Appendix A

NCCP/HCP Conditions for Coverage and Minimization Measures

This document presents conditions from the Water Authority's Subregional Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) that are applicable to implementation of the First Aqueduct Treated Water Tunnels Rehabilitation Project (project). Applicable NCCP/HCP General Conditions, Minimization Measures, Adjacency Guidelines, and Lake Stream and River Work Conditions are presented in Sections A-1 through A-4, while the relevant PMPP conditions are presented in Section V.

A-1: General Conditions for Coverage

The following general measures apply to all Covered Species, as listed in Section 2.1 of Appendix B of the NCCP/HCP, and will be implemented on the project:

1. Conduct pre-activity surveys within suitable habitat to ensure that Covered Species are adequately addressed by impact avoidance, minimization, and mitigation. Surveys must be conducted by an Environmental Surveyor during the appropriate field conditions for detection prior to any proposed impacts in the Plan Area.
2. Avoid and minimize impacts to occupied Covered Species habitat or potential migration and/or dispersal corridors for all new facilities and O&M Activities of existing facilities through project design considerations.
3. Establish a habitat buffer when appropriate and feasible around covered plant species populations to support the natural suite of pollinators unless a biologically appropriate mitigation approach is agreed to with the Wildlife Agencies at the time of project-specific environmental review.
4. Fence and/or flag Covered Species populations and sensitive habitat in or adjacent to work areas. Where necessary, install signage to prohibit access and/or flag areas being restored or protected for their biological value.
5. Avoid driving or parking on sensitive and/or occupied habitat by keeping vehicles on roads and in designated staging areas.
6. Deter unauthorized activities (such as trampling and off-road vehicle use) and perform litter abatement, including proper disposal of illegally dumped materials, as part of routine patrol of access roads.
7. Monitor encroachment of non-native and invasive species into Covered Species populations and perform weed abatement as needed to improve the habitat.
8. Stabilize work areas to control erosion or sedimentation problems when working near Covered Species populations within the Plan Area. Populations within or adjacent to work areas would be protected from vehicular traffic, excessive foot traffic, or other activities that result in soil surface disturbance.
9. Control dust when working near Covered Species populations and/or habitat in accordance with applicable regulations.
10. All identified populations of Covered Species within rights-of-ways must be managed to control edge effects to the maximum extent possible.
11. Any restoration and monitoring program prepared as a component of the mitigation plan for impacts to a Covered Species shall include, but not be limited to, species propagation ratios, restoration site selection and assessment, site preparation, implementation strategies, weed control procedures, required management and monitoring in perpetuity, funding commitment, and reporting procedures. The program would be prepared in advance of project impacts and approved by the Wildlife Agencies.

12. Any planting stock used shall be inspected by an Environmental Surveyor to ensure that it is free of pest species that may invade natural areas, including, but not limited to, Argentine ants (*Iridomyrmex humii*), fire ants (*Solenopsis invicta*), and other pests. Any planting stock that is infested would not be allowed within restoration areas or within 300 feet of native areas unless documentation is provided to the Wildlife Agencies that these pests already occur in the native areas around the project site. The stock would be quarantined, treated, or disposed of according to best management principles by qualified experts in a manner that precludes invasions into native habitat. Runoff from mitigation sites into native habitat would be minimized and managed.
13. To the maximum extent possible, conduct Covered Activities occurring within wetland habitats during the dry season when flows are at their lowest or nonexistent to minimize impacts to aquatic species and/or habitats.
14. Reseed temporary impact areas with an appropriate native seed mix and allow for natural recolonization of the area by adjacent populations.
15. For new facilities adjacent to native habitat, minimize ornamental landscaping or irrigation not associated with native habitat restoration.
16. Collection of covered plant and wildlife species by Water Authority personnel and contractors is prohibited.
17. Maintain and manage dispersal/movement corridors within the Plan Area that contribute to long-term population viability.
18. The use of outdoor lighting within or adjacent to potential Covered Species habitat will be discouraged. If lighting must be used for reasons of safety and security, light sources would be shielded away from habitat and only low-pressure sodium lighting would be used.

A-2: NCCP/HCP Minimization Measures

The following minimization measures listed in Section 6.4 of the NCCP/HCP will be incorporated as design features on the project:

Environmental Surveyor (Section 6.4.1.1)

1. The Water Authority will identify an Environmental Surveyor for the project to oversee pre-project evaluations/needs of Covered Activities and work with the project engineer and contractors to ensure implementation compliance of Covered Activities with Plan commitments.
2. If the Environmental Surveyor discovers that the Water Authority is out of compliance with the permits associated with this Plan, he/she will report the noncompliance to the Water Authority within one working day and to the Wildlife Agencies within five working days so that the Water Authority and Wildlife Agencies can determine how to put the Plan back into compliance.
3. Before any clearing and/or construction activities are performed in habitat areas that may support Covered Species, the Environmental Surveyor will review the site, identify any sensitive plant and animal species, and identify requirements pursuant to the Plan for impact avoidance and minimization. A standard PSF will be prepared for each project and submitted to the Water Authority for review and tracking purposes.
4. The Environmental Surveyor will determine the extent of potential Covered Species habitat and will flag the sensitive resources to be avoided. If a Covered Species is present, the Environmental Surveyor will

refer to Appendix B of the NCCP/HCP for species-specific conservation measures. In the case of unavoidable impacts to a Covered Species, the Environmental Surveyor will determine the extent of impact, the appropriate mitigation measures, and recommend to the project engineer additional measures to minimize impacts in accordance with Appendix B of the NCCP/HCP.

5. The Environmental Surveyor will work with the project engineer to identify and mark areas appropriate for staging and temporary equipment storage, placement of heavy machinery, as well as vehicle turn around and access, that will result in the least amount of impact to sensitive vegetation and/or Covered Species. The Environmental Surveyor will verify that all areas specified on the plans to be avoided are marked with flagging in the field prior to construction start.
6. The Environmental Surveyor will attend pre-construction meetings for projects in sensitive areas. The Environmental Surveyor will provide brief presentations to field staff, as needed, to familiarize field personnel with the natural resources to be protected and avoid on project sites and outline environmental expectations. The Environmental Surveyor will also be available to answer questions and address any last-minute construction changes.
7. The Environmental Surveyor will be present during clearing, topsoil salvage, and construction activities located within sensitive habitat. The frequency and duration of required monitoring will be specified in the PSF that is completed by the Environmental Surveyor and submitted to the Water Authority on a project-by-project basis prior to the start of construction.
8. The Environmental Surveyor will advise the construction manager during construction to ensure compliance with all avoidance, minimization, and mitigation measures.
9. The Environmental Surveyor will conduct (and document) monitoring as required by the PSF. At the completion of the Covered Activity, the Environmental Surveyor will prepare a brief report to verify compliance with the avoidance and minimization recommendations in the PSF. This report will include documentation that the flagged areas were avoided and that minimization measures were properly implemented. The Environmental Surveyor will be responsible for the identification and monitoring of any Covered Species that are found on the project site prior to and during construction activities. Monitoring activities will be in accordance with the species-specific measures (see Appendix B of the NCCP/HCP).
10. If any previously unidentified Covered Species or otherwise sensitive species, nests, dens, or burrows are located on a project site during construction activities, the Environmental Surveyor will provide guidance, through the construction manager, as to how best to minimize or avoid impacting the resource(s).
11. The Environmental Surveyor will be on-call (via phone) to respond within 24 hours for potential emergency deployment to assess and monitor potentially critical biological issues.
12. If the Environmental Surveyor determines that the Covered Activity is out of compliance with the requirements of the Plan, the Environmental Surveyor will report it to the Water Authority. The Water Authority will be responsible for bringing the project back into compliance and determine the appropriate remedial action, if necessary, through coordination with the Wildlife Agencies.
13. The Environmental Surveyor or construction manager will be responsible for ensuring the removal of all habitat flagging from the construction site at completion of work.
14. If included in the PSF, the Environmental Surveyor will direct the relocation of Covered Species that can be moved from harm's way in coordination with the species-specific Conditions of Coverage in Appendix B of the NCCP/HCP (in non-emergency situations) with notification to the Wildlife Agencies.

Pre-Activity Survey Form (Section 6.4.1.2)

1. The PSF will include avoidance, minimization, and mitigation requirements based on the general measures outlined in this section and the species-specific conditions in Appendix B of the NCCP/HCP. USFWS biological survey protocols performed by qualified and appropriately authorized personnel will be conducted where appropriate and required.
2. The pre-activity survey will be valid for 30 days unless the project is scheduled to begin during the avian breeding season, in which case the nesting bird clearance must be conducted within five days of project implementation. If ground disturbance activities have not commenced within 30 days after the survey is completed, the Environmental Surveyor will conduct a verification survey to confirm that biological conditions have not significantly changed that would alter the specified avoidance, minimization and mitigation commitments prior to construction.

Field Personnel Education Training (Section 6.4.1.3)

1. Field personnel working within sensitive habitat areas, including both Water Authority employees and contractors, will participate in an education training program at the start of each project. The program will be conducted on-site by an Environmental Surveyor under the direction of the Water Authority. The training will include: an overview of Covered Species identification and the legal protections afforded to each species; a brief discussion of their biology; habitat requirements; status under ESA and CESA; conservation measures being taken by the project for the protection of the Covered Species and their habitats under this Plan; and penalties for non-compliance. The training program will also educate field personnel in the identification of invasive species that may be removed, as well as desirable seeded and planted species, to ensure that native species are not affected by invasive species control. A fact sheet conveying this information will also be available to all personnel working in the project area. The Water Authority, either directly or through the services of the Environmental Surveyor, will be responsible for the education and training for new field personnel coming on-site after the start of a project.

Field Personnel (and Contractor) Responsibilities (Section 6.4.1.4)

1. Contractors or other project personnel will not collect plants or wildlife, unless specifically authorized and directed by the Environmental Surveyor. Only qualified and appropriately authorized personnel will handle or collect plants or wildlife as required by species-specific measures.
2. Field personnel will not intentionally harm or harass wildlife or damage nests, burrows, rock outcrops, or other habitat components.
3. Drivers on unpaved roads in native habitats will not exceed a speed of 20 miles per hour in order to avoid injury to animals and minimize dust generation.
4. Impacts to adjacent native vegetation that would be significantly affected by excessive fugitive dust will be avoided and minimized through watering of access roads (except in areas with vernal pools) or other appropriate measures, such as reducing the number or speed of vehicles or adding inert materials that reduce dust. Projects with the potential for excessive dust generation include those that involve more than occasional use of roads in dust-prone soils (i.e., more than three to five vehicle roundtrips per day) or require multiple vehicles to transport heavy equipment and supplies.
5. Vehicles will not park in areas where catalytic converters may ignite vegetation. Construction vehicles will be equipped with shovels and fire extinguishers in order to reduce the risk of wildfires.

6. Littering will be strictly prohibited. All trash will be deposited in secured, closed containers or hauled out daily by field personnel.
7. No pets will be allowed on any construction site.
8. No firearms or other weapons will be allowed on any construction site except as carried by governmental law enforcement, or as authorized in writing by Water Authority staff.
9. Field personnel will be prohibited from pushing or dumping soil and brush into sensitive habitats.
10. All vehicles, tools, and machinery will be restricted to access roads, approved staging areas, or within designated construction zones.
11. If any field personnel identify a previously unnoticed Covered Species on a construction site, work activities will cease in order to immediately notify the Water Authority's construction manager, project engineer, and the Environmental Surveyor. In conjunction with Water Authority environmental staff, the Environmental Surveyor will determine what actions would be taken to avoid or minimize impacts to the species according to the species-specific conditions outlined in Appendix B of the NCCP/HCP.
12. Field personnel will notify the project engineer/environmental staff of any sick, injured, or dead wildlife found on site.
13. Parking or driving underneath oak trees, except in established traffic areas, will not be allowed in order to protect root structures.

Design and Construction Controls (Section 6.4.2.5)

1. Projects will be designed to avoid and minimize impacts to biological resources, to the extent feasible.
2. Construction and operation activities will be designed and implemented to avoid and minimize new disturbance, erosion on manufactured and other slopes, and off-site degradation from sedimentation.
3. Storage and staging areas will be located in disturbed areas or within the least biologically sensitive areas established by the Environmental Surveyor. No filling, excavating, trenching, or stockpiling of materials will be permitted outside of the approved construction footprint, unless the area to be used is already disturbed and does not support habitat for Covered Species.
4. Construction footprints will be delineated in the construction documents. In addition, if the construction footprint is located within or near sensitive habitat, the project footprint will be fenced or continuously flagged with streamers or a boundary rope barrier to ensure that habitat is not removed beyond the limits of work. These barriers will be established prior to any grading, grubbing, or clearing, and will be monitored by the Environmental Surveyor.
5. Projects will be refined, where possible, during the engineering and construction phases to further avoid and minimize impacts to Covered Species or their habitat through seasonal timing of work, minor realignments, and narrowing of construction limits.
6. Clearing and grubbing will be performed within the construction areas only as necessary for safe vehicle movement and construction activities.

Stormwater Best Management Practices (Section 6.4.2.6)

1. Prior to the start of ground disturbing activities, the Water Authority or their consultants will prepare a Storm Water Pollution Prevention Plan (SWPPP) to reduce or eliminate pollutants during and after construction. The most current and applicable Best Management Practices (BMPs) will be implemented

at all construction sites in or adjacent to native habitat in accordance with the project specifications. In addition to the approved manual, BMPs listed in the most recent National Pollutant Discharge Elimination System (NPDES) General Permit and the BMP Fact Sheet located in State Water Resources Control Board (SWRCB) General Permit for Small Linear Underground/Overhead Projects will apply. The fact sheet is attached as an Appendix G and the SWRCB or RWQCB will be contacted for the latest requirements.

Cleanup (Section 6.4.2.8)

1. Refuse and trash will be regularly removed from activity sites and disposed of in a lawful manner. Timing of refuse and trash removal will be determined by the Environmental Surveyor and comply with the project specifications that require debris to be removed as work is completed. Petroleum products, including gasoline, diesel, and hydraulic fluid, will be used during construction in accordance with all federal, state, and local laws, regulations, and permitting requirements. In the event that hazardous materials are encountered or generated during construction, contractors certified by the responsible regulatory agency will conduct all recovery operations and dispose of hazardous waste in accordance with existing regulations and required permits. As required, petroleum products, trash, and other materials will be taken to a disposal facility authorized to accept such materials.

A-3: Wildlife Species Conditions for Coverage

The following conditions for coverage for wildlife species, as listed in Sections 5, 6, 7, and 8 of NCCP/HCP Appendix B, will be incorporated into the project:

Belding's Orange-throated Whiptail (Section 6.3.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Avoid or minimize impacts to Belding's orange-throated whiptail habitat at all study areas through project design and placement.
3. Minimize and manage effects from introduced ant species that may exclude the termite prey base during restoration efforts. All nursery stock plants will be checked for nonnative ants before installation at restoration sites. Non-native ants that penetrate native habitats appear to be partially supported by artificial irrigation associated with landscaping (Suarez et al. 1998). Therefore, runoff from mitigation sites in native habitat would be minimized and managed.

Coastal (Western)/San Diegan tiger Whiptail (Section 6.4.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Avoid or minimize impacts to coastal whiptail habitat at study areas 1, 3, 4, 5, 6, and 7 through project design and placement.

Northern Red Diamond Rattlesnake (Section 6.9.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. If a northern red diamond rattlesnake is observed in the construction area, the snake should be moved by an Environmental Surveyor to the closest safe, suitable habitat in the area. Exclusionary fences may be used to keep snakes out of construction areas. These fences would be placed and monitored daily.
3. Avoid or minimize impacts to red diamond rattlesnake habitat at study areas 1, 3, 4, 5, 6, and 7 through project design and placement.

Southern California Rufous-crowned Sparrow (Section 7.11.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Minimize impacts through timing of work in suitable habitat at study areas 1, 3, 4, 5, 6, and 7 to avoid the nesting season for upland avian species (February 15 to August 15) whenever possible, or ensure that habitat is removed prior to the initiation of the upland avian breeding season. If construction activities must commence during the upland avian breeding season, minimize impacts through conducting nest surveys within 300 feet of all proposed activities (see Section 2.3 of the NCCP/HCP). If active nests are encountered, no Covered Activities shall be implemented within a minimum distance of 100 feet of the nest. A greater setback (up to 300 feet) may be required, as determined by the Environmental Surveyor, based on the site specific considerations, phase of the nesting cycle, and species or other biological considerations (see Section 2.4 of the NCCP/HCP). Direct take of individuals and destruction of nests within an active territory is not allowed.

Coastal California Gnatcatcher (Section 7.7.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Conduct USFWS protocol surveys for the California gnatcatcher at study areas 1, 5, 6 and 7 under favorable conditions in areas of potential foraging or breeding habitat for all new facilities and O&M Activities, or assume occupancy of potential habitat, to ensure that this species is adequately addressed by impact avoidance, minimization, and mitigation. A permitted Environmental Surveyor would conduct surveys.
3. Minimize impacts through timing of work in suitable California gnatcatcher habitat to avoid the nesting season for upland avian species (February 15 to August 15) whenever possible, or ensure that habitat is removed prior to the initiation of the breeding season. If construction activities must commence during the upland avian breeding season, minimize impacts through conducting nest surveys within 300 feet of all proposed activities (see Section 2.3 of the NCCP/HCP for the Avian Breeding Season Policy). If active nests are encountered, no Covered Activities shall be implemented within a minimum distance of 100 feet of the nest. A greater setback (up to 300 feet) may be required, as determined by the Environmental Surveyor, based on the site specific considerations, phase of the nesting cycle, and species or other biological considerations (see Section 2.4 of the NCCP/HCP).
4. Direct take of individuals and destruction of nests within an active territory are not allowed.
5. For temporary impacts to occupied California gnatcatcher habitat, the work site would be returned to preexisting contours, where feasible, and revegetation with appropriate locally native species. All revegetation plans would require written concurrence of the Wildlife Agencies. Also, see Section 6.4, Plan Minimization Measures, of the NCCP/HCP.

