggs have hatched and/or larvae have metamorphosed. F. If an active western pond turtle nest is detected within the activity area, a 2550 ft-buffer zone around the nest will be established and maintained during the breeding and nesting season (April 1 – August 31). The buffer zone will remain in place until the young have left the nest, as determined by a qualified biologist. G. If adults or non-larval juveniles of a special status species are found, the individual will be captured and relocated by a qualified biologist (with USFWS and/or CDFG approval,

BMP Number	BMP Title	BMP Description
		<p>depending on the listing status of the species in question), and work may proceed.</p> <p>iii. For Sediment Removal and Bank Stabilization Projects the wildlife or fisheries biologist in cooperation with the project proponent shall complete a <i>Site Specific Species Protection Form for the project</i>. Elements of the form include: work rescheduling, training work crews, daily surveys, establishment of buffers and buffer fencing, on-site monitoring, habitat modification in advance of work activities, capture and relocation of individual special-status species, methods of documentation, and reporting of results.</p> <p>b. If no special status amphibian or reptile is found within the activity area during a pre-activity survey, the work may proceed.</p> <p>c. During animal conflict management activities, if special status species are found within a burrow proposed for destruction, a qualified biologist will determine an appropriate buffer distance around that burrow to ensure adequate protection of the habitat. The buffer area may include not destroying adjacent burrows as that may damage subterranean networks of the occupied burrow or produce substrate vibrations which could interfere with prey detection mechanisms. If two consecutive follow up surveys are conducted (spaced 30 days apart) in which the burrow is found to be unoccupied, work can proceed as planned. A naturally found back filled burrow known to have been inhabited by a special-status species will be presumed to still be occupied by that species and a clearly delineated buffer demarcation of the burrow area will be in place for the duration of nearby work activities. In rare instances in which destruction of the burrow is not avoidable during animal conflict management, the animal will be relocated to a safe burrow outside the impact area, with USFWS and/or CDFG approval, depending on the listing status of the species in question. A biologist will observe the relocated animal until it is certain that the animal is not in immediate danger of desiccation or predation.</p>
GEN-13	Protection of Bat Colonies	<ol style="list-style-type: none"> 1. A District Wildlife Biologist will conduct a desk audit to determine whether suitable habitat (appropriate roost trees or anthropogenic structures) is present for bat colonies within 100 feet of the work site, staging areas, or access routes. 2. If potential bat colony habitat is determined to be present, within two weeks prior to the onset of work activities a qualified biologist will conduct a survey to look for evidence of a bat use. If evidence is observed, or if potential roost sites are present in areas where evidence of bat use might not be detectable (such as a tree cavity), an evening survey and/or nocturnal acoustic survey may be necessary to determine if the bat colony is active and to identify the specific location of the bat colony. 3. If an active bat maternity colony is present then the qualified biologist will make the following determinations: <ol style="list-style-type: none"> a. The work can proceed without unduly disturbing the bat colony b. There is a need for a buffer zone to prevent disturbance to the bat colony, and implementation of the buffer zone (determined on a case-by-case basis by a qualified biologist) will reduce or eliminate the disturbance to an acceptable level. c. Work cannot proceed without unduly disturbing the bat colony; thus, the work will be postponed until after July 31. 4. If a non-breeding bat hibernaculum is found in a tree or structure that must be removed or physically disturbed, the qualified biologist will consult with DFG prior to initiating any removal or exclusion activities.
GEN-14	Protection of San Francisco Dusky-footed Woodrat	<ol style="list-style-type: none"> 1. Prior to work within riparian, oak woodland, or coyote brush scrub habitat, or the removal of any oak trees outside these habitats, a District Wildlife Biologist will conduct a desk audit to determine whether woodrats

BMP Number	BMP Title	BMP Description
		<p>could be present within suitable habitat for San Francisco dusky-footed woodrat or is known to be present in or adjacent to a maintenance activity site.</p> <ol style="list-style-type: none"> 2. If the District Wildlife Biologist determines that no San Francisco dusky-footed woodrat habitat is present, or there is habitat present but will not be affected by the maintenance activity, then no further action is required. 3. If the District Wildlife Biologist determines that suitable San Francisco dusky-footed woodrat habitat is present and may be affected by the maintenance activity, a qualified biologist shall conduct a pre-activity survey within 2 weeks prior to the start of work to determine if woodrat nests are in, or within 5 feet of, the immediate activity area. <ol style="list-style-type: none"> a. If woodrat nests are present at the site and will be affected by the work activity area, the District Wildlife Biologist in cooperation with the project proponent will evaluate the site specific situation. The Wildlife Biologist will then develop a site specific woodrat management plan to first avoid and second minimize take or injury of the woodrat(s). The woodrat management plan may include: establishment of buffers zones, installation of buffer zone fences, relocation of the woodrat nest, removal of the woodrat nest, and/or construction of artificial nests. Consideration will be given to the number of woodrat nests that may be affected by the work activity and the number in the project vicinity that may not be affected.
GEN-15	Salvage Native Aquatic Vertebrates from Dewatered Channels	<p>If fisheries or native aquatic vertebrates are present when cofferdams, water bypass structures, and silt barriers are to be installed, a fish and native aquatic vertebrate relocation plan shall be implemented to ensure that fish and native aquatic vertebrates are not stranded. Relocation efforts will be based on the District's Fish Relocation Guidelines. Streams that support a sensitive species (i.e. steelhead) will require a relocation effort and/ or initial onsite monitoring by a qualified biologist depending on seasonal conditions:</p> <ol style="list-style-type: none"> 1. In non-tidal channels, where water is to be diverted, prior to the start of work or during the installation of water diversion structures, native aquatic vertebrates shall be captured in the work area and transferred to another reach as determined by a qualified biologist. Timing of work in streams that supports a significant number of amphibians will be delayed until metamorphosis occurs to minimize impacts to the resource. Capture and relocation of aquatic native vertebrates is not required at individual work sites when site conditions preclude reasonably effective operation of capture gear and equipment. 2. Aquatic invertebrates will not be transferred (other than incidental catches) because of their anticipated abundance and colonization after completion of the repair work.
GEN-15.5	Avoidance of Impacts on the San Joaquin Kit Fox	<ol style="list-style-type: none"> 1. A qualified District biologist will conduct a desk audit to determine whether an SMP activity will occur in an area where the San Joaquin kit fox could potentially occur (i.e., roughly east of Frazier Lake Road and south of Bloomfield Avenue), and in potential habitat for the species. 2. If the District biologist determines that an SMP activity could occur in an area that could potentially support a kit fox, the SCVWD will implement applicable pre-activity surveys and other measures in accordance with the USFWS's <i>San Joaquin Kit Fox Survey Protocol for the Northern Range</i>, as follows: <ol style="list-style-type: none"> a) Conduct a preconstruction/pre-activity survey no less than 14 days and no more than 30 days prior to the beginning of project implementation. Surveys shall identify kit fox habitat features on the project site and evaluate use by kit fox and, if possible, and assess the potential impacts to the kit fox by the proposed activity. The status of all dens shall be determined and mapped in accordance with the survey protocol. b) If a natal/pupping den is discovered within the project area or within 200 feet of the project boundary,

BMP Number	BMP Title	BMP Description
		<p>the USFWS shall be immediately notified. Disturbance to all San Joaquin kit fox dens should be avoided to the maximum extent possible. Destruction of any known or natal/pupping kit fox den would require take authorization from the USFWS.</p> <p>c) The project proponent will establish exclusion zones around the kit fox dens, if determined to be present. The configuration of the exclusion should have a radius measured outward from the entrance or cluster of entrances. The following radii are minima to be applied:</p> <ul style="list-style-type: none"> ▪ Potential den: 50 feet ▪ Known den: 100 feet ▪ Natal/pupping den: Service must be contacted (occupied and unoccupied) ▪ Atypical den: 50 feet. <p>3. If take of the San Joaquin kit fox will occur, take authorization from the USFWS and CDFG will be necessary.</p>

General Maintenance Practices

GEN-16	In-Channel Minor Activities	For in-channel minor work activities, work will be conducted from the top of the bank if access is available and there are flows in the channel.
GEN-17	Employee/Contractor Training	All appropriate District staff and contractors will receive annual training on Stream Maintenance Program BMPs. The training will also include an overview of special-status species identification and habitat requirements. District staff and contractors will receive fact sheets to assist with in-the-field identification of special-status species and their habitats.
GEN-18	Paperwork Required On-site	<ol style="list-style-type: none"> 1. Copies of regulatory permits related to the Stream Maintenance Program will be kept on-site and available for review, if requested by regulatory personnel. 2. Copies of the Stream Maintenance Program Manual and this BMP Manual will be kept on-site.
GEN-19	Work Site Housekeeping	<ol style="list-style-type: none"> 1. District employees and contractors will maintain the work site in neat and orderly conditions on a daily basis, and will leave the site in a neat, clean, and orderly condition when work is complete. 2. Slash, sawdust, cuttings, etc. will be removed to clear the site of vegetation debris. As needed, paved access roads and trails will be swept and cleared of any residual vegetation or dirt resulting from the maintenance activity. 3. For activities that last more than one day, materials or equipment left on the site overnight will be stored as inconspicuously as possible, and will be neatly arranged. Any materials and equipment left on the site overnight will be stored to avoid erosion, leaks, or other potential impacts to water quality (see BMPs GEN-24). 4. The District's maintenance crews are responsible for properly removing and disposing of all debris incurred as a result of construction within 72 hours of project completion. 5. All trash that is brought to a project site during maintenance activities (e.g., plastic water bottles, plastic lunch bags, cigarettes) will be collected at the site daily.
GEN-20	Erosion and Sediment Control Measures	<ol style="list-style-type: none"> 1. Soils exposed due to maintenance activities will be seeded and stabilized using hydroseeding, straw placement, mulching, and/or erosion control fabric. These measures will be implemented such that the site is stabilized and water quality protected prior to significant rainfall. The channel bed and areas below the Ordinary High Water Mark (OHWM) are exempt from this BMP. 2. The preference for erosion control fabrics will be to consist of natural fibers; however, steeper slopes and areas that are highly erodible may require more structured erosion control methods. No non-porous fabric will

BMP Number	BMP Title	BMP Description
		<p>be used as part of a permanent erosion control approach. Plastic sheeting may be used to temporarily protect a slope from runoff, but only if there are no indications that special-status species would be impacted by the application.</p> <ol style="list-style-type: none"> 3. Erosion control measures will be installed according to manufacturer's specifications. 4. Appropriate measures include, but are not limited to, the following: <ul style="list-style-type: none"> o Silt Fences o Straw Bale Barriers o Brush or Rock Filters o Storm Drain Inlet Protection o Sediment Traps o Sediment Basins o Erosion Control Blankets and Mats o Soil Stabilization (i.e. tackified straw with seed, jute or geotextile blankets, etc.) o Wood chips o Straw mulch 5. All temporary construction-related erosion control methods shall be removed at the completion of the project (e.g. silt fences). 6. Surface barrier applications installed as a method of animal conflict management, such as chain link fencing, woven geotextiles, and other similar materials, will be installed no longer than 300 feet, with at least an equal amount of open area prior to another linear installation; and only on one side of levee slopes. Inboard and outboard areas will only have installations set in an alternating pattern, such that no inboard and outboard levee faces would have erosion control blankets along the same levee stationing.
GEN-21	Staging and Stockpiling of Materials	<ol style="list-style-type: none"> 1. To protect on-site vegetation and water quality, staging areas should occur on access roads, surface streets, or other disturbed areas that are already compacted and only support ruderal vegetation. Similarly, all maintenance equipment and materials (e.g., road rock and project spoil) will be contained within the existing service roads, paved roads, or other pre-determined staging areas. 2. Building materials and other maintenance-related materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into water bodies or storm drains. Materials will not be stockpiled longer than seven (7) calendar days. 3. No runoff from the staging areas may be allowed to enter water ways, including the creek channel or storm drains, without being subjected to adequate filtration (e.g., vegetated buffer, swale, hay wattles or bales, silt screens). 4. The discharge of decant water to water ways from any on-site temporary sediment stockpile or storage areas is prohibited. 5. Wet material removed from an isolated creek reach may be pulled to the side of the channel (within the channel and below top of bank) and allowed to naturally drain prior to removal from the channel. Pulled material will be removed from the channel prior to deactivation of the site or forecast of rain. 6. During the wet season, no stockpiled soils will remain exposed, unless surrounded by properly installed and maintained (i.e., per manufacturer specifications) silt fencing or other means of erosion control. During the dry season; exposed, dry stockpiles will be watered, enclosed, covered, or sprayed with non-toxic soil

BMP Number	BMP Title	BMP Description
		<p>stabilizers (GEN-24).</p> <p>7. All pipes, culverts, or similar structures stored at a site within sensitive species areas, for one or more overnight periods shall be securely capped prior to storage or inspected before the pipe is subsequently moved. If any potential special-status species are observed within a pipe, a District biologist shall be consulted on what steps should be taken to protect the species. If a District biologist is on-site, they may remove the special status species from the pipes and relocate to the nearest appropriate and unaffected habitat.</p>
GEN-22	Sediment Transport	<p>To prevent sediment-laden water from being released back into waterways during transport of spoils to disposal locations, truck beds will be lined with an impervious material (e.g., plastic), or the tailgate blocked with wattles, hay bales, or other appropriate filtration material. Trucks may then drain excess water by slightly tilting the loads and allowing the water to drain out through the applied filter, but only within the active project area of the creek where the sediment is being loaded into the trucks or within an identified vegetated area (swale) that is separated from the creek.</p>
GEN-23	Stream Access	<p>District personnel will use existing access ramps and roads to the extent feasible. If necessary to avoid large mature trees, native vegetation, or other significant habitat features, temporary access points will be constructed in a manner that minimizes impacts according to the following guidelines:</p> <ol style="list-style-type: none"> 1. Temporary access points will be constructed as close to the work area as possible to minimize equipment transport 2. In considering channel access routes, slopes of greater than 20 percent will be avoided, if possible. 3. Any temporary fill used for access will be removed upon completion of the project and pre-project topography will be restored to the extent possible. 4. When temporary access is removed, disturbed areas will be revegetated or filled with compacted soil, seeded, and/or stabilized with erosion control fabric immediately after construction to prevent future erosion. 5. Personnel will use the appropriate equipment for the job that minimizes impacts and disturbance to the stream bottom. Appropriately-tired vehicles, either tracked or wheeled, will be used depending on the site and maintenance activity.
GEN-24	On-Site Hazardous Materials Management	<ol style="list-style-type: none"> 1. An inventory of all hazardous materials used (and/or expected to be used) at the worksite and the end products that are produced (and/or expected to be produced) after their use will be maintained by the worksite manager. 2. As appropriate, containers will be properly labeled with a "Hazardous Waste" label and hazardous waste will be properly recycled or disposed of off-site. 3. Contact of chemicals with precipitation will be minimized by storing chemicals in watertight containers with appropriate secondary containment to prevent any spillage or leakage. 4. Quantities of toxic materials, such as equipment fuels and lubricants, will be stored with secondary containment that is capable of containing 110% of the primary container(s). 5. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials will not contact soil and not be allowed to enter surface waters or the storm drainage system. 6. All toxic materials, including waste disposal containers, will be covered when they are not in use, and located as far away as possible from a direct connection to the storm drainage system or surface water. 7. Sanitation facilities (e.g., portable toilets) will be placed outside of the creek channel and floodplain. Direct

BMP Number	BMP Title	BMP Description
		connections with soil, the storm drainage system, and surface waters will be avoided. 8. Sanitation facilities will be regularly cleaned and/or replaced, and inspected daily for leaks and spills.-
GEN-25	Existing Hazardous Materials	If hazardous materials, such as oil, batteries or paint cans, are encountered at the maintenance sites, the District will carefully remove and dispose of them according to applicable regulatory requirements. District staff will wear proper protective gear and store the waste in appropriate hazardous waste containers until it can be disposed at a hazardous waste facility.
GEN-26	Spill Prevention and Response	<p>The District will prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water into channels following these measures:</p> <ol style="list-style-type: none"> 1. District field personnel will be appropriately trained in spill prevention, hazardous material control, and clean up of accidental spills. 2. Equipment and materials for cleanup of spills will be available on site and spills and leaks will be cleaned up immediately and disposed of according to applicable regulatory requirements. 3. Field personnel will ensure that hazardous materials are properly handled and natural resources are protected by all reasonable means. 4. Spill prevention kits will always be in close proximity when using hazardous materials (e.g., at crew trucks and other logical locations). All field personnel will be advised of these locations. 5. District staff will routinely inspect the work site to verify that spill prevention and response measures are properly implemented and maintained. <p><i>Spill Response Measures:</i> For small spills on impervious surfaces, absorbent materials will be used to remove the spill, rather than hosing it down with water. For small spills on pervious surfaces such as soil, the spill will be excavated and properly disposed rather than burying it. Absorbent materials will be collected and disposed of properly and promptly.</p> <p>If a hazardous materials spill occurs that cannot be contained or cleaned up with the onsite materials, the onsite District field personnel will be responsible for immediately initiating an emergency response sequence by notifying the proper authorities (i.e., District Emergency Response (ER) Team and public fire and hazmat agencies) of the release; taking appropriate defensive steps from a safe distance to secure the site to minimize damage to people, environment, and property (PEP); and deferring all other response activities to public emergency response agencies and/or the District Emergency Response (ER) Team or District ER Contractor. Depending on the nature of the release, the District ER Team's actions will include: urgent (responding within 2 hours of notification) field response site reconnaissance, emergency sequence initiation, defensive containment, release control, incident command; or priority (non 2-hour) field response site reconnaissance and clean-up operations.</p> <p>If a "reportable" spill of petroleum products occurs, the District's Stream Maintenance Implementation Program Manager will be notified and action taken to contact the appropriate safety and cleanup crews. A reportable spill is defined as when:</p> <ul style="list-style-type: none"> ▪ a film or sheen on, or discoloration of, the water surface or adjoining bank/shoreline is observed; or ▪ a sludge or emulsion is deposited beneath the surface of the water or adjoining banks/shorelines (40 Code of Federal Regulations 110); or when ▪ another violation of water quality standards is observed. <p>A written description of the reportable release must be submitted to the appropriate Regional Water Quality Control</p>

BMP Number	BMP Title	BMP Description
		<p>Board and the California Department of Toxic Substances Control (DTSC). This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases.</p> <p>If an appreciable spill has occurred, and results determine that project activities have adversely affected surface water or groundwater quality, a detailed analysis will be performed to the specifications of DTSC to identify the likely cause of contamination. This analysis will include recommendations for reducing or eliminating the source or mechanisms of contamination. Based on this analysis, the District or contractors will select and implement measures to control contamination, with a performance standard that surface and groundwater quality will be returned to baseline conditions. These measures will be subject to approval by the District, DTSC, and the Regional Water Quality Control Board.</p>
GEN-27	Existing Hazardous Sites	<p>Upon selection of maintenance project locations, the District will conduct a search for existing known contaminated sites, as part of its annual preparation of the Notice of Proposed Work (NPW), on the State Water Resource Control Board's GeoTracker Web site (http://www.geotracker.waterboards.ca.gov). The Geotracker search will only be performed for the District's ground disturbing activities. For any proposed ground disturbing maintenance sites located within 1,500 feet of any "open" sites where contamination has not been remediated, the District will contact the RWQCB case manager listed in the database. The District will work with the case manager to ensure maintenance activities would not affect cleanup or monitoring activities or threaten the public or environment.</p>
GEN-28	Fire Prevention	<ol style="list-style-type: none"> 1. All earthmoving and portable equipment with internal combustion engines will be equipped with spark arrestors. 2. During the high fire danger period (April 1–December 1), work crews will ÷a Have appropriate fire suppression equipment available at the work site.
GEN-29	Dust Management	<p>The District will implement the Bay Area Air Quality Management District's (BAAQMD) required Dust Control Measures (http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines%20May%202011.ashx?la=en). Current measures stipulated by the BAAQMD Guidelines include the following:</p> <ol style="list-style-type: none"> 1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day. 2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered. 3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. 4. Water used to wash the various exposed surfaces (i.e., parking areas, staging areas, soil piles, graded areas, etc.) will not be allowed to enter the water way. 5. All vehicle speeds on unpaved roads shall be limited to 15 mph. 6. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. 7. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points. 8. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's

BMP Number	BMP Title	BMP Description
		<p>specifications. All equipment shall be checked by a certified visible emissions evaluator.</p> <p>9. Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.</p>
GEN-30	Vehicle and Equipment Maintenance	<ol style="list-style-type: none"> 1. All vehicles and equipment will be kept clean. Excessive build-up of oil and grease will be prevented. 2. All equipment used in the creek channel will be inspected for leaks each day prior to initiation of work. Maintenance, repairs, or other necessary actions will be taken to prevent or repair leaks, prior to use. 3. Incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) will be checked for leaking oil and fluids. Vehicles or equipment visibly leaking operational fluids will not be allowed on-site. 4. No heavy equipment will operate in a live stream. This will not apply to activities for which no other option exists, such as sediment removal which cannot be conducted from top of bank, etc. In these cases, dewatering will be conducted as necessary, following the protocols in BMPs GEN-33 or GEN-34. 5. No equipment servicing will be done in the creek channel or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated (i.e., pumps and generators). 6. If emergency repairs are required in the field, only those repairs necessary to move equipment to a more secure location, and that can be performed without releasing any material into the floodway or water, will be conducted in the channel or floodplain. 7. If necessary, all servicing of equipment done at the job site will be conducted in a designated, protected area to reduce threats to water quality from vehicle fluid spills. Designated areas will not directly connect to the ground, surface water, or the storm drain system. The service area will be clearly designated with berms, sandbags, or other barriers. Secondary containment, such as a drain pan, to catch spills or leaks will be used when removing or changing fluids. Fluids will be stored in appropriate containers with covers, and properly recycled or disposed of offsite.
GEN-31	Vehicle Cleaning	<ol style="list-style-type: none"> 1. Equipment will be cleaned of any visible sediment or vegetation clumps before transferring and using in a different watershed to avoid spreading pathogens or exotic/invasive species. 2. Vehicle and equipment washing can occur on-site only as needed to prevent the spread of sediment, pathogens or exotic/invasive species. No runoff from vehicle or equipment washing is allowed to enter water bodies, including creek channels and storm drains, without being subjected to adequate filtration (e.g., vegetated buffers, straw wattles or bales, fiber rolls, and silt screens). The discharge of decant water from any on-site wash area to water bodies or to areas outside of the active project site is prohibited. Additional vehicle/equipment washing will occur at the approved wash area in the District's corporation yard.
GEN-32	Vehicle and Equipment Fueling	<ol style="list-style-type: none"> 1. No fueling will be done in the channel (top-of-bank to top-of-bank) or immediate floodplain unless equipment stationed in these locations cannot be readily relocated (e.g., pumps and generators). 2. All off-site fueling sites (i.e., on access roads above the top-of-bank) will be equipped with secondary containment and avoid a direct connection to soil, surface water, or the storm drainage system. 3. For stationary equipment that must be fueled on-site, secondary containment, such as a drain pan or drop cloth, will be used to prevent accidental spills of fuels from reaching the soil, surface water, or the storm drain system.

BMP Number	BMP Title	BMP Description
<i>Dewatering</i>		
GEN-33	Dewatering for Non-Tidal Sites	<p>When sediment removal and bank stabilization work area includes a flowing stream, the entire streamflow will be diverted around the work area by construction of a temporary dam and/or bypass. Where appropriate, stream flow diversions will occur via gravity driven systems.</p> <p><i>A. Planning to avoid and minimize impacts to water quality and aquatic wildlife:</i></p> <ol style="list-style-type: none"> 1. For construction and monitoring of a stream flow bypass, the <i>Sediment Removal and Bank Stabilization Projects</i> checklist will be completed. 2. Recommendations by a qualified Fisheries Biologist to protect native fisheries and aquatic vertebrates will be incorporated into the bypass design. The recommendations may include but are not limited to: <ol style="list-style-type: none"> i. Screening the stream flow diversion source or pump to prevent entrainment of native fish or amphibian species. The screening dimensions will be appropriate to the species present. ii. Relocation of native aquatic vertebrates. This will include the methods to be used to capture and hold and move the aquatic vertebrates and a description of where the aquatic vertebrates will be relocated. 3. Depending on the channel configurations, sediment removal activities may occur where the flows are not bypassed around the work site as long as a berm is left between the work area and stream flows to minimize water quality impacts during excavation activities. The berm between the work and the live channel will be wide enough to prevent introduction of turbid water from the cell into the live channel. <p><i>B. Construction:</i></p> <ol style="list-style-type: none"> 1. The construction of facilities will be based on the water bypass plan. 2. Cofferdams will be installed both upstream and downstream of the work area to minimize impacts or the distance necessary to accomplish effective passive systems. 3. In streams where water may enter the construction site from downstream (reverse flow) additional coffer dams (downstream) may be necessary. When multiple coffer dams are constructed, the upstream dam will be constructed first. 4. Instream cofferdams will only be built from materials such as sandbags, earth fill, clean gravel, or rubber bladders which will cause little or no siltation or turbidity. 5. Plastic sheeting will be placed over k-rails, timbers, and earth fill to minimize water seepage into and out of the maintenance areas. The plastic sheets will be firmly anchored, using sandbags, to the streambed to minimize water seepage. 6. When pumping is necessary to dewater a work site, a temporary siltation basin and/or use of silt bags may be required to prevent sediment from re-entering the wetted channel. Pump intakes will be screened to prevent harm to aquatic wildlife. 7. If necessary to prevent erosion an energy dissipater will be constructed at the discharge point. 8. Timing of flow diversions will be coordinated with the completion of the dam structure to facilitate not drying up the downstream creek area and to minimize dry back conditions. <p><i>C. Implementation:</i></p> <ol style="list-style-type: none"> 1. Water flows downstream of the project site will be maintained to prevent stranding aquatic vertebrates.

BMP Number	BMP Title	BMP Description
		<ol style="list-style-type: none"> 2. Water diverted around work sites and water detained by coffer dams will be protected from maintenance activity-related pollutants, such as soils, equipment lubricants or fuels. 3. The <i>Fish Relocation Guidelines</i> will be implemented to ensure that fish and other aquatic vertebrates are not stranded during construction and implementation of channel dewatering. <ol style="list-style-type: none"> a) Native aquatic vertebrates shall be captured in the work area and transferred to another reach as determined by a qualified biologist. Timing of work in streams that supports a significant number of amphibians will be delayed until metamorphosis occurs to minimize impacts to the resource. Capture and relocation of aquatic native vertebrates is not required at individual work sites when site conditions preclude reasonably effective operation of capture gear and equipment. b) Aquatic invertebrates will not be transferred (other than incidental catches) because of their anticipated abundance and colonization after completion of the repair work. 4. Filtration devices (silt bags attached to the end of discharge hoses and pipes to remove sediment from discharged water) or settling basins will be provided as necessary at discharge sites to ensure that the turbidity of discharged water is not visibly more turbid than the water in the channel upstream of the maintenance site. If increases in turbidity are observed, additional measures will be implemented such as a larger settling basin or additional filtration. If increases in turbidity persist, the District's Stream Maintenance Program Implementation Project Manager will be alerted since turbidity measurements may be required. 5. Water remaining in the work area will be removed by evaporation, seepage, or pumping. When pumping is required to dewater a site, the decanted water will be discharged with water bypassed around the site or in a separate erosion control – energy dissipation area/vegetated swale. The turbidity of discharged water will not be visibly more turbid than the receiving water. <p><i>Deconstruction:</i></p> <ol style="list-style-type: none"> 1. When maintenance is completed, the flow diversion structure will be removed as soon as possible. Impounded water will be released at a reduced velocity to minimize erosion, turbidity, or harm to downstream habitat. 2. Removal will normally proceed from downstream in an upstream direction. 3. When diversion structures are removed, the ponded water will be directed back into the low-flow channel in a phased manner to minimize erosion and downstream water quality impacts. Normal flows will be restored. 4. The area disturbed by flow bypass mechanisms will be restored to the pre-project condition at the completion of the project (to the extent practical). This may include, but is not limited to, recontouring the area and planting of riparian vegetation.

BMP Number	BMP Title	BMP Description
GEN-34	Dewatering in Tidal Work Areas	<p>For tidal areas, a downstream cofferdam will be constructed to prevent the work area from being inundated by tidal flows.</p> <ol style="list-style-type: none"> 1. Installation of cofferdams and fish exclusion measures will be installed at low tide when the channel and project site are at their driest. 2. It is preferable to not use any bypass pipes when work is being conducted on one side of the channel, if isolated by the cofferdam, and flows can continue on the other side of the creek channel without entering the project area. 3. If downstream flows cannot be diverted around the project site, the creek waters will be transmitted around the site through cofferdam bypass pipes. Waters discharged through tidal cofferdam bypass pipes will not exceed 50 NTUs over the background levels of the tidal waters into which they are discharged. 4. Cofferdams in tidal areas may be made from earthen or gravel material. If earth is used, the downstream and upstream faces will be covered by a protected covering (e.g., plastic or fabric) if needed to minimize erosion. A protected covering or sheeting will be placed on the water side of an earthen coffer dam to protect water quality. 5. When maintenance is completed, the cofferdams and bypass pipes will be removed as soon as possible but no more than 72 hours after work is completed. Flows will be restored at a reduced velocity to minimize erosion, turbidity, or harm to downstream habitat.
GEN-35	Pump/Generator Operations and Maintenance	<p>When needed to assist in channel dewatering, pumps and generators will be maintained and operated in a manner that minimizes impacts to water quality and aquatic species.</p> <ol style="list-style-type: none"> 1. Pumps and generators will be maintained according to manufacturers' specifications to regulate flows to prevent dryback or washout conditions. 2. Pumps will be operated and monitored to prevent low water conditions, which could pump muddy bottom water, or high water conditions, which creates ponding. 3. All pump intakes will be screened. Pumps in steelhead creeks will be screened according to NMFS criteria (http://www.swr.noaa.gov/sr/fishscrn.pdf) to prevent entrainment of steelhead.
Public Safety		
GEN-36	Public Outreach	<p>The public will be informed of stream maintenance work prior to the start of work as part of the preparation of the NPW for all projects in the NPW:</p> <ol style="list-style-type: none"> 1. Each spring, a newspaper notice will be published with information on the NPW work sites, approximate work dates, and contact information. 2. Neighborhood Work Notices will be distributed as part of the NPW preparation prior to the start of work. 3. Local governments (cities and County) will be notified of scheduled maintenance work. The NPW will be submitted to the public works departments, local fire districts, and the District's Flood Protection and Watershed Advisory Committees. 4. The District will post specific information on individual maintenance projects on the Stream Maintenance Web site: (http://valleywater.org/EkContent.aspx?id=379&terms=stream+maintenance) 5. For high profile projects, at the District's discretion, signs will be posted in the neighborhood to notify the public at least one week in advance of maintenance schedules, trail closures, and road/lane closures as necessary and as possible. Signage used at work sites will include contact information for lodging comments and/or complaints regarding the maintenance activities.
GEN-37	Implement Public Safety	The District will implement public safety measures during maintenance as follows:

BMP Number	BMP Title	BMP Description
	Measures	<ol style="list-style-type: none"> 1. Construction signs will be posted at job sites warning the public of construction work and to exercise caution, as appropriate to public accessed areas. 2. Where work is proposed adjacent to a recreational trail, warning signs will be posted several feet beyond the limits of work. Signs will also be posted if trails will be temporarily closed. 3. If needed, a lane will be temporarily closed to allow for trucks to pull into and out of access points to the work site. 4. Temporary fencing, either the orange safety type or chain link, will be installed above repair sites on bank stabilization projects. 5. When necessary, District or contracted staff will provide traffic control and site security.
GEN-38	Minimize Noise Disturbances to Residential Areas	<p>The District will implement maintenance practices that minimize disturbances to residential areas surrounding work sites.</p> <ol style="list-style-type: none"> 1. With the exception of emergencies, work will be conducted during normal working hours. Maintenance activities in residential areas will not occur on Saturdays, Sundays, or District observed holidays except during emergencies, or with approval by the local jurisdiction and advance notification of surrounding residents. 2. Vehicles, generators and heavy equipment will be equipped with adequate mufflers. 3. Idling of vehicles will be prohibited beyond 5 minutes unless operation of the engine is required to operate a necessary system such as a power take-off (PTO).
GEN-39	Planning for Pedestrians, Traffic Flow, and Safety Measures	<ol style="list-style-type: none"> 1. Work will be staged and conducted in a manner that maintains two-way traffic flow on public roadways in the vicinity of the work site. If temporary lane closures are necessary, they will be coordinated with the appropriate jurisdictional agency and scheduled to occur outside of peak traffic hours (7:00 – 10:00 a.m. and 3:00 – 6:00 p.m.) to the maximum extent practicable. Any lane closures will include advance warning signage, a detour route and flaggers in both directions. When work is conducted on public roads and may have the potential to affect traffic flow, work will be coordinated with local emergency service providers as necessary to ensure that emergency vehicle access and response is not impeded. 2. Bicycle and pedestrian facility closures will be scheduled outside of peak traffic hours (7:00 – 10:00 a.m. and 3:00 – 6:00 p.m.) to the maximum extent practicable. 3. Public transit access and routes will be maintained in the vicinity of the work site. If public transit will be affected by temporary road closures and require detours, affected transit authorities will be consulted and kept informed of project activities. 4. Adequate parking will be provided or designated public parking areas will be used for maintenance-related vehicles not in use through the maintenance period. 5. Access to driveways and private roads will be maintained. If brief periods of maintenance would temporarily block access, property owners will be notified prior to maintenance activities.

BMP Number	BMP Title	BMP Description
Cultural Resources		
GEN-40	Discovery of Cultural Remains or Historic or Paleontological Artifacts	<p>Work in areas where remains or artifacts are found will be restricted or stopped until proper protocols are met.</p> <ol style="list-style-type: none"> 1. Work at the location of the find will halt immediately within 50 feet of the find. A “no work” zone shall be established utilizing appropriate flagging to delineate the boundary of this zone, which shall measure at least 50 feet in all directions from the find. 2. The District shall retain the services of a Consulting Archaeologist or Paleontologist, who shall visit the discovery site as soon as practicable, and perform minor hand-excavation to describe the archaeological or paleontological resources present and assess the amount of disturbance. 3. The Consulting Archaeologist shall provide to the District and the Corps, at a minimum, written and digital-photographic documentation of all observed materials, utilizing the guidelines for evaluating archaeological resources for the California Register of Historic Places (CRHP) and National Register of Historic Places (NRHP). Based on the assessment, the District and Corps shall identify the CEQA and Section 106 cultural-resources compliance procedure to be implemented. 4. If the find appears to not meet the CRHP or NRHP criteria of significance, and the Corps archaeologist concurs with the Consulting Archaeologist’s conclusions, construction shall continue while monitored by the Consulting Archaeologist. The authorized maintenance work shall resume at the discovery site only after the District has retained a Consulting Archaeologist to monitor and the Watershed Manager has received notification from the Corps to continue work. 5. If the find appears significant, avoidance of additional impacts is the preferred alternative. The Consulting Archaeologist shall determine if adverse impacts to the resources can be avoided. 6. When avoidance is not practical (e.g., maintenance activities cannot be deferred or they must be completed to satisfy the SMP objective), the District shall develop an Action Plan and submit it to the Corps within 48 hours of Consulting Archaeologist’s evaluation of the discovery. The action Plan may be submitted via e-mail to {rstradford@spd.usace.army.mil}. The Action Plan is synonymous with a data-recovery plan. It shall be prepared in accordance with the current professional standards and State guidelines for reporting the results of the work, and shall describe the services of a Native American Consultant and a proposal for curation of cultural materials recovered from a non-grave context. 7. The recovery effort will be detailed in a report prepared by the archaeologist in accordance with current archaeological standards. Any non-grave artifacts will be placed with an appropriate repository. 8. The Consulting Paleontologist will meet the Society for Vertebrate Paleontology’s criteria for a “qualified professional paleontologist” (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995). 9. The paleontologist will follow the Society for Vertebrate Paleontology’s guidelines for treatment of the artifact. Treatment may include preparation and recovery of fossil materials for an appropriate museum or university collection, and may include preparation of a report describing the finds. The District will be responsible for ensuring that paleontologist’s recommendations are implemented. 10. In the event of discovery of human remains (or the find consists of bones suspected to be human), the field crew supervisor shall take immediate steps to secure and protect such remains from vandalism during periods when work crews are absent.) 11. Immediately notify the Santa Clara County Coroner and provide any information that identify the remains as Native American. If the remains are determined to be from a prehistoric Native American, or determined to be a

BMP Number	BMP Title	BMP Description
		<p>Native American from the ethnographic period, the Coroner shall contact the Native American Heritage Commission (NAHC) within 24 hours of being notified of the remains. The NAHC then designates and notifies within 24 hours a Most Likely Descendant (MLD). The MLD has 24 hours to consult and provide recommendations for the treatment or disposition, with proper dignity, of the human remains and grave goods.</p> <p>12. Preservation in situ is the preferred option. Human remains shall be preserved in situ if continuation of the maintenance work, as determined by the Consulting Archaeologist and MLD, will not cause further damage to the remains. The remains and artifacts shall be documented and the find location carefully backfilled (with protective geo-fabric if desirable) and recorded in District project files.</p> <p>13. Human remains or cultural items exposed during maintenance that cannot be protected from further damage shall be exhumed by the Consulting Archaeologist at the discretion of the MLD and reburied with the concurrence of the MLD in a place mutually agreed upon by all parties.</p>
GEN-41	Review of Projects with Native Soil	<p>A cultural resources specialist will conduct a review and evaluation of those sites that would involve disturbance / excavation of native soil previously undisturbed by contemporary human activities to determine their potential for affecting significant cultural resources. The evaluation of the potential to disturb cultural resources will be based on an initial review of archival information provided by the California Historical Resources System/Northwest Information Center (CHRIS/NWIC) in regard to the project area based on a 0.25 mile search radius. It is recommended that this initial archival review be completed by a professional archaeologist who will be able to view confidential site location data and literature to arrive at a preliminary sensitivity determination. If necessary, a further archival record search and literature review (including a review of the Sacred Lands Inventory of the Native American Heritage Commission); and a field inventory of the project area will be conducted to determine the presence/absence of surface cultural materials associated with either prehistoric or historic occupation. The results along with any mitigation and/or management recommendations would be presented in an appropriate report format and include any necessary maps, figures, and correspondence with interested parties. A summary table indicating appropriate management actions (e.g., monitoring during construction, presence/absence testing for subsurface resources; data recovery, etc.) will be developed for each project site reviewed. The management actions will be implemented on site to avoid significant effects to cultural resources.</p>

BMP Number	BMP Title	BMP Description
Utilities		
GEN-42	Investigation of Utility Line Locations	<p>An evaluation of the locations of utility lines that could be affected by maintenance activities will be conducted annually as part of the preparation of the Notice of Proposed Work (NPW). Utilities will be avoided as much as possible. For maintenance areas with the potential for adverse effects on utility services, the following measures shall be implemented:</p> <ol style="list-style-type: none"> 1. Utility excavation or encroachment permits shall be required from the appropriate agencies. These permits include measures to minimize utility disruption. The District and its contractors shall comply with permit conditions. Such conditions shall be included in construction contract specifications. 2. Utility locations shall be verified through a field survey (potholing) and use of the Underground Service Alert services. 3. Detailed specifications shall be prepared as part of the design plans to include procedures for the excavation, support, and/or fill of areas around utility cables and pipelines. All affected utility services shall be notified of the District's maintenance plans and schedule. Arrangements shall be made with these entities regarding protection, relocation, or temporary disconnection of services. 4. Residents and businesses in the project area shall be notified of planned utility service disruption 2 to 4 days in advance, in conformance with state standards. 5. Disconnected cables and lines shall be reconnected promptly.

B. SECTION B – Sediment Removal BMPs

This group of BMPs is intended to be implemented specifically during sediment removal activities to avoid potential impacts on biological resources.

BMP Number	BMP Title	BMP Description
SED-1	Groundwater Management	If high levels of groundwater (i.e., visible water) are encountered during excavations in a work area, the water will be pumped out of the work site or left within the work area if the work activity is not causing water quality degradation in a live stream. Water Quality monitoring would need to occur. If necessary to protect water quality, the extracted water will be discharged into specifically constructed infiltration basins, holding ponds, or areas with vegetation to remove sediment prior to the water re-entering a creek. Water discharged into vegetated areas or swales will be pumped in a manner that will not create erosion around vegetation.
SED-2	Prevent Scour Downstream of Sediment Removal	Sediment removal sites in the transport zone on alluvial fans may cause increased scour downstream if they experience scouring flows or rapid sediment accumulation after maintenance. After sediment removal, the channel will be graded so that the transition between the existing channel both upstream and downstream of the maintenance area is smooth and continuous between the maintained and non-maintained areas and does not present a sudden vertical transition (wall of sediment) or other blockage that could erode once flows are restored to the channel.
SED-3	Restore Channel Features	Low-flow channels within non-tidal streams will be contoured to facilitate fish passage and will emulate the pre-construction conditions as closely as possible, within the finished channel topography.
SED-4	Berm Bypass	Where sediment removal is accomplished without a bypass by removing alternating cells, the berm between the

BMP Number	BMP Title	BMP Description
		work and the live channel will be wide enough to prevent introduction of turbid water from the cell into the live channel.

C. SECTION C – Vegetation Management BMPs

These BMPs provide specific and detailed guidance on the variety of vegetation management procedures implemented by the District. BMPs for the following maintenance techniques are included: tree pruning, tree removal, plant removal, woody debris management, herbicide application, mowing, disking, flaming, and grazing. Practices will be implemented by fully trained and qualified field crews.

BMP Number	BMP Title	BMP Description
VEG-1	Minimize Local Erosion Increase from In-channel Vegetation Removal	To minimize the potential effect of localized erosion, the toe of the bank will be protected by leaving vegetation to the maximum extent possible and consistent with the maintenance guidelines or original design requirements.
VEG-2	Non-native Invasive Plant Removal	Invasive species (e.g. cape ivy [<i>Delairea odorata</i> / <i>Senecio mikanooides</i>], arundo [<i>Arundo donax</i>]) will be disposed of in a manner that will not contribute to the further spread of the species. Cape ivy removed during a project shall be bagged and disposed of in a landfill. Arundo canes will be prevented from floating downstream or otherwise entering the creek or waterway.
VEG-3	Use Appropriate Equipment for Instream Removal	When using heavy equipment to cut or remove instream vegetation, low ground pressure equipment, such as tracked wheels will be utilized to reduce impacts to the streambed.
VEG-4	Use Flamers with Caution	1. A fire extinguisher, water supply and other appropriate fire suppression equipment will always be kept close to the work site in case of an emergency. 2. Propane tanks will be checked for leaks and proper functioning prior to and proceeding use of flaming equipment. The propane tank will be treated as a hazardous material.
VEG-5	Conduct Flaming During Appropriate Weather and Seasonal Conditions	Flamers will not be used during periods of high fire danger or in areas where fuel or climate conditions could accidentally ignite a fire.
VEG-6	Standard Grazing Procedures	1. Vegetation and areas to be preserved will be fenced off to exclude grazing animals. 2. Grazing animals will be excluded from stream channels, using fencing or other barriers.

D. SECTION D – Bank Stabilization BMPs

These BMPs provide additional guidance during implementation of bank stabilization projects to avoid impacts on biological and cultural resources. Review of the Post-Project Restoration BMPs in Section F is recommended because those measures will be implemented after bank stabilization projects are complete. The BMPs included in this section are implemented by the field crew and site manager.

BMP Number	BMP Title	BMP Description
BANK-1	Bank Stabilization Design to Prevent Erosion Downstream	To further prevent potential downstream erosion impacts due to bank stabilization, the site design will be adjusted to provide proactive protection of vulnerable areas within the reach of the worksite. Such measures include, but are not limited to, appropriately keyed-in coir logs, riparian planting, strategic placement of rock, and flow deflectors. Bank stabilization will include appropriate transition designs upstream and downstream of the work site to prevent potential erosion impacts.
BANK-2	Concrete Use Near Waterways	Concrete that has not been cured is alkaline and can increase the pH of the water. Fresh concrete will be isolated until it no longer poses a threat to water quality using the following appropriate measures: 1. Wet sacked concrete will be excluded from the wetted channel for a period of two weeks after installation. During that time, the wet sacked concrete will be kept moist (such as covering with wet carpet) and runoff from the wet sacked concrete will not be allowed to enter a live stream. 2. Poured concrete will be excluded from the wetted channel for a period of two weeks after it is poured. During that time, the poured concrete will be kept moist, and runoff from the wet concrete will not be allowed to enter a live stream. Commercial sealants (e.g., Deep Seal, Elasto-Deck Reservoir Grade) may be applied to the poured concrete surface where difficulty in excluding water flow for a long period may occur. If a sealant is used, water will be excluded from the site until the sealant is dry. 3. Dry sacked concrete will not be used in any channel. 4. An area outside of the channel and floodplain will be designated to clean out concrete transit vehicles.
BANK-3	Bank Stabilization Post-Construction Maintenance	The District may maintain or repair bank stabilization projects that are less than 2 years old that are damaged by winter flows. The District will notify the regulatory agencies 24 hours prior to beginning the work and the work will be reported as part of the Post-Construction Report submitted by January 15 of each year or if necessary, the subsequent year. Appropriate BMPs will be applied during maintenance repairs.

E. SECTION E – Post-Project Restoration BMPs

These BMPs will be implemented, as appropriate, on all sites that involve ground disturbance.

BMP Number	BMP Title	BMP Description
REVEG-1	Seeding	Sites where maintenance activities result in exposed soil will be stabilized to prevent erosion. Disturbed areas shall be seeded with native seed as soon as is appropriate after maintenance activities are complete. An erosion control seed mix may be applied to exposed soils, and down to the ordinary high water mark (OHWM). 1. The seed mix should consist of California native grasses (e.g., <i>Hordeum brachyantherum</i> , <i>Elymus glaucus</i> , and <i>Vulpia microstachyes</i>) or annual, sterile seed mix. 2. Temporary earthen access roads may be seeded when site and horticultural conditions are suitable, or have other appropriate erosion control measures in place (GEN-20).
REVEG-2	Planting Material	Revegetation and replacement plantings will consist of locally collected native species. Species selection will be based on surveys of natural areas on the same creek that have a similar ecological setting and/or as appropriate

BMP Number	BMP Title	BMP Description
		for the site location.

F. SECTION F – Management of Animal Damage Conflict BMPs

Methods of animal management included in the SMP are avoidance, biological controls, physical alterations, habitat alterations, and lethal controls. Of all these methods, implementation of lethal controls has the highest potential for environmental and biological impacts. Therefore, the animal management BMPs provided in this section focus on lethal controls. The application area for lethal controls will be identified during the annual planning process (see the Biological Resource Planning BMPs) and guided as directed by wildlife biologists. Species habitat areas are defined by the District's GIS species mapping, updated CNDDDB and known local biological information and are included in the SMP Update Subsequent EIR.

BMP Number	BMP Title	BMP Description
ANI-1	Avoid Redistribution of Rodenticides	<p>Carcass surveys will be conducted periodically when acute poisons and first generation anticoagulants are used. The frequency of the carcass surveys will be specific to the type of rodenticide used, to minimize secondary poisoning impacts:</p> <ul style="list-style-type: none"> • Acute toxins – Daily carcass surveys, beginning the first day after application until the end of the baiting period for acute toxins used above-ground. • Anticoagulants - Within 7 days of installation of first generation anticoagulant bait, and weekly thereafter. Anytime a carcass is found, daily carcass surveys will begin for as long as carcasses are found until no carcasses are found during a daily survey. Once no carcasses are found, carcass surveys will return to the weekly carcass survey timeline maximum from the date of initial installation of an anticoagulant bait station. <p>To verify that the frequency of carcass surveys is adequate, a biologist will conduct daily carcass surveys 2 times per year over one baiting cycle. Based on the results of these surveys, the timing of carcass surveys will be adjusted if necessary.</p> <p>Any spilled bait will be cleaned up immediately.</p>
ANI-2	Prevent Harm to the Salt Marsh Harvest Mouse and California Clapper Rail	<ol style="list-style-type: none"> 1. No rodenticides or fumigants will be used within the range of the SMHM or CCR as identified on District range maps. 2. Methods of rodent control within SMHM or CCR habitat will be limited to live trapping. All live traps shall have openings measuring no smaller than 2 inches by 1 inch to allow any SMHM that inadvertently enter the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line.
ANI-3	Burrowing Owl, Bald Eagle and Golden Eagle Buffer Zone	Per the California Department of Fish and Game's 2008 <i>Guidance for Burrowing Owl Conservation</i> , a 656-yard buffer will be established around known burrowing owl locations where no rodenticides or fumigants (including smoke bombs) will be used. A 0.5-mile buffer will be established around known bald eagle and golden eagle nesting locations where no rodenticides will be used.
ANI-4	Animal Control in Sensitive Amphibian Habitat	<ol style="list-style-type: none"> 1. Fumigants will not be used within the habitat areas of special status amphibians. 2. The use of bait stations within the potential habitat areas of California red-legged frog, California tiger

BMP Number	BMP Title	BMP Description
		salamander, or foothill yellow-legged frog will be limited to bait stations specifically designed to prevent entry by these species. 3. Any live traps will allow California red-legged frogs, California tiger salamanders, or foothill yellow-legged frogs to safely exit (e.g., by having openings measuring no smaller than 2 inches by 1 inch).
ANI-5	Slurry Mixture near Waterways	All slurry type mixes used to fill rodent burrows will be prevented from entering any waterway by using appropriate erosion control methods and according to the manufacturer's specifications. If the creek bed is dry or has been dewatered, any material that has entered the channel will be removed.

G. SECTION G – Use of Pesticides

Pesticides may be used for vegetation management or control of animal damage.

BMP Number	BMP Title	BMP Description
HM-4	Posting and Notification for Pesticide Use	Posting of areas where pesticides are used will be performed in compliance with District Policy Ad-8.2 Pesticide Use as follows: 1. Posting will be performed in compliance with the label requirements of the product being applied. 2. In addition, posting will be provided for any products applied in areas used by the public for recreational purposes, or those areas readily accessible to the public, regardless of whether the label requires such notification. In doing this, the District ensures that exposure risk is minimized further by adopting practices that go beyond the product label requirements. (The posting method may be modified to avoid destruction of bait stations or scattering of rodenticide.) 3. These postings will notify staff and the general public of the date and time of application, the product's active ingredients, and common name, and the time of allowable re-entry into the treated area. 4. Signs will not be removed until after the end of the specified re-entry interval. 5. Right-to-know literature on the product will be made available to anyone in the area during the re-entry period. 6. A District staff contact phone number will be posted on the sign, including a cellular phone number. 7. Notification of pesticide activities will be made as required by law. Also, the District will maintain records of neighbors with specific needs relative to notification before treatment of an adjacent area so that such needs are met.

Source: Data compiled by Horizon Water and Environment in 2011

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Draft EIR
Upper Llagas Creek Project

APPENDIX

C

UPPER LLAGAS CREEK PROJECT
COMPREHENSIVE BMPS

C.1 Upper Llagas Creek Project Comprehensive Best Management Practices (BMP) List

Air Quality	
AQ-1 Use Dust Control Measures for Soil Disturbing Activities	<p>The following Bay Area Air Quality Management District's (BAAQMD) Dust Control Measures will be implemented:</p> <ol style="list-style-type: none"> 1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day. 2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered. 3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. 4. Water used to wash the various exposed surfaces (i.e., parking areas, staging areas, soil piles, graded areas, etc.) will not be allowed to enter waterways. 5. All vehicle speeds on unpaved roads shall be limited to 15 mph. 6. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. 7. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points. 8. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator. 9. Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.
AQ-4 Avoid Stockpiling Potentially Odorous Materials	<p>Materials with decaying organic material will be handled in a manner that avoids impacting sensitive receptors.</p> <ol style="list-style-type: none"> 1. Avoid stockpiling potentially odorous materials within 1,000 feet of residential areas or other odor sensitive land uses. <p>Where appropriate, odorous stockpiles will be disposed of at an appropriate landfill.</p>
Biological Resources	
BI-3 Minimize Impacts to Steelhead	<p>Steelhead migrate upstream during the winter months to lay eggs. Eggs remain in the gravels for several weeks. Fry emerge from the gravel and may spend up to a year in local streams before migrating to the ocean.</p> <p>To avoid and minimize impacts to salmonids, routine use of vehicles and equipment in live salmonid streams will be avoided between January 1 and June 15.</p>

Biological Resources	
BI-4 Minimize Access Impacts	<p>Existing access ramps and roads will be utilized to the extent feasible. If necessary to avoid large mature trees, native vegetation, or other significant habitat features, temporary access points will be constructed in a manner that minimizes impacts according to the following guidelines:</p> <ol style="list-style-type: none"> 1. Temporary access points will be constructed as close to the work area as possible 2. In considering channel access routes, slopes of greater than 20 percent will be avoided, if possible. 3. Any temporary fill used for access will be removed upon completion of the project and pre-project topography will be restored to the extent possible. 4. When temporary access is removed, disturbed areas will be revegetated or filled with compacted soil, seeded, and/or stabilized with erosion control fabric immediately after construction to minimize future erosion.
BI-5 Remove Temporary Fills as Appropriate	<p>Temporary fills, such as for diversion structures or cofferdams, will be removed upon finishing the work. The creek channels and banks will be re-contoured to match pre-construction conditions to the extent possible. Low-flow channels within non-tidal streams will be contoured to facilitate fish passage and will emulate the preconstruction conditions as closely as possible, within the finished channel topography.</p>
BI-6 Minimize Adverse Effects of Pesticides on Non-target Species	<p>Pesticides will be handled, stored, transported, and used in a manner that minimizes negative environmental effects on non-target species and sensitive habitats. This includes all rodenticides, insecticides, herbicides, algaecides, and fungicides.</p> <p>The proposed project plan for handling, storing, transporting and using pesticides must be reviewed and approved by <u>both</u> of the following subject matter experts:</p> <ol style="list-style-type: none"> 1. District's Pest Control Advisor (a State-certified Qualified Applicator) – the plan will be reviewed, and modified as deemed appropriate, for compliance with: District policy, label restrictions and any advisories published by the California Department of Pesticide Regulation, the Santa Clara County Division of Agriculture, and the U.S. EPA bulletin <i>Protecting Endangered Species, Interim Measures for Use of Pesticides in Santa Clara County</i> (USEPA 2000). 2. Qualified District Biologist (as defined in EMAP-30264) – the plan will be reviewed, and modified as deemed appropriate, for compliance with: District policy, approved environmental review documents, project permits, and avoidance of all known listed (Threatened or Endangered) and sensitive species. Information sources for determination of all known locations of species that may be harmed by pesticides include the District's GIS system and California Natural Diversity Database (CNDDB). <p>Either the District's Pest Control Advisor or the Qualified District Biologist may modify the proposed pesticide plan, such as establishing buffer areas or prohibiting the use of pesticides outright, based on site-specific data, current regulatory requirements, and District policy.</p> <p>The purchase of all pesticides must be approved by the District's Pest Control Advisor to ensure compliance with the District's <i>Control and Oversight of Pesticide Use</i> policy and appropriate regulatory agency reporting requirements.</p>

Biological Resources	
BI-8 Avoid Impacts to Nesting Migratory Birds	<ol style="list-style-type: none"> 1. For activities occurring between January 15 and August 31, project areas will be checked by a qualified biologist for nesting birds within two weeks of starting work. If a lapse in project-related work of two weeks or longer occurs, another focused survey will be conducted before project work can be reinitiated. 2. If nesting birds are found, a buffer will be established around the nest and maintained until the young have fledged. Appropriate buffer widths are 0.5 mile for bald and golden eagles; 250 feet for other raptors and the least Bell's vireo, herons, and egrets; 25 feet for ground-nesting non-raptors; and 50 feet for non-raptors nesting on trees, shrubs and structures. A qualified biologist may identify an alternative buffer based on a site-specific evaluation. No work within the buffer will occur without written approval from a qualified biologist, for as long as the nest is active. 3. The boundary of each buffer zone will be marked with fencing, flagging, or other easily identifiable marking if work will occur immediately outside the buffer zone. 4. All protective buffer zones will be inspected daily if work is adjacent to the buffer to ensure the buffer is not violated. Each buffer zone will be maintained until the nest becomes inactive, as determined by a qualified biologist. 5. If monitoring shows that disturbance to actively nesting birds is occurring, the biologist will require increased buffer widths until monitoring shows that disturbance is no longer occurring. If this is not possible, work will cease in the area until young have fledged and the nest is no longer active as determined by a qualified biologist.
BI-9 Avoid Impacts to Nesting Migratory Birds from Pending Construction	<p>Nesting exclusion devices may be installed to prevent potential establishment or occurrence of nests in areas where construction activities would occur. All nesting exclusion devices will be maintained throughout the nesting season or until completion of work in an area makes the devices unnecessary. All exclusion devices will be removed and disposed of when work in the area is complete.</p>
BI-10 Minimize Impacts to Vegetation from Clearing and Trimming	<p>Vegetation to be trimmed or cleared will be evaluated by a qualified vegetation specialist or qualified biologist prior to impacts; and, the qualified vegetation specialist or qualified biologist recommendations will be followed.</p> <p>Cutting vegetation will be limited to the minimum length, width, and height necessary while conforming to International Society of Arboriculture (ISA) pruning standards. No trees with a 6-inch or greater diameter at breast height will be removed; and, no branches greater than 4" diameter will be removed.</p> <p>Woody vegetation (i.e. native trees and shrubs) which require pruning for equipment access, construction operations, etc, shall be pruned correctly such that health status is maintained and no post-construction impacts accrue. Woody vegetation will be pruned consistent with <u>all three</u> of the following complementary guidance or their updates:</p> <ol style="list-style-type: none"> 1. 'BEST MANAGEMENT PRACTICES, TREE PRUNING' 2008, INTERNATIONAL SOCIETY OF ARBORICULTURE; and 2. American National Standards Institute (ANSI) A300 (Part 1) – 2008 PRUNING; and 3. ANSI Z133.1, 2008, SAFETY REQUIREMENTS. <p>Woody material (including live leaning trees, dead trees, tree trunks, large limbs, and stumps) will be retained on site, unless it is threatening a structure or impedes access, in which case it must moved to a less threatening position.</p>

Biological Resources	
BI-11 Minimize Root Impacts to Woody Vegetation	<p>Construction activities, including cut and fill, will be minimized to the extent practicable within the root zones of existing woody vegetation to remain post project. In general, root extent can be estimated as 2-3 times canopy radius, but vary depending on slope and soil conditions. To the extent practicable, construction setbacks will be calculated using all of the following:</p> <ol style="list-style-type: none"> 1. Tree DBH (diameter at breast height); and 2. a multiplier of 1.25. The product is reported in feet as the radial distance in feet around the trunk inside which no construction activities are to occur. Example: a 12 inch dbh tree X 1.25 = 15 foot radial construction setback. <p>If soil encroachment must occur in 33% or more of this area, the tree should be evaluated for removal. Additionally, mulching the root zone will be employed to provide root protection from unavoidable equipment traffic during construction, specifically:</p> <ol style="list-style-type: none"> 1. Use 6 inches minimum depth of wood chips; or, 2. 4 inches minimum depth of ¾-inch (or greater) gravel. <p>Both may remain in place after work if approved by a qualified biologist or vegetation specialist.</p>
BI-13 Choose Local Ecotypes Of Native Plants and Appropriate Erosion-Control Seed Mixes	<p>Whenever native species are prescribed for installation the following steps will be taken by a qualified biologist or vegetation specialist:</p> <ol style="list-style-type: none"> 1. Evaluate whether the plant species currently grows wild in Santa Clara County; and, 2. If so, the qualified biologist or vegetation specialist will determine if any need to be local natives, i.e. grown from propagules collected in the same or adjacent watershed, and as close to the project site as feasible. <p>Also, consult a qualified biologist or vegetation specialist to determine which seeding option is ecologically appropriate and effective, specifically:</p> <ol style="list-style-type: none"> 1. For areas that are disturbed, an erosion control seed mix may be used consistent with the SCVWD Guidelines and Standards for Land Use Near Streams, Design Guide 5, 'Temporary Erosion Control Options.' 2. In areas with remnant native plants, the qualified biologist or vegetation specialist may choose an abiotic application instead, such as an erosion control blanket or seedless hydro-mulch and tackifier to facilitate passive revegetation of local native species. 3. Temporary earthen access roads may be seeded when site and horticultural conditions are suitable. 4. If a gravel or wood mulch has been used to prevent soil compaction per BI-11, this material may be left in place [if ecologically appropriate] instead of seeding. <p>Seed selection shall be ecologically appropriate as determined by a qualified biologist, per <i>Guidelines and Standards for Land Use Near Streams, Design Guide 2: Use of Local Native Species</i>.</p>
BI-15 Restore Riffle/Pool Configuration of Channel Bottom	<p>The channel bottom shall be re-graded the at the end of the work project to as close to original conditions as possible.</p> <p>In salmonid streams, restore pool and riffle configurations to emulate pre-project instream conditions, taking into account channel morphological features (i.e. slope), which affects riffle/pool sequence.</p>

Biological Resources

BI-16 Avoid Animal Entry and Entrapment	<p>All pipes, hoses, or similar structures less than 12 inches diameter will be closed or covered to prevent animal entry. All construction pipes, culverts, or similar structures, greater than 2-inches diameter, stored at a construction site overnight, will be inspected thoroughly for wildlife by a qualified biologist or properly trained construction personnel before the pipe is buried, capped, used, or moved. If inspection indicates presence of sensitive or state- or federally-listed species inside stored materials or equipment, work on those materials will cease until a qualified biologist determines the appropriate course of action.</p> <p>To prevent entrapment of animals, all excavations, steep-walled holes or trenches more than 6-inches deep will be secured against animal entry at the close of each day. Any of the following measures may be employed, depending on the size of the hole and method feasibility:</p> <ol style="list-style-type: none"> 1. Hole to be securely covered (no gaps) with plywood, or similar materials, at the close of each working day, or any time the opening will be left unattended for more than one hour; or 2. In the absence of covers, the excavation will be provided with escape ramps constructed of earth or untreated wood, sloped no steeper than 2:1, and located no farther than 15 feet apart; or 3. In situations where escape ramps are infeasible, the hole or trench will be surrounded by filter fabric fencing or a similar barrier with the bottom edge buried to prevent entry.
BI-17 Minimize Predator-Attraction Effects on Wildlife	<p>Remove trash daily from the worksite to avoid attracting potential predators to the site.</p>

Cultural Resources

CU-2 Stop Work and Report if Archaeological Artifacts are Found	<p>Work in areas where archaeological artifacts are found will be restricted or stopped until proper protocols are met. Work at the location of the find will halt immediately within 50 feet of the find. A "no work" zone shall be established utilizing appropriate flagging to delineate the boundary of this zone. A Consulting Archaeologist will visit the discovery site as soon as practicable for identification and evaluation pursuant to Section 21083.2 of the Public Resources Code and Section 15126.4 of the California Code of Regulations. If the archaeologist determines that the artifact is not significant, construction may resume. If the archaeologist determines that the artifact is significant, the archaeologist will determine if the artifact can be avoided and, if so, will detail avoidance procedures. If the artifact cannot be avoided, the archaeologist will develop within 48 hours an Action Plan which will include provisions to minimize impacts and, if required, a Data Recovery Plan for recovery of artifacts in accordance with Public Resources Code Section 21083.2 and Section 15126.4 of the CEQA Guidelines.</p>
CU-3 Stop Work and Report if Burial Remains are Found	<p>Work in areas where any burial site is found will be restricted or stopped until proper protocols are met. Upon discovering any burial site as evidenced by human skeletal remains, the County Coroner will be immediately notified and the field crew supervisor shall take immediate steps to secure and protect such remains from vandalism during periods when work crews are absent. No further excavation or disturbance within 30 feet of the site or any nearby area reasonably suspected to overlie adjacent remains may be made except as authorized by the County Coroner, California Native American Heritage Commission, and/or the County Coordinator of Indian Affairs.</p>

Hazards & Hazardous Materials

HM-1 Comply with All Pesticide Application Restrictions and Policies	<p>Pesticide products are to be used only after an assessment has been made regarding environmental, economic, and public health aspects of each of the alternatives by the District's Pest Control Advisor (PCA). All pesticide use will be consistent with approved product specifications. Applications will be made by, or under the direct supervision of, State Certified applicators under the direction of, or in a manner approved by the PCA. Refer to Q751D02, Control and Oversight of Pesticide Use.</p>
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Source: Santa Clara Valley Water District (SCVWD) 2013

Hazards & Hazardous Materials

HM-3 Minimize Use of Pesticides	<p>In all cases, where some form of pest control is deemed necessary by the PCA; evaluate alternative pest control methods and pesticides. Refer to Q751D02: Control and Oversight of Pesticide Use.</p>
HM-4 Post Areas Where Pesticides Will Be Used	<p>Posting of areas where pesticides are to be used shall be performed in compliance with Q751D02: Control and Oversight of Pesticide Use. Posting shall be performed in compliance with the label requirements of the product being applied.</p> <p>In addition, the District shall provide posting for any products applied in areas used by the public for recreational purposes, and areas readily accessible to the public, regardless of whether the label requires such notification (the posting method may be modified to avoid destruction of bait stations or scattering of rodenticide), including:</p> <ol style="list-style-type: none"> 1. Sign postings shall notify staff and the general public of the date and time of application; the product's active ingredients, and common name; and, the time of allowable re-entry into the treated area. 2. A District staff contact phone number shall be posted on the sign. 3. Signs shall not be removed until after the end of the specified re-entry interval. 4. Right-to-know literature on the product shall be made available upon request to anyone in the area. <p>Notification will take into account neighbors with specific needs prior to treatment of an adjacent area to ensure such needs are met. Such requests are maintained by the District under Q751D02.</p>
HM-5 Comply with All Pesticide Usage Requirements	<p>All projects that propose ongoing use of pesticides will comply with all provisions of Q751D02: Control and Oversight of Pesticide Use, including, but not necessarily limited to the following:</p> <ol style="list-style-type: none"> 1. All pest control methods will be performed only after a written Pest Control Recommendation for use has been prepared by the District's PCA in accordance with requirements of the California Food and Agricultural Code. <p>F751D01 – <i>Pest Control Recommendation & Spray Operators Report</i> will be completed for each pesticide application.</p>
HM-7 Comply with Restrictions on Herbicide Use in Upland Areas	<p>Consistent with provisions of Q751D02: Control and Oversight of Pesticide Use, application of pre emergence (residual) herbicides to upland areas will not be made within 72 hours of predicted significant rainfall. Predicted significant rainfall for the purposes of this BMP will be described as local rainfall greater than 0.5 inch in a 24-hour period with greater than a 50% probability of precipitation according to the National Weather Service.</p>
HM-8 Comply with Restrictions on Herbicide Use in Aquatic Areas	<p>Consistent with provisions of Q751D02: Control and Oversight of Pesticide Use, only herbicides and surfactants registered for aquatic use will be applied within the banks of channels within 20 feet of any water present.</p> <p>Furthermore, aquatic herbicide use will be limited to June 15th through October 31st with an extension through December 31 or until the first occurrence of any of the following conditions; whichever happens first:</p> <ol style="list-style-type: none"> 1. local rainfall greater than 0.5 inches is forecasted within a 24-hour period from planned application events according to the National Weather Service; or 2. when steelhead begin upmigrating and spawning in the 14 steelhead creeks, as determined by a qualified biologist (typically in November/December) <p>If rain is forecast then application of aquatic herbicide will be rescheduled.</p>
HM-9 Limit Vehicle and Equipment Cleaning to Appropriate Locations	<p>Vehicles may be washed only at approved areas. No washing of vehicles will occur at job sites.</p>

Source: Santa Clara Valley Water District (SCVWD) 2013

Hazards & Hazardous Materials

HM-10

Ensure Proper Vehicle and Equipment Fueling and Maintenance

No fueling or servicing will be done in a waterway or immediate flood plain, unless equipment stationed in these locations is not readily relocated (i.e., pumps, generators).

1. For stationary equipment that must be fueled or serviced on-site, containment will be provided in such a manner that any accidental spill will not be able to come in direct contact with soil, surface water, or the storm drainage system.
2. All fueling or servicing done at the job site will provide containment to the degree that any spill will be unable to enter any waterway or damage riparian vegetation.
3. All vehicles and equipment will be kept clean. Excessive build-up of oil and grease will be prevented.
4. All equipment used in the creek channel will be inspected for leaks each day prior to initiation of work. Maintenance, repairs, or other necessary actions will be taken to prevent or repair leaks, prior to use.

If emergency repairs are required in the field, only those repairs necessary to move equipment to a more secure location will be done in a channel or flood plain.

HM-12

Ensure Proper Hazardous Materials Management

Measures will be implemented to ensure that hazardous materials are properly handled and the quality of water resources is protected by all reasonable means.

1. Prior to entering the work site, all field personnel will know how to respond when toxic materials are discovered.
2. Contact of chemicals with precipitation will be minimized by storing chemicals in watertight containers with appropriate secondary containment to prevent any spillage or leakage.
3. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials will not contact soil and not be allowed to enter surface waters or the storm drainage system.
4. All toxic materials, including waste disposal containers, will be covered when they are not in use, and located as far away as possible from a direct connection to the storm drainage system or surface water.
5. Quantities of toxic materials, such as equipment fuels and lubricants, will be stored with secondary containment that is capable of containing 110% of the primary container(s).
6. The discharge of any hazardous or non-hazardous waste as defined in Division 2, Subdivision 1, Chapter 2 of the California Code of Regulations will be conducted in accordance with applicable State and federal regulations.

In the event of any hazardous material emergencies or spills, personnel will call the Chemical Emergencies/Spills Hotline at 1-800-510-5151.

HM-13

Utilize Spill Prevention Measures

Prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water following these measures:

1. Field personnel will be appropriately trained in spill prevention, hazardous material control, and clean up of accidental spills;
2. Equipment and materials for cleanup of spills will be available on site, and spills and leaks will be cleaned up immediately and disposed of according to applicable regulatory requirements;
3. Field personnel will ensure that hazardous materials are properly handled and natural resources are protected by all reasonable means;
4. Spill prevention kits will always be in close proximity when using hazardous materials (e.g., at crew trucks and other logical locations), and all field personnel will be advised of these locations; and,
5. The work site will be routinely inspected to verify that spill prevention and response measures are properly implemented and maintained.

Hazards & Hazardous Materials

HM-14 Incorporate Fire Prevention Measures	<ol style="list-style-type: none"> 1. All earthmoving and portable equipment with internal combustion engines will be equipped with spark arrestors. 2. During the high fire danger period (April 1–December 1), work crews will have appropriate fire suppression equipment available at the work site. 3. An extinguisher shall be available at the project site at all times when welding or other repair activities that can generate sparks (such as metal grinding) is occurring. <p>Smoking shall be prohibited except in designated staging areas and at least 20 feet from any combustible chemicals or vegetation.</p>
HM-17 Comply with BAAQMD Regulations for Naturally Occurring Asbestos	<p>The District will implement BAAQMD dust control measures and notification requirements when working in serpentine soils.</p> <p>The District will implement BAAQMD dust control measures and notification requirements when working in serpentine soils.</p>

Hydrology/Water Quality

WQ-1 Conduct Work from Top of Bank	<p>For work activities that will occur in the channel, work will be conducted from the top of the bank if access is available and there are flows in the channel.</p>
WQ-2 Evaluate Use of Wheel and Track Mounted Vehicles in Stream Bottoms	<p>Field personnel will use the appropriate equipment for the job that minimizes disturbance to the stream bottom. Appropriately tired vehicles, either tracked or wheeled, will be used depending on the situation. Tracked vehicles (bulldozers, loaders) may cause scarification. Wheeled vehicles may cause compaction. Heavy equipment will not operate in the live stream.</p>
WQ-3 Limit Impact of Pump and Generator Operation and Maintenance	<p>Pumps and generators will be maintained and operated in a manner that minimizes impacts to water quality and aquatic species.</p> <ol style="list-style-type: none"> 1. Pumps and generators will be maintained according to manufacturers' specifications to regulate flows to prevent dry-back or washout conditions. 2. Pumps will be operated and monitored to prevent low water conditions, which could pump muddy bottom water, or high water conditions, which creates ponding. 3. Pump intakes will be screened to prevent uptake of fish and other vertebrates. Pumps in steelhead creeks will be screened according to NMFS criteria. <p>Sufficient back-up pumps and generators will be onsite to replace defective or damaged pumps and generators.</p>

Hydrology/Water Quality	
WQ-4 Limit Impacts of Sediments on Water Quality	<p>Sediments will be stored and transported in a manner that minimizes water quality impacts.</p> <ol style="list-style-type: none"> 1. Wet sediments may be stockpiled outside of a live stream or may be stockpiled within a dewatered stream so water can drain or evaporate before removal. 2. This measure applies to saturated, not damp, sediments and depends upon the availability of a stockpile site. 3. For those stockpiles located outside the channel, water draining from them will not be allowed to flow back into the creek or into local storm drains that enter the creek, unless water quality protection measures recommended by the RWQCB are implemented. 4. Trucks may be lined with an impervious material (e.g. plastic), or the tail gate blocked with dry dirt or hay bales, for example, or trucks may drain excess water by slightly tilting their loads and allowing the water to drain out through a filter, but only within the active project area of the creek where the sediment is being loaded into the trucks or within an identified vegetated area (swale) that is separated from the creek. <p>Water will not drain directly into channels (outside of the work area) or onto public streets without providing water quality control measures.</p> <p>Streets will be cleared of mud and/or dirt by street sweeping (with a vacuum-powered street sweeper), as necessary, and not by hosing down the street.</p>
WQ-5 Limit Impacts From Staging and Stockpiling Materials	<ol style="list-style-type: none"> 1. To protect on-site vegetation and water quality, staging areas should occur on access roads, surface streets, or other disturbed areas that are already compacted and only support ruderal vegetation. Similarly, all equipment and materials (e.g., road rock and project spoil) will be contained within the existing service roads, paved roads, or other pre-determined staging areas. 2. Building materials and other project-related materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into water bodies or storm drains. 3. No runoff from the staging areas may be allowed to enter water ways, including the creek channel or storm drains, without being subjected to adequate filtration (e.g., vegetated buffer, swale, hay wattles or bales, silt screens). 4. The discharge of decant water to water ways from any on-site temporary sediment stockpile or storage areas is prohibited. 5. During the wet season, no stockpiled soils will remain exposed, unless surrounded by properly installed and maintained silt fencing or other means of erosion control. During the dry season; exposed, dry stockpiles will be watered, enclosed, covered, or sprayed with non-toxic soil stabilizers.
WQ-6 Stabilize Construction Entrances and Exits	<p>Measures will be implemented to minimize soil from being tracked onto streets near work sites:</p> <ol style="list-style-type: none"> 1. Methods used to prevent mud from being tracked out of work sites onto roadways include installing a layer of geotextile mat, followed by a 4-inch thick layer of 1 to 3-inch diameter gravel on unsurfaced access roads. <p>Access will be provided as close to the work area as possible, using existing ramps where available and planning work site access so as to minimize disturbance to the water body bed and banks, and the surrounding land uses.</p>
WQ-9 Minimize Erosion from Removal of In-channel Vegetation	<p>In-channel vegetation removal may result in increased local erosion due to increased flow velocity. To minimize the effect, the toe of the bank will be protected by leaving vegetation to the maximum extent practicable consistent with design requirements.</p>

Hydrology/Water Quality

WQ-10

Limit Impact of Concrete Near Waterways

Concrete that has not been cured is alkaline and can increase the pH of the water; fresh concrete will be isolated until it no longer poses a threat to water quality using the following appropriate measures:

1. Wet sacked concrete will be excluded from the wetted channel for a period of two weeks after installation. During that time, the wet sacked concrete will be kept moist (such as covering with wet carpet) and runoff from the wet sacked concrete will not be allowed to enter a live stream.
2. Poured concrete will be excluded from the wetted channel for a period of two weeks after it is poured. During that time, the poured concrete will be kept moist, and runoff from the wet concrete will not be allowed to enter a live stream. Commercial sealants (e.g., Deep Seal, Elasto-Deck Reservoir Grade) may be applied to the poured concrete surface where difficulty in excluding water flow for a long period may occur. If a sealant is used, water will be excluded from the site until the sealant is dry.
3. Dry sacked concrete will not be used in any channel.