Yellow Warbler (Section 7.8.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Minimize impacts through timing of work in riparian habitat at study areas 3, 4, and 6 to avoid the nesting season for riparian avian species (March 15 to September 15) whenever possible, or ensure that habitat is removed prior to the initiation of the breeding season. If construction activities must commence during the riparian avian breeding season, minimize impact through conducting nest surveys within 300 feet of all proposed activities (see Section 2.3 of the NCCP/HCP). If active nests are encountered, no Covered Activities shall be implemented within a minimum distance of 100 feet of the nest. A greater setback (up to 300 feet) may be required, as determined by the Environmental Surveyor, based on the site specific considerations, phase of the nesting cycle, and species or other biological considerations (see Section 2.4 of the NCCP/HCP). Direct take of individuals and destruction of nests within an active territory is not allowed.
3. [not applicable, related to preserve management]

Dulzura Pocket Mouse (Section 8.4.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Implement a small-mammal live trapping and identification program in suitable habitat located within impact areas of study areas 1, 3, 4, 5, 6 and 7 to determine the presence or absence of Dulzura pocket mouse.
3. If the species is observed and burrows will be affected by project-related disturbance, apre-construction live trapping and relocation program will be implemented by the Environmental Surveyor at the impact areas in which this species was observed. Individuals will be relocated into adjacent suitable habitat areas or preserves, and/or the Environmental Surveyor will provide measures to ensure exclusion during construction activities. Relocation would be determined and conducted by an Environmental Surveyor in consultation with the Wildlife Agencies.
4. [not applicable, related to preserve management]

Northwestern San Diego Pocket Mouse (Section 8.5.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Implement a small-mammal live trapping and identification program in suitable habitat located within impact areas of study areas 1, 3, 4, 5, 6 and 7 to determine the presence or absence of northwestern San Diego pocket mouse.
3. If the species is observed and burrows will be affected by project-related disturbance, a pre-construction live trapping and relocation program will be implemented by the Environmental Surveyor at the impact areas in which this species was observed. Individuals will be relocated into adjacent suitable habitat areas or preserves, and/or the Environmental Surveyor will provide measures to ensure exclusion during construction activities. Relocation would be determined and conducted by an Environmental Surveyor in consultation with the Wildlife Agencies.

Mountain Lion (Section 8.8.3)

1. Implement general Conditions for Coverage (see Section G-1).

San Diego Desert Woodrat (Section 8.7.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Implement a small-mammal live trapping and identification program in suitable habitat located within impact areas of study areas 1, 3, 4, 5, 6 and 7 to determine the presence or absence of San Diego desert woodrat.
3. If the species is observed and nests would be affected by project-related disturbance, a pre-construction live trapping and relocation program will be implemented by the Environmental Surveyor at the impact areas in which this species was observed. Individuals will be relocated into adjacent suitable habitat areas or preserves, and/or the Environmental Surveyor will provide measures to ensure exclusion during construction activities. Relocation would be determined and conducted by an Environmental Surveyor in consultation with the Wildlife Agencies.
4. Avoid to the maximum extent possible impacts to San Diego desert woodrat sticknests.
5. For temporary impacts to occupied desert woodrat habitat, incorporate suitable habitat elements, such as rock and brush piles, into the habitat restoration plan.

A-4: Lake Stream and River Work Conditions

The following conditions to avoid or minimize substantial adverse effects on jurisdictional waters features, as listed in Appendix I of the NCCP/HCP, will be incorporated into project activities subject to permitting with the California Department of Fish and Wildlife:

1. CDFG employees are authorized to conduct on-site inspections relevant to San Diego County Water Authority NCCP/HCP Section 6.6.1.1, upon reasonable notice.
2. Silty/turbid water shall not be discharged into the stream. Such water shall be settled, filtered, or otherwise treated prior to discharge. The Crew's/Contractor's ability to minimize turbidity/siltation shall be the subject of pre-construction planning and design feature implementation.
3. Preparation shall be made so that runoff from steep, erodible surfaces will be diverted into stable areas with little erosion potential. Frequent water checks shall be placed on dirt roads, cat tracks, or other work trails to control erosion.
4. Water containing mud, silt, or other pollutants from equipment washing or other activities shall not be allowed to enter a lake or flowing stream or placed in locations that may be subjected to high storm flows.
5. If off-stream siltation pond(s) is/are used to control sediment, pond(s) shall be constructed in a location, or shall be designed, such that potential spills into the stream/lake during periods of high water levels/flow are precluded.
6. If silt catchment basin(s) is/are used, the basin(s) shall be constructed across the stream immediately downstream of the project site. Catchment basins shall be constructed of materials that are free from mud and silt. Upon completion of the project, all basin materials along with the trapped sediments shall be removed from the stream in such a manner that said removal shall not introduced sediment to the stream.
7. Silt settling basins shall be located away from the stream or lake to prevent discolored, silt-bearing water from reaching the stream or lake during any flow regime.

8. Notwithstanding the use of silt catchment basins, upon Department determination that turbidity/siltation levels resulting from project related activities constitute a significant threat to aquatic life, activities associated with the turbidity/siltation, shall be halted until effective Department approved control devices are installed or abatement procedures are initiated.
9. Precautions to minimize turbidity/siltation shall be taken into account during project planning and shall be installed prior to construction. This may require that the work site be isolated and that water be diverted around the work area by means of a barrier, temporary culvert, new channel, or other means approved by CDFG. Precautions may also include placement of silt fencing, straw bales, sand bags, and/or the construction of silt catchment basins so that silt or other deleterious materials are not allowed to pass to downstream reaches. The method used to prevent siltation shall be monitored and cleaned/repaired weekly, or more frequently if warranted by local conditions. CDFG shall provide any determinations or approvals in writing within 14 days of receiving from the Water Authority or its agents a written request which includes a plan sheet or diagram indicating how the work site will be isolated.
10. No equipment shall be operated in ponded or flowing areas except as otherwise addressed in Water Authority project's Notification of Lake or Streambed Alteration application, contract specifications, and any applicable regulatory permits.
11. Rock, gravel, and/or other materials shall not be imported to, taken from, or moved within the bed or banks of the stream except as otherwise specifically identified in the project's Notification of Lake or Streambed Alteration application.
12. Temporary fills shall be constructed of nonerodible materials and shall be removed immediately upon work completion.
13. If operations require moving equipment across a flowing stream, such operations shall be conducted without substantially increasing stream turbidity. Where repeated crossings could result in a substantial increase in stream turbidly, the Water Authority shall install a permanent or temporary bridge, culvert, or rock-fill crossing as approved by the Water Authority Project Engineer.
14. If a stream channel and/or gradient have been temporarily altered during construction, it shall be returned as nearly as possible to pre-project conditions without creating a possible future bank erosion problem. If a lake margin has been altered, it shall be returned as nearly as possible to pre-project conditions without creating a future bank erosion problem.
15. Structures and associated materials not designed to withstand high seasonal flows shall be removed to areas above the high water mark before such flows occur.
16. Spoil sites shall not be located within a stream/lake, or where spoil shall be washed back into a stream/lake, or where it will cover aquatic or riparian vegetation, unless the site is specifically identified in the project's Notification of Lake or Streambed Alteration application.
17. Staging/storage areas for equipment and materials shall be located outside of the stream, unless the area is specifically identified in the project's Notification of Lake or Streambed Alteration application.
18. Access to the work site shall be via existing roads and access ramps when legally available to the Water Authority and its contractors for such use.
19. No equipment maintenance shall be done within or near any stream channel where petroleum products or other pollutants from the equipment may enter these areas under any flow.
20. No debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete or washings thereof, oil or petroleum products or other organic or earthen material from any construction, or associated activity of whatever nature shall be allowed to enter into or placed where it may be washed by rainfall or runoff into

waters of the State. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any stream or lake.

21. The Water Authority and its contractors, subcontractors, and employees shall comply with all litter and pollution laws. It is the responsibility of the Water Authority to ensure compliance.
22. Any equipment or vehicles driven and/or operated within or adjacent to the stream/lake shall be checked and maintained daily to prevent leaks of materials that if introduced to water could be deleterious to aquatic life.
23. Stationary equipment such as motors, pumps, generators, and welders located within or adjacent to the stream/lake shall be positioned over drip pans or confined within berms capable of containing any spills.
24. The clean-up of all spills shall begin immediately. CDFG shall be notified immediately by the Water Authority of any spills that affect aquatic habitat, and shall be consulted regarding clean-up procedures.
25. Any materials placed in seasonally dry portions of a stream or lake that could be washed downstream or could be deleterious to aquatic life shall be removed from the project site prior to inundation by high flows.
26. Installation of bridges, culverts, or other structures shall be such that water flow is not impaired. Bottoms of temporary culverts shall be placed at or below stream channel grade, and bottoms of permanent culverts shall be placed below stream channel grade. Excavation of the streambed and banks shall be limited to the extent necessary, as determined by the Water Authority Project Engineer, to install bottoms of culverts below stream grade. Temporary culverts placed on existing streambed grade shall be done so with minimal disturbance.
27. The inlet and outlet of all permanent culverts shall be protected by the placement of head walls that shall be constructed of rock riprap, gabions, concrete, or other suitable nonerodible material as determined by the Water Authority project engineer. To prevent undercutting, the head walls shall be keyed in place. To prevent erosion, energy dissipaters will be installed.
28. Culverts shall be long enough to extend completely beyond the toe of the fill (unless both the up and downstream sides of the fill are adequately protected to the maximum high-water mark).
29. All in-stream structures shall be designed so that no sudden change in stream velocity shall occur above, below, or in the structure. If a sudden change in stream velocities occurs upon installation of the structure, the structure shall be removed immediately.
30. If any wildlife is encountered in the stream or lake zone during the course of construction, said wildlife shall be allowed to leave the construction area unharmed.
31. All diversion channels shall be designed to maintain velocities at levels acceptable to all native and recreational fish species determined to be in the project impact area and adjacent upstream and downstream reaches.

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Appendix B

Air Quality and Greenhouse Gas Emissions Modeling

CalEEMod Version: CalEEMod.2020.4.0

Date: 8/18/2021 8:38 AM

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

FIRST AQUEDUCT TUNNELS REHABILITATION PROJECT

San Diego County APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	12.55	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2024
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	539.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Construction Start date beginning Oct 2022.

Land Use - Total acreage of project area: 12.55 acres

Construction Phase - Construction would begin Oct 2022.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

CalEEMod Version: CalEEMod.2020.4.0

Date: 8/18/2021 8:38 AM

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Trips and VMT - Updated trips per applicant.

Construction Off-road Equipment Mitigation - Water twice daily.

Off-road Equipment - Updated equipment per applicant.

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	0	273339
tblAreaCoating	Area_Nonresidential_Interior	0	820017
tblConstructionPhase	NumDays	20.00	40.00
tblConstructionPhase	NumDays	20.00	10.00
tblConstructionPhase	NumDays	300.00	50.00
tblConstructionPhase	NumDays	300.00	20.00
tblConstructionPhase	NumDays	300.00	3.00
tblConstructionPhase	NumDays	20.00	5.00
tblConstructionPhase	NumDays	30.00	5.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	10.00	2.00
tblConstructionPhase	NumDays	10.00	3.00
tblLandUse	LotAcreage	0.00	12.55
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks

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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	20.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00

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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	PhaseName		Tunnel slip lining
tblOffRoadEquipment	PhaseName		Bifurcation structure replacement
tblOffRoadEquipment	PhaseName		Tunnel slip lining
tblOffRoadEquipment	PhaseName		Structure Demolition (bifurcation structure locations only)
tblOffRoadEquipment	PhaseName		Excavation and portal development
tblOffRoadEquipment	PhaseName		Structure Demolition (bifurcation structure locations only)
tblOffRoadEquipment	PhaseName		Bifurcation structure replacement
tblOffRoadEquipment	PhaseName		Tunnel spray-on polymer application
tblOffRoadEquipment	PhaseName		Site finishing and architectural coatings
tblOffRoadEquipment	PhaseName		Habitat and site restoration
tblOffRoadEquipment	PhaseName		Tunnel slip lining
tblOffRoadEquipment	PhaseName		Structure Demolition (bifurcation structure locations only)
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	2.50
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	8.00	24.00

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tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	8.00	24.00
tblTripsAndVMT	HaulingTripNumber	0.00	1,260.00
tblTripsAndVMT	HaulingTripNumber	0.00	583.00
tblTripsAndVMT	HaulingVehicleClass		HHDT
tblTripsAndVMT	VendorTripNumber	0.00	8.00
tblTripsAndVMT	VendorVehicleClass		HDT_Mix
tblTripsAndVMT	WorkerTripNumber	50.00	80.00
tblTripsAndVMT	WorkerTripNumber	50.00	80.00
tblTripsAndVMT	WorkerTripNumber	75.00	80.00
tblTripsAndVMT	WorkerTripNumber	75.00	80.00
tblTripsAndVMT	WorkerTripNumber	0.00	160.00
tblTripsAndVMT	WorkerTripNumber	0.00	80.00
tblTripsAndVMT	WorkerTripNumber	0.00	160.00
tblTripsAndVMT	WorkerTripNumber	0.00	80.00
tblTripsAndVMT	WorkerTripNumber	75.00	80.00
tblTripsAndVMT	WorkerVehicleClass		LD_Mix

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.4257	3.3742	3.7342	7.2200e-003	0.2178	0.1563	0.3741	0.0987	0.1534	0.2521	0.0000	615.9902	615.9902	0.0634	0.0107	620.7511
2023	0.1730	1.3773	1.6052	3.5700e-003	0.1361	0.0621	0.1982	0.0606	0.0592	0.1197	0.0000	311.7003	311.7003	0.0642	8.4000e-004	313.5534
Maximum	**0.4257**	**3.3742**	**3.7342**	**7.2200e-003**	**0.2178**	**0.1563**	**0.3741**	**0.0987**	**0.1534**	**0.2521**	**0.0000**	**615.9902**	**615.9902**	**0.0642**	**0.0107**	**620.7511**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.4257	3.3742	3.7342	7.2200e-003	0.1277	0.1563	0.2840	0.0524	0.1534	0.2058	0.0000	615.9896	615.9896	0.0634	0.0107	620.7505
2023	0.1730	1.3773	1.6052	3.5700e-003	0.0821	0.0621	0.1442	0.0328	0.0592	0.0919	0.0000	311.6999	311.6999	0.0642	8.4000e-004	313.5530
Maximum	**0.4257**	**3.3742**	**3.7342**	**7.2200e-003**	**0.1277**	**0.1563**	**0.2840**	**0.0524**	**0.1534**	**0.2058**	**0.0000**	**615.9896**	**615.9896**	**0.0642**	**0.0107**	**620.7505**

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	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	40.73	0.00	25.19	46.51	0.00	19.93	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site mobilization, clearing, grubbing, and vegetation removal	Site Preparation	10/3/2022	10/7/2022	5	5	
2	Structure Demolition (bifurcation structure locations only)	Demolition	10/8/2022	10/14/2022	5	5	
3	Excavation and portal development	Grading	10/15/2022	10/21/2022	5	5	
4	Tunnel slip lining	Building Construction	10/22/2022	12/30/2022	5	50	
5	Bifurcation structure replacement	Building Construction	12/31/2022	1/27/2023	5	20	
6	Manway construction	Building Construction	1/28/2023	2/1/2023	5	3	
7	Tunnel spray-on polymer application	Architectural Coating	2/2/2023	3/29/2023	5	40	
8	Site finishing and architectural coatings	Architectural Coating	3/30/2023	4/12/2023	5	10	
9	Habitat and site restoration	Site Preparation	4/13/2023	4/17/2023	5	3	
10	Demobilization	Site Preparation	4/18/2023	4/19/2023	5	2	

Acres of Grading (Site Preparation Phase): 25

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating –

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OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site mobilization, clearing, grubbing, and vegetation removal	Rubber Tired Dozers	10	8.00	247	0.40
Site mobilization, clearing, grubbing, and vegetation removal	Tractors/Loaders/Backhoes	10	8.00	97	0.37
Structure Demolition (bifurcation structure locations only)	Concrete/Industrial Saws	6	8.00	81	0.73
Structure Demolition (bifurcation structure locations only)	Cranes	6	8.00	231	0.29
Structure Demolition (bifurcation structure locations only)	Crushing/Proc. Equipment	6	8.00	85	0.78
Structure Demolition (bifurcation structure locations only)	Excavators	6	8.00	158	0.38
Structure Demolition (bifurcation structure locations only)	Tractors/Loaders/Backhoes	6	8.00	97	0.37
Excavation and portal development	Cranes	10	8.00	231	0.29
Excavation and portal development	Excavators	10	8.00	158	0.38
Excavation and portal development	Tractors/Loaders/Backhoes	10	8.00	97	0.37
Tunnel slip lining	Cement and Mortar Mixers	3	18.00	9	0.56
Tunnel slip lining	Concrete/Industrial Saws	3	12.00	81	0.73
Tunnel slip lining	Cranes	3	2.50	231	0.29
Tunnel slip lining	Generator Sets	6	24.00	84	0.74
Tunnel slip lining	Other Construction Equipment	3	2.50	172	0.42
Tunnel slip lining	Welders	6	24.00	46	0.45
Bifurcation structure replacement	Cement and Mortar Mixers	6	8.00	9	0.56
Bifurcation structure replacement	Cranes	6	8.00	231	0.29
Bifurcation structure replacement	Excavators	6	8.00	158	0.38
Bifurcation structure replacement	Tractors/Loaders/Backhoes	6	8.00	97	0.37
Tunnel spray-on polymer application	Air Compressors	3	8.00	78	0.48
Tunnel spray-on polymer application	Generator Sets	3	8.00	84	0.74
Site finishing and architectural coatings	Air Compressors	10	8.00	78	0.48

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Site finishing and architectural coatings	Generator Sets	10	8.00	84	0.74
Habitat and site restoration	Off-Highway Trucks	20	8.00	402	0.38
Habitat and site restoration	Rubber Tired Dozers	10	8.00	247	0.40
Demobilization	Off-Highway Trucks	20	8.00	402	0.38
Manway construction	Excavators	10	8.00	158	0.38
Manway construction	Tractors/Loaders/Backhoes	10	8.00	97	0.37
Manway construction	Cranes	10	8.00	231	0.29
Manway construction	Off-Highway Trucks	10	8.00	402	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site mobilization, clearing, grubbing, and	20	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Structure Demolition (bifurcation structure	30	80.00	0.00	1,260.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Excavation and portal development	30	80.00	0.00	583.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Tunnel slip lining	24	160.00	8.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Bifurcation structure replacement	24	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Manway construction	0	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Tunnel spray-on polymer application	6	160.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site finishing and architectural coatings	20	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Habitat and site restoration	30	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demobilization	20	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site mobilization, clearing, grubbing, and vegetation removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1638	0.0000	0.1638	0.0842	0.0000	0.0842	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0251	0.2617	0.1455	2.9000e-004		0.0127	0.0127		0.0117	0.0117	0.0000	25.5888	25.5888	8.2800e-003	0.0000	25.7957
Total	**0.0251**	**0.2617**	**0.1455**	**2.9000e-004**	**0.1638**	**0.0127**	**0.1765**	**0.0842**	**0.0117**	**0.0959**	**0.0000**	**25.5888**	**25.5888**	**8.2800e-003**	**0.0000**	**25.7957**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	4.2000e-004	4.9100e-003	1.0000e-005	1.6000e-003	1.0000e-005	1.6100e-003	4.3000e-004	1.0000e-005	4.3000e-004	0.0000	1.3105	1.3105	4.0000e-005	4.0000e-005	1.3229
Total	**5.8000e-004**	**4.2000e-004**	**4.9100e-003**	**1.0000e-005**	**1.6000e-003**	**1.0000e-005**	**1.6100e-003**	**4.3000e-004**	**1.0000e-005**	**4.3000e-004**	**0.0000**	**1.3105**	**1.3105**	**4.0000e-005**	**4.0000e-005**	**1.3229**

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Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0737	0.0000	0.0737	0.0379	0.0000	0.0379	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0251	0.2617	0.1455	2.9000e-004		0.0127	0.0127		0.0117	0.0117	0.0000	25.5888	25.5888	8.2800e-003	0.0000	25.7957
Total	**0.0251**	**0.2617**	**0.1455**	**2.9000e-004**	**0.0737**	**0.0127**	**0.0864**	**0.0379**	**0.0117**	**0.0496**	**0.0000**	**25.5888**	**25.5888**	**8.2800e-003**	**0.0000**	**25.7957**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	4.2000e-004	4.9100e-003	1.0000e-005	1.6000e-003	1.0000e-005	1.6100e-003	4.3000e-004	1.0000e-005	4.3000e-004	0.0000	1.3105	1.3105	4.0000e-005	4.0000e-005	1.3229
Total	**5.8000e-004**	**4.2000e-004**	**4.9100e-003**	**1.0000e-005**	**1.6000e-003**	**1.0000e-005**	**1.6100e-003**	**4.3000e-004**	**1.0000e-005**	**4.3000e-004**	**0.0000**	**1.3105**	**1.3105**	**4.0000e-005**	**4.0000e-005**	**1.3229**

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3.3 Structure Demolition (bifurcation structure locations only) - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0237	0.2050	0.2307	4.1000e-004		0.0102	0.0102		9.7800e-003	9.7800e-003	0.0000	35.6153	35.6153	7.0100e-003	0.0000	35.7907
Total	**0.0237**	**0.2050**	**0.2307**	**4.1000e-004**		**0.0102**	**0.0102**		**9.7800e-003**	**9.7800e-003**	**0.0000**	**35.6153**	**35.6153**	**7.0100e-003**	**0.0000**	**35.7907**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.7900e-003	0.1061	0.0250	4.0000e-004	0.0108	9.9000e-004	0.0118	2.9600e-003	9.4000e-004	3.9100e-003	0.0000	39.4892	39.4892	1.9000e-003	6.2700e-003	41.4060
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	4.2000e-004	4.9100e-003	1.0000e-005	1.6000e-003	1.0000e-005	1.6100e-003	4.3000e-004	1.0000e-005	4.3000e-004	0.0000	1.3105	1.3105	4.0000e-005	4.0000e-005	1.3229
Total	**3.3700e-003**	**0.1065**	**0.0299**	**4.1000e-004**	**0.0124**	**1.0000e-003**	**0.0134**	**3.3900e-003**	**9.5000e-004**	**4.3400e-003**	**0.0000**	**40.7997**	**40.7997**	**1.9400e-003**	**6.3100e-003**	**42.7289**

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Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0237	0.2050	0.2307	4.1000e-004		0.0102	0.0102		9.7800e-003	9.7800e-003	0.0000	35.6153	35.6153	7.0100e-003	0.0000	35.7907
Total	**0.0237**	**0.2050**	**0.2307**	**4.1000e-004**		**0.0102**	**0.0102**		**9.7800e-003**	**9.7800e-003**	**0.0000**	**35.6153**	**35.6153**	**7.0100e-003**	**0.0000**	**35.7907**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.7900e-003	0.1061	0.0250	4.0000e-004	0.0108	9.9000e-004	0.0118	2.9600e-003	9.4000e-004	3.9100e-003	0.0000	39.4892	39.4892	1.9000e-003	6.2700e-003	41.4060
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	4.2000e-004	4.9100e-003	1.0000e-005	1.6000e-003	1.0000e-005	1.6100e-003	4.3000e-004	1.0000e-005	4.3000e-004	0.0000	1.3105	1.3105	4.0000e-005	4.0000e-005	1.3229
Total	**3.3700e-003**	**0.1065**	**0.0299**	**4.1000e-004**	**0.0124**	**1.0000e-003**	**0.0134**	**3.3900e-003**	**9.5000e-004**	**4.3400e-003**	**0.0000**	**40.7997**	**40.7997**	**1.9400e-003**	**6.3100e-003**	**42.7289**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.4 Excavation and portal development - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0185	0.1909	0.1846	3.5000e-004		8.7400e-003	8.7400e-003		8.0400e-003	8.0400e-003	0.0000	30.8462	30.8462	9.9800e-003	0.0000	31.0956
Total	**0.0185**	**0.1909**	**0.1846**	**3.5000e-004**	**0.0000**	**8.7400e-003**	**8.7400e-003**	**0.0000**	**8.0400e-003**	**8.0400e-003**	**0.0000**	**30.8462**	**30.8462**	**9.9800e-003**	**0.0000**	**31.0956**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.2900e-003	0.0491	0.0116	1.8000e-004	4.9900e-003	4.6000e-004	5.4500e-003	1.3700e-003	4.4000e-004	1.8100e-003	0.0000	18.2716	18.2716	8.8000e-004	2.9000e-003	19.1585
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	4.2000e-004	4.9100e-003	1.0000e-005	1.6000e-003	1.0000e-005	1.6100e-003	4.3000e-004	1.0000e-005	4.3000e-004	0.0000	1.3105	1.3105	4.0000e-005	4.0000e-005	1.3229
Total	**1.8700e-003**	**0.0495**	**0.0165**	**1.9000e-004**	**6.5900e-003**	**4.7000e-004**	**7.0600e-003**	**1.8000e-003**	**4.5000e-004**	**2.2400e-003**	**0.0000**	**19.5821**	**19.5821**	**9.2000e-004**	**2.9400e-003**	**20.4814**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0185	0.1909	0.1846	3.5000e-004		8.7400e-003	8.7400e-003		8.0400e-003	8.0400e-003	0.0000	30.8462	30.8462	9.9800e-003	0.0000	31.0956
Total	**0.0185**	**0.1909**	**0.1846**	**3.5000e-004**	**0.0000**	**8.7400e-003**	**8.7400e-003**	**0.0000**	**8.0400e-003**	**8.0400e-003**	**0.0000**	**30.8462**	**30.8462**	**9.9800e-003**	**0.0000**	**31.0956**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.2900e-003	0.0491	0.0116	1.8000e-004	4.9900e-003	4.6000e-004	5.4500e-003	1.3700e-003	4.4000e-004	1.8100e-003	0.0000	18.2716	18.2716	8.8000e-004	2.9000e-003	19.1585
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	4.2000e-004	4.9100e-003	1.0000e-005	1.6000e-003	1.0000e-005	1.6100e-003	4.3000e-004	1.0000e-005	4.3000e-004	0.0000	1.3105	1.3105	4.0000e-005	4.0000e-005	1.3229
Total	**1.8700e-003**	**0.0495**	**0.0165**	**1.9000e-004**	**6.5900e-003**	**4.7000e-004**	**7.0600e-003**	**1.8000e-003**	**4.5000e-004**	**2.2400e-003**	**0.0000**	**19.5821**	**19.5821**	**9.2000e-004**	**2.9400e-003**	**20.4814**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.5 Tunnel slip lining - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3407	2.5408	3.0202	5.2100e-003		0.1229	0.1229		0.1222	0.1222	0.0000	431.8661	431.8661	0.0343	0.0000	432.7231
Total	**0.3407**	**2.5408**	**3.0202**	**5.2100e-003**		**0.1229**	**0.1229**		**0.1222**	**0.1222**	**0.0000**	**431.8661**	**431.8661**	**0.0343**	**0.0000**	**432.7231**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.4000e-004	0.0110	3.6100e-003	4.0000e-005	1.3300e-003	1.2000e-004	1.4400e-003	3.8000e-004	1.1000e-004	4.9000e-004	0.0000	4.1708	4.1708	1.3000e-004	6.1000e-004	4.3545
Worker	0.0115	8.3800e-003	0.0982	2.9000e-004	0.0321	1.9000e-004	0.0323	8.5200e-003	1.7000e-004	8.6900e-003	0.0000	26.2106	26.2106	8.3000e-004	7.6000e-004	26.4582
Total	**0.0120**	**0.0194**	**0.1018**	**3.3000e-004**	**0.0334**	**3.1000e-004**	**0.0337**	**8.9000e-003**	**2.8000e-004**	**9.1800e-003**	**0.0000**	**30.3814**	**30.3814**	**9.6000e-004**	**1.3700e-003**	**30.8127**

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Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3407	2.5408	3.0202	5.2100e-003		0.1229	0.1229		0.1222	0.1222	0.0000	431.8656	431.8656	0.0343	0.0000	432.7226
Total	**0.3407**	**2.5408**	**3.0202**	**5.2100e-003**		**0.1229**	**0.1229**		**0.1222**	**0.1222**	**0.0000**	**431.8656**	**431.8656**	**0.0343**	**0.0000**	**432.7226**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.4000e-004	0.0110	3.6100e-003	4.0000e-005	1.3300e-003	1.2000e-004	1.4400e-003	3.8000e-004	1.1000e-004	4.9000e-004	0.0000	4.1708	4.1708	1.3000e-004	6.1000e-004	4.3545
Worker	0.0115	8.3800e-003	0.0982	2.9000e-004	0.0321	1.9000e-004	0.0323	8.5200e-003	1.7000e-004	8.6900e-003	0.0000	26.2106	26.2106	8.3000e-004	7.6000e-004	26.4582
Total	**0.0120**	**0.0194**	**0.1018**	**3.3000e-004**	**0.0334**	**3.1000e-004**	**0.0337**	**8.9000e-003**	**2.8000e-004**	**9.1800e-003**	**0.0000**	**30.3814**	**30.3814**	**9.6000e-004**	**1.3700e-003**	**30.8127**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.6 Bifurcation structure replacement - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.6 Bifurcation structure replacement - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0450	0.4361	0.4579	8.9000e-004		0.0195	0.0195		0.0180	0.0180	0.0000	76.8032	76.8032	0.0242	0.0000	77.4091
Total	**0.0450**	**0.4361**	**0.4579**	**8.9000e-004**		**0.0195**	**0.0195**		**0.0180**	**0.0180**	**0.0000**	**76.8032**	**76.8032**	**0.0242**	**0.0000**	**77.4091**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1600e-003	1.5000e-003	0.0182	6.0000e-005	6.4200e-003	4.0000e-005	6.4500e-003	1.7000e-003	3.0000e-005	1.7400e-003	0.0000	5.0765	5.0765	1.5000e-004	1.4000e-004	5.1224
Total	**2.1600e-003**	**1.5000e-003**	**0.0182**	**6.0000e-005**	**6.4200e-003**	**4.0000e-005**	**6.4500e-003**	**1.7000e-003**	**3.0000e-005**	**1.7400e-003**	**0.0000**	**5.0765**	**5.0765**	**1.5000e-004**	**1.4000e-004**	**5.1224**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0450	0.4361	0.4579	8.9000e-004		0.0195	0.0195		0.0180	0.0180	0.0000	76.8031	76.8031	0.0242	0.0000	77.4090
Total	**0.0450**	**0.4361**	**0.4579**	**8.9000e-004**		**0.0195**	**0.0195**		**0.0180**	**0.0180**	**0.0000**	**76.8031**	**76.8031**	**0.0242**	**0.0000**	**77.4090**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1600e-003	1.5000e-003	0.0182	6.0000e-005	6.4200e-003	4.0000e-005	6.4500e-003	1.7000e-003	3.0000e-005	1.7400e-003	0.0000	5.0765	5.0765	1.5000e-004	1.4000e-004	5.1224
Total	**2.1600e-003**	**1.5000e-003**	**0.0182**	**6.0000e-005**	**6.4200e-003**	**4.0000e-005**	**6.4500e-003**	**1.7000e-003**	**3.0000e-005**	**1.7400e-003**	**0.0000**	**5.0765**	**5.0765**	**1.5000e-004**	**1.4000e-004**	**5.1224**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.7 Manway construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0180	0.1573	0.1594	4.1000e-004		6.6100e-003	6.6100e-003		6.0800e-003	6.0800e-003	0.0000	36.0169	36.0169	0.0117	0.0000	36.3081
Total	**0.0180**	**0.1573**	**0.1594**	**4.1000e-004**		**6.6100e-003**	**6.6100e-003**		**6.0800e-003**	**6.0800e-003**	**0.0000**	**36.0169**	**36.0169**	**0.0117**	**0.0000**	**36.3081**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.2000e-004	2.2000e-004	2.7300e-003	1.0000e-005	9.6000e-004	1.0000e-005	9.7000e-004	2.6000e-004	0.0000	2.6000e-004	0.0000	0.7615	0.7615	2.0000e-005	2.0000e-005	0.7684
Total	**3.2000e-004**	**2.2000e-004**	**2.7300e-003**	**1.0000e-005**	**9.6000e-004**	**1.0000e-005**	**9.7000e-004**	**2.6000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**0.7615**	**0.7615**	**2.0000e-005**	**2.0000e-005**	**0.7684**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0180	0.1573	0.1594	4.1000e-004		6.6100e-003	6.6100e-003		6.0800e-003	6.0800e-003	0.0000	36.0169	36.0169	0.0117	0.0000	36.3081
Total	**0.0180**	**0.1573**	**0.1594**	**4.1000e-004**		**6.6100e-003**	**6.6100e-003**		**6.0800e-003**	**6.0800e-003**	**0.0000**	**36.0169**	**36.0169**	**0.0117**	**0.0000**	**36.3081**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.2000e-004	2.2000e-004	2.7300e-003	1.0000e-005	9.6000e-004	1.0000e-005	9.7000e-004	2.6000e-004	0.0000	2.6000e-004	0.0000	0.7615	0.7615	2.0000e-005	2.0000e-005	0.7684
Total	**3.2000e-004**	**2.2000e-004**	**2.7300e-003**	**1.0000e-005**	**9.6000e-004**	**1.0000e-005**	**9.7000e-004**	**2.6000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**0.7615**	**0.7615**	**2.0000e-005**	**2.0000e-005**	**0.7684**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.8 Tunnel spray-on polymer application - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0337	0.2672	0.3651	6.3000e-004		0.0134	0.0134		0.0134	0.0134	0.0000	54.3385	54.3385	2.7100e-003	0.0000	54.4063
Total	**0.0337**	**0.2672**	**0.3651**	**6.3000e-004**		**0.0134**	**0.0134**		**0.0134**	**0.0134**	**0.0000**	**54.3385**	**54.3385**	**2.7100e-003**	**0.0000**	**54.4063**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.6500e-003	5.9900e-003	0.0729	2.2000e-004	0.0257	1.4000e-004	0.0258	6.8200e-003	1.3000e-004	6.9500e-003	0.0000	20.3059	20.3059	6.0000e-004	5.7000e-004	20.4898
Total	**8.6500e-003**	**5.9900e-003**	**0.0729**	**2.2000e-004**	**0.0257**	**1.4000e-004**	**0.0258**	**6.8200e-003**	**1.3000e-004**	**6.9500e-003**	**0.0000**	**20.3059**	**20.3059**	**6.0000e-004**	**5.7000e-004**	**20.4898**