An area outside of the channel and floodplain will be designated to clean out concrete transit vehicles.

Hydrology/Water Quality

WQ-12

Isolate Work in Non-tidal Sites With Use of Diversion of Bypass

When work in a flowing stream is unavoidable, the entire streamflow will be diverted around the work area by a barrier. Construction of the barrier will normally begin in the upstream area and continue in a downstream direction, and the flow will be diverted only when construction of the diversion is completed. Where appropriate, the diversion will occur via gravity flow around or through the work site using temporary culverts. If necessary, stream flow may be pumped around the work site using pumps and screened intake hoses. When pumping is necessary to dewater a work site, a temporary siltation basin and/or use of silt bags may be required to prevent sediment from re-entering the wetted channel discharge sites to ensure that the turbidity of discharged water is not visibly more turbid than the water in the channel upstream of the site. If increases in turbidity are observed, additional measures will be implemented. Sumps or basins also may be used to collect water, where appropriate (e.g., in channels with low flows).

Recommendations by a qualified Fisheries Biologist to protect native fisheries and aquatic vertebrates will be incorporated into the bypass design. The recommendations may include but are not limited to:

1. Screening the stream flow diversion source or pump to prevent entrainment of native fish or amphibian species. The screening dimensions will be appropriate to the species present;
2. Relocation of native aquatic vertebrates will include a plan specifying the methods to be used to capture, hold and move the aquatic vertebrates, as well as a description of where the aquatic vertebrates will be relocated; and,
3. Timing work in streams that support a significant number of amphibians until after metamorphosis occurs.

Instream cofferdams will be built only from materials such as sandbags, clean gravel, or rubber bladders, which will cause little or no siltation or turbidity. Plastic sheeting will be placed over k-rails, timbers, and earthen fill to minimize water seepage into, and out of, the work areas. The plastic sheets will be firmly anchored, using sandbags, to the streambed to minimize water seepage.

If necessary to prevent erosion, an energy dissipater will be constructed at the discharge point. Timing of flow diversions will be coordinated with the completion of the dam structure to avoid drying up the downstream creek area.

Water remaining in the work area will be removed by evaporation, seepage, or pumping. When pumping is required to dewater a site, the decanted water will be discharged with water bypassed around the site or in a separate erosion control – energy dissipation area/vegetated swale. The turbidity of discharged water will not be visibly more turbid than the receiving water.

Diversions will maintain ambient stream flows below the diversion, and waters discharged below the project site will not be diminished or degraded by the diversion.

Coffer dams will be installed both upstream and downstream to minimize the distance necessary to accomplish effective passive systems, not more than 100 feet from the extent of the work areas.

In-channel berms that only deflect water to one side of the channel during sediment removal may be constructed of channel material.

When work is completed, the flow diversion structure will be removed as soon as possible. Impounded water will be released at a reduced velocity to minimize erosion, turbidity, or harm to downstream habitat, as follows:

- > All water will be discharged in a non-erosive manner (e.g., gravel or vegetated bars, on hay bales, on plastic, on concrete, or in storm drains when equipped with filtering devices, etc.);
- > Normally, removal will proceed from downstream in an upstream direction;
- > When diversion structures are removed, the ponded water will be directed back into the low-flow channel in a phased manner to minimize erosion and downstream water quality impacts. Normal flows will be restored; and,
- > The area disturbed by flow bypass mechanisms will be restored to the pre-project condition at the completion of the project (to the extent practical). This may include, but is not limited to, re-contouring the area and planting of site appropriate vegetation.

Source: Santa Clara Valley Water District (SCVWD) 2013

Hydrology/Water Quality	
WQ-14 Use Seeding for Erosion Control, Weed Suppression, and Site Improvement	<p>Disturbed areas shall be seeded with native seed as soon as is appropriate after activities are complete. An erosion control seed mix will be applied to exposed soils down to the ordinary high water mark in streams.</p> <ol style="list-style-type: none"> 1. The seed mix should consist of California native grasses, (for example <i>Hordeum brachyantherum</i>; <i>Elymus glaucus</i>; and annual <i>Vulpia microstachyes</i>) or annual, sterile hybrid seed mix (e.g., <i>Regreen</i>™, a wheat x wheatgrass hybrid). 2. Temporary earthen access roads may be seeded when site and horticultural conditions are suitable, or have other appropriate erosion control measures in place.
WQ-15 Manage Exposed Groundwater at Work Sites	<p>If high levels of groundwater in a work area are encountered, the water will be pumped out of the work site. If necessary to protect water quality, the water will be directed into specifically constructed infiltration basins, into holding ponds, or onto areas with vegetation to remove sediment prior to the water re-entering a receiving water body. Water pumped into vegetated areas will be pumped in a manner that will not create erosion around vegetation.</p>
WQ-18 Maintain Clean Conditions at Work Sites	<p>The work site, areas adjacent to the work site, and access roads will be maintained in an orderly condition, free and clear from debris and discarded materials on a daily basis. Personnel will not sweep, grade, or flush surplus materials, rubbish, debris, or dust into storm drains or waterways.</p> <p>For activities that last more than one day, materials or equipment left on the site overnight will be stored as inconspicuously as possible, and will be neatly arranged. Any materials and equipment left on the site overnight will be stored to avoid erosion, leaks, or other potential impacts to water quality</p> <p>Upon completion of work, all building materials, debris, unused materials, concrete forms, and other construction-related materials will be removed from the work site.</p>
WQ-40 Prevent Water Pollution	<p>Oily, greasy, or sediment laden substances or other material that originate from the project operations and may degrade the quality of surface water or adversely affect aquatic life, fish, or wildlife will not be allowed to enter, or be placed where they may later enter, any waterway.</p> <ol style="list-style-type: none"> 1. The project will not increase the turbidity of any watercourse flowing past the construction site by taking all necessary precautions to limit the increase in turbidity as follows: 2. where natural turbidity is between 0 and 50 Nephelometric Turbidity Units (NTU), increases will not exceed 5 percent; 3. where natural turbidity is greater than 50 NTU, increases will not exceed 10 percent; 4. where the receiving water body is a dry creek bed or storm drain, waters in excess of 50 NTU will not be discharged from the project. <p>Water turbidity changes will be monitored. The discharge water measurements will be made at the point where the discharge water exits the water control system for tidal sites and 100 feet downstream of the discharge point for non-tidal sites. Natural watercourse turbidity measurements will be made in the receiving water 100 feet upstream of the discharge site. Natural watercourse turbidity measurements will be made prior to initiation of project discharges, preferably at least 2 days prior to commencement of operations.</p>

Hydrology/Water Quality	
WQ-41 Prevent Stormwater Pollution	<ol style="list-style-type: none"> 1. Soils exposed due to project activities will be seeded and stabilized using hydroseeding, straw placement, mulching, and/or erosion control fabric. These measures will be implemented such that the site is stabilized and water quality protected prior to significant rainfall. In creeks, the channel bed and areas below the Ordinary High Water Mark are exempt from this BMP. 2. The preference for erosion control fabrics will be to consist of natural fibers; however, steeper slopes and areas that are highly erodible may require more structured erosion control methods. No non-porous fabric will be used as part of a permanent erosion control approach. Plastic sheeting may be used to temporarily protect a slope from runoff, but only if there are no indications that special-status species would be impacted by the application. 3. Erosion control measures will be installed according to manufacturer's specifications. 4. Appropriate measures include, but are not limited to, the following: <ul style="list-style-type: none"> – Silt Fences – Straw Bale Barriers – Brush or Rock Filters – Storm Drain Inlet Protection – Sediment Traps – Sediment Basins – Erosion Control Blankets and Mats – Soil Stabilization (i.e. tackified straw with seed, jute or geotextile blankets, etc.) – Straw mulch 5. All temporary construction-related erosion control methods shall be removed at the completion of the project (e.g. silt fences). <p>Surface barrier applications installed as a method of animal conflict management, such as chain link fencing, woven geotextiles, and other similar materials, will be installed no longer than 300 feet, with at least an equal amount of open area prior to another linear installation.</p>
WQ-42 Manage Sanitary/ Septic Waste	<p>Temporary sanitary facilities will be located on jobs that last multiple days in compliance with California Division of Occupational Safety and Health (Cal/OSHA) regulation 8 CCR 1526. All temporary sanitary facilities will be located where overflow or spillage will not enter a watercourse directly (overbank) or indirectly (through a storm drain).</p>
Noise	
NO-1 Minimize Noise Pollution	<p>Noise produced by construction activities will not exceed the applicable local noise ordinance standards.</p>
NO-2 Minimize Noise Disturbances to Residential Neighborhoods	<p>The District will implement practices that minimize disturbances to residential neighborhoods surrounding work sites.</p> <p>In general, work will be conducted during normal working hours. Extending weekday hours and working weekends may be necessary to complete some projects.</p> <ol style="list-style-type: none"> 1. Internal combustion engines will be equipped with adequate mufflers. 2. Excessive idling of vehicles will be prohibited. 3. All construction equipment will be equipped with manufacture's standard noise control devices. 4. The arrival and departure of trucks hauling material will be limited to the hours of construction. <p>The use of jake brakes is prohibited in residential areas.</p>

Source: Santa Clara Valley Water District (SCVWD) 2013

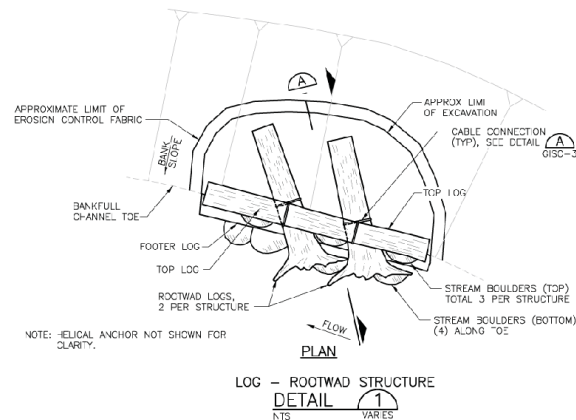
Transportation/Traffic	
TR-1 Incorporate Public Safety Measures	<p>Fences, barriers, lights, flagging, guards, and signs will be installed as determined appropriate by the public agency having jurisdiction, to give adequate warning to the public of the construction and of any dangerous condition to be encountered as a result thereof.</p>
TR-2 Minimize Impacts on Traffic, Bicycles and Pedestrians	<ol style="list-style-type: none"> 1. Work will be staged and conducted in a manner that maintains two-way traffic flow on public roadways in the vicinity of the work site. If temporary lane closures are necessary, they will be coordinated with the appropriate jurisdictional agency and scheduled to occur outside of peak traffic hours (7:00 – 10:00 a.m. and 3:00 – 6:00 p.m.) to the maximum extent practicable. Any lane closures will include advance warning signage, a detour route and flaggers in both directions. When work is conducted on public roads and may have the potential to affect traffic flow, work will be coordinated with local emergency service providers as necessary to ensure that emergency vehicle access and response is not impeded. 2. Bicycle and pedestrian facility closures will be scheduled outside of peak traffic hours (7:00 – 10:00 a.m. and 3:00 – 6:00 p.m.) to the maximum extent practicable. 3. Public transit access and routes will be maintained in the vicinity of the work site. If public transit will be affected by temporary road closures and require detours, affected transit authorities will be consulted and kept informed of project activities. 4. Adequate parking will be provided in designated staging areas. <p>Access to driveways and private roads will be maintained. If brief periods of project activity would temporarily block access, property owners will be notified prior to work activities.</p>

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Upper Llagas Creek Project

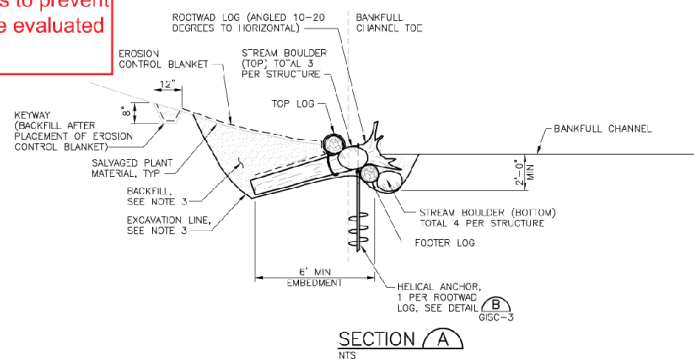
APPENDIX

D

INSTREAM AQUATIC HABITAT
FEATURES

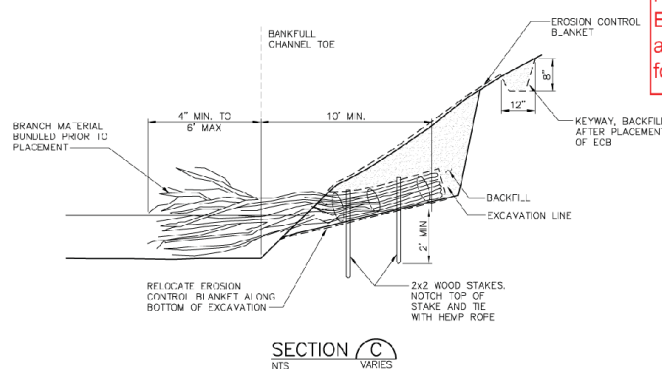
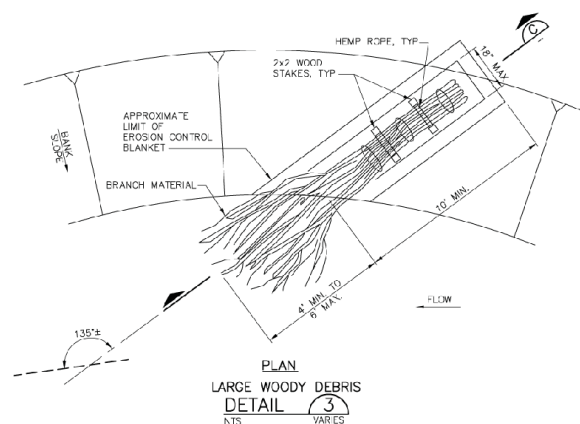
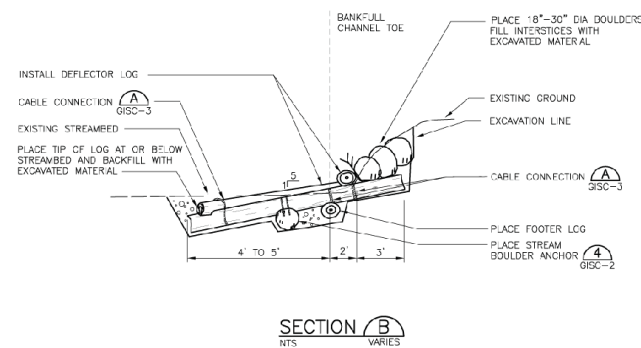
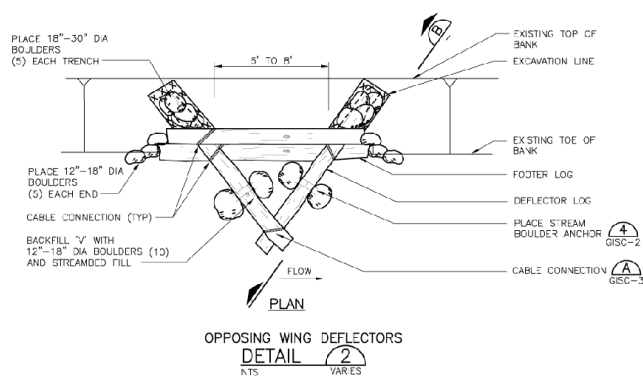


Need for rock or plantings over Erosion Control Blankets to prevent additional erosion will be evaluated for 90% submittal.



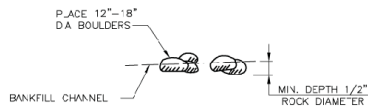
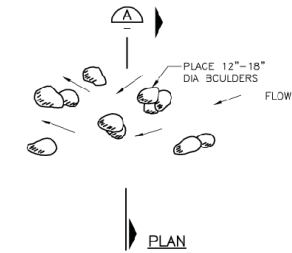
GENERAL NOTES FOR INSTREAM COMPLEXITY DRAWING:

1. ACTUAL LOCATION AND PLACEMENT OF INSTREAM STRUCTURES WILL BE FIELD DIRECTED BY THE CONTRACTING OFFICER.
2. THE NUMBER IN PARENTHESES (X) IS THE REQUIRED NUMBER OF BOULDERS.



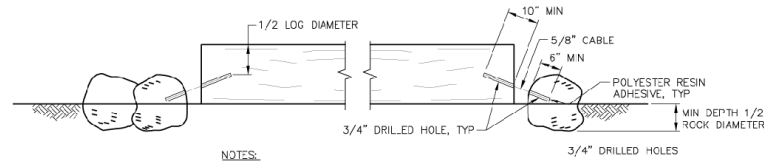
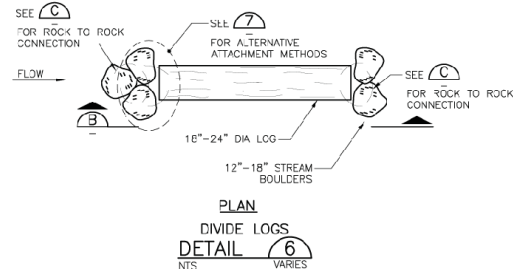
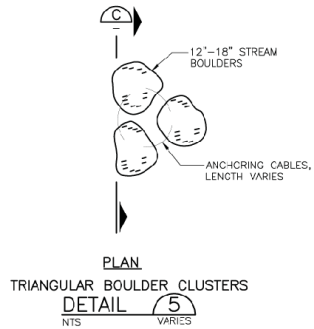
Need for rock or plantings over Erosion Control Blankets to prevent additional erosion will be evaluated for 90% submittal.

Source: Santa Clara Valley Water District, Feb 2013
Note: 65% Submittal Not for Construction

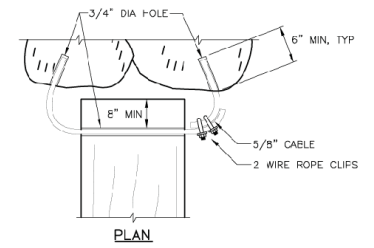
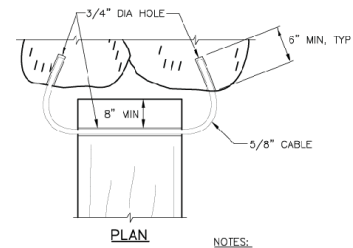
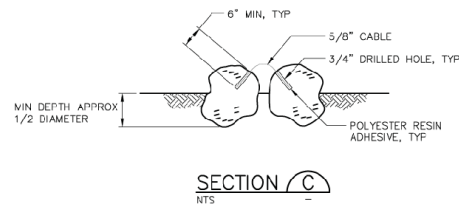


NOTE:
1. APPROXIMATE LOCATIONS AND QUANTITIES ARE SHOWN ON THE GRADING PLANS. ACTUAL LOCATIONS AND PLACEMENT WILL BE DIRECTED BY ENGINEER.

STREAM BOULDER PLACEMENT
DETAIL 4
NTS VARIES

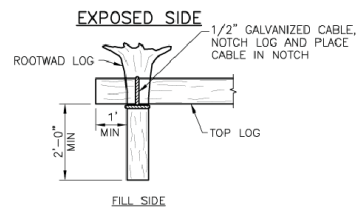


NOTES:
1. CONTRACTOR SHALL ENSURE THAT CABLES ARE TAUT TO PREVENT SETTLING OR MOVEMENT OF ANY COMPONENT.

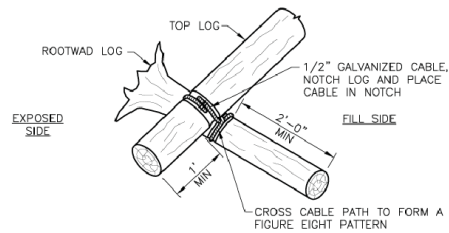


NOTES:
1. FILL HOLES WITH POLYESTER RESIN ADHESIVE.

CONNECTION ALTERNATIVES
DETAIL 7
NTS

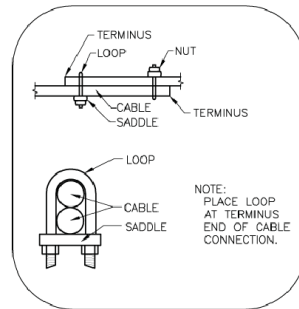


PLAN – LOGS PERPENDICULAR OR AT AN ANGLE

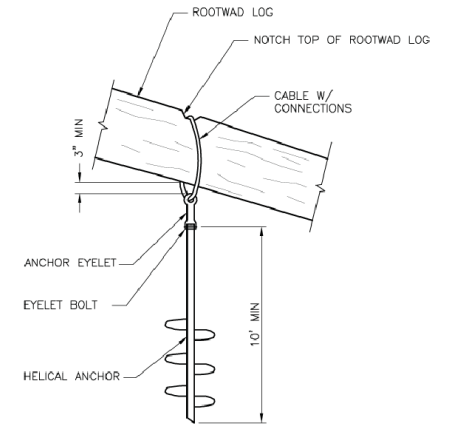


ISOMETRIC VIEW

CABLE CONNECTION
DETAIL A
NTS GISC-1



NOTE:
MAKE CABLE CONNECTIONS IN
AREAS TO BE BACKFILLED AND
MINIMIZE EXPOSED CABLE.



HELICAL ANCHOR
DETAIL B
NTS GISC-1












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Upper Llagas Creek Project

APPENDIX

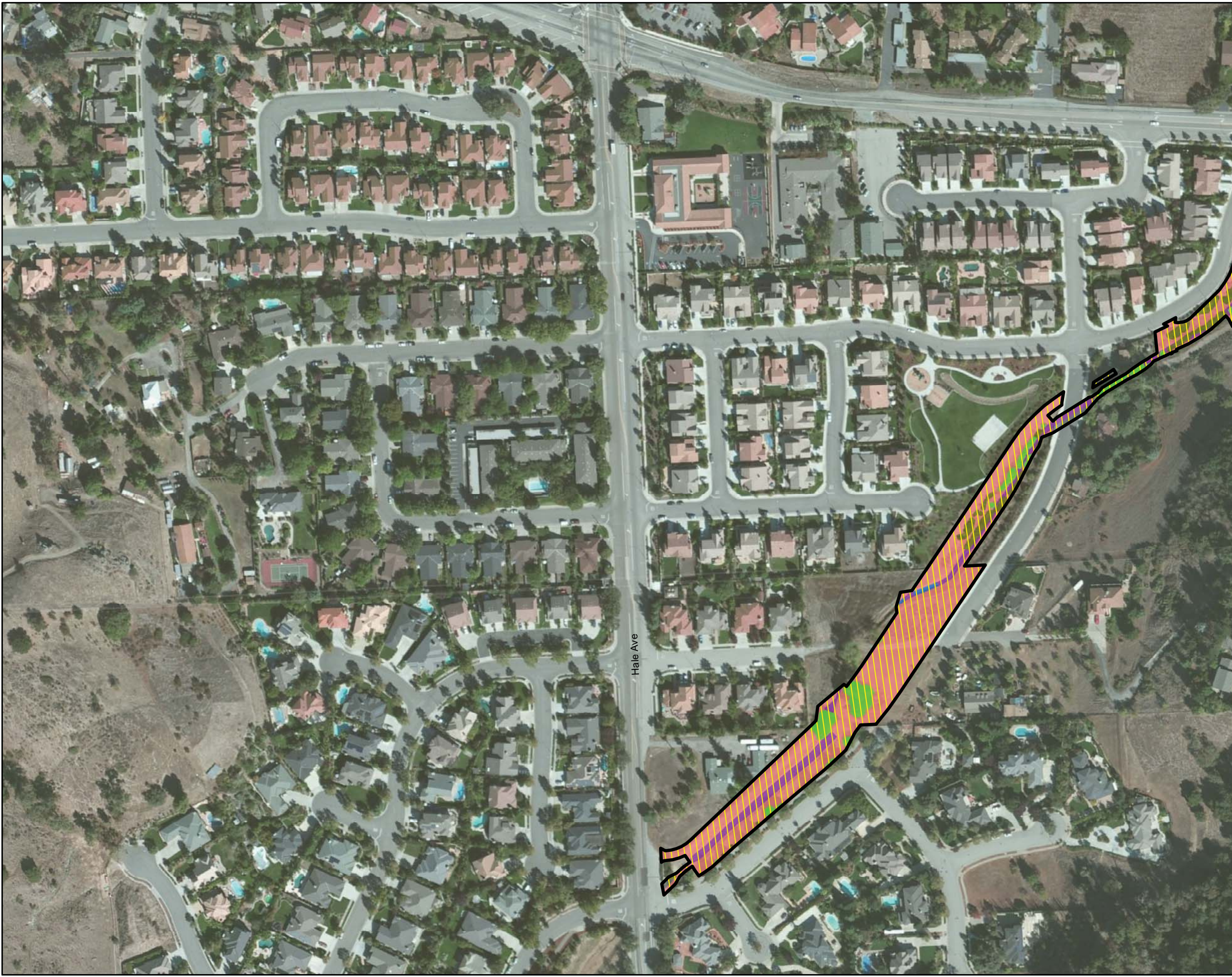
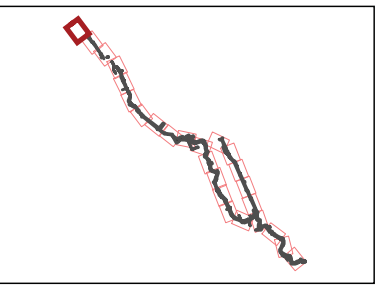
E

IMPACTS TO VEGETATION TYPES
AND HABITATS FOR THE TUNNEL
(PREFERRED) ALTERNATIVE


Legend


- Reach Break 
- Project Footprint 
- CDFW Jurisdiction Boundary 
- Temporary Impact 
- Permanent Impacts 
- CAR Habitat Types**
 - Riparian Forest (PFO) 
 - Riparian Scrub-shrub (PSS) 
 - Perennial Emergent Marsh (PEM) 
 - Upland Herbaceous (U/H) 
- Other Habitat Types**
 - Aquatic 
 - Developed 


Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013





Legend

Reach Break 


Project Footprint 


CDFW Jurisdiction Boundary 

Temporary Impact 


Permanent Impacts 

CAR Habitat Types


Riparian Forest (PFO) 


Riparian Scrub-shrub (PSS) 

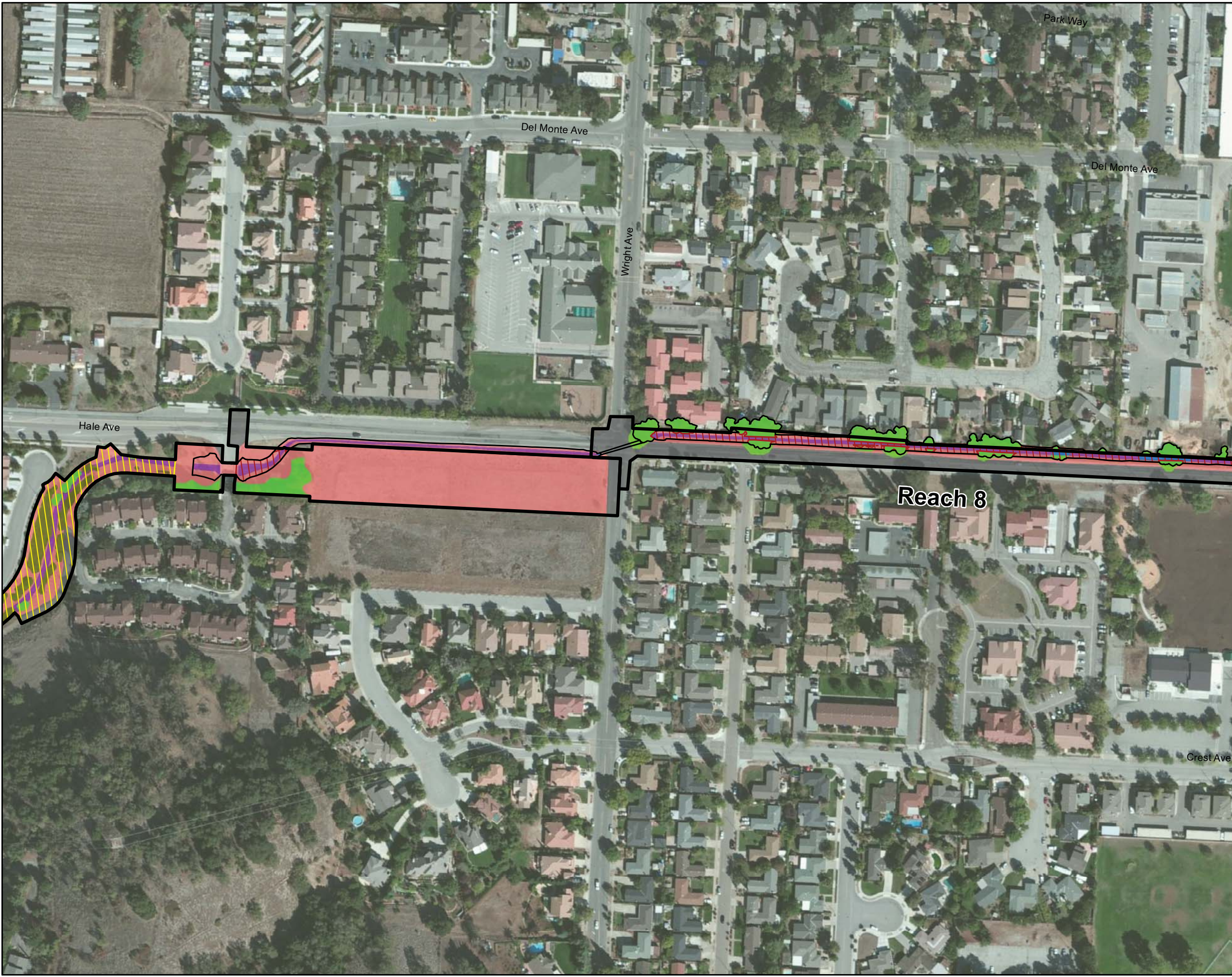
Perennial Emergent Marsh (PEM) 

Upland Herbaceous (U/H) 

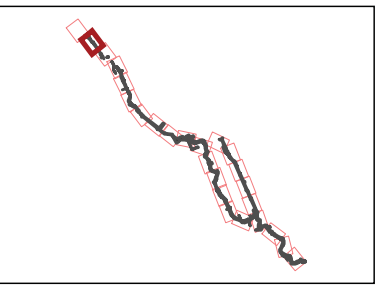
Other Habitat Types

Aquatic 












Developed 



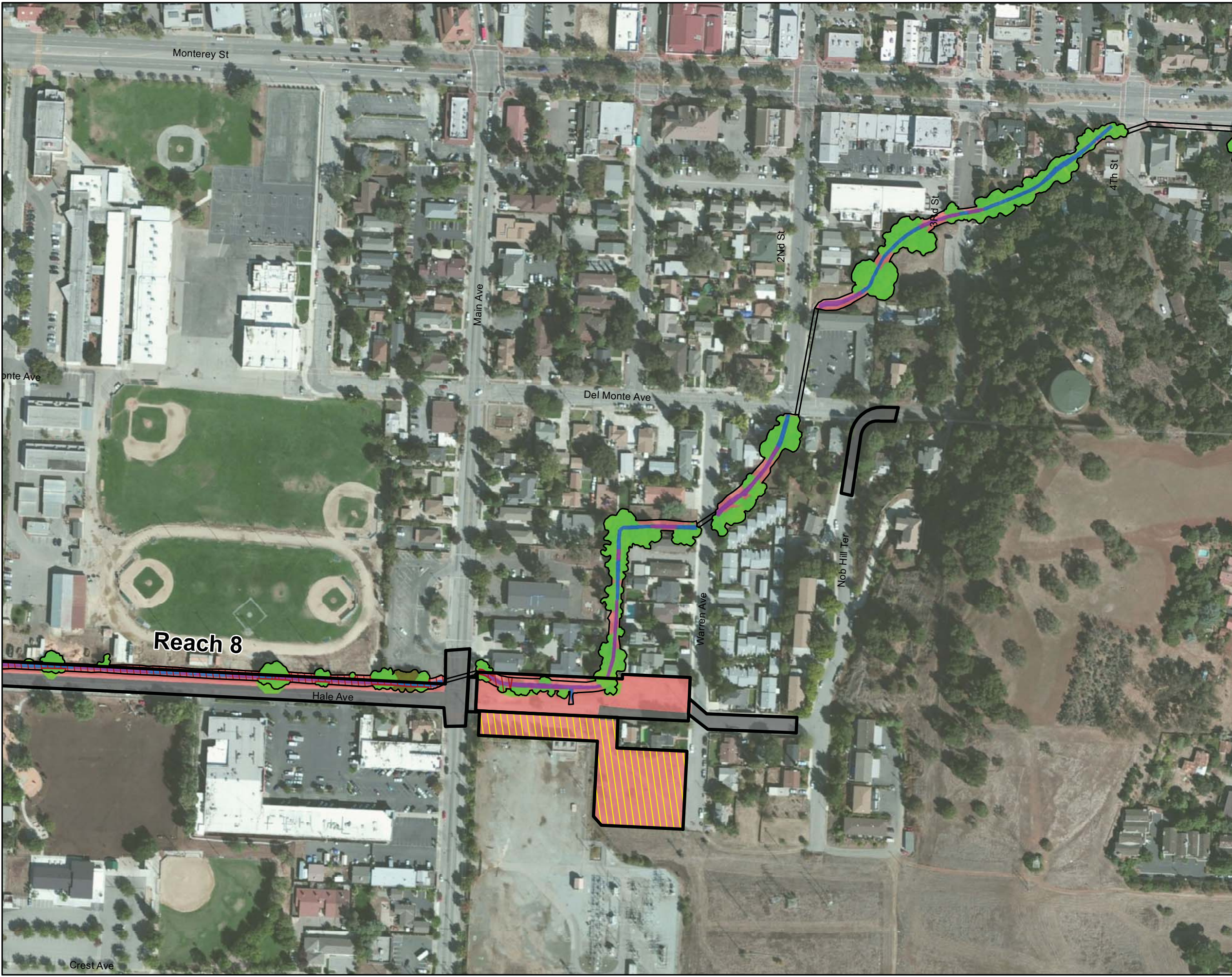
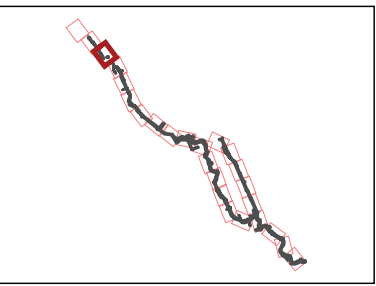
Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
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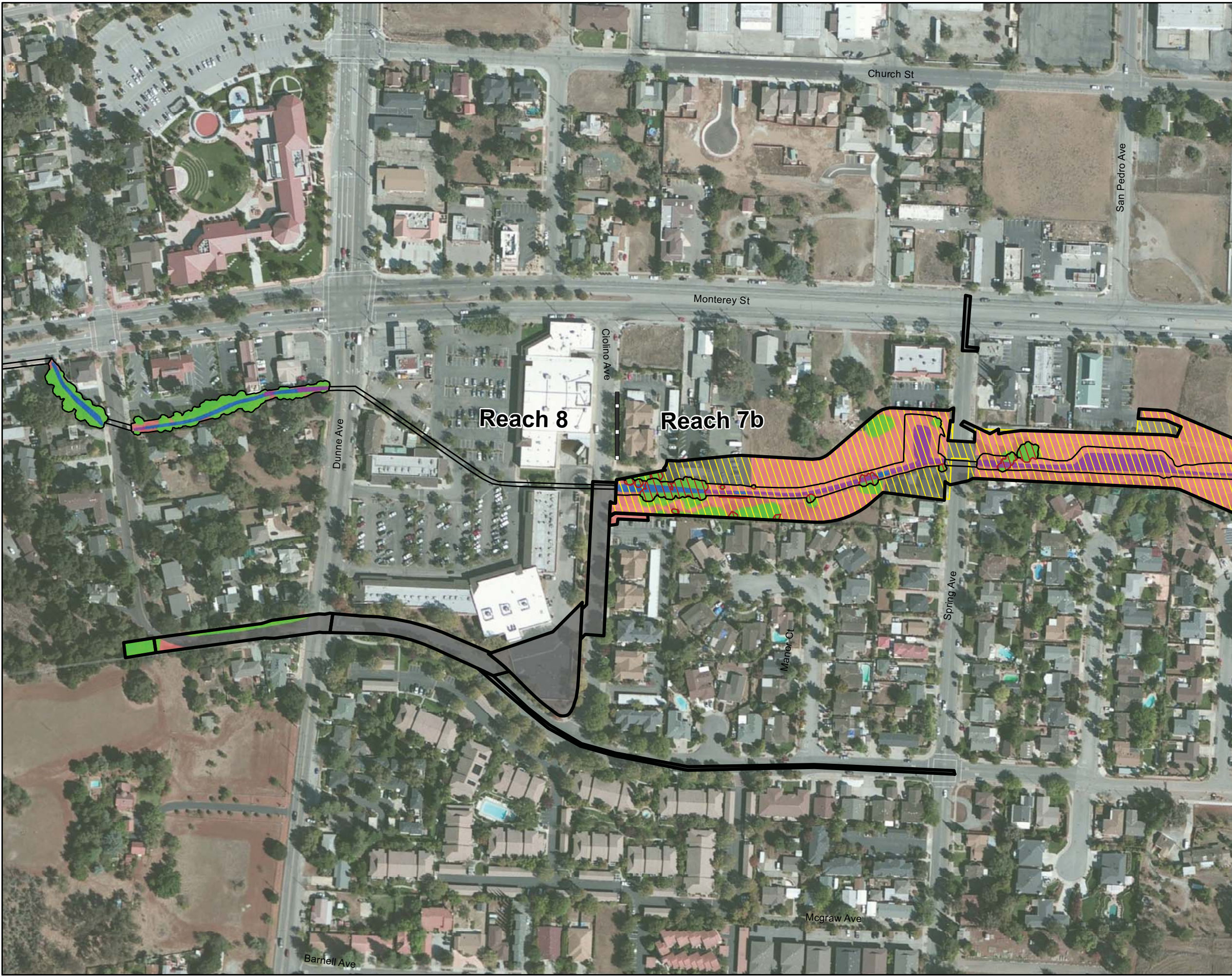
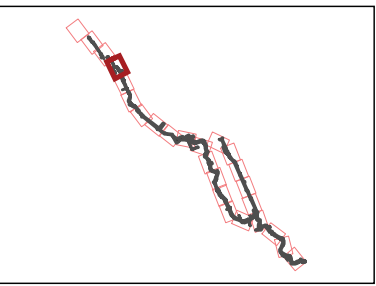
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Source: HT Harvey, 2013a and
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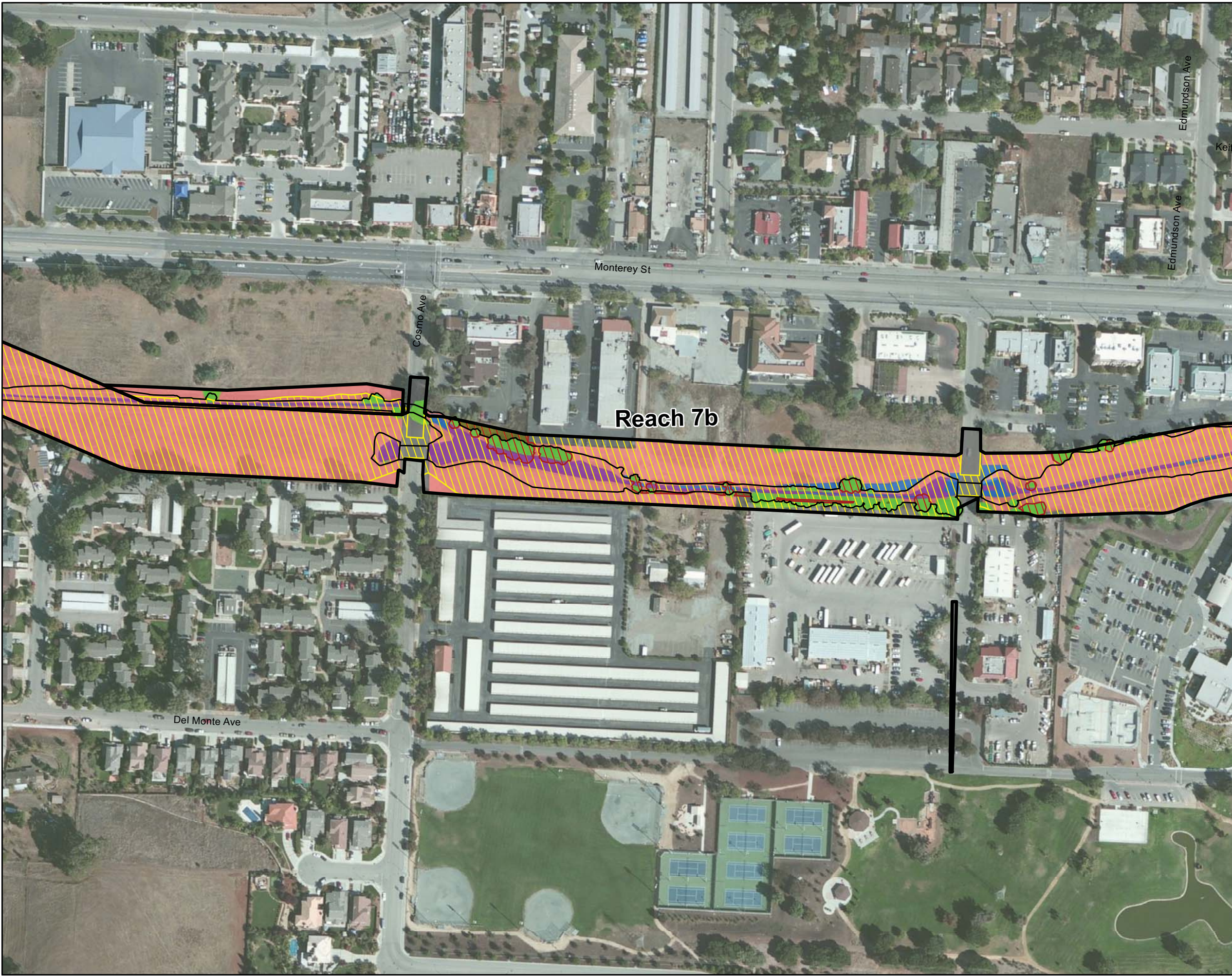
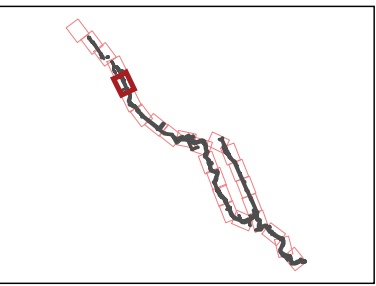
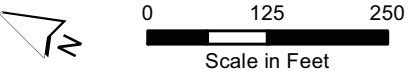
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Source: HT Harvey, 2013a and
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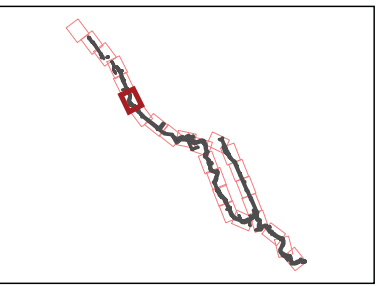
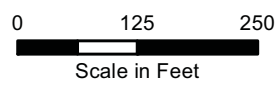
Upland Herbaceous (U/H) 

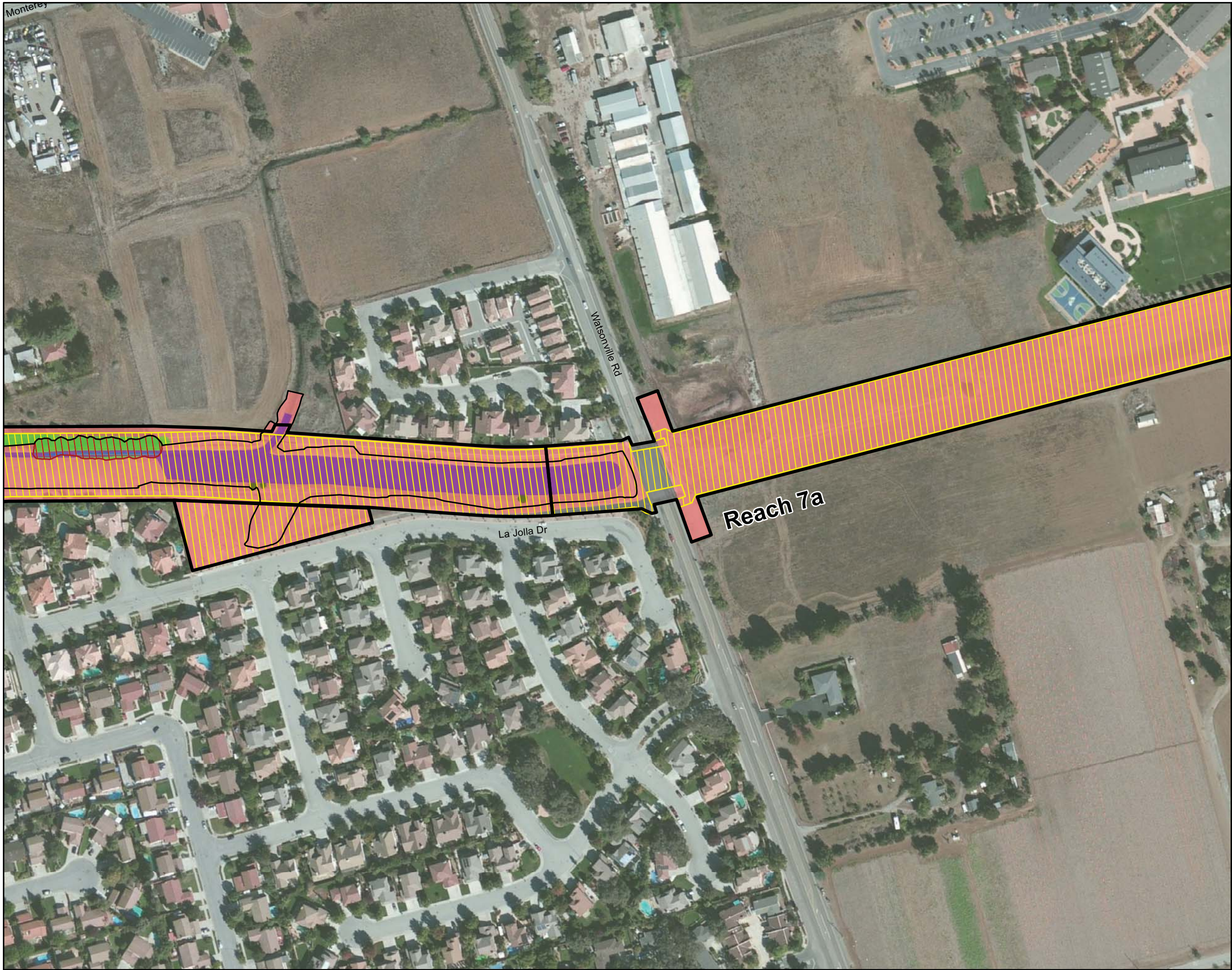
Other Habitat Types

Aquatic 


Developed 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013








Legend

Reach Break 


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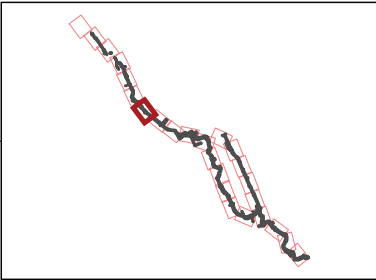
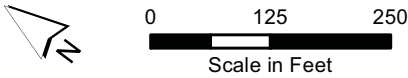
Upland Herbaceous (U/H) 

Other Habitat Types












Aquatic 

Developed 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013



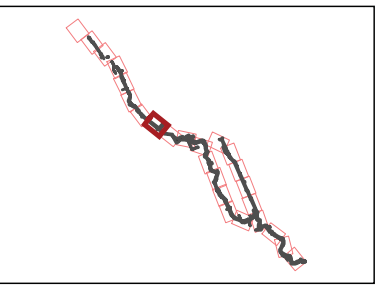
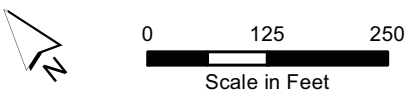
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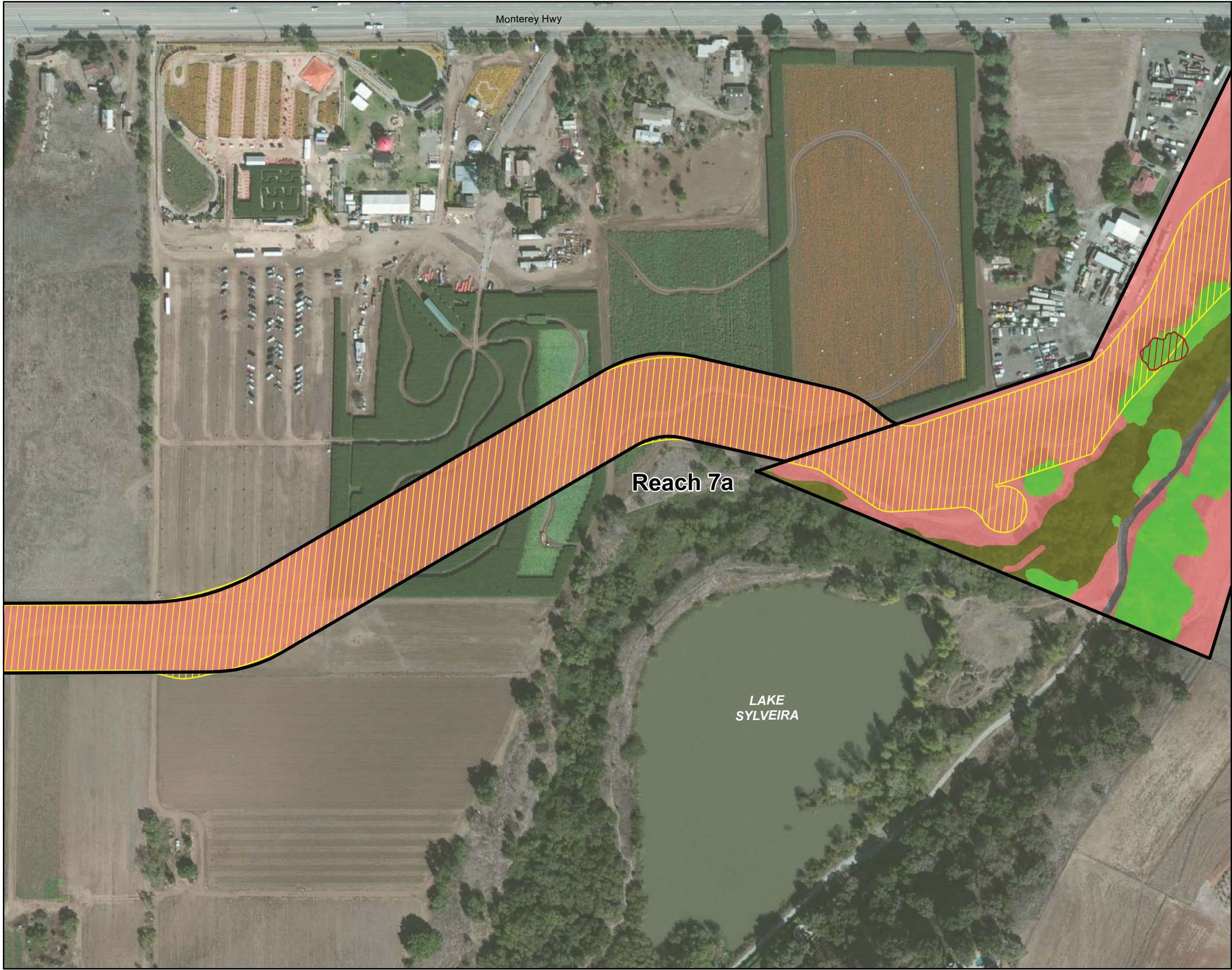
- Reach Break 
- Project Footprint 
- CDFW Jurisdiction Boundary 
- Temporary Impact 
- Permanent Impacts 
- CAR Habitat Types**
- Riparian Forest (PFO) 
- Riparian Scrub-shrub (PSS) 
- Perennial Emergent Marsh (PEM) 
- Upland Herbaceous (U/H) 
- Other Habitat Types**
- Aquatic 
- Developed 

Reach 7a






Middle Ave

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013











Legend

- Reach Break 
- Project Footprint 
- CDFW Jurisdiction Boundary 
- Temporary Impact 
- Permanent Impacts 

CAR Habitat Types

- Riparian Forest (PFO) 
- Riparian Scrub-shrub (PSS) 
- Perennial Emergent Marsh (PEM) 
- Upland Herbaceous (U/H) 


Other Habitat Types


- Aquatic 
- Developed 


Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013





Legend

Reach Break 


Project Footprint 


CDFW Jurisdiction Boundary 

Temporary Impact 


Permanent Impacts 

CAR Habitat Types


Riparian Forest (PFO) 


Riparian Scrub-shrub (PSS) 

Perennial Emergent Marsh (PEM) 

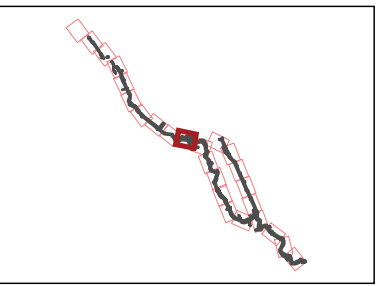
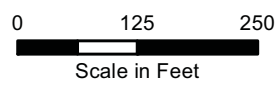
Upland Herbaceous (U/H) 

Other Habitat Types

Aquatic 

Developed 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013



Reach 6


Reach 7a


Llagas Ave


Monterey Hwy


Appendix E
Impacts to Vegetation Types
and Habitats for the
Study Area


Legend

Reach Break 


Project Footprint 


CDFW Jurisdiction Boundary 

Temporary Impact 


Permanent Impacts 

CAR Habitat Types


Riparian Forest (PFO) 


Riparian Scrub-shrub (PSS) 

Perennial Emergent Marsh (PEM) 

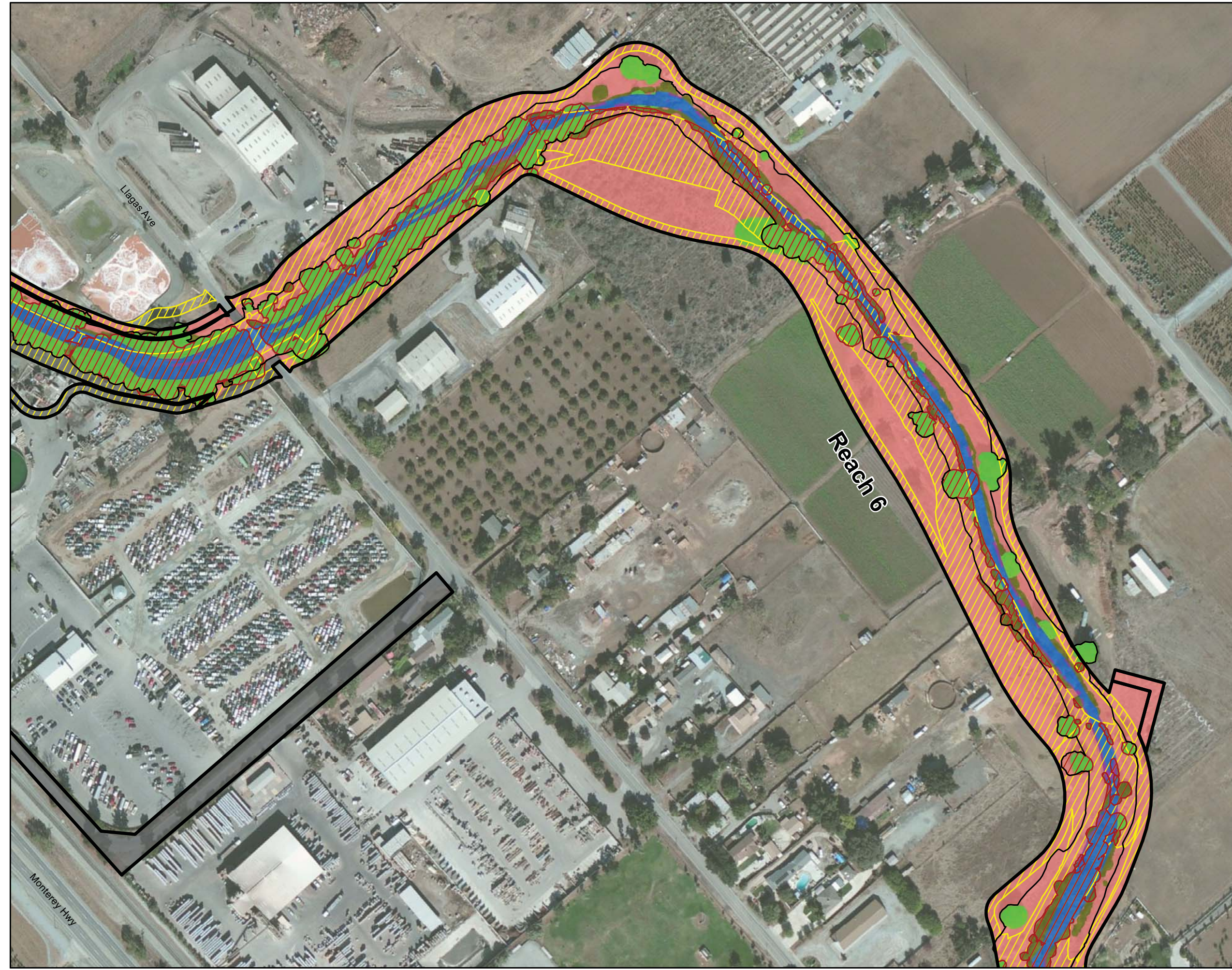
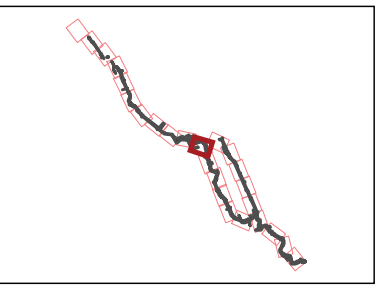
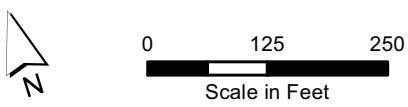
Upland Herbaceous (U/H) 

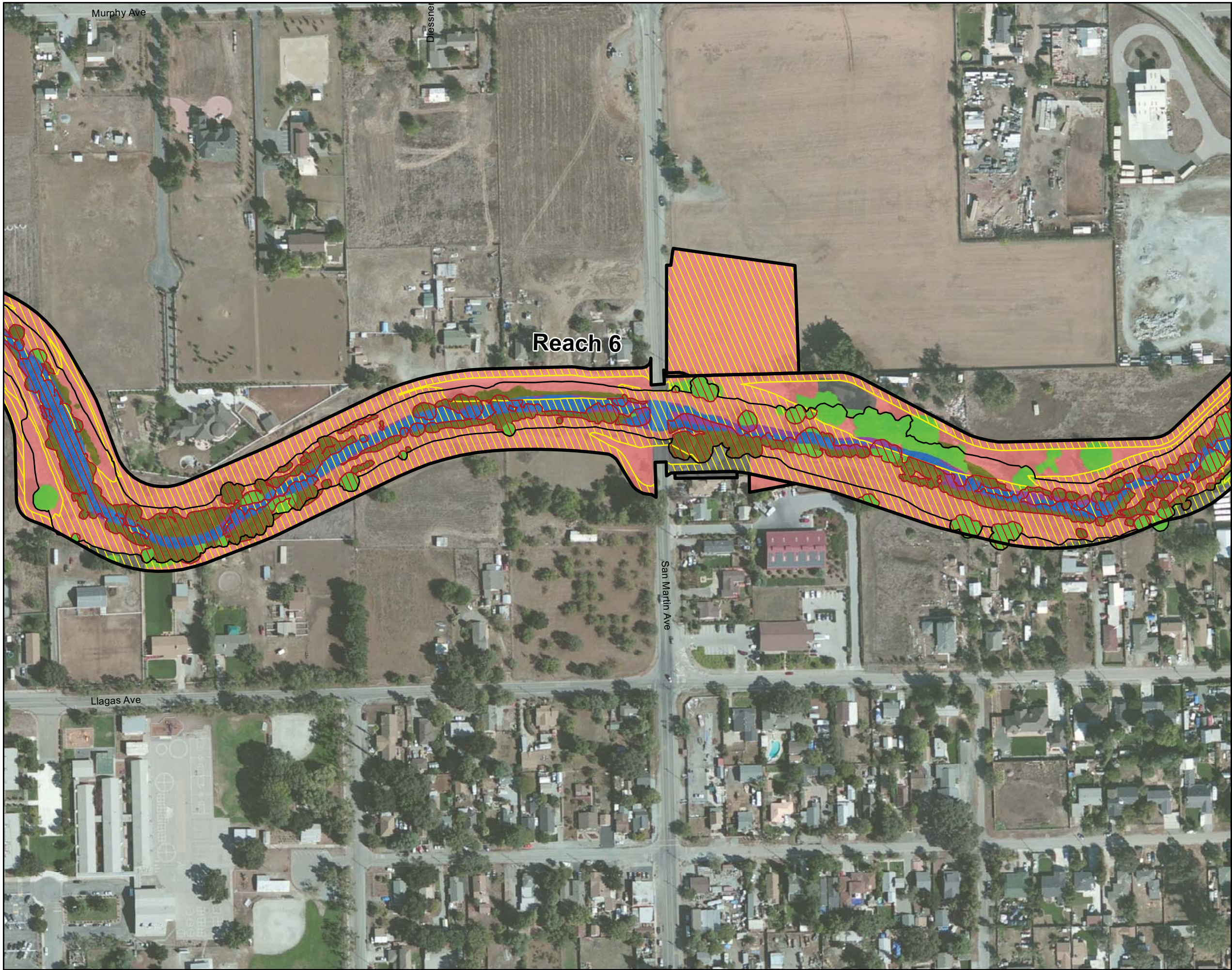
Other Habitat Types

Aquatic 






Developed 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013











Legend

- Reach Break 
- Project Footprint 
- CDFW Jurisdiction Boundary 
- Temporary Impact 
- Permanent Impacts 

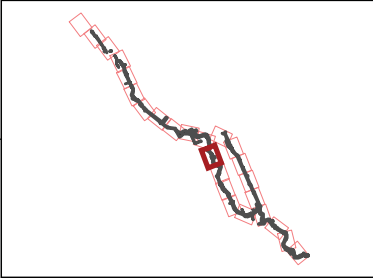
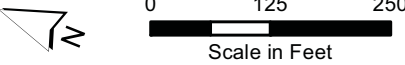
CAR Habitat Types

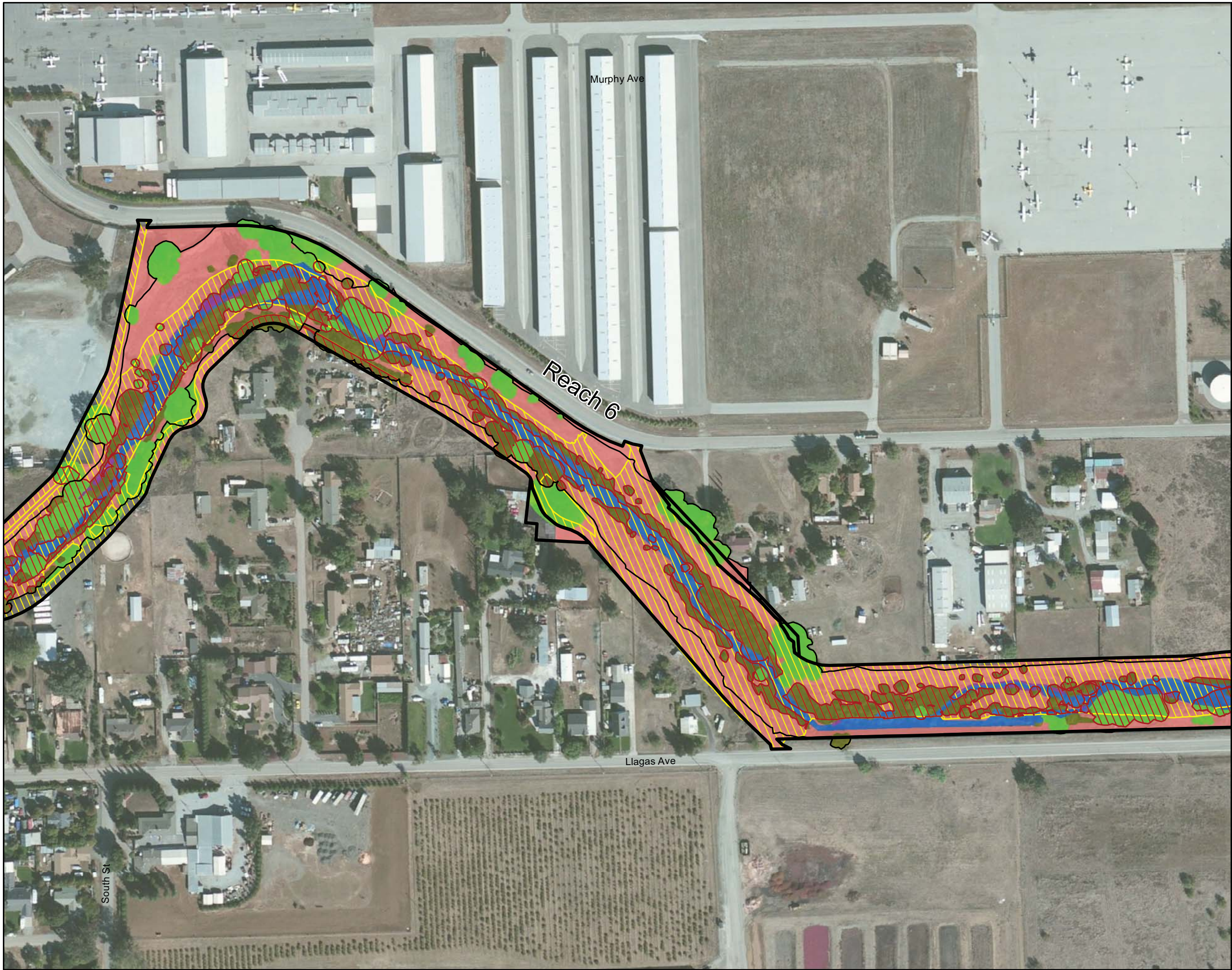
- Riparian Forest (PFO) 
- Riparian Scrub-shrub (PSS) 
- Perennial Emergent Marsh (PEM) 
- Upland Herbaceous (U/H) 

Other Habitat Types


- Aquatic 
- Developed 


Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013





Legend

Reach Break 


Project Footprint 


CDFW Jurisdiction Boundary 

Temporary Impact 


Permanent Impacts 

CAR Habitat Types

Riparian Forest (PFO) 


Riparian Scrub-shrub (PSS) 

Perennial Emergent Marsh (PEM) 

Upland Herbaceous (U/H) 

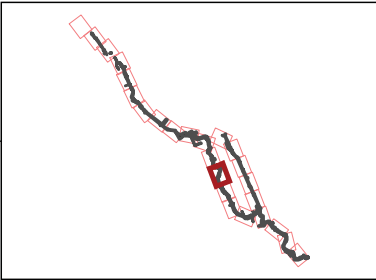
Other Habitat Types

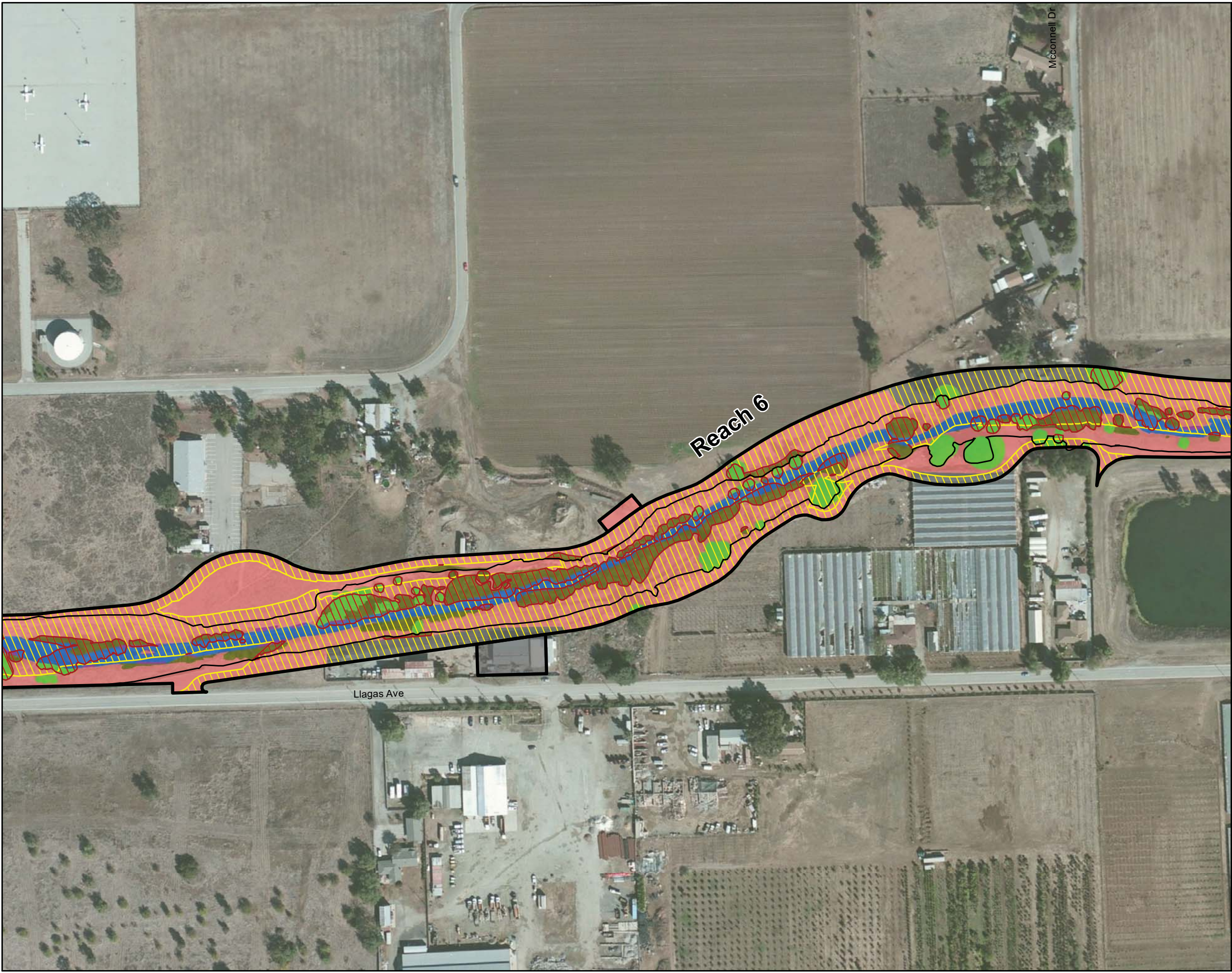
Aquatic 

Developed 












Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013

0 125 250
Scale in Feet
















Legend

- Reach Break 
- Project Footprint 
- CDFW Jurisdiction Boundary 
- Temporary Impact 
- Permanent Impacts 
- CAR Habitat Types**
 - Riparian Forest (PFO) 
 - Riparian Scrub-shrub (PSS) 
 - Perennial Emergent Marsh (PEM) 
 - Upland Herbaceous (U/H) 
- Other Habitat Types**
 - Aquatic 
 - Developed 

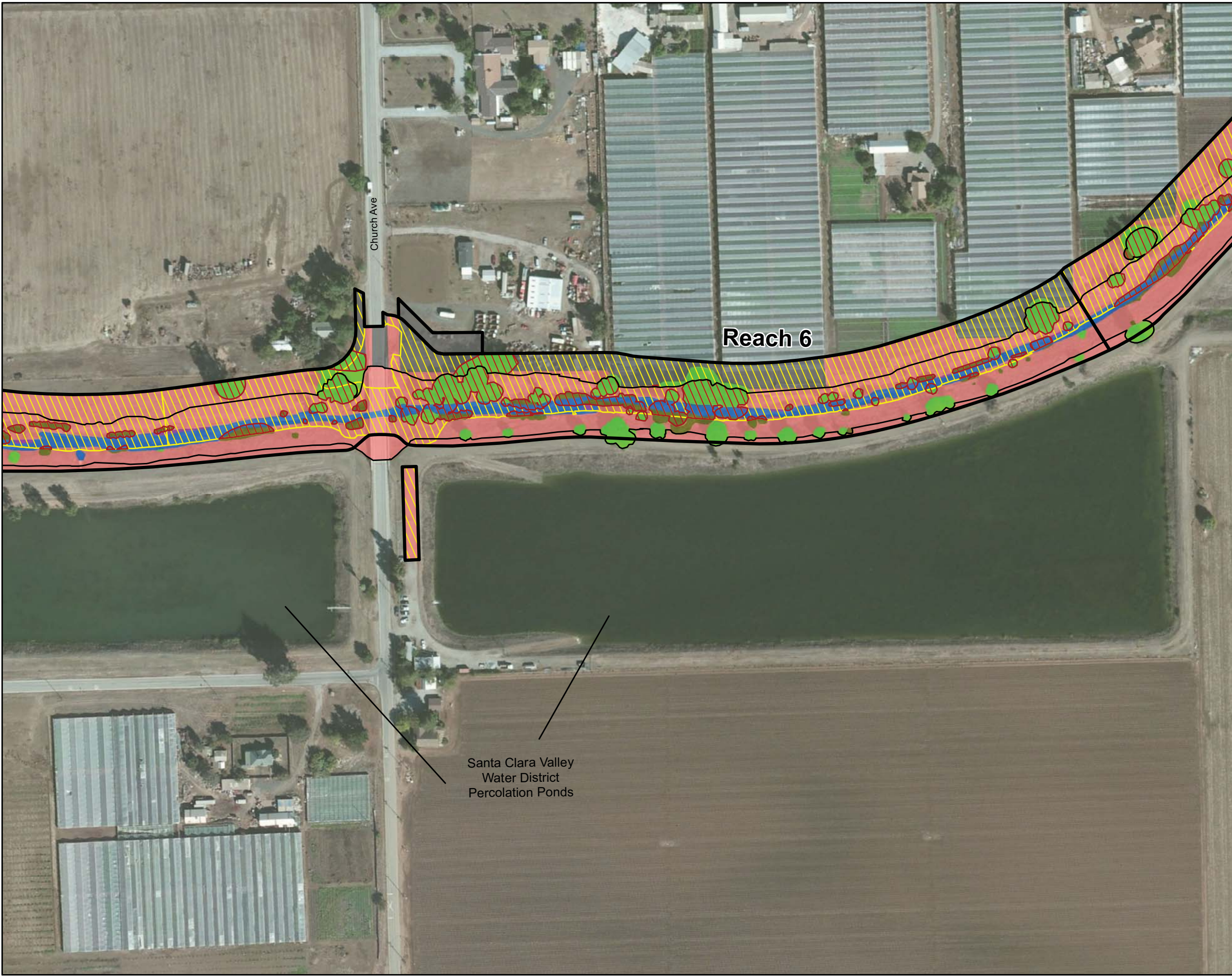
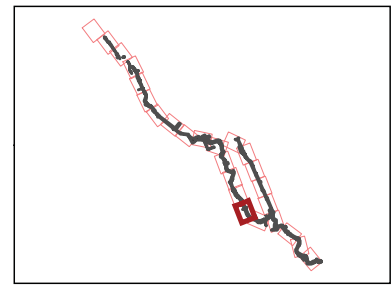
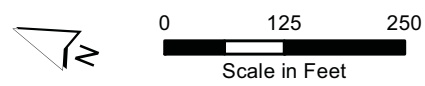
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Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013