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Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0337	0.2672	0.3651	6.3000e-004		0.0134	0.0134		0.0134	0.0134	0.0000	54.3384	54.3384	2.7100e-003	0.0000	54.4063
Total	**0.0337**	**0.2672**	**0.3651**	**6.3000e-004**		**0.0134**	**0.0134**		**0.0134**	**0.0134**	**0.0000**	**54.3384**	**54.3384**	**2.7100e-003**	**0.0000**	**54.4063**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.6500e-003	5.9900e-003	0.0729	2.2000e-004	0.0257	1.4000e-004	0.0258	6.8200e-003	1.3000e-004	6.9500e-003	0.0000	20.3059	20.3059	6.0000e-004	5.7000e-004	20.4898
Total	**8.6500e-003**	**5.9900e-003**	**0.0729**	**2.2000e-004**	**0.0257**	**1.4000e-004**	**0.0258**	**6.8200e-003**	**1.3000e-004**	**6.9500e-003**	**0.0000**	**20.3059**	**20.3059**	**6.0000e-004**	**5.7000e-004**	**20.4898**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.9 Site finishing and architectural coatings - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0281	0.2226	0.3042	5.3000e-004		0.0111	0.0111		0.0111	0.0111	0.0000	45.2821	45.2821	2.2600e-003	0.0000	45.3386
Total	**0.0281**	**0.2226**	**0.3042**	**5.3000e-004**		**0.0111**	**0.0111**		**0.0111**	**0.0111**	**0.0000**	**45.2821**	**45.2821**	**2.2600e-003**	**0.0000**	**45.3386**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0800e-003	7.5000e-004	9.1200e-003	3.0000e-005	3.2100e-003	2.0000e-005	3.2300e-003	8.5000e-004	2.0000e-005	8.7000e-004	0.0000	2.5382	2.5382	8.0000e-005	7.0000e-005	2.5612
Total	**1.0800e-003**	**7.5000e-004**	**9.1200e-003**	**3.0000e-005**	**3.2100e-003**	**2.0000e-005**	**3.2300e-003**	**8.5000e-004**	**2.0000e-005**	**8.7000e-004**	**0.0000**	**2.5382**	**2.5382**	**8.0000e-005**	**7.0000e-005**	**2.5612**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0281	0.2226	0.3042	5.3000e-004		0.0111	0.0111		0.0111	0.0111	0.0000	45.2820	45.2820	2.2600e-003	0.0000	45.3386
Total	**0.0281**	**0.2226**	**0.3042**	**5.3000e-004**		**0.0111**	**0.0111**		**0.0111**	**0.0111**	**0.0000**	**45.2820**	**45.2820**	**2.2600e-003**	**0.0000**	**45.3386**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0800e-003	7.5000e-004	9.1200e-003	3.0000e-005	3.2100e-003	2.0000e-005	3.2300e-003	8.5000e-004	2.0000e-005	8.7000e-004	0.0000	2.5382	2.5382	8.0000e-005	7.0000e-005	2.5612
Total	**1.0800e-003**	**7.5000e-004**	**9.1200e-003**	**3.0000e-005**	**3.2100e-003**	**2.0000e-005**	**3.2300e-003**	**8.5000e-004**	**2.0000e-005**	**8.7000e-004**	**0.0000**	**2.5382**	**2.5382**	**8.0000e-005**	**7.0000e-005**	**2.5612**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.10 Habitat and site restoration - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0983	0.0000	0.0983	0.0505	0.0000	0.0505	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0254	0.2139	0.1453	5.2000e-004		8.6800e-003	8.6800e-003		7.9900e-003	7.9900e-003	0.0000	46.0865	46.0865	0.0149	0.0000	46.4591
Total	**0.0254**	**0.2139**	**0.1453**	**5.2000e-004**	**0.0983**	**8.6800e-003**	**0.1070**	**0.0505**	**7.9900e-003**	**0.0585**	**0.0000**	**46.0865**	**46.0865**	**0.0149**	**0.0000**	**46.4591**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.2000e-004	2.2000e-004	2.7300e-003	1.0000e-005	9.6000e-004	1.0000e-005	9.7000e-004	2.6000e-004	0.0000	2.6000e-004	0.0000	0.7615	0.7615	2.0000e-005	2.0000e-005	0.7684
Total	**3.2000e-004**	**2.2000e-004**	**2.7300e-003**	**1.0000e-005**	**9.6000e-004**	**1.0000e-005**	**9.7000e-004**	**2.6000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**0.7615**	**0.7615**	**2.0000e-005**	**2.0000e-005**	**0.7684**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0442	0.0000	0.0442	0.0227	0.0000	0.0227	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0254	0.2139	0.1453	5.2000e-004		8.6800e-003	8.6800e-003		7.9900e-003	7.9900e-003	0.0000	46.0864	46.0864	0.0149	0.0000	46.4591
Total	**0.0254**	**0.2139**	**0.1453**	**5.2000e-004**	**0.0442**	**8.6800e-003**	**0.0529**	**0.0227**	**7.9900e-003**	**0.0307**	**0.0000**	**46.0864**	**46.0864**	**0.0149**	**0.0000**	**46.4591**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.2000e-004	2.2000e-004	2.7300e-003	1.0000e-005	9.6000e-004	1.0000e-005	9.7000e-004	2.6000e-004	0.0000	2.6000e-004	0.0000	0.7615	0.7615	2.0000e-005	2.0000e-005	0.7684
Total	**3.2000e-004**	**2.2000e-004**	**2.7300e-003**	**1.0000e-005**	**9.6000e-004**	**1.0000e-005**	**9.7000e-004**	**2.6000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**0.7615**	**0.7615**	**2.0000e-005**	**2.0000e-005**	**0.7684**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.11 Demobilization - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0101	0.0714	0.0658	2.6000e-004		2.5800e-003	2.5800e-003		2.3700e-003	2.3700e-003	0.0000	23.2219	23.2219	7.5100e-003	0.0000	23.4097
Total	**0.0101**	**0.0714**	**0.0658**	**2.6000e-004**	**0.0000**	**2.5800e-003**	**2.5800e-003**	**0.0000**	**2.3700e-003**	**2.3700e-003**	**0.0000**	**23.2219**	**23.2219**	**7.5100e-003**	**0.0000**	**23.4097**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.2000e-004	1.5000e-004	1.8200e-003	1.0000e-005	6.4000e-004	0.0000	6.5000e-004	1.7000e-004	0.0000	1.7000e-004	0.0000	0.5077	0.5077	2.0000e-005	1.0000e-005	0.5122
Total	**2.2000e-004**	**1.5000e-004**	**1.8200e-003**	**1.0000e-005**	**6.4000e-004**	**0.0000**	**6.5000e-004**	**1.7000e-004**	**0.0000**	**1.7000e-004**	**0.0000**	**0.5077**	**0.5077**	**2.0000e-005**	**1.0000e-005**	**0.5122**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0101	0.0714	0.0658	2.6000e-004		2.5800e-003	2.5800e-003		2.3700e-003	2.3700e-003	0.0000	23.2219	23.2219	7.5100e-003	0.0000	23.4096
Total	**0.0101**	**0.0714**	**0.0658**	**2.6000e-004**	**0.0000**	**2.5800e-003**	**2.5800e-003**	**0.0000**	**2.3700e-003**	**2.3700e-003**	**0.0000**	**23.2219**	**23.2219**	**7.5100e-003**	**0.0000**	**23.4096**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.2000e-004	1.5000e-004	1.8200e-003	1.0000e-005	6.4000e-004	0.0000	6.5000e-004	1.7000e-004	0.0000	1.7000e-004	0.0000	0.5077	0.5077	2.0000e-005	1.0000e-005	0.5122
Total	**2.2000e-004**	**1.5000e-004**	**1.8200e-003**	**1.0000e-005**	**6.4000e-004**	**0.0000**	**6.5000e-004**	**1.7000e-004**	**0.0000**	**1.7000e-004**	**0.0000**	**0.5077**	**0.5077**	**2.0000e-005**	**1.0000e-005**	**0.5122**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

FIRST AQUEDUCT TUNNELS REHABILITATION PROJECT

San Diego County APCD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	12.55	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2024
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	539.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Construction Start date beginning Oct 2022.

Land Use - Total acreage of project area: 12.55 acres

Construction Phase - Construction would begin Oct 2022.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

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Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Trips and VMT - Updated trips per applicant.

Construction Off-road Equipment Mitigation - Water twice daily.

Off-road Equipment - Updated equipment per applicant.

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	0	273339
tblAreaCoating	Area_Nonresidential_Interior	0	820017
tblConstructionPhase	NumDays	20.00	40.00
tblConstructionPhase	NumDays	20.00	10.00
tblConstructionPhase	NumDays	300.00	50.00
tblConstructionPhase	NumDays	300.00	20.00
tblConstructionPhase	NumDays	300.00	3.00
tblConstructionPhase	NumDays	20.00	5.00
tblConstructionPhase	NumDays	30.00	5.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	10.00	2.00
tblConstructionPhase	NumDays	10.00	3.00
tblLandUse	LotAcreage	0.00	12.55
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks

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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	20.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00

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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	PhaseName		Tunnel slip lining
tblOffRoadEquipment	PhaseName		Bifurcation structure replacement
tblOffRoadEquipment	PhaseName		Tunnel slip lining
tblOffRoadEquipment	PhaseName		Structure Demolition (bifurcation structure locations only)
tblOffRoadEquipment	PhaseName		Excavation and portal development
tblOffRoadEquipment	PhaseName		Structure Demolition (bifurcation structure locations only)
tblOffRoadEquipment	PhaseName		Bifurcation structure replacement
tblOffRoadEquipment	PhaseName		Tunnel spray-on polymer application
tblOffRoadEquipment	PhaseName		Site finishing and architectural coatings
tblOffRoadEquipment	PhaseName		Habitat and site restoration
tblOffRoadEquipment	PhaseName		Tunnel slip lining
tblOffRoadEquipment	PhaseName		Structure Demolition (bifurcation structure locations only)
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	2.50
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	8.00	24.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	8.00	24.00
tblTripsAndVMT	HaulingTripNumber	0.00	1,260.00
tblTripsAndVMT	HaulingTripNumber	0.00	583.00
tblTripsAndVMT	HaulingVehicleClass		HHDT
tblTripsAndVMT	VendorTripNumber	0.00	8.00
tblTripsAndVMT	VendorVehicleClass		HDT_Mix
tblTripsAndVMT	WorkerTripNumber	50.00	80.00
tblTripsAndVMT	WorkerTripNumber	50.00	80.00
tblTripsAndVMT	WorkerTripNumber	75.00	80.00
tblTripsAndVMT	WorkerTripNumber	75.00	80.00
tblTripsAndVMT	WorkerTripNumber	0.00	160.00
tblTripsAndVMT	WorkerTripNumber	0.00	80.00
tblTripsAndVMT	WorkerTripNumber	0.00	160.00
tblTripsAndVMT	WorkerTripNumber	0.00	80.00
tblTripsAndVMT	WorkerTripNumber	75.00	80.00
tblTripsAndVMT	WorkerVehicleClass		LD_Mix

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	14.1143	123.0580	125.0930	0.3281	66.1805	5.0786	71.2591	33.8491	4.8995	38.5214	0.0000	33,718.4950	33,718.4950	4.8037	2.7812	34,645.9674
2023	17.1427	142.7652	108.2043	0.3556	66.1805	5.7930	71.9735	33.8491	5.3296	39.1787	0.0000	34,454.7083	34,454.7083	10.9694	0.0293	34,733.3042
Maximum	**17.1427**	**142.7652**	**125.0930**	**0.3556**	**66.1805**	**5.7930**	**71.9735**	**33.8491**	**5.3296**	**39.1787**	**0.0000**	**34,454.7083**	**34,454.7083**	**10.9694**	**2.7812**	**34,733.3042**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	14.1143	123.0580	125.0930	0.3281	30.1427	5.0786	35.2213	15.3280	4.8995	20.0003	0.0000	33,718.4950	33,718.4950	4.8037	2.7812	34,645.9674
2023	17.1427	142.7652	108.2043	0.3556	30.1427	5.7930	35.9357	15.3280	5.3296	20.6575	0.0000	34,454.7083	34,454.7083	10.9694	0.0293	34,733.3042
Maximum	**17.1427**	**142.7652**	**125.0930**	**0.3556**	**30.1427**	**5.7930**	**35.9357**	**15.3280**	**5.3296**	**20.6575**	**0.0000**	**34,454.7083**	**34,454.7083**	**10.9694**	**2.7812**	**34,733.3042**

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	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	54.45	0.00	50.32	54.72	0.00	47.67	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site mobilization, clearing, grubbing, and vegetation removal	Site Preparation	10/3/2022	10/7/2022	5	5	
2	Structure Demolition (bifurcation structure locations only)	Demolition	10/8/2022	10/14/2022	5	5	
3	Excavation and portal development	Grading	10/15/2022	10/21/2022	5	5	
4	Tunnel slip lining	Building Construction	10/22/2022	12/30/2022	5	50	
5	Bifurcation structure replacement	Building Construction	12/31/2022	1/27/2023	5	20	
6	Manway construction	Building Construction	1/28/2023	2/1/2023	5	3	
7	Tunnel spray-on polymer application	Architectural Coating	2/2/2023	3/29/2023	5	40	
8	Site finishing and architectural coatings	Architectural Coating	3/30/2023	4/12/2023	5	10	
9	Habitat and site restoration	Site Preparation	4/13/2023	4/17/2023	5	3	
10	Demobilization	Site Preparation	4/18/2023	4/19/2023	5	2	

Acres of Grading (Site Preparation Phase): 25

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating –

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OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site mobilization, clearing, grubbing, and vegetation removal	Rubber Tired Dozers	10	8.00	247	0.40
Site mobilization, clearing, grubbing, and vegetation removal	Tractors/Loaders/Backhoes	10	8.00	97	0.37
Structure Demolition (bifurcation structure locations only)	Concrete/Industrial Saws	6	8.00	81	0.73
Structure Demolition (bifurcation structure locations only)	Cranes	6	8.00	231	0.29
Structure Demolition (bifurcation structure locations only)	Crushing/Proc. Equipment	6	8.00	85	0.78
Structure Demolition (bifurcation structure locations only)	Excavators	6	8.00	158	0.38
Structure Demolition (bifurcation structure locations only)	Tractors/Loaders/Backhoes	6	8.00	97	0.37
Excavation and portal development	Cranes	10	8.00	231	0.29
Excavation and portal development	Excavators	10	8.00	158	0.38
Excavation and portal development	Tractors/Loaders/Backhoes	10	8.00	97	0.37
Tunnel slip lining	Cement and Mortar Mixers	3	18.00	9	0.56
Tunnel slip lining	Concrete/Industrial Saws	3	12.00	81	0.73
Tunnel slip lining	Cranes	3	2.50	231	0.29
Tunnel slip lining	Generator Sets	6	24.00	84	0.74
Tunnel slip lining	Other Construction Equipment	3	2.50	172	0.42
Tunnel slip lining	Welders	6	24.00	46	0.45
Bifurcation structure replacement	Cement and Mortar Mixers	6	8.00	9	0.56
Bifurcation structure replacement	Cranes	6	8.00	231	0.29
Bifurcation structure replacement	Excavators	6	8.00	158	0.38
Bifurcation structure replacement	Tractors/Loaders/Backhoes	6	8.00	97	0.37
Tunnel spray-on polymer application	Air Compressors	3	8.00	78	0.48
Tunnel spray-on polymer application	Generator Sets	3	8.00	84	0.74
Site finishing and architectural coatings	Air Compressors	10	8.00	78	0.48

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Site finishing and architectural coatings	Generator Sets		10	8.00	84	0.74
Habitat and site restoration	Off-Highway Trucks		20	8.00	402	0.38
Habitat and site restoration	Rubber Tired Dozers		10	8.00	247	0.40
Demobilization	Off-Highway Trucks		20	8.00	402	0.38
Manway construction	Excavators		10	8.00	158	0.38
Manway construction	Tractors/Loaders/Backhoes		10	8.00	97	0.37
Manway construction	Cranes		10	8.00	231	0.29
Manway construction	Off-Highway Trucks		10	8.00	402	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site mobilization, clearing, grubbing, and	20	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Structure Demolition (bifurcation structure	30	80.00	0.00	1,260.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Excavation and portal development	30	80.00	0.00	583.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Tunnel slip lining	24	160.00	8.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Bifurcation structure replacement	24	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Manway construction	0	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Tunnel spray-on polymer application	6	160.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site finishing and architectural coatings	20	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Habitat and site restoration	30	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demobilization	20	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

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3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site mobilization, clearing, grubbing, and vegetation removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					65.5234	0.0000	65.5234	33.6748	0.0000	33.6748			0.0000			0.0000
Off-Road	10.0181	104.6929	58.1994	0.1164		5.0749	5.0749		4.6689	4.6689		11,282.7430	11,282.7430	3.6491		11,373.9697
Total	**10.0181**	**104.6929**	**58.1994**	**0.1164**	**65.5234**	**5.0749**	**70.5982**	**33.6748**	**4.6689**	**38.3437**		**11,282.7430**	**11,282.7430**	**3.6491**		**11,373.9697**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2335	0.1520	2.0714	6.0000e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		606.1663	606.1663	0.0175	0.0157	611.2912
Total	**0.2335**	**0.1520**	**2.0714**	**6.0000e-003**	**0.6572**	**3.7200e-003**	**0.6609**	**0.1743**	**3.4200e-003**	**0.1777**		**606.1663**	**606.1663**	**0.0175**	**0.0157**	**611.2912**