Legend


- Reach Break 
- Project Footprint 
- CDFW Jurisdiction Boundary 
- Temporary Impact 
- Permanent Impacts 
- CAR Habitat Types**
- Riparian Forest (PFO) 
- Riparian Scrub-shrub (PSS) 
- Perennial Emergent Marsh (PEM) 
- Upland Herbaceous (U/H) 
- Other Habitat Types**
- Aquatic 
- Developed 


Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013





Legend

Reach Break 


Project Footprint 


CDFW Jurisdiction Boundary 

Temporary Impact 


Permanent Impacts 

CAR Habitat Types


Riparian Forest (PFO) 


Riparian Scrub-shrub (PSS) 

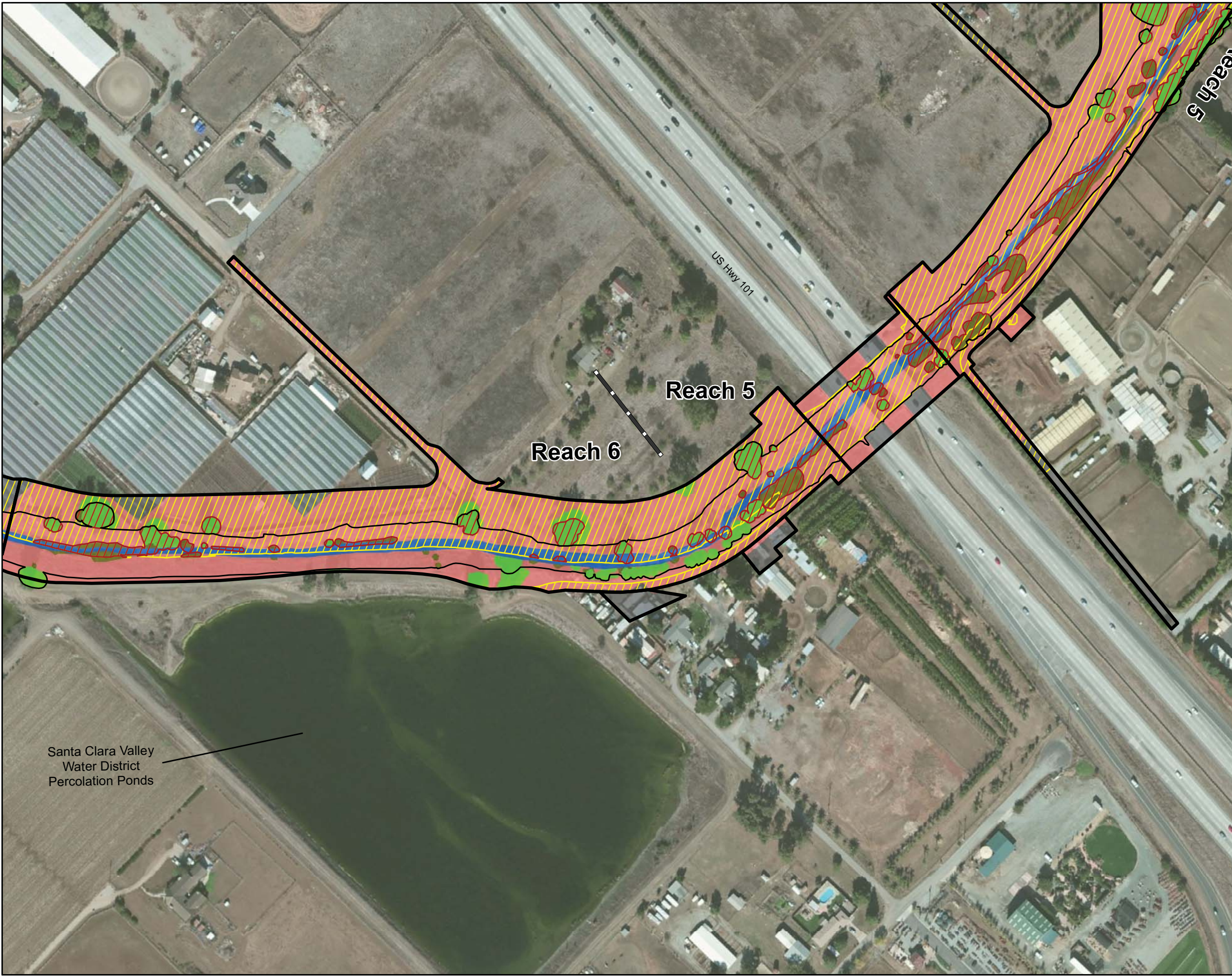
Perennial Emergent Marsh (PEM) 

Upland Herbaceous (U/H) 

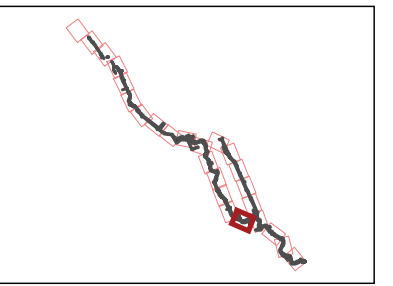
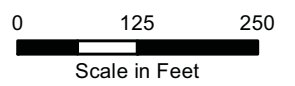
Other Habitat Types

Aquatic 

Developed 



Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013



Santa Clara Valley
Water District
Percolation Ponds

Reach 5

Reach 6


US Hwy 101

Reach 5

Legend

Reach Break 


Project Footprint 


CDFW Jurisdiction Boundary 

Temporary Impact 


Permanent Impacts 

CAR Habitat Types


Riparian Forest (PFO) 


Riparian Scrub-shrub (PSS) 

Perennial Emergent Marsh (PEM) 

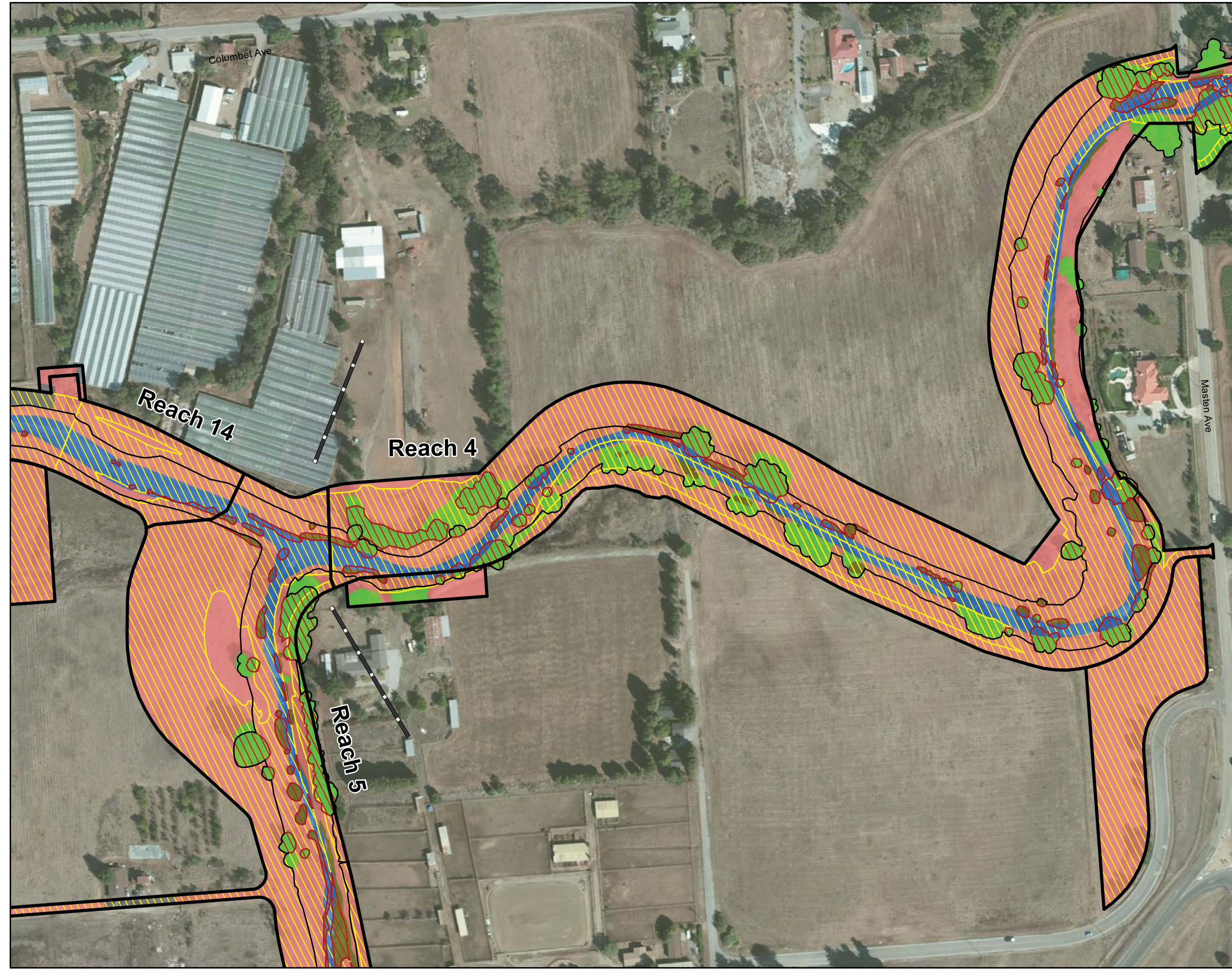
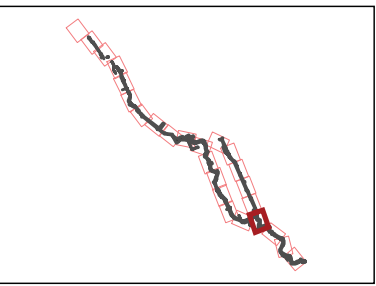
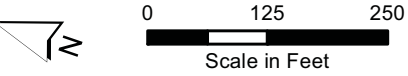
Upland Herbaceous (U/H) 

Other Habitat Types


Aquatic 


Developed 


Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013





Legend

Reach Break 


Project Footprint 


CDFW Jurisdiction Boundary 

Temporary Impact 


Permanent Impacts 

CAR Habitat Types


Riparian Forest (PFO) 


Riparian Scrub-shrub (PSS) 

Perennial Emergent Marsh (PEM) 

Upland Herbaceous (U/H) 

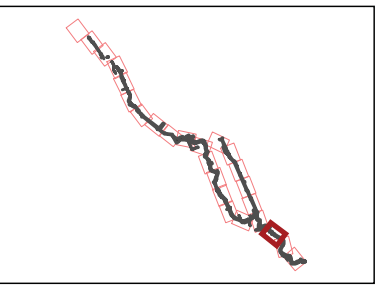
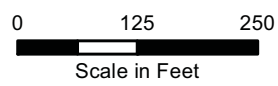
Other Habitat Types

Aquatic 


Developed 





Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013





Legend

Reach Break 


Project Footprint 


CDFW Jurisdiction Boundary 

Temporary Impact 


Permanent Impacts 

CAR Habitat Types

Riparian Forest (PFO) 


Riparian Scrub-shrub (PSS) 

Perennial Emergent Marsh (PEM) 

Upland Herbaceous (U/H) 

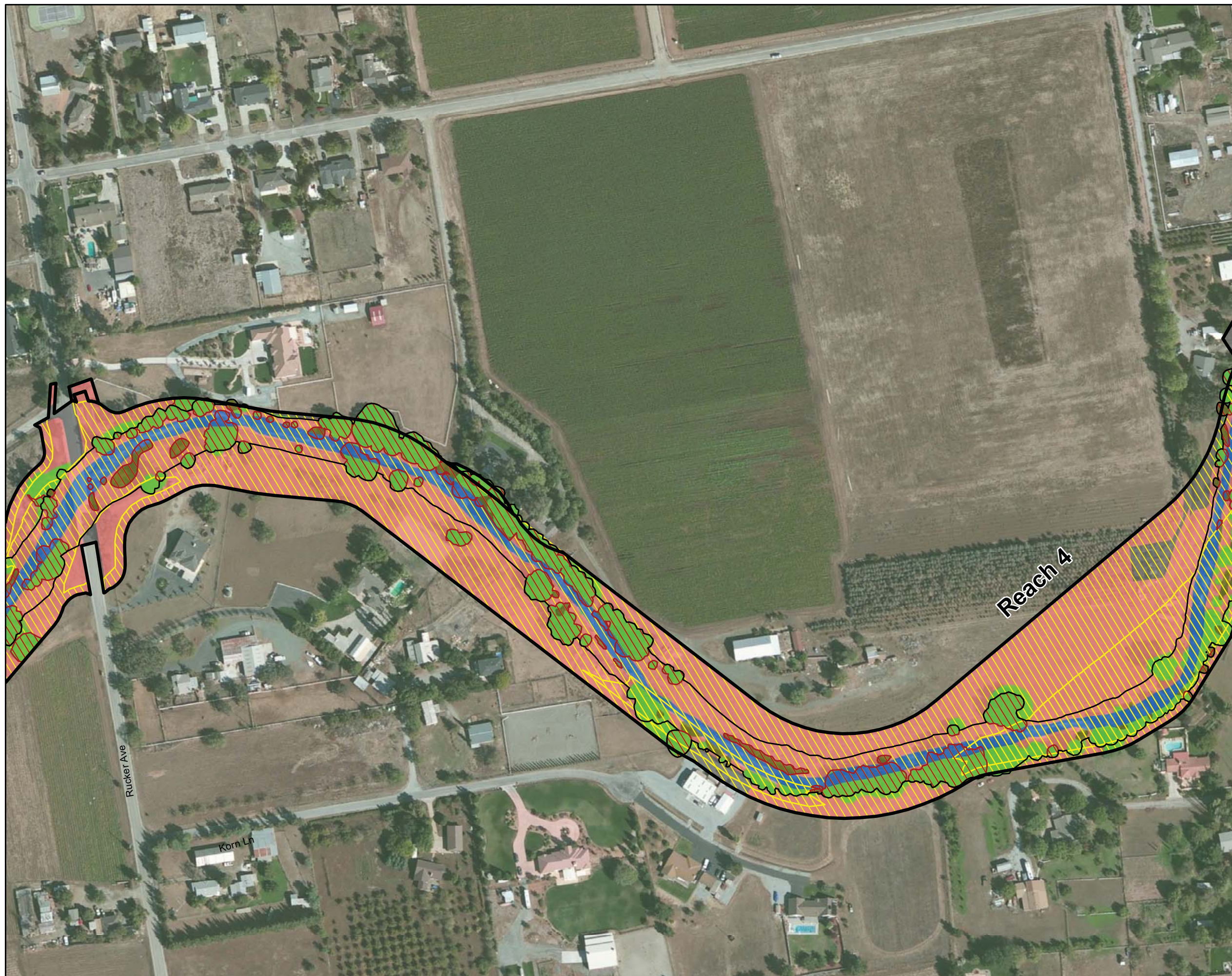
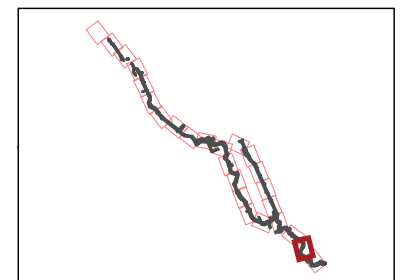
Other Habitat Types

Aquatic 


Developed 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013


0 125 250
Scale in Feet




Legend

Reach Break 


Project Footprint 


CDFW Jurisdiction Boundary 

Temporary Impact 


Permanent Impacts 

CAR Habitat Types

Riparian Forest (PFO) 


Riparian Scrub-shrub (PSS) 

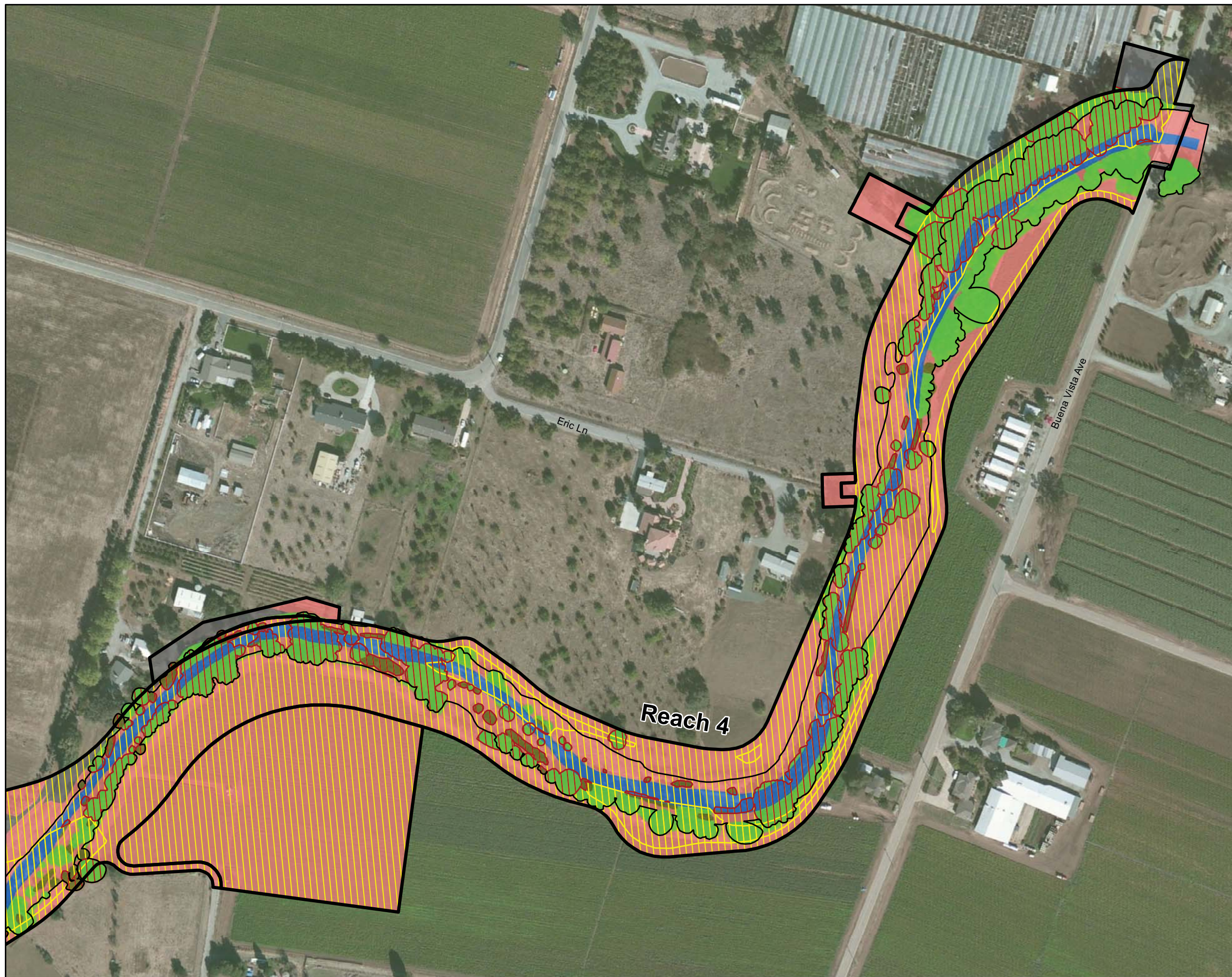
Perennial Emergent Marsh (PEM) 

Upland Herbaceous (U/H) 

Other Habitat Types

Aquatic 

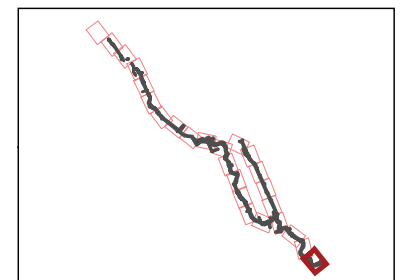
Developed 














Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013



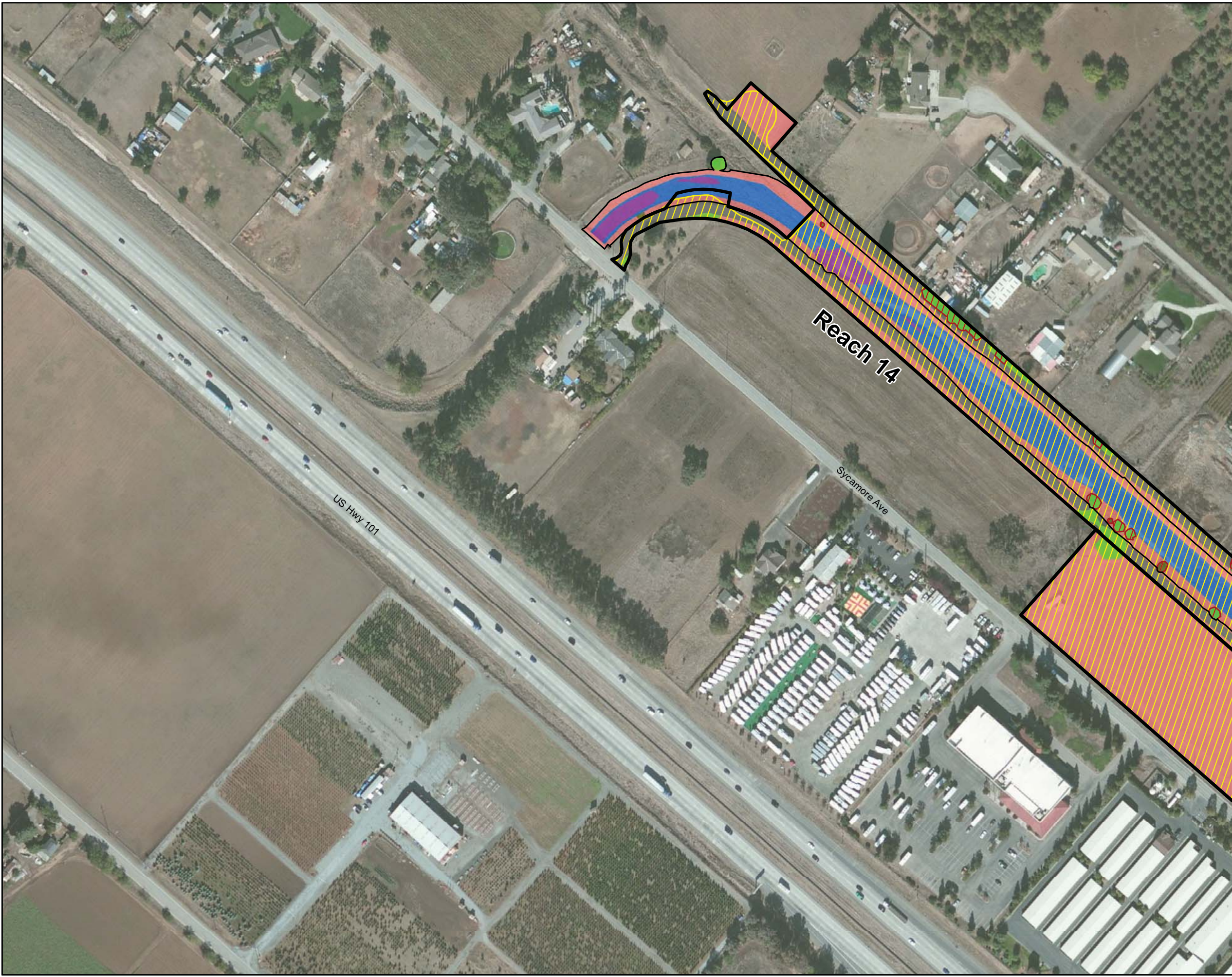
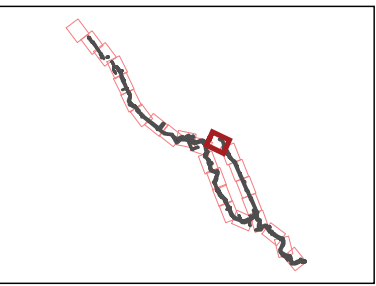
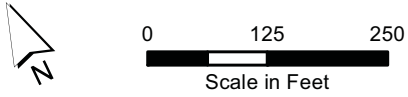
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Scale in Feet

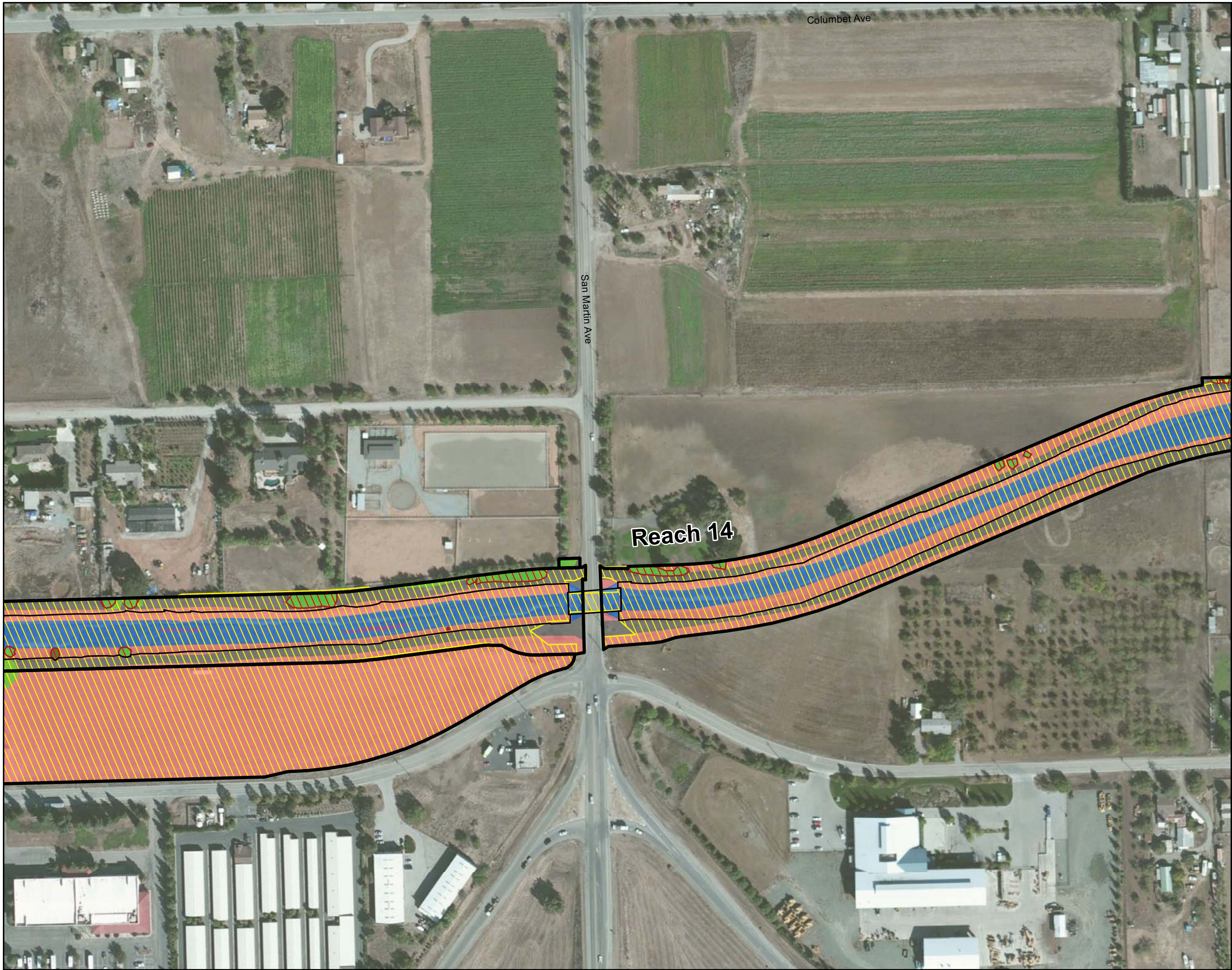


Legend


- Reach Break 
- Project Footprint 
- CDFW Jurisdiction Boundary 
- Temporary Impact 
- Permanent Impacts 
- CAR Habitat Types**
- Riparian Forest (PFO) 
- Riparian Scrub-shrub (PSS) 
- Perennial Emergent Marsh (PEM) 
- Upland Herbaceous (U/H) 
- Other Habitat Types**
- Aquatic 
- Developed 


Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013







Legend

Reach Break 


Project Footprint 


CDFW Jurisdiction Boundary 

Temporary Impact 


Permanent Impacts 

CAR Habitat Types

Riparian Forest (PFO) 


Riparian Scrub-shrub (PSS) 

Perennial Emergent Marsh (PEM) 

Upland Herbaceous (U/H) 

Other Habitat Types

Aquatic 

Developed 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013








0 125 250
Scale in Feet







Appendix E
Impacts to Vegetation Types
and Habitats for the
Study Area



Legend

- Reach Break 
- Project Footprint 
- CDFW Jurisdiction Boundary 
- Temporary Impact 
- Permanent Impacts 

CAR Habitat Types

- Riparian Forest (PFO) 
- Riparian Scrub-shrub (PSS) 
- Perennial Emergent Marsh (PEM) 
- Upland Herbaceous (U/H) 

Other Habitat Types

- Aquatic 
- Developed 

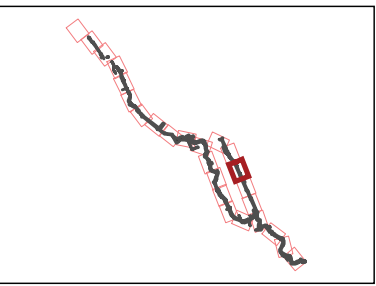
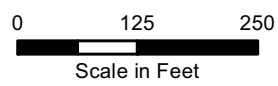
Reach 14

Columbet Ave












Hager Ct

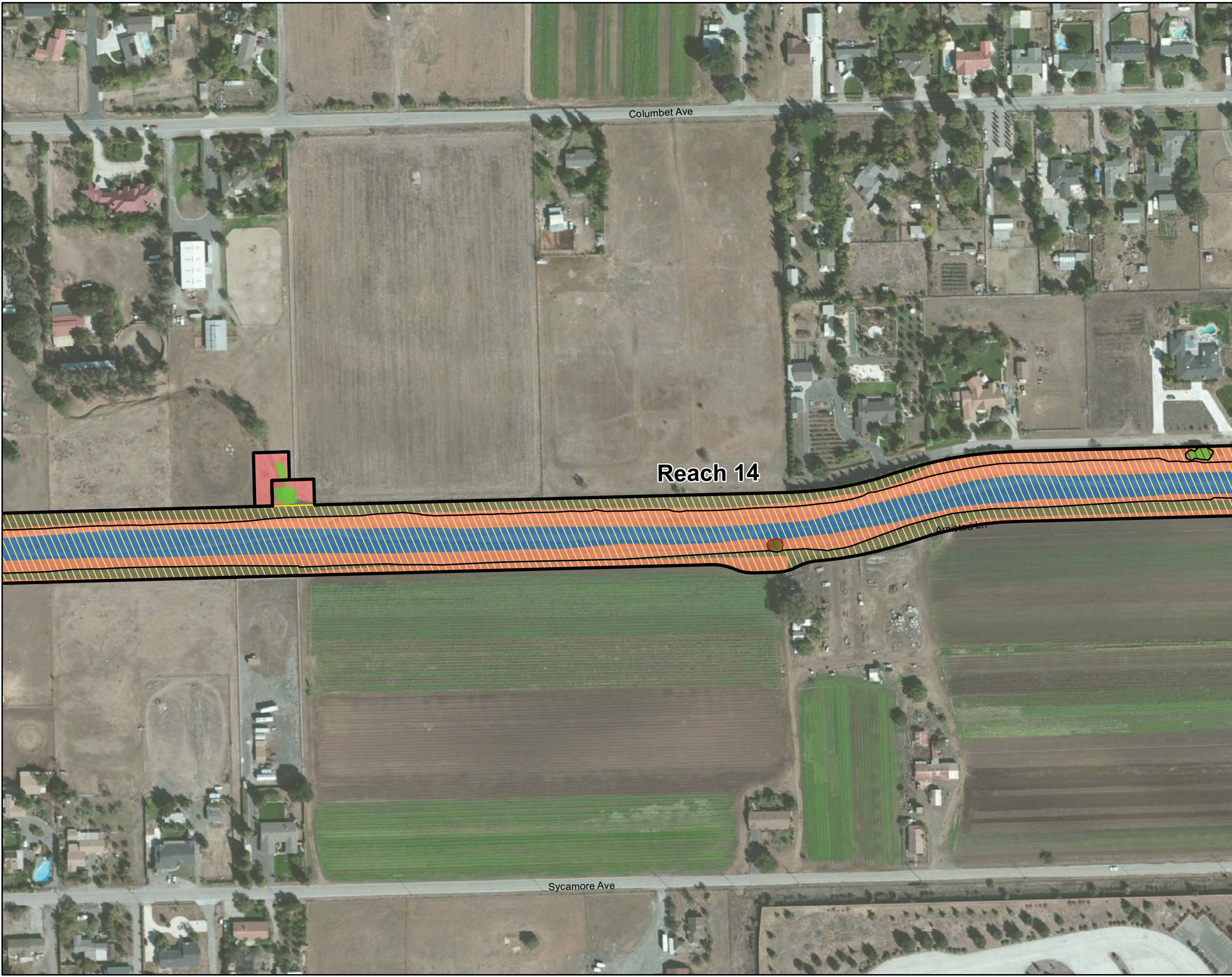
Sycamore Ave

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013

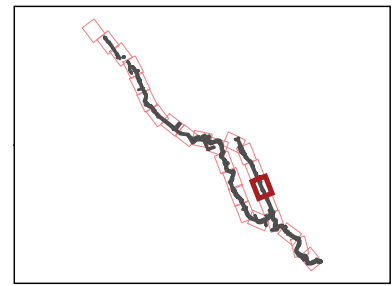
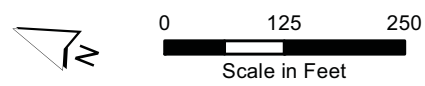


Legend


- Reach Break 
- Project Footprint 
- CDFW Jurisdiction Boundary 
- Temporary Impact 
- Permanent Impacts 
- CAR Habitat Types**
 - Riparian Forest (PFO) 
 - Riparian Scrub-shrub (PSS) 
 - Perennial Emergent Marsh (PEM) 
 - Upland Herbaceous (U/H) 
- Other Habitat Types**
 - Aquatic 
 - Developed 





Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013





Legend

Reach Break 


Project Footprint 


CDFW Jurisdiction Boundary 

Temporary Impact 


Permanent Impacts 

CAR Habitat Types


Riparian Forest (PFO) 


Riparian Scrub-shrub (PSS) 

Perennial Emergent Marsh (PEM) 

Upland Herbaceous (U/H) 

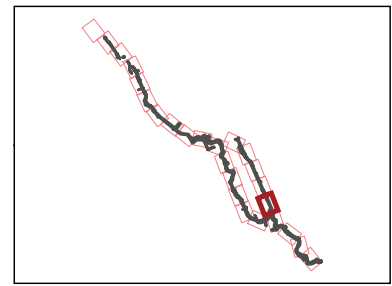
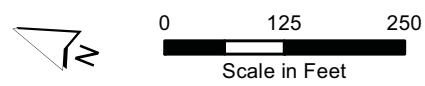
Other Habitat Types

Aquatic 

Developed 



Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a and
Cardno ENTRIX, 2013



Draft EIR
Upper Llagas Creek Project




APPENDIX

F





POTENTIAL JURISDICTIONAL WATERS AND
CALIFORNIA SYCAMORE WOODLAND

Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland
Map 1 of 23



Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 


USACE Jurisdictional Waters of the US
Non-wetland Waters

- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 

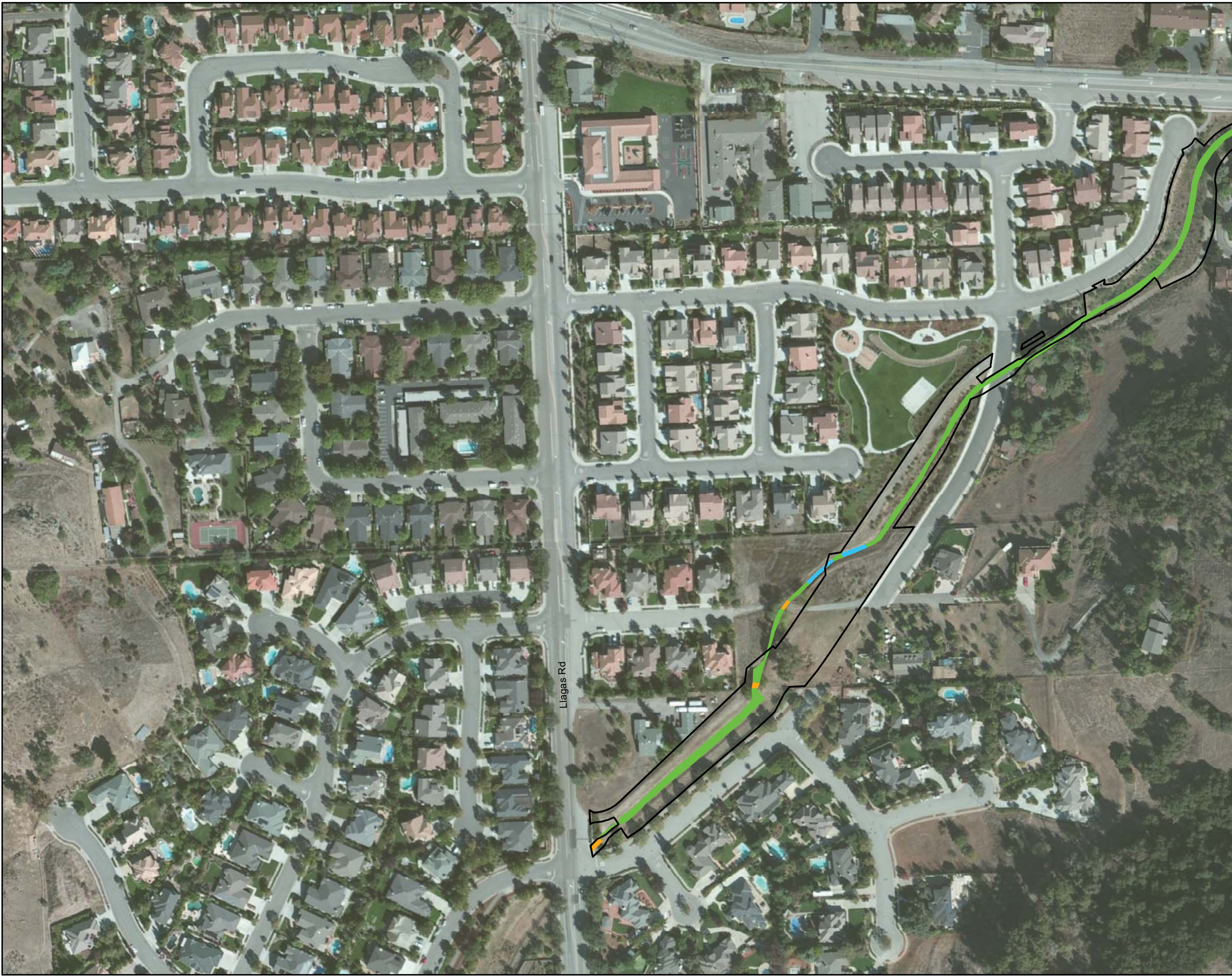
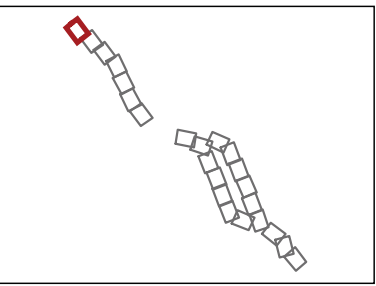
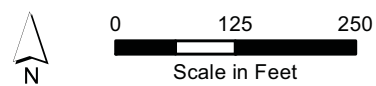
Wetland Waters

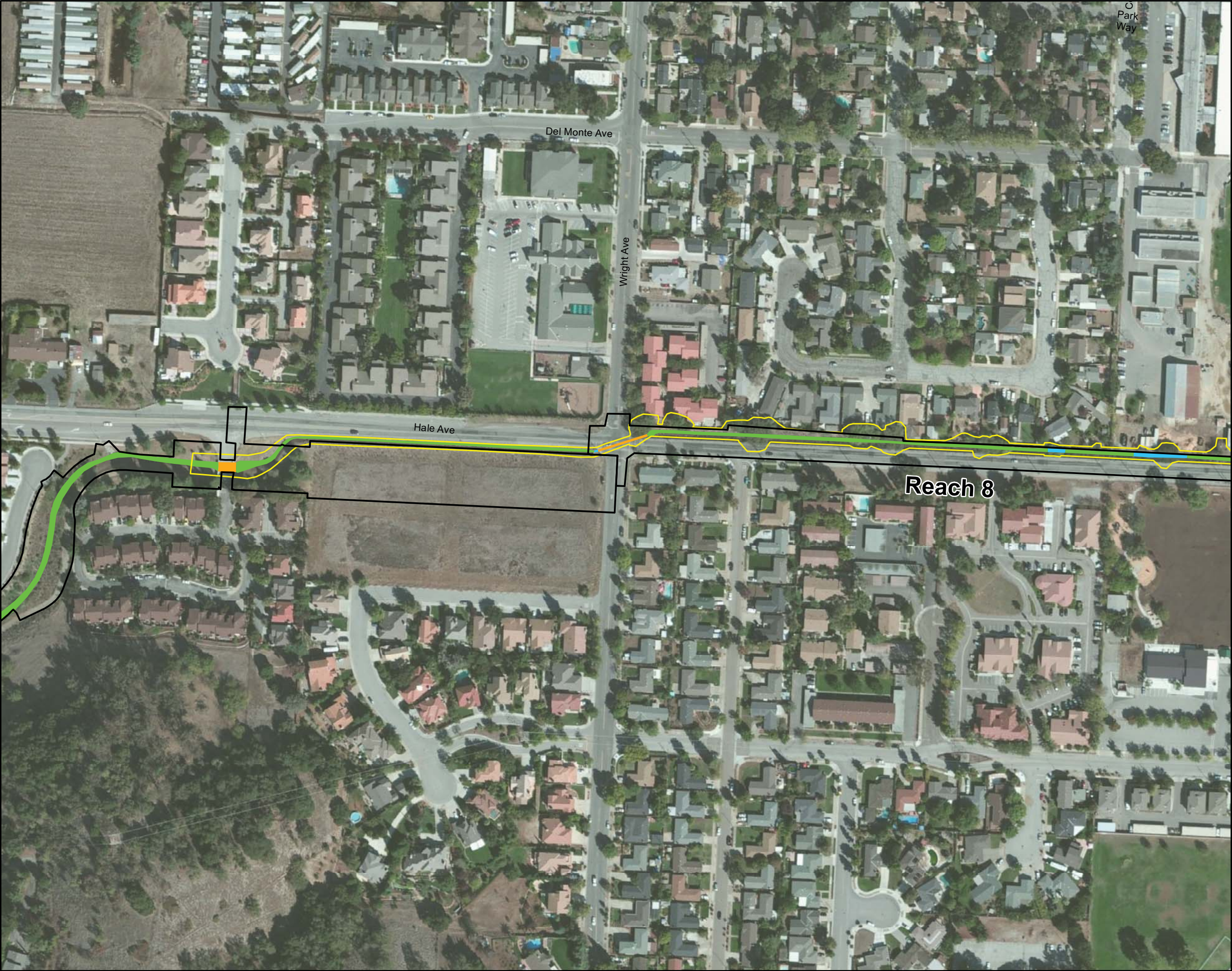
- Perennial Marsh 
- Seasonal Wetland 

Sensitive Habitat

- California Sycamore Woodland 











Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a



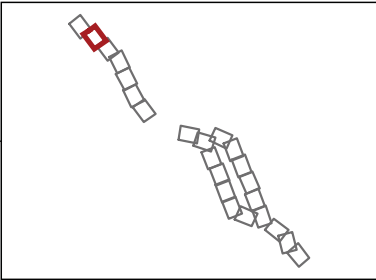
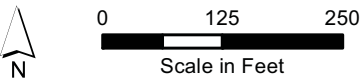


Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland
Map 2 of 23

Legend











- Reach Break 
- Delineation Study Area 
- Project Study Area 
- USACE Jurisdictional Waters of the US**
- Non-wetland Waters**
- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a

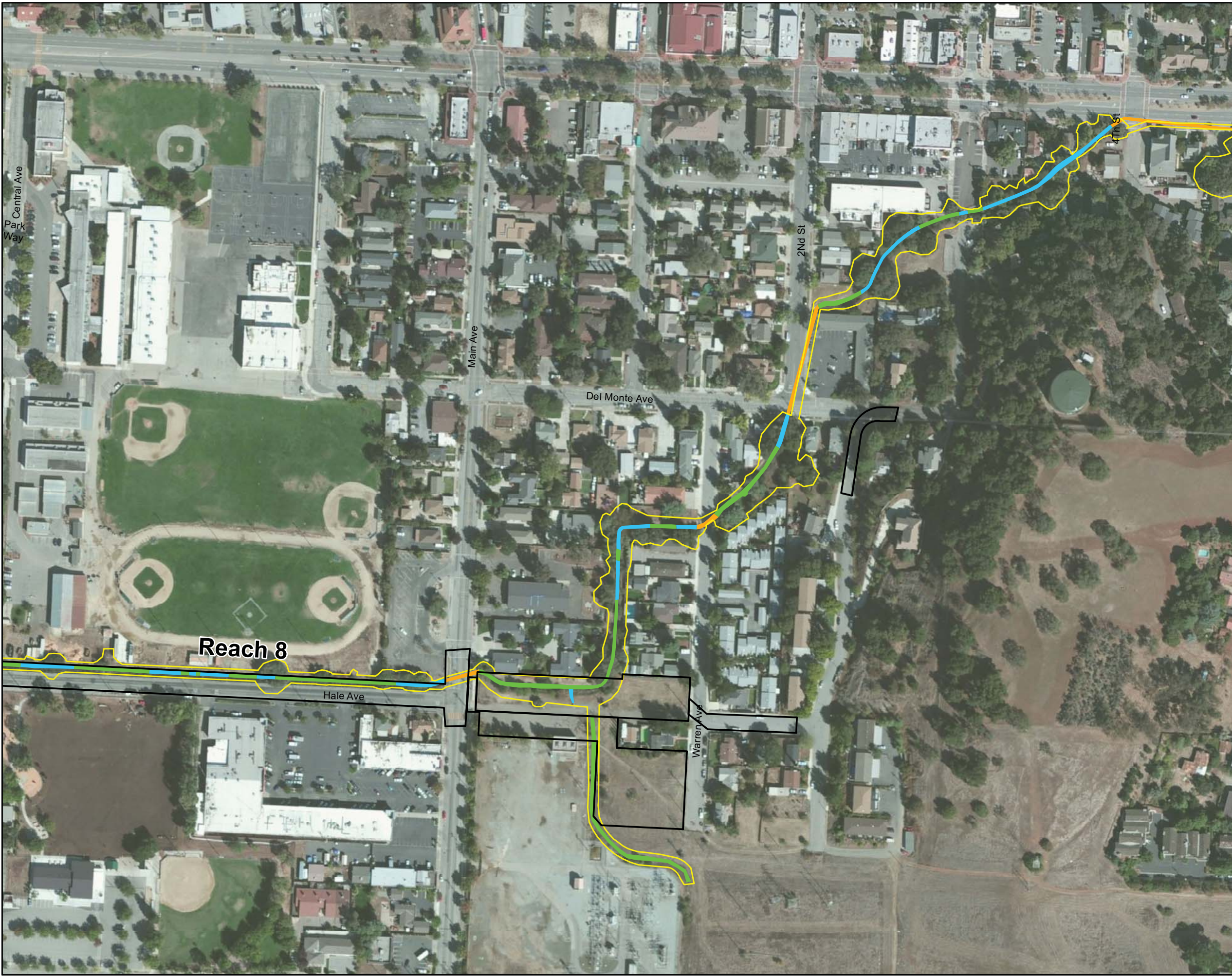
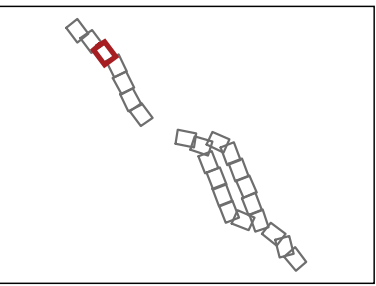
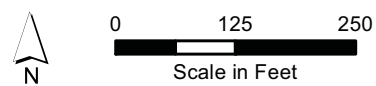


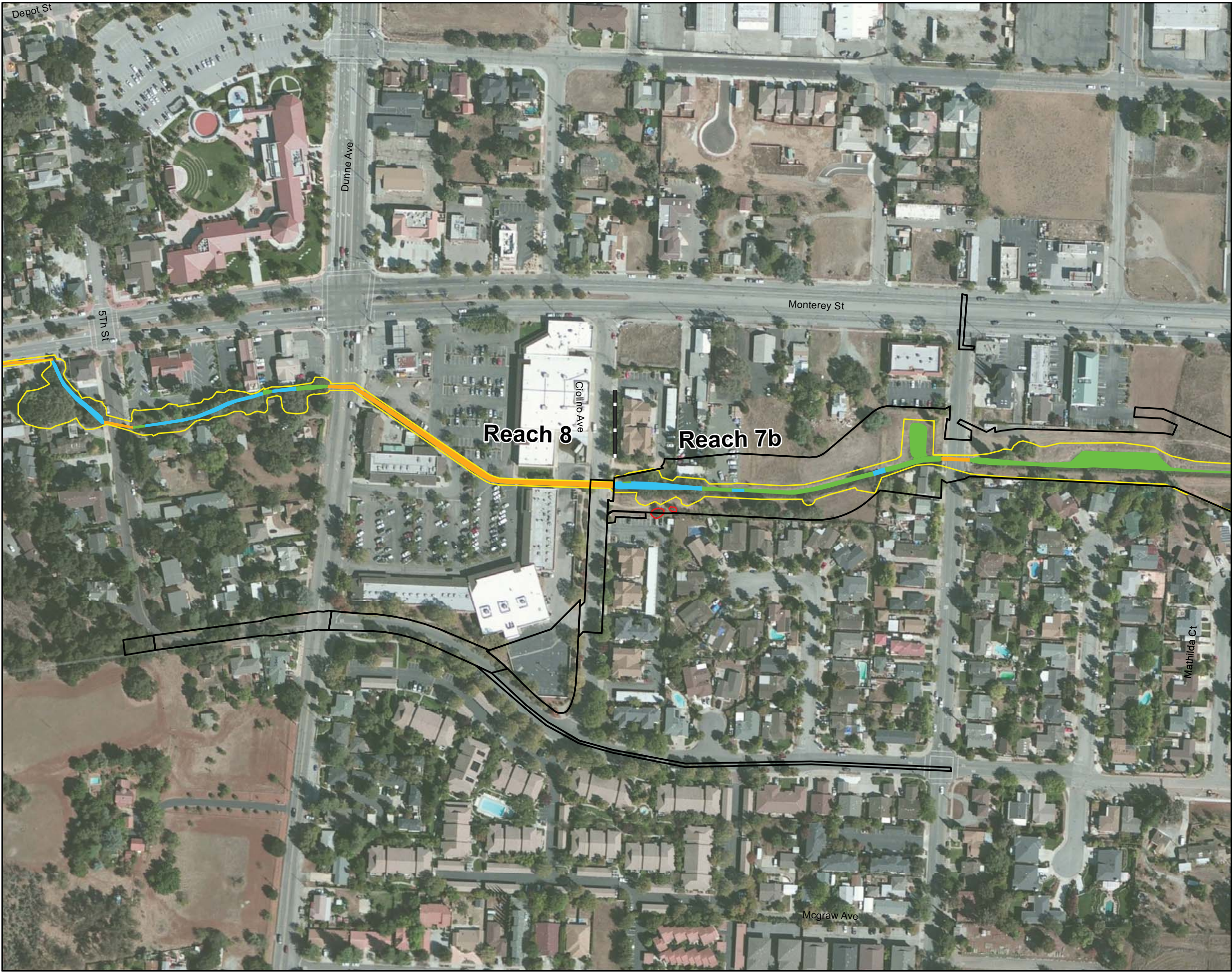
Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland
Map 3 of 23

Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 
- USACE Jurisdictional Waters of the US**
- Non-wetland Waters**
- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 











Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a



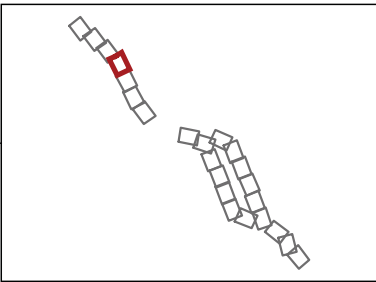
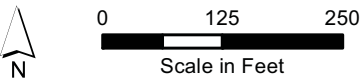


Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland
Map 4 of 23

Legend




- Reach Break 
- Delineation Study Area 
- Project Study Area 
- USACE Jurisdictional Waters of the US**
- Non-wetland Waters**
- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a







Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland
Map 5 of 23



Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 


USACE Jurisdictional Waters of the US
Non-wetland Waters

- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 

Wetland Waters

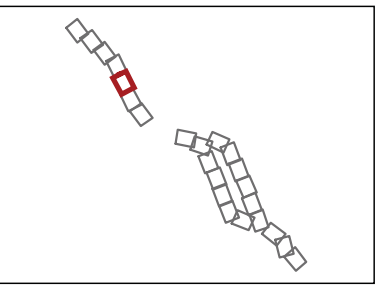
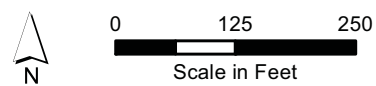
- Perennial Marsh 
- Seasonal Wetland 

Sensitive Habitat

- California Sycamore Woodland 













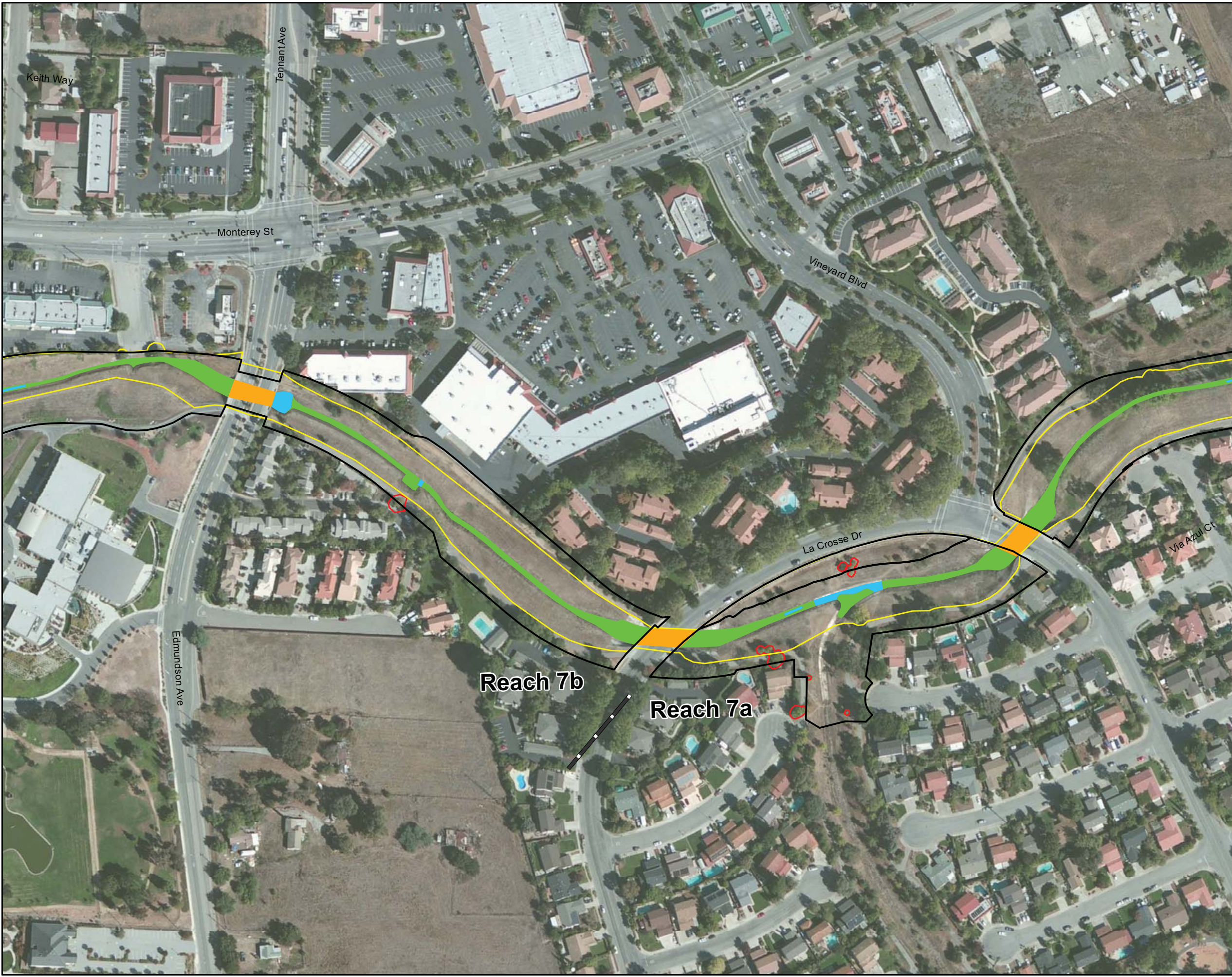
Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a



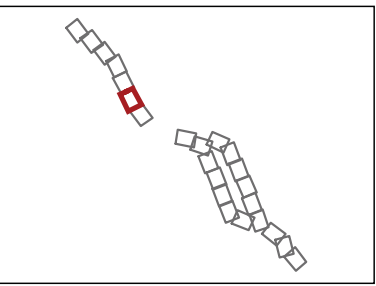
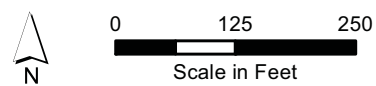
Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland
Map 6 of 23

Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 
- USACE Jurisdictional Waters of the US**
 - Non-wetland Waters**
 - Culverts 
 - Intermittent Streams 
 - Perennial Streams 
 - Pond 
 - Wetland Waters**
 - Perennial Marsh 
 - Seasonal Wetland 
 - Sensitive Habitat**
 - California Sycamore Woodland 













Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a



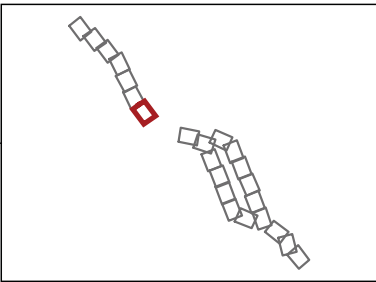
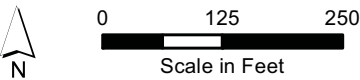


Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland
Map 7 of 23

Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 
- USACE Jurisdictional Waters of the US**
- Non-wetland Waters**
- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 




Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a







Crowner Ave

Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland
Map 8 of 23



Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 


USACE Jurisdictional Waters of the US
Non-wetland Waters

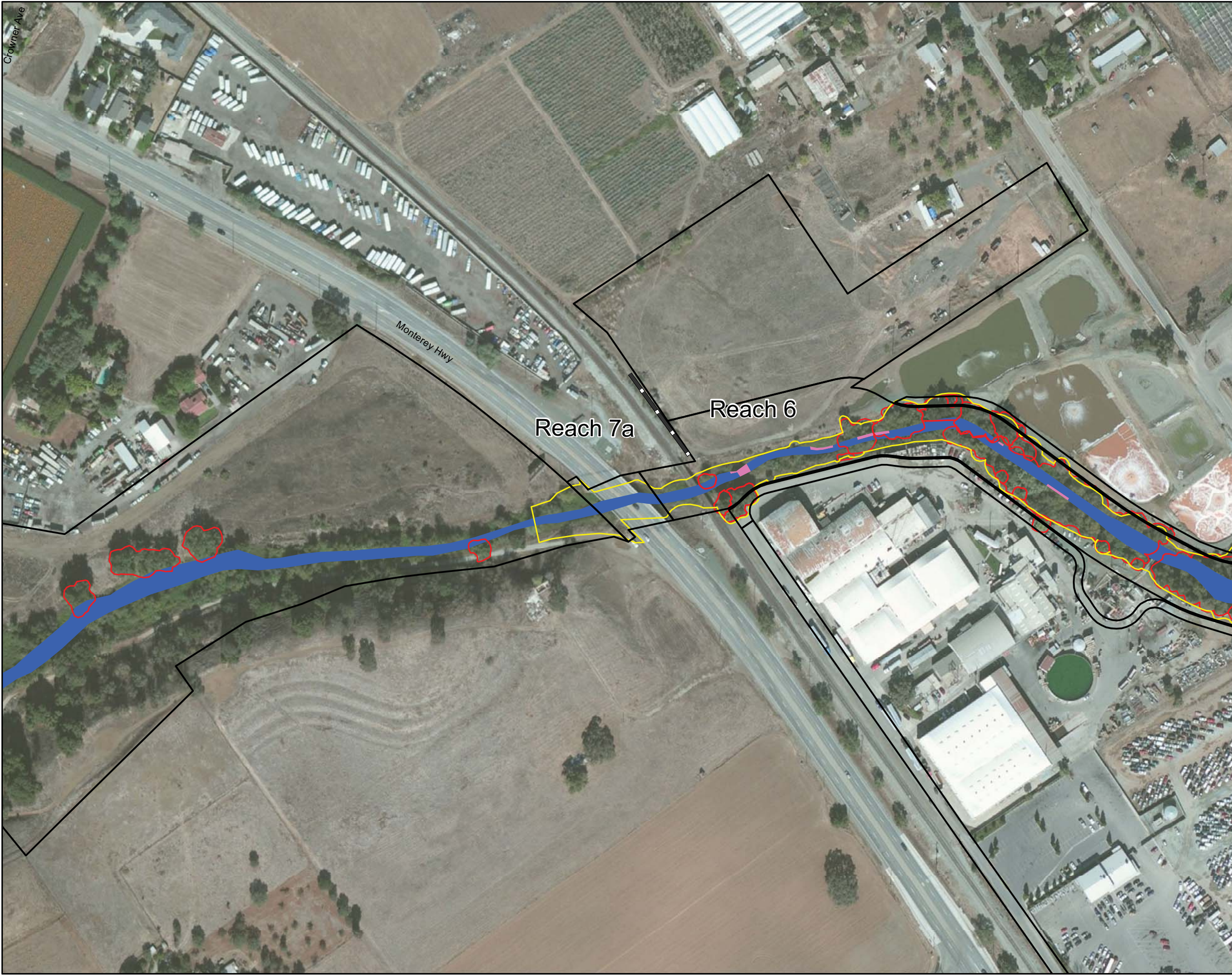
- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 

Wetland Waters

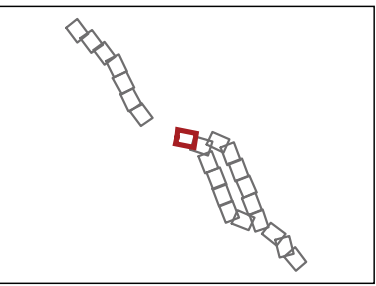
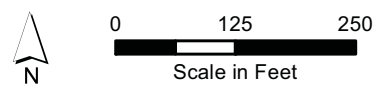
- Perennial Marsh 
- Seasonal Wetland 

Sensitive Habitat

- California Sycamore Woodland 






Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a







Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland
Map 9 of 23



Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 


USACE Jurisdictional Waters of the US
Non-wetland Waters

- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 

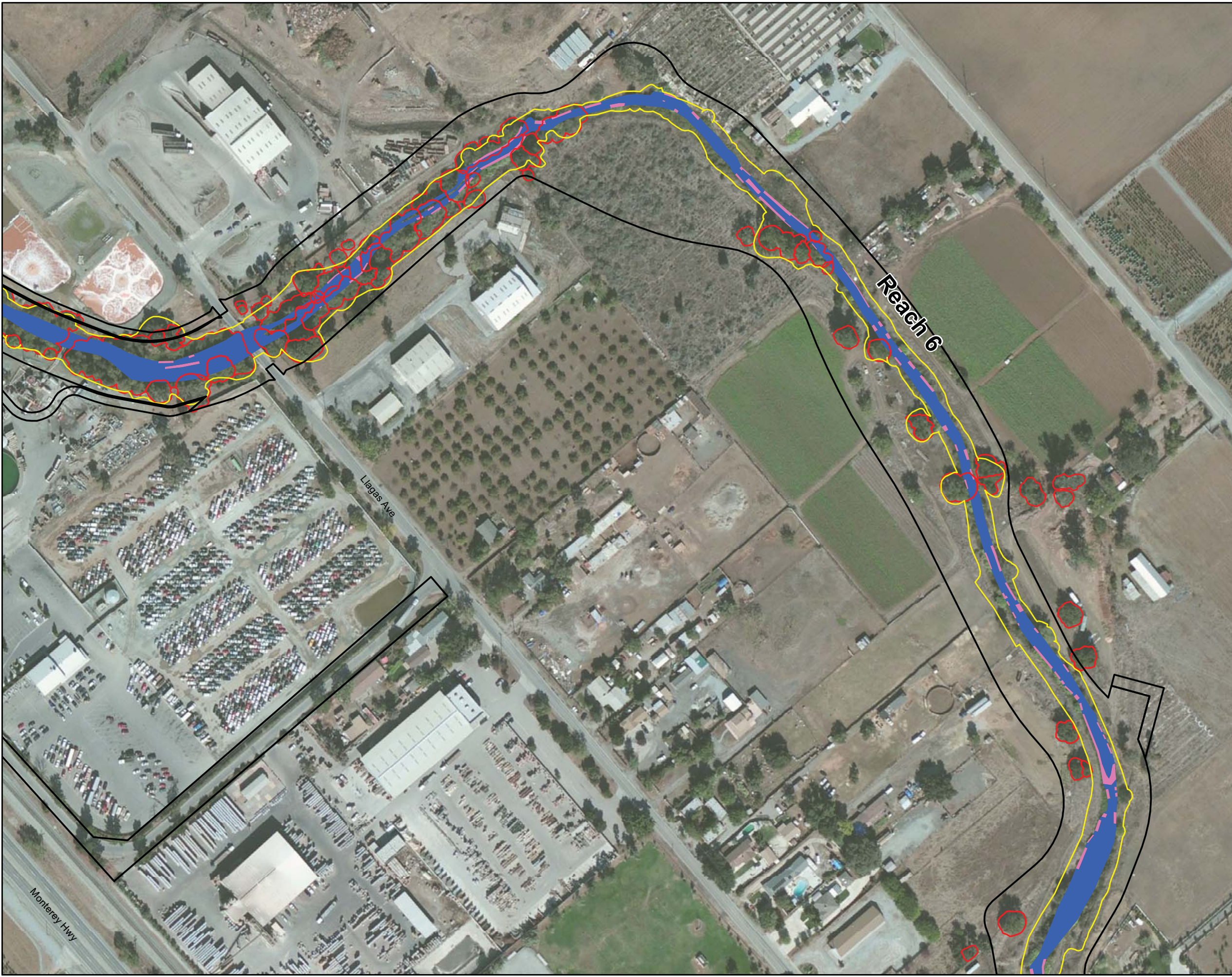
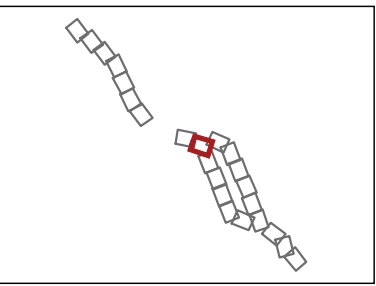
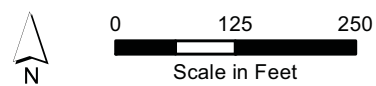
Wetland Waters

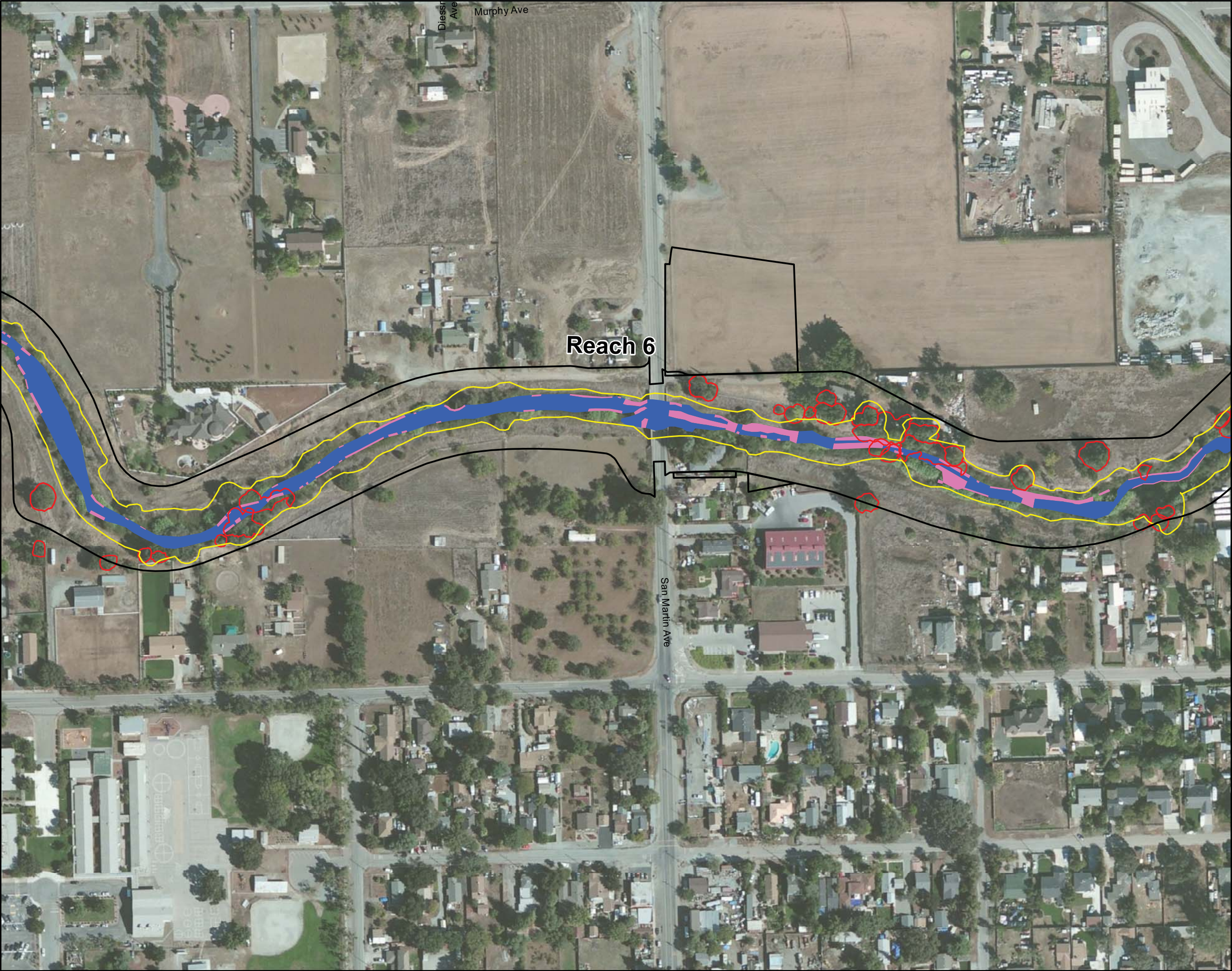
- Perennial Marsh 
- Seasonal Wetland 

Sensitive Habitat

- California Sycamore Woodland 











Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a



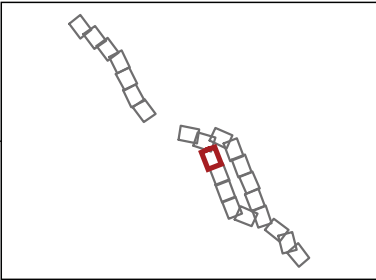
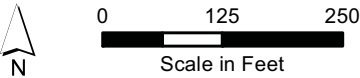


Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

Legend

- Reach Break 
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- Project Study Area 
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- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 











Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a



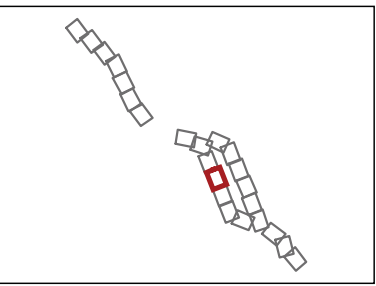
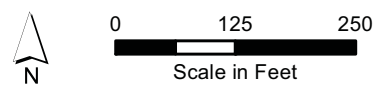


Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

Legend











- Reach Break 
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- Project Study Area 
- USACE Jurisdictional Waters of the US**
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- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a



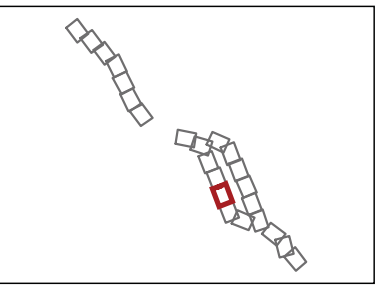
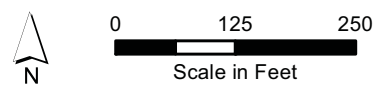
Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

Legend

- Reach Break 
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- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 