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Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					29.4855	0.0000	29.4855	15.1537	0.0000	15.1537			0.0000			0.0000
Off-Road	10.0181	104.6929	58.1994	0.1164		5.0749	5.0749		4.6689	4.6689	0.0000	11,282.7430	11,282.7430	3.6491		11,373.9697
Total	**10.0181**	**104.6929**	**58.1994**	**0.1164**	**29.4855**	**5.0749**	**34.5604**	**15.1537**	**4.6689**	**19.8225**	**0.0000**	**11,282.7430**	**11,282.7430**	**3.6491**		**11,373.9697**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2335	0.1520	2.0714	6.0000e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		606.1663	606.1663	0.0175	0.0157	611.2912
Total	**0.2335**	**0.1520**	**2.0714**	**6.0000e-003**	**0.6572**	**3.7200e-003**	**0.6609**	**0.1743**	**3.4200e-003**	**0.1777**		**606.1663**	**606.1663**	**0.0175**	**0.0157**	**611.2912**

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3.3 Structure Demolition (bifurcation structure locations only) - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	9.4635	81.9784	92.2877	0.1639		4.0801	4.0801		3.9122	3.9122		15,703.6760	15,703.6760	3.0928		15,780.9970
Total	**9.4635**	**81.9784**	**92.2877**	**0.1639**		**4.0801**	**4.0801**		**3.9122**	**3.9122**		**15,703.6760**	**15,703.6760**	**3.0928**		**15,780.9970**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.1293	40.9276	9.9486	0.1581	4.4074	0.3942	4.8017	1.2081	0.3772	1.5853		17,408.6528	17,408.6528	0.8372	2.7654	18,253.6792
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2335	0.1520	2.0714	6.0000e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		606.1663	606.1663	0.0175	0.0157	611.2912
Total	**1.3628**	**41.0796**	**12.0200**	**0.1641**	**5.0646**	**0.3980**	**5.4626**	**1.3824**	**0.3806**	**1.7630**		**18,014.8190**	**18,014.8190**	**0.8547**	**2.7812**	**18,864.9704**

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Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	9.4635	81.9784	92.2877	0.1639		4.0801	4.0801		3.9122	3.9122	0.0000	15,703.6760	15,703.6760	3.0928		15,780.9969
Total	**9.4635**	**81.9784**	**92.2877**	**0.1639**		**4.0801**	**4.0801**		**3.9122**	**3.9122**	**0.0000**	**15,703.6760**	**15,703.6760**	**3.0928**		**15,780.9969**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.1293	40.9276	9.9486	0.1581	4.4074	0.3942	4.8017	1.2081	0.3772	1.5853		17,408.6528	17,408.6528	0.8372	2.7654	18,253.6792
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2335	0.1520	2.0714	6.0000e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		606.1663	606.1663	0.0175	0.0157	611.2912
Total	**1.3628**	**41.0796**	**12.0200**	**0.1641**	**5.0646**	**0.3980**	**5.4626**	**1.3824**	**0.3806**	**1.7630**		**18,014.8190**	**18,014.8190**	**0.8547**	**2.7812**	**18,864.9704**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.4 Excavation and portal development - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	7.4011	76.3689	73.8542	0.1405		3.4977	3.4977		3.2179	3.2179		13,600.8457	13,600.8457	4.3988		13,710.8155
Total	**7.4011**	**76.3689**	**73.8542**	**0.1405**	**0.0000**	**3.4977**	**3.4977**	**0.0000**	**3.2179**	**3.2179**		**13,600.8457**	**13,600.8457**	**4.3988**		**13,710.8155**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Hauling	0.5226	18.9371	4.6032	0.0732	2.0393	0.1824	2.2217	0.5590	0.1745	0.7335		8,054.9560	8,054.9560	0.3874	1.2796	8,445.9484
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2335	0.1520	2.0714	6.0000e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		606.1663	606.1663	0.0175	0.0157	611.2912
Total	**0.7560**	**19.0891**	**6.6746**	**0.0792**	**2.6965**	**0.1861**	**2.8826**	**0.7333**	**0.1779**	**0.9112**		**8,661.1223**	**8,661.1223**	**0.4049**	**1.2953**	**9,057.2396**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	7.4011	76.3689	73.8542	0.1405		3.4977	3.4977		3.2179	3.2179	0.0000	13,600.8457	13,600.8457	4.3988		13,710.8154
Total	**7.4011**	**76.3689**	**73.8542**	**0.1405**	**0.0000**	**3.4977**	**3.4977**	**0.0000**	**3.2179**	**3.2179**	**0.0000**	**13,600.8457**	**13,600.8457**	**4.3988**		**13,710.8154**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5226	18.9371	4.6032	0.0732	2.0393	0.1824	2.2217	0.5590	0.1745	0.7335		8,054.9560	8,054.9560	0.3874	1.2796	8,445.9484
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2335	0.1520	2.0714	6.0000e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		606.1663	606.1663	0.0175	0.0157	611.2912
Total	**0.7560**	**19.0891**	**6.6746**	**0.0792**	**2.6965**	**0.1861**	**2.8826**	**0.7333**	**0.1779**	**0.9112**		**8,661.1223**	**8,661.1223**	**0.4049**	**1.2953**	**9,057.2396**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.5 Tunnel slip lining - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	13.6295	101.6307	120.8079	0.2086		4.9162	4.9162		4.8883	4.8883		19,042.0364	19,042.0364	1.5114		19,079.8217
Total	**13.6295**	**101.6307**	**120.8079**	**0.2086**		**4.9162**	**4.9162**		**4.8883**	**4.8883**		**19,042.0364**	**19,042.0364**	**1.5114**		**19,079.8217**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0178	0.4255	0.1423	1.7100e-003	0.0542	4.6300e-003	0.0588	0.0156	4.4200e-003	0.0200		183.8605	183.8605	5.5900e-003	0.0267	191.9531
Worker	0.4670	0.3040	4.1429	0.0120	1.3144	7.4300e-003	1.3218	0.3486	6.8400e-003	0.3555		1,212.3326	1,212.3326	0.0350	0.0315	1,222.5824
Total	**0.4848**	**0.7294**	**4.2852**	**0.0137**	**1.3685**	**0.0121**	**1.3806**	**0.3642**	**0.0113**	**0.3755**		**1,396.1931**	**1,396.1931**	**0.0406**	**0.0582**	**1,414.5355**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	13.6295	101.6307	120.8079	0.2086		4.9162	4.9162		4.8883	4.8883	0.0000	19,042.0364	19,042.0364	1.5114		19,079.8217
Total	**13.6295**	**101.6307**	**120.8079**	**0.2086**		**4.9162**	**4.9162**		**4.8883**	**4.8883**	**0.0000**	**19,042.0364**	**19,042.0364**	**1.5114**		**19,079.8217**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0178	0.4255	0.1423	1.7100e-003	0.0542	4.6300e-003	0.0588	0.0156	4.4200e-003	0.0200		183.8605	183.8605	5.5900e-003	0.0267	191.9531
Worker	0.4670	0.3040	4.1429	0.0120	1.3144	7.4300e-003	1.3218	0.3486	6.8400e-003	0.3555		1,212.3326	1,212.3326	0.0350	0.0315	1,222.5824
Total	**0.4848**	**0.7294**	**4.2852**	**0.0137**	**1.3685**	**0.0121**	**1.3806**	**0.3642**	**0.0113**	**0.3755**		**1,396.1931**	**1,396.1931**	**0.0406**	**0.0582**	**1,414.5355**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.6 Bifurcation structure replacement - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.7932	48.0304	46.1632	0.0886		2.1845	2.1845		2.0166	2.0166		8,463.6053	8,463.6053	2.6707		8,530.3739
Total	**4.7932**	**48.0304**	**46.1632**	**0.0886**		**2.1845**	**2.1845**		**2.0166**	**2.0166**		**8,463.6053**	**8,463.6053**	**2.6707**		**8,530.3739**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2335	0.1520	2.0714	6.0000e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		606.1663	606.1663	0.0175	0.0157	611.2912
Total	**0.2335**	**0.1520**	**2.0714**	**6.0000e-003**	**0.6572**	**3.7200e-003**	**0.6609**	**0.1743**	**3.4200e-003**	**0.1777**		**606.1663**	**606.1663**	**0.0175**	**0.0157**	**611.2912**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.7932	48.0304	46.1632	0.0886		2.1845	2.1845		2.0166	2.0166	0.0000	8,463.6053	8,463.6053	2.6707		8,530.3738
Total	**4.7932**	**48.0304**	**46.1632**	**0.0886**		**2.1845**	**2.1845**		**2.0166**	**2.0166**	**0.0000**	**8,463.6053**	**8,463.6053**	**2.6707**		**8,530.3738**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2335	0.1520	2.0714	6.0000e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		606.1663	606.1663	0.0175	0.0157	611.2912
Total	**0.2335**	**0.1520**	**2.0714**	**6.0000e-003**	**0.6572**	**3.7200e-003**	**0.6609**	**0.1743**	**3.4200e-003**	**0.1777**		**606.1663**	**606.1663**	**0.0175**	**0.0157**	**611.2912**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.6 Bifurcation structure replacement - 2023

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Off-Road	4.5012	43.6081	45.7912	0.0886		1.9516	1.9516		1.8023	1.8023		8,466.1062	8,466.1062	2.6716		8,532.8949
Total	**4.5012**	**43.6081**	**45.7912**	**0.0886**		**1.9516**	**1.9516**		**1.8023**	**1.8023**		**8,466.1062**	**8,466.1062**	**2.6716**		**8,532.8949**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2186	0.1358	1.9199	5.8100e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		586.9312	586.9312	0.0159	0.0146	591.6890
Total	**0.2186**	**0.1358**	**1.9199**	**5.8100e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**586.9312**	**586.9312**	**0.0159**	**0.0146**	**591.6890**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.5012	43.6081	45.7912	0.0886		1.9516	1.9516		1.8023	1.8023	0.0000	8,466.1061	8,466.1061	2.6716		8,532.8949
Total	**4.5012**	**43.6081**	**45.7912**	**0.0886**		**1.9516**	**1.9516**		**1.8023**	**1.8023**	**0.0000**	**8,466.1061**	**8,466.1061**	**2.6716**		**8,532.8949**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2186	0.1358	1.9199	5.8100e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		586.9312	586.9312	0.0159	0.0146	591.6890
Total	**0.2186**	**0.1358**	**1.9199**	**5.8100e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**586.9312**	**586.9312**	**0.0159**	**0.0146**	**591.6890**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.7 Manway construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	11.9784	104.8556	106.2844	0.2734		4.4061	4.4061		4.0536	4.0536		26,467.8932	26,467.8932	8.5603		26,681.8995
Total	**11.9784**	**104.8556**	**106.2844**	**0.2734**		**4.4061**	**4.4061**		**4.0536**	**4.0536**		**26,467.8932**	**26,467.8932**	**8.5603**		**26,681.8995**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2186	0.1358	1.9199	5.8100e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		586.9312	586.9312	0.0159	0.0146	591.6890
Total	**0.2186**	**0.1358**	**1.9199**	**5.8100e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**586.9312**	**586.9312**	**0.0159**	**0.0146**	**591.6890**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	11.9784	104.8556	106.2844	0.2734		4.4061	4.4061		4.0536	4.0536	0.0000	26,467.8932	26,467.8932	8.5603		26,681.8995
Total	**11.9784**	**104.8556**	**106.2844**	**0.2734**		**4.4061**	**4.4061**		**4.0536**	**4.0536**	**0.0000**	**26,467.8932**	**26,467.8932**	**8.5603**		**26,681.8995**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2186	0.1358	1.9199	5.8100e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		586.9312	586.9312	0.0159	0.0146	591.6890
Total	**0.2186**	**0.1358**	**1.9199**	**5.8100e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**586.9312**	**586.9312**	**0.0159**	**0.0146**	**591.6890**

CalEEMod Version: CalEEMod.2020.4.0

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.8 Tunnel spray-on polymer application - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	1.6843	13.3587	18.2526	0.0316		0.6681	0.6681		0.6681	0.6681		2,994.8959	2,994.8959	0.1496		2,998.6353
Total	**1.6843**	**13.3587**	**18.2526**	**0.0316**		**0.6681**	**0.6681**		**0.6681**	**0.6681**		**2,994.8959**	**2,994.8959**	**0.1496**		**2,998.6353**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.4373	0.2715	3.8398	0.0116	1.3144	7.0500e-003	1.3214	0.3486	6.4900e-003	0.3551		1,173.8625	1,173.8625	0.0318	0.0293	1,183.3780
Total	**0.4373**	**0.2715**	**3.8398**	**0.0116**	**1.3144**	**7.0500e-003**	**1.3214**	**0.3486**	**6.4900e-003**	**0.3551**		**1,173.8625**	**1,173.8625**	**0.0318**	**0.0293**	**1,183.3780**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	1.6843	13.3587	18.2526	0.0316		0.6681	0.6681		0.6681	0.6681	0.0000	2,994.8959	2,994.8959	0.1496		2,998.6353
Total	**1.6843**	**13.3587**	**18.2526**	**0.0316**		**0.6681**	**0.6681**		**0.6681**	**0.6681**	**0.0000**	**2,994.8959**	**2,994.8959**	**0.1496**		**2,998.6353**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.4373	0.2715	3.8398	0.0116	1.3144	7.0500e-003	1.3214	0.3486	6.4900e-003	0.3551		1,173.8625	1,173.8625	0.0318	0.0293	1,183.3780
Total	**0.4373**	**0.2715**	**3.8398**	**0.0116**	**1.3144**	**7.0500e-003**	**1.3214**	**0.3486**	**6.4900e-003**	**0.3551**		**1,173.8625**	**1,173.8625**	**0.0318**	**0.0293**	**1,183.3780**

CalEEMod Version: CalEEMod.2020.4.0

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.9 Site finishing and architectural coatings - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	5.6142	44.5290	60.8419	0.1054		2.2270	2.2270		2.2270	2.2270		9,982.9863	9,982.9863	0.4986		9,995.4511
Total	**5.6142**	**44.5290**	**60.8419**	**0.1054**		**2.2270**	**2.2270**		**2.2270**	**2.2270**		**9,982.9863**	**9,982.9863**	**0.4986**		**9,995.4511**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2186	0.1358	1.9199	5.8100e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		586.9312	586.9312	0.0159	0.0146	591.6890
Total	**0.2186**	**0.1358**	**1.9199**	**5.8100e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**586.9312**	**586.9312**	**0.0159**	**0.0146**	**591.6890**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	5.6142	44.5290	60.8419	0.1054		2.2270	2.2270		2.2270	2.2270	0.0000	9,982.9863	9,982.9863	0.4986		9,995.4511
Total	**5.6142**	**44.5290**	**60.8419**	**0.1054**		**2.2270**	**2.2270**		**2.2270**	**2.2270**	**0.0000**	**9,982.9863**	**9,982.9863**	**0.4986**		**9,995.4511**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2186	0.1358	1.9199	5.8100e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		586.9312	586.9312	0.0159	0.0146	591.6890
Total	**0.2186**	**0.1358**	**1.9199**	**5.8100e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**586.9312**	**586.9312**	**0.0159**	**0.0146**	**591.6890**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.10 Habitat and site restoration - 2023

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Fugitive Dust					65.5234	0.0000	65.5234	33.6748	0.0000	33.6748			0.0000			0.0000
Off-Road	16.9240	142.6295	96.8333	0.3498		5.7895	5.7895		5.3263	5.3263		33,867.7771	33,867.7771	10.9535		34,141.6152
Total	**16.9240**	**142.6295**	**96.8333**	**0.3498**	**65.5234**	**5.7895**	**71.3128**	**33.6748**	**5.3263**	**39.0011**		**33,867.7771**	**33,867.7771**	**10.9535**		**34,141.6152**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2186	0.1358	1.9199	5.8100e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		586.9312	586.9312	0.0159	0.0146	591.6890
Total	**0.2186**	**0.1358**	**1.9199**	**5.8100e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**586.9312**	**586.9312**	**0.0159**	**0.0146**	**591.6890**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					29.4855	0.0000	29.4855	15.1537	0.0000	15.1537			0.0000			0.0000
Off-Road	16.9240	142.6295	96.8333	0.3498		5.7895	5.7895		5.3263	5.3263	0.0000	33,867.7771	33,867.7771	10.9535		34,141.6152
Total	**16.9240**	**142.6295**	**96.8333**	**0.3498**	**29.4855**	**5.7895**	**35.2750**	**15.1537**	**5.3263**	**20.4800**	**0.0000**	**33,867.7771**	**33,867.7771**	**10.9535**		**34,141.6152**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2186	0.1358	1.9199	5.8100e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		586.9312	586.9312	0.0159	0.0146	591.6890
Total	**0.2186**	**0.1358**	**1.9199**	**5.8100e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**586.9312**	**586.9312**	**0.0159**	**0.0146**	**591.6890**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.11 Demobilization - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					lb/day								lb/day			
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	10.0774	71.3580	65.7699	0.2645		2.5802	2.5802		2.3738	2.3738		25,597.7700	25,597.770 0	8.2788		25,804.7410
Total	**10.0774**	**71.3580**	**65.7699**	**0.2645**	**0.0000**	**2.5802**	**2.5802**	**0.0000**	**2.3738**	**2.3738**		**25,597.7700**	**25,597.770 0**	**8.2788**		**25,804.7410**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					lb/day								lb/day			
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2186	0.1358	1.9199	5.8100e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		586.9312	586.9312	0.0159	0.0146	591.6890
Total	**0.2186**	**0.1358**	**1.9199**	**5.8100e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**586.9312**	**586.9312**	**0.0159**	**0.0146**	**591.6890**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	10.0774	71.3580	65.7699	0.2645		2.5802	2.5802		2.3738	2.3738	0.0000	25,597.7700	25,597.7700	8.2788		25,804.7409
Total	**10.0774**	**71.3580**	**65.7699**	**0.2645**	**0.0000**	**2.5802**	**2.5802**	**0.0000**	**2.3738**	**2.3738**	**0.0000**	**25,597.7700**	**25,597.7700**	**8.2788**		**25,804.7409**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2186	0.1358	1.9199	5.8100e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		586.9312	586.9312	0.0159	0.0146	591.6890
Total	**0.2186**	**0.1358**	**1.9199**	**5.8100e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**586.9312**	**586.9312**	**0.0159**	**0.0146**	**591.6890**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

FIRST AQUEDUCT TUNNELS REHABILITATION PROJECT

San Diego County APCD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	12.55	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2024
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	539.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Construction Start date beginning Oct 2022.

Land Use - Total acreage of project area: 12.55 acres

Construction Phase - Construction would begin Oct 2022.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Off-road Equipment - Updated equipment per applicant.

Trips and VMT - Updated trips per applicant.

Construction Off-road Equipment Mitigation - Water twice daily.

Off-road Equipment - Updated equipment per applicant.

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	0	273339
tblAreaCoating	Area_Nonresidential_Interior	0	820017
tblConstructionPhase	NumDays	20.00	40.00
tblConstructionPhase	NumDays	20.00	10.00
tblConstructionPhase	NumDays	300.00	50.00
tblConstructionPhase	NumDays	300.00	20.00
tblConstructionPhase	NumDays	300.00	3.00
tblConstructionPhase	NumDays	20.00	5.00
tblConstructionPhase	NumDays	30.00	5.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	10.00	2.00
tblConstructionPhase	NumDays	10.00	3.00
tblLandUse	LotAcreage	0.00	12.55
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	20.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	3.00

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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	10.00
tblOffRoadEquipment	PhaseName		Tunnel slip lining
tblOffRoadEquipment	PhaseName		Bifurcation structure replacement
tblOffRoadEquipment	PhaseName		Tunnel slip lining
tblOffRoadEquipment	PhaseName		Structure Demolition (bifurcation structure locations only)
tblOffRoadEquipment	PhaseName		Excavation and portal development
tblOffRoadEquipment	PhaseName		Structure Demolition (bifurcation structure locations only)
tblOffRoadEquipment	PhaseName		Bifurcation structure replacement
tblOffRoadEquipment	PhaseName		Tunnel spray-on polymer application
tblOffRoadEquipment	PhaseName		Site finishing and architectural coatings
tblOffRoadEquipment	PhaseName		Habitat and site restoration
tblOffRoadEquipment	PhaseName		Tunnel slip lining
tblOffRoadEquipment	PhaseName		Structure Demolition (bifurcation structure locations only)
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	PhaseName		Manway construction
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	2.50
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	8.00	24.00

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tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	8.00	24.00
tblTripsAndVMT	HaulingTripNumber	0.00	1,260.00
tblTripsAndVMT	HaulingTripNumber	0.00	583.00
tblTripsAndVMT	HaulingVehicleClass		HHDT
tblTripsAndVMT	VendorTripNumber	0.00	8.00
tblTripsAndVMT	VendorVehicleClass		HDT_Mix
tblTripsAndVMT	WorkerTripNumber	50.00	80.00
tblTripsAndVMT	WorkerTripNumber	50.00	80.00
tblTripsAndVMT	WorkerTripNumber	75.00	80.00
tblTripsAndVMT	WorkerTripNumber	75.00	80.00
tblTripsAndVMT	WorkerTripNumber	0.00	160.00
tblTripsAndVMT	WorkerTripNumber	0.00	80.00
tblTripsAndVMT	WorkerTripNumber	0.00	160.00
tblTripsAndVMT	WorkerTripNumber	0.00	80.00
tblTripsAndVMT	WorkerTripNumber	75.00	80.00
tblTripsAndVMT	WorkerVehicleClass		LD_Mix

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	14.1522	124.6136	124.8825	0.3278	66.1805	5.0786	71.2591	33.8491	4.8995	38.5214	0.0000	33,692.4575	33,692.457 5	4.8040	2.7837	34,620.6858
2023	17.1611	142.7821	108.1088	0.3553	66.1805	5.7930	71.9735	33.8491	5.3296	39.1787	0.0000	34,422.4482	34,422.448 2	10.9705	0.0317	34,701.4255
Maximum	**17.1611**	**142.7821**	**124.8825**	**0.3553**	**66.1805**	**5.7930**	**71.9735**	**33.8491**	**5.3296**	**39.1787**	**0.0000**	**34,422.4482**	**34,422.448 2**	**10.9705**	**2.7837**	**34,701.4255**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	14.1522	124.6136	124.8825	0.3278	30.1427	5.0786	35.2213	15.3280	4.8995	20.0003	0.0000	33,692.4575	33,692.457 5	4.8040	2.7837	34,620.6858
2023	17.1611	142.7821	108.1088	0.3553	30.1427	5.7930	35.9357	15.3280	5.3296	20.6575	0.0000	34,422.4482	34,422.448 2	10.9705	0.0317	34,701.4255
Maximum	**17.1611**	**142.7821**	**124.8825**	**0.3553**	**30.1427**	**5.7930**	**35.9357**	**15.3280**	**5.3296**	**20.6575**	**0.0000**	**34,422.4482**	**34,422.448 2**	**10.9705**	**2.7837**	**34,701.4255**

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	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	54.45	0.00	50.32	54.72	0.00	47.67	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site mobilization, clearing, grubbing, and vegetation removal	Site Preparation	10/3/2022	10/7/2022	5	5	
2	Structure Demolition (bifurcation structure locations only)	Demolition	10/8/2022	10/14/2022	5	5	
3	Excavation and portal development	Grading	10/15/2022	10/21/2022	5	5	
4	Tunnel slip lining	Building Construction	10/22/2022	12/30/2022	5	50	
5	Bifurcation structure replacement	Building Construction	12/31/2022	1/27/2023	5	20	
6	Manway construction	Building Construction	1/28/2023	2/1/2023	5	3	
7	Tunnel spray-on polymer application	Architectural Coating	2/2/2023	3/29/2023	5	40	
8	Site finishing and architectural coatings	Architectural Coating	3/30/2023	4/12/2023	5	10	
9	Habitat and site restoration	Site Preparation	4/13/2023	4/17/2023	5	3	
10	Demobilization	Site Preparation	4/18/2023	4/19/2023	5	2	

Acres of Grading (Site Preparation Phase): 25

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating –

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OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site mobilization, clearing, grubbing, and vegetation removal	Rubber Tired Dozers	10	8.00	247	0.40
Site mobilization, clearing, grubbing, and vegetation removal	Tractors/Loaders/Backhoes	10	8.00	97	0.37
Structure Demolition (bifurcation structure locations only)	Concrete/Industrial Saws	6	8.00	81	0.73
Structure Demolition (bifurcation structure locations only)	Cranes	6	8.00	231	0.29
Structure Demolition (bifurcation structure locations only)	Crushing/Proc. Equipment	6	8.00	85	0.78
Structure Demolition (bifurcation structure locations only)	Excavators	6	8.00	158	0.38
Structure Demolition (bifurcation structure locations only)	Tractors/Loaders/Backhoes	6	8.00	97	0.37
Excavation and portal development	Cranes	10	8.00	231	0.29
Excavation and portal development	Excavators	10	8.00	158	0.38
Excavation and portal development	Tractors/Loaders/Backhoes	10	8.00	97	0.37
Tunnel slip lining	Cement and Mortar Mixers	3	18.00	9	0.56
Tunnel slip lining	Concrete/Industrial Saws	3	12.00	81	0.73
Tunnel slip lining	Cranes	3	2.50	231	0.29
Tunnel slip lining	Generator Sets	6	24.00	84	0.74
Tunnel slip lining	Other Construction Equipment	3	2.50	172	0.42
Tunnel slip lining	Welders	6	24.00	46	0.45
Bifurcation structure replacement	Cement and Mortar Mixers	6	8.00	9	0.56
Bifurcation structure replacement	Cranes	6	8.00	231	0.29
Bifurcation structure replacement	Excavators	6	8.00	158	0.38
Bifurcation structure replacement	Tractors/Loaders/Backhoes	6	8.00	97	0.37
Tunnel spray-on polymer application	Air Compressors	3	8.00	78	0.48
Tunnel spray-on polymer application	Generator Sets	3	8.00	84	0.74
Site finishing and architectural coatings	Air Compressors	10	8.00	78	0.48

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Site finishing and architectural coatings	Generator Sets		10	8.00	84	0.74
Habitat and site restoration	Off-Highway Trucks		20	8.00	402	0.38
Habitat and site restoration	Rubber Tired Dozers		10	8.00	247	0.40
Demobilization	Off-Highway Trucks		20	8.00	402	0.38
Manway construction	Excavators		10	8.00	158	0.38
Manway construction	Tractors/Loaders/Backhoes		10	8.00	97	0.37
Manway construction	Cranes		10	8.00	231	0.29
Manway construction	Off-Highway Trucks		10	8.00	402	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site mobilization, clearing, grubbing, and	20	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Structure Demolition (bifurcation structure	30	80.00	0.00	1,260.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Excavation and portal development	30	80.00	0.00	583.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Tunnel slip lining	24	160.00	8.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Bifurcation structure replacement	24	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Manway construction	0	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Tunnel spray-on polymer application	6	160.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site finishing and architectural coatings	20	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Habitat and site restoration	30	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demobilization	20	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site mobilization, clearing, grubbing, and vegetation removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Fugitive Dust					65.5234	0.0000	65.5234	33.6748	0.0000	33.6748			0.0000			0.0000
Off-Road	10.0181	104.6929	58.1994	0.1164		5.0749	5.0749		4.6689	4.6689		11,282.7430	11,282.7430	3.6491		11,373.9697
Total	**10.0181**	**104.6929**	**58.1994**	**0.1164**	**65.5234**	**5.0749**	**70.5982**	**33.6748**	**4.6689**	**38.3437**		**11,282.7430**	**11,282.7430**	**3.6491**		**11,373.9697**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2525	0.1709	1.9640	5.6700e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		572.7571	572.7571	0.0186	0.0170	578.2927
Total	**0.2525**	**0.1709**	**1.9640**	**5.6700e-003**	**0.6572**	**3.7200e-003**	**0.6609**	**0.1743**	**3.4200e-003**	**0.1777**		**572.7571**	**572.7571**	**0.0186**	**0.0170**	**578.2927**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					29.4855	0.0000	29.4855	15.1537	0.0000	15.1537			0.0000			0.0000
Off-Road	10.0181	104.6929	58.1994	0.1164		5.0749	5.0749		4.6689	4.6689	0.0000	11,282.7430	11,282.7430	3.6491		11,373.9697
Total	**10.0181**	**104.6929**	**58.1994**	**0.1164**	**29.4855**	**5.0749**	**34.5604**	**15.1537**	**4.6689**	**19.8225**	**0.0000**	**11,282.7430**	**11,282.7430**	**3.6491**		**11,373.9697**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2525	0.1709	1.9640	5.6700e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		572.7571	572.7571	0.0186	0.0170	578.2927
Total	**0.2525**	**0.1709**	**1.9640**	**5.6700e-003**	**0.6572**	**3.7200e-003**	**0.6609**	**0.1743**	**3.4200e-003**	**0.1777**		**572.7571**	**572.7571**	**0.0186**	**0.0170**	**578.2927**

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3.3 Structure Demolition (bifurcation structure locations only) - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	9.4635	81.9784	92.2877	0.1639		4.0801	4.0801		3.9122	3.9122		15,703.6760	15,703.6760	3.0928		15,780.9970
Total	**9.4635**	**81.9784**	**92.2877**	**0.1639**		**4.0801**	**4.0801**		**3.9122**	**3.9122**		**15,703.6760**	**15,703.6760**	**3.0928**		**15,780.9970**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.1004	42.4642	10.1001	0.1582	4.4074	0.3949	4.8023	1.2081	0.3778	1.5859		17,416.0244	17,416.0244	0.8355	2.7667	18,261.3961
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2525	0.1709	1.9640	5.6700e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		572.7571	572.7571	0.0186	0.0170	578.2927
Total	**1.3529**	**42.6352**	**12.0641**	**0.1639**	**5.0646**	**0.3986**	**5.4632**	**1.3824**	**0.3812**	**1.7636**		**17,988.7815**	**17,988.7815**	**0.8541**	**2.7837**	**18,839.6889**