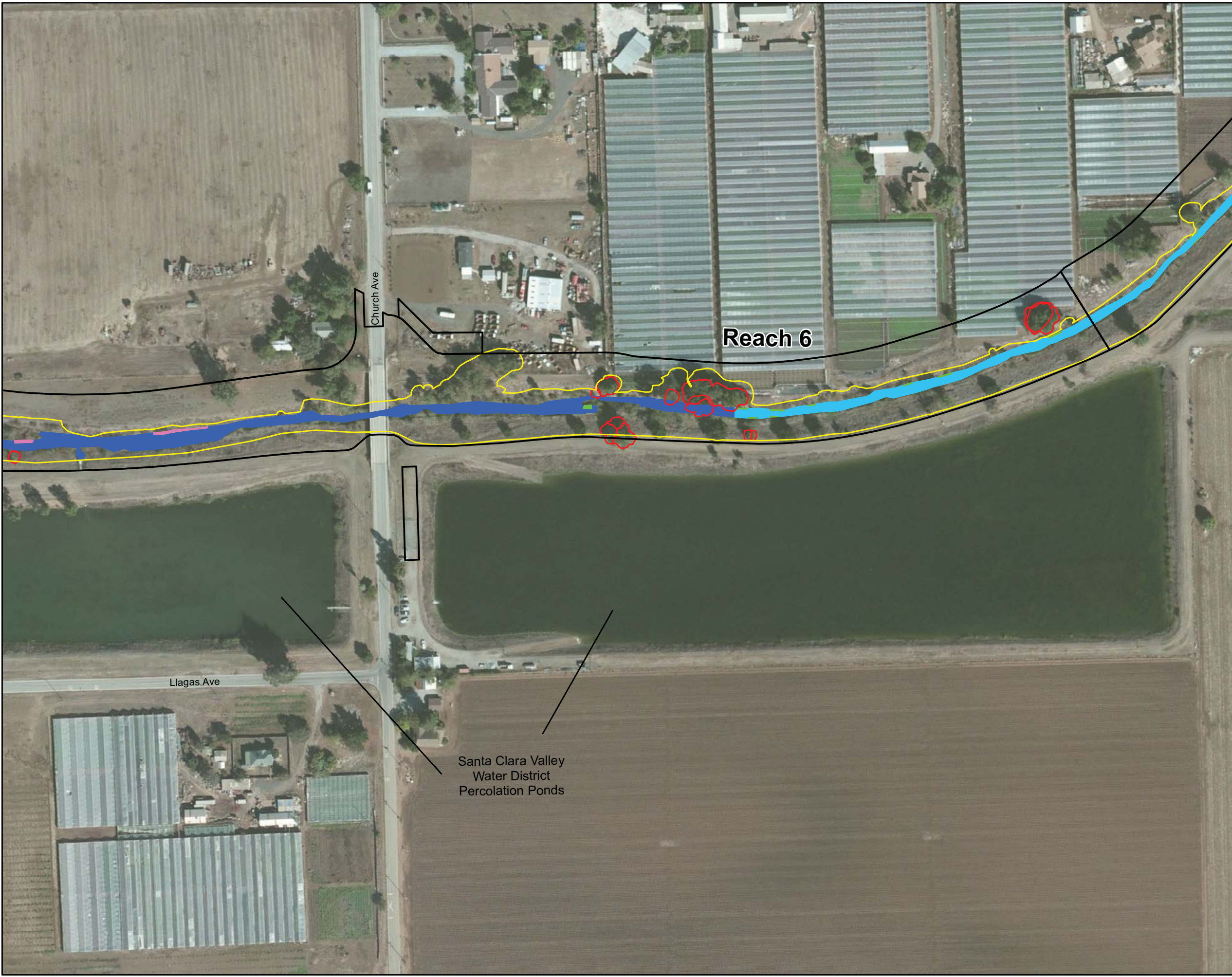
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Source: HT Harvey, 2013a



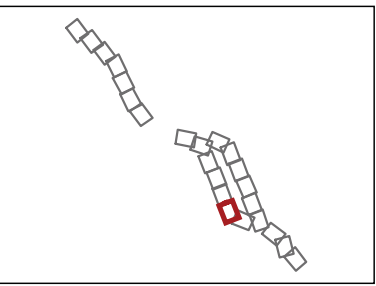
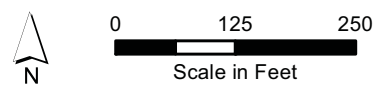
Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 
- USACE Jurisdictional Waters of the US**
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- Intermittent Streams 
- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 













Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a

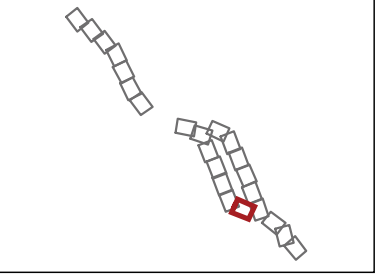
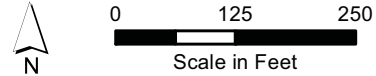


Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

Legend

- Reach Break 
- Delineation Study Area 
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- USACE Jurisdictional Waters of the US**
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- Perennial Streams 
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- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a



Santa Clara Valley
Water District
Percolation Ponds

Reach 5

Reach 6

US Hwy 101











Reach 5



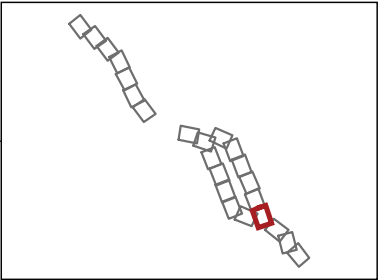
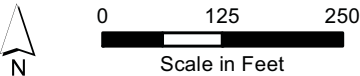
Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

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Legend




- Reach Break 
- Delineation Study Area 
- Project Study Area 
- USACE Jurisdictional Waters of the US**
- Non-wetland Waters**
- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a







Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland



Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 


USACE Jurisdictional Waters of the US
Non-wetland Waters

- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 

Wetland Waters

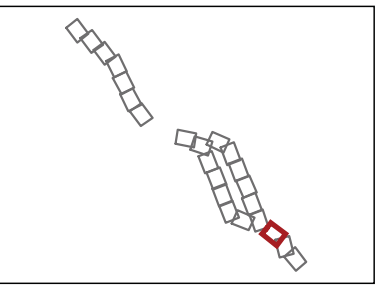
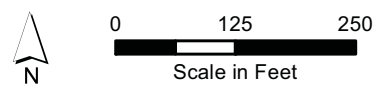
- Perennial Marsh 
- Seasonal Wetland 

Sensitive Habitat

- California Sycamore Woodland 













Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a



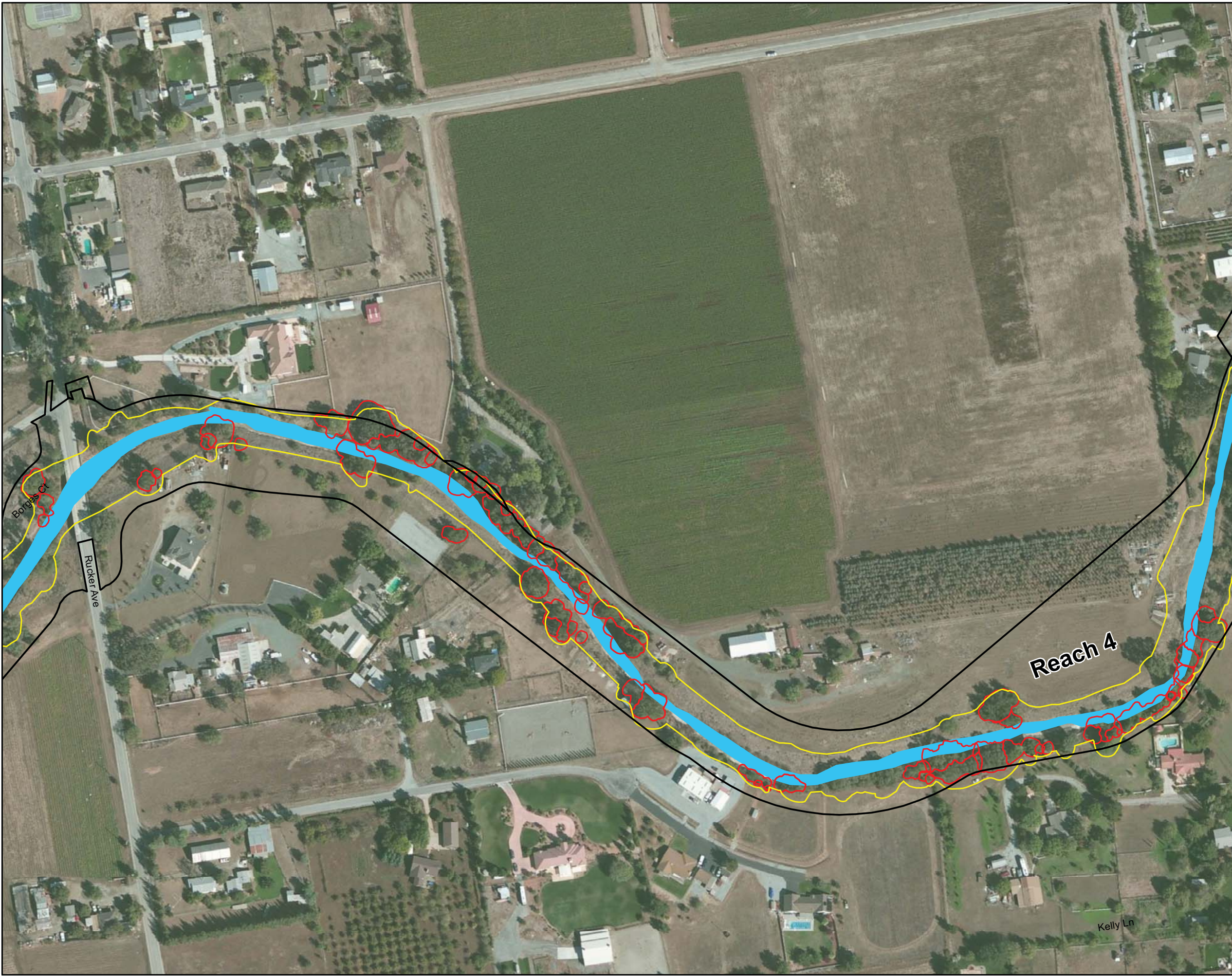
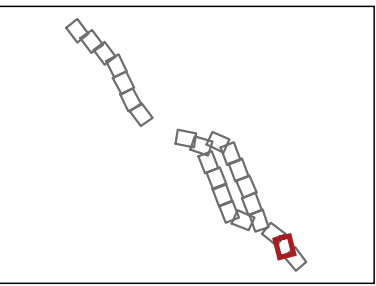
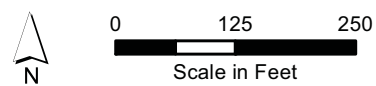
Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

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Legend




- Reach Break 
- Delineation Study Area 
- Project Study Area 
- USACE Jurisdictional Waters of the US**
- Non-wetland Waters**
- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a







Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland



Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 


USACE Jurisdictional Waters of the US
Non-wetland Waters

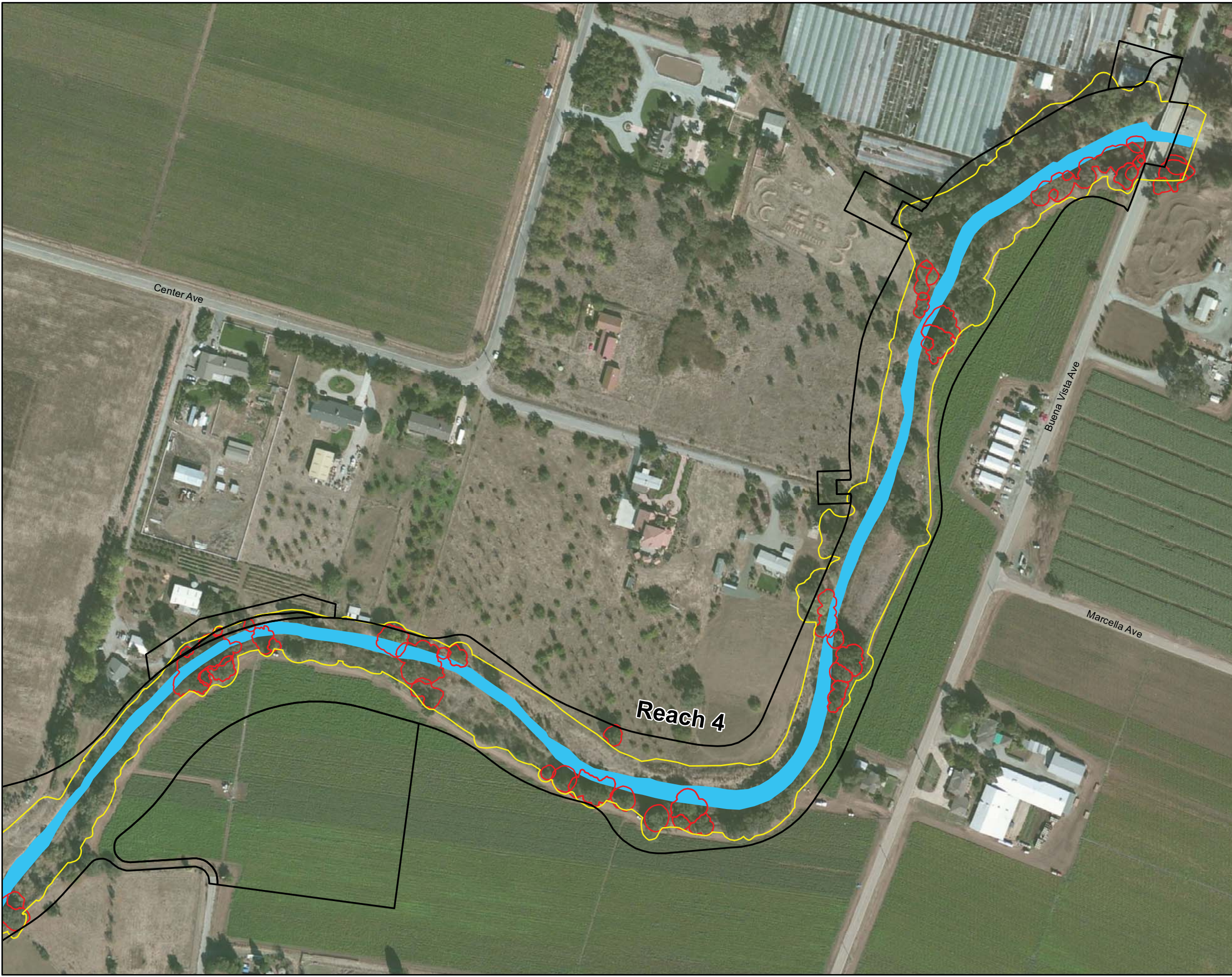
- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 

Wetland Waters

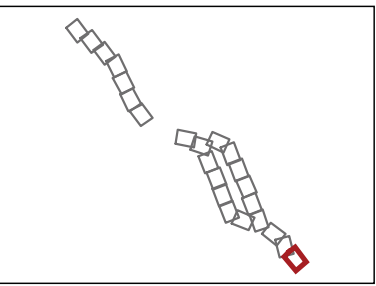
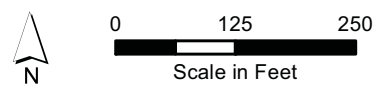
- Perennial Marsh 
- Seasonal Wetland 

Sensitive Habitat

- California Sycamore Woodland 













Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a

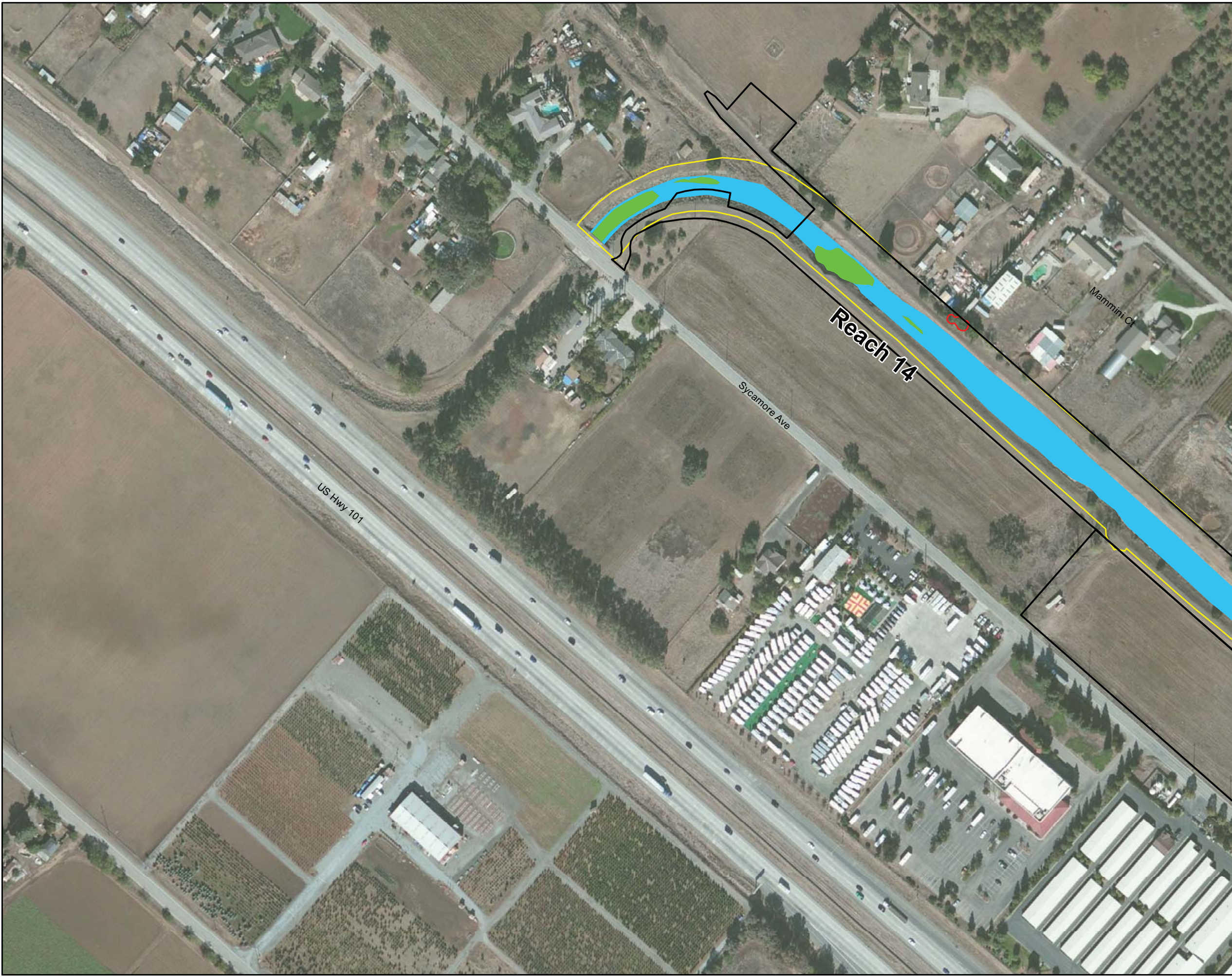
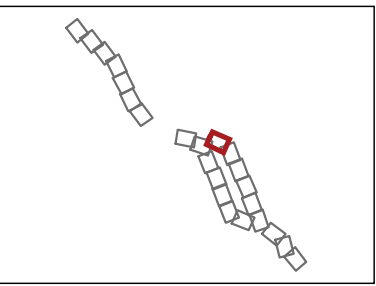
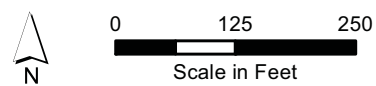


Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 
- USACE Jurisdictional Waters of the US**
- Non-wetland Waters**
- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a















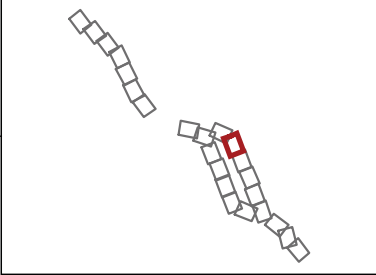
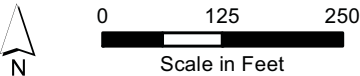
Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

Map 20 of 23

Legend











- Reach Break 
- Delineation Study Area 
- Project Study Area 
- USACE Jurisdictional Waters of the US**
- Non-wetland Waters**
- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a



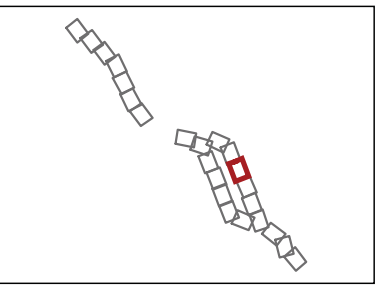
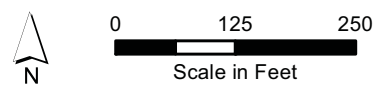
Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

Legend

- Reach Break 
- Delineation Study Area 
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- USACE Jurisdictional Waters of the US**
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- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 

Reach 14




Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a







Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

Map 22 of 23



Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 


USACE Jurisdictional Waters of the US
Non-wetland Waters

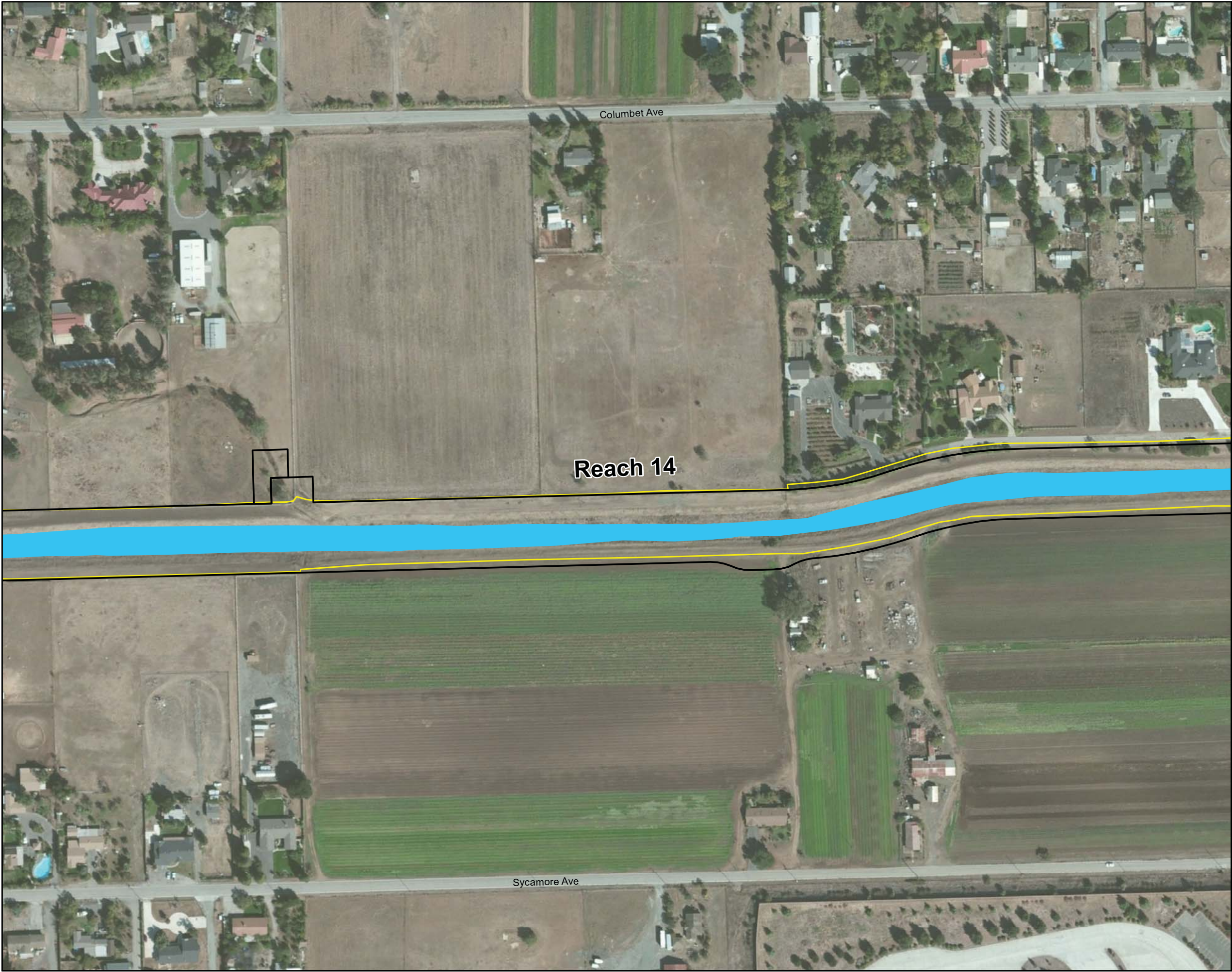
- Culverts 
- Intermittent Streams 
- Perennial Streams 
- Pond 

Wetland Waters

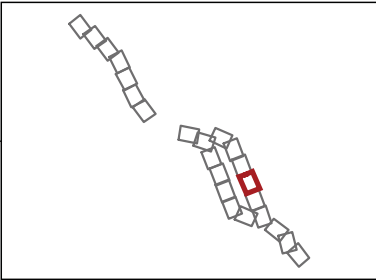
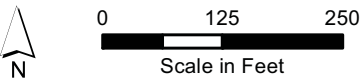
- Perennial Marsh 
- Seasonal Wetland 

Sensitive Habitat

- California Sycamore Woodland 



Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a















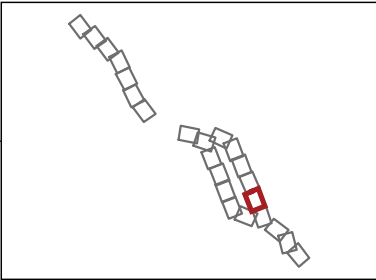
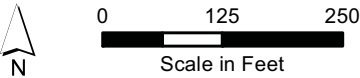
Appendix F
Potential Jurisdictional Waters
and California Sycamore Woodland

Map 23 of 23

Legend

- Reach Break 
- Delineation Study Area 
- Project Study Area 
- USACE Jurisdictional Waters of the US**
- Non-wetland Waters**
- Culverts 
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- Perennial Streams 
- Pond 
- Wetland Waters**
- Perennial Marsh 
- Seasonal Wetland 
- Sensitive Habitat**
- California Sycamore Woodland 

Imagery: Microsoft, 05/12/2010
Source: HT Harvey, 2013a



Draft EIR
Upper Llagas Creek Project

APPENDIX

G

SPECIAL-STATUS PLANT SPECIES POTENTIALLY
OCCURRING IN THE PROJECT VICINITY

G.1 Special-status Plant Species Potentially Occurring in the Project Vicinity

Common Name Scientific Name	Status		General Habitat Requirement and Blooming Period	Potential to Occur in the Study Area
	State	Federal		
Bent-flowered fiddleneck (<i>Amsinckia lunaris</i>)	1B	None	Annual herb that occurs in coastal bluff scrub, cismontane woodlands and valley and foothill grasslands at elevations from 3-500 meters. Blooms: March-June	Unlikely to occur; closest CNDDDB occurrence is >10 miles from the Tunnel Alternative Project Area.
Anderson's manzanita (<i>Arctostaphylos andersonii</i>)	1B	None	Evergreen shrub that occurs in openings and edges of broadleaved upland forest, chaparral, and north coast coniferous forest at elevations from 60-760 meters. Blooms: Nov – May	Unlikely to occur; closest CNDDDB occurrence is >5 miles from the Tunnel Alternative Project Area.
Hooker's manzanita (<i>Arctostaphylos hookeri</i> ssp. <i>hookeri</i>)	1B	None	Evergreen shrub that occurs in closed-cone coniferous forest, chaparral, cismontane woodland, and coastal scrub in sandy soil and sandstone outcrops at elevations from 85-536 meters. Blooms: Jan – Jun	Unlikely to occur; closest CNDDDB occurrence is >10 miles from the Tunnel Alternative Project Area.
Pajaro manzanita (<i>Arctostaphylos pajaroensis</i>)	1B	None	Evergreen shrub that occurs in chaparral in sandy soils at elevations from 30-760 meters. BLOOM: DEC – MAR	Unlikely to occur; suitable habitat is not present in the study area.
Kings Mountain manzanita (<i>Arctostaphylos regismontana</i>)	1B	None	Evergreen shrub that occurs at granitic or sandstone sites in broadleaved upland forest, chaparral, and North Coast coniferous forest at elevations from 305-730 meters. Blooms: JAN – APR	Unlikely to occur; suitable habitat is not present in the study area and this species is known from higher elevations than elevations in the study area.
San Joaquin spearscale (<i>Atriplex joaquiniana</i>)	1B	None	Annual herb that occurs in chenopod scrub, meadows and seeps, playas, and valley and foothill grassland on alkaline substrates at elevations from 1-835 meters. Blooms: APR – OCT	Unlikely to occur; suitable habitat is not present in the study area.
Big-scale balsamroot (<i>Balsamorhiza macrolepis</i> var. <i>macrolepis</i>)	1B	None	Perennial herb that occurs in chaparral, cismontane woodland, valley and foothill grassland, sometimes serpentine, at elevations from 90-1555 meters. Blooms: MAR – JUN	Potential to occur in the study area in Grassland or various woodland habitats. Closest CNDDDB occurrence is approximately 2.6 miles from the Tunnel Alternative Project Area.

Common Name Scientific Name	Status		General Habitat Requirement and Blooming Period	Potential to Occur in the Study Area
	State	Federal		
Round-leaved filaree (<i>California macrophylla</i>)	1B	None	Annual herb that occurs in cismontane woodland, valley and foothill grassland on clay soils at elevations from 15-1,200 meters. Blooms: MAR – MAY	Unlikely to occur; closest CNDDDB occurrence is >10 miles from the Tunnel Alternative Project Area.
Santa Cruz Mountains pussypaws (<i>Calyptridium parryi</i> var. <i>hesseae</i>)	1B	None	Annual herb that occurs in sandy or gravelly soil in openings of chaparral and cismontane woodland at elevations from 305-1530 meters. Blooms: MAY – AUG	Unlikely to occur; closest CNDDDB occurrence is >5 miles from the Tunnel Alternative Project Area and this species is known from higher elevations than elevations in the study area.
Chaparral harebell (<i>Campanula exigua</i>)	1B	None	Annual herb that occurs in chaparral (rocky, usually serpentine) habitats at elevations from 275-1250 meters. Blooms: MAY – JUN	Unlikely to occur; suitable habitat is not present in the study area.
Tiburon paintbrush (<i>Castilleja affinis</i> ssp. <i>neglecta</i>)	CT, 1B	FE	Perennial herb that occurs in valley and foothill grassland on rocky serpentine sites at elevations from 75-400 meters. Blooms: APR – JUN	Unlikely to occur; this species is a strict serpentine endemic (ICF 2012) and serpentine is not present in the study area.
Pink creamsacs (<i>Castilleja rubicundula</i> ssp. <i>rubicundula</i>)	1B	None	Annual herb that occurs in moist serpentine soil in chaparral openings, cismontane woodland, meadows and seeps, and valley and foothill grassland at elevations from 20-910 meters. Blooms: APR – JUN	Unlikely to occur; suitable habitat and serpentine are not present in the study area.
Coyote ceanothus (<i>Ceanothus ferrisiae</i>)	1B	FE	Evergreen shrub that occurs in serpentine soil in chaparral, coastal scrub, and valley and foothill grassland at elevations from 120-460 meters. Blooms: JAN – MAY	Unlikely to occur; suitable serpentine habitat is not present in the study area.
Congdon's tarplant (<i>Centromadia parryi</i> ssp. <i>congdonii</i>)	1B	None	Annual herb that occurs in alkaline and white clay soils in valley and foothill grassland habitats at elevations from 1-230 meters. Blooms: MAY – OCT	Unlikely to occur; suitable habitat is not present in the study area.
Monterey spineflower (<i>Chorizanthe pungens</i> var. <i>pungens</i>)	1B	FT	Annual herb that occurs in sandy chaparral (maritime), cismontane woodland, coastal dunes, coastal scrub, and valley and foothill grassland at elevations from 3-450 meters. Blooms: APR – JUL	Unlikely to occur; suitable habitat is not present in the study area.

Common Name Scientific Name	Status		General Habitat Requirement and Blooming Period	Potential to Occur in the Study Area
	State	Federal		
Robust spineflower (<i>Chorizanthe robusta</i> var. <i>robusta</i>)	1B	FE	Annual herb that occurs in chaparral (maritime), cismontane woodland (openings), coastal dunes, and coastal scrub habitats with sandy or gravelly soil at elevations from 3-300 meters. Blooms: APR – SEP	Unlikely to occur; suitable habitat is not present in the study area.
Mt. Hamilton fountain thistle (<i>Cirsium fontinale</i> var. <i>campylon</i>)	1B	None	Perennial herb that occurs in serpentinite seeps and moist areas within chaparral, cismontane woodland, and valley and foothill grassland at elevations from 100-890 meters. Blooms: FEB – OCT	Unlikely to occur; suitable moist, serpentinite habitat is not present in the study area.
San Francisco collinsia (<i>Collinsia multicolor</i>)	1B	None	Annual herb that occurs in mudstone (decomposed shale) mixed with humus or serpentinite soils, closed-cone coniferous forests, and coastal scrub at elevations from 30-250 meters. Blooms: MAR – MAY	Unlikely to occur; suitable habitat is not present in the study area.
Hospital Canyon larkspur (<i>Delphinium californicum</i> ssp. <i>interius</i>)	1B	None	Perennial herb that occurs in wet, boggy meadows of cismontane woodlands and openings in chaparral and in canyons, at elevations from 230-1095 meters. Blooms: APR – JUN	Unlikely to occur; suitable habitat is not present in the study area.
Santa Clara Valley dudleya (<i>Dudleya abramsii</i> ssp. <i>setchellii</i>)	1B	FE	This perennial occurs in serpentinite and rocky soils and outcrops in cismontane woodland and valley and foothill grassland at elevations from 60-455 meters. No serpentine soils in the study area. Blooms: APR – OCT	Unlikely to occur; suitable serpentinite habitat is not present in the study area. Restricted to rocky, serpentine outcrops and is only found in Santa Clara County in the vicinity of Coyote Valley (ICF 2012).
Brandegee's eriastrum (<i>Eriastrum brandegeae</i>)	1B	None	Annual herb that herb occurs in chaparral and cismontane woodlands on barren volcanic soils in open areas at elevations from 300-1030 meters.. Blooms: APR – AUG	Unlikely to occur; suitable habitat is not present in the study area.
Tracy's eriastrum (<i>Eriastrum tracyi</i>)	1B	None	Annual herb that plant occurs in clay and gravelly soils in chaparral habitats and cismontane woodlands (frequently in openings), at elevations from 315-1125 meters. Blooms: JUN – JUL	Unlikely to occur; closest CNDDDB occurrence is >10 miles from the Tunnel Alternative Project Area.

Common Name Scientific Name	Status		General Habitat Requirement and Blooming Period	Potential to Occur in the Study Area
	State	Federal		
Hoover's button-celery (<i>Eryngium aristulatum</i> var. <i>hooveri</i>)	1B	None	Occurs in vernal pools, alkaline depressions and roadside ditches at elevations from 3-45 meters. Blooms: JUL	Unlikely to occur; suitable habitat is not present in the study area.
Sand-loving wallflower (<i>Erysimum ammophilum</i>)	1B	None	Perennial herb that occurs in sandy soil and openings in chaparral (maritime), coastal dunes, and coastal scrub at elevations from 0-60 meters. Blooms: FEB – JUN	Unlikely to occur; suitable habitat is not present in the study area.
Fragrant fritillary (<i>Fritillaria liliacea</i>)	1B	None	This perennial usually occurs on serpentinite and sometimes in heavy clay soils in cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland, at elevations from 3-410 meters. Blooms: FEB – APR	Potential to occur in the study area in Grassland or woodland habitats; clay soils are present in the study area. Closest CNDDDB occurrence is approximately 6.3 miles from the Tunnel Alternative Project Area.
Monterey gilia (<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>)	CT, 1B	FE	Annual herb that occurs in sandy soil in openings in chaparral (maritime), cismontane woodland, coastal dunes, and coastal scrub at elevations from 0-45 meters. Blooms: APR – JUN	Unlikely to occur; suitable habitat is not present in the study area.
Loma Prieta hoita (<i>Hoita strobilina</i>)	1B	None	Perennial herb that usually occurs on serpentinite, mesic sites in chaparral, cismontane woodland, and riparian woodland at elevations from 30-860 meters.. No serpentine soils in the Project Area. Blooms: MAY – JUL	Potential to occur in the study area in or woodland habitats. Closest CNDDDB occurrence is approximately 1.7 miles from the Tunnel Alternative Project Area.
Santa Cruz tarplant (<i>Holocarpha macradenia</i>)	SE, 1B	FT	Annual herb that occurs in coastal prairie and valley and foothill grasslands, in areas with light, sandy soil or sandy clay. Often occurs with non-natives, and is extant only in Monterey and Santa Cruz Counties and Wildcat Canyon. Found at elevations from 10-260 meters. Blooms: JUN – OCT	Unlikely to occur; suitable habitat is not present in the study area.

Common Name Scientific Name	Status		General Habitat Requirement and Blooming Period	Potential to Occur in the Study Area
	State	Federal		
Kellogg's horkelia (<i>Horkelia cuneata</i> ssp. <i>sericea</i>)	1B	None	Perennial herb that occurs in closed-cone coniferous forest, chaparral (maritime), coastal dunes and sandhills, and coastal scrub in openings with sandy or gravelly soils at elevations from 10-200 meters. Blooms: APR – SEP	Unlikely to occur; suitable habitat is not present in the study area.
Contra Costa goldfields (<i>Lasthenia conjugens</i>)	1B	FE	Annual herb that occurs in cismontane woodland, alkaline playas, valley and foothill grassland, and vernal pools, often on mesic sites, at elevations from 0-470 meters. Blooms: MAR – JUN	Unlikely to occur; suitable habitat is not present in the study area.
Legenere (<i>Legenere limosa</i>)	1B	None	Annual herb that occurs in vernal pools at elevations from 1-880 meters. Blooms: APR – JUN	Unlikely to occur; suitable habitat is not present in the study area.
Mt. Hamilton coreopsis (<i>Leptosyne hamiltonii</i>)	1B	None	Annual herb that occurs in rocky talus soils in cismontane woodlands with open southwest exposure, ranging at elevations from 550-1300 meters. Blooms: MAR – MAY	Unlikely to occur; suitable habitat is not present in the study area.
Smooth lessingia (<i>Lessingia micradenia</i> var. <i>glabrata</i>)	1B	None	Annual herb that occurs in serpentinite soil, often along roadsides in chaparral and cismontane woodland at elevations from 120-420 meters. Blooms: JUL – NOV	Unlikely to occur; suitable moist, serpentinite habitat is not present in the study area.
Mt. Hamilton lomatium (<i>Lomatium observatorium</i>)	1B	None	Perennial herb that occurs in sedimentary and volcanic soils in cismontane woodlands (often associated with oaks and Coulter pines) at elevations from 1219-13030 meters. Blooms: MAR – MAY	Unlikely to occur; suitable habitat is not present in the study area.
Showy golden madia (<i>Madia radiata</i>)	1B	None	Annual herb that occurs on clay soils in cismontane woodland and valley and foothill grassland at elevations from 25-900 meters. Blooms: MAR – MAY	Unlikely to occur; closest CNDDDB occurrence is >10 miles from the Tunnel Alternative Project Area.
Arcuate bush-mallow (<i>Malacothamnus arcuatus</i>)	1B	None	Evergreen shrub that occurs on gravelly soils and alluvium in chaparral and cismontane woodland at elevations from 15-355 meters. Blooms: APR – SEP	Potential to occur in the study area in woodland habitats. Closest CNDDDB occurrence is approximately 2.0 miles from the Tunnel Alternative Project Area.

Common Name <i>Scientific Name</i>	Status		General Habitat Requirement and Blooming Period	Potential to Occur in the Study Area
	State	Federal		
Hall's bush-mallow (<i>Malacothamnus hallii</i>)	1B	None	Evergreen shrub that occurs in chaparral and coastal scrub, sometimes on serpentinite soils, at elevations from 10-760 meters. Blooms: MAY – OCT	Unlikely to occur; suitable habitat is not present in the study area.
Oregon meconella (<i>Meconella oregana</i>)	1B	None	Annual herb that occurs in coastal prairie and scrub in open moist places at elevations from 250-620 meters. Blooms: MAR – APR	Unlikely to occur; suitable habitat is not present in the study area.
Woodland woollythreads (<i>Monolopia gracilens</i>)	1B	None	This fire adapted annual occurs in serpentine soils in broadleaved upland forest openings, chaparral openings, cismontane woodland, North Coast coniferous forest openings, and valley and foothill grassland at elevations from 100-1200 meters. Blooms: FEB – JUL	Unlikely to occur; suitable moist, serpentinite habitat is not present in the study area.
Dudley's lousewort (<i>Pedicularis dudleyi</i>)	Rare, 1B	None	Perennial herb that occurs in chaparral (maritime), cismontane woodland, North Coast coniferous forest (such as old growth redwoods), and valley and foothill grassland at elevations from 60-900 meters. Blooms: APR – JUN	Unlikely to occur; suitable habitat is not present in the study area.
Santa Cruz Mountains beardtongue (<i>Penstemon rattanii</i> var. <i>kleei</i>)	1B	None	Perennial herb that occurs on sandy slopes in chaparral, lower montane coniferous forest, North Coast coniferous forest (especially at forest/chaparral ecotones) at elevations from 400-1100 meters. Blooms: MAY – JUN	Unlikely to occur; suitable habitat is not present in the study area.
San Benito pentachaeta (<i>Pentachaeta exilis</i> ssp. <i>aeolica</i>)	1B	None	Annual herb that herb occurs on grassy areas in cismontane woodlands, and valley and foothill grassland habitats at elevations from 640-855 meters. Blooms: MAR – MAY	Unlikely to occur; closest CNDDB occurrence is >10 miles from the study area.
Mt. Diablo phacelia (<i>Phacelia phacelioides</i>)	1B	None	Annual herb that occurs in chaparral and cismontane woodlands on rock outcrop/talus slopes, sometimes serpentine soils, and edges of trails, between at elevations from 500-1370 meters. Blooms: APR – MAY	Unlikely to occur; suitable habitat is not present in the study area.

Common Name Scientific Name	Status		General Habitat Requirement and Blooming Period	Potential to Occur in the Study Area
	State	Federal		
Monterey pine (<i>Pinus radiata</i>)	1B	None	Occurs in closed-cone coniferous forest and cismontane woodland habitats at elevations from 25-185 meters. Widely planted ornamental tree.	Unlikely to occur; suitable habitat for local native populations is not present in the study area.
Yadon's rein orchid (<i>Piperia yadonii</i>)	1B	FE	Perennial herb that occurs in sandy soil in coastal bluff scrub, closed-cone coniferous forest, and chaparral (maritime) habitats at elevations from 10-510 meters. Blooms: FEB – AUG	Unlikely to occur; suitable habitat is not present in the study area.
Choris' popcorn-flower (<i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i>)	1B	None	Annual herb that occurs in mesic habitats, chaparral, coastal prairie, and coastal scrub at elevations from 15-160 meters. Blooms: MAR – JUN	Unlikely to occur; suitable habitat is not present in the study area.
Hairless popcorn-flower (<i>Plagiobothrys glaber</i>)	1A	None	Annual herb that herb occurs in meadows, seeps, marshes, swamps, coastal salt marsh and alkaline meadows at elevations from 15-180 meters. Blooms: MAR – MAY	Unlikely to occur; suitable habitat is not present in the study area.
Hooked popcorn-flower (<i>Plagiobothrys uncinatus</i>)	1B	None	Annual herb that herb occurs in sandy soils, outcrops and canyon walls in chaparral, cismontane woodlands, and valley and foothill grassland habitats at elevations from 300-760 meters. Blooms: APR – MAY	Unlikely to occur; suitable habitat is not present in the study area.
Rock sanicle (<i>Sanicula saxatilis</i>)	Rare, 1B	None	Perennial herb that occurs in broadleafed upland forest, chaparral, and valley and foothill grassland habitats on bedrock outcrops and talus slopes at elevations from 615-1215 meters. Blooms: APR – MAY	Unlikely to occur; suitable habitat is not present in the study area.
Metcalf Canyon jewel-flower (<i>Streptanthus albidus</i> ssp. <i>albidus</i>)	1B	FE	Annual herb that occurs in serpentinite soil in valley and foothill grassland (open, dry, grassy areas) at elevations from 45-800 meters. Blooms: APR – JUL	Unlikely to occur; suitable serpentinite habitat is not present in the study area. This species is a serpentine endemic (ICF 2012).
Most beautiful jewel-flower (<i>Streptanthus albidus</i> ssp. <i>peramoenus</i>)	1B	None	Annual herb that occurs in chaparral, cismontane woodland, and valley and foothill grassland habitats, often on serpentine outcrops, ridges and slopes at elevations from 120-730 meters Blooms: APR – SEP	Unlikely to occur; suitable serpentinite habitat is not present in the study area. This species is almost entirely restricted to serpentinite outcrops or serpentinite soils.

Common Name Scientific Name	Status		General Habitat Requirement and Blooming Period	Potential to Occur in the Study Area
	State	Federal		
Mt. Hamilton jewel-flower (<i>Streptanthus callistus</i>)	1B	None	Annual herb that occurs in chaparral and cismontane woodland (often with grey pine or black oak) at elevations from 600-790 meters. Blooms: APR – MAY	Unlikely to occur; suitable habitat is not present in the study area.
Showy rancheria clover, two-forked clover (<i>Trifolium amoenum</i>)	1B	FE	Annual herb that occurs in valley and foothill grasslands, and coastal bluff scrub. It may occur on serpentine soils, open sunny sites, swales, and has recently been sighted along a roadside and eroding cliff face. Grows at elevations from 5-560 meters. Blooms: APR – JUN	Unlikely to occur; closest CNDDDB occurrence is >10 miles from the Tunnel Alternative Project Area.
Santa Cruz clover (<i>Trifolium buckwestiorum</i>)	1B	None	Annual herb that occurs in gravelly soils on moist grassland on the margins of broadleafed upland forest, cismontane woodland, and coastal prairie at elevations from 105-610 meters. Blooms: APR – OCT	Unlikely to occur; suitable habitat is not present in the study area.
Saline clover (<i>Trifolium hydrophilum</i>)	1B	None	Annual herb that occurs in marshes and swamps, valley and foothill grassland (mesic, alkaline), and vernal pools at elevations from 0-300 meters. Blooms: APR – JUN	Unlikely to occur; suitable habitat is not present in the study area.

Status Code Definitions:

- 1A = Presumed extinct in California; California Rare Plant Rank (RPR)
- 1B = Rare or Endangered in California and elsewhere; California Rare Plant Rank (RPR)
- CT = California Threatened under the CESA.
- FE = Federally Endangered; listed by USFWS as in danger of extinction throughout all or a significant portion of its range.
- FT = Federally Threatened; listed by USFWS as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- Rare = State listed as Rare
- SE = California Endangered Status under the CESA

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Upper Llagas Creek Project

APPENDIX

H

CNDDDB OCCURRENCES IN THE
PROJECT VICINITY

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1 <i>Adela oplerella</i> Opler's longhorn moth	IILEE0G040			G2G3	S2S3	
2 <i>Agelaius tricolor</i> tricolored blackbird	ABPBXB0020			G2G3	S2	SC
3 <i>Ambystoma californiense</i> California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3	SC
4 <i>Ambystoma macrodactylum croceum</i> Santa Cruz long-toed salamander	AAAAA01082	Endangered	Endangered	G5T1	S1	
5 <i>Anniella pulchra nigra</i> black legless lizard	ARACC01011			G3G4T2T3 Q	S2	SC
6 <i>Antrozous pallidus</i> pallid bat	AMACC10010			G5	S3	SC
7 <i>Aquila chrysaetos</i> golden eagle	ABNKC22010			G5	S3	
8 <i>Arctostaphylos andersonii</i> Anderson's manzanita	PDERI04030			G2	S2?	1B.2
9 <i>Arctostaphylos hookeri ssp. hookeri</i> Hooker's manzanita	PDERI040J1			G3T2?	S2?	1B.2
10 <i>Arctostaphylos pajaroenensis</i> Pajaro manzanita	PDERI04100			G2	S2.1	1B.1
11 <i>Arctostaphylos regismontana</i> Kings Mountain manzanita	PDERI041C0			G2	S2.2	1B.2
12 <i>Ardea herodias</i> great blue heron	ABNGA04010			G5	S4	
13 <i>Athene cunicularia</i> burrowing owl	ABNSB10010			G4	S2	SC
14 <i>Atriplex joaquinana</i> San Joaquin spearscale	PDCHE041F3			G2	S2	1B.2
15 <i>Balsamorhiza macrolepis</i> big-scale balsamroot	PDAST11061			G2	S2	1B.2
16 <i>Calyptridium parryi var. hesseae</i> Santa Cruz Mountains pussypaws	PDPOR09052			G3G4T2	S2	1B.1
17 <i>Campanula exigua</i> chaparral harebell	PDCAM020A0			G2	S2.2	1B.2
18 <i>Castilleja affinis ssp. neglecta</i> Tiburon paintbrush	PDSCR0D013	Endangered	Threatened	G4G5T1	S1	1B.2
19 <i>Castilleja rubicundula ssp. rubicundula</i> pink creamsacs	PDSCR0D482			G5T2	S2	1B.2
20 <i>Ceanothus ferrisiae</i> Coyote ceanothus	PDRHA041N0	Endangered		G2	S2	1B.1
21 <i>Central Dune Scrub</i>	CTT21320CA			G2	S2.2	
22 <i>Centromadia parryi ssp. congdonii</i> Congdon's tarplant	PDAST4R0P1			G4T2	S2	1B.2
23 <i>Charadrius alexandrinus nivosus</i> western snowy plover	ABNNB03031	Threatened		G4T3	S2	SC

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
24 <i>Chorizanthe pungens</i> var. <i>pungens</i> Monterey spineflower	PDPGN040M2	Threatened		G2T2	S2	1B.2
25 <i>Chorizanthe robusta</i> var. <i>robusta</i> robust spineflower	PDPGN040Q2	Endangered		G2T1	S1	1B.1
26 <i>Cirsium fontinale</i> var. <i>campylon</i> Mt. Hamilton fountain thistle	PDAST2E163			G2T2	S2	1B.2
27 <i>Clarkia concinna</i> ssp. <i>automixa</i> Santa Clara red ribbons	PDONA050A1			G5?T3	S3.3	4.3
28 <i>Coastal and Valley Freshwater Marsh</i>	CTT52410CA			G3	S2.1	
29 <i>Collinsia multicolor</i> San Francisco collinsia	PDSCR0H0B0			G2	S2.2	1B.2
30 <i>Cypseloides niger</i> black swift	ABNUA01010			G4	S2	SC
31 <i>Danaus plexippus</i> monarch butterfly	IILEPP2010			G5	S3	
32 <i>Dipodomys venustus venustus</i> Santa Cruz kangaroo rat	AMAFD03042			G4T1	S1	
33 <i>Dudleya abramsii</i> ssp. <i>setchellii</i> Santa Clara Valley dudleya	PDCRA040Z0	Endangered		G3T2	S2	1B.1
34 <i>Elanus leucurus</i> white-tailed kite	ABNKC06010			G5	S3	
35 <i>Emys marmorata</i> western pond turtle	ARAAD02030			G3G4	S3	SC
36 <i>Eryngium aristulatum</i> var. <i>hooveri</i> Hoover's button-celery	PDAP10Z043			G5T2	S2.1	1B.1
37 <i>Erysimum ammophilum</i> sand-loving wallflower	PDBRA16010			G2	S2.2	1B.2
38 <i>Euphydryas editha bayensis</i> Bay checkerspot butterfly	IILEPK4055	Threatened		G5T1	S1	
39 <i>Fritillaria liliacea</i> fragrant fritillary	PMLIL0V0C0			G2	S2	1B.2
40 <i>Gilia tenuiflora</i> ssp. <i>arenaria</i> sand gilia	PDPLM041P2	Endangered	Threatened	G3G4T2	S2	1B.2
41 <i>Hoita strobilina</i> Loma Prieta hoita	PDFAB5Z030			G2	S2	1B.1
42 <i>Holocarpha macradenia</i> Santa Cruz tarplant	PDAST4X020	Threatened	Endangered	G1	S1	1B.1
43 <i>Horkelia cuneata</i> var. <i>sericea</i> Kellogg's horkelia	PDROS0W043			G4T2	S2?	1B.1
44 <i>Lasiurus cinereus</i> hoary bat	AMACC05030			G5	S4?	
45 <i>Legenere limosa</i> legenere	PDCAM0C010			G2	S2.2	1B.1
46 <i>Leptosyne hamiltonii</i> Mt. Hamilton coreopsis	PDAST2L0C0			G2	S2.2	1B.2

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
47 <i>Lessingia micradenia</i> var. <i>glabrata</i> smooth lessingia	PDAST5S062			G2T2	S2	1B.2
48 <i>Malacothamnus aboriginum</i> Indian Valley bush-mallow	PDMAL0Q020			G2	S2	1B.2
49 <i>Malacothamnus arcuatus</i> arcuate bush-mallow	PDMAL0Q0E0			G2Q	S2.2	1B.2
50 <i>Malacothamnus hallii</i> Hall's bush-mallow	PDMAL0Q0F0			G2Q	S2	1B.2
51 <i>Microcina homi</i> Horn's micro-blind harvestman	ILARA47020			G1	S1	
52 <i>Monolopia gracilens</i> woodland woollythreads	PDAST6G010			G2G3	S2S3	1B.2
53 <i>Myotis yumanensis</i> Yuma myotis	AMACC01020			G5	S4?	
54 <i>Navarretia prostrata</i> prostrate vernal pool navarretia	PDPLM0C0Q0			G2	S2	1B.1
55 <i>Neotoma fuscipes annectens</i> San Francisco dusky-footed woodrat	AMAFF08082			G5T2T3	S2S3	SC
56 <i>Oncorhynchus mykiss irideus</i> steelhead - central California coast DPS	AFCHA0209G	Threatened		G5T2Q	S2	
57 <i>Oncorhynchus mykiss irideus</i> steelhead - south/central California coast DPS	AFCHA0209H	Threatened		G5T2Q	S2	SC
58 <i>Optioservus canus</i> Pinnacles optioservus riffle beetle	IICOL5E020			G1	S1	
59 <i>Pedicularis dudleyi</i> Dudley's lousewort	PDSCR1K0D0		Rare	G2	S2.2	1B.2
60 <i>Penstemon rattanii</i> var. <i>kleei</i> Santa Cruz Mountains beardtongue	PDSCR1L5B1			G4T2	S2.2	1B.2
61 <i>Phrynosoma blainvillii</i> coast horned lizard	ARACF12100			G4G5	S3S4	SC
62 <i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i> Choris' popcornflower	PDBOR0V061			G3T2Q	S2.2	1B.2
63 <i>Plagiobothrys glaber</i> hairless popcornflower	PDBOR0V0B0			GH	SH	1A
64 <i>Rana boylei</i> foothill yellow-legged frog	AAABH01050			G3	S2S3	SC
65 <i>Rana draytonii</i> California red-legged frog	AAABH01022	Threatened		G4T2T3	S2S3	SC
66 <i>Riparia riparia</i> bank swallow	ABPAU08010		Threatened	G5	S2S3	
67 <i>Sanicula saxatilis</i> rock sanicle	PDAP11Z0H0		Rare	G2	S2	1B.2
68 <i>Serpentine Bunchgrass</i>	CTT42130CA			G2	S2.2	
69 <i>Streptanthus albidus</i> ssp. <i>albidus</i> Metcalf Canyon jewel-flower	PDBRA2G011	Endangered		G2T1	S1	1B.1

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
70 <i>Streptanthus albidus</i> ssp. <i>peramoenus</i> most beautiful jewel-flower	PDBRA2G012			G2T2	S2.2	1B.2
71 <i>Streptanthus callistus</i> Mt. Hamilton jewel-flower	PDBRA2G0A0			G1	S1	1B.3
72 <i>Sycamore Alluvial Woodland</i>	CTT62100CA			G1	S1.1	
73 <i>Taxidea taxus</i> American badger	AMAJF04010			G5	S4	SC
74 <i>Trifolium buckwestiorum</i> Santa Cruz clover	PDFAB402W0			G1	S1.1	1B.1
75 <i>Trifolium hydrophilum</i> saline clover	PDFAB400R5			G2	S2	1B.2
76 <i>Vireo bellii pusillus</i> least Bell's vireo	ABPBW01114	Endangered	Endangered	G5T2	S2	
77 <i>Vulpes macrotis mutica</i> San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2T3	S2S3	

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APPENDIX

I

USFWS SPECIES LIST FOR THE
PROJECT VICINITY

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office
Federal Endangered and Threatened Species that Occur in
or may be Affected by Projects in the Counties and/or
U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 130128124310

Database Last Updated: September 18, 2011

Quad Lists

SAN FELIPE (385B)

Listed Species

Invertebrates

Euphydryas editha bayensis
bay checkerspot butterfly (T)

Fish

Oncorhynchus mykiss
South Central California steelhead (T) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)
Critical habitat, CA tiger salamander, central population (X)

Rana draytonii
California red-legged frog (T)
Critical habitat, California red-legged frog (X)

Birds

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*
California least tern (E)

Vireo bellii pusillus
Least Bell's vireo (E)

Mammals

Vulpes macrotis mutica
San Joaquin kit fox (E)

CHITTENDEN (386A)

Listed Species

Invertebrates

Euphydryas editha bayensis
bay checkerspot butterfly (T)

Fish

Oncorhynchus mykiss
South Central California steelhead (T) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Rana draytonii

California red-legged frog (T)

Birds

Brachyramphus marmoratus

marbled murrelet (T)

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*

California least tern (E)

Vireo bellii pusillus

Least Bell's vireo (E)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

WATSONVILLE EAST (386B)

Listed Species

Invertebrates

Euphydryas editha bayensis

bay checkerspot butterfly (T)

Fish

Oncorhynchus mykiss

South Central California steelhead (T) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Rana draytonii

California red-legged frog (T)

Birds

Brachyramphus marmoratus

marbled murrelet (T)

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*

California least tern (E)

Vireo bellii pusillus

Least Bell's vireo (E)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Holocarpha macradenia

Critical habitat, Santa Cruz tarplant (X)

Santa Cruz tarplant (T)

MISSISSIPPI CREEK (405B)

Listed Species

Fish

Hypomesus transpacificus

delta smelt (T)

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)

South Central California steelhead (T) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Rana draytonii

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

Birds

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*

California least tern (E)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Dudleya setchellii

Santa Clara Valley dudleya (E)

GILROY HOT SPRINGS (405C)

Listed Species

Fish

Hypomesus transpacificus

delta smelt (T)

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)

South Central California steelhead (T) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Critical habitat, CA tiger salamander, central population (X)

Rana draytonii

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

Birds

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*

California least tern (E)

Vireo bellii pusillus

Least Bell's vireo (E)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Dudleya setchellii

Santa Clara Valley dudleya (E)

MT. SIZER (406A)

Listed Species

Invertebrates

Euphydryas editha bayensis

bay checkerspot butterfly (T)

Fish

Hypomesus transpacificus

delta smelt (T)

Oncorhynchus mykiss

Central California Coastal steelhead (T) (NMFS)

Central Valley steelhead (T) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Critical habitat, CA tiger salamander, central population (X)

Rana draytonii

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

Birds

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*

California least tern (E)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Ceanothus ferrisiae

Coyote ceanothus (E)

Dudleya setchellii

Santa Clara Valley dudleya (E)

Streptanthus albidus ssp. *albidus*

Metcalf Canyon jewelflower (E)

MORGAN HILL (406B)

Listed Species

Invertebrates

Euphydryas editha bayensis

bay checkerspot butterfly (T)

Critical habitat, bay checkerspot butterfly (X)

Fish

Hypomesus transpacificus

delta smelt (T)

Oncorhynchus mykiss

Central California Coastal steelhead (T) (NMFS)

Central Valley steelhead (T) (NMFS)

Critical habitat, Central California coastal steelhead (X) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Critical habitat, CA tiger salamander, central population (X)

Rana draytonii

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

Birds

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*

California least tern (E)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Castilleja affinis ssp. *neglecta*

Tiburon paintbrush (E)

Ceanothus ferrisiae

Coyote ceanothus (E)

Dudleya setchellii

Santa Clara Valley dudleya (E)

Streptanthus albidus ssp. *albidus*

Metcalf Canyon jewelflower (E)

MT. MADONNA (406C)

Listed Species

Invertebrates

Euphydryas editha bayensis

bay checkerspot butterfly (T)

Critical habitat, bay checkerspot butterfly (X)

Fish

Hypomesus transpacificus

delta smelt (T)

Oncorhynchus mykiss

South Central California steelhead (T) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Critical habitat, CA tiger salamander, central population (X)

Rana draytonii

California red-legged frog (T)

Birds

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*

California least tern (E)

Vireo bellii pusillus

Least Bell's vireo (E)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Dudleya setchellii

Santa Clara Valley dudleya (E)

Holocarpha macradenia

Critical habitat, Santa Cruz tarplant (X)

Santa Cruz tarplant (T)

GILROY (406D)

Listed Species

Invertebrates

Euphydryas editha bayensis

bay checkerspot butterfly (T)

Critical habitat, bay checkerspot butterfly (X)

Fish

Hypomesus transpacificus

delta smelt (T)

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)

South Central California steelhead (T) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Critical habitat, CA tiger salamander, central population (X)

Rana draytonii

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

Birds

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*
California least tern (E)

Vireo bellii pusillus
Least Bell's vireo (E)

Mammals

Vulpes macrotis mutica
San Joaquin kit fox (E)

Plants

Dudleya setchellii
Santa Clara Valley dudleya (E)
Streptanthus albidus ssp. *albidus*
Metcalf Canyon jewelflower (E)

SANTA TERESA HILLS (407A)

Listed Species

Invertebrates

Euphydryas editha bayensis
bay checkerspot butterfly (T)
Critical habitat, bay checkerspot butterfly (X)

Fish

Hypomesus transpacificus
delta smelt (T)
Oncorhynchus mykiss
Central California Coastal steelhead (T) (NMFS)
Central Valley steelhead (T) (NMFS)
Critical habitat, Central California coastal steelhead (X) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)
Critical habitat, CA tiger salamander, central population (X)
Rana draytonii
California red-legged frog (T)

Birds

Brachyramphus marmoratus
marbled murrelet (T)
Sternula antillarum (= *Sterna*, = *albifrons*) *browni*
California least tern (E)

Mammals

Vulpes macrotis mutica
San Joaquin kit fox (E)

Plants

Dudleya setchellii
Santa Clara Valley dudleya (E)
Streptanthus albidus ssp. *albidus*
Metcalf Canyon jewelflower (E)

LOMA PRIETA (407D)

Listed Species

Invertebrates

Euphydryas editha bayensis

bay checkerspot butterfly (T)

Fish

Eucyclogobius newberryi

tidewater goby (E)

Hypomesus transpacificus

delta smelt (T)

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)

Critical habitat, Central California coastal steelhead (X) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Rana draytonii

California red-legged frog (T)

Birds

Brachyramphus marmoratus

marbled murrelet (T)

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*

California least tern (E)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Ceanothus ferrisae

Coyote ceanothus (E)

Holocarpha macradenia

Critical habitat, Santa Cruz tarplant (X)

Santa Cruz tarplant (T)

LICK OBSERVATORY (426C)

Listed Species

Invertebrates

Euphydryas editha bayensis

bay checkerspot butterfly (T)

Critical habitat, bay checkerspot butterfly (X)

Fish

Hypomesus transpacificus

delta smelt (T)

Oncorhynchus mykiss

Central California Coastal steelhead (T) (NMFS)

Central Valley steelhead (T) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Critical habitat, CA tiger salamander, central population (X)

Rana draytonii

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

Birds

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*

California least tern (E)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Dudleya setchellii

Santa Clara Valley dudleya (E)

Streptanthus albidus ssp. *albidus*

Metcalf Canyon jewelflower (E)

ISABEL VALLEY (426D)

Listed Species

Invertebrates

Euphydryas editha bayensis

bay checkerspot butterfly (T)

Fish

Hypomesus transpacificus

delta smelt (T)

Oncorhynchus mykiss

Central California Coastal steelhead (T) (NMFS)

Central Valley steelhead (T) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Critical habitat, CA tiger salamander, central population (X)

Rana draytonii

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

Birds

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*

California least tern (E)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

Proposed Species

Amphibians

Rana draytonii

Critical habitat, California red-legged frog (PX)

SAN JOSE EAST (427D)

Listed Species

Invertebrates

Euphydryas editha bayensis

bay checkerspot butterfly (T)

Critical habitat, bay checkerspot butterfly (X)

Fish

Hypomesus transpacificus

delta smelt (T)

Oncorhynchus mykiss

Central California Coastal steelhead (T) (NMFS)

Central Valley steelhead (T) (NMFS)

Critical habitat, Central California coastal steelhead (X) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Rana draytonii

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

Birds

Sternula antillarum (= *Sterna*, = *albifrons*) *browni*

California least tern (E)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Chorizanthe robusta var. *robusta*

robust spineflower (E)

Dudleya setchellii

Santa Clara Valley dudleya (E)

Lasthenia conjugens

Contra Costa goldfields (E)

Streptanthus albidus ssp. *albidus*

Metcalf Canyon jewelflower (E)

County Lists

Santa Clara County

Listed Species

Invertebrates

Branchinecta conservatio

Conservancy fairy shrimp (E)

Branchinecta lynchi

vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus

valley elderberry longhorn beetle (T)

Euphydryas editha bayensis

bay checkerspot butterfly (T)

Critical habitat, bay checkerspot butterfly (X)

Lepidurus packardii

Critical habitat, vernal pool tadpole shrimp (X)

vernal pool tadpole shrimp (E)

Fish

Acipenser medirostris

green sturgeon (T) (NMFS)

Eucyclogobius newberryi

tidewater goby (E)

Hypomesus transpacificus

delta smelt (T)

Oncorhynchus kisutch

coho salmon - central CA coast (E) (NMFS)

Critical habitat, coho salmon - central CA coast (X) (NMFS)

Oncorhynchus mykiss

Central California Coastal steelhead (T) (NMFS)

Central Valley steelhead (T) (NMFS)

Critical habitat, Central California coastal steelhead (X) (NMFS)

South Central California steelhead (T) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Critical habitat, CA tiger salamander, central population (X)

Rana draytonii

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

Reptiles

Gambelia (=Crotaphytus) sila

blunt-nosed leopard lizard (E)

Masticophis lateralis euryxanthus

Alameda whipsnake [=striped racer] (T)

Critical habitat, Alameda whipsnake (X)

Thamnophis gigas

giant garter snake (T)

Thamnophis sirtalis tetrataenia

San Francisco garter snake (E)

Birds

Brachyramphus marmoratus

Critical habitat, marbled murrelet (X)

marbled murrelet (T)

Charadrius alexandrinus nivosus

western snowy plover (T)

Pelecanus occidentalis californicus

California brown pelican (E)

Rallus longirostris obsoletus

California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni

California least tern (E)

Vireo bellii pusillus

Least Bell's vireo (E)

Mammals

Reithrodontomys raviventris

salt marsh harvest mouse (E)

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Acanthomintha duttonii

San Mateo thornmint (E)

Castilleja affinis ssp. neglecta

Tiburon paintbrush (E)

Ceanothus ferrisae

Coyote ceanothus (E)

Chorizanthe robusta var. robusta

robust spineflower (E)

Cirsium fontinale var. fontinale

fountain thistle (E)

Dudleya setchellii

Santa Clara Valley dudleya (E)

Eriophyllum latilobum

San Mateo woolly sunflower (E)

Hesperolinon congestum

Marin dwarf-flax (=western flax) (T)

Holocarpha macradenia

Critical habitat, Santa Cruz tarplant (X)

Santa Cruz tarplant (T)

Lasthenia conjugens

Contra Costa goldfields (E)

Critical habitat, Contra Costa goldfields (X)

Streptanthus albidus ssp. albidus

Metcalf Canyon jewelflower (E)

Suaeda californica

California sea blite (E)

Trifolium amoenum

showy Indian clover (E)

Proposed Species

Amphibians

Rana draytonii

Critical habitat, California red-legged frog (PX)

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the [National Oceanic & Atmospheric Administration Fisheries Service](#). Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online [Inventory of Rare and Endangered Plants](#).

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our [Protocol](#) and [Recovery Permits](#) pages.

For plant surveys, we recommend using the [Guidelines for Conducting and Reporting Botanical Inventories](#). The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal [consultation](#) with the Service.

During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our [Map Room](#) page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. [More info](#)

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6520.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be April 28, 2013.