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Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	9.4635	81.9784	92.2877	0.1639		4.0801	4.0801		3.9122	3.9122	0.0000	15,703.6760	15,703.6760	3.0928		15,780.9969
Total	**9.4635**	**81.9784**	**92.2877**	**0.1639**		**4.0801**	**4.0801**		**3.9122**	**3.9122**	**0.0000**	**15,703.6760**	**15,703.6760**	**3.0928**		**15,780.9969**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.1004	42.4642	10.1001	0.1582	4.4074	0.3949	4.8023	1.2081	0.3778	1.5859		17,416.0244	17,416.0244	0.8355	2.7667	18,261.3961
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2525	0.1709	1.9640	5.6700e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		572.7571	572.7571	0.0186	0.0170	578.2927
Total	**1.3529**	**42.6352**	**12.0641**	**0.1639**	**5.0646**	**0.3986**	**5.4632**	**1.3824**	**0.3812**	**1.7636**		**17,988.7815**	**17,988.7815**	**0.8541**	**2.7837**	**18,839.6889**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.4 Excavation and portal development - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	7.4011	76.3689	73.8542	0.1405		3.4977	3.4977		3.2179	3.2179		13,600.8457	13,600.8457	4.3988		13,710.8155
Total	**7.4011**	**76.3689**	**73.8542**	**0.1405**	**0.0000**	**3.4977**	**3.4977**	**0.0000**	**3.2179**	**3.2179**		**13,600.8457**	**13,600.8457**	**4.3988**		**13,710.8155**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5091	19.6481	4.6733	0.0732	2.0393	0.1827	2.2220	0.5590	0.1748	0.7338		8,058.3669	8,058.3669	0.3866	1.2802	8,449.5190
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2525	0.1709	1.9640	5.6700e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		572.7571	572.7571	0.0186	0.0170	578.2927
Total	**0.7617**	**19.8191**	**6.6373**	**0.0789**	**2.6965**	**0.1864**	**2.8829**	**0.7333**	**0.1782**	**0.9115**		**8,631.1239**	**8,631.1239**	**0.4052**	**1.2972**	**9,027.8118**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	7.4011	76.3689	73.8542	0.1405		3.4977	3.4977		3.2179	3.2179	0.0000	13,600.8457	13,600.8457	4.3988		13,710.8154
Total	**7.4011**	**76.3689**	**73.8542**	**0.1405**	**0.0000**	**3.4977**	**3.4977**	**0.0000**	**3.2179**	**3.2179**	**0.0000**	**13,600.8457**	**13,600.8457**	**4.3988**		**13,710.8154**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5091	19.6481	4.6733	0.0732	2.0393	0.1827	2.2220	0.5590	0.1748	0.7338		8,058.3669	8,058.3669	0.3866	1.2802	8,449.5190
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2525	0.1709	1.9640	5.6700e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		572.7571	572.7571	0.0186	0.0170	578.2927
Total	**0.7617**	**19.8191**	**6.6373**	**0.0789**	**2.6965**	**0.1864**	**2.8829**	**0.7333**	**0.1782**	**0.9115**		**8,631.1239**	**8,631.1239**	**0.4052**	**1.2972**	**9,027.8118**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.5 Tunnel slip lining - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	13.6295	101.6307	120.8079	0.2086		4.9162	4.9162		4.8883	4.8883		19,042.0364	19,042.0364	1.5114		19,079.8217
Total	**13.6295**	**101.6307**	**120.8079**	**0.2086**		**4.9162**	**4.9162**		**4.8883**	**4.8883**		**19,042.0364**	**19,042.0364**	**1.5114**		**19,079.8217**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0177	0.4415	0.1467	1.7100e-003	0.0542	4.6400e-003	0.0588	0.0156	4.4400e-003	0.0200		183.9549	183.9549	5.5700e-003	0.0267	192.0582
Worker	0.5051	0.3419	3.9279	0.0113	1.3144	7.4300e-003	1.3218	0.3486	6.8400e-003	0.3555		1,145.5142	1,145.5142	0.0372	0.0340	1,156.5855
Total	**0.5227**	**0.7834**	**4.0746**	**0.0130**	**1.3685**	**0.0121**	**1.3806**	**0.3642**	**0.0113**	**0.3755**		**1,329.4691**	**1,329.4691**	**0.0428**	**0.0608**	**1,348.6437**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	13.6295	101.6307	120.8079	0.2086		4.9162	4.9162		4.8883	4.8883	0.0000	19,042.0364	19,042.0364	1.5114		19,079.8217
Total	**13.6295**	**101.6307**	**120.8079**	**0.2086**		**4.9162**	**4.9162**		**4.8883**	**4.8883**	**0.0000**	**19,042.0364**	**19,042.0364**	**1.5114**		**19,079.8217**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0177	0.4415	0.1467	1.7100e-003	0.0542	4.6400e-003	0.0588	0.0156	4.4400e-003	0.0200		183.9549	183.9549	5.5700e-003	0.0267	192.0582
Worker	0.5051	0.3419	3.9279	0.0113	1.3144	7.4300e-003	1.3218	0.3486	6.8400e-003	0.3555		1,145.5142	1,145.5142	0.0372	0.0340	1,156.5855
Total	**0.5227**	**0.7834**	**4.0746**	**0.0130**	**1.3685**	**0.0121**	**1.3806**	**0.3642**	**0.0113**	**0.3755**		**1,329.4691**	**1,329.4691**	**0.0428**	**0.0608**	**1,348.6437**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.6 Bifurcation structure replacement - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.7932	48.0304	46.1632	0.0886		2.1845	2.1845		2.0166	2.0166		8,463.6053	8,463.6053	2.6707		8,530.3739
Total	**4.7932**	**48.0304**	**46.1632**	**0.0886**		**2.1845**	**2.1845**		**2.0166**	**2.0166**		**8,463.6053**	**8,463.6053**	**2.6707**		**8,530.3739**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2525	0.1709	1.9640	5.6700e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		572.7571	572.7571	0.0186	0.0170	578.2927
Total	**0.2525**	**0.1709**	**1.9640**	**5.6700e-003**	**0.6572**	**3.7200e-003**	**0.6609**	**0.1743**	**3.4200e-003**	**0.1777**		**572.7571**	**572.7571**	**0.0186**	**0.0170**	**578.2927**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.7932	48.0304	46.1632	0.0886		2.1845	2.1845		2.0166	2.0166	0.0000	8,463.6053	8,463.6053	2.6707		8,530.3738
Total	**4.7932**	**48.0304**	**46.1632**	**0.0886**		**2.1845**	**2.1845**		**2.0166**	**2.0166**	**0.0000**	**8,463.6053**	**8,463.6053**	**2.6707**		**8,530.3738**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2525	0.1709	1.9640	5.6700e-003	0.6572	3.7200e-003	0.6609	0.1743	3.4200e-003	0.1777		572.7571	572.7571	0.0186	0.0170	578.2927
Total	**0.2525**	**0.1709**	**1.9640**	**5.6700e-003**	**0.6572**	**3.7200e-003**	**0.6609**	**0.1743**	**3.4200e-003**	**0.1777**		**572.7571**	**572.7571**	**0.0186**	**0.0170**	**578.2927**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.6 Bifurcation structure replacement - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.5012	43.6081	45.7912	0.0886		1.9516	1.9516		1.8023	1.8023		8,466.1062	8,466.1062	2.6716		8,532.8949
Total	**4.5012**	**43.6081**	**45.7912**	**0.0886**		**1.9516**	**1.9516**		**1.8023**	**1.8023**		**8,466.1062**	**8,466.1062**	**2.6716**		**8,532.8949**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2371	0.1527	1.8244	5.4900e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		554.6711	554.6711	0.0169	0.0158	559.8103
Total	**0.2371**	**0.1527**	**1.8244**	**5.4900e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**554.6711**	**554.6711**	**0.0169**	**0.0158**	**559.8103**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.5012	43.6081	45.7912	0.0886		1.9516	1.9516		1.8023	1.8023	0.0000	8,466.1061	8,466.1061	2.6716		8,532.8949
Total	**4.5012**	**43.6081**	**45.7912**	**0.0886**		**1.9516**	**1.9516**		**1.8023**	**1.8023**	**0.0000**	**8,466.1061**	**8,466.1061**	**2.6716**		**8,532.8949**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2371	0.1527	1.8244	5.4900e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		554.6711	554.6711	0.0169	0.0158	559.8103
Total	**0.2371**	**0.1527**	**1.8244**	**5.4900e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**554.6711**	**554.6711**	**0.0169**	**0.0158**	**559.8103**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.7 Manway construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	11.9784	104.8556	106.2844	0.2734		4.4061	4.4061		4.0536	4.0536		26,467.8932	26,467.8932	8.5603		26,681.8995
Total	**11.9784**	**104.8556**	**106.2844**	**0.2734**		**4.4061**	**4.4061**		**4.0536**	**4.0536**		**26,467.8932**	**26,467.8932**	**8.5603**		**26,681.8995**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2371	0.1527	1.8244	5.4900e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		554.6711	554.6711	0.0169	0.0158	559.8103
Total	**0.2371**	**0.1527**	**1.8244**	**5.4900e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**554.6711**	**554.6711**	**0.0169**	**0.0158**	**559.8103**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	11.9784	104.8556	106.2844	0.2734		4.4061	4.4061		4.0536	4.0536	0.0000	26,467.8932	26,467.8932	8.5603		26,681.8995
Total	**11.9784**	**104.8556**	**106.2844**	**0.2734**		**4.4061**	**4.4061**		**4.0536**	**4.0536**	**0.0000**	**26,467.8932**	**26,467.8932**	**8.5603**		**26,681.8995**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2371	0.1527	1.8244	5.4900e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		554.6711	554.6711	0.0169	0.0158	559.8103
Total	**0.2371**	**0.1527**	**1.8244**	**5.4900e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**554.6711**	**554.6711**	**0.0169**	**0.0158**	**559.8103**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.8 Tunnel spray-on polymer application - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	1.6843	13.3587	18.2526	0.0316		0.6681	0.6681		0.6681	0.6681		2,994.8959	2,994.8959	0.1496		2,998.6353
Total	**1.6843**	**13.3587**	**18.2526**	**0.0316**		**0.6681**	**0.6681**		**0.6681**	**0.6681**		**2,994.8959**	**2,994.8959**	**0.1496**		**2,998.6353**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.4741	0.3054	3.6488	0.0110	1.3144	7.0500e-003	1.3214	0.3486	6.4900e-003	0.3551		1,109.3423	1,109.3423	0.0339	0.0317	1,119.6205
Total	**0.4741**	**0.3054**	**3.6488**	**0.0110**	**1.3144**	**7.0500e-003**	**1.3214**	**0.3486**	**6.4900e-003**	**0.3551**		**1,109.3423**	**1,109.3423**	**0.0339**	**0.0317**	**1,119.6205**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	1.6843	13.3587	18.2526	0.0316		0.6681	0.6681		0.6681	0.6681	0.0000	2,994.8959	2,994.8959	0.1496		2,998.6353
Total	**1.6843**	**13.3587**	**18.2526**	**0.0316**		**0.6681**	**0.6681**		**0.6681**	**0.6681**	**0.0000**	**2,994.8959**	**2,994.8959**	**0.1496**		**2,998.6353**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.4741	0.3054	3.6488	0.0110	1.3144	7.0500e-003	1.3214	0.3486	6.4900e-003	0.3551		1,109.3423	1,109.3423	0.0339	0.0317	1,119.6205
Total	**0.4741**	**0.3054**	**3.6488**	**0.0110**	**1.3144**	**7.0500e-003**	**1.3214**	**0.3486**	**6.4900e-003**	**0.3551**		**1,109.3423**	**1,109.3423**	**0.0339**	**0.0317**	**1,119.6205**

CalEEMod Version: CalEEMod.2020.4.0

Date: 8/18/2021 8:41 AM

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.9 Site finishing and architectural coatings - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	5.6142	44.5290	60.8419	0.1054		2.2270	2.2270		2.2270	2.2270		9,982.9863	9,982.9863	0.4986		9,995.4511
Total	**5.6142**	**44.5290**	**60.8419**	**0.1054**		**2.2270**	**2.2270**		**2.2270**	**2.2270**		**9,982.9863**	**9,982.9863**	**0.4986**		**9,995.4511**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2371	0.1527	1.8244	5.4900e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		554.6711	554.6711	0.0169	0.0158	559.8103
Total	**0.2371**	**0.1527**	**1.8244**	**5.4900e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**554.6711**	**554.6711**	**0.0169**	**0.0158**	**559.8103**

CalEEMod Version: CalEEMod.2020.4.0

Date: 8/18/2021 8:41 AM

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	5.6142	44.5290	60.8419	0.1054		2.2270	2.2270		2.2270	2.2270	0.0000	9,982.9863	9,982.9863	0.4986		9,995.4511
Total	**5.6142**	**44.5290**	**60.8419**	**0.1054**		**2.2270**	**2.2270**		**2.2270**	**2.2270**	**0.0000**	**9,982.9863**	**9,982.9863**	**0.4986**		**9,995.4511**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2371	0.1527	1.8244	5.4900e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		554.6711	554.6711	0.0169	0.0158	559.8103
Total	**0.2371**	**0.1527**	**1.8244**	**5.4900e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**554.6711**	**554.6711**	**0.0169**	**0.0158**	**559.8103**

CalEEMod Version: CalEEMod.2020.4.0

Date: 8/18/2021 8:41 AM

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.10 Habitat and site restoration - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					65.5234	0.0000	65.5234	33.6748	0.0000	33.6748			0.0000			0.0000
Off-Road	16.9240	142.6295	96.8333	0.3498		5.7895	5.7895		5.3263	5.3263		33,867.7771	33,867.7771	10.9535		34,141.6152
Total	**16.9240**	**142.6295**	**96.8333**	**0.3498**	**65.5234**	**5.7895**	**71.3128**	**33.6748**	**5.3263**	**39.0011**		**33,867.7771**	**33,867.7771**	**10.9535**		**34,141.6152**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2371	0.1527	1.8244	5.4900e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		554.6711	554.6711	0.0169	0.0158	559.8103
Total	**0.2371**	**0.1527**	**1.8244**	**5.4900e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**554.6711**	**554.6711**	**0.0169**	**0.0158**	**559.8103**

CalEEMod Version: CalEEMod.2020.4.0

Date: 8/18/2021 8:41 AM

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					29.4855	0.0000	29.4855	15.1537	0.0000	15.1537			0.0000			0.0000
Off-Road	16.9240	142.6295	96.8333	0.3498		5.7895	5.7895		5.3263	5.3263	0.0000	33,867.7771	33,867.7771	10.9535		34,141.6152
Total	**16.9240**	**142.6295**	**96.8333**	**0.3498**	**29.4855**	**5.7895**	**35.2750**	**15.1537**	**5.3263**	**20.4800**	**0.0000**	**33,867.7771**	**33,867.7771**	**10.9535**		**34,141.6152**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2371	0.1527	1.8244	5.4900e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		554.6711	554.6711	0.0169	0.0158	559.8103
Total	**0.2371**	**0.1527**	**1.8244**	**5.4900e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**554.6711**	**554.6711**	**0.0169**	**0.0158**	**559.8103**

CalEEMod Version: CalEEMod.2020.4.0

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.11 Demobilization - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	10.0774	71.3580	65.7699	0.2645		2.5802	2.5802		2.3738	2.3738		25,597.7700	25,597.7700	8.2788		25,804.7410
Total	**10.0774**	**71.3580**	**65.7699**	**0.2645**	**0.0000**	**2.5802**	**2.5802**	**0.0000**	**2.3738**	**2.3738**		**25,597.7700**	**25,597.7700**	**8.2788**		**25,804.7410**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2371	0.1527	1.8244	5.4900e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		554.6711	554.6711	0.0169	0.0158	559.8103
Total	**0.2371**	**0.1527**	**1.8244**	**5.4900e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**554.6711**	**554.6711**	**0.0169**	**0.0158**	**559.8103**

CalEEMod Version: CalEEMod.2020.4.0

Date: 8/18/2021 8:41 AM

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	10.0774	71.3580	65.7699	0.2645		2.5802	2.5802		2.3738	2.3738	0.0000	25,597.7700	25,597.7700	8.2788		25,804.7409
Total	**10.0774**	**71.3580**	**65.7699**	**0.2645**	**0.0000**	**2.5802**	**2.5802**	**0.0000**	**2.3738**	**2.3738**	**0.0000**	**25,597.7700**	**25,597.7700**	**8.2788**		**25,804.7409**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2371	0.1527	1.8244	5.4900e-003	0.6572	3.5200e-003	0.6607	0.1743	3.2400e-003	0.1776		554.6711	554.6711	0.0169	0.0158	559.8103
Total	**0.2371**	**0.1527**	**1.8244**	**5.4900e-003**	**0.6572**	**3.5200e-003**	**0.6607**	**0.1743**	**3.2400e-003**	**0.1776**		**554.6711**	**554.6711**	**0.0169**	**0.0158**	**559.8103**

Construction

Hours of Operation for Construction Equipment

FIRST AQUEDUCT TUNNELS REHABILITATION PROJECT	**Equipment Type**	**Number of Equipment**	**Hours/day**	**Phase Duration**	**Hours of Equipmment Use**	**Phase Totals**	**MTCO2**
Site mobilization, clearing, grubbing, and vegetation removal	Rubber Tired Dozers	10	8	5	400		
	Tractors/Loaders/Backhoes	10	8	5	400		
Total		**20**				**800**	**25.59**
Structure Demolition (bifurcation structure locations only)	Concrete/Industrial Saws	6	8	5	240		
	Cranes	6	8	5	240		
	Crushing Equipment	6	8	5	240		
	Excavators	6	8	5	240		
	Tractors/Loaders/Backhoes	6	8	5	240		
Total		**30**				**1,200**	**35.62**
Excavation and portal development	Cranes	10	8	5	400		
	Excavators	10	8	5	400		
	Tractors/Loaders/Backhoes	10	8	5	400		
Total		**30**				**1,200**	**30.85**
Tunnel slip lining	Cement and mortar mixers	3	8	50	1,200		
	Concrete/Industrial Saws	3	8	50	1,200		
	Cranes	3	8	50	1,200		
	Generator Sets	6	8	50	2,400		
	Other Construction Equipment	3	8	50	1,200		
	Welders	6	8	50	2,400		
Total		**24**				**9,600**	**431.87**
Bifurcation structure replacement	Cement and mortar mixers	6	8	20	960		
	Cranes	6	8	20	960		
	Excavators	6	8	20	960		
	Tractors/Loaders/Backhoes	6	8	20	960		
Total		**24**				**3,840**	**76.80**
Manway construction	Excavators	10	8	3	240		
	Tractors/Loaders/Backhoes	10	8	3	240		
	Cranes	10	8	3	240		
	Tractors/Loaders/Backhoes	10	8	3	240		
Total		**40**				**960**	**36.02**
Tunnel spray-on polymer application	Air Compressors	3	8	40	960		
	Generator Sets	3	8	40	960		
Total		**6**				**1,920**	**54.34**
Site finishing and architectural coatings	Air Compressors	10	8	10	800		
	Generator Sets	10	8	10	800		
Total		**20**				**1,600**	**45.28**
Habitat and site restoration	Off Highway Trucks	**20**	8	3	480		
Total		**20**				**480**	**46.09**
Demobilization	Off Highway Trucks	20	8	2	320		
Total		**20**				**320**	**23.22**
					Total	**21,920**	

Construction Equipment Diesel Demand

Phase	**Pieces of Equipment**	**Equipment CO2 (MT)**	**Kg/CO2/Gallon**	**Gallons**
Site mobilization, clearing, grubbing, and vegetation removal	20	25.59	10.21	2,506.25
Structure Demolition (bifurcation structure locations only)	30	35.62	10.21	3,488.28
Excavation and portal development	30	30.85	10.21	3,021.18
Tunnel slip lining	24	431.87	10.21	42,298.34
Bifurcation structure replacement	24	76.80	10.21	7,522.35
Manway construction	40	36.02	10.21	3,527.91
Tunnel spray-on polymer application	6	54.34	10.21	5,322.09
Site finishing and architectural coatings	10	45.28	10.21	4,435.07
Habitat and site restoration	10	46.09	10.21	4,513.86
Demobilization	20	23.22	10.21	2,274.43
	214	805.6686	**Total**	**78,909.76**

Construction Worker Gasoline Demand

Phase	**Trips**	**Vehicle CO2 (MT)**	**Kg/CO2/Gallon**	**Gallons**
Site mobilization, clearing, grubbing, and vegetation removal	400	1.31	8.78	149.26
Structure Demolition (bifurcation structure locations only)	400	1.31	8.78	149.26
Excavation and portal development	400	1.31	8.78	149.26
Tunnel slip lining	8,000	26.21	8.78	2,985.26
Bifurcation structure replacement	1,600	5.08	8.78	578.19
Manway construction	240	0.76	8.78	86.73
Tunnel spray-on polymer application	6,400	20.31	8.78	2,312.74
Site finishing and architectural coatings	800	2.54	8.78	289.09
Habitat and site restoration	240	0.76	8.78	86.73
Demobilization	160	0.51	8.78	57.82
	18,640	60.09	**Total**	**6,844.35**

Construction Vendor Truck Diesel Demand

Phase	**Trips**	**Vehicle CO2 (MT)**	**Kg/CO2/Gallon**	**Gallons**
Site mobilization, clearing, grubbing, and vegetation removal	0	0.00	10.21	0.00
Structure Demolition (bifurcation structure locations only)	0	0.00	10.21	0.00
Excavation and portal development	0	0.00	10.21	0.00
Tunnel slip lining	400	4.17	10.21	408.50
Bifurcation structure replacement	0	0.00	10.21	0.00
Manway construction	0	0.00	10.21	0.00
Tunnel spray-on polymer application	0	0.00	10.21	0.00
Site finishing and architectural coatings	0	0.00	10.21	0.00
Habitat and site restoration	0	0.00	10.21	0.00
Demobilization	0	0.00	10.21	0.00
	400	4.17	**Total**	**408.50**

Construction Haul Truck Diesel Demand

Phase	**Trips**	**Vehicle CO2 (MT)**	**Kg/CO2/Gallon**	**Gallons**
Site mobilization, clearing, grubbing, and vegetation removal	0	0.00	10.21	0.00
Structure Demolition (bifurcation structure locations only)	1,260	39.49	10.21	3,867.70
Excavation and portal development	583	18.27	10.21	1,789.58
Tunnel slip lining	0	0.00	10.21	0.00
Bifurcation structure replacement	0	0.00	10.21	0.00
Manway construction	0	0.00	10.21	0.00

Tunnel spray-on polymer application	0	0.00	10.21	0.00
Site finishing and architectural coatings	0	0.00	10.21	0.00
Habitat and site restoration	0	0.00	10.21	0.00
Demobilization	14	0.00	10.21	0.00
	1,857	**57.76**		**5,657.28**

Total Diesel	84,975.53
Total Gasoline	6,844.35
	91,819.88

California's Consumption of Petroleum Over Construction Period

		Start	End	
78,600,000	gallons per day	10/3/2022	4/19/2023	198 days
15,562,800,000.00				

0.000033%

Appendix C

Biological Resources Technical Report

Biological Resources Report for the First Aqueduct Treated Water Tunnels Rehabilitation Project

Prepared for:

San Diego County Water Authority
4677 Overland Avenue
San Diego, California 92123
Contact: Sean Paver (spaver@sdcwa.org)

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024
Contact: Patricia Schuyler (pschuyler@dudek.com)

SEPTEMBER 2021

SDCWA Project No.	Q0238	SDCWA Project Name	First Aqueduct Treated Water Tunnels Rehabilitation Project
SDCWA ENV No.	TBD	SDCWA Contract ID/Task No.	061904/28
Associated Permits	2810-2011-001-05; TE03216A-0; waters permits TBD		

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APPENDICES

FIGURES

TABLES

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
BSRA	biologically significant resource area
CDFW	California Department of Fish and Wildlife
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
ESA	Endangered Species Act
FP	Fully Protected
HCP	Habitat Conservation Plan
NCCP	Natural Community Conservation Plan
NWW	non-wetland waters
P1	Pipeline 1
P2	Pipeline 2
PMPP	Programmatic Master Plan Permit
project	Southern First Aqueduct Rehabilitation Project
ROW	right-of-way
RWQCB	Regional Water Quality Control Board
SSC	Species of Special Concern
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
Water Authority	San Diego County Water Authority
WOTUS	water of the United States

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Executive Summary

This Biological Resources Technical Report (report) provides an assessment of existing conditions with respect to biological resources and analysis of potential impacts to those resources associated with the San Diego County Water Authority's (Water Authority) First Aqueduct Treated Water Tunnels Rehabilitation Project (project) located in San Diego County, California. The project would entail rehabilitation of three tunnels along the First San Diego Aqueduct (First Aqueduct) to prevent additional structure deterioration and ensure reliable delivery of quality drinking water. Access to the interior of the tunnels to implement the project would potentially require demolition and replacement of bifurcation structures located at the upstream and downstream ends of each tunnel.