Draft EIR
Upper Llagas Creek Project

APPENDIX

J

SPECIAL-STATUS WILDLIFE SPECIES
POTENTIALLY OCCURRING IN THE PROJECT
VICINITY

J.1 Special-status Wildlife potentially Occurring Near Llagas Creek

Name	Status**		General Habitat Description	Species Occurs in USGS Quad*	Project Area Habitat Suitability	Potential for Occurrence
	State	Federal				
Mammals						
Hoary bat (<i>Lasiurus cinereus</i>)	None	None	Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths and requires water.	GI	Habitat within the Project area provides low suitability for reproduction, cover, and foraging for this species. Higher foraging suitability near perennial water.	Moderate
Pallid bat (<i>Antrozous pallidus</i>)	CSC	None	Deserts, grasslands, scrublands, woodlands and open forests. Most common in open, dry habitats with rocky areas for roosting.	GI, MH	May roost in hollow trees, buildings, under bridges, and in tunnels. Suitable foraging habitat present. 2 CNDDB occurrences within 10 miles of Project area.	Moderate
Yuma myotis (<i>Myotis yumanensis</i>)	None	None	Optimal habitats are open forests and woodlands with sources of water over which to feed. Distribution is closely tied to bodies of water. Maternity colonies in caves, mines, buildings, or crevices.	ST	May roost under bridges and in tunnels. Suitable foraging habitat present. 1 CNDDB occurrence within 10 miles of Project area.	Moderate
San Francisco dusky-footed woodrat (<i>Neotoma fuscipes annectens</i>)	CSC	None	Found among oak/bay woodland and riparian areas around the San Francisco Bay Area. May also be found in rock outcrops and chaparral habitat types.	MH	May nest in areas with high density of woody vegetation. Sensitive to disturbance. Dens have been observed near the intersection of Monterey Road and Watsonville Road.	Moderate
San Joaquin kit fox (<i>Vulpes macrotis mutica</i>)	CT	FE	Open, level, sandy ground preferred. Often associated with annual grasslands and small mammal burrow complexes.	CH, GH, PP, WW	Occasionally occurs in agricultural areas. Dominate Project area has low to no suitability, except as a potential migratory corridor.	Low
American badger (<i>Taxidea taxus</i>)	CSC	None	Herbaceous, shrub, and open stages of most habitats with dry, friable soils.	CH, GI, MH	Prefers open grasslands with ground squirrels. Dominate Project area has low to no suitability, except as a potential migratory corridor.	Low

Name	Status**		General Habitat Description	Species Occurs in USGS Quad*	Project Area Habitat Suitability	Potential for Occurrence
	State	Federal				
Salt marsh harvest mouse (<i>Reithrodontomys raviventris</i>)	CE	FE	Restricted to salk and brackish marsh. Critically dependent upon dense cover and preferred habitat is pickleweed (<i>Salicornia virginica</i>). Occurs in the upper zone of marshes with salt-tolerant plants. May move in to grasslands during highest winter tides.	SCC	No suitable nesting or foraging habitat within the Project area and large distance from nearest known occurrence.	None
Birds						
Western burrowing owl (<i>Athene cunicularia hypugaea</i>)	CSC	None	Ground dweller of open country, golf courses, airports, etc. Often associated with California ground squirrel burrow complexes.	CH, LO, MH, MM, SF	Prefers open areas with ground squirrels burrows. Will use man-made structures. Multiple CNDDDB occurrences within Project area. Suitable burrowing and foraging habitat in adjacent agricultural fields.	Low-Moderate
Least Bell's vireo (<i>Vireo bellii pusillus</i>)	CE	FE	Natural early successional riparian and cottonwood-willow riparian areas, young forests and woodlands, coastal chaparral, and scrub oak ecosystems.	CH, SF, WE	Limited potential riparian nesting habitat, but too narrow and no historical or recent breeding records within 2.5 miles of the Project area.	Low-None
Black swift (<i>Cypseloides niger</i>)	CSC	None	Steep cliffs ledges and shallow caves behind or near waterfalls. Forages in forests and open montane habitat.	ST	No suitable nesting or foraging habitat. 1 CNDDDB occurrence within 10 miles of Project Area.	None
Yellow warbler (<i>Dendroica petechial</i>)	CSC	None	(Nesting) Occurs widely in migration and a summer resident from late March early Oct. Breeding numbers greatly declined in lowland areas west of Cascade-Sierra Nevada and Central Valley. Breeds locally in Santa Clara County., San Mateo, Santa Cruz, Monterey, and San Luis Obispo County. Occupies riparian vegetation in close proximity to water, along streams and wet meadows. Found in willow and cottonwood.	--	Limited riparian nesting habitat, but too narrow and no historical or recent breeding records. No known occurrences within 10 miles of Project area.	Low-None

Name	Status**		General Habitat Description	Species Occurs in USGS Quad*	Project Area Habitat Suitability	Potential for Occurrence
	State	Federal				
Bank swallow (<i>Riparia riparia</i>)	CT	None	Lowland vertical or near vertical banks with erodible soil near coasts, rivers, streams, lakes, reservoirs, and wetlands. Feeding sites are near wetlands, open water, grasslands, riparian woodlands, agricultural areas, shrublands, and, occasionally, upland woodlands.	CH	No suitable nesting habitat. Potential feeding habitats (grassland and agricultural areas) adjacent to Project area.	Low
Tricolored blackbird (<i>Agelaius tricolor</i>)	CSC	None	Open grasslands and pasturelands associated with nesting cover (e.g., blackberry shrubs, wetland emergent vegetation, etc.).	CH, ST	Potential feeding and nesting habitat present in reaches with perennial water. 2 CNDDDB occurrences within 10 miles of Project area.	Low
White-tailed kite (<i>Elanus leucurus</i>)	FP	None	Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Forages in open grasslands, meadows, or marshes, close to isolated, dense-topped trees for nesting and perching.	GI	Low habitat suitability for foraging and nesting within the Project area, however suitable foraging habitat is present in adjacent agricultural fields. 1 CNDDDB occurrence within 10 miles of Project area.	Low
Golden eagle (<i>Aquila chrysaetos</i>)	FP	None	(Nesting & wintering) Rolling foothills, mountain areas, sage-juniper flats and desert. Cliff-walled canyons provide nesting habitat in most parts of range; also large trees in open areas.	ST	No suitable feeding or nesting habitat. 1 CNDDDB occurrence within 10 miles of Project area.	None
Great blue heron (<i>Ardea herodias</i>)	None	None	(Nesting) Colonial nester in tall trees, cliffsides, and sequestered spots on marshes. Rookery sites in close proximity to foraging areas—marshes, lake margins, tide-flats, rivers and streams, and wet meadows.	MH	Suitable feeding (fresh and saline wetlands) habitat at perennial reaches within Project area. Riparian trees adjacent to creek provide suitable nesting habitat.	Moderate
Marbled murrelet (<i>Brachyramphus marmoratus</i>)	CT	FT	(Nesting) Uses old-growth forest, characterized by large trees, multiple canopy layers and high canopy closure. Prefers nesting along coastal and in near-shore marine waters as far south as northern Monterey Bay.	CH, WE, WW	No suitable nesting or foraging habitat and large distance from nearest known occurrence.	None

Name	Status**		General Habitat Description	Species Occurs in USGS Quad*	Project Area Habitat Suitability	Potential for Occurrence
	State	Federal				
California least tern (<i>Sternula antillarum</i> (= <i>Sterna</i> , = <i>albifrons</i>) <i>browni</i>)	FP	FE	Occurs from Pacific coast from San Francisco to Baja, California. Breeding colonies are located along marine and estuarine shores, abandoned salt ponds along estuarine shores. Feeds in shallow, estuarine waters.	SF, CH, PP, WE, WW	No suitable nesting or foraging habitat and large distance from nearest known occurrence.	None
Western snowy plover (<i>Charadrius alexandrinus nivosus</i>)	CSC	FT	(Nesting) Breeds primarily on coastal beaches from southern Washington to southern Baja, California. Breeds above high tide line on coastal beaches, sand spits, dune-backed beaches, sparsely-vegetated dunes, beaches at creek and river mouths, and salt pans. Less common nesting habitat include river bars, dry salt pond, salt pond levees.	SCC, WW ¹	No suitable nesting or foraging habitat and large distance from nearest known occurrence.	None
Western brown pelican (<i>Pelecanus occidentalis californicus</i>)	DE	FE	Range from Gulf of California to southern British Columbia. Nests on islands and rarely seen inland or far out at sea.	SCC	No suitable nesting or foraging habitat and large distance from nearest known occurrence.	None
California clapper rail (<i>Rallus longirostris obsoletus</i>)	CE	FE	Restricted almost entirely to marshes of San Francisco estuary, where only known breeding population occurs. Distribution is patchy and discontinuous.	SCC	No suitable nesting or foraging habitat and large distance from nearest known occurrence.	None
Reptiles						
Western pond turtle (<i>Actinemys marmorata</i> , formerly <i>Clemmys</i> or <i>Emmys marmorata</i>)	CSC	None	Aquatic turtle of ponds, lakes, marshes, rivers, streams, and irrigation ditches that typically have rocky or muddy bottom, with aquatic vegetation. Nests in uplands associated with wetland habitat.	CH, GH, GI, LO, LP, MC, MH, MM, MS, PP, SE, ST, WE	Dominant habitat within Project area, especially areas with perennial waters. Females move overland to find suitable egg laying sites.	Moderate-High
Black legless lizard (<i>Anniella pulchra nigra</i>)	CSC	None	Loose soil and leaf litter within coastal scrub types, coastal dunes, valley foothills, and chaparral. Isolated population within the desert in Riverside County.	WW	No suitable habitat and large distance from nearest known habitat. Nearest CNDDDB occurrence is 9.5 miles.	None

Name	Status**		General Habitat Description	Species Occurs in USGS Quad*	Project Area Habitat Suitability	Potential for Occurrence
	State	Federal				
Coast horned lizard (<i>Phrynosoma blainvillii</i> , formerly <i>P. coronatum frontale</i>)	CSC	None	Open country, especially sandy areas, washes, flood plains and wind-blown deposits in a wide variety of habitats. Common in lowlands along sandy washes where scattered low shrubs provide cover. Requires friable soils.	GH, ST	Possible in sandier portions of reaches. Nearest CDDDB occurrence is 7.3 miles from Project area.	Low-None
Blunt-nosed leopard lizard (<i>Gambelia</i> (= <i>Crotaphytus</i>) <i>sila</i>)	CE	FE	Found only in the San Joaquin Valley and adjacent foothills, Carrizo Plain and Cuyama Valley. Inhabits open, sparsely vegetated low relief areas on the valley floor and surrounding foothill. Also inhabits alkali playa and valley saltbrush scrub. Generally absent from dense vegetation or areas subject to seasonal flooding.	SCC	No suitable habitat within Project area and large distance from nearest known occurrence.	None
Alameda whipsnake (<i>Masticophis lateralis euryxanthus</i>)	CT	FT	Inhabits inner coast range in Contra Costa., Alameda, San Joaquin, and Santa Clara counties. Found in chaparral-northern coastal sage scrub and coastal sage. Will occur up to 500 feet into adjacent habitats, including grassland, oak savanna, and occasionally oak-bay woodland. Lays eggs in grassland communities adjacent to chaparral community.	SCC	No suitable habitat within Project area and large distance from nearest known occurrence.	None
Amphibians						
California tiger salamander (<i>Ambystoma californiense</i>)	CT, CSC	FT	Quiet water of ponds, reservoirs, lakes, vernal pools, streams, and stock ponds within annual grasslands, oak savannah, oak woodland and open chaparral.	CH, GH, GI, IV, LO, MH, MM, MS, PP, SF, ST, WW	Suitable habitat exists but fragmented by development. The Project area is within a region where the CTS has been presumed to be extinct, but portions of the Project area are within the migration range of potential breeding habitat, including designated critical habitat. Multiple CNDDB occurrences within 10 miles of Project area.	Low

Name	Status**		General Habitat Description	Species Occurs in USGS Quad*	Project Area Habitat Suitability	Potential for Occurrence
	State	Federal				
California red-legged frog (<i>Rana draytonii</i>)	CSC	FT	Chiefly lakes, ponds, and streams in coastal forest, inland woodlands, and valley grasslands where cattails, bulrush, or other plants provide dense cover. Aquatic sites need not be permanent.	CH, GH, GI, LO, LP, MC, MH, MM, MS, PP, SF, ST, WE, WW	Pooled waters in some reaches, but surveys in the Project area and vicinity indicate that CRLF no longer occurs in the lowlands of the valley. The Project area is within a region in which the CRLF is presumed to be extinct. However, multiple CNDDDB occurrences are within 10mi of Project area.	Low-None
Foothill yellow-legged frog (<i>Rana boylei</i>)	CSC	None	Closely associated with permanent water courses including streams or rivers in woodland, chaparral, and forest. Often found in riffles with rocks and sunny banks.	GH, MC, MH, MS, ST	In areas with perennial waters.	Low-None
Invertebrates						
Conservancy fairy shrimp (<i>Branchinecta conservation</i>)	None	FE	Inhabits large, cool-water vernal pools with moderately turbid water. Pools generally last until June. Eight recorded populations, none of which are in Santa Clara County.	SCC	No vernal pools within Project area.	None
Vernal pool fairy shrimp (<i>Branchinecta lynchi</i>)	None	FT	Aquatic species that inhabits a variety of different vernal pools habitats, from small, clear sandstone rock pools to large, turbid, alkaline valley floor pools. Tends to occur in smaller pools. Occurs in a wide range of vernal pools in southern and Central Valley, California.	SCC	No vernal pools within Project area.	None
Valley elderberry longhorn beetle (<i>Desmocerus californicus dimorphus</i>)	None	FT	Found on or close to its host plant, elderberry (<i>Sambucus</i> spp.). Shrubs must have stems 1" or greater in diameter at ground level. Occurs from southern Shasta County to Fresno County.	SCC	The Project area is not within VELB habitat range.	None

Name	Status**		General Habitat Description	Species Occurs in USGS Quad*	Project Area Habitat Suitability	Potential for Occurrence
	State	Federal				
Opler's longhorn moth (<i>Adela oplerella</i>)	None	FC	Almost completely restricted to native grasslands on outcrops of serpentine soil in the vicinity of San Francisco Bay where its host plant, <i>Platystemon californicus</i> , is known to occur.	MH, MM, ST	Multiple CNDDDB occurrences with closest occurrence at 0.7 mile from Project area. Potentially suitable habitat present if the host plant is present within the Project area. Botanical survey of annual native plant food should be conducted.	Low- None
Monarch butterfly (<i>Danaus plexippus</i>)	None	None	Can be found in a wide range of habitats, such as fields, meadows, prairie remnants, urban and suburban parks, gardens, trees, and roadsides. It overwinters in cypress groves, but will also use Eucalyptus.	WW	Roosting groves are not present within the Project area. May migrate through the Project area to more suitable areas. 1 CNDDDB occurrence within 10 miles of Project area.	Low
Jung's micro-blind harvestman (<i>Microcina jungi</i>)	None	None	Known only to occur beneath serpentine rocks in grasslands habitats in the San Francisco Bay region.	LO	1 CNDDDB occurrence within 10 miles of Project area.	None
Bay checkerspot butterfly (<i>Euphydryas editha bayensis</i>)	None	FT	Inhabits grasslands and open woodlands, especially on serpentine, near growths of its primary larval food plant, native plantain (<i>Plantago erecta</i>) an annual herb, or one of two species of their secondary larval food plant, owl's clover (<i>Castilleja densiflorus</i> and <i>C. exerta</i>). <i>Plantago erecta</i> occurs at 0 to 2,500 feet elevation.	GI, LO, MH, MM, ST, WE	Potentially suitable habitat present if the host plant is present within the Project area. Spring botanical survey of annual native food plants should be conducted. CNDDDB occurrences within 2.5 miles of Project area. May migrate through the Project area to more suitable areas; critical habitat for the species is within 2.5 miles and is located north, west, and east of the Project area.	Moderate

Name	Status**		General Habitat Description	Species Occurs in USGS Quad*	Project Area Habitat Suitability	Potential for Occurrence
	State	Federal				

Legend:

* Location Codes: CH – Chittenden, GH – Gilroy Hot Springs, GI – Gilroy, IV – Isabel Valley, LO – Lick Observatory, LP – Loma Prieta, MC – Mississippi Creek, MH – Morgan Hill, MM – Mt. Madonna, MS – Mt. Sizer, PP – Pacheco Peak, SF – San Felipe, ST – Santa Teresa Hills, WE – Watsonville East, WW – Watsonville West

SCC – Santa Clara County

-- Species is show up on quad or county list but is included at the request of CDFW Scoping Comments Nov. 9, 2012.

** Special status codes

None = no special status granted or recognized by named party

FC = Federal Candidate; USFWS has enough information on biological vulnerability and threats to support a proposal to list as endangered or threatened.

FE = Federally Endangered; listed by USFWS as in danger of extinction throughout all or a significant portion of its range.

FT = Federally Threatened; listed by USFWS as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

CCE = California Candidate for Endangered Status under the CESA.

CCT = California Candidate for Threatened Status under the CESA.

CSC = California Species of Special Concern.

CE = California Endangered under the CESA.

CT = California Threatened under the CESA.

FP = Fully Protected under California Fish and Game Code (Sections 3511, 4700, 5050, and 5515)

DE = Delisted/Recovered

a = Based on 7.5-minute USGS quad lists from query of California Natural Diversity Database (CNDDB) search, accessed December 2012.

1= Critical habitat in WW, but no species occurrences.

Sources: CNDDB 2013, USFWS, Santa Clara County List

Draft EIR
Upper Llagas Creek Project

APPENDIX

K

AIR QUALITY TABLES

3.11-a Ambient Air Standards

Table 3.11-1 Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards		Federal Standards	
		ppmv	µg/m ³	ppmv	µg/m ³
Ozone (O ₃)	1-hour	0.09	177	—	—
	8-hour	0.07	137	0.075	147
Nitrogen Dioxide (NO ₂)	1-hour	0.18	338	0.100	188
	Annual	0.03	56	0.053	100
Sulfur Dioxide (SO ₂)	1-hour	0.25	655	0.075	196
	3-hour Secondary	—	—	0.50	1,309
	24-hour	0.04	105	—	—
Carbon Monoxide (CO)	1-hour	20	22,898	35	40,071
	8-hour	9	10,304	9	10,304
	Lake Tahoe (8-hr)	6	6,869	—	—
Particulates (as PM ₁₀)	24-hour	—	50	—	150
	Annual	—	20	—	—
Particulates (as PM _{2.5})	24-hour	—	—	—	35
	Annual Primary	—	12	—	12
	Annual Secondary	—	—	—	15
Lead (Pb)	30-day	—	1.5	—	—
	3-month (rolling)	—	—	—	0.15
Sulfates (as SO ₄)	24-hour	—	25	—	—
Hydrogen Sulfide (H ₂ S)	1-hour	0.03	42	—	—
Vinyl Chloride (C ₂ H ₃ Cl)	24-hour	0.01	26	—	—
Visibility Reducing Particles	8-hour	Extinction coefficient of 0.23 per km; visibility of 10 miles or more (0.07 to 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70%.		—	—

Sources: CARB 2012a, USEPA 2011a

Notes:

ppmv = parts per million by volume

µg/m³ = micrograms per cubic meter

The 1.5 µg/m³ federal quarterly lead standard applied until 2008; 0.15 µg/m³ rolling 3-month average thereafter

For gases, µg/m³ calculated from ppmv based on molecular weight and standard conditions

Standard Temperature

25 deg C

Standard Molar Volume

24.465 liter/g-mole

3.11-b Attainment Status

Table 3.11-2 Attainment Status Summary - Bay Area Region

Criteria Pollutant	State Designation	Federal Designation
Ozone (O ₃) (1-hour)	Nonattainment	—
Ozone (O ₃) (8-hour)	Nonattainment	Nonattainment ⁽¹⁾
Nitrogen Dioxide (NO ₂) (1-hour)	Attainment	Unclassified ⁽²⁾
Nitrogen Dioxide (NO ₂) (annual)	Attainment	Attainment
Sulfur Dioxide (SO ₂)	Attainment	Attainment
Carbon Monoxide (CO)	Attainment	Attainment
Respirable Particulates (as PM ₁₀) (24-hour)	Nonattainment	Unclassified ⁽²⁾
Respirable Particulates (as PM ₁₀) (annual)	Nonattainment	—
Fine Particulates (as PM _{2.5}) (24-hour)	—	Nonattainment
Fine Particulates (as PM _{2.5}) (annual)	Nonattainment	Attainment
Lead (Pb)	Attainment	Attainment
Sulfates (as SO ₄)	Attainment	—
Hydrogen Sulfide (H ₂ S)	Unclassified ⁽²⁾	—
Vinyl Chloride (C ₂ H ₃ Cl)	n/d	—
Visibility	Unclassified ⁽²⁾	—

Source: BAAQMD 2012a, CARB 2012b, USEPA 2012a

Notes:

⁽¹⁾ The 0.08 ppmv federal 8-hour ozone standard applied until 2008; 0.075 ppmv thereafter

⁽²⁾ At the time of designation, if the available data does not support a designation of attainment or nonattainment, the area is designated as unclassified.

n/d - no data/information available

3.11-c Ambient AQ

Table 3.11-3 Ambient Air Quality in Project Vicinity - Santa Clara County

Criteria Pollutant	Year	San Jose		San Martin		Gilroy	
		monitored value	days over standard	monitored value	days over standard	monitored value	days over standard
Ozone (O ₃) (1-hour max ppmv)	2011	0.098	1	0.091	0	0.081	0
	2010	0.126	5	0.109	2	0.094	0
	2009	0.088	0	0.107	4	0.098	1
Ozone (O ₃) (8-hour max ppmv)	2011	0.067	0	0.072	2	0.073	1
	2010	0.086	3	0.087	8	0.081	7
	2009	0.068	0	0.081	6	0.078	4
Nitrogen Dioxide (NO ₂) (1-hour max ppmv)	2011	0.061	0	—	—	—	—
	2010	0.064	0	—	—	—	—
	2009	0.069	0	—	—	—	—
Nitrogen Dioxide (NO ₂) (annual average ppmv)	2011	0.015	0	—	—	—	—
	2010	0.014	0	—	—	—	—
	2009	0.015	0	—	—	—	—
Sulfur Dioxide (SO ₂) (1-hour max ppmv)	2011	0.0072	0	—	—	—	—
	2010	0.0049	0	—	—	—	—
	2009	—	0	—	—	—	—
Sulfur Dioxide (SO ₂) (24-hour max ppmv)	2011	0.0024	0	—	—	—	—
	2010	0.0018	0	—	—	—	—
	2009	0.0010	0	—	—	—	—
Carbon Monoxide (CO) (1-hour max ppmv)	2011	2.5	0	—	—	—	—
	2010	2.8	0	—	—	—	—
	2009	3.4	0	—	—	—	—
Carbon Monoxide (CO) (8-hour max ppmv)	2011	2.3	0	—	—	—	—
	2010	2.2	0	—	—	—	—
	2009	2.5	0	—	—	—	—
Resp. Particulates (as PM ₁₀) (24-hour max µg/m ³)	2011	44	0	—	—	—	—
	2010	47	0	—	—	—	—
	2009	43	0	—	—	—	—
Resp. Particulates (as PM ₁₀) (annual avg µg/m ³)	2011	19.2	0	—	—	—	—
	2010	19.5	0	—	—	—	—
	2009	20.4	0	—	—	—	—
Fine Particulates (as PM _{2.5}) (24-hour max µg/m ³)	2011	50.5	3	—	—	35.5	1
	2010	41.5	3	—	—	29.9	0
	2009	35.0	0	—	—	36.6	1
Fine Particulates (as PM _{2.5}) (annual avg µg/m ³)	2011	9.9	0	—	—	8.1	0
	2010	8.8	0	—	—	8.2	0
	2009	10.1	0	—	—	8.9	0

Source: BAAQMD 2013

3.11-d Emissions Summaries

Table 3.11-10 CEQA Significance Thresholds - BAAQMD (1999)

Applicability	VOC	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}
Operation, tons/year	15	CAAQS	15	40 ⁽²⁾	15	10 ⁽²⁾
Operation, pounds/year	30,000	CAAQS	30,000	80,000	30,000	20,000
Operation, pounds/day	80	CAAQS	80	—	80	—
Construction, pounds/day	80	CAAQS	80	—	80 ⁽³⁾	—

Sources: BAAQMD 1999, 2012b (see note 4), 40 CFR 51.166

Notes:

⁽¹⁾ No violation of CAAQS for CO (9 ppmv for 1 hour, 20 ppmv for 8 hours)

⁽²⁾ Prevention of Significant Deterioration (PSD), annual only

⁽³⁾ For construction projects, applies to exhaust emissions only, not fugitive dusts

⁽⁴⁾ On March 5, 2012 the Alameda County Superior Court issued a judgment finding that the District had failed to comply with CEQA when it adopted the thresholds of significance. The court did not determine whether the thresholds were valid on the merits, but found that the adoption of the thresholds was a project under CEQA. The court issued a writ of mandate ordering the District to set aside the 2010 thresholds and cease dissemination of them until the District had complied with CEQA. The District is no longer recommending that the 2010 thresholds be used as a generally applicable measure of a project's significance. Lead Agencies may continue to rely on the District's 1999 thresholds and may continue to make determinations regarding the significance of an individual project's air quality impacts based on the substantial evidence in the record for that project.

Table 3.11-11 Estimated Peak Daily Criteria Emissions for Project with Reach 8 NRCS or Culvert/Channel Alternatives

Project Phase	VOC lbs/day	CO lbs/day	NO _x lbs/day	SO _x lbs/day	C-PM ₁₀ lbs/day	C-PM _{2.5} lbs/day	F-PM ₁₀ lbs/day	F-PM _{2.5} lbs/day
Year 1	13	72	88	0.2	5	4	21	3
Year 2	38	210	260	0.5	14	12	62	8
Year 3	38	207	257	0.5	13	12	62	8
Year 4	19	104	128	0.3	7	6	31	4
Year 5	19	104	128	0.3	7	6	21	3
Year 6	7	36	44	0.1	2	2	10	1
Peak Day	38	210	260	0.5	14	12	62	8
Significance	LTS	LTS	S	—	LTS	—	—	—

Sources: SCAQMD 2008, USEPA 2011b

Notes:

Reach 8 Culvert/Channel Alternative same as NRCS Alternative (estimated emissions are the same)

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter

LTS = Less than significant; S = Significant; LTSM = Less than significant with mitigation

3.11-d Emissions Summaries

Table 3.11-12 Estimated Peak Daily Criteria Emissions for Project with Reach 8 Tunnel Alternative

Project Phase	VOC lbs/day	CO lbs/day	NO _x lbs/day	SO _x lbs/day	C-PM ₁₀ lbs/day	C-PM _{2.5} lbs/day	F-PM ₁₀ lbs/day	F-PM _{2.5} lbs/day
Year 1	13	72	88	0.2	5	4	21	3
Year 2	44	242	303	0.6	16	15	64	9
Year 3	44	240	300	0.6	16	14	64	9
Year 4	25	136	171	0.3	9	8	33	5
Year 5	25	136	171	0.3	9	8	23	3
Year 6	7	36	44	0.1	2	2	10	1
Peak Day	44	242	303	0.6	16	15	64	9
Significance	LTS	LTS	S	—	LTS	—	—	—

Sources: SCAQMD 2008, USEPA 2011b

Notes:

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter

LTS = Less than significant; S = Significant; LTSM = Less than significant with mitigation

Table 3.11-13 Estimated Peak Daily Criteria Emissions for Project with Reach 8 Tunnel and Reach 6 Bypass Alternatives

Project Phase	VOC lbs/day	CO lbs/day	NO _x lbs/day	SO _x lbs/day	C-PM ₁₀ lbs/day	C-PM _{2.5} lbs/day	F-PM ₁₀ lbs/day	F-PM _{2.5} lbs/day
Year 1	13	72	88	0.2	5	4	21	3
Year 2	40	221	277	0.5	15	13	55	8
Year 3	40	219	274	0.5	14	13	55	8
Year 4	21	115	145	0.3	8	7	24	4
Year 5	21	115	145	0.3	8	7	14	2
Year 6	7	36	44	0.1	2	2	10	1
Peak Day	40	221	277	0.5	15	13	55	8
Significance	LTS	LTS	S	—	LTS	—	—	—

Sources: SCAQMD 2008, USEPA 2011b

Notes:

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter

LTS = Less than significant; S = Significant; LTSM = Less than significant with mitigation

3.11-d Emissions Summaries

Table 3.11-14 Estimated Average Annual Criteria Emissions for Project with Reach 8 NRCS or Culvert/Channel Alternatives

Project Phase	VOC tons/yr	CO tons/yr	NO _x tons/yr	SO _x tons/yr	C-PM ₁₀ tons/yr	C-PM _{2.5} tons/yr	F-PM ₁₀ tons/yr	F-PM _{2.5} tons/yr
Year 1	1.0	5.6	6.8	0.01	0.4	0.3	1.4	0.2
Year 2	3.1	17.1	21.2	0.04	1.1	1.0	4.5	0.6
Year 3	3.2	17.2	21.4	0.04	1.1	1.0	4.6	0.6
Year 4	1.7	9.5	11.8	0.02	0.6	0.6	2.5	0.3
Year 5	1.7	9.5	11.8	0.02	0.6	0.6	1.8	0.2
Year 6	0.7	3.6	4.4	0.01	0.2	0.2	0.9	0.1
Highest Year	3.2	17.2	21.4	0.04	1.1	1.0	4.6	0.6

Sources: SCAQMD 2008, USEPA 2011b

Notes:

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter

Reach 8 Culvert/Channel Alternative same as NRCS Alternative (estimated emissions are the same)

Table 3.11-15 Estimated Average Annual Criteria Emissions for Project with Reach 8 Tunnel Alternative

Project Phase	VOC tons/yr	CO tons/yr	NO _x tons/yr	SO _x tons/yr	C-PM ₁₀ tons/yr	C-PM _{2.5} tons/yr	F-PM ₁₀ tons/yr	F-PM _{2.5} tons/yr
Year 1	1.0	5.6	6.8	0.01	0.4	0.3	1.4	0.2
Year 2	3.7	20.1	25.2	0.05	1.3	1.2	4.7	0.7
Year 3	3.7	20.3	25.3	0.05	1.3	1.2	4.7	0.7
Year 4	2.3	12.5	15.7	0.03	0.8	0.8	2.7	0.4
Year 5	2.3	12.5	15.7	0.03	0.8	0.8	1.9	0.3
Year 6	0.7	3.6	4.4	0.01	0.2	0.2	0.9	0.1
Highest Year	3.7	20.3	25.3	0.05	1.3	1.2	4.7	0.7

Sources: SCAQMD 2008, USEPA 2011b

Notes:

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter

3.11-d Emissions Summaries

Table 3.11-16 Estimated Average Annual Criteria Emissions for Project with Reach 8 Tunnel and Reach 6 Bypass Alternatives

Project Phase	VOC tons/yr	CO tons/yr	NO _x tons/yr	SO _x tons/yr	C-PM ₁₀ tons/yr	C-PM _{2.5} tons/yr	F-PM ₁₀ tons/yr	F-PM _{2.5} tons/yr
Year 1	1.0	5.6	6.8	0.01	0.4	0.3	1.4	0.2
Year 2	3.5	19.2	24.0	0.05	1.3	1.2	4.2	0.6
Year 3	3.5	19.3	24.1	0.05	1.3	1.2	4.3	0.6
Year 4	2.1	11.6	14.5	0.03	0.8	0.7	2.2	0.3
Year 5	2.1	11.6	14.5	0.03	0.8	0.7	1.5	0.2
Year 6	0.7	3.6	4.4	0.01	0.2	0.2	0.9	0.1
Highest Year	3.5	19.3	24.1	0.05	1.3	1.2	4.3	0.6

Sources: SCAQMD 2008, USEPA 2011b

Notes:

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter

Table 3.11-17 Estimated Total Criteria Emissions for All Project Alternatives

Project Options	VOC tons	CO tons	NO _x tons	SO _x tons	C-PM ₁₀ tons	C-PM _{2.5} tons	F-PM ₁₀ tons	F-PM _{2.5} tons
NRCS or Culvert/Channel	11.5	62.7	77.4	0.15	4.0	3.7	16.5	2.2
with Reach 8 Tunnel	13.7	74.7	93.2	0.18	4.9	4.5	17.2	2.4
with Tunnel and Bypass	12.9	71.3	88.9	0.17	4.7	4.3	15.5	2.2

Sources: SCAQMD 2008, USEPA 2011b

Notes:

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter

Reach 8 Culvert/Channel Alternative same as NRCS Alternative (estimated emissions are the same)

3.11-d Emissions Summaries

Table 3.11-18 Estimated GHG Emissions for NRCS or C/C Alternative

Project Phase	CO ₂ MT/yr	CH ₄ MT/yr	N ₂ O MT/yr	CO ₂ e MT/yr
Year 1	1,084	0.1	0.0	1,097
Year 2	3,380	0.3	0.1	3,422
Year 3	3,406	0.3	0.1	3,449
Year 4	1,893	0.1	0.1	1,917
Year 5	1,893	0.1	0.1	1,917
Year 6	714	0.1	0.0	723
Highest Year	3,406	0.3	0.1	3,449

Sources: SCAQMD 2008, USEPA 2012b

Notes:

1 metric tonne (MT) = 1,000 kilograms or 2,204.6 pounds

Reach 8 Culvert/Channel Alternative same as NRCS Alternative (estimated emissions are the same)

Table 3.11-19 Estimated GHG Emissions for Reach 8 Tunnel Alternative

Project Phase	CO ₂ MT/yr	CH ₄ MT/yr	N ₂ O MT/yr	CO ₂ e MT/yr
Year 1	1,084	0.1	0.0	1,097
Year 2	3,977	0.3	0.1	4,027
Year 3	4,003	0.3	0.1	4,054
Year 4	2,491	0.2	0.1	2,522
Year 5	2,491	0.2	0.1	2,522
Year 6	714	0.1	0.0	723
Highest Year	4,003	0.3	0.1	4,054

Sources: SCAQMD 2008, USEPA 2012b

Notes:

1 metric tonne (MT) = 1,000 kilograms or 2,204.6 pounds

3.11-d Emissions Summaries

Table 3.11-20 Estimated GHG Emissions for Tunnel and Bypass Alternatives

Project Phase	CO ₂ MT/yr	CH ₄ MT/yr	N ₂ O MT/yr	CO ₂ e MT/yr
Year 1	1,084	0.1	0.0	1,097
Year 2	3,808	0.3	0.1	3,855
Year 3	3,834	0.3	0.1	3,882
Year 4	2,321	0.2	0.1	2,350
Year 5	2,321	0.2	0.1	2,350
Year 6	714	0.1	0.0	723
Highest Year	3,834	0.3	0.1	3,882

Sources: SCAQMD 2008, USEPA 2012b

Notes:

1 metric tonne (MT) = 1,000 kilograms or 2,204.6 pounds

Table 3.11-21 Estimated Total GHG Emissions for All Project Alternatives

Project Options	CO ₂ MT	CH ₄ MT	N ₂ O MT	CO ₂ e MT
NRCS or Culvert/Channel	12,386	0.9	0.4	12,543
with Reach 8 Tunnel	14,777	1.1	0.5	14,962
with Tunnel and Bypass	14,179	1.0	0.5	14,354

Sources: SCAQMD 2008, USEPA 2012b

Notes:

1 metric tonne (MT) = 1,000 kilograms or 2,204.6 pounds

Reach 8 Culvert/Channel Alternative same as NRCS Alternative (estimated emissions are the same)

3.11-d Emissions Summaries

Table 3.11-22 Screening Health Risk Assessment for Excavation Activity

DPM Screen Parameter	Units	Reach 7a	Reach 7b	Reach 8
Onsite Emission Rate	lb/day	0.526	0.351	0.526
	g/sec	2.76E-03	1.84E-03	2.76E-03
Receptor Distance	meters	20	20	10
Modeled Hourly Concentration	$\mu\text{g}/\text{m}^3$	2.478	1.652	5.588
Corrected Annual Concentration	$\mu\text{g}/\text{m}^3$	0.248	0.165	0.559
Unit Risk Value (70-year MEI)	$(\mu\text{g}/\text{m}^3)^{-1}$	3.00E-04	3.00E-04	3.00E-04
Activity Duration	days	5	12	20
Annual MEI Correction	fraction	2.0E-04	4.7E-04	7.8E-04
Cancer Risk	probability	1.5E-08	2.3E-08	1.3E-07
	per million	0.01	0.02	0.13
CEQA Threshold	per million	10	10	10
	significance	LTS	LTS	LTS

Sources: NOAA 2008, USEPA 1992, USEPA 2011c, OEHHA 2009, WC 2013, BAAQMD 1999

Notes:

DPM = diesel particulate matter (PM_{10})

70-year Maximally Exposed Individual = 25,550 days = 613,200 hours

LTS = Less Than Significant; S = Significant

3.11-e Dry Air Composition

Table 3.11-4 Standard Composition of Dry Air

Principal Gas	Chemical Symbol	Gas MW g/mole	Concentration ppmv	Fraction percent	Fraction MW g/mole
Nitrogen	N ₂	28.014	780,805.00	78.080500	21.873471
Oxygen	O ₂	31.998	209,440.00	20.944000	6.701661
Argon	Ar	39.948	9,340.00	0.934000	0.373114
Carbon Dioxide	CO ₂	44.009	387.69	0.038769	0.017062
Neon	Ne	20.183	18.21	0.001821	0.000368
Helium	He	4.003	5.24	0.000524	0.000021
Methane	CH ₄	16.043	1.81	0.000181	0.000029
Krypton	Kr	83.800	1.14	0.000114	0.000096
Hydrogen	H ₂	2.016	0.50	0.000050	0.000001
Nitrous Oxide	N ₂ O	44.013	0.32	0.000032	0.000014
Xenon	Xe	31.300	0.09	0.000009	0.000003
Totals			1,000,000.00	100.000	28.966

Sources: UIG 2008, USEPA 2012b, du Pont 1971, Jennings 1970

Notes:

MW = molecular weight, g/mole

ppmv = parts per million by volume (10⁻⁶)

3.11-f Fuels

Table 3.11-5 Typical GHG Contents of Common Fuels

Fuel	CO ₂ kg/mmBTU	CH ₄ kg/mmBTU	N ₂ O kg/mmBTU	CO ₂ e lb/mmBTU	Energy BTU/gal	CO ₂ e lb/gal
Diesel Fuel No. 2	73.96	0.0105	0.0006	163.97	138,300	22.68
Kerosene	73.19	0.0105	0.0006	162.27	138,700	22.51
Jet Fuel	72.23	0.0105	0.0006	160.17	135,000	21.62
Motor Gasoline	71.35	0.0105	0.0006	158.23	122,600	19.40
Aviation Gasoline	69.15	0.0105	0.0006	153.38	120,200	18.44
Propane	62.22	0.0053	0.0001	137.49	91,300	12.55
Pipeline Natural Gas	53.02	0.0053	0.0001	117.20	—	—

Sources: USEPA 2012b, USEPA 2011b

Notes:

kg/mmBTU - kilograms per million British Thermal Units

lb/mmBTU - pounds per million British Thermal Units

BTU - the amount of energy (heat) required to raise 1 pound of liquid water 1 degree Fahrenheit from 39 to 40 °F

3.11-g GHG Inventories

Table 3.11-6 Greenhouse Gas Emissions Inventories - Gross Basis

Summary Year	National MMT CO ₂ e	California MMT CO ₂ e	Bay Area MMT CO ₂ e
2005	7,204	482.5	—
2006	7,159	481.9	—
2007	7,253	488.8	95.8
2008	7,048	484.7	—
2009	6,608	456.8	—
5-Year Average	7,054	478.9	—
Average Annual Variation	2.6%	1.8%	—

Sources: USEPA 2012b, CARB 2011b, BAAQMD 2010b

Notes:

MMT - million metric tonnes (annual)

1 metric tonne = 1,000 kilograms or 2,204.6 pounds

2009 is most recent CARB published data; Bay Area for 2007 only

Table 3.11-7 Bay Area GHG Emissions by Sector

End-Use Sector	District Emissions	
	Percent	MMT CO ₂ e
Industrial / Commercial	36.4%	34.9
Residential Fuel Use	7.1%	6.8
Local Electric Power Generation	8.5%	8.1
Imported Electric Power Generation	7.4%	7.1
Offroad Equipment	3.0%	2.9
Transportation	36.4%	34.9
Agriculture / Farming	1.2%	1.1
Totals	100.0%	95.8

Source: BAAQMD 2010b

Notes:

MMT - million metric tonnes (annual)

1 metric tonne = 1,000 kilograms or 2,204.6 pounds

3.11-g GHG Inventories

Table 3.11-8 Bay Area GHG Emissions by County

County	District Emissions	
	Percent	MMT CO ₂ e
Alameda	16.4%	15.7
Contra Costa	32.9%	31.5
Marin	2.8%	2.7
Napa	1.8%	1.7
San Francisco	7.4%	7.1
San Mateo	8.9%	8.5
Santa Clara	19.6%	18.8
Solano (within BAAQMD)	5.9%	5.7
Sonoma (within BAAQMD)	4.3%	4.1
Totals	100.0%	95.8

Source: BAAQMD 2010b

Notes:

MMT - million metric tonnes (annual)

1 metric tonne = 1,000 kilograms or 2,204.6 pounds

Table 3.11-9 Mobile Sectors GHG Emissions by County

County	Offroad	Transportation
	MT CO ₂ e	MT CO ₂ e
Alameda	569,000	8,351,000
Contra Costa	406,000	4,998,000
Marin	99,000	1,286,000
Napa	50,000	917,000
San Francisco	415,000	2,673,000
San Mateo	270,000	4,850,000
Santa Clara	790,000	7,859,000
Solano (within BAAQMD)	147,000	1,834,000
Sonoma (within BAAQMD)	175,000	2,103,000
Totals	2,921,000	34,871,000

Source: BAAQMD 2010b

Notes:

MT - metric tonnes (annual)

1 metric tonne = 1,000 kilograms or 2,204.6 pounds

Values rounded to nearest 1,000 tonnes

"Offroad" is offroad equipment category

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles			Offroad		Planned Schedule			Duration	Offroad	Onroad	Daily Max		Project Total		Annual Average		ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	Category	Qty.	BHP	years	months	wks/mo	days/wk	days	hrs/day	mi/day	hours	VMT	hours	VMT	hours	VMT	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit
Reach 4																										
Hydraulic Excavator, Crawler (2 CY Bucket)	offroad	2	190	3	22.9	4.33	5	497	6		12		5964		1988		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Vibratory / Static Roller (Single Drum)	offroad	1	100	3	22.9	4.33	5	497	6		6		2982		994		0.07342	0.35631	0.40339	0.00059	0.03199	0.02943	49.56	0.00662	0.00294	50.61
Front End Loader (2.6 – 3.8 CY Bucket)	offroad	1	200	3	22.9	4.33	5	497	6		6		2982		994		0.09689	0.52527	0.70422	0.00136	0.03318	0.03052	120.54	0.00874	0.00389	121.92
Hydraulic Excavator (0.5 – 2 CY)	offroad	1	190	3	22.9	4.33	5	497	6		6		2982		994		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Tractor Crawler / Dozer	offroad	1	240	3	22.9	4.33	5	497	6		6		2982		994		0.14041	0.47127	1.11186	0.00180	0.04384	0.04033	160.14	0.01267	0.00563	162.15
Pavment Breaker	offroad	1	90	3	22.9	4.33	5	497	6		6		2982		994		0.05841	0.39630	0.38013	0.00070	0.02417	0.02224	58.20	0.00527	0.00234	59.04
Air Compressor	offroad	1	80	3	22.9	4.33	5	497	6		6		2982		994		0.05786	0.26003	0.26680	0.00040	0.02101	0.01933	32.85	0.00522	0.00232	33.68
Backhoe (0.8 CY)	offroad	1	120	3	22.9	4.33	5	497	6		6		2982		994		0.04771	0.34418	0.32159	0.00061	0.02166	0.01992	51.73	0.00430	0.00191	52.41
Grader	offroad	1	140	3	22.9	4.33	5	497	6		6		2982		994		0.10037	0.59422	0.64906	0.00107	0.04407	0.04055	92.77	0.00906	0.00403	94.21
Asphalt Compactor Roller (6 tons)	offroad	1	130	3	22.9	4.33	5	497	6		6		2982		994		0.07777	0.43431	0.52038	0.00079	0.03809	0.03504	67.93	0.00702	0.00312	69.04
Hydraulic Crane	offroad	1	270	3	22.9	4.33	5	497	6		6		2982		994		0.08646	0.27056	0.70619	0.00130	0.02441	0.02245	117.59	0.00780	0.00347	118.83
Hydroseeder (3,000 gal)	offroad	1	30	3	22.9	4.33	5	497	6		6		2982		994		0.02723	0.09811	0.13230	0.00021	0.00654	0.00601	16.63	0.00246	0.00109	17.02
Dump Trucks (12-20 CY)	onroad HD	2		3	22.9	4.33	5	497		20		40		19880		6627	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Water Tanker (5,000 gal)	onroad HD	1		3	22.9	4.33	5	497		20		20		9940		3313	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Flatbed Trucks	onroad MD	2		3	22.9	4.33	5	497		50		100		49700		16567	0.00150	0.00998	0.01070	0.00003	0.00043	0.00035	2.84	0.00007	0.00006	2.86
Pickup Trucks (worker transportation)	onroad LD	4		3	22.9	4.33	5	497		50		200		99400		33133	0.00060	0.00538	0.00051	0.00001	0.00009	0.00006	1.11	0.00005	0.00008	1.13
Reach 5																										
Hydraulic Excavator, Crawler (2 CY Bucket)	offroad	3	190	2	10.3	4.33	5	223	6		18		4014		2007		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Vibratory / Static Roller (Single Drum)	offroad	1	100	2	10.3	4.33	5	223	6		6		1338		669		0.07342	0.35631	0.40339	0.00059	0.03199	0.02943	49.56	0.00662	0.00294	50.61
Front End Loader (2.6 – 3.8 CY Bucket)	offroad	1	200	2	10.3	4.33	5	223	6		6		1338		669		0.09689	0.52527	0.70422	0.00136	0.03318	0.03052	120.54	0.00874	0.00389	121.92
Hydraulic Excavator (0.5 – 2 CY)	offroad	1	190	2	10.3	4.33	5	223	6		6		1338		669		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Tractor Crawler / Dozer	offroad	1	240	2	10.3	4.33	5	223	6		6		1338		669		0.14041	0.47127	1.11186	0.00180	0.04384	0.04033	160.14	0.01267	0.00563	162.15
Pavment Breaker	offroad		90	2	10.3	4.33	5	223									0.05841	0.39630	0.38013	0.00070	0.02417	0.02224	58.20	0.00527	0.00234	59.04
Air Compressor	offroad		80	2	10.3	4.33	5	223									0.05786	0.26003	0.26680	0.00040	0.02101	0.01933	32.85	0.00522	0.00232	33.68
Backhoe (0.8 CY)	offroad	1	120	2	10.3	4.33	5	223	6		6		1338		669		0.04771	0.34418	0.32159	0.00061	0.02166	0.01992	51.73	0.00430	0.00191	52.41
Grader	offroad	1	140	2	10.3	4.33	5	223	6		6		1338		669		0.10037	0.59422	0.64906	0.00107	0.04407	0.04055	92.77	0.00906	0.00403	94.21
Asphalt Compactor Roller (6 tons)	offroad	1	130	2	10.3	4.33	5	223	6		6		1338		669		0.07777	0.43431	0.52038	0.00079	0.03809	0.03504	67.93	0.00702	0.00312	69.04
Hydraulic Crane	offroad	1	270	2	10.3	4.33	5	223	6		6		1338		669		0.08646	0.27056	0.70619	0.00130	0.02441	0.02245	117.59	0.00780	0.00347	118.83
Hydroseeder (3,000 gal)	offroad	1	30	2	10.3	4.33	5	223	6		6		1338		669		0.02723	0.09811	0.13230	0.00021	0.00654	0.00601	16.63	0.00246	0.00109	17.02
Dump Trucks (12-20 CY)	onroad HD	2		2	10.3	4.33	5	223		20		40		8920		4460	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Water Tanker (5,000 gal)	onroad HD	1		2	10.3	4.33	5	223		20		20		4460		2230	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Flatbed Trucks	onroad MD	2		2	10.3	4.33	5	223		50		100		22300		11150	0.00150									

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot
Reach 4																				
Hydraulic Excavator, Crawler (2 CY Bucket)	1.098	7.183	7.203	0.016	0.351	0.323	1458.2	0.099	0.044	1473.9	545.7	3570.0	3579.8	8.2	174.3	160.3	724708	49.2	21.9	732527
Vibratory / Static Roller (Single Drum)	0.440	2.138	2.420	0.004	0.192	0.177	297.4	0.040	0.018	303.7	218.9	1062.5	1202.9	1.8	95.4	87.8	147784	19.8	8.8	150920
Front End Loader (2.6 – 3.8 CY Bucket)	0.581	3.152	4.225	0.008	0.199	0.183	723.2	0.052	0.023	731.5	288.9	1566.4	2100.0	4.0	98.9	91.0	359437	26.1	11.6	363576
Hydraulic Excavator (0.5 – 2 CY)	0.549	3.592	3.601	0.008	0.175	0.161	729.1	0.050	0.022	736.9	272.9	1785.0	1789.9	4.1	87.1	80.2	362354	24.6	10.9	366263
Tractor Crawler / Dozer	0.842	2.828	6.671	0.011	0.263	0.242	960.8	0.076	0.034	972.9	418.7	1405.3	3315.6	5.4	130.7	120.3	477535	37.8	16.8	483533
Pavment Breaker	0.350	2.378	2.281	0.004	0.145	0.133	349.2	0.032	0.014	354.2	174.2	1181.8	1133.5	2.1	72.1	66.3	173554	15.7	7.0	176049
Air Compressor	0.347	1.560	1.601	0.002	0.126	0.116	197.1	0.031	0.014	202.1	172.5	775.4	795.6	1.2	62.6	57.6	97953	15.6	6.9	100424
Backhoe (0.8 CY)	0.286	2.065	1.930	0.004	0.130	0.120	310.4	0.026	0.011	314.5	142.3	1026.3	959.0	1.8	64.6	59.4	154253	12.8	5.7	156291
Grader	0.602	3.565	3.894	0.006	0.264	0.243	556.6	0.054	0.024	565.2	299.3	1772.0	1935.5	3.2	131.4	120.9	276632	27.0	12.0	280920
Asphalt Compactor Roller (6 tons)	0.467	2.606	3.122	0.005	0.229	0.210	407.6	0.042	0.019	414.2	231.9	1295.1	1551.8	2.3	113.6	104.5	202557	20.9	9.3	205879
Hydraulic Crane	0.519	1.623	4.237	0.008	0.146	0.135	705.6	0.047	0.021	713.0	257.8	806.8	2105.9	3.9	72.8	67.0	350666	23.3	10.3	354360
Hydroseeder (3,000 gal)	0.163	0.589	0.794	0.001	0.039	0.036	99.8	0.015	0.007	102.1	81.2	292.6	394.5	0.6	19.5	17.9	49585	7.3	3.3	50749
Dump Trucks (12-20 CY)	0.058	0.260	0.676	0.002	0.034	0.028	168.3	0.003	0.003	169.2	28.9	129.3	336.0	0.8	16.9	13.9	83659	1.3	1.3	84077
Water Tanker (5,000 gal)	0.029	0.130	0.338	0.001	0.017	0.014	84.2	0.001	0.001	84.6	14.4	64.7	168.0	0.4	8.4	6.9	41830	0.7	0.6	42039
Flatbed Trucks	0.150	0.998	1.070	0.003	0.043	0.035	284.0	0.007	0.006	286.1	74.7	496.1	531.8	1.4	21.4	17.2	141150	3.3	3.1	142186
Pickup Trucks (worker transportation)	0.120	1.076	0.103	0.002	0.019	0.012	221.3	0.011	0.016	226.6	59.7	534.7	51.0	1.1	9.4	6.2	109964	5.3	8.2	112615
Reach 5																				
Hydraulic Excavator, Crawler (2 CY Bucket)	1.647	10.775	10.804	0.025	0.526	0.484	2187.2	0.149	0.066	2210.8	367.3	2402.7	2409.3	5.5	117.3	107.9	487756	33.1	14.7	493019
Vibratory / Static Roller (Single Drum)	0.440	2.138	2.420	0.004	0.192	0.177	297.4	0.040	0.018	303.7	98.2	476.7	539.7	0.8	42.8	39.4	66309	8.9	3.9	67717
Front End Loader (2.6 – 3.8 CY Bucket)	0.581	3.152	4.225	0.008	0.199	0.183	723.2	0.052	0.023	731.5	129.6	702.8	942.2	1.8	44.4	40.8	161277	11.7	5.2	163134
Hydraulic Excavator (0.5 – 2 CY)	0.549	3.592	3.601	0.008	0.175	0.161	729.1	0.050	0.022	736.9	122.4	800.9	803.1	1.8	39.1	36.0	162585	11.0	4.9	164340
Tractor Crawler / Dozer	0.842	2.828	6.671	0.011	0.263	0.242	960.8	0.076	0.034	972.9	187.9	630.6	1487.7	2.4	58.7	54.0	214266	17.0	7.5	216957
Pavment Breaker																				
Air Compressor																				
Backhoe (0.8 CY)	0.286	2.065	1.930	0.004	0.130	0.120	310.4	0.026	0.011	314.5	63.8	460.5	430.3	0.8	29.0	26.7	69212	5.8	2.6	70127
Grader	0.602	3.565	3.894	0.006	0.264	0.243	556.6	0.054	0.024	565.2	134.3	795.1	868.4	1.4	59.0	54.3	124123	12.1	5.4	126047
Asphalt Compactor Roller (6 tons)	0.467	2.606	3.122	0.005	0.229	0.210	407.6	0.042	0.019	414.2	104.1	581.1	696.3	1.1	51.0	46.9	90886	9.4	4.2	92376
Hydraulic Crane	0.519	1.623	4.237	0.008	0.146	0.135	705.6	0.047	0.021	713.0	115.7	362.0	944.9	1.7	32.7	30.0	157341	10.4	4.6	158998
Hydroseeder (3,000 gal)	0.163	0.589	0.794	0.001	0.039	0.036	99.8	0.015	0.007	102.1	36.4	131.3	177.0	0.3	8.7	8.0	22249	3.3	1.5	22770
Dump Trucks (12-20 CY)	0.058	0.260	0.676	0.002	0.034	0.028	168.3	0.003	0.003	169.2	13.0	58.0	150.8	0.4	7.6	6.2	37537	0.6	0.6	37725
Water Tanker (5,000 gal)	0.029	0.130	0.338	0.001	0.017	0.014	84.2	0.001	0.001	84.6	6.5	29.0	75.4	0.2	3.8	3.1	18769	0.3	0.3	18862
Flatbed Trucks	0.150	0.998	1.070	0.003	0.043	0.035	284.0	0.007	0.006	286.1	33.5	222.6	238.6	0.6	9.6	7.7	63333	1.5	1.4	63798
Pickup Trucks (worker transportation)	0.180	1.614	0.154	0.003	0.028	0.019	331.9	0.016	0.025	339.9	40.2	359.8	34.3	0.7	6.3	4.1	74010	3.5	5.5	75794
Reach 6																				
Hydraulic Excavator, Crawler (2 CY Bucket)	1.647	10.775	10.804	0.025	0.526	0.484	2187.2	0.149	0.066	2210.8	1652.1	10806.9	10836.6	24.7	527.5	485.3	2193810	149.1	66.3	2217478
Vibratory / Static Roller (Single Drum)	0.440	2.138	2.420	0.004	0.192	0.177	297.4	0.040	0.018	303.7	441.8	2144.3	2427.6	3.6	192.5	177.1	298244	39.9	17.7	304573
Front End Loader (2.6 – 3.8 CY Bucket)	0.581	3.152	4.225	0.008	0.199	0.183	723.2	0.052	0.023	731.5	583.1	3161.1	4238.0	8.2	199.7	183.7	725384	52.6	23.4	733737
Hydraulic Excavator (0.5 – 2 CY)	0.549	3.592	3.601	0.008	0.175	0.161	729.1	0.050	0.022	736.9	550.7	3602.3	3612.2	8.2	175.8	161.8	731270	49.7	22.1	739159
Tractor Crawler / Dozer	0.842	2.828	6.671	0.011	0.263	0.242	960.8	0.076	0.034	972.9	845.0	2836.1	6691.2	10.8	263.8	242.7	963717	76.2	33.9	975822
Pavment Breaker																				
Air Compressor																				
Backhoe (0.8 CY)	0.286	2.065	1.930	0.004	0.130	0.120	310.4	0.026	0.011	314.5	287.1	2071.2	1935.3	3.7	130.3	119.9	311299	25.9	11.5	315413
Grader	0.602	3.565	3.894	0.006	0.264	0.243	556.6	0.054	0.024	565.2	604.0	3576.0	3906.1	6.4	265.2	244.0	558273	54.5	24.2	566927
Asphalt Compactor Roller (6 tons)	0.467	2.606	3.122	0.005	0.229	0.210	407.6	0.042	0.019	414.2	468.0	2613.7	3131.7	4.7	229.2	210.9	408781	42.2	18.8	415487
Hydraulic Crane	0.519	1.623	4.237	0.008	0.146	0.135	705.6	0.047	0.021	713.0	520.3	1628.2	4249.9	7.8	146.9	135.1	707682	46.9	20.9	715136
Hydroseeder (3,000 gal)	0.163	0.589	0.794	0.001	0.039	0.036	99.8	0.015	0.007	102.1	163.9	590.4	796.2	1.3	39.3	36.2	100069	14.8	6.6	102416
Dump Trucks (12-20 CY)	0.058	0.260	0.676	0.002	0.034	0.028	168.3	0.003	0.003	169.2	58.3	261.0	678.2	1.6	34.1	28.0	168833	2.7	2.5	169677
Water Tanker (5,000 gal)	0.029	0.130	0.338	0.001	0.017	0.014	84.2	0.001	0.001	84.6	29.1	130.5	339.1	0.8	17.0	14.0	84417	1.3	1.3	84838
Flatbed Trucks	0.150	0.998	1.070	0.003	0.043	0.035	284.0	0.007	0.006	286.1	150.7	1001.1	1073.2	2.7	43.3	34.7	284857	6.7	6.3	286947
Pickup Trucks (worker transportation)	0.180	1.614	0.154	0.003	0.028	0.019	331.9	0.016	0.025	339.9	180.9	1618.5	154.4	3.2	28.4	18.6	332878	15.9	24.8	340904

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr
Reach 4										
Hydraulic Excavator, Crawler (2 CY Bucket)	181.9	1190.0	1193.3	2.7	58.1	53.4	241569	16.4	7.3	244176
Vibratory / Static Roller (Single Drum)	73.0	354.2	401.0	0.6	31.8	29.3	49261	6.6	2.9	50307
Front End Loader (2.6 – 3.8 CY Bucket)	96.3	522.1	700.0	1.3	33.0	30.3	119812	8.7	3.9	121192
Hydraulic Excavator (0.5 – 2 CY)	91.0	595.0	596.6	1.4	29.0	26.7	120785	8.2	3.6	122088
Tractor Crawler / Dozer	139.6	468.4	1105.2	1.8	43.6	40.1	159178	12.6	5.6	161178
Pavment Breaker	58.1	393.9	377.8	0.7	24.0	22.1	57851	5.2	2.3	58683
Air Compressor	57.5	258.5	265.2	0.4	20.9	19.2	32651	5.2	2.3	33475
Backhoe (0.8 CY)	47.4	342.1	319.7	0.6	21.5	19.8	51418	4.3	1.9	52097
Grader	99.8	590.7	645.2	1.1	43.8	40.3	92211	9.0	4.0	93640
Asphalt Compactor Roller (6 tons)	77.3	431.7	517.3	0.8	37.9	34.8	67519	7.0	3.1	68626
Hydraulic Crane	85.9	268.9	702.0	1.3	24.3	22.3	116889	7.8	3.4	118120
Hydroseeder (3,000 gal)	27.1	97.5	131.5	0.2	6.5	6.0	16528	2.4	1.1	16916
Dump Trucks (12-20 CY)	9.6	43.1	112.0	0.3	5.6	4.6	27886	0.4	0.4	28026
Water Tanker (5,000 gal)	4.8	21.6	56.0	0.1	2.8	2.3	13943	0.2	0.2	14013
Flatbed Trucks	24.9	165.4	177.3	0.5	7.1	5.7	47050	1.1	1.0	47395
Pickup Trucks (worker transportation)	19.9	178.2	17.0	0.4	3.1	2.1	36655	1.8	2.7	37538
Reach 5										
Hydraulic Excavator, Crawler (2 CY Bucket)	183.7	1201.4	1204.7	2.7	58.6	54.0	243878	16.6	7.4	246509
Vibratory / Static Roller (Single Drum)	49.1	238.4	269.9	0.4	21.4	19.7	33155	4.4	2.0	33858
Front End Loader (2.6 – 3.8 CY Bucket)	64.8	351.4	471.1	0.9	22.2	20.4	80638	5.8	2.6	81567
Hydraulic Excavator (0.5 – 2 CY)	61.2	400.5	401.6	0.9	19.5	18.0	81293	5.5	2.5	82170
Tractor Crawler / Dozer	93.9	315.3	743.8	1.2	29.3	27.0	107133	8.5	3.8	108479
Pavment Breaker										
Air Compressor										
Backhoe (0.8 CY)	31.9	230.3	215.1	0.4	14.5	13.3	34606	2.9	1.3	35063
Grader	67.1	397.5	434.2	0.7	29.5	27.1	62061	6.1	2.7	63023
Asphalt Compactor Roller (6 tons)	52.0	290.6	348.1	0.5	25.5	23.4	45443	4.7	2.1	46188
Hydraulic Crane	57.8	181.0	472.4	0.9	16.3	15.0	78671	5.2	2.3	79499
Hydroseeder (3,000 gal)	18.2	65.6	88.5	0.1	4.4	4.0	11124	1.6	0.7	11385
Dump Trucks (12-20 CY)	6.5	29.0	75.4	0.2	3.8	3.1	18769	0.3	0.3	18862
Water Tanker (5,000 gal)	3.2	14.5	37.7	0.1	1.9	1.6	9384	0.1	0.1	9431
Flatbed Trucks	16.8	111.3	119.3	0.3	4.8	3.9	31667	0.7	0.7	31899
Pickup Trucks (worker transportation)	20.1	179.9	17.2	0.4	3.2	2.1	37005	1.8	2.8	37897
Reach 6										
Hydraulic Excavator, Crawler (2 CY Bucket)	330.4	2161.4	2167.3	4.9	105.5	97.1	438762	29.8	13.3	443496
Vibratory / Static Roller (Single Drum)	88.4	428.9	485.5	0.7	38.5	35.4	59649	8.0	3.5	60915
Front End Loader (2.6 – 3.8 CY Bucket)	116.6	632.2	847.6	1.6	39.9	36.7	145077	10.5	4.7	146747
Hydraulic Excavator (0.5 – 2 CY)	110.1	720.5	722.4	1.6	35.2	32.4	146254	9.9	4.4	147832
Tractor Crawler / Dozer	169.0	567.2	1338.2	2.2	52.8	48.5	192743	15.2	6.8	195164
Pavment Breaker										
Air Compressor										
Backhoe (0.8 CY)	57.4	414.2	387.1	0.7	26.1	24.0	62260	5.2	2.3	63083
Grader	120.8	715.2	781.2	1.3	53.0	48.8	111655	10.9	4.8	113385
Asphalt Compactor Roller (6 tons)	93.6	522.7	626.3	0.9	45.8	42.2	81756	8.4	3.8	83097
Hydraulic Crane	104.1	325.6	850.0	1.6	29.4	27.0	141536	9.4	4.2	143027
Hydroseeder (3,000 gal)	32.8	118.1	159.2	0.3	7.9	7.2	20014	3.0	1.3	20483
Dump Trucks (12-20 CY)	11.7	52.2	135.6	0.3	6.8	5.6	33767	0.5	0.5	33935
Water Tanker (5,000 gal)	5.8	26.1	67.8	0.2	3.4	2.8	16883	0.3	0.3	16968
Flatbed Trucks	30.1	200.2	214.6	0.5	8.7	6.9	56971	1.3	1.3	57389
Pickup Trucks (worker transportation)	36.2	323.7	30.9	0.6	5.7	3.7	66576	3.2	5.0	68181

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles			Offroad	Planned Schedule				Duration	Offroad	Onroad	Daily Max		Project Total		Annual Average		ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	Category	Qty.	BHP	years	months	wks/mo	days/wk	days	hrs/day	mi/day	hours	VMT	hours	VMT	hours	VMT	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit
Reach 7a								290																		
Hydraulic Excavator, Crawler (2 CY Bucket)	offroad	3	190	2	13.4	4.33	5	290	6		18		5220		2610		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Vibratory / Static Roller (Single Drum)	offroad	1	100	2	13.4	4.33	5	290	6		6		1740		870		0.07342	0.35631	0.40339	0.00059	0.03199	0.02943	49.56	0.00662	0.00294	50.61
Front End Loader (2.6 – 3.8 CY Bucket)	offroad	1	200	2	13.4	4.33	5	290	6		6		1740		870		0.09689	0.52527	0.70422	0.00136	0.03318	0.03052	120.54	0.00874	0.00389	121.92
Hydraulic Excavator (0.5 – 2 CY)	offroad	1	190	2	13.4	4.33	5	290	6		6		1740		870		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Tractor Crawler / Dozer	offroad	1	240	2	13.4	4.33	5	290	6		6		1740		870		0.14041	0.47127	1.11186	0.00180	0.04384	0.04033	160.14	0.01267	0.00563	162.15
Pavment Breaker	offroad		90	2	13.4	4.33	5	290									0.05841	0.39630	0.38013	0.00070	0.02417	0.02224	58.20	0.00527	0.00234	59.04
Air Compressor	offroad		80	2	13.4	4.33	5	290									0.05786	0.26003	0.26680	0.00040	0.02101	0.01933	32.85	0.00522	0.00232	33.68
Backhoe (0.8 CY)	offroad	1	120	2	13.4	4.33	5	290	6		6		1740		870		0.04771	0.34418	0.32159	0.00061	0.02166	0.01992	51.73	0.00430	0.00191	52.41
Grader	offroad	1	140	2	13.4	4.33	5	290	6		6		1740		870		0.10037	0.59422	0.64906	0.00107	0.04407	0.04055	92.77	0.00906	0.00403	94.21
Asphalt Compactor Roller (6 tons)	offroad	1	130	2	13.4	4.33	5	290	6		6		1740		870		0.07777	0.43431	0.52038	0.00079	0.03809	0.03504	67.93	0.00702	0.00312	69.04
Hydraulic Crane	offroad	1	270	2	13.4	4.33	5	290	6		6		1740		870		0.08646	0.27056	0.70619	0.00130	0.02441	0.02245	117.59	0.00780	0.00347	118.83
Hydroseeder (3,000 gal)	offroad	1	30	2	13.4	4.33	5	290	6		6		1740		870		0.02723	0.09811	0.13230	0.00021	0.00654	0.00601	16.63	0.00246	0.00109	17.02
Dump Trucks (12-20 CY)	onroad HD	2		2	13.4	4.33	5	290		20		40		11600		5800	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Water Tanker (5,000 gal)	onroad HD	1		2	13.4	4.33	5	290		20		20		5800		2900	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Flatbed Trucks	onroad MD	2		2	13.4	4.33	5	290		50		100		29000		14500	0.00150	0.00998	0.01070	0.00003	0.00043	0.00035	2.84	0.00007	0.00006	2.86
Pickup Trucks (worker transportation)	onroad LD	6		2	13.4	4.33	5	290		50		300		87000		43500	0.00060	0.00538	0.00051	0.00001	0.00009	0.00006	1.11	0.00005	0.00008	1.13
Reach 7b								496																		
Hydraulic Excavator, Crawler (2 CY Bucket)	offroad	2	190	3	22.9	4.33	5	496	6		12		5952		1984		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Vibratory / Static Roller (Single Drum)	offroad	1	100	3	22.9	4.33	5	496	6		6		2976		992		0.07342	0.35631	0.40339	0.00059	0.03199	0.02943	49.56	0.00662	0.00294	50.61
Front End Loader (2.6 – 3.8 CY Bucket)	offroad	1	200	3	22.9	4.33	5	496	6		6		2976		992		0.09689	0.52527	0.70422	0.00136	0.03318	0.03052	120.54	0.00874	0.00389	121.92
Hydraulic Excavator (0.5 – 2 CY)	offroad	1	190	3	22.9	4.33	5	496	6		6		2976		992		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Tractor Crawler / Dozer	offroad	1	240	3	22.9	4.33	5	496	6		6		2976		992		0.14041	0.47127	1.11186	0.00180	0.04384	0.04033	160.14	0.01267	0.00563	162.15
Pavment Breaker	offroad		90	3	22.9	4.33	5	496									0.05841	0.39630	0.38013	0.00070	0.02417	0.02224	58.20	0.00527	0.00234	59.04
Air Compressor	offroad		80	3	22.9	4.33	5	496									0.05786	0.26003	0.26680	0.00040	0.02101	0.01933	32.85	0.00522	0.00232	33.68
Backhoe (0.8 CY)	offroad	1	120	3	22.9	4.33	5	496	6		6		2976		992		0.04771	0.34418	0.32159	0.00061	0.02166	0.01992	51.73	0.00430	0.00191	52.41
Grader	offroad	1	140	3	22.9	4.33	5	496	6		6		2976		992		0.10037	0.59422	0.64906	0.00107	0.04407	0.04055	92.77	0.00906	0.00403	94.21
Asphalt Compactor Roller (6 tons)	offroad	1	130	3	22.9	4.33	5	496	6		6		2976		992		0.07777	0.43431	0.52038	0.00079	0.03809	0.03504	67.93	0.00702	0.00312	69.04
Hydraulic Crane	offroad	1	270	3	22.9	4.33	5	496	6		6		2976		992		0.08646	0.27056	0.70619	0.00130	0.02441	0.02245	117.59	0.00780	0.00347	118.83
Hydroseeder (3,000 gal)	offroad	1	30	3	22.9	4.33	5	496	6		6		2976		992		0.02723	0.09811	0.13230	0.00021	0.00654	0.00601	16.63	0.00246	0.00109	17.02
Dump Trucks (12-20 CY)	onroad HD	2		3	22.9	4.33	5	496		20		40		19840		6613	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Water Tanker (5,000 gal)	onroad HD	1		3	22.9	4.33	5	496		20		20		9920		3307	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Flatbed Trucks	onroad MD	2		3	22.9	4.33	5	496		50		100		49600		16533	0.00150	0.00998	0.01070	0.00003	0.00043	0.00035	2.84	0.00007	0.00006	2.86
Pickup Trucks (worker transportation)	onroad LD	4		3	22.9	4.33	5	496		50		200		99200		33067	0.00060	0.00538	0.00051	0.00001	0.00009	0.00006	1.11	0.00005	0.00008	1.13
Reach 8 - NRCS Alternative								735																		
Hydraulic Excavator, Crawler (2 CY Bucket)	offroad	3	190	4	33.9	4.33	5	735	6		18		13230		3308		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Vibratory / Static Roller (Single Drum)	offroad	1	100	4	33.9	4.33	5	735	6		6		4410		1103		0.07342	0.35631	0.40339	0.00059	0.03199	0.02943	49.56	0.00662	0.00294	50.61
Front End Loader (2.6 – 3.8 CY Bucket)	offroad	1	200	4	33.9	4.33	5	735	6		6		4410		1103		0.09689	0.52527	0.70422	0.00136	0.03318	0.03052	120.54	0.00874	0.00389	121.92
Hydraulic Excavator (0.5 – 2 CY)	offroad	1	190	4	33.9	4.33	5	735	6		6		4410		1103		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Tractor Crawler / Dozer	offroad	1	240	4	33.9	4.33	5	735	6		6		4410		1103		0.14041	0.47127	1.11186	0.00180	0.04384	0.04033	160.14	0.01267	0.00563	162.15
Pavment Breaker	offroad		90	4	33.9	4.33	5	735									0.05841	0.39630	0.38013	0.00070	0.02417	0.02224	58.20	0.00527	0.00234	59.04
Air Compressor	offroad		80	4	33.9	4.33	5	735									0.05786	0.26003	0.26680	0.00040	0.02101	0.01933	32.85	0.00522	0.00232	33.68
Backhoe (0.8 CY)	offroad	1	120	4	33.9	4.33	5	735	6		6		4410		1103		0.04771	0.34418	0.32159	0.00061	0.02166	0.01992	51.73	0.00430	0.00191	52.41
Grader	offroad	1	140	4	33.9	4.33	5	735	6		6		4410		1103		0.10037	0.59422	0.64906	0.00107	0.04407	0.04055	92.77	0.00906	0.00403	94.21
Asphalt Compactor Roller (6 tons)	offroad	1	130	4	33.9	4.33	5	735	6		6		4410		1103		0.07777	0.43431	0.52038	0.00079	0.03809	0.03504	67.93	0.00702	0.00312	69.04
Hydraulic Crane	offroad	1	270	4	33.9	4.33	5	735	6		6		4410		1103		0.08646	0.27056	0.70619	0.00130	0.02441	0.02245	117.59	0.00780	0.00347	118.83
Hydroseeder (3,000 gal)	offroad	1	30	4	33.9	4.33	5	735	6		6		4410		1103		0.02723	0.09811	0.13230	0.00021	0.00654	0.00601	16.63	0.00246	0.00109	17.02
Dump Trucks (12-20 CY)	onroad HD	2		4	33.9	4.33	5	735		20		40		29400		7350	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Water Tanker (5,000 gal)	onroad HD	1		4	33.9	4.33	5	735		20		20		14700		3675	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Flatbed Trucks	onroad MD	2		4	33.9	4.33	5	735		50		100		73500		18375	0.00150	0.00998	0.01070	0.00003	0.00043	0.00035	2.84	0.00007	0.00006	2.86
Pickup Trucks (worker transportation)	onroad LD	6		4	33.9	4.33	5	735		50		300		220500		55125	0.00060	0.00538	0.00051	0.00001	0.00009	0.00006	1.11	0.00005	0.00008	1.13

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot
Reach 7a					0.526	as DPM														
Hydraulic Excavator, Crawler (2 CY Bucket)	1.647	10.775	10.804	0.025	0.526	0.484	2187.2	0.149	0.066	2210.8	477.7	3124.6	3133.2	7.1	152.5	140.3	634302	43.1	19.2	641145
Vibratory / Static Roller (Single Drum)	0.440	2.138	2.420	0.004	0.192	0.177	297.4	0.040	0.018	303.7	127.7	620.0	701.9	1.0	55.7	51.2	86232	11.5	5.1	88062
Front End Loader (2.6 – 3.8 CY Bucket)	0.581	3.152	4.225	0.008	0.199	0.183	723.2	0.052	0.023	731.5	168.6	914.0	1225.3	2.4	57.7	53.1	209732	15.2	6.8	212147
Hydraulic Excavator (0.5 – 2 CY)	0.549	3.592	3.601	0.008	0.175	0.161	729.1	0.050	0.022	736.9	159.2	1041.5	1044.4	2.4	50.8	46.8	211434	14.4	6.4	213715
Tractor Crawler / Dozer	0.842	2.828	6.671	0.011	0.263	0.242	960.8	0.076	0.034	972.9	244.3	820.0	1934.6	3.1	76.3	70.2	278642	22.0	9.8	282142
Pavment Breaker																				
Air Compressor																				
Backhoe (0.8 CY)	0.286	2.065	1.930	0.004	0.130	0.120	310.4	0.026	0.011	314.5	83.0	598.9	559.6	1.1	37.7	34.7	90007	7.5	3.3	91196
Grader	0.602	3.565	3.894	0.006	0.264	0.243	556.6	0.054	0.024	565.2	174.6	1034.0	1129.4	1.9	76.7	70.6	161415	15.8	7.0	163917
Asphalt Compactor Roller (6 tons)	0.467	2.606	3.122	0.005	0.229	0.210	407.6	0.042	0.019	414.2	135.3	755.7	905.5	1.4	66.3	61.0	118192	12.2	5.4	120131
Hydraulic Crane	0.519	1.623	4.237	0.008	0.146	0.135	705.6	0.047	0.021	713.0	150.4	470.8	1228.8	2.3	42.5	39.1	204614	13.6	6.0	206769
Hydroseeder (3,000 gal)	0.163	0.589	0.794	0.001	0.039	0.036	99.8	0.015	0.007	102.1	47.4	170.7	230.2	0.4	11.4	10.5	28933	4.3	1.9	29612
Dump Trucks (12-20 CY)	0.058	0.260	0.676	0.002	0.034	0.028	168.3	0.003	0.003	169.2	16.8	75.5	196.1	0.5	9.8	8.1	48815	0.8	0.7	49059
Water Tanker (5,000 gal)	0.029	0.130	0.338	0.001	0.017	0.014	84.2	0.001	0.001	84.6	8.4	37.7	98.0	0.2	4.9	4.0	24408	0.4	0.4	24530
Flatbed Trucks	0.150	0.998	1.070	0.003	0.043	0.035	284.0	0.007	0.006	286.1	43.6	289.4	310.3	0.8	12.5	10.0	82361	1.9	1.8	82966
Pickup Trucks (worker transportation)	0.180	1.614	0.154	0.003	0.028	0.019	331.9	0.016	0.025	339.9	52.3	468.0	44.6	0.9	8.2	5.4	96246	4.6	7.2	98566
Reach 7b					0.351	as DPM														
Hydraulic Excavator, Crawler (2 CY Bucket)	1.098	7.183	7.203	0.016	0.351	0.323	1458.2	0.099	0.044	1473.9	544.7	3562.8	3572.6	8.1	173.9	160.0	723250	49.1	21.8	731053
Vibratory / Static Roller (Single Drum)	0.440	2.138	2.420	0.004	0.192	0.177	297.4	0.040	0.018	303.7	218.5	1060.4	1200.5	1.8	95.2	87.6	147486	19.7	8.8	150616
Front End Loader (2.6 – 3.8 CY Bucket)	0.581	3.152	4.225	0.008	0.199	0.183	723.2	0.052	0.023	731.5	288.3	1563.2	2095.8	4.0	98.7	90.8	358714	26.0	11.6	362845
Hydraulic Excavator (0.5 – 2 CY)	0.549	3.592	3.601	0.008	0.175	0.161	729.1	0.050	0.022	736.9	272.3	1781.4	1786.3	4.1	87.0	80.0	361625	24.6	10.9	365527
Tractor Crawler / Dozer	0.842	2.828	6.671	0.011	0.263	0.242	960.8	0.076	0.034	972.9	417.9	1402.5	3308.9	5.4	130.5	120.0	476574	37.7	16.8	482560
Pavment Breaker																				
Air Compressor																				
Backhoe (0.8 CY)	0.286	2.065	1.930	0.004	0.130	0.120	310.4	0.026	0.011	314.5	142.0	1024.3	957.1	1.8	64.5	59.3	153943	12.8	5.7	155977
Grader	0.602	3.565	3.894	0.006	0.264	0.243	556.6	0.054	0.024	565.2	298.7	1768.4	1931.6	3.2	131.2	120.7	276075	27.0	12.0	280355
Asphalt Compactor Roller (6 tons)	0.467	2.606	3.122	0.005	0.229	0.210	407.6	0.042	0.019	414.2	231.5	1292.5	1548.7	2.3	113.3	104.3	202149	20.9	9.3	205465
Hydraulic Crane	0.519	1.623	4.237	0.008	0.146	0.135	705.6	0.047	0.021	713.0	257.3	805.2	2101.6	3.9	72.6	66.8	349961	23.2	10.3	353647
Hydroseeder (3,000 gal)	0.163	0.589	0.794	0.001	0.039	0.036	99.8	0.015	0.007	102.1	81.0	292.0	393.7	0.6	19.5	17.9	49486	7.3	3.2	50646
Dump Trucks (12-20 CY)	0.058	0.260	0.676	0.002	0.034	0.028	168.3	0.003	0.003	169.2	28.8	129.1	335.4	0.8	16.8	13.8	83491	1.3	1.3	83908
Water Tanker (5,000 gal)	0.029	0.130	0.338	0.001	0.017	0.014	84.2	0.001	0.001	84.6	14.4	64.5	167.7	0.4	8.4	6.9	41745	0.7	0.6	41954
Flatbed Trucks	0.150	0.998	1.070	0.003	0.043	0.035	284.0	0.007	0.006	286.1	74.5	495.1	530.7	1.4	21.4	17.2	140866	3.3	3.1	141900
Pickup Trucks (worker transportation)	0.120	1.076	0.103	0.002	0.019	0.012	221.3	0.011	0.016	226.6	59.6	533.6	50.9	1.1	9.4	6.1	109742	5.3	8.2	112388
Reach 8 - NRCS Alternative					0.526	as DPM														
Hydraulic Excavator, Crawler (2 CY Bucket)	1.647	10.775	10.804	0.025	0.526	0.484	2187.2	0.149	0.066	2210.8	1210.6	7919.3	7941.1	18.1	386.6	355.7	1607628	109.2	48.5	1624972
Vibratory / Static Roller (Single Drum)	0.440	2.138	2.420	0.004	0.192	0.177	297.4	0.040	0.018	303.7	323.8	1571.3	1778.9	2.6	141.1	129.8	218553	29.2	13.0	223192
Front End Loader (2.6 – 3.8 CY Bucket)	0.581	3.152	4.225	0.008	0.199	0.183	723.2	0.052	0.023	731.5	427.3	2316.5	3105.6	6.0	146.3	134.6	531562	38.6	17.1	537683
Hydraulic Excavator (0.5 – 2 CY)	0.549	3.592	3.601	0.008	0.175	0.161	729.1	0.050	0.022	736.9	403.5	2639.8	2647.0	6.0	128.9	118.6	535876	36.4	16.2	541657
Tractor Crawler / Dozer	0.842	2.828	6.671	0.011	0.263	0.242	960.8	0.076	0.034	972.9	619.2	2078.3	4903.3	7.9	193.3	177.9	706213	55.9	24.8	715084
Pavment Breaker																				
Air Compressor																				
Backhoe (0.8 CY)	0.286	2.065	1.930	0.004	0.130	0.120	310.4	0.026	0.011	314.5	210.4	1517.8	1418.2	2.7	95.5	87.9	228121	19.0	8.4	231135
Grader	0.602	3.565	3.894	0.006	0.264	0.243	556.6	0.054	0.024	565.2	442.6	2620.5	2862.4	4.7	194.4	178.8	409104	39.9	17.8	415445
Asphalt Compactor Roller (6 tons)	0.467	2.606	3.122	0.005	0.229	0.210	407.6	0.042	0.019	414.2	343.0	1915.3	2294.9	3.5	168.0	154.5	299556	30.9	13.8	304469
Hydraulic Crane	0.519	1.623	4.237	0.008	0.146	0.135	705.6	0.047	0.021	713.0	381.3	1193.2	3114.3	5.7	107.6	99.0	518591	34.4	15.3	524053
Hydroseeder (3,000 gal)	0.163	0.589	0.794	0.001	0.039	0.036	99.8	0.015	0.007	102.1	120.1	432.7	583.4	0.9	28.8	26.5	73330	10.8	4.8	75051
Dump Trucks (12-20 CY)	0.058	0.260	0.676	0.002	0.034	0.028	168.3	0.003	0.003	169.2	42.7	191.3	497.0	1.2	25.0	20.5	123721	2.0	1.9	124339
Water Tanker (5,000 gal)	0.029	0.130	0.338	0.001	0.017	0.014	84.2	0.001	0.001	84.6	21.3	95.6	248.5	0.6	12.5	10.2	61861	1.0	0.9	62170
Flatbed Trucks	0.150	0.998	1.070	0.003	0.043	0.035	284.0	0.007	0.006	286.1	110.4	733.6	786.5	2.0	31.7	25.4	208744	4.9	4.6	210275
Pickup Trucks (worker transportation)	0.180	1.614	0.154	0.003	0.028	0.019	331.9	0.016	0.025	339.9	132.5	1186.1	113.1	2.4	20.8	13.7	243934	11.7	18.2	249815

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr
Reach 7a										
Hydraulic Excavator, Crawler (2 CY Bucket)	238.8	1562.3	1566.6	3.6	76.3	70.2	317151	21.5	9.6	320573
Vibratory / Static Roller (Single Drum)	63.9	310.0	350.9	0.5	27.8	25.6	43116	5.8	2.6	44031
Front End Loader (2.6 – 3.8 CY Bucket)	84.3	457.0	612.7	1.2	28.9	26.6	104866	7.6	3.4	106074
Hydraulic Excavator (0.5 – 2 CY)	79.6	520.8	522.2	1.2	25.4	23.4	105717	7.2	3.2	106858
Tractor Crawler / Dozer	122.2	410.0	967.3	1.6	38.1	35.1	139321	11.0	4.9	141071
Pavment Breaker										
Air Compressor										
Backhoe (0.8 CY)	41.5	299.4	279.8	0.5	18.8	17.3	45003	3.7	1.7	45598
Grader	87.3	517.0	564.7	0.9	38.3	35.3	80708	7.9	3.5	81959
Asphalt Compactor Roller (6 tons)	67.7	377.9	452.7	0.7	33.1	30.5	59096	6.1	2.7	60065
Hydraulic Crane	75.2	235.4	614.4	1.1	21.2	19.5	102307	6.8	3.0	103385
Hydroseeder (3,000 gal)	23.7	85.4	115.1	0.2	5.7	5.2	14467	2.1	0.9	14806
Dump Trucks (12-20 CY)	8.4	37.7	98.0	0.2	4.9	4.0	24408	0.4	0.4	24530
Water Tanker (5,000 gal)	4.2	18.9	49.0	0.1	2.5	2.0	12204	0.2	0.2	12265
Flatbed Trucks	21.8	144.7	155.2	0.4	6.3	5.0	41181	1.0	0.9	41483
Pickup Trucks (worker transportation)	26.1	234.0	22.3	0.5	4.1	2.7	48123	2.3	3.6	49283
Reach 7b										
Hydraulic Excavator, Crawler (2 CY Bucket)	181.6	1187.6	1190.9	2.7	58.0	53.3	241083	16.4	7.3	243684
Vibratory / Static Roller (Single Drum)	72.8	353.5	400.2	0.6	31.7	29.2	49162	6.6	2.9	50205
Front End Loader (2.6 – 3.8 CY Bucket)	96.1	521.1	698.6	1.3	32.9	30.3	119571	8.7	3.9	120948
Hydraulic Excavator (0.5 – 2 CY)	90.8	593.8	595.4	1.4	29.0	26.7	120542	8.2	3.6	121842
Tractor Crawler / Dozer	139.3	467.5	1103.0	1.8	43.5	40.0	158858	12.6	5.6	160853
Pavment Breaker										
Air Compressor										
Backhoe (0.8 CY)	47.3	341.4	319.0	0.6	21.5	19.8	51314	4.3	1.9	51992
Grader	99.6	589.5	643.9	1.1	43.7	40.2	92025	9.0	4.0	93452
Asphalt Compactor Roller (6 tons)	77.2	430.8	516.2	0.8	37.8	34.8	67383	7.0	3.1	68488
Hydraulic Crane	85.8	268.4	700.5	1.3	24.2	22.3	116654	7.7	3.4	117882
Hydroseeder (3,000 gal)	27.0	97.3	131.2	0.2	6.5	6.0	16495	2.4	1.1	16882
Dump Trucks (12-20 CY)	9.6	43.0	111.8	0.3	5.6	4.6	27830	0.4	0.4	27969
Water Tanker (5,000 gal)	4.8	21.5	55.9	0.1	2.8	2.3	13915	0.2	0.2	13985
Flatbed Trucks	24.8	165.0	176.9	0.5	7.1	5.7	46955	1.1	1.0	47300
Pickup Trucks (worker transportation)	19.9	177.9	17.0	0.4	3.1	2.0	36581	1.8	2.7	37463
Reach 8 - NRCS Alternative										
Hydraulic Excavator, Crawler (2 CY Bucket)	302.7	1979.8	1985.3	4.5	96.6	88.9	401907	27.3	12.1	406243
Vibratory / Static Roller (Single Drum)	80.9	392.8	444.7	0.7	35.3	32.4	54638	7.3	3.2	55798
Front End Loader (2.6 – 3.8 CY Bucket)	106.8	579.1	776.4	1.5	36.6	33.7	132891	9.6	4.3	134421
Hydraulic Excavator (0.5 – 2 CY)	100.9	659.9	661.8	1.5	32.2	29.6	133969	9.1	4.0	135414
Tractor Crawler / Dozer	154.8	519.6	1225.8	2.0	48.3	44.5	176553	14.0	6.2	178771
Pavment Breaker										
Air Compressor										
Backhoe (0.8 CY)	52.6	379.5	354.6	0.7	23.9	22.0	57030	4.7	2.1	57784
Grader	110.7	655.1	715.6	1.2	48.6	44.7	102276	10.0	4.4	103861
Asphalt Compactor Roller (6 tons)	85.7	478.8	573.7	0.9	42.0	38.6	74889	7.7	3.4	76117
Hydraulic Crane	95.3	298.3	778.6	1.4	26.9	24.8	129648	8.6	3.8	131013
Hydroseeder (3,000 gal)	30.0	108.2	145.9	0.2	7.2	6.6	18333	2.7	1.2	18763
Dump Trucks (12-20 CY)	10.7	47.8	124.2	0.3	6.2	5.1	30930	0.5	0.5	31085
Water Tanker (5,000 gal)	5.3	23.9	62.1	0.1	3.1	2.6	15465	0.2	0.2	15542
Flatbed Trucks	27.6	183.4	196.6	0.5	7.9	6.4	52186	1.2	1.2	52569
Pickup Trucks (worker transportation)	33.1	296.5	28.3	0.6	5.2	3.4	60983	2.9	4.5	62454

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles			Offroad	Planned Schedule				Duration	Offroad	Onroad	Daily Max		Project Total		Annual Average		ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	Category	Qty.	BHP	years	months	wks/mo	days/wk	days	hrs/day	mi/day	hours	VMT	hours	VMT	hours	VMT	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit
Reach 8 - Culvert/Channel Alternative																										
Hydraulic Excavator, Crawler (2 CY Bucket)	offroad	3	190	4	33.9	4.33	5	735	6		18		13230		3308		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Vibratory / Static Roller (Single Drum)	offroad	1	100	4	33.9	4.33	5	735	6		6		4410		1103		0.07342	0.35631	0.40339	0.00059	0.03199	0.02943	49.56	0.00662	0.00294	50.61
Front End Loader (2.6 – 3.8 CY Bucket)	offroad	1	200	4	33.9	4.33	5	735	6		6		4410		1103		0.09689	0.52527	0.70422	0.00136	0.03318	0.03052	120.54	0.00874	0.00389	121.92
Hydraulic Excavator (0.5 – 2 CY)	offroad	1	190	4	33.9	4.33	5	735	6		6		4410		1103		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Tractor Crawler / Dozer	offroad	1	240	4	33.9	4.33	5	735	6		6		4410		1103		0.14041	0.47127	1.11186	0.00180	0.04384	0.04033	160.14	0.01267	0.00563	162.15
Pavment Breaker	offroad		90	4	33.9	4.33	5	735									0.05841	0.39630	0.38013	0.00070	0.02417	0.02224	58.20	0.00527	0.00234	59.04
Air Compressor	offroad		80	4	33.9	4.33	5	735									0.05786	0.26003	0.26680	0.00040	0.02101	0.01933	32.85	0.00522	0.00232	33.68
Backhoe (0.8 CY)	offroad	1	120	4	33.9	4.33	5	735	6		6		4410		1103		0.04771	0.34418	0.32159	0.00061	0.02166	0.01992	51.73	0.00430	0.00191	52.41
Grader	offroad	1	140	4	33.9	4.33	5	735	6		6		4410		1103		0.10037	0.59422	0.64906	0.00107	0.04407	0.04055	92.77	0.00906	0.00403	94.21
Asphalt Compactor Roller (6 tons)	offroad	1	130	4	33.9	4.33	5	735	6		6		4410		1103		0.07777	0.43431	0.52038	0.00079	0.03809	0.03504	67.93	0.00702	0.00312	69.04
Hydraulic Crane	offroad	1	270	4	33.9	4.33	5	735	6		6		4410		1103		0.08646	0.27056	0.70619	0.00130	0.02441	0.02245	117.59	0.00780	0.00347	118.83
Hydroseeder (3,000 gal)	offroad	1	30	4	33.9	4.33	5	735	6		6		4410		1103		0.02723	0.09811	0.13230	0.00021	0.00654	0.00601	16.63	0.00246	0.00109	17.02
Dump Trucks (12-20 CY)	onroad HD	2		4	33.9	4.33	5	735		20		40		29400		7350	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Water Tanker (5,000 gal)	onroad HD	1		4	33.9	4.33	5	735		20		20		14700		3675	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Flatbed Trucks	onroad MD	2		4	33.9	4.33	5	735		50		100		73500		18375	0.00150	0.00998	0.01070	0.00003	0.00043	0.00035	2.84	0.00007	0.00006	2.86
Pickup Trucks (worker transportation)	onroad LD	6		4	33.9	4.33	5	735		50		300		220500		55125	0.00060	0.00538	0.00051	0.00001	0.00009	0.00006	1.11	0.00005	0.00008	1.13
Reach 8 - Tunnel Alternative																										
Hydraulic Excavator, Crawler (2 CY Bucket)	offroad	2	190	4	33.9	4.33	5	735	6		12		8820		2205		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Vibratory / Static Roller (Single Drum)	offroad	1	100	4	33.9	4.33	5	735	6		6		4410		1103		0.07342	0.35631	0.40339	0.00059	0.03199	0.02943	49.56	0.00662	0.00294	50.61
Front End Loader (2.6 – 3.8 CY Bucket)	offroad	1	200	4	33.9	4.33	5	735	6		6		4410		1103		0.09689	0.52527	0.70422	0.00136	0.03318	0.03052	120.54	0.00874	0.00389	121.92
Hydraulic Excavator (0.5 – 2 CY)	offroad	1	190	4	33.9	4.33	5	735	6		6		4410		1103		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Tractor Crawler / Dozer	offroad	1	240	4	33.9	4.33	5	735	6		6		4410		1103		0.14041	0.47127	1.11186	0.00180	0.04384	0.04033	160.14	0.01267	0.00563	162.15
Pavment Breaker	offroad		90	4	33.9	4.33	5	735									0.05841	0.39630	0.38013	0.00070	0.02417	0.02224	58.20	0.00527	0.00234	59.04
Air Compressor	offroad	1	80	4	33.9	4.33	5	735	8		8		5880		1470		0.05786	0.26003	0.26680	0.00040	0.02101	0.01933	32.85	0.00522	0.00232	33.68
Backhoe (0.8 CY)	offroad	1	120	4	33.9	4.33	5	735	6		6		4410		1103		0.04771	0.34418	0.32159	0.00061	0.02166	0.01992	51.73	0.00430	0.00191	52.41
Grader	offroad	1	140	4	33.9	4.33	5	735	6		6		4410		1103		0.10037	0.59422	0.64906	0.00107	0.04407	0.04055	92.77	0.00906	0.00403	94.21
Asphalt Compactor Roller (6 tons)	offroad	1	130	4	33.9	4.33	5	735	6		6		4410		1103		0.07777	0.43431	0.52038	0.00079	0.03809	0.03504	67.93	0.00702	0.00312	69.04
Hydraulic Crane	offroad	1	270	4	33.9	4.33	5	735	6		6		4410		1103		0.08646	0.27056	0.70619	0.00130	0.02441	0.02245	117.59	0.00780	0.00347	118.83
Hydroseeder (3,000 gal)	offroad	1	30	4	33.9	4.33	5	735	6		6		4410		1103		0.02723	0.09811	0.13230	0.00021	0.00654	0.00601	16.63	0.00246	0.00109	17.02
Dump Trucks (12-20 CY)	onroad HD	2		4	33.9	4.33	5	735		20		40		29400		7350	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Water Tanker (5,000 gal)	onroad HD	1		4	33.9	4.33	5	735		20		20		14700		3675	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Flatbed Trucks	onroad MD	2		4	33.9	4.33	5	735		50		100		73500		18375	0.00150	0.00998	0.01070	0.00003	0.00043	0.00035	2.84	0.00007	0.00006	2.86
Pickup Trucks (worker transportation)	onroad LD	8		4	33.9	4.33	5	735		50		400		294000		73500	0.00060	0.00538	0.00051	0.00001	0.00009	0.00006	1.11	0.00005	0.00008	1.13
Vibratory / Sheet Pile Driver	offroad	1	280	4	33.9	4.33	5	735	6		6		4410		1103		0.08318	0.55163	0.64262	0.00162	0.02713	0.02496	154.24	0.00751	0.00334	155.43
Impact Pile Driver	offroad	1	280	4	33.9	4.33	5	735	6		6		4410		1103		0.08318	0.55163	0.64262	0.00162	0.02713	0.02496	154.24	0.00751	0.00334	155.43
Drilling Jumbo	offroad	1	60	4	33.9	4.33	5	735	8		8		5880		1470		0.02266	0.25656	0.21306	0.00047	0.00514	0.00473	37.62	0.00204	0.00091	37.95
Roadheader	offroad	1	100	4	33.9	4.33	5	735	8		8		5880		1470		0.07565	0.37558	0.40931	0.00060	0.03318	0.03053	50.52	0.00683	0.00303	51.61
Load/Haul/Dump (Mucking) Unit	offroad	1	120	4	33.9	4.33	5	735	8		8		5880		1470		0.07141	0.40381	0.44595	0.00069	0.03456	0.03180	58.91	0.00644	0.00286	59.94
Wheeled Loader (4.88 CY)	offroad	1	350	4	33.9	4.33	5	735	8		8		5880		1470		0.12053	0.41386	0.93056	0.00194	0.03248	0.02989	184.19	0.01088	0.00483	185.92
Spader	offroad	1	180	4	33.9	4.33	5	735	8		8		5880		1470		0.16097	0.83015	1.22145	0.00168	0.06517	0.05996	149.16	0.01452	0.00646	151.47
Pump (dewatering)	offroad	1	80	4	33.9	4.33	5	735	8		8		5880		1470		0.07143	0.36260	0.40337	0.00065	0.02768	0.02547	53.03	0.00644	0.00286	54.05
Shotcrete Pump	offroad	1	160	4	33.9	4.33	5	735	8		8		5880		1470		0.08910	0.66491	0.77125	0.00140	0.03983	0.03664	123.17	0.00804	0.00357	124.44
Shotcrete / Concrete Trucks	onroad HD	2		4	33.9	4.33	5	735		50		100		73500		18375	0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot
Reach 8 - Culvert/Channel Alternative																				
Hydraulic Excavator, Crawler (2 CY Bucket)	1.647	10.775	10.804	0.025	0.526	0.484	2187.2	0.149	0.066	2210.8	1210.6	7919.3	7941.1	18.1	386.6	355.7	1607628	109.2	48.5	1624972
Vibratory / Static Roller (Single Drum)	0.440	2.138	2.420	0.004	0.192	0.177	297.4	0.040	0.018	303.7	323.8	1571.3	1778.9	2.6	141.1	129.8	218553	29.2	13.0	223192
Front End Loader (2.6 – 3.8 CY Bucket)	0.581	3.152	4.225	0.008	0.199	0.183	723.2	0.052	0.023	731.5	427.3	2316.5	3105.6	6.0	146.3	134.6	531562	38.6	17.1	537683
Hydraulic Excavator (0.5 – 2 CY)	0.549	3.592	3.601	0.008	0.175	0.161	729.1	0.050	0.022	736.9	403.5	2639.8	2647.0	6.0	128.9	118.6	535876	36.4	16.2	541657
Tractor Crawler / Dozer	0.842	2.828	6.671	0.011	0.263	0.242	960.8	0.076	0.034	972.9	619.2	2078.3	4903.3	7.9	193.3	177.9	706213	55.9	24.8	715084
Pavment Breaker																				
Air Compressor																				
Backhoe (0.8 CY)	0.286	2.065	1.930	0.004	0.130	0.120	310.4	0.026	0.011	314.5	210.4	1517.8	1418.2	2.7	95.5	87.9	228121	19.0	8.4	231135
Grader	0.602	3.565	3.894	0.006	0.264	0.243	556.6	0.054	0.024	565.2	442.6	2620.5	2862.4	4.7	194.4	178.8	409104	39.9	17.8	415445
Asphalt Compactor Roller (6 tons)	0.467	2.606	3.122	0.005	0.229	0.210	407.6	0.042	0.019	414.2	343.0	1915.3	2294.9	3.5	168.0	154.5	299556	30.9	13.8	304469
Hydraulic Crane	0.519	1.623	4.237	0.008	0.146	0.135	705.6	0.047	0.021	713.0	381.3	1193.2	3114.3	5.7	107.6	99.0	518591	34.4	15.3	524053
Hydroseeder (3,000 gal)	0.163	0.589	0.794	0.001	0.039	0.036	99.8	0.015	0.007	102.1	120.1	432.7	583.4	0.9	28.8	26.5	73330	10.8	4.8	75051
Dump Trucks (12-20 CY)	0.058	0.260	0.676	0.002	0.034	0.028	168.3	0.003	0.003	169.2	42.7	191.3	497.0	1.2	25.0	20.5	123721	2.0	1.9	124339
Water Tanker (5,000 gal)	0.029	0.130	0.338	0.001	0.017	0.014	84.2	0.001	0.001	84.6	21.3	95.6	248.5	0.6	12.5	10.2	61861	1.0	0.9	62170
Flatbed Trucks	0.150	0.998	1.070	0.003	0.043	0.035	284.0	0.007	0.006	286.1	110.4	733.6	786.5	2.0	31.7	25.4	208744	4.9	4.6	210275
Pickup Trucks (worker transportation)	0.180	1.614	0.154	0.003	0.028	0.019	331.9	0.016	0.025	339.9	132.5	1186.1	113.1	2.4	20.8	13.7	243934	11.7	18.2	249815
Reach 8 - Tunnel Alternative																				
Hydraulic Excavator, Crawler (2 CY Bucket)	1.098	7.183	7.203	0.016	0.351	0.323	1458.2	0.099	0.044	1473.9	807.1	5279.5	5294.0	12.1	257.7	237.1	1071752	72.8	32.4	1083314
Vibratory / Static Roller (Single Drum)	0.440	2.138	2.420	0.004	0.192	0.177	297.4	0.040	0.018	303.7	323.8	1571.3	1778.9	2.6	141.1	129.8	218553	29.2	13.0	223192
Front End Loader (2.6 – 3.8 CY Bucket)	0.581	3.152	4.225	0.008	0.199	0.183	723.2	0.052	0.023	731.5	427.3	2316.5	3105.6	6.0	146.3	134.6	531562	38.6	17.1	537683
Hydraulic Excavator (0.5 – 2 CY)	0.549	3.592	3.601	0.008	0.175	0.161	729.1	0.050	0.022	736.9	403.5	2639.8	2647.0	6.0	128.9	118.6	535876	36.4	16.2	541657
Tractor Crawler / Dozer	0.842	2.828	6.671	0.011	0.263	0.242	960.8	0.076	0.034	972.9	619.2	2078.3	4903.3	7.9	193.3	177.9	706213	55.9	24.8	715084
Pavment Breaker																				
Air Compressor	0.463	2.080	2.134	0.003	0.168	0.155	262.8	0.042	0.019	269.4	340.2	1529.0	1568.8	2.4	123.5	113.6	193146	30.7	13.6	198020
Backhoe (0.8 CY)	0.286	2.065	1.930	0.004	0.130	0.120	310.4	0.026	0.011	314.5	210.4	1517.8	1418.2	2.7	95.5	87.9	228121	19.0	8.4	231135
Grader	0.602	3.565	3.894	0.006	0.264	0.243	556.6	0.054	0.024	565.2	442.6	2620.5	2862.4	4.7	194.4	178.8	409104	39.9	17.8	415445
Asphalt Compactor Roller (6 tons)	0.467	2.606	3.122	0.005	0.229	0.210	407.6	0.042	0.019	414.2	343.0	1915.3	2294.9	3.5	168.0	154.5	299556	30.9	13.8	304469
Hydraulic Crane	0.519	1.623	4.237	0.008	0.146	0.135	705.6	0.047	0.021	713.0	381.3	1193.2	3114.3	5.7	107.6	99.0	518591	34.4	15.3	524053
Hydroseeder (3,000 gal)	0.163	0.589	0.794	0.001	0.039	0.036	99.8	0.015	0.007	102.1	120.1	432.7	583.4	0.9	28.8	26.5	73330	10.8	4.8	75051
Dump Trucks (12-20 CY)	0.058	0.260	0.676	0.002	0.034	0.028	168.3	0.003	0.003	169.2	42.7	191.3	497.0	1.2	25.0	20.5	123721	2.0	1.9	124339
Water Tanker (5,000 gal)	0.029	0.130	0.338	0.001	0.017	0.014	84.2	0.001	0.001	84.6	21.3	95.6	248.5	0.6	12.5	10.2	61861	1.0	0.9	62170
Flatbed Trucks	0.150	0.998	1.070	0.003	0.043	0.035	284.0	0.007	0.006	286.1	110.4	733.6	786.5	2.0	31.7	25.4	208744	4.9	4.6	210275
Pickup Trucks (worker transportation)	0.240	2.152	0.205	0.004	0.038	0.025	442.5	0.021	0.033	453.2	176.7	1581.4	150.8	3.2	27.8	18.2	325245	15.6	24.2	333087
Vibratory / Sheet Pile Driver	0.499	3.310	3.856	0.010	0.163	0.150	925.4	0.045	0.020	932.6	366.8	2432.7	2834.0	7.1	119.6	110.1	680205	33.1	14.7	685460
Impact Pile Driver	0.499	3.310	3.856	0.010	0.163	0.150	925.4	0.045	0.020	932.6	366.8	2432.7	2834.0	7.1	119.6	110.1	680205	33.1	14.7	685460
Drilling Jumbo	0.181	2.052	1.704	0.004	0.041	0.038	301.0	0.016	0.007	303.6	133.3	1508.6	1252.8	2.8	30.3	27.8	221208	12.0	5.3	223117
Roadheader	0.605	3.005	3.274	0.005	0.265	0.244	404.2	0.055	0.024	412.9	444.8	2208.4	2406.7	3.5	195.1	179.5	297082	40.1	17.8	303455
Load/Haul/Dump (Mucking) Unit	0.571	3.230	3.568	0.006	0.276	0.254	471.3	0.052	0.023	479.5	419.9	2374.4	2622.2	4.1	203.2	187.0	346411	37.9	16.8	352427
Wheeled Loader (4.88 CY)	0.964	3.311	7.444	0.015	0.260	0.239	1473.5	0.087	0.039	1487.3	708.7	2433.5	5471.7	11.4	191.0	175.7	1083033	63.9	28.4	1093187
Spader	1.288	6.641	9.772	0.013	0.521	0.480	1193.3	0.116	0.052	1211.8	946.5	4881.3	7182.1	9.9	383.2	352.6	877089	85.4	38.0	890649
Pump (dewatering)	0.571	2.901	3.227	0.005	0.221	0.204	424.2	0.052	0.023	432.4	420.0	2132.1	2371.8	3.8	162.8	149.8	311798	37.9	16.8	317815
Shotcrete Pump	0.713	5.319	6.170	0.011	0.319	0.293	985.3	0.064	0.029	995.5	523.9	3909.7	4534.9	8.2	234.2	215.4	724221	47.3	21.0	731727
Shotcrete / Concrete Trucks	0.145	0.651	1.690	0.004	0.085	0.070	420.8	0.007	0.006	422.9	106.7	478.1	1242.4	3.0	62.4	51.2	309303	4.9	4.7	310848

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr
Reach 8 - Culvert/Channel Alternative										
Hydraulic Excavator, Crawler (2 CY Bucket)	302.7	1979.8	1985.3	4.5	96.6	88.9	401907	27.3	12.1	406243
Vibratory / Static Roller (Single Drum)	80.9	392.8	444.7	0.7	35.3	32.4	54638	7.3	3.2	55798
Front End Loader (2.6 – 3.8 CY Bucket)	106.8	579.1	776.4	1.5	36.6	33.7	132891	9.6	4.3	134421
Hydraulic Excavator (0.5 – 2 CY)	100.9	659.9	661.8	1.5	32.2	29.6	133969	9.1	4.0	135414
Tractor Crawler / Dozer	154.8	519.6	1225.8	2.0	48.3	44.5	176553	14.0	6.2	178771
Pavment Breaker										
Air Compressor										
Backhoe (0.8 CY)	52.6	379.5	354.6	0.7	23.9	22.0	57030	4.7	2.1	57784
Grader	110.7	655.1	715.6	1.2	48.6	44.7	102276	10.0	4.4	103861
Asphalt Compactor Roller (6 tons)	85.7	478.8	573.7	0.9	42.0	38.6	74889	7.7	3.4	76117
Hydraulic Crane	95.3	298.3	778.6	1.4	26.9	24.8	129648	8.6	3.8	131013
Hydroseeder (3,000 gal)	30.0	108.2	145.9	0.2	7.2	6.6	18333	2.7	1.2	18763
Dump Trucks (12-20 CY)	10.7	47.8	124.2	0.3	6.2	5.1	30930	0.5	0.5	31085
Water Tanker (5,000 gal)	5.3	23.9	62.1	0.1	3.1	2.6	15465	0.2	0.2	15542
Flatbed Trucks	27.6	183.4	196.6	0.5	7.9	6.4	52186	1.2	1.2	52569
Pickup Trucks (worker transportation)	33.1	296.5	28.3	0.6	5.2	3.4	60983	2.9	4.5	62454
Reach 8 - Tunnel Alternative										
Hydraulic Excavator, Crawler (2 CY Bucket)	201.8	1319.9	1323.5	3.0	64.4	59.3	267938	18.2	8.1	270829
Vibratory / Static Roller (Single Drum)	80.9	392.8	444.7	0.7	35.3	32.4	54638	7.3	3.2	55798
Front End Loader (2.6 – 3.8 CY Bucket)	106.8	579.1	776.4	1.5	36.6	33.7	132891	9.6	4.3	134421
Hydraulic Excavator (0.5 – 2 CY)	100.9	659.9	661.8	1.5	32.2	29.6	133969	9.1	4.0	135414
Tractor Crawler / Dozer	154.8	519.6	1225.8	2.0	48.3	44.5	176553	14.0	6.2	178771
Pavment Breaker										
Air Compressor	85.0	382.2	392.2	0.6	30.9	28.4	48287	7.7	3.4	49505
Backhoe (0.8 CY)	52.6	379.5	354.6	0.7	23.9	22.0	57030	4.7	2.1	57784
Grader	110.7	655.1	715.6	1.2	48.6	44.7	102276	10.0	4.4	103861
Asphalt Compactor Roller (6 tons)	85.7	478.8	573.7	0.9	42.0	38.6	74889	7.7	3.4	76117
Hydraulic Crane	95.3	298.3	778.6	1.4	26.9	24.8	129648	8.6	3.8	131013
Hydroseeder (3,000 gal)	30.0	108.2	145.9	0.2	7.2	6.6	18333	2.7	1.2	18763
Dump Trucks (12-20 CY)	10.7	47.8	124.2	0.3	6.2	5.1	30930	0.5	0.5	31085
Water Tanker (5,000 gal)	5.3	23.9	62.1	0.1	3.1	2.6	15465	0.2	0.2	15542
Flatbed Trucks	27.6	183.4	196.6	0.5	7.9	6.4	52186	1.2	1.2	52569
Pickup Trucks (worker transportation)	44.2	395.4	37.7	0.8	6.9	4.6	81311	3.9	6.1	83272
Vibratory / Sheet Pile Driver	91.7	608.2	708.5	1.8	29.9	27.5	170051	8.3	3.7	171365
Impact Pile Driver	91.7	608.2	708.5	1.8	29.9	27.5	170051	8.3	3.7	171365
Drilling Jumbo	33.3	377.1	313.2	0.7	7.6	7.0	55302	3.0	1.3	55779
Roadheader	111.2	552.1	601.7	0.9	48.8	44.9	74271	10.0	4.5	75864
Load/Haul/Dump (Mucking) Unit	105.0	593.6	655.5	1.0	50.8	46.7	86603	9.5	4.2	88107
Wheeled Loader (4.88 CY)	177.2	608.4	1367.9	2.8	47.8	43.9	270758	16.0	7.1	273297
Spader	236.6	1220.3	1795.5	2.5	95.8	88.1	219272	21.4	9.5	222662
Pump (dewatering)	105.0	533.0	593.0	0.9	40.7	37.4	77949	9.5	4.2	79454
Shotcrete Pump	131.0	977.4	1133.7	2.1	58.5	53.9	181055	11.8	5.3	182932
Shotcrete / Concrete Trucks	26.7	119.5	310.6	0.7	15.6	12.8	77326	1.2	1.2	77712

Offroad Equipments and Onroad Vehicles			Offroad	Planned Schedule				Duration	Offroad	Onroad	Daily Max		Project Total		Annual Average		ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	
Name or Type		Category	Qty.	BHP	years	months	wks/mo	days/wk	days	hrs/day	mi/day	hours	VMT	hours	VMT	hours	VMT	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit
Reach 14																											
Hydraulic Excavator, Crawler (2 CY Bucket)		offroad	2	190	2	15.9	4.33	5	345	6		12						0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Vibratory / Static Roller (Single Drum)		offroad	1	100	2	15.9	4.33	5	345	6		6						0.07342	0.35631	0.40339	0.00059	0.03199	0.02943	49.56	0.00662	0.00294	50.61
Front End Loader (2.6 – 3.8 CY Bucket)		offroad	1	200	2	15.9	4.33	5	345	6		6						0.09689	0.52527	0.70422	0.00136	0.03318	0.03052	120.54	0.00874	0.00389	121.92
Hydraulic Excavator (0.5 – 2 CY)		offroad	1	190	2	15.9	4.33	5	345	6		6						0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Tractor Crawler / Dozer		offroad	1	240	2	15.9	4.33	5	345	6		6						0.14041	0.47127	1.11186	0.00180	0.04384	0.04033	160.14	0.01267	0.00563	162.15
Pavment Breaker		offroad		90	2	15.9	4.33	5	345									0.05841	0.39630	0.38013	0.00070	0.02417	0.02224	58.20	0.00527	0.00234	59.04
Air Compressor		offroad		80	2	15.9	4.33	5	345									0.05786	0.26003	0.26680	0.00040	0.02101	0.01933	32.85	0.00522	0.00232	33.68
Backhoe (0.8 CY)		offroad	1	120	2	15.9	4.33	5	345	6		6						0.04771	0.34418	0.32159	0.00061	0.02166	0.01992	51.73	0.00430	0.00191	52.41
Grader		offroad	1	140	2	15.9	4.33	5	345	6		6						0.10037	0.59422	0.64906	0.00107	0.04407	0.04055	92.77	0.00906	0.00403	94.21
Asphalt Compactor Roller (6 tons)		offroad	1	130	2	15.9	4.33	5	345	6		6						0.07777	0.43431	0.52038	0.00079	0.03809	0.03504	67.93	0.00702	0.00312	69.04
Hydraulic Crane		offroad	1	270	2	15.9	4.33	5	345	6		6						0.08646	0.27056	0.70619	0.00130	0.02441	0.02245	117.59	0.00780	0.00347	118.83
Hydroseeder (3,000 gal)		offroad	1	30	2	15.9	4.33	5	345	6		6						0.02723	0.09811	0.13230	0.00021	0.00654	0.00601	16.63	0.00246	0.00109	17.02
Dump Trucks (12-20 CY)		onroad HD	2		2	15.9	4.33	5	345		20	40			13800	6900		0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Water Tanker (5,000 gal)		onroad HD	1		2	15.9	4.33	5	345		20	20			6900	3450		0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Flatbed Trucks		onroad MD	2		2	15.9	4.33	5	345		50	100			34500	17250		0.00150	0.00998	0.01070	0.00003	0.00043	0.00035	2.84	0.00007	0.00006	2.86
Pickup Trucks (worker transportation)		onroad LD	4		2	15.9	4.33	5	345		50	200			69000	34500		0.00060	0.00538	0.00051	0.00001	0.00009	0.00006	1.11	0.00005	0.00008	1.13
Reach 6 - Bypass Alternative																											
Hydraulic Excavator, Crawler (2 CY Bucket)		offroad	3	190	4	33.7	4.33	5	730	6		18			13140	3285		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Vibratory / Static Roller (Single Drum)		offroad	1	100	4	33.7	4.33	5	730	6		6			4380	1095		0.07342	0.35631	0.40339	0.00059	0.03199	0.02943	49.56	0.00662	0.00294	50.61
Front End Loader (2.6 – 3.8 CY Bucket)		offroad	1	200	4	33.7	4.33	5	730	6		6			4380	1095		0.09689	0.52527	0.70422	0.00136	0.03318	0.03052	120.54	0.00874	0.00389	121.92
Hydraulic Excavator (0.5 – 2 CY)		offroad	1	190	4	33.7	4.33	5	730	6		6			4380	1095		0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.51	0.00826	0.00367	122.82
Tractor Crawler / Dozer		offroad	1	240	4	33.7	4.33	5	730	6		6			4380	1095		0.14041	0.47127	1.11186	0.00180	0.04384	0.04033	160.14	0.01267	0.00563	162.15
Pavment Breaker		offroad		90	4	33.7	4.33	5	730									0.05841	0.39630	0.38013	0.00070	0.02417	0.02224	58.20	0.00527	0.00234	59.04
Air Compressor		offroad	1	80	4	33.7	4.33	5	730	6		6			4380	1095		0.05786	0.26003	0.26680	0.00040	0.02101	0.01933	32.85	0.00522	0.00232	33.68
Backhoe (0.8 CY)		offroad	1	120	4	33.7	4.33	5	730	6		6			4380	1095		0.04771	0.34418	0.32159	0.00061	0.02166	0.01992	51.73	0.00430	0.00191	52.41
Grader		offroad	1	140	4	33.7	4.33	5	730	6		6			4380	1095		0.10037	0.59422	0.64906	0.00107	0.04407	0.04055	92.77	0.00906	0.00403	94.21
Asphalt Compactor Roller (6 tons)		offroad	1	130	4	33.7	4.33	5	730	6		6			4380	1095		0.07777	0.43431	0.52038	0.00079	0.03809	0.03504	67.93	0.00702	0.00312	69.04
Hydraulic Crane		offroad	1	270	4	33.7	4.33	5	730	6		6			4380	1095		0.08646	0.27056	0.70619	0.00130	0.02441	0.02245	117.59	0.00780	0.00347	118.83
Hydroseeder (3,000 gal)		offroad	1	30	4	33.7	4.33	5	730	6		6			4380	1095		0.02723	0.09811	0.13230	0.00021	0.00654	0.00601	16.63	0.00246	0.00109	17.02
Dump Trucks (12-20 CY)		onroad HD	2		4	33.7	4.33	5	730		20	40			29200	7300		0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Water Tanker (5,000 gal)		onroad HD	1		4	33.7	4.33	5	730		20	20			14600	3650		0.00145	0.00651	0.01690	0.00004	0.00085	0.00070	4.21	0.00007	0.00006	4.23
Flatbed Trucks		onroad MD	2		4	33.7	4.33	5	730		50	100			73000	18250		0.00150	0.00998	0.01070	0.00003	0.00043	0.00035	2.84	0.00007	0.00006	2.86
Pickup Trucks (worker transportation)		onroad LD	6		4	33.7	4.33	5	730		50	300			219000	54750		0.00060	0.00538	0.00051	0.00001	0.00009	0.00006	1.11	0.00005	0.00008	1.13
Vibratory / Sheet Pile Driver		offroad	1	280	4	33.7	4.33	5	730	6		6			4380	1095		0.08318	0.55163	0.64262	0.00162	0.02713	0.02496	154.24	0.00751	0.00334	155.43
Impact Pile Driver		offroad	1	280	4	33.7	4.33	5	730	6		6			4380	1095		0.08318	0.55163	0.64262	0.00162	0.02713	0.02496	154.24	0.00751	0.00334	155.43
Drilling Jumbo		offroad		60	4	33.7	4.33	5	730									0.02266	0.25656	0.21306	0.00047	0.00514	0.00473	37.62	0.00204	0.00091	37.95
Roadheader		offroad		100	4	33.7	4.33	5	730									0.07565	0.37558	0.40931	0.00060	0.03318	0.03053	50.52	0.00683	0.00303	51.61
Load/Haul/Dump (Mucking) Unit		offroad		120	4	33.7	4.33	5	730									0.07141	0.40381	0.44595	0.00069	0.03456	0.03180	58.91	0.00644	0.00286	59.94
Wheeled Loader (4.88 CY)		offroad		350	4	33.7	4.33	5	730									0.12053	0.41386	0.93056	0.00194	0.03248	0.02989	184.19	0.01088	0.00483	185.92
Spader		offroad		180	4	33.7	4.33	5	730									0.16097	0.83015	1.22145	0.00168	0.06517	0.05996	149.16	0.01452	0.00646	151.47
Pump (dewatering)		offroad	1	80	4	33.7	4.33	5	730	6		6			4380	1095		0.07143	0.36260	0.40337	0.00065	0.02768	0.02547	53.03	0.00644	0.00286	54.05
Shotcrete Pump		offroad	1	160	4	33.7	4.																				

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot
Reach 14																				
Hydraulic Excavator, Crawler (2 CY Bucket)	1.098	7.183	7.203	0.016	0.351	0.323	1458.2	0.099	0.044	1473.9	378.8	2478.2	2485.0	5.7	121.0	111.3	503067	34.2	15.2	508495
Vibratory / Static Roller (Single Drum)	0.440	2.138	2.420	0.004	0.192	0.177	297.4	0.040	0.018	303.7	152.0	737.6	835.0	1.2	66.2	60.9	102586	13.7	6.1	104763
Front End Loader (2.6 – 3.8 CY Bucket)	0.581	3.152	4.225	0.008	0.199	0.183	723.2	0.052	0.023	731.5	200.6	1087.3	1457.7	2.8	68.7	63.2	249509	18.1	8.0	252382
Hydraulic Excavator (0.5 – 2 CY)	0.549	3.592	3.601	0.008	0.175	0.161	729.1	0.050	0.022	736.9	189.4	1239.1	1242.5	2.8	60.5	55.6	251534	17.1	7.6	254247
Tractor Crawler / Dozer	0.842	2.828	6.671	0.011	0.263	0.242	960.8	0.076	0.034	972.9	290.6	975.5	2301.5	3.7	90.7	83.5	331488	26.2	11.7	335652
Pavment Breaker																				
Air Compressor																				
Backhoe (0.8 CY)	0.286	2.065	1.930	0.004	0.130	0.120	310.4	0.026	0.011	314.5	98.8	712.4	665.7	1.3	44.8	41.2	107077	8.9	4.0	108492
Grader	0.602	3.565	3.894	0.006	0.264	0.243	556.6	0.054	0.024	565.2	207.8	1230.0	1343.6	2.2	91.2	83.9	192028	18.7	8.3	195005
Asphalt Compactor Roller (6 tons)	0.467	2.606	3.122	0.005	0.229	0.210	407.6	0.042	0.019	414.2	161.0	899.0	1077.2	1.6	78.8	72.5	140608	14.5	6.5	142914
Hydraulic Crane	0.519	1.623	4.237	0.008	0.146	0.135	705.6	0.047	0.021	713.0	179.0	560.1	1461.8	2.7	50.5	46.5	243420	16.1	7.2	245984
Hydroseeder (3,000 gal)	0.163	0.589	0.794	0.001	0.039	0.036	99.8	0.015	0.007	102.1	56.4	203.1	273.9	0.4	13.5	12.4	34420	5.1	2.3	35228
Dump Trucks (12-20 CY)	0.058	0.260	0.676	0.002	0.034	0.028	168.3	0.003	0.003	169.2	20.0	89.8	233.3	0.6	11.7	9.6	58073	0.9	0.9	58363
Water Tanker (5,000 gal)	0.029	0.130	0.338	0.001	0.017	0.014	84.2	0.001	0.001	84.6	10.0	44.9	116.6	0.3	5.9	4.8	29037	0.5	0.4	29182
Flatbed Trucks	0.150	0.998	1.070	0.003	0.043	0.035	284.0	0.007	0.006	286.1	51.8	344.3	369.2	0.9	14.9	11.9	97982	2.3	2.2	98701
Pickup Trucks (worker transportation)	0.120	1.076	0.103	0.002	0.019	0.012	221.3	0.011	0.016	226.6	41.5	371.1	35.4	0.7	6.5	4.3	76333	3.7	5.7	78173
Reach 6 - Bypass Alternative																				
Hydraulic Excavator, Crawler (2 CY Bucket)	1.647	10.775	10.804	0.025	0.526	0.484	2187.2	0.149	0.066	2210.8	1202.4	7865.4	7887.0	18.0	383.9	353.2	1596691	108.5	48.2	1613917
Vibratory / Static Roller (Single Drum)	0.440	2.138	2.420	0.004	0.192	0.177	297.4	0.040	0.018	303.7	321.6	1560.6	1766.8	2.6	140.1	128.9	217067	29.0	12.9	221673
Front End Loader (2.6 – 3.8 CY Bucket)	0.581	3.152	4.225	0.008	0.199	0.183	723.2	0.052	0.023	731.5	424.4	2300.7	3084.5	5.9	145.3	133.7	527946	38.3	17.0	534026
Hydraulic Excavator (0.5 – 2 CY)	0.549	3.592	3.601	0.008	0.175	0.161	729.1	0.050	0.022	736.9	400.8	2621.8	2629.0	6.0	128.0	117.7	532230	36.2	16.1	537972
Tractor Crawler / Dozer	0.842	2.828	6.671	0.011	0.263	0.242	960.8	0.076	0.034	972.9	615.0	2064.2	4869.9	7.9	192.0	176.7	701409	55.5	24.7	710219
Pavment Breaker																				
Air Compressor	0.347	1.560	1.601	0.002	0.126	0.116	197.1	0.031	0.014	202.1	253.4	1138.9	1168.6	1.8	92.0	84.7	143874	22.9	10.2	147505
Backhoe (0.8 CY)	0.286	2.065	1.930	0.004	0.130	0.120	310.4	0.026	0.011	314.5	209.0	1507.5	1408.6	2.7	94.9	87.3	226569	18.9	8.4	229563
Grader	0.602	3.565	3.894	0.006	0.264	0.243	556.6	0.054	0.024	565.2	439.6	2602.7	2842.9	4.7	193.0	177.6	406321	39.7	17.6	412619
Asphalt Compactor Roller (6 tons)	0.467	2.606	3.122	0.005	0.229	0.210	407.6	0.042	0.019	414.2	340.6	1902.3	2279.3	3.4	166.8	153.5	297518	30.7	13.7	302398
Hydraulic Crane	0.519	1.623	4.237	0.008	0.146	0.135	705.6	0.047	0.021	713.0	378.7	1185.1	3093.1	5.7	106.9	98.3	515063	34.2	15.2	520488
Hydroseeder (3,000 gal)	0.163	0.589	0.794	0.001	0.039	0.036	99.8	0.015	0.007	102.1	119.3	429.7	579.5	0.9	28.6	26.3	72832	10.8	4.8	74540
Dump Trucks (12-20 CY)	0.058	0.260	0.676	0.002	0.034	0.028	168.3	0.003	0.003	169.2	42.4	190.0	493.6	1.2	24.8	20.4	122879	2.0	1.8	123493
Water Tanker (5,000 gal)	0.029	0.130	0.338	0.001	0.017	0.014	84.2	0.001	0.001	84.6	21.2	95.0	246.8	0.6	12.4	10.2	61440	1.0	0.9	61747
Flatbed Trucks	0.150	0.998	1.070	0.003	0.043	0.035	284.0	0.007	0.006	286.1	109.7	728.6	781.1	2.0	31.5	25.3	207324	4.9	4.6	208845
Pickup Trucks (worker transportation)	0.180	1.614	0.154	0.003	0.028	0.019	331.9	0.016	0.025	339.9	131.6	1178.0	112.3	2.4	20.7	13.6	242274	11.6	18.1	248116
Vibratory / Sheet Pile Driver	0.499	3.310	3.856	0.010	0.163	0.150	925.4	0.045	0.020	932.6	364.3	2416.1	2814.7	7.1	118.8	109.3	675578	32.9	14.6	680797
Impact Pile Driver	0.499	3.310	3.856	0.010	0.163	0.150	925.4	0.045	0.020	932.6	364.3	2416.1	2814.7	7.1	118.8	109.3	675578	32.9	14.6	680797
Drilling Jumbo																				
Roadheader																				
Load/Haul/Dump (Mucking) Unit																				
Wheeled Loader (4.88 CY)																				
Spader																				
Pump (dewatering)	0.429	2.176	2.420	0.004	0.166	0.153	318.2	0.039	0.017	324.3	312.8	1588.2	1766.8	2.8	121.3	111.6	232257	28.2	12.5	236739
Shotcrete Pump	0.535	3.989	4.627	0.008	0.239	0.220	739.0	0.048	0.021	746.7	390.3	2912.3	3378.1	6.1	174.4	160.5	539471	35.2	15.6	545062
Shotcrete / Concrete Trucks	0.145	0.651	1.690	0.004	0.085	0.070	420.8	0.007	0.006	422.9	106.0	474.9	1234.0	2.9	62.0	50.9	307199	4.9	4.6	308734

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr
Reach 14										
Hydraulic Excavator, Crawler (2 CY Bucket)	189.4	1239.1	1242.5	2.8	60.5	55.6	251534	17.1	7.6	254247
Vibratory / Static Roller (Single Drum)	76.0	368.8	417.5	0.6	33.1	30.5	51293	6.9	3.0	52382
Front End Loader (2.6 – 3.8 CY Bucket)	100.3	543.7	728.9	1.4	34.3	31.6	124754	9.0	4.0	126191
Hydraulic Excavator (0.5 – 2 CY)	94.7	619.5	621.2	1.4	30.2	27.8	125767	8.5	3.8	127124
Tractor Crawler / Dozer	145.3	487.8	1150.8	1.9	45.4	41.7	165744	13.1	5.8	167826
Pavment Breaker										
Air Compressor										
Backhoe (0.8 CY)	49.4	356.2	332.8	0.6	22.4	20.6	53538	4.5	2.0	54246
Grader	103.9	615.0	671.8	1.1	45.6	42.0	96014	9.4	4.2	97502
Asphalt Compactor Roller (6 tons)	80.5	449.5	538.6	0.8	39.4	36.3	70304	7.3	3.2	71457
Hydraulic Crane	89.5	280.0	730.9	1.3	25.3	23.2	121710	8.1	3.6	122992
Hydroseeder (3,000 gal)	28.2	101.5	136.9	0.2	6.8	6.2	17210	2.5	1.1	17614
Dump Trucks (12-20 CY)	10.0	44.9	116.6	0.3	5.9	4.8	29037	0.5	0.4	29182
Water Tanker (5,000 gal)	5.0	22.4	58.3	0.1	2.9	2.4	14518	0.2	0.2	14591
Flatbed Trucks	25.9	172.2	184.6	0.5	7.4	6.0	48991	1.1	1.1	49350
Pickup Trucks (worker transportation)	20.7	185.6	17.7	0.4	3.3	2.1	38166	1.8	2.8	39087
Reach 6 - Bypass Alternative										
Hydraulic Excavator, Crawler (2 CY Bucket)	300.6	1966.4	1971.8	4.5	96.0	88.3	399173	27.1	12.1	403479
Vibratory / Static Roller (Single Drum)	80.4	390.2	441.7	0.6	35.0	32.2	54267	7.3	3.2	55418
Front End Loader (2.6 – 3.8 CY Bucket)	106.1	575.2	771.1	1.5	36.3	33.4	131987	9.6	4.3	133506
Hydraulic Excavator (0.5 – 2 CY)	100.2	655.5	657.3	1.5	32.0	29.4	133058	9.0	4.0	134493
Tractor Crawler / Dozer	153.7	516.0	1217.5	2.0	48.0	44.2	175352	13.9	6.2	177555
Pavment Breaker										
Air Compressor	63.4	284.7	292.2	0.4	23.0	21.2	35969	5.7	2.5	36876
Backhoe (0.8 CY)	52.2	376.9	352.1	0.7	23.7	21.8	56642	4.7	2.1	57391
Grader	109.9	650.7	710.7	1.2	48.3	44.4	101580	9.9	4.4	103155
Asphalt Compactor Roller (6 tons)	85.2	475.6	569.8	0.9	41.7	38.4	74379	7.7	3.4	75600
Hydraulic Crane	94.7	296.3	773.3	1.4	26.7	24.6	128766	8.5	3.8	130122
Hydroseeder (3,000 gal)	29.8	107.4	144.9	0.2	7.2	6.6	18208	2.7	1.2	18635
Dump Trucks (12-20 CY)	10.6	47.5	123.4	0.3	6.2	5.1	30720	0.5	0.5	30873
Water Tanker (5,000 gal)	5.3	23.7	61.7	0.1	3.1	2.5	15360	0.2	0.2	15437
Flatbed Trucks	27.4	182.2	195.3	0.5	7.9	6.3	51831	1.2	1.1	52211
Pickup Trucks (worker transportation)	32.9	294.5	28.1	0.6	5.2	3.4	60569	2.9	4.5	62029
Vibratory / Sheet Pile Driver	91.1	604.0	703.7	1.8	29.7	27.3	168895	8.2	3.7	170199
Impact Pile Driver	91.1	604.0	703.7	1.8	29.7	27.3	168895	8.2	3.7	170199
Drilling Jumbo										
Roadheader										
Load/Haul/Dump (Mucking) Unit										
Wheeled Loader (4.88 CY)										
Spader										
Pump (dewatering)	78.2	397.1	441.7	0.7	30.3	27.9	58064	7.1	3.1	59185
Shotcrete Pump	97.6	728.1	844.5	1.5	43.6	40.1	134868	8.8	3.9	136265
Shotcrete / Concrete Trucks	26.5	118.7	308.5	0.7	15.5	12.7	76800	1.2	1.2	77183

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles				Offroad	Planned Schedule				Duration	Offroad	Onroad	Daily Max		Project Total		Annual Average		ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type		Category	Qty.	BHP	years	months	wks/mo	days/wk	days	hrs/day	mi/day	hours	VMT	hours	VMT	hours	VMT	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit
Reach 4																											
Bulldozer (tracked)												6	2982														
Bulldozer (wheeled)																											
Scraper (dumper)																											
Dump Truck/ADT																											
Clamshell Derrick																											
Dragline (small)																											
Motor Grader												6	2982														
Tractor/Offroad Forklift																											
Compactor/Roller												6	2982														
Crane (tracked)																											
Backhoe/Skip Loader												6	2982														
Bobcat/Skid Steer Loader																											
Drill Auger/Borer																											
Hydraulic Excavator												18	8946														
Front End Loader												6	2982														
Concrete Grinder												6	2982														
Screener (coarse)																											
Reach 5																											
Bulldozer (tracked)												6	1338														
Bulldozer (wheeled)																											
Scraper (dumper)																											
Dump Truck/ADT																											
Clamshell Derrick																											
Dragline (small)																											
Motor Grader												6	1338														
Tractor/Offroad Forklift																											
Compactor/Roller												6	1338														
Crane (tracked)																											
Backhoe/Skip Loader												6	1338														
Bobcat/Skid Steer Loader																											
Drill Auger/Borer																											
Hydraulic Excavator												24	5352														
Front End Loader												6	1338														
Concrete Grinder																											
Screener (coarse)																											
Reach 6																											
Bulldozer (tracked)												6	6018														
Bulldozer (wheeled)																											
Scraper (dumper)																											
Dump Truck/ADT																											
Clamshell Derrick																											
Dragline (small)																											
Motor Grader												6	6018														
Tractor/Offroad Forklift																											
Compactor/Roller												6	6018														
Crane (tracked)																											
Backhoe/Skip Loader												6	6018														
Bobcat/Skid Steer Loader																											
Drill Auger/Borer																											
Hydraulic Excavator												24	24072														
Front End Loader												6	6018														
Concrete Grinder																											
Screener (coarse)																											

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	
Name or Type	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	
Reach 4																					
Bulldozer (tracked)											TOTALS	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Bulldozer (wheeled)											basic	11.5	62.7	77.4	0.2	4.0	3.7	13654	1.0	0.5	13826
Scraper (dumper)											tunnel	13.7	74.7	93.2	0.2	4.9	4.5	16288	1.2	0.6	16493
Dump Truck/ADT											bypass	10.7	59.3	73.1	0.1	3.8	3.5	12995	0.9	0.5	13156
Clamshell Derrick											tun + by	12.9	71.3	88.9	0.2	4.7	4.3	15629	1.1	0.5	15823
Dragline (small)																					
Motor Grader	For basic project (no options)																				
Tractor/Offroad Forklift	Maxima	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	
Compactor/Roller	Year 1	13.1	71.7	88.1	0.2	4.7	4.3	15399	1.2	0.6	15595										
Crane (tracked)	Year 2	38.4	209.7	260.0	0.5	13.6	12.4	45611	3.4	1.6	46184										
Backhoe/Skip Loader	Year 3	38.0	207.2	256.5	0.5	13.4	12.3	45103	3.4	1.6	45674										
Bobcat/Skid Steer Loader	Year 4	18.9	103.7	128.2	0.3	6.7	6.1	22698	1.7	0.8	22984										
Drill Auger/Borer	Year 5	18.9	103.7	128.2	0.3	6.7	6.1	22698	1.7	0.8	22984										
Hydraulic Excavator	Year 6	6.5	35.9	43.9	0.1	2.3	2.1	7846	0.6	0.3	7945										
Front End Loader	PEAK	38.4	209.7	260.0	0.5	13.6	12.4	45611	3.4	1.6	46184										
Concrete Grinder																					
Screener (coarse)	For tunnel option project																				
Reach 5	Maxima	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	
Bulldozer (tracked)	Year 1	13.1	71.7	88.1	0.2	4.7	4.3	15399	1.2	0.6	15595										
Bulldozer (wheeled)	Year 2	44.4	242.4	303.2	0.6	15.9	14.5	52780	3.9	1.9	53441										
Scraper (dumper)	Year 3	44.0	239.9	299.7	0.6	15.8	14.4	52272	3.9	1.9	52930										
Dump Truck/ADT	Year 4	24.9	136.4	171.3	0.3	9.0	8.2	29867	2.2	1.1	30241										
Clamshell Derrick	Year 5	24.9	136.4	171.3	0.3	9.0	8.2	29867	2.2	1.1	30241										
Dragline (small)	Year 6	6.5	35.9	43.9	0.1	2.3	2.1	7846	0.6	0.3	7945										
Motor Grader	PEAK	44.4	242.4	303.2	0.6	15.9	14.5	52780	3.9	1.9	53441										
Tractor/Offroad Forklift																					
Compactor/Roller	For bypass option project																				
Crane (tracked)	Maxima	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	
Backhoe/Skip Loader	Year 1	13.1	71.7	88.1	0.2	4.7	4.3	15399	1.2	0.6	15595										
Bobcat/Skid Steer Loader	Year 2	34.3	188.7	234.2	0.5	12.2	11.2	41291	3.0	1.4	41800										
Drill Auger/Borer	Year 3	33.9	186.2	230.7	0.5	12.1	11.0	40783	3.0	1.4	41290										
Hydraulic Excavator	Year 4	14.9	82.7	102.3	0.2	5.3	4.9	18378	1.3	0.6	18600										
Front End Loader	Year 5	14.9	82.7	102.3	0.2	5.3	4.9	18378	1.3	0.6	18600										
Concrete Grinder	Year 6	6.5	35.9	43.9	0.1	2.3	2.1	7846	0.6	0.3	7945										
Screener (coarse)	PEAK	34.3	188.7	234.2	0.5	12.2	11.2	41291	3.0	1.4	41800										
Reach 6																					
Bulldozer (tracked)	For tunnel + bypass option project																				
Bulldozer (wheeled)	Maxima	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	
Scraper (dumper)	Year 1	13.1	71.7	88.1	0.2	4.7	4.3	15399	1.2	0.6	15595										
Dump Truck/ADT	Year 2	40.3	221.5	277.3	0.5	14.6	13.3	48460	3.6	1.7	49057										
Clamshell Derrick	Year 3	39.9	219.0	273.8	0.5	14.4	13.2	47952	3.5	1.7	48547										
Dragline (small)	Year 4	20.9	115.5	145.4	0.3	7.6	7.0	25547	1.8	0.9	25857										
Motor Grader	Year 5	20.9	115.5	145.4	0.3	7.6	7.0	25547	1.8	0.9	25857										
Tractor/Offroad Forklift	Year 6	6.5	35.9	43.9	0.1	2.3	2.1	7846	0.6	0.3	7945										
Compactor/Roller	PEAK	40.3	221.5	277.3	0.5	14.6	13.3	48460	3.6	1.7	49057										
Crane (tracked)																					
Backhoe/Skip Loader	Option	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	
	5	6.5	35.9	43.9	0.1	2.3	2.1	7846	0.6	0.3	7945										
Bobcat/Skid Steer Loader	6	6.5	35.9	43.9	0.1	2.3	2.1	7846	0.6	0.3	7945										
Drill Auger/Borer	6 bypass	9.0	50.9	62.0	0.1	3.2	2.9	11372	0.8	0.4	11506										
Hydraulic Excavator	delta 6	-4.1	-20.9	-25.9	0.0	-1.3	-1.2	-4320	-0.4	-0.2	-4384										
Front End Loader	8 NRCS	6.5	35.9	43.9	0.1	2.3	2.1	7846	0.6	0.3	7945										
Concrete Grinder	8 culvert	6.5	35.9	43.9	0.1	2.3	2.1	7846	0.6	0.3	7945										
Screener (coarse)	8 tunnel	12.5	68.7	87.1	0.2	4.6	4.2	15015	1.1	0.5	15202										
	delta 8	6.0	32.8	43.1	0.1	2.3	2.1	7169	0.5	0.2	7257										

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	
Name or Type	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	
Reach 4											
Bulldozer (tracked)											
Bulldozer (wheeled)											
Scraper (dumper)											
Dump Truck/ADT											
Clamshell Derrick											
Dragline (small)											
Motor Grader	For basic project (no options)										
Tractor/Offroad Forklift	Averages	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
Compactor/Roller	Year 1	1.0	5.6	6.8	0.0	0.4	0.3	1194	0.1	0.0	1210
Crane (tracked)	Year 2	3.1	17.1	21.2	0.0	1.1	1.0	3725	0.3	0.1	3772
Backhoe/Skip Loader	Year 3	3.2	17.2	21.4	0.0	1.1	1.0	3754	0.3	0.1	3802
Bobcat/Skid Steer Loader	Year 4	1.7	9.5	11.8	0.0	0.6	0.6	2087	0.2	0.1	2113
Drill Auger/Borer	Year 5	1.7	9.5	11.8	0.0	0.6	0.6	2087	0.2	0.1	2113
Hydraulic Excavator	Year 6	0.7	3.6	4.4	0.0	0.2	0.2	787	0.1	0.0	797
Front End Loader	HIGH	3.2	17.2	21.4	0.0	1.1	1.0	3754	0.3	0.1	3802
Concrete Grinder											
Screener (coarse)	For tunnel option project										
Reach 5	Averages	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
Bulldozer (tracked)	Year 1	1.0	5.6	6.8	0.0	0.4	0.3	1194	0.1	0.0	1210
Bulldozer (wheeled)	Year 2	3.7	20.1	25.2	0.0	1.3	1.2	4384	0.3	0.2	4439
Scraper (dumper)	Year 3	3.7	20.3	25.3	0.0	1.3	1.2	4413	0.3	0.2	4469
Dump Truck/ADT	Year 4	2.3	12.5	15.7	0.0	0.8	0.8	2746	0.2	0.1	2780
Clamshell Derrick	Year 5	2.3	12.5	15.7	0.0	0.8	0.8	2746	0.2	0.1	2780
Dragline (small)	Year 6	0.7	3.6	4.4	0.0	0.2	0.2	787	0.1	0.0	797
Motor Grader	HIGH	3.7	20.3	25.3	0.0	1.3	1.2	4413	0.3	0.2	4469
Tractor/Offroad Forklift											
Compactor/Roller	For bypass option project										
Crane (tracked)	Averages	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
Backhoe/Skip Loader	Year 1	1.0	5.6	6.8	0.0	0.4	0.3	1194	0.1	0.0	1210
Bobcat/Skid Steer Loader	Year 2	2.9	16.2	20.0	0.0	1.0	1.0	3539	0.3	0.1	3582
Drill Auger/Borer	Year 3	3.0	16.3	20.2	0.0	1.1	1.0	3568	0.3	0.1	3612
Hydraulic Excavator	Year 4	1.5	8.6	10.6	0.0	0.6	0.5	1900	0.1	0.1	1923
Front End Loader	Year 5	1.5	8.6	10.6	0.0	0.6	0.5	1900	0.1	0.1	1923
Concrete Grinder	Year 6	0.7	3.6	4.4	0.0	0.2	0.2	787	0.1	0.0	797
Screener (coarse)	HIGH	3.0	16.3	20.2	0.0	1.1	1.0	3568	0.3	0.1	3612
Reach 6											
Bulldozer (tracked)	For tunnel + bypass option project										
Bulldozer (wheeled)	Averages	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
Scraper (dumper)	Year 1	1.0	5.6	6.8	0.0	0.4	0.3	1194	0.1	0.0	1210
Dump Truck/ADT	Year 2	3.5	19.2	24.0	0.0	1.3	1.2	4197	0.3	0.1	4249
Clamshell Derrick	Year 3	3.5	19.3	24.1	0.0	1.3	1.2	4226	0.3	0.1	4279
Dragline (small)	Year 4	2.1	11.6	14.5	0.0	0.8	0.7	2559	0.2	0.1	2590
Motor Grader	Year 5	2.1	11.6	14.5	0.0	0.8	0.7	2559	0.2	0.1	2590
Tractor/Offroad Forklift	Year 6	0.7	3.6	4.4	0.0	0.2	0.2	787	0.1	0.0	797
Compactor/Roller	HIGH	3.5	19.3	24.1	0.0	1.3	1.2	4226	0.3	0.1	4279
Crane (tracked)											
Backhoe/Skip Loader	Option	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
	5	0.36	2.00	2.45	0.00	0.13	0.12	437	0.03	0.02	443
Bobcat/Skid Steer Loader	6	0.65	3.60	4.41	0.01	0.23	0.21	787	0.06	0.03	797
Drill Auger/Borer	6 bypass	0.82	4.65	5.66	0.01	0.29	0.27	1038	0.07	0.03	1050
Hydraulic Excavator	delta 6	-0.20	-0.96	-1.20	0.00	-0.06	-0.06	-187	-0.02	-0.01	-190
Front End Loader	8 NRCS	0.60	3.30	4.04	0.01	0.21	0.19	721	0.05	0.03	730
Concrete Grinder	8 culvert	0.60	3.30	4.04	0.01	0.21	0.19	721	0.05	0.03	730
Screener (coarse)	8 tunnel	1.15	6.31	8.00	0.02	0.42	0.39	1379	0.10	0.05	1397
	delta 8	0.55	3.01	3.96	0.01	0.21	0.19	659	0.05	0.02	667

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles				Offroad	Planned Schedule				Duration	Offroad	Onroad	Daily Max		Project Total		Annual Average		ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type		Category	Qty.	BHP	years	months	wks/mo	days/wk	days	hrs/day	mi/day	hours	VMT	hours	VMT	hours	VMT	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit
Reach 7a																											
Bulldozer (tracked)												6			1740												
Bulldozer (wheeled)																											
Scraper (dumper)																											
Dump Truck/ADT																											
Clamshell Derrick																											
Dragline (small)																											
Motor Grader												6			1740												
Tractor/Offroad Forklift																											
Compactor/Roller												6			1740												
Crane (tracked)																											
Backhoe/Skip Loader												6			1740												
Bobcat/Skid Steer Loader																											
Drill Auger/Borer																											
Hydraulic Excavator												24			6960												
Front End Loader												6			1740												
Concrete Grinder																											
Screener (coarse)																											
Reach 7b																											
Bulldozer (tracked)												6			2976												
Bulldozer (wheeled)																											
Scraper (dumper)																											
Dump Truck/ADT																											
Clamshell Derrick																											
Dragline (small)																											
Motor Grader												6			2976												
Tractor/Offroad Forklift																											
Compactor/Roller												6			2976												
Crane (tracked)																											
Backhoe/Skip Loader												6			2976												
Bobcat/Skid Steer Loader																											
Drill Auger/Borer																											
Hydraulic Excavator												18			8928												
Front End Loader												6			2976												
Concrete Grinder																											
Screener (coarse)																											
Reach 8 - NRCS Alternative																											
Bulldozer (tracked)												6			4410												
Bulldozer (wheeled)																											
Scraper (dumper)																											
Dump Truck/ADT																											
Clamshell Derrick																											
Dragline (small)																											
Motor Grader												6			4410												
Tractor/Offroad Forklift																											
Compactor/Roller												6			4410												
Crane (tracked)																											
Backhoe/Skip Loader												6			4410												
Bobcat/Skid Steer Loader																											
Drill Auger/Borer																											
Hydraulic Excavator												24			17640												
Front End Loader												6			4410												
Concrete Grinder																											
Screener (coarse)																											

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e												
Name or Type	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot												
Reach 7a																																
Bulldozer (tracked)																																
Bulldozer (wheeled)																																
Scraper (dumper)																																
Dump Truck/ADT	Reach	Project Year																														
Clamshell Derrick		1	2	3	4	5	6																									
Dragline (small)		4	X	X	X																											
Motor Grader		5		X	X																											
Tractor/Offroad Forklift		6		X	X	X	X	X																								
Compactor/Roller		7a	X	X																												
Crane (tracked)		7b			X	X	X																									
Backhoe/Skip Loader		8 NRCS		X	X	X	X																									
Bobcat/Skid Steer Loader		8 culvert		X	X	X	X																									
Drill Auger/Borer		8 tunnel		X	X	X	X																									
Hydraulic Excavator		14		X	X																											
Front End Loader		6 bypass		X	X	X	X																									
Concrete Grinder																																
Screener (coarse)																																
Reach 7b																																
Bulldozer (tracked)																																
Bulldozer (wheeled)																																
Scraper (dumper)																																
Dump Truck/ADT																																
Clamshell Derrick																																
Dragline (small)																																
Motor Grader																																
Tractor/Offroad Forklift																																
Compactor/Roller																																
Crane (tracked)																																
Backhoe/Skip Loader																																
Bobcat/Skid Steer Loader																																
Drill Auger/Borer																																
Hydraulic Excavator																																
Front End Loader																																
Concrete Grinder																																
Screener (coarse)																																
Reach 8 - NRCS Alternative																																
Bulldozer (tracked)																																
Bulldozer (wheeled)																																
Scraper (dumper)																																
Dump Truck/ADT																																
Clamshell Derrick																																
Dragline (small)																																
Motor Grader																																
Tractor/Offroad Forklift																																
Compactor/Roller																																
Crane (tracked)																																
Backhoe/Skip Loader																																
Bobcat/Skid Steer Loader																																
Drill Auger/Borer																																
Hydraulic Excavator																																
Front End Loader																																
Concrete Grinder																																
Screener (coarse)																																

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr
Reach 7a										
Bulldozer (tracked)										
Bulldozer (wheeled)										
Scraper (dumper)										
Dump Truck/ADT										
Clamshell Derrick										
Dragline (small)										
Motor Grader										
Tractor/Offroad Forklift										
Compactor/Roller										
Crane (tracked)										
Backhoe/Skip Loader										
Bobcat/Skid Steer Loader										
Drill Auger/Borer										
Hydraulic Excavator										
Front End Loader										
Concrete Grinder										
Screener (coarse)										
Reach 7b										
Bulldozer (tracked)										
Bulldozer (wheeled)										
Scraper (dumper)										
Dump Truck/ADT										
Clamshell Derrick										
Dragline (small)										
Motor Grader										
Tractor/Offroad Forklift										
Compactor/Roller										
Crane (tracked)										
Backhoe/Skip Loader										
Bobcat/Skid Steer Loader										
Drill Auger/Borer										
Hydraulic Excavator										
Front End Loader										
Concrete Grinder										
Screener (coarse)										
Reach 8 - NRCS Alternative										
Bulldozer (tracked)										
Bulldozer (wheeled)										
Scraper (dumper)										
Dump Truck/ADT										
Clamshell Derrick										
Dragline (small)										
Motor Grader										
Tractor/Offroad Forklift										
Compactor/Roller										
Crane (tracked)										
Backhoe/Skip Loader										
Bobcat/Skid Steer Loader										
Drill Auger/Borer										
Hydraulic Excavator										
Front End Loader										
Concrete Grinder										
Screener (coarse)										

3.11-h Llagas Schedule

3.11-h Llagas Schedule

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot
Reach 8 - Culvert/Channel Alternative																				
Bulldozer (tracked)																				
Bulldozer (wheeled)																				
Scraper (dumper)																				
Dump Truck/ADT																				
Clamshell Derrick																				
Dragline (small)																				
Motor Grader																				
Tractor/Offroad Forklift																				
Compactor/Roller																				
Crane (tracked)																				
Backhoe/Skip Loader																				
Bobcat/Skid Steer Loader																				
Drill Auger/Borer																				
Hydraulic Excavator																				
Front End Loader																				
Concrete Grinder																				
Screener (coarse)																				
Reach 8 - Tunnel																				
Bulldozer (tracked)																				
Bulldozer (wheeled)																				
Scraper (dumper)																				
Dump Truck/ADT																				
Clamshell Derrick																				
Dragline (small)																				
Motor Grader																				
Tractor/Offroad Forklift																				
Compactor/Roller																				
Crane (tracked)																				
Backhoe/Skip Loader																				
Bobcat/Skid Steer Loader																				
Drill Auger/Borer																				
Hydraulic Excavator																				
Front End Loader																				
Concrete Grinder																				
Screener (coarse)																				
Reach 14																				
Bulldozer (tracked)																				
Bulldozer (wheeled)																				
Scraper (dumper)																				
Dump Truck/ADT																				
Clamshell Derrick																				
Dragline (small)																				
Motor Grader																				
Tractor/Offroad Forklift																				
Compactor/Roller																				
Crane (tracked)																				
Backhoe/Skip Loader																				
Bobcat/Skid Steer Loader																				
Drill Auger/Borer																				
Hydraulic Excavator																				
Front End Loader																				
Concrete Grinder																				
Screener (coarse)																				

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr
Reach 8 - Culvert/Channel Alternative										
Bulldozer (tracked)										
Bulldozer (wheeled)										
Scraper (dumper)										
Dump Truck/ADT										
Clamshell Derrick										
Dragline (small)										
Motor Grader										
Tractor/Offroad Forklift										
Compactor/Roller										
Crane (tracked)										
Backhoe/Skip Loader										
Bobcat/Skid Steer Loader										
Drill Auger/Borer										
Hydraulic Excavator										
Front End Loader										
Concrete Grinder										
Screenener (coarse)										
Reach 8 - Tunnel										
Bulldozer (tracked)										
Bulldozer (wheeled)										
Scraper (dumper)										
Dump Truck/ADT										
Clamshell Derrick										
Dragline (small)										
Motor Grader										
Tractor/Offroad Forklift										
Compactor/Roller										
Crane (tracked)										
Backhoe/Skip Loader										
Bobcat/Skid Steer Loader										
Drill Auger/Borer										
Hydraulic Excavator										
Front End Loader										
Concrete Grinder										
Screenener (coarse)										
Reach 14										
Bulldozer (tracked)										
Bulldozer (wheeled)										
Scraper (dumper)										
Dump Truck/ADT										
Clamshell Derrick										
Dragline (small)										
Motor Grader										
Tractor/Offroad Forklift										
Compactor/Roller										
Crane (tracked)										
Backhoe/Skip Loader										
Bobcat/Skid Steer Loader										
Drill Auger/Borer										
Hydraulic Excavator										
Front End Loader										
Concrete Grinder										
Screenener (coarse)										

Offroad Equipments and Onroad Vehicles				Offroad	Planned Schedule				Duration	Offroad	Onroad	Daily Max		Project Total		Annual Average		ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type		Category	Qty.	BHP	years	months	wks/mo	days/wk	days	hrs/day	mi/day	hours	VMT	hours	VMT	hours	VMT	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit
Reach 6 - Bypass Alternative																											
Bulldozer (tracked)												6			4380												
Bulldozer (wheeled)																											
Scraper (dumper)																											
Dump Truck/ADT																											
Clamshell Derrick																											
Dragline (small)																											
Motor Grader												6			4380												
Tractor/Offroad Forklift																											
Compactor/Roller												6			4380												
Crane (tracked)																											
Backhoe/Skip Loader												6			4380												
Bobcat/Skid Steer Loader																											
Drill Auger/Borer																											
Hydraulic Excavator												24			17520												
Front End Loader												6			4380												
Concrete Grinder																											
Screener (coarse)																											
Reach 4												522			303150												
Tractor Trailer (materials/hauling)																											
Tractor Trailer (equipment/supplies)																											
Cement Truck (concrete/pumping)																											
Dump Truck (soil/sand/gravel transport)												40			19880												
Water Truck (dust control)												20			9940												
Work Truck (all trades)												100			49700												
Pickup/SUV (managers/engineers)												200			99400												
Pickup/SUV (supervisors/foremen)																											
Pickup/SUV (operators/drivers)																											
Pickup/SUV (tradesmen/laborers)																											
Reach 5																											
Tractor Trailer (materials/hauling)																											
Tractor Trailer (equipment/supplies)																											
Cement Truck (concrete/pumping)																											
Dump Truck (soil/sand/gravel transport)												40			8920												
Water Truck (dust control)												20			4460												
Work Truck (all trades)												100			22300												
Pickup/SUV (managers/engineers)												300			66900												
Pickup/SUV (supervisors/foremen)																											
Pickup/SUV (operators/drivers)																											
Pickup/SUV (tradesmen/laborers)																											
Reach 6																											
Tractor Trailer (materials/hauling)																											
Tractor Trailer (equipment/supplies)																											
Cement Truck (concrete/pumping)																											
Dump Truck (soil/sand/gravel transport)												40			40120												
Water Truck (dust control)												20			20060												
Work Truck (all trades)												100			100300												
Pickup/SUV (managers/engineers)												300			300900												
Pickup/SUV (supervisors/foremen)																											
Pickup/SUV (operators/drivers)																											
Pickup/SUV (tradesmen/laborers)																											

[illegible]

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr
Reach 6 - Bypass Alternative										
Bulldozer (tracked)										
Bulldozer (wheeled)										
Scraper (dumper)										
Dump Truck/ADT										
Clamshell Derrick										
Dragline (small)										
Motor Grader										
Tractor/Offroad Forklift										
Compactor/Roller										
Crane (tracked)										
Backhoe/Skip Loader										
Bobcat/Skid Steer Loader										
Drill Auger/Borer										
Hydraulic Excavator										
Front End Loader										
Concrete Grinder										
Screener (coarse)										
Reach 4										
Tractor Trailer (materials/hauling)										
Tractor Trailer (equipment/supplies)										
Cement Truck (concrete/pumping)										
Dump Truck (soil/sand/gravel transport)										
Water Truck (dust control)										
Work Truck (all trades)										
Pickup/SUV (managers/engineers)										
Pickup/SUV (supervisors/foremen)										
Pickup/SUV (operators/drivers)										
Pickup/SUV (tradesmen/laborers)										
Reach 5										
Tractor Trailer (materials/hauling)										
Tractor Trailer (equipment/supplies)										
Cement Truck (concrete/pumping)										
Dump Truck (soil/sand/gravel transport)										
Water Truck (dust control)										
Work Truck (all trades)										
Pickup/SUV (managers/engineers)										
Pickup/SUV (supervisors/foremen)										
Pickup/SUV (operators/drivers)										
Pickup/SUV (tradesmen/laborers)										
Reach 6										
Tractor Trailer (materials/hauling)										
Tractor Trailer (equipment/supplies)										
Cement Truck (concrete/pumping)										
Dump Truck (soil/sand/gravel transport)										
Water Truck (dust control)										
Work Truck (all trades)										
Pickup/SUV (managers/engineers)										
Pickup/SUV (supervisors/foremen)										
Pickup/SUV (operators/drivers)										
Pickup/SUV (tradesmen/laborers)										

Llagas Creek Equipment and Vehicle Schedule for Proposed Project (from PD Tables 2.5-3 2.5-5)

Offroad Equipments and Onroad Vehicles				Offroad	Planned Schedule				Duration	Offroad	Onroad	Daily Max		Project Total		Annual Average		ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type		Category	Qty.	BHP	years	months	wks/mo	days/wk	days	hrs/day	mi/day	hours	VMT	hours	VMT	hours	VMT	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit
Reach 7a																											
Tractor Trailer (materials/hauling)																											
Tractor Trailer (equipment/supplies)																											
Cement Truck (concrete/pumping)																											
Dump Truck (soil/sand/gravel transport)												40	11600														
Water Truck (dust control)												20	5800														
Work Truck (all trades)												100	29000														
Pickup/SUV (managers/engineers)												300	87000														
Pickup/SUV (supervisors/foremen)																											
Pickup/SUV (operators/drivers)																											
Pickup/SUV (tradesmen/laborers)																											
Reach 7b																											
Tractor Trailer (materials/hauling)																											
Tractor Trailer (equipment/supplies)																											
Cement Truck (concrete/pumping)																											
Dump Truck (soil/sand/gravel transport)												40	19840														
Water Truck (dust control)												20	9920														
Work Truck (all trades)												100	49600														
Pickup/SUV (managers/engineers)												200	99200														
Pickup/SUV (supervisors/foremen)																											
Pickup/SUV (operators/drivers)																											
Pickup/SUV (tradesmen/laborers)																											
Reach 8 - NRCS																											
Tractor Trailer (materials/hauling)																											
Tractor Trailer (equipment/supplies)																											
Cement Truck (concrete/pumping)																											
Dump Truck (soil/sand/gravel transport)												40	29400														
Water Truck (dust control)												20	14700														
Work Truck (all trades)												100	73500														
Pickup/SUV (managers/engineers)												300	220500														
Pickup/SUV (supervisors/foremen)																											
Pickup/SUV (operators/drivers)																											
Pickup/SUV (tradesmen/laborers)																											
Reach 8 - Culvert/Channel																											
Tractor Trailer (materials/hauling)																											
Tractor Trailer (equipment/supplies)																											
Cement Truck (concrete/pumping)																											
Dump Truck (soil/sand/gravel transport)												40	29400														
Water Truck (dust control)												20	14700														
Work Truck (all trades)												100	73500														
Pickup/SUV (managers/engineers)												300	220500														
Pickup/SUV (supervisors/foremen)																											
Pickup/SUV (operators/drivers)																											
Pickup/SUV (tradesmen/laborers)																											
Reach 8 - Tunnel																											
Tractor Trailer (materials/hauling)																											
Tractor Trailer (equipment/supplies)																											
Cement Truck (concrete/pumping)												100	73500														
Dump Truck (soil/sand/gravel transport)												40	29400														
Water Truck (dust control)												20	14700														
Work Truck (all trades)												100	73500														
Pickup/SUV (managers/engineers)												400	294000														
Pickup/SUV (supervisors/foremen)																											
Pickup/SUV (operators/drivers)																											
Pickup/SUV (tradesmen/laborers)																											

December 2013

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr
Reach 7a										
Tractor Trailer (materials/hauling)										
Tractor Trailer (equipment/supplies)										
Cement Truck (concrete/pumping)										
Dump Truck (soil/sand/gravel transport)										
Water Truck (dust control)										
Work Truck (all trades)										
Pickup/SUV (managers/engineers)										
Pickup/SUV (supervisors/foremen)										
Pickup/SUV (operators/drivers)										
Pickup/SUV (tradesmen/laborers)										
Reach 7b										
Tractor Trailer (materials/hauling)										
Tractor Trailer (equipment/supplies)										
Cement Truck (concrete/pumping)										
Dump Truck (soil/sand/gravel transport)										
Water Truck (dust control)										
Work Truck (all trades)										
Pickup/SUV (managers/engineers)										
Pickup/SUV (supervisors/foremen)										
Pickup/SUV (operators/drivers)										
Pickup/SUV (tradesmen/laborers)										
Reach 8 - NRCS										
Tractor Trailer (materials/hauling)										
Tractor Trailer (equipment/supplies)										
Cement Truck (concrete/pumping)										
Dump Truck (soil/sand/gravel transport)										
Water Truck (dust control)										
Work Truck (all trades)										
Pickup/SUV (managers/engineers)										
Pickup/SUV (supervisors/foremen)										
Pickup/SUV (operators/drivers)										
Pickup/SUV (tradesmen/laborers)										
Reach 8 - Culvert/Channel										
Tractor Trailer (materials/hauling)										
Tractor Trailer (equipment/supplies)										
Cement Truck (concrete/pumping)										
Dump Truck (soil/sand/gravel transport)										
Water Truck (dust control)										
Work Truck (all trades)										
Pickup/SUV (managers/engineers)										
Pickup/SUV (supervisors/foremen)										
Pickup/SUV (operators/drivers)										
Pickup/SUV (tradesmen/laborers)										
Reach 8 - Tunnel										
Tractor Trailer (materials/hauling)										
Tractor Trailer (equipment/supplies)										
Cement Truck (concrete/pumping)										
Dump Truck (soil/sand/gravel transport)										
Water Truck (dust control)										
Work Truck (all trades)										
Pickup/SUV (managers/engineers)										
Pickup/SUV (supervisors/foremen)										
Pickup/SUV (operators/drivers)										
Pickup/SUV (tradesmen/laborers)										

Offroad Equipments and Onroad Vehicles			Offroad	Planned Schedule				Duration	Offroad	Onroad	Daily Max		Project Total		Annual Average		ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	
Name or Type		Category	Qty.	BHP	years	months	wks/mo	days/wk	days	hrs/day	mi/day	hours	VMT	hours	VMT	hours	VMT	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit	lb/unit
Reach 14																											
Tractor Trailer (materials/hauling)																											
Tractor Trailer (equipment/supplies)																											
Cement Truck (concrete/pumping)																											
Dump Truck (soil/sand/gravel transport)												40	13800														
Water Truck (dust control)												20	6900														
Work Truck (all trades)												100	34500														
Pickup/SUV (managers/engineers)												200	69000														
Pickup/SUV (supervisors/foremen)																											
Pickup/SUV (operators/drivers)																											
Pickup/SUV (tradesmen/laborers)																											
Reach 6 - Bypass																											
Tractor Trailer (materials/hauling)																											
Tractor Trailer (equipment/supplies)																											
Cement Truck (concrete/pumping)												100	73000														
Dump Truck (soil/sand/gravel transport)												40	29200														
Water Truck (dust control)												20	14600														
Work Truck (all trades)												100	73000														
Pickup/SUV (managers/engineers)												300	219000														
Pickup/SUV (supervisors/foremen)												4600	3E+06														
Pickup/SUV (operators/drivers)																											
Pickup/SUV (tradesmen/laborers)																											

40	13800
20	6900
100	34500
200	69000

100	73000
40	29200
20	14600
100	73000
300	219000
4600	3E+06

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot	lbs tot
Reach 14																				
Tractor Trailer (materials/hauling)																				
Tractor Trailer (equipment/supplies)																				
Cement Truck (concrete/pumping)																				
Dump Truck (soil/sand/gravel transport)																				
Water Truck (dust control)																				
Work Truck (all trades)																				
Pickup/SUV (managers/engineers)																				
Pickup/SUV (supervisors/foremen)																				
Pickup/SUV (operators/drivers)																				
Pickup/SUV (tradesmen/laborers)																				
Reach 6 - Bypass																				
Tractor Trailer (materials/hauling)																				
Tractor Trailer (equipment/supplies)																				
Cement Truck (concrete/pumping)																				
Dump Truck (soil/sand/gravel transport)																				
Water Truck (dust control)																				
Work Truck (all trades)																				
Pickup/SUV (managers/engineers)																				
Pickup/SUV (supervisors/foremen)																				
Pickup/SUV (operators/drivers)																				
Pickup/SUV (tradesmen/laborers)																				

Offroad Equipments and Onroad Vehicles	ROG	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Name or Type	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr
Reach 14										
Tractor Trailer (materials/hauling)										
Tractor Trailer (equipment/supplies)										
Cement Truck (concrete/pumping)										
Dump Truck (soil/sand/gravel transport)										
Water Truck (dust control)										
Work Truck (all trades)										
Pickup/SUV (managers/engineers)										
Pickup/SUV (supervisors/foremen)										
Pickup/SUV (operators/drivers)										
Pickup/SUV (tradesmen/laborers)										
Reach 6 - Bypass										
Tractor Trailer (materials/hauling)										
Tractor Trailer (equipment/supplies)										
Cement Truck (concrete/pumping)										
Dump Truck (soil/sand/gravel transport)										
Water Truck (dust control)										
Work Truck (all trades)										
Pickup/SUV (managers/engineers)										
Pickup/SUV (supervisors/foremen)										
Pickup/SUV (operators/drivers)										
Pickup/SUV (tradesmen/laborers)										

3.11-i Offroad Dust

Estimated Offroad Fugitive Dust Emissions

Earthmoving	Activity		Required Variables								Uncontrolled		Controlled Emissions				
	Pk. Daily	Project	EET	Moist (M)	Silt (s)	Drop (d)	Speed (S)	Wind (U)	Den (D)	Rate (V)	PM ₁₀	PM _{2.5}	Control	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
	hours	hours	code	percent	percent	feet	mph	mph	ton/cy	cy/hr	lb/hr	lb/hr	%	lb/day	lb/day	lbs	lbs
Reach 4																	
Bulldozer (tracked)	6	2,982	A	14	9						0.50332	0.27119	85%	0.5	0.2	225.1	121.3
Bulldozer (wheeled)	-	-	A	14	9						0.37749	0.20339	85%	-	-	-	-
Scraper (dumper)	-	-	B+C	14		3	5			30	3.92192	0.33705	85%	-	-	-	-
Dump Truck/ADT	-	-	B	14		6				30	0.07623	0.00351	85%	-	-	-	-
Clamshell Derrick	-	-	B	14		9				30	0.10124	0.00549	85%	-	-	-	-
Dragline (small)	-	-	B	14		12				60	0.24766	0.01506	85%	-	-	-	-
Motor Grader	6	2,982	C	14			4				1.98400	0.15360	85%	1.8	0.1	887.4	68.7
Tractor/Offroad Forklift	-	-	C	14			3				0.83700	0.05612	85%	-	-	-	-
Compactor/Roller	6	2,982	C	14			2				0.24800	0.01358	85%	0.2	0.0	110.9	6.1
Crane (tracked)	-	-	C	14			1				0.03100	0.00120	85%	-	-	-	-
Backhoe/Skip Loader	6	2,982	D	14				6.7	1.5	20	0.00317	0.00049	85%	0.0	0.0	1.4	0.2
Bobcat/Skid Steer Loader	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Drill Auger/Borer	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Hydraulic Excavator	18	8,946	D	14				6.7	1.5	60	0.00950	0.00147	85%	0.0	0.0	12.7	2.0
Front End Loader	6	2,982	D	14				6.7	1.5	30	0.00475	0.00073	85%	0.0	0.0	2.1	0.3
Concrete Grinder	6	2,982	E	10					1.9	40	0.18240	0.03040	78%	0.2	0.0	117.9	19.6
Screener (coarse)			F	18					1.9	40	0.66120	0.04560	92%	-	-	-	-
Reach 5																	
Bulldozer (tracked)	6	1,338	A	14	9						0.50332	0.27119	85%	0.5	0.2	101.0	54.4
Bulldozer (wheeled)	-	-	A	14	9						0.37749	0.20339	85%	-	-	-	-
Scraper (dumper)	-	-	B+C	14		3	5			30	3.92192	0.33705	85%	-	-	-	-
Dump Truck/ADT	-	-	B	14		6				30	0.07623	0.00351	85%	-	-	-	-
Clamshell Derrick	-	-	B	14		9				30	0.10124	0.00549	85%	-	-	-	-
Dragline (small)	-	-	B	14		12				60	0.24766	0.01506	85%	-	-	-	-
Motor Grader	6	1,338	C	14			4				1.98400	0.15360	85%	1.8	0.1	398.2	30.8
Tractor/Offroad Forklift	-	-	C	14			3				0.83700	0.05612	85%	-	-	-	-
Compactor/Roller	6	1,338	C	14			2				0.24800	0.01358	85%	0.2	0.0	49.8	2.7
Crane (tracked)	-	-	C	14			1				0.03100	0.00120	85%	-	-	-	-
Backhoe/Skip Loader	6	1,338	D	14				6.7	1.5	20	0.00317	0.00049	85%	0.0	0.0	0.6	0.1
Bobcat/Skid Steer Loader	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Drill Auger/Borer	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Hydraulic Excavator	24	5,352	D	14				6.7	1.5	60	0.00950	0.00147	85%	0.0	0.0	7.6	1.2
Front End Loader	6	1,338	D	14				6.7	1.5	30	0.00475	0.00073	85%	0.0	0.0	1.0	0.1
Concrete Grinder			E	10					1.9	40	0.18240	0.03040	78%	-	-	-	-
Screener (coarse)			F	18					1.9	40	0.66120	0.04560	92%	-	-	-	-

3.11-i Offroad Dust

Estimated Offroad Fugitive Dust Emissions

Reach 6																	
Bulldozer (tracked)	6	6,018	A	14	9						0.50332	0.27119	85%	0.5	0.2	454.3	244.8
Bulldozer (wheeled)	-	-	A	14	9						0.37749	0.20339	85%	-	-	-	-
Scraper (dumper)	-	-	B+C	14		3	5			30	3.92192	0.33705	85%	-	-	-	-
Dump Truck/ADT	-	-	B	14		6				30	0.07623	0.00351	85%	-	-	-	-
Clamshell Derrick	-	-	B	14		9				30	0.10124	0.00549	85%	-	-	-	-
Dragline (small)	-	-	B	14		12				60	0.24766	0.01506	85%	-	-	-	-
Motor Grader	6	6,018	C	14			4				1.98400	0.15360	85%	1.8	0.1	1,791.0	138.7
Tractor/Offroad Forklift	-	-	C	14			3				0.83700	0.05612	85%	-	-	-	-
Compactor/Roller	6	6,018	C	14			2				0.24800	0.01358	85%	0.2	0.0	223.9	12.3
Crane (tracked)	-	-	C	14			1				0.03100	0.00120	85%	-	-	-	-
Backhoe/Skip Loader	6	6,018	D	14				6.7	1.5	20	0.00317	0.00049	85%	0.0	0.0	2.9	0.4
Bobcat/Skid Steer Loader	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Drill Auger/Borer	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Hydraulic Excavator	24	24,072	D	14				6.7	1.5	10	0.00158	0.00024	85%	0.0	0.0	5.7	0.9
Front End Loader	6	6,018	D	14				6.7	1.5	30	0.00475	0.00073	85%	0.0	0.0	4.3	0.7
Concrete Grinder			E	10					1.9	40	0.18240	0.03040	78%	-	-	-	-
Screener (coarse)			F	18					1.9	40	0.66120	0.04560	92%	-	-	-	-
Reach 7a																	
Bulldozer (tracked)	6	1,740	A	14	9						0.50332	0.27119	85%	0.5	0.2	131.4	70.8
Bulldozer (wheeled)	-	-	A	14	9						0.37749	0.20339	85%	-	-	-	-
Scraper (dumper)	-	-	B+C	14		3	5			30	3.92192	0.33705	85%	-	-	-	-
Dump Truck/ADT	-	-	B	14		6				30	0.07623	0.00351	85%	-	-	-	-
Clamshell Derrick	-	-	B	14		9				30	0.10124	0.00549	85%	-	-	-	-
Dragline (small)	-	-	B	14		12				60	0.24766	0.01506	85%	-	-	-	-
Motor Grader	6	1,740	C	14			4				1.98400	0.15360	85%	1.8	0.1	517.8	40.1
Tractor/Offroad Forklift	-	-	C	14			3				0.83700	0.05612	85%	-	-	-	-
Compactor/Roller	6	1,740	C	14			2				0.24800	0.01358	85%	0.2	0.0	64.7	3.5
Crane (tracked)	-	-	C	14			1				0.03100	0.00120	85%	-	-	-	-
Backhoe/Skip Loader	6	1,740	D	14				6.7	1.5	20	0.00317	0.00049	85%	0.0	0.0	0.8	0.1
Bobcat/Skid Steer Loader	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Drill Auger/Borer	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Hydraulic Excavator	24	6,960	D	14				6.7	1.5	60	0.00950	0.00147	85%	0.0	0.0	9.9	1.5
Front End Loader	6	1,740	D	14				6.7	1.5	30	0.00475	0.00073	85%	0.0	0.0	1.2	0.2
Concrete Grinder			E	10					1.9	40	0.18240	0.03040	78%	-	-	-	-
Screener (coarse)			F	18					1.9	40	0.66120	0.04560	92%	-	-	-	-

3.11-i Offroad Dust

Estimated Offroad Fugitive Dust Emissions

Reach 7b																	
Bulldozer (tracked)	6	2,976	A	14	9						0.50332	0.27119	85%	0.5	0.2	224.7	121.1
Bulldozer (wheeled)	-	-	A	14	9						0.37749	0.20339	85%	-	-	-	-
Scraper (dumper)	-	-	B+C	14		3	5			30	3.92192	0.33705	85%	-	-	-	-
Dump Truck/ADT	-	-	B	14		6				30	0.07623	0.00351	85%	-	-	-	-
Clamshell Derrick	-	-	B	14		9				30	0.10124	0.00549	85%	-	-	-	-
Dragline (small)	-	-	B	14		12				60	0.24766	0.01506	85%	-	-	-	-
Motor Grader	6	2,976	C	14			4				1.98400	0.15360	85%	1.8	0.1	885.7	68.6
Tractor/Offroad Forklift	-	-	C	14			3				0.83700	0.05612	85%	-	-	-	-
Compactor/Roller	6	2,976	C	14			2				0.24800	0.01358	85%	0.2	0.0	110.7	6.1
Crane (tracked)	-	-	C	14			1				0.03100	0.00120	85%	-	-	-	-
Backhoe/Skip Loader	6	2,976	D	14				6.7	1.5	20	0.00317	0.00049	85%	0.0	0.0	1.4	0.2
Bobcat/Skid Steer Loader	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Drill Auger/Borer	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Hydraulic Excavator	18	8,928	D	14				6.7	1.5	60	0.00950	0.00147	85%	0.0	0.0	12.7	2.0
Front End Loader	6	2,976	D	14				6.7	1.5	30	0.00475	0.00073	85%	0.0	0.0	2.1	0.3
Concrete Grinder			E	10					1.9	40	0.18240	0.03040	78%	-	-	-	-
Screener (coarse)			F	18					1.9	40	0.66120	0.04560	92%	-	-	-	-
Reach 8 - NRCS																	
Bulldozer (tracked)	6	4,410	A	14	9						0.50332	0.27119	85%	0.5	0.2	332.9	179.4
Bulldozer (wheeled)	-	-	A	14	9						0.37749	0.20339	85%	-	-	-	-
Scraper (dumper)	-	-	B+C	14		3	5			30	3.92192	0.33705	85%	-	-	-	-
Dump Truck/ADT	-	-	B	14		6				30	0.07623	0.00351	85%	-	-	-	-
Clamshell Derrick	-	-	B	14		9				30	0.10124	0.00549	85%	-	-	-	-
Dragline (small)	-	-	B	14		12				60	0.24766	0.01506	85%	-	-	-	-
Motor Grader	6	4,410	C	14			4				1.98400	0.15360	85%	1.8	0.1	1,312.4	101.6
Tractor/Offroad Forklift	-	-	C	14			3				0.83700	0.05612	85%	-	-	-	-
Compactor/Roller	6	4,410	C	14			2				0.24800	0.01358	85%	0.2	0.0	164.1	9.0
Crane (tracked)	-	-	C	14			1				0.03100	0.00120	85%	-	-	-	-
Backhoe/Skip Loader	6	4,410	D	14				6.7	1.5	20	0.00317	0.00049	85%	0.0	0.0	2.1	0.3
Bobcat/Skid Steer Loader	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Drill Auger/Borer	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Hydraulic Excavator	24	17,640	D	14				6.7	1.5	60	0.00950	0.00147	85%	0.0	0.0	25.1	3.9
Front End Loader	6	4,410	D	14				6.7	1.5	30	0.00475	0.00073	85%	0.0	0.0	3.1	0.5
Concrete Grinder			E	10					1.9	40	0.18240	0.03040	78%	-	-	-	-
Screener (coarse)			F	18					1.9	40	0.66120	0.04560	92%	-	-	-	-

3.11-i Offroad Dust

Estimated Offroad Fugitive Dust Emissions

Reach 8 - Culvert/Channel																	
Bulldozer (tracked)	6	4,410	A	14	9						0.50332	0.27119	85%	0.5	0.2	332.9	179.4
Bulldozer (wheeled)	-	-	A	14	9						0.37749	0.20339	85%	-	-	-	-
Scraper (dumper)	-	-	B+C	14		3	5			30	3.92192	0.33705	85%	-	-	-	-
Dump Truck/ADT	-	-	B	14		6				30	0.07623	0.00351	85%	-	-	-	-
Clamshell Derrick	-	-	B	14		9				30	0.10124	0.00549	85%	-	-	-	-
Dragline (small)	-	-	B	14		12				60	0.24766	0.01506	85%	-	-	-	-
Motor Grader	6	4,410	C	14			4				1.98400	0.15360	85%	1.8	0.1	1,312.4	101.6
Tractor/Offroad Forklift	-	-	C	14			3				0.83700	0.05612	85%	-	-	-	-
Compactor/Roller	6	4,410	C	14			2				0.24800	0.01358	85%	0.2	0.0	164.1	9.0
Crane (tracked)	-	-	C	14			1				0.03100	0.00120	85%	-	-	-	-
Backhoe/Skip Loader	6	4,410	D	14				6.7	1.5	20	0.00317	0.00049	85%	0.0	0.0	2.1	0.3
Bobcat/Skid Steer Loader	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Drill Auger/Borer	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Hydraulic Excavator	24	17,640	D	14				6.7	1.5	60	0.00950	0.00147	85%	0.0	0.0	25.1	3.9
Front End Loader	6	4,410	D	14				6.7	1.5	30	0.00475	0.00073	85%	0.0	0.0	3.1	0.5
Concrete Grinder			E	10					1.9	40	0.18240	0.03040	78%	-	-	-	-
Screener (coarse)			F	18					1.9	40	0.66120	0.04560	92%	-	-	-	-
Reach 8 - Tunnel																	
Bulldozer (tracked)	6	4,410	A	14	9						0.50332	0.27119	85%	0.5	0.2	332.9	179.4
Bulldozer (wheeled)	-	-	A	14	9						0.37749	0.20339	85%	-	-	-	-
Scraper (dumper)	-	-	B+C	14		3	5			30	3.92192	0.33705	85%	-	-	-	-
Dump Truck/ADT	-	-	B	14		6				30	0.07623	0.00351	85%	-	-	-	-
Clamshell Derrick	-	-	B	14		9				30	0.10124	0.00549	85%	-	-	-	-
Dragline (small)	-	-	B	14		12				60	0.24766	0.01506	85%	-	-	-	-
Motor Grader	6	4,410	C	14			4				1.98400	0.15360	85%	1.8	0.1	1,312.4	101.6
Tractor/Offroad Forklift	-	-	C	14			3				0.83700	0.05612	85%	-	-	-	-
Compactor/Roller	6	4,410	C	14			2				0.24800	0.01358	85%	0.2	0.0	164.1	9.0
Crane (tracked)	-	-	C	14			1				0.03100	0.00120	85%	-	-	-	-
Backhoe/Skip Loader	6	4,410	D	14				6.7	1.5	20	0.00317	0.00049	85%	0.0	0.0	2.1	0.3
Bobcat/Skid Steer Loader	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Drill Auger/Borer	-	-	D	14				6.7	1.5	10	0.00158	0.00024	85%	-	-	-	-
Hydraulic Excavator	18	13,230	D	14				6.7	1.5	60	0.00950	0.00147	85%	0.0	0.0	18.9	2.9
Front End Loader	6	4,410	D	14				6.7	1.5	30	0.00475	0.00073	85%	0.0	0.0	3.1	0.5
Concrete Grinder			E	10					1.9	40	0.18240	0.03040	78%	-	-	-	-
Screener (coarse)			F	18					1.9	40	0.66120	0.04560	92%	-	-	-	-

Estimated Offroad Fugitive Dust Emissions

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3.11-i Offroad Dust

Estimated Offroad Fugitive Dust Emissions

Construction Earthmoving	Activity		Required Variables								Uncontrolled		Controlled Emissions				
	Pk. Daily	Project	EET	Moist (M)	Silt (s)	Drop (d)	Speed (S)	Wind (U)	Den (D)	Rate (V)	PM ₁₀	PM _{2.5}	Control	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
	hours	hours	code	percent	percent	feet	mph	mph	ton/cy	cy/hr	lb/hr	lb/hr	%	lb/day	lb/day	lbs	lbs
Bulldozer (tracked)			A	7	9						1.32827	0.66775	56%	-	-	-	-
Bulldozer (wheeled)			A	7	9						0.99621	0.50081	56%	-	-	-	-
Scraper (dumper)			B+C	7		3	5			30	3.93277	0.33743	56%	-	-	-	-
Dump Truck/ADT			B	7		6				30	0.09385	0.00432	56%	-	-	-	-
Clamshell Derrick			B	7		9				30	0.12465	0.00675	56%	-	-	-	-
Dragline (small)			B	7		12				60	0.30491	0.01854	56%	-	-	-	-
Motor Grader			C	7			4				1.98400	0.15360	56%	-	-	-	-
Tractor/Offroad Forklift			C	7			3				0.83700	0.05612	56%	-	-	-	-
Compactor/Roller			C	7			2				0.24800	0.01358	56%	-	-	-	-
Crane (tracked)			C	7			1				0.03100	0.00120	56%	-	-	-	-
Backhoe/Skip Loader			D	7				6.7	1.5	20	0.00836	0.00129	56%	-	-	-	-
Bobcat/Skid Steer Loader			D	7				6.7	1.5	10	0.00418	0.00065	56%	-	-	-	-
Drill Auger/Borer			D	7				6.7	1.5	10	0.00418	0.00065	56%	-	-	-	-
Hydraulic Excavator			D	7				6.7	1.5	60	0.02507	0.00387	56%	-	-	-	-
Front End Loader			D	7				6.7	1.5	30	0.01254	0.00194	56%	-	-	-	-
Concrete Grinder			E	10					1.9	40	0.18240	0.03040	78%	-	-	-	-
Screener (coarse)			F	18					1.9	40	0.66120	0.04560	92%	-	-	-	-

EET Code A

AP-42 Chapter 11.9 for bulldozer, tractor dozer (Tables 11.9-1):

$$E = 0.75 * 1.0 * (s)^{1.5} / (M)^{1.4} \text{ for PM}_{10}$$

$$E = 0.105 * 5.7 * (s)^{1.2} / (M)^{1.3} \text{ for PM}_{2.5}$$

$$\text{Simplifies to } E = 0.75 * (s)^{1.5} / (M)^{1.4} \text{ for PM}_{10}$$

$$\text{Simplifies to } E = 0.60 * (s)^{1.2} / (M)^{1.3} \text{ for PM}_{2.5}$$

E = lb/hr fugitive

s = silt content, percent

M = moisture content, percent

EET Code B

AP-42 Chapter 11.9 for small dragline, clamshell, dumping, scraper (Table 11.9-1):

$$E = 0.75 * 0.0021 * (d)^{0.7} / (M)^{0.3} \text{ for PM}_{10}$$

$$E = 0.017 * 0.0021 * (d)^{1.1} / (M)^{0.3} \text{ for PM}_{2.5}$$

$$\text{Simplifies to } E = 1.6e-3 * (d)^{0.7} / (M)^{0.3} \text{ for PM}_{10}$$

$$\text{Simplifies to } E = 3.6e-5 * (d)^{1.1} / (M)^{0.3} \text{ for PM}_{2.5}$$

E = lb/cy * cy/hr = lb/hr fugitive

M = moisture content, percent

d = drop distance = 12 feet (small dragline)

d = drop distance = 9 feet (clamshell)

d = drop distance = 6 feet (dump truck/ADT)

d = drop distance = 3 feet (scraper)

3.11-i Offroad Dust

Estimated Offroad Fugitive Dust Emissions

EET Code C

AP-42 Chapter 11.9 for scraper, grader, tractor, compactor, crane (Table 11.9-1) :

$$E = S * 0.60 * 0.051 * (S)^{2.0} \text{ for PM}_{10}$$

$$E = S * 0.031 * 0.040 * (S)^{2.5} \text{ for PM}_{2.5}$$

$$\text{Simplifies to } E = 0.031 * (S)^{3.0} \text{ for PM}_{10}$$

$$\text{Simplifies to } E = 0.0012 * (S)^{3.5} \text{ for PM}_{2.5}$$

$$E = \text{lb/VMT} * \text{VMT/hr} = \text{lb/hr fugitive}$$

$$S = \text{Mean Vehicle Speed} = 5 \text{ mph (scrapers)}$$

$$S = \text{Mean Vehicle Speed} = 4 \text{ mph (graders)}$$

$$S = \text{Mean Vehicle Speed} = 3 \text{ mph (tractors)}$$

$$S = \text{Mean Vehicle Speed} = 2 \text{ mph (compactors)}$$

$$S = \text{Mean Vehicle Speed} = 1 \text{ mph (cranes)}$$

EET Code D

AP-42 Chapter 13.2.4 Loading/Handling (backhoe, Bobcat, drill auger, excavator, backhoe, front end loader):

$$E = V * D * 0.35 * 0.0032 * (U/5)^{1.3} / (M/2)^{1.4} \text{ for PM}_{10}$$

$$E = V * D * 0.053 * 0.0032 * (U/5)^{1.3} / (M/2)^{1.4} \text{ for PM}_{2.5}$$

$$\text{Simplifies to } E = V * D * 1.1e-3 * (U/5)^{1.3} / (M/2)^{1.4} \text{ for PM}_{10}$$

$$\text{Simplifies to } E = V * D * 1.7e-4 * (U/5)^{1.3} / (M/2)^{1.4} \text{ for PM}_{2.5}$$

$$V = \text{cy/hr}$$

$$M = \text{moisture content, percent}$$

$$E = \text{lb/ton} * \text{tons/cy} * \text{cy/hr} = \text{lb/hr fugitive}$$

$$D = 1.3 \text{ tons/cy for sand or cinder concrete}$$

$$D = 1.5 \text{ tons/cy for soil (typical)}$$

$$D = 1.9 \text{ tons/cy for sandstone or stone concrete}$$

$$D = 2.1 \text{ tons/cy for granite rock}$$

$$U = \text{wind speed} = 1 \text{ m/s or } 2.2 \text{ mi/hr (light air)}$$

$$U = \text{wind speed} = 2 \text{ m/s or } 4.5 \text{ mi/hr (light breeze)}$$

$$U = \text{wind speed} = 3 \text{ m/s or } 6.7 \text{ mi/hr (light breeze)}$$

$$U = \text{wind speed} = 4 \text{ m/s or } 8.9 \text{ mi/hr (gentle breeze)}$$

$$U = \text{wind speed} = 5 \text{ m/s or } 11.2 \text{ mi/hr (gentle breeze)}$$

$$U = \text{wind speed} = 6 \text{ m/s or } 13.4 \text{ mi/hr (moderate breeze)}$$

$$U = \text{wind speed} = 7 \text{ m/s or } 15.7 \text{ mi/hr (moderate breeze)}$$

EET Code E

AP-42 Chapter 11.19.2 Coarse Tertiary Crushing

$$E = 0.0024 \text{ lb/ton uncontrolled PM}_{10}$$

$$E = 0.0004 \text{ lb/ton uncontrolled PM}_{2.5}$$

$$E = D * V * 0.0024 \text{ lb/hr uncontrolled PM}_{10}$$

$$E = D * V * 0.0004 \text{ lb/hr uncontrolled PM}_{2.5}$$

$$V = \text{cy/hr}$$

$$E = \text{lb/ton} * \text{tons/cy} * \text{cy/hr} = \text{lb/hr fugitive}$$

$$D = 1.3 \text{ tons/cy for sand or cinder concrete}$$

$$D = 1.5 \text{ tons/cy for soil (typical)}$$

$$D = 1.9 \text{ tons/cy for sandstone or stone concrete}$$

$$D = 2.1 \text{ tons/cy for granite rock}$$

$$\text{Control efficiency} = 78\% \text{ where applicable (water spray)}$$

3.11-i Offroad Dust

Estimated Offroad Fugitive Dust Emissions

EET Code F

AP-42 Chapter 11.19.2 Coarse Screening

$E = 0.0087 \text{ lb/ton uncontrolled PM}_{10}$

$E = 0.0006 \text{ lb/ton uncontrolled PM}_{2.5}$

$E = D * V * 0.0087 \text{ lb/hr uncontrolled PM}_{10}$

$E = D * V * 0.0006 \text{ lb/hr uncontrolled PM}_{2.5}$

$V = \text{cy/hr}$

$E = \text{lb/ton} * \text{tons/cy} * \text{cy/hr} = \text{lb/hr fugitive}$

$D = 1.3 \text{ tons/cy for sand or cinder concrete}$

$D = 1.5 \text{ tons/cy for soil (typical)}$

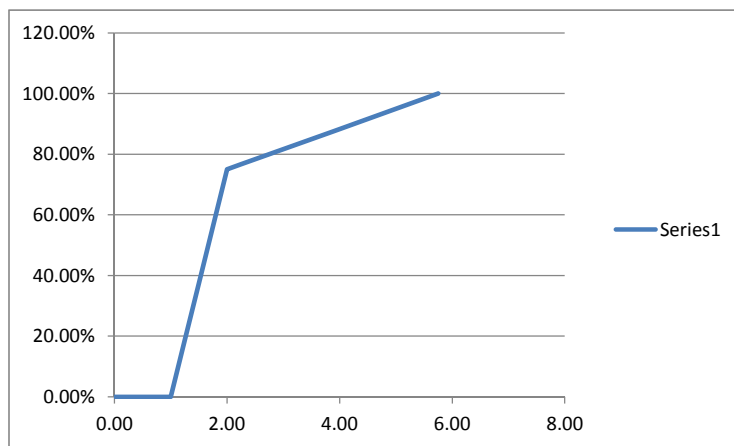
$D = 1.9 \text{ tons/cy for sandstone or stone concrete}$

$D = 2.1 \text{ tons/cy for granite rock}$

Control efficiency = 92% where applicable (water spray)

AP-42 Table	Silt Content, percent			Moisture Content, percent		
	lower	upper	g-mean	lower	upper	g-mean
11.9-3	3.8	15.1	6.9	2.2	16.8	7.9
11.9-3	7.2	25.2	16.4	0.2	16.3	3.2
11.9-3	1.2	19.2	4.3	0.3	20.1	2.4
13.2.2-1	2.4	16.0	10.0			
13.2.2-1	5.0	15.0	8.3			
13.2.2-1	2.8	18.0	8.4			
13.2.2-1	0.6	23.0	8.5			
13.2.2-1	2.2	21.0	6.4			
13.2.4-1	3.8	15.0	7.5	2.8	20.0	6.9
13.2.4-1	5.1	21.0	15.0	0.8	6.4	3.4
13.2.4-1	5.0	16.0	9.0	8.9	16.0	12.0
13.2.4-1	4.5	7.4	6.0	8.9	11.0	10.0
Averages (rounded)	4	18	9	3	15	7
EET application as:	coarse	fine	typical	dry	moist	typical

AP-42 Figure 13.2.2-2		
Moisture (M)		Control
percent	ratio	%
0	0.00	0.00%
1	0.25	0.00%
2	0.50	0.00%
3	0.75	0.00%
4	1.00	0.00%
5	1.25	18.75%
6	1.50	37.50%
7	1.75	56.25%
8	2.00	75.00%
9	2.25	76.67%
10	2.50	78.33%
11	2.75	80.00%
12	3.00	81.67%
13	3.25	83.33%
14	3.50	85.00%
15	3.75	86.67%
16	4.00	88.34%
17	4.25	90.00%
18	4.50	91.67%
19	4.75	93.34%
20	5.00	95.00%
21	5.25	96.67%
22	5.50	98.34%
23	5.75	100.00%



Estimated Onroad Fugitive Dust Emissions

All Roads Travelled	Vehicle Category	Activity		Usage	
		Pk. Daily	Project	Unpaved	Paved
		VMT	VMT	%	%
Reach 4					
Tractor Trailer (materials/hauling)	onroad HHD			1%	99%
Tractor Trailer (equipment/supplies)	onroad HHD			1%	99%
Cement Truck (concrete/pumping)	onroad HHD			1%	99%
Dump Truck (soil/sand/gravel transport)	onroad HHD	40	19880	10%	90%
Water Truck (dust control)	onroad HHD	20	9940	90%	10%
Work Truck (all trades)	onroad MD	100	49700	1%	99%
Pickup/SUV (managers/engineers)	onroad LD	200	99400	1%	99%
Pickup/SUV (supervisors/foremen)	onroad LD			1%	99%
Pickup/SUV (operators/drivers)	onroad LD			1%	99%
Pickup/SUV (tradesmen/laborers)	onroad LD			1%	99%
Reach 5					
Tractor Trailer (materials/hauling)	onroad HHD			1%	99%
Tractor Trailer (equipment/supplies)	onroad HHD			1%	99%
Cement Truck (concrete/pumping)	onroad HHD			1%	99%
Dump Truck (soil/sand/gravel transport)	onroad HHD	40	8920	10%	90%
Water Truck (dust control)	onroad HHD	20	4460	90%	10%
Work Truck (all trades)	onroad MD	100	22300	1%	99%
Pickup/SUV (managers/engineers)	onroad LD	300	66900	1%	99%
Pickup/SUV (supervisors/foremen)	onroad LD			1%	99%
Pickup/SUV (operators/drivers)	onroad LD			1%	99%
Pickup/SUV (tradesmen/laborers)	onroad LD			1%	99%
Reach 6					
Tractor Trailer (materials/hauling)	onroad HHD			1%	99%
Tractor Trailer (equipment/supplies)	onroad HHD			1%	99%
Cement Truck (concrete/pumping)	onroad HHD			1%	99%
Dump Truck (soil/sand/gravel transport)	onroad HHD	40	40120	10%	90%
Water Truck (dust control)	onroad HHD	20	20060	90%	10%
Work Truck (all trades)	onroad MD	100	100300	1%	99%
Pickup/SUV (managers/engineers)	onroad LD	300	300900	1%	99%
Pickup/SUV (supervisors/foremen)	onroad LD			1%	99%
Pickup/SUV (operators/drivers)	onroad LD			1%	99%
Pickup/SUV (tradesmen/laborers)	onroad LD			1%	99%
Reach 7a					
Tractor Trailer (materials/hauling)	onroad HHD			1%	99%
Tractor Trailer (equipment/supplies)	onroad HHD			1%	99%
Cement Truck (concrete/pumping)	onroad HHD			1%	99%
Dump Truck (soil/sand/gravel transport)	onroad HHD	40	11600	10%	90%
Water Truck (dust control)	onroad HHD	20	5800	90%	10%
Work Truck (all trades)	onroad MD	100	29000	1%	99%
Pickup/SUV (managers/engineers)	onroad LD	300	87000	1%	99%
Pickup/SUV (supervisors/foremen)	onroad LD			1%	99%
Pickup/SUV (operators/drivers)	onroad LD			1%	99%
Pickup/SUV (tradesmen/laborers)	onroad LD			1%	99%
Reach 7b					
Tractor Trailer (materials/hauling)	onroad HHD			1%	99%
Tractor Trailer (equipment/supplies)	onroad HHD			1%	99%
Cement Truck (concrete/pumping)	onroad HHD			1%	99%
Dump Truck (soil/sand/gravel transport)	onroad HHD	40	19840	10%	90%
Water Truck (dust control)	onroad HHD	20	9920	90%	10%

Estimated Onroad Fugitive Dust Emissions

Work Truck (all trades)	onroad MD	100	49600	1%	99%
Pickup/SUV (managers/engineers)	onroad LD	200	99200	1%	99%
Pickup/SUV (supervisors/foremen)	onroad LD			1%	99%
Pickup/SUV (operators/drivers)	onroad LD			1%	99%
Pickup/SUV (tradesmen/laborers)	onroad LD			1%	99%
Reach 8 - NRCS					
Tractor Trailer (materials/hauling)	onroad HHD			1%	99%
Tractor Trailer (equipment/supplies)	onroad HHD			1%	99%
Cement Truck (concrete/pumping)	onroad HHD			1%	99%
Dump Truck (soil/sand/gravel transport)	onroad HHD	40	29400	10%	90%
Water Truck (dust control)	onroad HHD	20	14700	90%	10%
Work Truck (all trades)	onroad MD	100	73500	1%	99%
Pickup/SUV (managers/engineers)	onroad LD	300	220500	1%	99%
Pickup/SUV (supervisors/foremen)	onroad LD			1%	99%
Pickup/SUV (operators/drivers)	onroad LD			1%	99%
Pickup/SUV (tradesmen/laborers)	onroad LD			1%	99%
Reach 8 - Culvert/Channel					
Tractor Trailer (materials/hauling)	onroad HHD			1%	99%
Tractor Trailer (equipment/supplies)	onroad HHD			1%	99%
Cement Truck (concrete/pumping)	onroad HHD			1%	99%
Dump Truck (soil/sand/gravel transport)	onroad HHD	40	29400	10%	90%
Water Truck (dust control)	onroad HHD	20	14700	90%	10%
Work Truck (all trades)	onroad MD	100	73500	1%	99%
Pickup/SUV (managers/engineers)	onroad LD	300	220500	1%	99%
Pickup/SUV (supervisors/foremen)	onroad LD			1%	99%
Pickup/SUV (operators/drivers)	onroad LD			1%	99%
Pickup/SUV (tradesmen/laborers)	onroad LD			1%	99%
Reach 8 - Tunnel					
Tractor Trailer (materials/hauling)	onroad HHD			1%	99%
Tractor Trailer (equipment/supplies)	onroad HHD			1%	99%
Cement Truck (concrete/pumping)	onroad HHD	100	73500	1%	99%
Dump Truck (soil/sand/gravel transport)	onroad HHD	40	29400	10%	90%
Water Truck (dust control)	onroad HHD	20	14700	90%	10%
Work Truck (all trades)	onroad MD	100	73500	1%	99%
Pickup/SUV (managers/engineers)	onroad LD	400	294000	1%	99%
Pickup/SUV (supervisors/foremen)	onroad LD			1%	99%
Pickup/SUV (operators/drivers)	onroad LD			1%	99%
Pickup/SUV (tradesmen/laborers)	onroad LD			1%	99%
Reach 14					
Tractor Trailer (materials/hauling)	onroad HHD			1%	99%
Tractor Trailer (equipment/supplies)	onroad HHD			1%	99%
Cement Truck (concrete/pumping)	onroad HHD			1%	99%
Dump Truck (soil/sand/gravel transport)	onroad HHD	40	13800	10%	90%
Water Truck (dust control)	onroad HHD	20	6900	90%	10%
Work Truck (all trades)	onroad MD	100	34500	1%	99%
Pickup/SUV (managers/engineers)	onroad LD	200	69000	1%	99%
Pickup/SUV (supervisors/foremen)	onroad LD			1%	99%
Pickup/SUV (operators/drivers)	onroad LD			1%	99%
Pickup/SUV (tradesmen/laborers)	onroad LD			1%	99%

Estimated Onroad Fugitive Dust Emissions

Reach 6 - Bypass					
Tractor Trailer (materials/hauling)	onroad HHD			1%	99%
Tractor Trailer (equipment/supplies)	onroad HHD			1%	99%
Cement Truck (concrete/pumping)	onroad HHD	100	73000	1%	99%
Dump Truck (soil/sand/gravel transport)	onroad HHD	40	29200	10%	90%
Water Truck (dust control)	onroad HHD	20	14600	90%	10%
Work Truck (all trades)	onroad MD	100	73000	1%	99%
Pickup/SUV (managers/engineers)	onroad LD	300	219000	1%	99%
Pickup/SUV (supervisors/foremen)	onroad LD			1%	99%
Pickup/SUV (operators/drivers)	onroad LD			1%	99%
Pickup/SUV (tradesmen/laborers)	onroad LD			1%	99%

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Unpaved Road Dust	Vehicle Category	Activity		Required Variables						Uncontrolled		Controlled Emissions					
		Pk. Daily	Project	EET	Moist (M)	Silt (s)	Weight (W)	Speed (S)	Precip (P)	PM ₁₀	PM _{2.5}	Control	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	
		VMT	VMT	code	percent	percent	tons	mph	days/yr	lb/VMT	lb/VMT	%	lb/day	lb/day	lbs	lbs	
Reach 4																	
Tractor Trailer (materials/hauling)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-	
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	G	14	9	30	50	60	2.07888	0.20773	85%	-	-	-	-	
Cement Truck (concrete/pumping)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-	
Dump Truck (soil/sand/gravel transport)	onroad HHD	4	1,988	G	14	9	30	20	60	1.91440	0.19128	85%	1.1	0.1	477.0	47.7	
Water Truck (dust control)	onroad HHD	18	8,946	G	14	9	30	5	60	1.77289	0.17713	85%	4.8	0.5	1,988.0	198.6	
Work Truck (all trades)	onroad MD	1	497	G	14	9	8	20	60	1.18292	0.11814	85%	0.2	0.0	73.7	7.4	
Pickup/SUV (managers/engineers)	onroad LD	2	994	G	14	9	3	20	60	0.86171	0.08601	85%	0.3	0.0	107.4	10.7	
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-	
Pickup/SUV (operators/drivers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-	
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-	
Reach 5																	
Tractor Trailer (materials/hauling)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-	
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-	
Cement Truck (concrete/pumping)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-	
Dump Truck (soil/sand/gravel transport)	onroad HHD	4	892	G	14	9	30	20	60	1.91440	0.19128	85%	1.1	0.1	214.0	21.4	
Water Truck (dust control)	onroad HHD	18	4,014	G	14	9	30	5	60	1.77289	0.17713	85%	4.8	0.5	892.0	89.1	
Work Truck (all trades)	onroad MD	1	223	G	14	9	8	20	60	1.18292	0.11814	85%	0.2	0.0	33.1	3.3	
Pickup/SUV (managers/engineers)	onroad LD	3	669	G	14	9	3	20	60	0.86171	0.08601	85%	0.4	0.0	72.3	7.2	
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-	
Pickup/SUV (operators/drivers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-	
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-	
Reach 6																	
Tractor Trailer (materials/hauling)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-	
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-	
Cement Truck (concrete/pumping)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-	
Dump Truck (soil/sand/gravel transport)	onroad HHD	4	4,012	G	14	9	30	20	60	1.91440	0.19128	85%	1.1	0.1	962.7	96.2	
Water Truck (dust control)	onroad HHD	18	18,054	G	14	9	30	5	60	1.77289	0.17713	85%	4.8	0.5	4,011.9	400.8	
Work Truck (all trades)	onroad MD	1	1,003	G	14	9	8	20	60	1.18292	0.11814	85%	0.2	0.0	148.7	14.9	
Pickup/SUV (managers/engineers)	onroad LD	3	3,009	G	14	9	3	20	60	0.86171	0.08601	85%	0.4	0.0	325.0	32.4	
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-	
Pickup/SUV (operators/drivers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-	
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-	

Estimated Onroad Fugitive Dust Emissions

Reach 7a																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	4	1,160	G	14	9	30	20	60	1.91440	0.19128	85%	1.1	0.1	278.3	27.8
Water Truck (dust control)	onroad HHD	18	5,220	G	14	9	30	5	60	1.77289	0.17713	85%	4.8	0.5	1,160.0	115.9
Work Truck (all trades)	onroad MD	1	290	G	14	9	8	20	60	1.18292	0.11814	85%	0.2	0.0	43.0	4.3
Pickup/SUV (managers/engineers)	onroad LD	3	870	G	14	9	3	20	60	0.86171	0.08601	85%	0.4	0.0	94.0	9.4
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Reach 7b																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	4	1,984	G	14	9	30	20	60	1.91440	0.19128	85%	1.1	0.1	476.1	47.6
Water Truck (dust control)	onroad HHD	18	8,928	G	14	9	30	5	60	1.77289	0.17713	85%	4.8	0.5	1,984.0	198.2
Work Truck (all trades)	onroad MD	1	496	G	14	9	8	20	60	1.18292	0.11814	85%	0.2	0.0	73.5	7.3
Pickup/SUV (managers/engineers)	onroad LD	2	992	G	14	9	3	20	60	0.86171	0.08601	85%	0.3	0.0	107.1	10.7
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Reach 8 - NRCS																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	4	2,940	G	14	9	30	20	60	1.91440	0.19128	85%	1.1	0.1	705.5	70.5
Water Truck (dust control)	onroad HHD	18	13,230	G	14	9	30	5	60	1.77289	0.17713	85%	4.8	0.5	2,939.9	293.7
Work Truck (all trades)	onroad MD	1	735	G	14	9	8	20	60	1.18292	0.11814	85%	0.2	0.0	109.0	10.9
Pickup/SUV (managers/engineers)	onroad LD	3	2,205	G	14	9	3	20	60	0.86171	0.08601	85%	0.4	0.0	238.2	23.8
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Reach 8 - Culvert/Channel																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	4	2,940	G	14	9	30	20	60	1.91440	0.19128	85%	1.1	0.1	705.5	70.5
Water Truck (dust control)	onroad HHD	18	13,230	G	14	9	30	5	60	1.77289	0.17713	85%	4.8	0.5	2,939.9	293.7
Work Truck (all trades)	onroad MD	1	735	G	14	9	8	20	60	1.18292	0.11814	85%	0.2	0.0	109.0	10.9
Pickup/SUV (managers/engineers)	onroad LD	3	2,205	G	14	9	3	20	60	0.86171	0.08601	85%	0.4	0.0	238.2	23.8
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Reach 8 - Tunnel																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	1	735	G	14	9	30	20	60	1.91440	0.19128	85%	0.3	0.0	176.4	17.6
Dump Truck (soil/sand/gravel transport)	onroad HHD	4	2,940	G	14	9	30	20	60	1.91440	0.19128	85%	1.1	0.1	705.5	70.5
Water Truck (dust control)	onroad HHD	18	13,230	G	14	9	30	5	60	1.77289	0.17713	85%	4.8	0.5	2,939.9	293.7
Work Truck (all trades)	onroad MD	1	735	G	14	9	8	20	60	1.18292	0.11814	85%	0.2	0.0	109.0	10.9
Pickup/SUV (managers/engineers)	onroad LD	4	2,940	G	14	9	3	20	60	0.86171	0.08601	85%	0.5	0.1	317.5	31.7
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-

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Estimated Onroad Fugitive Dust Emissions

Pickup/SUV (operators/drivers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Reach 14 - Tunnel																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	4	1,380	G	14	9	30	20	60	1.91440	0.19128	85%	1.1	0.1	331.1	33.1
Water Truck (dust control)	onroad HHD	18	6,210	G	14	9	30	5	60	1.77289	0.17713	85%	4.8	0.5	1,380.0	137.9
Work Truck (all trades)	onroad MD	1	345	G	14	9	8	20	60	1.18292	0.11814	85%	0.2	0.0	51.2	5.1
Pickup/SUV (managers/engineers)	onroad LD	2	690	G	14	9	3	20	60	0.86171	0.08601	85%	0.3	0.0	74.5	7.4
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Reach 6 - Bypass																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	G	14	9	30	20	60	1.91440	0.19128	85%	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	1	730	G	14	9	30	20	60	1.91440	0.19128	85%	0.3	0.0	175.2	17.5
Dump Truck (soil/sand/gravel transport)	onroad HHD	4	2,920	G	14	9	30	20	60	1.91440	0.19128	85%	1.1	0.1	700.7	70.0
Water Truck (dust control)	onroad HHD	18	13,140	G	14	9	30	5	60	1.77289	0.17713	85%	4.8	0.5	2,919.9	291.7
Work Truck (all trades)	onroad MD	1	730	G	14	9	8	20	60	1.18292	0.11814	85%	0.2	0.0	108.2	10.8
Pickup/SUV (managers/engineers)	onroad LD	3	2,190	G	14	9	3	20	60	0.86171	0.08601	85%	0.4	0.0	236.5	23.6
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	G	14	9	3	20	60	0.86171	0.08601	85%	-	-	-	-
Special Note: Daily maximums do not include importing equipment from other areas in state (local emissions only)										Unpaved Roads		lbs/day	lbs/day	tons	tons	
										Reach 4		6.4	0.6	1.3	0.1	
										Reach 5		6.5	0.6	0.6	0.1	
										Reach 6		6.5	0.6	2.7	0.3	
										Reach 7a		6.5	0.6	0.8	0.1	
										Reach 7b		6.4	0.6	1.3	0.1	
										Reach 8 - NRCS		6.5	0.6	2.0	0.2	
										Reach 8 - Culvert/Channel		6.5	0.6	2.0	0.2	
										Reach 8 - Tunnel		6.9	0.7	2.1	0.2	
										Reach 14		6.4	0.6	0.9	0.1	
										Reach 6 - Bypass		6.8	0.7	2.1	0.2	

Estimated Onroad Fugitive Dust Emissions

Paved Road Dust	Vehicle Category	Activity		Required Variables						Uncontrolled		Controlled Emissions				
		Pk. Daily	Project	EET	Moist (M)	Silt (sL)	Weight (W)	Speed (S)	Precip (P)	PM ₁₀	PM _{2.5}	Control	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
		VMT	VMT	code	percent	g/m ²	tons	mph	days/yr	lb/VMT	lb/VMT	%	lb/day	lb/day	lbs	lbs
Reach 4																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	H	--	0.015	30	--	60	0.00155	0.00038	--	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	36	17,892	H	--	0.18	30	--	60	0.01484	0.00364	--	0.5	0.1	254.6	62.5
Water Truck (dust control)	onroad HHD	2	994	H	--	0.18	30	--	60	0.01484	0.00364	--	0.0	0.0	14.1	3.5
Work Truck (all trades)	onroad MD	99	49,203	H	--	0.18	8	--	60	0.00385	0.00095	--	0.4	0.1	181.8	44.6
Pickup/SUV (managers/engineers)	onroad LD	198	98,406	H	--	0.18	3	--	60	0.00142	0.00035	--	0.3	0.1	133.7	32.8
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Reach 5																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	H	--	0.015	30	--	60	0.00155	0.00038	--	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	36	8,028	H	--	0.18	30	--	60	0.01484	0.00364	--	0.5	0.1	114.2	28.0
Water Truck (dust control)	onroad HHD	2	446	H	--	0.18	30	--	60	0.01484	0.00364	--	0.0	0.0	6.3	1.6
Work Truck (all trades)	onroad MD	99	22,077	H	--	0.18	8	--	60	0.00385	0.00095	--	0.4	0.1	81.6	20.0
Pickup/SUV (managers/engineers)	onroad LD	297	66,231	H	--	0.18	3	--	60	0.00142	0.00035	--	0.4	0.1	90.0	22.1
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Reach 6																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	H	--	0.015	30	--	60	0.00155	0.00038	--	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	36	36,108	H	--	0.18	30	--	60	0.01484	0.00364	--	0.5	0.1	513.8	126.1
Water Truck (dust control)	onroad HHD	2	2,006	H	--	0.18	30	--	60	0.01484	0.00364	--	0.0	0.0	28.5	7.0
Work Truck (all trades)	onroad MD	99	99,297	H	--	0.18	8	--	60	0.00385	0.00095	--	0.4	0.1	366.9	90.1
Pickup/SUV (managers/engineers)	onroad LD	297	297,891	H	--	0.18	3	--	60	0.00142	0.00035	--	0.4	0.1	404.8	99.4
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Reach 7a																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	H	--	0.015	30	--	60	0.00155	0.00038	--	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	36	10,440	H	--	0.18	30	--	60	0.01484	0.00364	--	0.5	0.1	148.5	36.5
Water Truck (dust control)	onroad HHD	2	580	H	--	0.18	30	--	60	0.01484	0.00364	--	0.0	0.0	8.3	2.0
Work Truck (all trades)	onroad MD	99	28,710	H	--	0.18	8	--	60	0.00385	0.00095	--	0.4	0.1	106.1	26.0
Pickup/SUV (managers/engineers)	onroad LD	297	86,130	H	--	0.18	3	--	60	0.00142	0.00035	--	0.4	0.1	117.0	28.7
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Reach 7b																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	H	--	0.015	30	--	60	0.00155	0.00038	--	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	36	17,856	H	--	0.18	30	--	60	0.01484	0.00364	--	0.5	0.1	254.1	62.4
Water Truck (dust control)	onroad HHD	2	992	H	--	0.18	30	--	60	0.01484	0.00364	--	0.0	0.0	14.1	3.5

Estimated Onroad Fugitive Dust Emissions																
Work Truck (all trades)	onroad MD	99	49,104	H	--	0.18	8	--	60	0.00385	0.00095	--	0.4	0.1	181.5	44.5
Pickup/SUV (managers/engineers)	onroad LD	198	98,208	H	--	0.18	3	--	60	0.00142	0.00035	--	0.3	0.1	133.4	32.8
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Reach 8 - NRCS																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	H	--	0.015	30	--	60	0.00155	0.00038	--	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	36	26,460	H	--	0.18	30	--	60	0.01484	0.00364	--	0.5	0.1	376.5	92.4
Water Truck (dust control)	onroad HHD	2	1,470	H	--	0.18	30	--	60	0.01484	0.00364	--	0.0	0.0	20.9	5.1
Work Truck (all trades)	onroad MD	99	72,765	H	--	0.18	8	--	60	0.00385	0.00095	--	0.4	0.1	268.9	66.0
Pickup/SUV (managers/engineers)	onroad LD	297	218,295	H	--	0.18	3	--	60	0.00142	0.00035	--	0.4	0.1	296.6	72.8
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Reach 8 - Culvert/Channel																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	H	--	0.015	30	--	60	0.00155	0.00038	--	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	36	26,460	H	--	0.18	30	--	60	0.01484	0.00364	--	0.5	0.1	376.5	92.4
Water Truck (dust control)	onroad HHD	2	1,470	H	--	0.18	30	--	60	0.01484	0.00364	--	0.0	0.0	20.9	5.1
Work Truck (all trades)	onroad MD	99	72,765	H	--	0.18	8	--	60	0.00385	0.00095	--	0.4	0.1	268.9	66.0
Pickup/SUV (managers/engineers)	onroad LD	297	218,295	H	--	0.18	3	--	60	0.00142	0.00035	--	0.4	0.1	296.6	72.8
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Reach 8 - Tunnel																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	H	--	0.015	30	--	60	0.00155	0.00038	--	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	99	72,765	H	--	0.18	30	--	60	0.01484	0.00364	--	1.5	0.4	1,035.3	254.1
Dump Truck (soil/sand/gravel transport)	onroad HHD	36	26,460	H	--	0.18	30	--	60	0.01484	0.00364	--	0.5	0.1	376.5	92.4
Water Truck (dust control)	onroad HHD	2	1,470	H	--	0.18	30	--	60	0.01484	0.00364	--	0.0	0.0	20.9	5.1
Work Truck (all trades)	onroad MD	99	72,765	H	--	0.18	8	--	60	0.00385	0.00095	--	0.4	0.1	268.9	66.0
Pickup/SUV (managers/engineers)	onroad LD	396	291,060	H	--	0.18	3	--	60	0.00142	0.00035	--	0.6	0.1	395.5	97.1
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Reach 14																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	H	--	0.015	30	--	60	0.00155	0.00038	--	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Dump Truck (soil/sand/gravel transport)	onroad HHD	36	12,420	H	--	0.18	30	--	60	0.01484	0.00364	--	0.5	0.1	176.7	43.4
Water Truck (dust control)	onroad HHD	2	690	H	--	0.18	30	--	60	0.01484	0.00364	--	0.0	0.0	9.8	2.4
Work Truck (all trades)	onroad MD	99	34,155	H	--	0.18	8	--	60	0.00385	0.00095	--	0.4	0.1	126.2	31.0
Pickup/SUV (managers/engineers)	onroad LD	198	68,310	H	--	0.18	3	--	60	0.00142	0.00035	--	0.3	0.1	92.8	22.8
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Reach 6 - Bypass																
Tractor Trailer (materials/hauling)	onroad HHD	-	-	H	--	0.18	30	--	60	0.01484	0.00364	--	-	-	-	-
Tractor Trailer (equipment/supplies)	onroad HHD	-	-	H	--	0.015	30	--	60	0.00155	0.00038	--	-	-	-	-
Cement Truck (concrete/pumping)	onroad HHD	99	72,270	H	--	0.18	30	--	60	0.01484	0.00364	--	1.5	0.4	1,028.3	252.4

Estimated Onroad Fugitive Dust Emissions

Dump Truck (soil/sand/gravel transport)	onroad HHD	36	26,280	H	--	0.18	30	--	60	0.01484	0.00364	--	0.5	0.1	373.9	91.8
Water Truck (dust control)	onroad HHD	2	1,460	H	--	0.18	30	--	60	0.01484	0.00364	--	0.0	0.0	20.8	5.1
Work Truck (all trades)	onroad MD	99	72,270	H	--	0.18	8	--	60	0.00385	0.00095	--	0.4	0.1	267.1	65.6
Pickup/SUV (managers/engineers)	onroad LD	297	216,810	H	--	0.18	3	--	60	0.00142	0.00035	--	0.4	0.1	294.6	72.3
Pickup/SUV (supervisors/foremen)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (operators/drivers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-
Pickup/SUV (tradesmen/laborers)	onroad LD	-	-	H	--	0.18	3	--	60	0.00142	0.00035	--	-	-	-	-

Special Note: Daily maximums do not include importing equipment from other areas in state (local emissions only)

Paved Roads	lbs/day	lbs/day	tons	tons
Reach 4	1.2	0.3	0.3	0.1
Reach 5	1.4	0.3	0.1	0.0
Reach 6	1.4	0.3	0.7	0.2
Reach 7a	1.4	0.3	0.2	0.0
Reach 7b	1.2	0.3	0.3	0.1
Reach 8 - NRCS	1.4	0.3	0.5	0.1
Reach 8 - Culvert/Channel	1.4	0.3	0.5	0.1
Reach 8 - Tunnel	3.0	0.7	1.0	0.3
Reach 14	1.2	0.3	0.2	0.0
Reach 6 - Bypass	2.8	0.7	1.0	0.2

EET Code G

Unpaved Road Dust (AP-42 Section 13.2.2):

$E = [1.5 * (s/12)^{0.9} * (W/3)^{0.45}] * P_C * (1-CE)$ for PM₁₀
 $E = [1.8 * (s/12)^{1.0} * (S/30)^{0.5} / (M/0.5)^{0.2} - 0.00047] * P_C * (1-CE)$ for PM₁₀
 $E = [0.15 * (s/12)^{0.9} * (W/3)^{0.45}] * P_C * (1-CE)$ for PM_{2.5}
 $E = [0.18 * (s/12)^{1.0} * (S/30)^{0.5} / (M/0.5)^{0.2} - 0.00036] * P_C * (1-CE)$ for PM_{2.5}
Equation pairs calculated for average factoring of both vehicle weight and speed
s = silt content, percent
W = average vehicle weight (see below)
M = moisture content, percent
S = mean vehicle speed = 5-10 mph for watering trucks
S = mean vehicle speed = 15 mph for haul roads (general mitigation measure)
S = mean vehicle speed = 20 mph for graded dirt/gravel roads
E = lb/VMT fugitive
P_C = (365-P)/365

P = Number of wet days over 0.01 in precipitation for averaging period (from AP-42 Figure 13.2.1-2)
Note: precipitation correction not used (P_C = 1) for worst case day calculations
CE = control efficiency for watering (moisture content)
Light Duty = 3 tons average (loaded)
Medium Duty = 8 tons average (loaded)
Heavy Heavy Duty = 30 tons average (loaded 40 tons, unloaded 20 tons)

EET Code H

Paved Road Dust (New AP-42 Section 13.2.1):
 $E = 0.0022 * (sL)^{0.91} * (W)^{1.02} * P_C$ for PM₁₀
 $E = 0.00054 * (sL)^{0.91} * (W)^{1.02} * P_C$ for PM_{2.5}
E = lb/VMT fugitive
sL = Silt Loading from Table 13.2.1-2
W = Average weight of vehicles in tons (below)
P_C = (1-P/4N)
P = Number of wet days over 0.01 in precipitation for averaging period (from AP-42 Figure 13.2.1-2)

Years	tons/yr	tons/yr	Offroad + Unpaved + Paved	lbs/day	lbs/day	tons	tons
3	0.8	0.1	Reach 4	10.3	1.4	2.3	0.3
2	0.5	0.1	Reach 5	10.4	1.4	1.0	0.1
5	0.9	0.1	Reach 6	10.3	1.4	4.6	0.6
2	0.7	0.1	Reach 7a	10.4	1.4	1.3	0.2
3	0.7	0.1	Reach 7b	10.1	1.3	2.2	0.3
4	0.8	0.1	Reach 8 - NRCS	10.4	1.4	3.4	0.5
4	0.8	0.1	Reach 8 - Culvert/Channel	10.4	1.4	3.4	0.5
4	1.0	0.2	Reach 8 - Tunnel	12.4	1.8	4.1	0.6
2	0.8	0.1	Reach 14	10.1	1.3	1.6	0.2
4	1.0	0.1	Reach 6 - Bypass	12.1	1.8	4.0	0.6

TOTALS			tons	tons
basic			16.5	2.2
tunnel			17.2	2.4
bypass			14.8	2.1
tun + by			15.5	2.2

Reach	Project Year					
	1	2	3	4	5	6
4	X	X	X			
5		X	X			
6		X	X	X	X	X
7a	X	X				
7b			X	X	X	
8 NRCS		X	X	X	X	
8 culvert		X	X	X	X	
8 tunnel		X	X	X	X	
14		X	X			
6 bypass		X	X	X	X	

3.11-j Onroad Dust

Estimated Onroad Fugitive Dust Emissions

N = days of period = 365 days (4N = 1460)
Note: precipitation correction not used ($P_c = 1$) for worst case day calculations
Light Duty = 3 tons average (loaded)
Medium Duty = 8 tons average (loaded)
Heavy Heavy Duty = 30 tons average (loaded 40 tons, unloaded 20 tons)

For basic project (no options)

	lbs/day	lbs/day	tons/yr	tons/yr
Year 1	20.7	2.8	1.4	0.2
Year 2	61.9	8.3	4.5	0.6
Year 3	61.6	8.2	4.6	0.6
Year 4	30.8	4.1	2.5	0.3
Year 5	20.7	2.8	1.8	0.2
Year 6	10.3	1.4	0.9	0.1
MAX	61.9	8.3	4.6	0.6

For tunnel option project

	lbs/day	lbs/day	tons/yr	tons/yr
Year 1	20.7	2.8	1.4	0.2
Year 2	63.9	8.7	4.7	0.7
Year 3	63.6	8.6	4.7	0.7
Year 4	32.8	4.5	2.7	0.4
Year 5	22.7	3.2	1.9	0.3
Year 6	10.3	1.4	0.9	0.1
MAX	63.9	8.7	4.7	0.7

For bypass option project

	lbs/day	lbs/day	tons/yr	tons/yr
Year 1	20.7	2.8	1.4	0.2
Year 2	53.3	7.3	4.1	0.6
Year 3	53.0	7.2	4.1	0.6
Year 4	22.2	3.1	2.1	0.3
Year 5	12.1	1.8	1.3	0.2
Year 6	10.3	1.4	0.9	0.1
MAX	53.3	7.3	4.1	0.6

For tunnel + bypass option project

	lbs/day	lbs/day	tons/yr	tons/yr
Year 1	20.7	2.8	1.4	0.2
Year 2	55.3	7.7	4.2	0.6
Year 3	55.0	7.6	4.3	0.6
Year 4	24.2	3.5	2.2	0.3
Year 5	14.1	2.2	1.5	0.2
Year 6	10.3	1.4	0.9	0.1
MAX	55.3	7.7	4.3	0.6

Option	lbs/day	lbs/day	tons/yr	tons/yr
5	10.4	1.4	0.5	0.1
6	10.3	1.4	0.9	0.1
6 bypass	12.1	1.8	1.0	0.1
delta 6	-8.6	-1.0	-0.4	0.0
8 NRCS	10.4	1.4	0.8	0.1
8 culvert	10.4	1.4	0.8	0.1
8 tunnel	12.4	1.8	1.0	0.2
delta 8	2.0	0.4	0.2	0.0

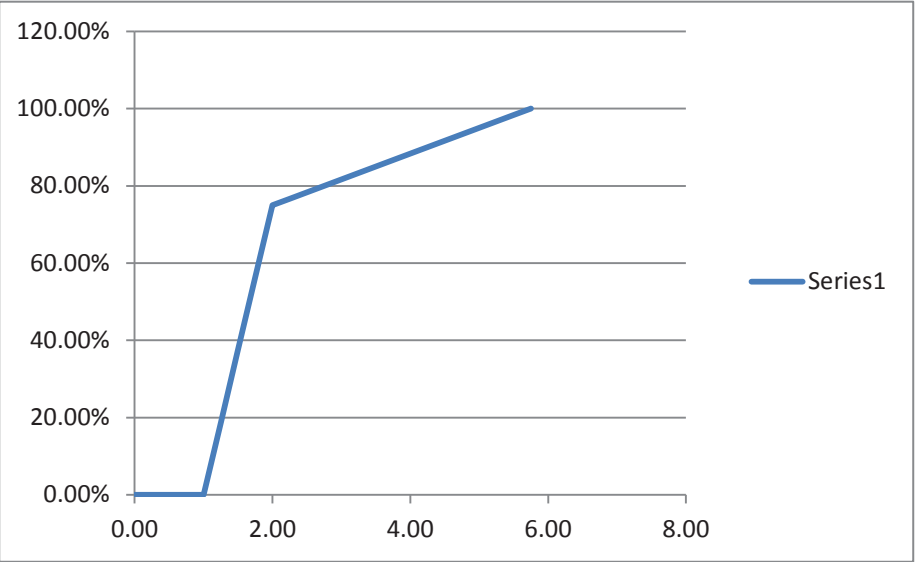
3.11-j Onroad Dust

Estimated Onroad Fugitive Dust Emissions

AP-42 Figure 13.2.1-2 (California)	
Values for Precipitation (P)	days/yr
Low Deserts	20
High Deserts & Inland SoCal	30
South/Central Coast/Valley & Mountains	40
Mid/Northern Central Valley	50
Bay & Delta Areas	60
Wine Country & Sierras	90
North Coast	120

AP-42 Table 13.2.1-2 (US)	
Values for Silt Loading (sL)	g/m³
< 500 average daily traffic (ADT) count	0.6
500 - 5,000 ADT	0.2
5,000 - 10,000 ADT	0.06
> 10,000 ADT (surface streets)	0.03
> 10,000 ADT (limited access)	0.015
Average Rural	0.4
Average Mid-Range	0.13
Average Urban	0.023
Average for All Roads	0.18

AP-42 Figure 13.2.2-2		
Moisture (M)		Control
percent	ratio	%
0	0.00	0.00%
1	0.25	0.00%
2	0.50	0.00%
3	0.75	0.00%
4	1.00	0.00%
5	1.25	18.75%
6	1.50	37.50%
7	1.75	56.25%
8	2.00	75.00%
9	2.25	76.67%
10	2.50	78.33%
11	2.75	80.00%
12	3.00	81.67%
13	3.25	83.33%
14	3.50	85.00%
15	3.75	86.67%
16	4.00	88.34%
17	4.25	90.00%
18	4.50	91.67%
19	4.75	93.34%
20	5.00	95.00%
21	5.25	96.67%
22	5.50	98.34%
23	5.75	100.00%



AERSCREEN INPUT DATA	UNITS	VALUES	VALUES	VALUES
Initial Information				
Title of modeling run	alpha	Reach_7a	Reach_7b	Reach_8
Input units, English or metric (E/M)	alpha	M	M	M
Source type (Point, Volume, Area, Circle, Flare, Shielded, Horizontal)	alpha	P	P	P
Source Information				
Emission rate	grams/sec	2.76E-03	1.84E-03	2.76E-03
Stack height	meters	1.5	1.5	1.5
Stack diameter	meters	0.15	0.15	0.15
Stack exit temperature	°K	700	700	700
Stack exit velocity (option 1, m/s)	meters/sec	38	38	38
Rural/Urban (R/U)	alpha	U	U	U
Population of urban area	integer	38000	38000	38000
Minimum distance to ambient air	meters	default	default	default
Option for modeling NO ₂ chemistry (1, 2, 3)	option #	1	1	1
1) No chemistry or pollutant is not NO ₂ (worst case unitary)				
2) Use ozone limiting method				
3) Use plume volume molar ratio method				
In-stack NO ₂ to NO _x ratio for options 2 or 3	ratio	0.1	0.1	0.1
Ozone concentration (ambient) for options 2 or 3	ppmv			
Building Downwash Information				
Include building downwash (Y/N)	alpha	N	N	N
Use existing BPIPPRM input file (Y/N)	alpha	N	N	N
Building height	meters			
Maximum horizontal dimension	meters			
Minimum horizontal dimension	meters			
Orientation of maximum building dimension to true North (0-179)	degrees			
Direction of stack from true North axis (0-359)	degrees			
Distance from stack to building center axis	meters			
Terrain Height Information				
Include terrain heights (Y/N)	alpha	N	N	N
Maximum distance to probe (2 km radius of vicinity)	meters	500	500	500
Include up to 10 discrete receptors (Y/N)	alpha	Y	Y	Y
Filename of discrete receptors (*.txt)	.txt	receptorA.txt	receptorA.txt	receptorA.txt
Use flagpole receptors (Y/N)	alpha	Y	Y	Y
Flagpole receptor height	meters	1.5	1.5	1.5
Source base elevation above mean sea level (land parcel)	meters	100	100	100
Meteorology Information for MAKEMET				
Minimum temperature (35 °F)	°K	275	275	275
Maximum temperature (107 °F)	°K	305	305	305
Minimum wind speed (2.2 mph)	meters/sec	1	1	1
Anemometer height	meters	10	10	10
Source of surface characteristics (1-user spec, 2-AERMET, 3-ext file)	option #	2	2	2
Dominant surface profile (land use: 1, 2, 3, 4, 5, 6, 7, 8)	option #	7	7	7
Dominant climate profile (1-average, 2-wet, 3-dry)	option #	3	3	3
Output File				
Use non-default name (*.out)	.out	Reach_7a	Reach_7b	Reach_8

Reach	7a	7b	8
miles	1.74	1.31	1.13
meters	2800	2108	1819
days	290	496	735
m/day	9.7	4.3	2.5
m	50	50	50
days	5	12	20

3.11-I Offroad 2017

SCAB Fleet Average Emission Factors (Diesel)

3.11-I Offroad 2017	
Air Basin	SC

Extrapolation (down)
Interpolation
Extrapolation (up)

		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Equipment	MaxHP	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	CO2 e
	10	0.00671	0.03522	0.04205	0.00009	0.00165	0.00152	5.8	0.00061	0.00027	5.86
Aerial Lifts	15	0.01007	0.05283	0.06308	0.00013	0.00247	0.00228	8.7	0.00091	0.00040	8.80
	25	0.01463	0.04734	0.08734	0.00014	0.00409	0.00377	11.0	0.00132	0.00059	11.17
	50	0.03817	0.15475	0.15797	0.00025	0.01042	0.00958	19.6	0.00344	0.00153	20.16
	80	0.03759	0.18855	0.20971	0.00034	0.01425	0.01311	27.5	0.00339	0.00151	28.06
	120	0.03682	0.23362	0.27870	0.00045	0.01937	0.01782	38.1	0.00332	0.00148	38.60
	500	0.08905	0.39831	0.98906	0.00209	0.02986	0.02747	212.9	0.00803	0.00357	214.13
	750	0.16472	0.71998	1.84446	0.00387	0.05489	0.05050	384.8	0.01486	0.00661	387.12
	800	0.17570	0.76798	1.96742	0.00413	0.05855	0.05386	410.4	0.01585	0.00705	412.92
Aerial Lifts Composite		0.03580	0.17681	0.23101	0.00040	0.01340	0.01233	34.7	0.00323	0.00144	35.23
Air Compressors	15	0.01005	0.04581	0.06239	0.00011	0.00350	0.00322	7.2	0.00091	0.00040	7.37
	25	0.02124	0.06543	0.12049	0.00018	0.00624	0.00574	14.4	0.00192	0.00085	14.75
	50	0.05907	0.22091	0.19135	0.00029	0.01475	0.01357	22.3	0.00533	0.00237	23.12
	80	0.05786	0.26003	0.26680	0.00040	0.02101	0.01933	32.8	0.00522	0.00232	33.68
	120	0.05624	0.31220	0.36741	0.00055	0.02935	0.02700	47.0	0.00507	0.00226	47.76
	175	0.07516	0.49984	0.57004	0.00100	0.03059	0.02814	88.5	0.00678	0.00301	89.56
	250	0.07911	0.26918	0.73883	0.00148	0.02302	0.02118	131.2	0.00714	0.00317	132.35
	500	0.13214	0.45980	1.13631	0.00227	0.03815	0.03510	231.7	0.01192	0.00530	233.63
	750	0.20568	0.71061	1.81415	0.00360	0.06003	0.05523	358.1	0.01856	0.00825	361.09
	1000	0.31274	1.07393	3.95056	0.00489	0.10481	0.09642	486.4	0.02822	0.01254	490.84
Air Compressors Composite		0.06411	0.31653	0.43179	0.00071	0.02816	0.02591	63.6	0.00578	0.00257	64.53
Bore/Drill Rigs	15	0.01204	0.06317	0.07542	0.00016	0.00295	0.00271	10.3	0.00109	0.00048	10.52
	25	0.01929	0.06583	0.12189	0.00020	0.00457	0.00421	16.0	0.00174	0.00077	16.26
	50	0.02100	0.22153	0.19920	0.00040	0.00441	0.00406	31.0	0.00189	0.00084	31.34
	60	0.02266	0.25656	0.21306	0.00047	0.00514	0.00473	37.6	0.00204	0.00091	37.95
	120	0.03264	0.46671	0.29622	0.00090	0.00954	0.00878	77.1	0.00295	0.00131	77.59
	175	0.05189	0.75410	0.35886	0.00159	0.01211	0.01114	141.1	0.00468	0.00208	141.82
	250	0.05798	0.34256	0.31238	0.00212	0.00882	0.00812	188.1	0.00523	0.00233	188.93
	500	0.09552	0.55113	0.50351	0.00306	0.01447	0.01331	311.3	0.00862	0.00383	312.68
	750	0.18908	1.08901	1.00179	0.00618	0.02866	0.02637	615.1	0.01706	0.00758	617.80
	1000	0.30161	1.64571	4.39725	0.00933	0.08548	0.07864	928.3	0.02721	0.01209	932.60
Bore/Drill Rigs Composite		0.05776	0.50129	0.46916	0.00175	0.01259	0.01158	164.9	0.00521	0.00232	165.72
Cement and Mortar Mixers	15	0.00736	0.03859	0.04610	0.00010	0.00184	0.00169	6.3	0.00066	0.00030	6.43
	25	0.02372	0.07620	0.14109	0.00022	0.00669	0.00615	17.6	0.00214	0.00095	17.90
Cement and Mortar Mixers Composite		0.00871	0.04170	0.05394	0.00011	0.00224	0.00206	7.2	0.00079	0.00035	7.37

3.11-I Offroad 2017

SCAB Fleet Average Emission Factors (Diesel)

3.11-I Offroad 2017		<div>Extrapolation (down)</div> <div>Interpolation</div> <div>Extrapolation (up)</div>									
Air Basin		SC									
Equipment	MaxHP	(lb/hr) ROG	(lb/hr) CO	(lb/hr) NOX	(lb/hr) SOX	(lb/hr) PM10	(lb/hr) PM2.5	(lb/hr) CO2	(lb/hr) CH4	(lb/hr) N2O	(lb/hr) CO2 e
Concrete/Industrial Saws	25	0.01988	0.06785	0.12562	0.00021	0.00468	0.00431	16.5	0.00179	0.00080	16.76
	50	0.06246	0.26019	0.24733	0.00039	0.01666	0.01533	30.2	0.00564	0.00250	31.10
	120	0.07276	0.46911	0.53312	0.00087	0.03847	0.03539	74.1	0.00657	0.00292	75.19
	175	0.11156	0.86631	0.93487	0.00180	0.04665	0.04292	160.2	0.01007	0.00447	161.80
Concrete/Industrial Saws Composite		0.06787	0.38921	0.42671	0.00070	0.02980	0.02742	58.5	0.00612	0.00272	59.44
Cranes	50	0.07095	0.25878	0.20872	0.00030	0.01676	0.01542	23.2	0.00640	0.00285	24.20
	120	0.06901	0.35088	0.41553	0.00059	0.03414	0.03141	50.1	0.00623	0.00277	51.14
	175	0.08067	0.47739	0.55495	0.00090	0.03140	0.02889	80.3	0.00728	0.00324	81.50
	250	0.08300	0.25720	0.68322	0.00126	0.02348	0.02160	112.2	0.00749	0.00333	113.35
	270	0.08646	0.27056	0.70619	0.00130	0.02441	0.02245	117.6	0.00780	0.00347	118.83
	500	0.12620	0.42426	0.97036	0.00177	0.03510	0.03229	180.1	0.01139	0.00506	181.91
	750	0.21372	0.71321	1.68905	0.00305	0.06017	0.05536	303.0	0.01928	0.00857	306.11
	1000	0.78229	2.53432	8.28271	0.00976	0.23442	0.21567	970.6	0.07058	0.03137	981.81
Cranes Composite		0.10733	0.41525	0.86248	0.00138	0.03522	0.03240	128.6	0.00968	0.00430	130.17
Crawler Tractors	50	0.08762	0.29471	0.23119	0.00032	0.01973	0.01815	24.9	0.00791	0.00351	26.13
	120	0.10076	0.47074	0.59715	0.00077	0.04893	0.04501	65.8	0.00909	0.00404	67.25
	175	0.13472	0.73425	0.92929	0.00136	0.05222	0.04804	121.2	0.01216	0.00540	123.12
	240	0.14041	0.47127	1.11186	0.00180	0.04384	0.04033	160.1	0.01267	0.00563	162.15
	250	0.14128	0.43081	1.13995	0.00187	0.04255	0.03915	166.1	0.01275	0.00567	168.16
	500	0.20692	0.75307	1.59874	0.00254	0.06094	0.05607	259.2	0.01867	0.00830	262.19
	750	0.37261	1.34748	2.94021	0.00467	0.11065	0.10180	464.7	0.03362	0.01494	470.02
	1000	0.56717	2.11858	6.02449	0.00662	0.17934	0.16499	658.1	0.05117	0.02274	666.23
Crawler Tractors Composite		0.12580	0.54636	0.86167	0.00126	0.05002	0.04602	114.0	0.01135	0.00504	115.82
Crushing/Proc. Equipment	50	0.10858	0.43554	0.37389	0.00057	0.02745	0.02525	44.0	0.00980	0.00435	45.57
	120	0.09478	0.55470	0.62098	0.00098	0.04837	0.04450	83.1	0.00855	0.00380	84.50
	175	0.13798	0.95267	1.01554	0.00188	0.05451	0.05015	167.3	0.01245	0.00553	169.24
	250	0.14663	0.49934	1.28541	0.00275	0.04045	0.03722	244.5	0.01323	0.00588	246.63
	500	0.21347	0.73571	1.71086	0.00367	0.05823	0.05357	373.6	0.01926	0.00856	376.70
	750	0.33474	1.15489	2.76412	0.00592	0.09202	0.08465	588.8	0.03020	0.01342	593.63
	1000	0.87024	2.83102	10.17982	0.01315	0.26928	0.24774	1307.8	0.07852	0.03490	1320.23
Crushing/Proc. Equipment Composite		0.12186	0.63879	0.81135	0.00146	0.04729	0.04351	132.3	0.01100	0.00489	134.05
Dumpers/Tenders	25	0.00923	0.03139	0.05852	0.00010	0.00231	0.00212	7.6	0.00083	0.00037	7.76
Dumpers/Tenders Composite		0.00923	0.03139	0.05852	0.00010	0.00231	0.00212	7.6	0.00083	0.00037	7.76
Excavators	25	0.01983	0.06769	0.12533	0.00021	0.00468	0.00431	16.4	0.00179	0.00080	16.72
	50	0.05213	0.25680	0.20816	0.00032	0.01281	0.01179	25.0	0.00470	0.00209	25.76
	120	0.07598	0.50422	0.48400	0.00086	0.03399	0.03127	73.6	0.00686	0.00305	74.71

3.11-I Offroad 2017

SCAB Fleet Average Emission Factors (Diesel)

3.11-I Offroad 2017		Extrapolation (down)									
Air Basin		Interpolation									
SC		Extrapolation (up)									
Equipment	MaxHP	(lb/hr) ROG	(lb/hr) CO	(lb/hr) NOX	(lb/hr) SOX	(lb/hr) PM10	(lb/hr) PM2.5	(lb/hr) CO2	(lb/hr) CH4	(lb/hr) N2O	(lb/hr) CO2 e
	175	0.08958	0.66439	0.57833	0.00126	0.03075	0.02829	112.2	0.00808	0.00359	113.50
	190	0.09151	0.59859	0.60023	0.00137	0.02922	0.02688	121.5	0.00826	0.00367	122.82
	250	0.09922	0.33538	0.68783	0.00179	0.02308	0.02123	158.7	0.00895	0.00398	160.10
	500	0.14153	0.47617	0.89880	0.00229	0.03228	0.02970	233.7	0.01277	0.00568	235.76
	750	0.23559	0.78899	1.53590	0.00390	0.05437	0.05002	387.4	0.02126	0.00945	390.79
Excavators Composite		0.09157	0.51840	0.58578	0.00132	0.02888	0.02657	119.6	0.00826	0.00367	120.89
Forklifts	50	0.02537	0.14629	0.12284	0.00019	0.00685	0.00630	14.7	0.00229	0.00102	15.04
	120	0.02874	0.21254	0.19258	0.00037	0.01277	0.01175	31.2	0.00259	0.00115	31.64
	175	0.04245	0.33221	0.26851	0.00063	0.01457	0.01341	56.1	0.00383	0.00170	56.66
	250	0.04670	0.15643	0.30568	0.00087	0.01032	0.00949	77.1	0.00421	0.00187	77.79
	500	0.06591	0.21389	0.39374	0.00109	0.01447	0.01331	111.0	0.00595	0.00264	111.92
Forklifts Composite		0.03991	0.21811	0.24927	0.00060	0.01186	0.01091	54.4	0.00360	0.00160	54.97
Generator Sets	15	0.01262	0.06474	0.08743	0.00016	0.00453	0.00417	10.2	0.00114	0.00051	10.39
	25	0.02359	0.07985	0.14706	0.00022	0.00730	0.00672	17.6	0.00213	0.00095	17.97
	50	0.05588	0.23263	0.24426	0.00040	0.01559	0.01435	30.6	0.00504	0.00224	31.42
	120	0.07248	0.47284	0.56285	0.00091	0.03810	0.03505	77.9	0.00654	0.00291	78.99
	175	0.09023	0.73279	0.84395	0.00160	0.03832	0.03526	142.0	0.00814	0.00362	143.27
	250	0.09263	0.39885	1.10034	0.00239	0.03070	0.02824	212.5	0.00836	0.00371	213.83
	500	0.13426	0.62365	1.54642	0.00331	0.04594	0.04226	336.9	0.01211	0.00538	338.78
	750	0.22238	1.00678	2.57457	0.00547	0.07540	0.06936	543.8	0.02007	0.00892	546.98
	1000	0.56218	2.15700	7.97781	0.01054	0.19394	0.17843	1048.6	0.05072	0.02254	1056.66
Generator Sets Composite		0.05269	0.28209	0.40525	0.00070	0.02155	0.01983	61.0	0.00475	0.00211	61.75
Graders	50	0.07430	0.29319	0.23875	0.00036	0.01760	0.01619	27.5	0.00670	0.00298	28.60
	120	0.09285	0.51656	0.57530	0.00088	0.04472	0.04114	75.0	0.00838	0.00372	76.30
	140	0.10037	0.59422	0.64906	0.00107	0.04407	0.04055	92.8	0.00906	0.00403	94.21
	175	0.11354	0.73014	0.77814	0.00139	0.04294	0.03950	123.9	0.01024	0.00455	125.55
	250	0.11799	0.38476	0.93829	0.00194	0.03211	0.02954	172.1	0.01065	0.00473	173.80
	500	0.14967	0.53441	1.11386	0.00225	0.04005	0.03685	229.5	0.01350	0.00600	231.63
	750	0.31871	1.13030	2.43229	0.00488	0.08624	0.07934	485.7	0.02876	0.01278	490.31
Graders Composite		0.11210	0.58438	0.80079	0.00150	0.03966	0.03648	132.7	0.01011	0.00450	134.35
Off-Highway Tractors	120	0.17119	0.69313	0.99729	0.00110	0.08345	0.07677	93.7	0.01545	0.00687	96.19
	175	0.16968	0.81222	1.19874	0.00147	0.06768	0.06227	130.4	0.01531	0.00680	132.85
	250	0.13443	0.40015	1.10033	0.00147	0.04458	0.04101	130.4	0.01213	0.00539	132.34
	750	0.54339	2.21702	4.43095	0.00571	0.17651	0.16239	568.1	0.04903	0.02179	575.92
	1000	0.82195	3.47382	8.43785	0.00819	0.26961	0.24804	814.3	0.07416	0.03296	826.07
Off-Highway Tractors Composite		0.17158	0.69061	1.31772	0.00167	0.06234	0.05735	151.4	0.01548	0.00688	153.87

3.11-I Offroad 2017

SCAB Fleet Average Emission Factors (Diesel)

3.11-I Offroad 2017		Extrapolation (down) Interpolation Extrapolation (up)									
Air Basin		SC									
Equipment	MaxHP	(lb/hr) ROG	(lb/hr) CO	(lb/hr) NOX	(lb/hr) SOX	(lb/hr) PM10	(lb/hr) PM2.5	(lb/hr) CO2	(lb/hr) CH4	(lb/hr) N2O	(lb/hr) CO2 e
Off-Highway Trucks	175	0.10715	0.75465	0.67644	0.00141	0.03631	0.03341	125.1	0.00967	0.00430	126.62
	250	0.11088	0.36084	0.76252	0.00187	0.02564	0.02359	166.5	0.01000	0.00445	168.13
	500	0.17532	0.56763	1.10340	0.00267	0.03970	0.03652	272.3	0.01582	0.00703	274.85
	750	0.28563	0.92035	1.84756	0.00444	0.06548	0.06024	441.7	0.02577	0.01145	445.83
	1000	0.43079	1.36598	4.60135	0.00628	0.12293	0.11310	624.7	0.03887	0.01728	630.90
Off-Highway Trucks Composite		0.17123	0.57217	1.18513	0.00266	0.04067	0.03742	260.1	0.01545	0.00687	262.51
Other Construction Equipment	15	0.01177	0.06171	0.07368	0.00016	0.00288	0.00265	10.1	0.00106	0.00047	10.28
	25	0.01595	0.05442	0.10076	0.00017	0.00378	0.00348	13.2	0.00144	0.00064	13.45
	50	0.04678	0.23917	0.21851	0.00036	0.01248	0.01148	28.0	0.00422	0.00188	28.66
	90	0.05841	0.39630	0.38013	0.00070	0.02417	0.02224	58.2	0.00527	0.00234	59.04
	120	0.06714	0.51415	0.50134	0.00095	0.03294	0.03030	80.9	0.00606	0.00269	81.82
	175	0.06652	0.58598	0.51327	0.00120	0.02524	0.02322	106.5	0.00600	0.00267	107.47
	280	0.08318	0.55163	0.64262	0.00162	0.02713	0.02496	154.2	0.00751	0.00334	155.43
	500	0.11808	0.47964	0.91364	0.00250	0.03108	0.02860	254.2	0.01065	0.00474	255.93
Other Construction Equipment Composite		0.06746	0.35683	0.50445	0.00127	0.02062	0.01897	122.5	0.00609	0.00271	123.51
Other General Industrial Equipmen	15	0.00663	0.03905	0.04662	0.00010	0.00182	0.00168	6.4	0.00060	0.00027	6.49
	25	0.01852	0.06320	0.11701	0.00019	0.00437	0.00402	15.3	0.00167	0.00074	15.61
	30	0.02723	0.09811	0.13230	0.00021	0.00654	0.00601	16.6	0.00246	0.00109	17.02
	50	0.06208	0.23774	0.19346	0.00028	0.01520	0.01399	21.7	0.00560	0.00249	22.63
	100	0.07565	0.37558	0.40931	0.00060	0.03318	0.03053	50.5	0.00683	0.00303	51.61
	120	0.08108	0.43072	0.49564	0.00073	0.04037	0.03714	62.0	0.00732	0.00325	63.20
	175	0.09108	0.56646	0.63069	0.00108	0.03507	0.03227	95.9	0.00822	0.00365	97.24
	250	0.09356	0.29002	0.77777	0.00153	0.02494	0.02295	135.6	0.00844	0.00375	136.92
	500	0.17453	0.54426	1.32575	0.00261	0.04590	0.04223	265.4	0.01575	0.00700	267.91
	750	0.28937	0.89705	2.25697	0.00440	0.07699	0.07083	437.4	0.02611	0.01160	441.60
	1000	0.40682	1.27392	4.64029	0.00563	0.12742	0.11722	559.6	0.03671	0.01631	565.43
Other General Industrial Equipmen Composite		0.11872	0.46495	0.91382	0.00160	0.03792	0.03488	152.2	0.01071	0.00476	153.94
Other Material Handling Equipment	50	0.08600	0.32822	0.26891	0.00039	0.02113	0.01944	30.3	0.00776	0.00345	31.57
	120	0.07860	0.41920	0.48395	0.00071	0.03939	0.03624	60.7	0.00709	0.00315	61.80
	175	0.11462	0.71726	0.80136	0.00137	0.04445	0.04090	122.1	0.01034	0.00460	123.72
	250	0.09880	0.30875	0.83094	0.00163	0.02661	0.02448	145.0	0.00891	0.00396	146.43
	500	0.12432	0.39152	0.95596	0.00188	0.03305	0.03040	191.6	0.01122	0.00499	193.41
	1000	0.56209	1.68211	6.13721	0.00728	0.16807	0.15462	741.3	0.05072	0.02254	749.40
Other Material Handling Equipment Composite		0.11230	0.45436	0.89481	0.00154	0.03665	0.03372	141.2	0.01013	0.00450	142.80

3.11-I Offroad 2017

SCAB Fleet Average Emission Factors (Diesel)

3.11-I Offroad 2017		Extrapolation (down)									
Air Basin		Interpolation									
SC		Extrapolation (up)									
Equipment	MaxHP	(lb/hr) ROG	(lb/hr) CO	(lb/hr) NOX	(lb/hr) SOX	(lb/hr) PM10	(lb/hr) PM2.5	(lb/hr) CO2	(lb/hr) CH4	(lb/hr) N2O	(lb/hr) CO2 e
Pavers	25	0.02277	0.07710	0.14399	0.00024	0.00580	0.00533	18.7	0.00205	0.00091	18.99
	50	0.10404	0.32616	0.26149	0.00036	0.02342	0.02155	28.0	0.00939	0.00417	29.48
	120	0.10951	0.48945	0.66060	0.00081	0.05480	0.05042	69.2	0.00988	0.00439	70.77
	175	0.14432	0.76533	1.04374	0.00144	0.05822	0.05356	128.3	0.01302	0.00579	130.35
	250	0.16637	0.51743	1.42903	0.00219	0.05370	0.04941	194.4	0.01501	0.00667	196.76
	500	0.18582	0.72392	1.54153	0.00229	0.05881	0.05410	233.2	0.01677	0.00745	235.91
Pavers Composite		0.11932	0.50734	0.66721	0.00089	0.04533	0.04170	77.9	0.01077	0.00479	79.64
Paving Equipment	25	0.01523	0.05200	0.09627	0.00016	0.00361	0.00332	12.6	0.00137	0.00061	12.85
	50	0.08853	0.27605	0.22296	0.00031	0.02003	0.01843	23.9	0.00799	0.00355	25.19
	120	0.08576	0.38343	0.51875	0.00064	0.04334	0.03988	54.5	0.00774	0.00344	55.73
	175	0.11244	0.59869	0.81962	0.00114	0.04576	0.04210	101.0	0.01015	0.00451	102.63
	250	0.10176	0.31777	0.89494	0.00138	0.03290	0.03026	122.3	0.00918	0.00408	123.75
Paving Equipment Composite		0.09096	0.41654	0.59652	0.00079	0.04044	0.03720	68.9	0.00821	0.00365	70.24
Plate Compactors	15	0.00502	0.02634	0.03145	0.00007	0.00123	0.00113	4.3	0.00045	0.00020	4.39
Plate Compactors Composite		0.00502	0.02634	0.03145	0.00007	0.00123	0.00113	4.3	0.00045	0.00020	4.39
Pressure Washers	15	0.00605	0.03102	0.04189	0.00008	0.00217	0.00200	4.9	0.00055	0.00024	4.98
	25	0.00956	0.03237	0.05962	0.00009	0.00296	0.00272	7.1	0.00086	0.00038	7.28
	50	0.01949	0.09179	0.10979	0.00018	0.00611	0.00562	14.3	0.00176	0.00078	14.57
	120	0.01912	0.13927	0.16591	0.00028	0.00999	0.00919	24.1	0.00173	0.00077	24.35
Pressure Washers Composite		0.01110	0.05702	0.07325	0.00013	0.00402	0.00370	9.4	0.00100	0.00044	9.57
Pumps	15	0.01033	0.04709	0.06412	0.00012	0.00360	0.00331	7.4	0.00093	0.00041	7.57
	25	0.02865	0.08826	0.16254	0.00025	0.00842	0.00774	19.5	0.00258	0.00115	19.90
	50	0.06797	0.27439	0.27729	0.00044	0.01843	0.01695	34.3	0.00613	0.00273	35.31
	80	0.07143	0.36260	0.40337	0.00065	0.02768	0.02547	53.0	0.00644	0.00286	54.05
	120	0.07603	0.48021	0.57149	0.00091	0.04003	0.03683	77.9	0.00686	0.00305	79.04
	160	0.08910	0.66491	0.77125	0.00140	0.03983	0.03664	123.2	0.00804	0.00357	124.44
	175	0.09400	0.73417	0.84616	0.00158	0.03975	0.03657	140.1	0.00848	0.00377	141.47
	250	0.09320	0.38414	1.06009	0.00227	0.03032	0.02790	201.4	0.00841	0.00374	202.70
	500	0.14684	0.64778	1.60535	0.00339	0.04893	0.04502	345.2	0.01325	0.00589	347.31
	750	0.24812	1.07092	2.73769	0.00574	0.08226	0.07568	570.7	0.02239	0.00995	574.26
	1000	0.75480	2.82734	10.42951	0.01362	0.25686	0.23631	1354.8	0.06810	0.03027	1365.65
Pumps Composite		0.05081	0.27513	0.35605	0.00059	0.02138	0.01967	49.6	0.00458	0.00204	50.33
Rollers	15	0.00736	0.03859	0.04607	0.00010	0.00180	0.00166	6.3	0.00066	0.00030	6.43
	25	0.01610	0.05494	0.10172	0.00017	0.00381	0.00351	13.3	0.00145	0.00065	13.57
	50	0.07285	0.26114	0.22449	0.00034	0.01745	0.01605	26.0	0.00657	0.00292	27.03
	100	0.07342	0.35631	0.40339	0.00059	0.03199	0.02943	49.6	0.00662	0.00294	50.61

3.11-I Offroad 2017

SCAB Fleet Average Emission Factors (Diesel)

3.11-I Offroad 2017		Extrapolation (down)									
Air Basin		Interpolation									
SC		Extrapolation (up)									
Equipment	MaxHP	(lb/hr) ROG	(lb/hr) CO	(lb/hr) NOX	(lb/hr) SOX	(lb/hr) PM10	(lb/hr) PM2.5	(lb/hr) CO2	(lb/hr) CH4	(lb/hr) N2O	(lb/hr) CO2 e
	120	0.07364	0.39438	0.47495	0.00069	0.03781	0.03478	59.0	0.00664	0.00295	60.04
	130	0.07777	0.43431	0.52038	0.00079	0.03809	0.03504	67.9	0.00702	0.00312	69.04
	175	0.09637	0.61403	0.72484	0.00122	0.03933	0.03618	108.1	0.00870	0.00386	109.53
	250	0.09850	0.33755	0.90348	0.00172	0.03020	0.02778	153.1	0.00889	0.00395	154.50
	500	0.13233	0.50913	1.14635	0.00215	0.04015	0.03694	219.1	0.01194	0.00531	221.00
Rollers Composite		0.07360	0.39130	0.48665	0.00077	0.03216	0.02959	67.0	0.00664	0.00295	68.10
Rough Terrain Forklifts	50	0.07431	0.33727	0.28464	0.00044	0.01902	0.01750	33.9	0.00671	0.00298	34.92
	120	0.06598	0.42034	0.43409	0.00073	0.03195	0.02939	62.4	0.00595	0.00265	63.40
	175	0.09929	0.72327	0.68993	0.00141	0.03706	0.03409	124.9	0.00896	0.00398	126.32
	250	0.10467	0.35439	0.80975	0.00192	0.02687	0.02472	170.8	0.00944	0.00420	172.30
	500	0.15143	0.51043	1.07071	0.00252	0.03827	0.03521	256.6	0.01366	0.00607	258.74
Rough Terrain Forklifts Composite		0.07039	0.45224	0.46452	0.00082	0.03227	0.02969	70.3	0.00635	0.00282	71.29
Rubber Tired Dozers	175	0.17629	0.82324	1.22394	0.00146	0.06918	0.06365	129.5	0.01591	0.00707	132.00
	250	0.19924	0.58446	1.59537	0.00206	0.06545	0.06021	183.5	0.01798	0.00799	186.34
	500	0.26601	1.09723	2.08932	0.00260	0.08491	0.07812	264.9	0.02400	0.01067	268.68
	750	0.40155	1.64685	3.20706	0.00401	0.12889	0.11858	398.8	0.03623	0.01610	404.54
	1000	0.62758	2.66064	6.26645	0.00595	0.20338	0.18711	591.9	0.05663	0.02517	600.88
Rubber Tired Dozers Composite		0.24650	0.93004	1.95084	0.00245	0.07960	0.07323	239.1	0.02224	0.00988	242.62
Rubber Tired Loaders	25	0.02042	0.06971	0.12906	0.00021	0.00481	0.00443	16.9	0.00184	0.00082	17.22
	50	0.08179	0.32695	0.26839	0.00040	0.01955	0.01798	31.1	0.00738	0.00328	32.32
	120	0.07141	0.40381	0.44595	0.00069	0.03456	0.03180	58.9	0.00644	0.00286	59.94
	175	0.09535	0.62338	0.65712	0.00120	0.03618	0.03329	106.3	0.00860	0.00382	107.68
	200	0.09689	0.52527	0.70422	0.00136	0.03318	0.03052	120.5	0.00874	0.00389	121.92
	250	0.09995	0.32905	0.79842	0.00168	0.02717	0.02499	149.0	0.00902	0.00401	150.41
	350	0.12053	0.41386	0.93056	0.00194	0.03248	0.02989	184.2	0.01088	0.00483	185.92
	500	0.15140	0.54108	1.12876	0.00233	0.04046	0.03722	237.0	0.01366	0.00607	239.18
	750	0.31207	1.10767	2.38764	0.00488	0.08437	0.07762	485.5	0.02816	0.01251	490.00
	1000	0.41489	1.48219	4.71455	0.00597	0.13025	0.11983	593.9	0.03744	0.01664	599.82
Rubber Tired Loaders Composite		0.09198	0.45097	0.64463	0.00120	0.03362	0.03093	108.6	0.00830	0.00369	109.93
Scrapers	120	0.14714	0.67285	0.87122	0.00110	0.07195	0.06619	93.9	0.01328	0.00590	96.01
	175	0.16733	0.89748	1.16378	0.00167	0.06551	0.06027	148.1	0.01510	0.00671	150.47
	250	0.18054	0.54954	1.47826	0.00236	0.05523	0.05081	209.5	0.01629	0.00724	212.06
	500	0.25944	0.96023	2.03752	0.00315	0.07767	0.07146	321.4	0.02341	0.01040	325.15
	750	0.45024	1.65573	3.61013	0.00558	0.13588	0.12501	555.3	0.04062	0.01806	561.73
Scrapers Composite		0.22565	0.87132	1.74832	0.00269	0.07162	0.06589	262.5	0.02036	0.00905	265.72

3.11-I Offroad 2017

SCAB Fleet Average Emission Factors (Diesel)

3.11-I Offroad 2017	
Air Basin	SC

Extrapolation (down)
Interpolation
Extrapolation (up)

		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Equipment	MaxHP	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	CO2 e
Signal Boards	15	0.00718	0.03767	0.04498	0.00010	0.00176	0.00162	6.2	0.00065	0.00029	6.27
	50	0.07379	0.30474	0.29231	0.00047	0.01952	0.01796	36.2	0.00666	0.00296	37.25
	120	0.07810	0.50332	0.57287	0.00094	0.04102	0.03774	80.2	0.00705	0.00313	81.33
	175	0.10572	0.82797	0.89883	0.00174	0.04398	0.04046	154.5	0.00954	0.00424	156.06
	250	0.12302	0.49193	1.28336	0.00287	0.03788	0.03485	255.3	0.01110	0.00493	257.05
Signal Boards Composite		0.01512	0.09184	0.10981	0.00021	0.00550	0.00506	16.7	0.00136	0.00061	16.91
Skid Steer Loaders	25	0.01794	0.05877	0.10904	0.00018	0.00504	0.00464	13.8	0.00162	0.00072	14.05
	50	0.02876	0.20566	0.18651	0.00033	0.00786	0.00723	25.5	0.00259	0.00115	25.93
	120	0.02680	0.26860	0.21722	0.00050	0.01143	0.01052	42.8	0.00242	0.00107	43.15
Skid Steer Loaders Composite		0.02741	0.21613	0.19123	0.00037	0.00882	0.00811	30.3	0.00247	0.00110	30.67
Surfacing Equipment	50	0.03456	0.12700	0.11780	0.00018	0.00849	0.00781	14.1	0.00312	0.00139	14.60
	120	0.07221	0.40962	0.49952	0.00075	0.03679	0.03385	63.8	0.00652	0.00290	64.80
	175	0.06846	0.46854	0.55888	0.00097	0.02818	0.02593	85.8	0.00618	0.00275	86.76
	250	0.07799	0.29267	0.77323	0.00152	0.02533	0.02331	134.9	0.00704	0.00313	135.99
	500	0.11860	0.52479	1.13920	0.00217	0.03854	0.03546	221.2	0.01070	0.00476	222.91
	750	0.18875	0.82239	1.84082	0.00349	0.06143	0.05652	347.0	0.01703	0.00757	349.75
Surfacing Equipment Composite		0.09807	0.43334	0.88546	0.00167	0.03206	0.02949	166.0	0.00885	0.00393	167.37
Sweepers/Scrubbers	15	0.01238	0.07289	0.08703	0.00019	0.00340	0.00313	11.9	0.00112	0.00050	12.12
	25	0.02366	0.08076	0.14952	0.00025	0.00557	0.00513	19.6	0.00213	0.00095	19.95
	50	0.05812	0.30191	0.26267	0.00041	0.01582	0.01455	31.6	0.00524	0.00233	32.38
	120	0.07012	0.49958	0.48550	0.00088	0.03362	0.03093	75.0	0.00633	0.00281	76.04
	175	0.10286	0.80175	0.70990	0.00156	0.03812	0.03507	139.0	0.00928	0.00412	140.47
	250	0.09356	0.32324	0.69698	0.00182	0.02297	0.02114	162.0	0.00844	0.00375	163.36
Sweepers/Scrubbers Composite		0.07372	0.49620	0.47264	0.00092	0.02881	0.02651	78.5	0.00665	0.00296	79.60
Tractors/Loaders/Backhoes	25	0.01916	0.06532	0.12131	0.00020	0.00471	0.00433	15.9	0.00173	0.00077	16.14
	50	0.05552	0.28893	0.24354	0.00039	0.01405	0.01293	30.3	0.00501	0.00223	31.14
	120	0.04771	0.34418	0.32159	0.00061	0.02166	0.01992	51.7	0.00430	0.00191	52.41
	175	0.07261	0.58469	0.48856	0.00114	0.02539	0.02336	101.4	0.00655	0.00291	102.43
	250	0.09684	0.35064	0.68873	0.00193	0.02291	0.02108	171.7	0.00874	0.00388	173.12
	500	0.18857	0.68588	1.23147	0.00388	0.04383	0.04033	344.9	0.01701	0.00756	347.55
	750	0.28422	1.02862	1.90401	0.00582	0.06683	0.06148	517.3	0.02564	0.01140	521.35
Tractors/Loaders/Backhoes Composite		0.05589	0.36663	0.36806	0.00078	0.02218	0.02041	66.8	0.00504	0.00224	67.60
Trenchers	15	0.00985	0.05168	0.06170	0.00013	0.00241	0.00222	8.5	0.00089	0.00040	8.61
	25	0.03971	0.13554	0.25094	0.00042	0.00936	0.00861	32.9	0.00358	0.00159	33.49
	50	0.12220	0.37283	0.30514	0.00043	0.02737	0.02518	32.9	0.01103	0.00490	34.67
	120	0.10178	0.45292	0.62661	0.00076	0.05138	0.04727	64.9	0.00918	0.00408	66.35

3.11-I Offroad 2017

SCAB Fleet Average Emission Factors (Diesel)

3.11-I Offroad 2017	
Air Basin	SC

Extrapolation (down)
Interpolation
Extrapolation (up)

		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Equipment	MaxHP	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	CO2 e
	175	0.15902	0.84637	1.18930	0.00162	0.06529	0.06007	143.9	0.01435	0.00638	146.18
	180	0.16097	0.83015	1.22145	0.00168	0.06517	0.05996	149.2	0.01452	0.00646	151.47
	250	0.18835	0.60308	1.67150	0.00251	0.06348	0.05841	222.9	0.01699	0.00755	225.60
	500	0.24330	1.00858	2.10484	0.00306	0.08052	0.07408	311.3	0.02195	0.00976	314.79
	750	0.46103	1.89711	4.06161	0.00590	0.15352	0.14124	586.9	0.04160	0.01849	593.48
Trenchers Composite		0.11291	0.44218	0.54103	0.00070	0.04227	0.03889	58.7	0.01019	0.00453	60.33
Welders	15	0.00864	0.03937	0.05362	0.00010	0.00301	0.00277	6.2	0.00078	0.00035	6.33
	25	0.01659	0.05111	0.09413	0.00014	0.00487	0.00448	11.3	0.00150	0.00067	11.52
	50	0.06383	0.24084	0.21834	0.00034	0.01620	0.01490	26.0	0.00576	0.00256	26.87
	120	0.04443	0.25591	0.30326	0.00046	0.02341	0.02153	39.5	0.00401	0.00178	40.14
	175	0.07741	0.54039	0.62144	0.00110	0.03215	0.02958	98.2	0.00698	0.00310	99.30
	250	0.06568	0.23836	0.65818	0.00134	0.01999	0.01839	119.1	0.00593	0.00263	120.01
	500	0.08655	0.32632	0.80959	0.00165	0.02640	0.02429	167.6	0.00781	0.00347	168.84
Welders Composite		0.04337	0.19120	0.20541	0.00032	0.01504	0.01384	25.6	0.00391	0.00174	26.22

Notes:

SCAQMD emission factors for 2017 (SCAQMD 2008)

Offroad diesel exhaust PM_{2.5} = 92% of PM₁₀ per EMFAC 2007 version 2.3 (SCAQMD 2008)

N2O & CO2 eqv per Inventory of U.S. GHG Emissions & Sinks - Annex 3 (USEPA 2012)

Non-matching application-specific values interpolated or extrapolated for improved accuracy

USEPA GWPs for CO2 eqv (1, 21, 310)

3.11-m Onroad 2017

SCAB Fleet Average Emission Factors

3.11-m Onroad 2017

Air Basin		SC
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		(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)
Vehicle Type	Category	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	CO2 e
Light Duty (pickups/SUVs)	Onroad LD	0.000601	0.005379	0.000513	0.000011	0.000094	0.000062	1.106275	0.000053	0.000082	1.132948
Medium Duty (work trucks)	Onroad MD	0.001502	0.009981	0.010700	0.000027	0.000431	0.000346	2.840050	0.000067	0.000063	2.860890
Heavy Heavy Duty (tractor/trailers)	Onroad HHD	0.001452	0.006505	0.016904	0.000040	0.000849	0.000697	4.208201	0.000067	0.000063	4.229226

Notes:

SCAQMD 2008

HHD includes tire & brake wear

N2O & CO2 eqv per Inventory of U.S. GHG Emissions & Sinks - Annex 3 (USEPA 2012)

3.11-n Onroad LD MD 2011-2026

Highest (Most Conservative) EMFAC2007 (version 2.3)
Emission Factors for On-Road Passenger Vehicles & Delivery Trucks
Projects in the SCAQMD (Scenario Years 2011 - 2026)
Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

Vehicle Class:

Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)

The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories:

Passenger Vehicles & Delivery Trucks.

These emission factors can be used to calculate on-road mobile source emissions for the vehicle categories listed in the tables below, by use of the following equation:

$$\text{Emissions (pounds per day)} = N \times TL \times EF$$

where N = number of trips, TL = trip length (miles/day), and EF = emission factor (pounds per mile)

This methodology replaces the old EMFAC emission factors in Tables A-9-5-J-1 through A-9-5-L in Appendix A9 of the current SCAQMD CEQA Handbook. All the emission factors account for the emissions from start, running and idling exhaust. In addition, the ROG emission factors include diurnal, hot soak, running and resting emissions, and the PM10 & PM2.5 emission factors include tire and brake wear.

3.11-n Onroad LD MD 2011-2026

Scenario Year: **2011**

All model years in the range 1967 to 2011

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00826276	CO	0.01693242
NOx	0.00084460	NOx	0.01893366
ROG	0.00085233	ROG	0.00241868
SOx	0.00001077	SOx	0.00002728
PM10	0.00008879	PM10	0.00070097
PM2.5	0.00005653	PM2.5	0.00059682
CO2	1.10235154	CO2	2.75180822
CH4	0.00007678	CH4	0.00011655
N2O	0.00011943	N2O	0.00010970
CO2 eqv	1.14098746	CO2 eqv	2.78826189

Scenario Year: **2012**

All model years in the range 1968 to 2012

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00765475	CO	0.01545741
NOx	0.00077583	NOx	0.01732423
ROG	0.00079628	ROG	0.00223776
SOx	0.00001073	SOx	0.00002667
PM10	0.00008979	PM10	0.00064975
PM2.5	0.00005750	PM2.5	0.00054954
CO2	1.10152540	CO2	2.76628414
CH4	0.00007169	CH4	0.00010668
N2O	0.00011151	N2O	0.00010040
CO2 eqv	1.13760039	CO2 eqv	2.79964841

Scenario Year: **2013**

All model years in the range 1969 to 2013

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00709228	CO	0.01407778
NOx	0.00071158	NOx	0.01577311
ROG	0.00074567	ROG	0.00206295
SOx	0.00001072	SOx	0.00002682
PM10	0.00009067	PM10	0.00059956
PM2.5	0.00005834	PM2.5	0.00050174
CO2	1.10087435	CO2	2.78163459
CH4	0.00006707	CH4	0.00009703
N2O	0.00010434	N2O	0.00009133
CO2 eqv	1.13462778	CO2 eqv	2.81198332

Scenario Year: **2014**

All model years in the range 1970 to 2014

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00660353	CO	0.01284321
NOx	0.00065484	NOx	0.01425162
ROG	0.00070227	ROG	0.00189649
SOx	0.00001069	SOx	0.00002754
PM10	0.00009185	PM10	0.00054929
PM2.5	0.00005939	PM2.5	0.00045519
CO2	1.10257205	CO2	2.79845465
CH4	0.00006312	CH4	0.00008798
N2O	0.00009818	N2O	0.00008280
CO2 eqv	1.13433310	CO2 eqv	2.82597096

Scenario Year: **2015**

All model years in the range 1971 to 2015

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00614108	CO	0.01169445
NOx	0.00060188	NOx	0.01285026
ROG	0.00066355	ROG	0.00173890
SOx	0.00001070	SOx	0.00002741
PM10	0.00009259	PM10	0.00050307
PM2.5	0.00006015	PM2.5	0.00041268
CO2	1.10192837	CO2	2.81247685
CH4	0.00005923	CH4	0.00008076
N2O	0.00009213	N2O	0.00007601
CO2 eqv	1.13173218	CO2 eqv	2.83773531

Scenario Year: **2016**

All model years in the range 1972 to 2016

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00575800	CO	0.01080542
NOx	0.00055658	NOx	0.01172881
ROG	0.00063254	ROG	0.00161521
SOx	0.00001071	SOx	0.00002767
PM10	0.00009392	PM10	0.00046606
PM2.5	0.00006131	PM2.5	0.00037868
CO2	1.10677664	CO2	2.83134285
CH4	0.00005623	CH4	0.00007355
N2O	0.00008747	N2O	0.00006922
CO2 eqv	1.13507331	CO2 eqv	2.85434695

3.11-n Onroad LD MD 2011-2026

Scenario Year: **2017**

All model years in the range 1973 to 2017

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00537891	CO	0.00998101
NOx	0.00051297	NOx	0.01070034
ROG	0.00060109	ROG	0.00150242
SOx	0.00001079	SOx	0.00002723
PM10	0.00009446	PM10	0.00043131
PM2.5	0.00006192	PM2.5	0.00034605
CO2	1.10627489	CO2	2.84005015
CH4	0.00005300	CH4	0.00006663
N2O	0.00008245	N2O	0.00006271
CO2 eqv	1.13294795	CO2 eqv	2.86088993

Scenario Year: **2018**

All model years in the range 1974 to 2018

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00502881	CO	0.00923234
NOx	0.00047300	NOx	0.00979416
ROG	0.00057178	ROG	0.00139856
SOx	0.00001071	SOx	0.00002749
PM10	0.00009494	PM10	0.00040110
PM2.5	0.00006234	PM2.5	0.00031792
CO2	1.10562643	CO2	2.84646835
CH4	0.00005003	CH4	0.00006203
N2O	0.00007782	N2O	0.00005838
CO2 eqv	1.13080168	CO2 eqv	2.86587008

Scenario Year: **2019**

All model years in the range 1975 to 2019

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00471820	CO	0.00857192
NOx	0.00043716	NOx	0.00900205
ROG	0.00054654	ROG	0.00130563
SOx	0.00001072	SOx	0.00002706
PM10	0.00009523	PM10	0.00037393
PM2.5	0.00006259	PM2.5	0.00029276
CO2	1.10496100	CO2	2.85060182
CH4	0.00004743	CH4	0.00005619
N2O	0.00007378	N2O	0.00005289
CO2 eqv	1.12882815	CO2 eqv	2.86817714

Scenario Year: **2020**

All model years in the range 1976 to 2020

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00444247	CO	0.00799617
NOx	0.00040506	NOx	0.00831802
ROG	0.00052463	ROG	0.00122382
SOx	0.00001073	SOx	0.00002733
PM10	0.00009550	PM10	0.00035054
PM2.5	0.00006279	PM2.5	0.00027128
CO2	1.10456157	CO2	2.85148109
CH4	0.00004495	CH4	0.00005330
N2O	0.00006992	N2O	0.00005016
CO2 eqv	1.12718066	CO2 eqv	2.86815105

Scenario Year: **2021**

All model years in the range 1977 to 2021

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00421218	CO	0.00748303
NOx	0.00037757	NOx	0.00773500
ROG	0.00050573	ROG	0.00115568
SOx	0.00001073	SOx	0.00002755
PM10	0.00009640	PM10	0.00033125
PM2.5	0.00006364	PM2.5	0.00025331
CO2	1.11009559	CO2	2.86434187
CH4	0.00004322	CH4	0.00004905
N2O	0.00006724	N2O	0.00004616
CO2 eqv	1.13184726	CO2 eqv	2.87968274

Scenario Year: **2022**

All model years in the range 1978 to 2022

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00397866	CO	0.00699290
NOx	0.00035150	NOx	0.00722470
ROG	0.00048658	ROG	0.00108569
SOx	0.00001072	SOx	0.00002774
PM10	0.00009661	PM10	0.00031501
PM2.5	0.00006389	PM2.5	0.00023906
CO2	1.11019931	CO2	2.87006769
CH4	0.00004121	CH4	0.00004557
N2O	0.00006411	N2O	0.00004289
CO2 eqv	1.13093833	CO2 eqv	2.88431947

3.11-n Onroad LD MD 2011-2026

Scenario Year: **2023**

All model years in the range 1979 to 2023

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00377527	CO	0.00658123
NOx	0.00032851	NOx	0.00679147
ROG	0.00046900	ROG	0.00102852
SOx	0.00001070	SOx	0.00002790
PM10	0.00009676	PM10	0.00030109
PM2.5	0.00006405	PM2.5	0.00022582
CO2	1.11023373	CO2	2.87466338
CH4	0.00003951	CH4	0.00004218
N2O	0.00006146	N2O	0.00003970
CO2 eqv	1.13011498	CO2 eqv	2.88785549

Scenario Year: **2024**

All model years in the range 1980 to 2024

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00358611	CO	0.00625076
NOx	0.00030721	NOx	0.00647083
ROG	0.00045136	ROG	0.00096578
SOx	0.00001080	SOx	0.00002807
PM10	0.00009676	PM10	0.00029407
PM2.5	0.00006410	PM2.5	0.00021880
CO2	1.11061572	CO2	2.88010717
CH4	0.00003781	CH4	0.00004019
N2O	0.00005881	N2O	0.00003782
CO2 eqv	1.12964186	CO2 eqv	2.89267641

Scenario Year: **2025**

All model years in the range 1981 to 2025

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00342738	CO	0.00595363
NOx	0.00028846	NOx	0.00615945
ROG	0.00043545	ROG	0.00092178
SOx	0.00001070	SOx	0.00002761
PM10	0.00009679	PM10	0.00028425
PM2.5	0.00006418	PM2.5	0.00020958
CO2	1.11078571	CO2	2.88143570
CH4	0.00003641	CH4	0.00003765
N2O	0.00005663	N2O	0.00003543
CO2 eqv	1.12910559	CO2 eqv	2.89321111

Scenario Year: **2026**

All model years in the range 1982 to 2026

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00328779	CO	0.00569435
NOx	0.00027141	NOx	0.00589869
ROG	0.00042052	ROG	0.00088403
SOx	0.00001076	SOx	0.00002716
PM10	0.00009687	PM10	0.00027657
PM2.5	0.00006415	PM2.5	0.00020187
CO2	1.11105829	CO2	2.88298299
CH4	0.00003518	CH4	0.00003581
N2O	0.00005472	N2O	0.00003370
CO2 eqv	1.12876023	CO2 eqv	2.89418178

Notes:

SCAQMD 2008

HHD-DSL composite includes tire & brake wear

N2O & CO2 eqv per Inventory of U.S. GHG Emissions & Sinks - Annex 3 (USEPA 2012)

3.11-o Onroad HHD 2011-2026

Highest (Most Conservative) EMFAC2007 (version 2.3)

Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks

Projects in the SCAQMD (Scenario Years 2011 - 2026)

Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

Vehicle Class:

Heavy-Heavy-Duty Diesel Trucks (33,001 to 60,000 pounds)

The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and extracting the **Heavy-Heavy-Duty Diesel Truck (HHDT)** Emission Factors.

These emission factors can be used to calculate on-road mobile source emissions for the vehicle/emission categories listed in the tables below, by use of the following equation:

$$\text{Emissions (pounds per day)} = N \times TL \times EF$$

where N = number of trips, TL = trip length (miles/day), and EF = emission factor (pounds per mile)

The **HHDT-DSL** vehicle/emission category accounts for all emissions from heavy-heavy-duty diesel trucks, including start, running and idling exhaust. In addition, ROG emission factors account for diurnal, hot soak, running and resting emissions, and the PM10 & PM2.5 emission factors account for tire and brake wear.

The **HHDT-DSL, Exh** vehicle/emission category includes only the exhaust portion of PM10 & PM2.5 emissions from heavy-heavy-duty diesel trucks.

3.11-o Onroad HHD 2011-2026

Scenario Year: **2011**

All model years in the range 1967 to 2011

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.01112463	PM10	0.00151936
NOx	0.03455809	PM2.5	0.00139772
ROG	0.00279543		
SOx	0.00003972		
PM10	0.00166087		
PM2.5	0.00144489		
CO2	4.22045680		
CH4	0.00012910		
N2O	0.00012150		
CO2 eqv	4.26083358		

Scenario Year: **2012**

All model years in the range 1968 to 2012

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.01021519	PM10	0.00135537
NOx	0.03092379	PM2.5	0.00124837
ROG	0.00252764		
SOx	0.00004042		
PM10	0.00149566		
PM2.5	0.00129354		
CO2	4.21590774		
CH4	0.00011651		
N2O	0.00010966		
CO2 eqv	4.25234923		

Scenario Year: **2013**

All model years in the range 1969 to 2013

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00931790	PM10	0.00119623
NOx	0.02742935	PM2.5	0.00109863
ROG	0.00226308		
SOx	0.00004086		
PM10	0.00133697		
PM2.5	0.00114629		
CO2	4.21518556		
CH4	0.00010441		
N2O	0.00009827		
CO2 eqv	4.24784287		

Scenario Year: **2014**

All model years in the range 1970 to 2014

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00846435	PM10	0.00104243
NOx	0.02418049	PM2.5	0.00096059
ROG	0.00201594		
SOx	0.00004092		
PM10	0.00118458		
PM2.5	0.00100582		
CO2	4.21279345		
CH4	0.00009261		
N2O	0.00008716		
CO2 eqv	4.24175938		

Scenario Year: **2015**

All model years in the range 1971 to 2015

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00766891	PM10	0.00090631
NOx	0.02122678	PM2.5	0.00083282
ROG	0.00178608		
SOx	0.00004082		
PM10	0.00104715		
PM2.5	0.00087977		
CO2	4.20902225		
CH4	0.00008369		
N2O	0.00007877		
CO2 eqv	4.23519770		

Scenario Year: **2016**

All model years in the range 1972 to 2016

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00704604	PM10	0.00080419
NOx	0.01887374	PM2.5	0.00073898
ROG	0.00161035		
SOx	0.00003952		
PM10	0.00094448		
PM2.5	0.00078443		
CO2	4.21063031		
CH4	0.00007508		
N2O	0.00007067		
CO2 eqv	4.23411393		

3.11-o Onroad HHD 2011-2026

Scenario Year: **2017**

All model years in the range 1973 to 2017

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00650533	PM10	0.00070873
NOx	0.01690387	PM2.5	0.00065111
ROG	0.00145203		
SOx	0.00004033		
PM10	0.00084894		
PM2.5	0.00069721		
CO2	4.20820129		
CH4	0.00006722		
N2O	0.00006327		
CO2 eqv	4.22922648		

Scenario Year: **2018**

All model years in the range 1974 to 2018

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00604721	PM10	0.00062758
NOx	0.01526414	PM2.5	0.00057700
ROG	0.00131697		
SOx	0.00003934		
PM10	0.00076808		
PM2.5	0.00062383		
CO2	4.20756838		
CH4	0.00006182		
N2O	0.00005818		
CO2 eqv	4.22690378		

Scenario Year: **2019**

All model years in the range 1975 to 2019

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00565433	PM10	0.00056085
NOx	0.01389113	PM2.5	0.00051320
ROG	0.00120235		
SOx	0.00004032		
PM10	0.00070198		
PM2.5	0.00056085		
CO2	4.20637830		
CH4	0.00005499		
N2O	0.00005175		
CO2 eqv	4.22357577		

Scenario Year: **2020**

All model years in the range 1976 to 2020

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00532242	PM10	0.00050364
NOx	0.01274755	PM2.5	0.00046227
ROG	0.00110621		
SOx	0.00003957		
PM10	0.00064574		
PM2.5	0.00050904		
CO2	4.20541416		
CH4	0.00005216		
N2O	0.00004909		
CO2 eqv	4.22172889		

Scenario Year: **2021**

All model years in the range 1977 to 2021

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00503726	PM10	0.00045411
NOx	0.01179977	PM2.5	0.00041729
ROG	0.00103095		
SOx	0.00004033		
PM10	0.00059437		
PM2.5	0.00046287		
CO2	4.21495573		
CH4	0.00004734		
N2O	0.00004455		
CO2 eqv	4.22976181		

Scenario Year: **2022**

All model years in the range 1978 to 2022

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00478830	PM10	0.00041399
NOx	0.01098794	PM2.5	0.00037807
ROG	0.00096142		
SOx	0.00004106		
PM10	0.00055427		
PM2.5	0.00042597		
CO2	4.21520828		
CH4	0.00004448		
N2O	0.00004186		
CO2 eqv	4.22911963		

3.11-o Onroad HHD 2011-2026

Scenario Year: **2023**

All model years in the range 1979 to 2023

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00457902	PM10	0.00037922
NOx	0.01031407	PM2.5	0.00034915
ROG	0.00090210		
SOx	0.00004009		
PM10	0.00052122		
PM2.5	0.00039592		
CO2	4.21483461		
CH4	0.00004176		
N2O	0.00003931		
CO2 eqv	4.22789696		

Scenario Year: **2024**

All model years in the range 1980 to 2024

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00444444	PM10	0.00036682
NOx	0.00974372	PM2.5	0.00033735
ROG	0.00084009		
SOx	0.00003930		
PM10	0.00050766		
PM2.5	0.00038320		
CO2	4.19552935		
CH4	0.00003930		
N2O	0.00003699		
CO2 eqv	4.20782175		

Scenario Year: **2025**

All model years in the range 1981 to 2025

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00431086	PM10	0.00034397
NOx	0.00932573	PM2.5	0.00031664
ROG	0.00080206		
SOx	0.00004018		
PM10	0.00048541		
PM2.5	0.00036326		
CO2	4.19512979		
CH4	0.00003697		
N2O	0.00003479		
CO2 eqv	4.20669226		

Scenario Year: **2026**

All model years in the range 1982 to 2026

HHDT-DSL (pounds/mile)		HHDT-DSL, Exh (pounds/mile)	
CO	0.00420297	PM10	0.00032670
NOx	0.00898990	PM2.5	0.00029830
ROG	0.00077178		
SOx	0.00003946		
PM10	0.00046717		
PM2.5	0.00034564		
CO2	4.19349747		
CH4	0.00003630		
N2O	0.00003417		
CO2 eqv	4.20485099		

Notes:

SCAQMD 2008

HHDT-DSL composite includes tire & brake wear

N2O & CO2 eqv per Inventory of U.S. GHG Emissions & Sinks - Annex 3 (USEPA 2012)

Draft EIR
Upper Llagas Creek Project

APPENDIX

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UPPER LLAGAS CREEK BASELINE
NOISE MEASUREMENTS

Technical Memorandum

Date: February 20, 2012

To: Chelsea Ayala, Senior Project Scientist
Cardno ENTRIX

cc: Christie Robinson, Senior Consultant

From: Adam O'Connor, Senior Staff Scientist

RE: **Llagas Creek Noise Measurements**

Cardno ENTRIX

2300 Clayton Road
Suite 200
Concord, CA 94520
USA

Phone 925 935 9920
Toll-free 800 368 7511
Fax 925 935 5368
www.cardno.com

www.cardnoentrix.com

1.0 Introduction

This report summarizes background noise measurements recorded from November 15 to December 22, 2011 for the Upper Llagas Creek Project (Figure 1). The purpose of the baseline noise measurements is to identify the baseline noise levels which will be used to prepare a Noise Control Plan which will identify, control and mitigate short-term noise impacts during construction along the path of the creek. Baseline noise measurements will also be used to determine impacts from construction and operation of the project.

2.0 Methods

A total of seven baseline noise measurements were recorded at locations along Upper Llagas Creek in San Martin and Morgan Hill, California from November 15 to December 22, 2011. Five long-term measurements (24 hours) and two-short term measurements (1 hour) were made over the course of this study. Figures 2 through 7 depict the measurement locations. The following is a summary of the study locations:

1. 24-hour measurement near intersection of Amistad Lane and Church Avenue, San Martin, Reach 14, semi-rural residential area some distance from industry and airport.
2. 24 hour measurement near intersection of Spring Street and Llagas Avenue, San Martin, Reach 6b, densest semi-rural residential area in San Martin but still some distance from airport. Takeoffs and landings were recorded intermittently throughout noise measurement duration.
3. 24 hour measurement along Watsonville Road near La Jolla Drive, Morgan Hill, Reach 7a.

4. 24 hour measurement near intersection of Warren Avenue and Hale Avenue for baseline noise at North Tunnel Portal location.
5. 24 hour measurement along Del Monte Avenue between Dunne Avenue and 5th Street for baseline noise at South Tunnel Portal location.
6. 1-hour measurement near Rucker Avenue and Borges Court for Reach 4 near south end of project and outside San Martin.
7. 1-hour measurement near Monterey Road and Spring Avenue for residential development in Morgan Hill, Reach 7b.

Noise levels were gathered using a Quest Technologies Sound Pro SE/DL Sound Level Meter and analyzed using QuestSuite Professional II software. The Sound Level Meters were calibrated before and after each event, with no change in levels noted. The microphones were placed approximately 2 meters from the ground surface and at least 1 meter from any surface that may reflect sound. The monitoring equipment was set to record the following measurements over 5 second intervals for the duration of each study:

Parameter	Description
L_{eq}	True equivalent sound level measured over the run time. Functionally the same as the average.
L_{min}	Minimum (lowest) sound pressure level (SPL) recorded over the run time.
L_{max}	Maximum (highest) sound pressure level SPL recorded over the run time.
L_{pk}	Peak SPL (highest) instantaneous sound level detected by the microphone during a study. L_{pk} is affected by frequency response settings but not the time response.
TWA	Time weighted average. The constant SPL over and 8-hour interval that would produce the same exposure to sound as an exposure measured over a run time sampling interval.

All measurements were taken over typical weekday periods on a Tuesday, Wednesday or Thursday. Full descriptions of the equipment setup and weather conditions can be found in Appendix A (Field Notes).

General weather conditions such as wind, air temperature and humidity were recorded using a Kestrel 3000 Pocket Weather Meter during equipment setup and removal. Weather at the sites was generally sunny and clear. All measurements were made during periods when no rain or fog was present to interfere with measurements. On a few occasions intermittent winds were gusting throughout the monitoring period.

3.0 Results and Discussion

The results of the Baseline Noise Study are summarized in Table 1. All the recorded data and field notes are provided in Appendix A. The 24-hour long term measurements show a diurnal pattern in the noise levels, with lowest decibel levels late in the evening between approximately 10pm and 2am. Automobile traffic was the dominant noise source observed at all locations. Other sources of detectable noises included: landscaping (lawn mowers, hedge trimmers and leaf cutters), pedestrian traffic and vegetation blowing during gusts of wind.

The L_{min} values were similar at all seven study locations with a minimum of 31.8 decibels (dB) and a max of 47.2 dB. The two highest minimum noise levels were recorded during the 1-hour studies at Sites 6 and 7. The L_{min} values recorded at Sites 1 through 5 ranged from 31.8 dB to 40.8 dB.

Measurements collected at Sites 1, 2 and 3 had the highest L_{max} , L_{pk} and time weighted average (TWA) values measured during this study. These values correspond to high volumes of observed automobile traffic along Church Avenue at Site 1, Llagas Avenue at Site 2 and Watsonville Road at Site 3.

Measurements at Site 2 had the additional observed noise source associated with the airport, located approximately 0.25 miles to the east, and the 101 freeway, located approximately 0.5 miles to the east.

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Tables

Table 1
Summary of Baseline Noise Study
Upper Llagas Creek
Morgan Hill and San Martin, California

Station ID	Duration of Study	Start of Study	Leq	Lmin	Lmax	Lpk	TWA
Site 1	24-hours	11/22/2011 11:30	63.6	40.8	98.3	112.8	68.4
Site 2	24-hours	11/30/2011 10:52	55.4	33.5	95.3	104.8	60.1
Site 3	24-hours	12/21/2011 11:47	63.3	31.8	94.3	107.1	68.1
Site 4	24-hours	11/15/2011 11:28	49.5	35.2	82.3	96.3	54.3
Site 5	24-hours	12/20/2011 11:16	53.5	35.3	84.8	96	58.3
Site 6	1-hour	11/17/2011 10:43	60.1	42.9	80.1	99.5	51
Site 7	1-hour	11/15/2011 12:30	62.1	47.2	85.7	100.9	53.1

Notes:

All measurements in decibels (dB)

Figures



REGIONAL LOCATION MAP
UPPER LLAGAS CREEK BASELINE NOISE STUDY
MORGAN HILL, CALIFORNIA

Drawn By: APOC	PROJECT No. 30523020	FIGURE. No. 1	DATE 1/12
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LEGEND

- Noise Monitoring Location



UPPER LLAGAS CREEK
BASELINE NOISE STUDY
MORGAN HILL and SAN MARTIN, CALIFORNIA

FIGURE 2
STUDY LOCATION 1
UPPER LLAGAS CREEK
SAN MARTIN, CA



LEGEND

- Noise Monitoring Location



UPPER LLAGAS CREEK
BASELINE NOISE STUDY
MORGAN HILL and SAN MARTIN, CALIFORNIA

FIGURE 3
STUDY LOCATION 2
UPPER LLAGAS CREEK
SAN MARTIN, CA



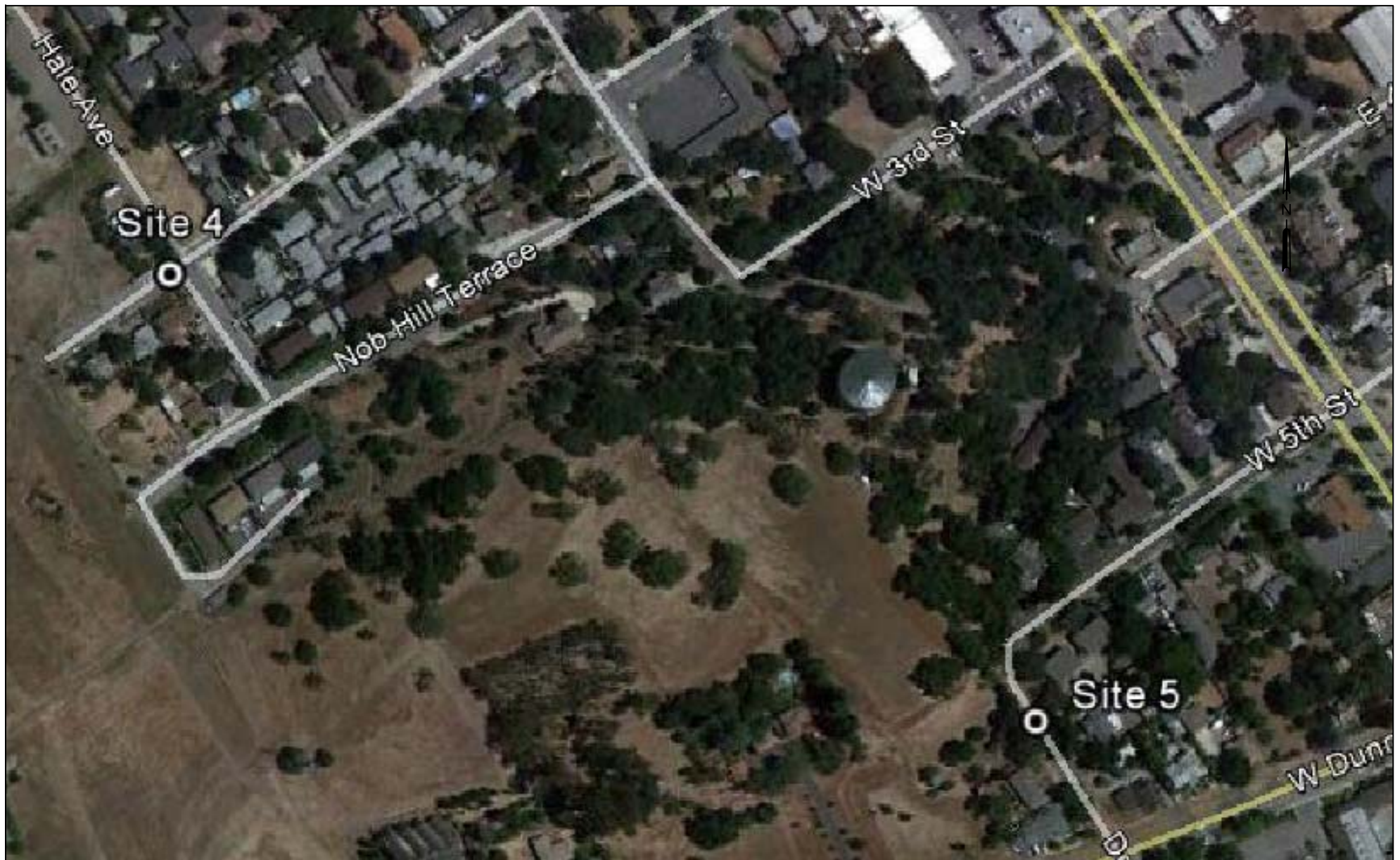
LEGEND

- Noise Monitoring Location



UPPER LLAGAS CREEK
BASELINE NOISE STUDY
MORGAN HILL and SAN MARTIN, CALIFORNIA

FIGURE 4
STUDY LOCATION 3
UPPER LLAGAS CREEK
MORGAN HILL, CA



LEGEND

- Noise Monitoring Location



UPPER LLAGAS CREEK
BASELINE NOISE STUDY
MORGAN HILL and SAN MARTIN,
CALIFORNIA

FIGURE 5
STUDY LOCATIONS
4 and 5
UPPER LLAGAS CREEK
MORGAN HILL, CA



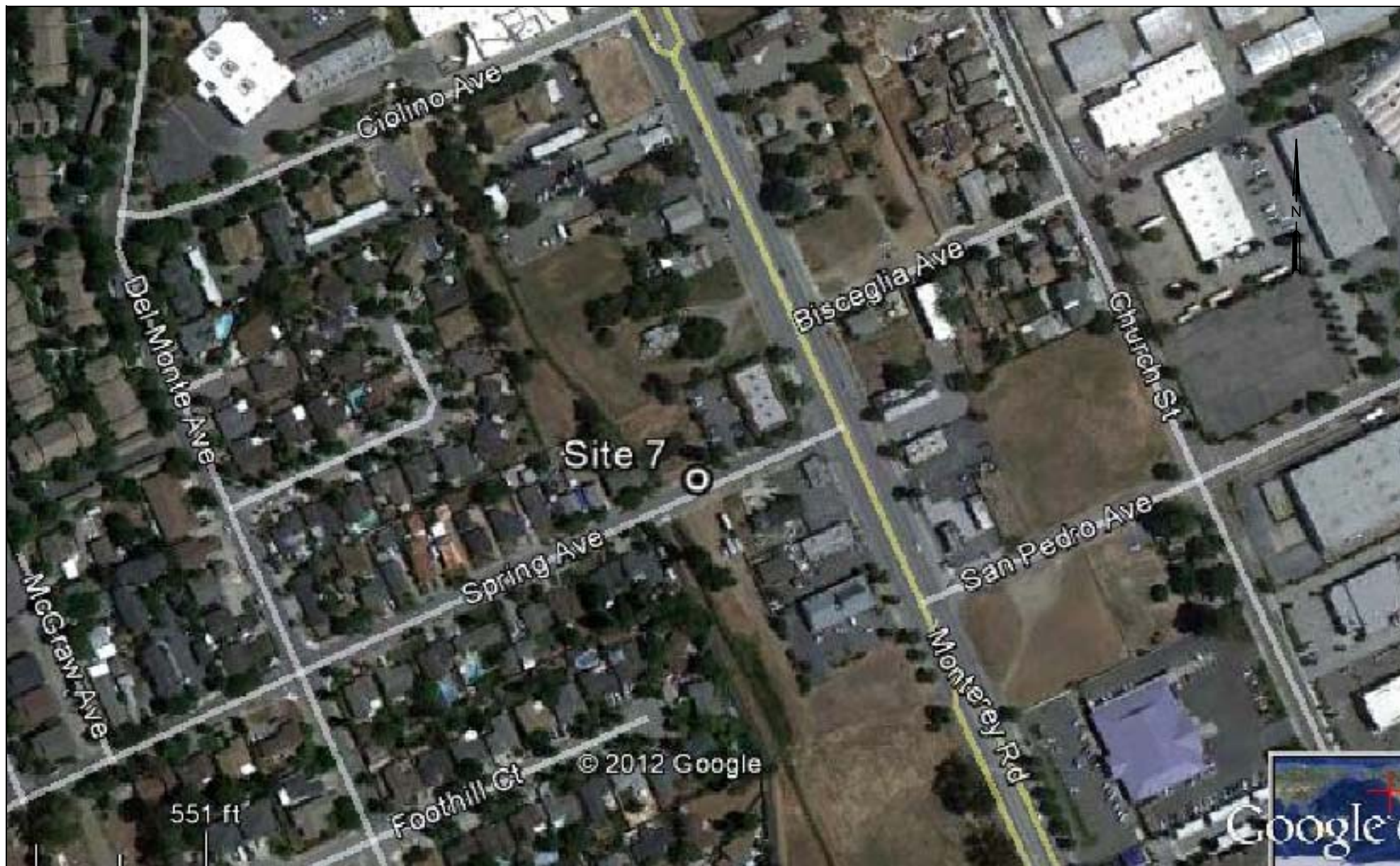
LEGEND

- Noise Monitoring Location



UPPER LLAGAS CREEK
BASELINE NOISE STUDY
MORGAN HILL and SAN MARTIN,
CALIFORNIA

FIGURE 6
STUDY LOCATION 6
UPPER LLAGAS CREEK
SAN MARTIN, CA



LEGEND

- Noise Monitoring Location



UPPER LLAGAS CREEK
BASELINE NOISE STUDY
MORGAN HILL and SAN MARTIN,
CALIFORNIA

FIGURE 7
STUDY LOCATION 7
UPPER LLAGAS CREEK
SAN MARTIN, CA