The project-related stretch of the First Aqueduct is approximately 7 miles long in total but includes seven discrete locations (study areas) associated with the Lilac, Red Mountain and Oat Hills tunnels where aboveground bifurcation structures and underground, tunneled pipeline infrastructure would be potentially replaced or rehabilitated. The study areas are all located east of Interstate 15 in northern San Diego County and span from the community of Lilac in the north to just north of the City of Escondido in the south. The project is a "Covered Activity" under the Water Authority's Subregional Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) (SDCWA 2010).

Project planning and design is currently underway, and the resource assessment and impact analysis presented in this report relies on assumptions of potential work areas and likely construction activities developed in coordination with Water Authority engineers. For purposes of conservative analysis, this report assumes all three tunnels would be rehabilitated by the slip-lining method, which may be necessary for engineering purposes, and which would require the largest work area. This method entails inserting sections of liner inside the existing tunnels and joining them together. Access to the interior of the tunnels would be obtained by developing a series of portals, with crews excavating large pits to expose sections of tunnel and cutting open the tunnel. Other methods that may be used for tunnel rehabilitation would require smaller areas of disturbance.

Eleven potential portal locations have been identified, including each of the six bifurcation structure locations, two mid-tunnel locations on the Lilac Tunnel, and three mid-tunnel locations on the Red Mountain Tunnel. Access to the tunnel at the bifurcation structures would require demolishing the existing structure and in-place replacement of the structures after the completion of the tunnel rehabilitation work. A staging and laydown yard has been identified along the Lilac Tunnel right-of-way, between two of the portal sites. In addition, new manways would be installed at the five proposed portal locations along the Lilac and Red Mountain Tunnels to enable future personnel access inside the tunnels for maintenance and inspection; two would be installed on the Lilac Tunnel and three on the Red Mountain Tunnel. A new access road leading to the new manway at Portal 6 along the Red Mountain Tunnel would also be installed; the new manways and this associated access road would be the only permanent impacts associated with the project. Additional access road improvements may be incorporated into the project along existing dirt roads that lead to bifurcation structures or mid-tunnel portal sites. All areas subject to project-related temporary impacts would be restored to their pre-project conditions per NCCP/HCP requirements. All permanent impacts would be mitigated through debit of habitat acre credits from a Water Authority Preserve, pursuant to protocols established in the NCCP/HCP.

For the biological resources research and reconnaissance survey, Dudek organized the potential impact areas into seven project study areas that encompass all 11 portal locations. Dudek's biological reconnaissance surveys included vegetation mapping, a general plant and wildlife survey (including a habitat assessment for special-status and NCCP/HCP Covered Species and Narrow Endemic species), and a jurisdictional delineation to define aquatic resources subject to federal and state regulations. The project study areas include potential work areas/portal locations around existing Water Authority bifurcation structures, potential work areas at mid-tunnel portal sites and a 300-foot buffer around these work areas.[1] Dudek biologists also assessed the potential for special-status species to occur within the study areas through a desktop analysis of the California Natural Diversity Database and U.S. Fish and Wildlife Service data and project specific field surveys.

Based on species composition and general appearance, 16 different vegetation communities and land cover types were mapped within study areas 1 through 7. These can be summarized via general categories as follows: disturbed/developed, agricultural, chaparral, grasslands, exotic landscapes, oak woodland and forest, coastal sage scrub, wetland, and riparian. Ten sensitive vegetation communities occur within the project study areas: coast live oak forest, southern cottonwood-willow riparian forest, southern coast live oak riparian forest, coastal sage scrub (Diegan), flat-topped buckwheat scrub, mule fat scrub, southern mixed chaparral, non-native grassland (grassland), tamarisk scrub, and freshwater marsh. All temporarily impacted vegetation communities would be restored to pre-project conditions and all permanent impacts to sensitive vegetation communities would be mitigated in accordance with the NCCP/HCP. Impact acreages provided in this report are based on the current design and are subject to modifications. However, every attempt was made to delineate the maximum impact footprint required to accommodate project construction.

No special-status plant species or NCCP/HCP Covered Species were detected within the study areas during field surveys; additionally, none are expected to have a high potential to occur. Subsequently, no special-status plant species are expected to be impacted by project activities.

Three wildlife Covered Species (none of which are considered Narrow Endemic Species) were observed within project study areas during reconnaissance surveys: orange-throated whiptail (*Aspidoscelis hyperythra*), Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), and yellow warbler (*Setophaga petechia*). Seven additional Covered Species were determined to have a high potential to occur within the potential work areas around Water Authority structures or exploratory sites: coastal (western)/San Diegan tiger whiptail (*Aspidoscelis tigris stejnegeri*), red diamondback rattlesnake (*Crotalus ruber*), coastal California gnatcatcher (*Polioptila californica californica*), Dulzura pocket mouse (*Chaetodipus californicus femoralis*), northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), mountain lion (*Felis concolor*), and San Diego desert woodrat (*Neotoma lepida intermedia*). Potential impacts to these species would be minimized through implementation of the special conditions for coverage for each species listed in the NCCP/HCP.

The formal delineation of jurisdictional aquatic resources conducted within the project alignment identified resources within or adjacent to study areas 1, 3, 4, 5, 6, and 7. Most of the identified jurisdictional aquatic resources are considered non-wetland waters/streambeds assumed to be under the jurisdiction of the U.S. Army Corps of Engineers (USACE), California Department of Fish and Wildlife (CDFW), and Regional Water Quality Control Board (RWQCB). Additionally, several erosional features (that have been created as a result of road runoff) exist within study areas 5 and 7; they are likely only regulated by RWQCB. CDFW riparian habitat exists around several of these non-wetland waters/streambeds where the vegetation is dominated by hydrophytic plant species. Two assumed 3-parameter USACE/RWQCB/CDFW wetlands were identified during the delineation outside of the Water Authority right-of-way in study area 5. Impact acreages provided in this report are based on the current design and are subject to modifications. However, every attempt was made to delineate the maximum impact footprint required to accommodate project construction.

1 The buffer included in the project study area reflects the extent of the study area during initial research and pedestrian survey for this report. Subsequent revisions in potential construction work areas resulted in an adjustment to the boundaries of impact areas displayed on figures in this report and discussed in terms of project impacts. The buffer included in the study area has not been adjusted to account for these changes.

The project would remain consistent with the NCCP/HCP through compliance with the General Conditions for Coverage (see Sections 2.2 through 2.6 of Appendix B of the NCCP/HCP), species-specific special conditions for coverage (see Appendix B, Sections 5.0 through 9.0 of the NCCP/HCP), and applicable minimization measures (Section 6.4 of the NCCP/HCP) (SDCWA 2010). No impacts to biologically significant resource areas are expected.

Mitigation measures for potential direct and indirect impacts to sensitive vegetation communities would follow the requirements outlined in the NCCP/HCP. Since most impacts to vegetation communities would be one-time, temporary impacts, restoration and revegetation of the impacted areas would be implemented on site at a 1:1 ratio in accordance with the NCCP/HCP. Permanent impacts to sensitive upland vegetation communities would be mitigated off site at the Water Authority's San Miguel Conservation Bank/Habitat Management Area at ratios established in the NCCP/HCP. There are no permanent impacts to jurisdictional aquatic resources.

Species-specific conditions of coverage, listed in NCCP/HCP Appendix B (SDCWA 2010), and included in Appendix F of this report (Section F-3), would be implemented and serve as avoidance and minimization measures that would ensure no significant project impacts to special-status wildlife species occur. As required by the NCCP/HCP, a pre-activity survey would be performed prior to project-related ground disturbance to verify there are no substantial changes to the biological baseline conditions documented in this report. During pre-activity surveys required at all project work areas, additional investigations into habitat suitability and/or species presence/absence surveys would be performed to determine the need to implement additional species-specific avoidance and minimization measures.

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1 Introduction

This Biological Resources Technical Report (report) provides an assessment of existing conditions with respect to biological resources and analysis of potential impacts to those resources associated with the San Diego County Water Authority's (Water Authority) First Aqueduct Treated Water Tunnels Rehabilitation Project (project) located in northern San Diego County, California. As described in greater detail in Section 1.3 of this report and depicted in Figure 1, this biological resources assessment addresses impacts from project-related construction and infrastructure improvements at seven study areas (containing 11 potential portal locations) where project impacts may occur. This report also provides recommendations to avoid and reduce potential project impacts on biological resources as required by the Water Authority's Subregional Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) (SDCWA 2010).

The project is a "Covered Activity" under the NCCP/HCP as a Water Authority Capital Improvement Program project, pursuant to NCCP/HCP Section 5.1.1.3 (relining of existing pipelines) and Section 5.1.7 (access road construction, re-establishment, and improvements); and as an operations and maintenance activity pursuant to Section 5.2.2 of the NCCP/HCP (replacement of pipelines and minor support facilities/appurtenances). The NCCP/HCP addresses the potential "take" of Covered Species and habitats associated with new construction, operation, and maintenance of certain types of Capital Improvement Program projects and operations and maintenance activities (SDCWA 2010).

1.1 Project Location and Study Areas

The project is located at multiple sites along the northern portion of the Water Authority's First San Diego Aqueduct (First Aqueduct), which is composed of two parallel underground pipelines referred to as Pipeline 1 (P1) and Pipeline 2 (P2), stretching from the Metropolitan Water District (MWD) transfer point north of State Route 76 to San Vicente Reservoir in the south. The northern portion of the First Aqueduct carries treated water purchased from MWD to Water Authority member agencies in the northern part of their service area. Most of the First Aqueduct pipes were installed by open-cut trench, but tunnels were constructed at several locations to convey water by gravity through hilly and mountainous terrain and avoid the need for pumping. At the upstream and downstream ends of each tunnel, bifurcation structures were constructed to combine flows from P1 and P2 into a single pipeline/tunnel, and then split the flow from the single pipeline/tunnel back into P1 and P2.

The project extends along approximately 7 miles of existing Water Authority First Aqueduct right-of-way (ROW) and access roads extending outside the aqueduct ROW, through agricultural land, rural residential development, and undeveloped land in unincorporated San Diego County. The project impact areas addressed in this report includes seven discrete locations (study areas) associated with the Lilac, Red Mountain and Oat Hills tunnels where aboveground bifurcation structures and underground pipeline infrastructure would be accessed to replace, rehabilitate, investigate, or reline segments of tunneled pipe.

The tunnels are all located east of Interstate 15 in northern San Diego County and span from the community of Lilac in the north to just north of the City of Escondido in the south. The northernmost Lilac Tunnel is located west of the intersection of Couser Canyon Road and San Gabriel Way in Lilac. The middle Red Mountain Tunnel is located southeast of the intersection of Mystery Mountain Road and Coulter Creek Way between the communities of Hidden Meadows and Valley Center. The southernmost Oat Hills Tunnel is located southwest of Tuner Lake near the northwestern boundary of the City of Escondido (Figure 1, Project Location). The approximate center of the project alignment addressed in this report is located at 33.256668° and -117.092551° (decimal degrees).

The study areas addressed in this biological resources assessment include portals that are sequentially numbered from Portal 1 in the north to Portal 10 in the south, for ease of identification and reference. All study areas are centered around potential work areas where construction or maintenance may take place; most of the potential work areas are centered on bifurcation structures located at the northern and southern ends of tunnels. Upstream study areas are at the northern ends of a tunnel while downstream study areas are at the southern ends. The only exception to this is the Lilac Tunnel Study Area (referred to as study area 1 in this report); this area includes multiple portals connected by the aqueduct ROW, which has been identified for potential impacts because most of the pipeline alignment in this area is shallow enough to make portal development feasible.

Some potential portal sites within these study areas are not centered around bifurcation structures but are located where the underground pipe is shallow enough for feasible portal development. Study area 1 includes two mid-tunnel portal, and the Red Mountain tunnel includes three mid-tunnel portals. Two of these mid-tunnel sites are standalone study areas (Portal 5 as study area 3, and Portal 6 as study area 4); the third (and southernmost) is Portal 7, which is included with Portal 8 in study area 5, connected by a span of potential access road improvement. The Oat Hills Tunnel is limited to two portals and their respective study areas. All study areas are listed in Table 1 along with their corresponding study area ID/number (which will be used to refer to these study areas in this report) and their respective center coordinates. Figure 1 shows an overview of the project alignment, including all study area locations, and Figure 2.1A through Figure 2.7, Vegetation Communities and Biological Resources, show the seven individual study areas in greater detail.

Table 1. Water Authority Tunnel Study Areas Included in Biological Resources Assessment

Bio Report Study Area ID/Number	Title/Portal Sites/Work Area Description	Study Area Center Coordinates (Decimal Degrees)
1	Lilac Tunnel Study Area (Portal 1, Portal 2A, Portal 2B, Portal 3, and Lilac Tunnel Staging Area)	33.308106, -117.0964442
2	Portal 4 (Red Mountain Upstream Bifurcation Structure)	33.24740808, -117.0926282
3	Portal 5 (Red Mountain Mid-Tunnel North)	33.24443692, -117.0892256
4	Portal 6 (Red Mountain Mid-Tunnel Central)	33.24101571, -117.0869029
5	Portal 7 and Portal 8 (Red Mountain Mid-Tunnel South and Downstream Bifurcation Structure)	33.23189605 -117.0865617
6	Portal 9 (Oat Hills Upstream Bifurcation Structure)	33.2223618, -117.0866542
7	Portal 10 (Oat Hills Downstream Bifurcation Structure)	33.21208222, -117.0887505

1.2 Environmental Setting

The project alignment occurs in a rural area that features a mixture of rural residential development, agricultural uses, and undeveloped areas. Surrounding habitats are generally characterized by a mixture of existing rural properties, orchards, undeveloped open space and native vegetation (including chaparral, scrub, oak woodland, and riparian areas), agricultural fields, and a variety of roads and highways.

The project alignment is generally very hilly with variable topography and varying vegetation types at each structure. Elevations along the project alignment range from 1,000 feet to 1,300 feet above mean sea level. Various ephemeral and intermittent creeks traverse several of the study areas. The discrete tunnel structures and exploratory sites within each study area are located within the Water Authority ROW and typically are immediately adjacent to dirt access roads.

1.3 Project Description

Recent condition inspections of the Lilac, Red Mountain and Oat Hills tunnels identified multiple defects and groundwater infiltration in all three tunnels. As a result, the Water Authority is planning to implement tunnel rehabilitation to prevent additional structure deterioration and ensure reliable delivery of quality drinking water. The Water Authority may replace the bifurcation structures positioned at the upstream and downstream ends of each tunnel to provide access portals for tunnel rehabilitation.

Project planning and design is currently underway, and the resource assessment and impact analysis presented in this report relies on assumptions of potential work areas and likely construction activities developed in coordination with Water Authority engineers. For purposes of conservative analysis, this report assumes all three tunnels would be rehabilitated by the slip-lining method, which would entail inserting sections of liner inside the existing tunnels and joining them together. Access to the interior of the tunnels would be obtained by developing a series of portals, with crews excavating large pits to expose sections of tunnel and cutting open the tunnel. The Water Authority is considering other methods that may be used for pipeline rehabilitation that would require smaller areas of disturbance, but they may not provide an adequate solution to the water-infiltration problem that the project aims to correct, so they may not be feasible to implement on all of the tunnels.[2] Eleven potential portal locations have been identified, including each of the six bifurcation structure locations, two additional mid-tunnel locations on the Lilac Tunnel, and three additional mid-tunnel locations on the Red Mountain Tunnel. Due to the potential for replacement, this report assumes that all six bifurcation structures would be replaced after removal for portal development, as a worst-case scenario. Potential access road improvements may be incorporated into the project, typically along existing dirt roads that lead to bifurcation structures or exploratory sites. All these activities are expected to result in one-time, temporary impacts.

The permanent project impacts would result from the installation of five new manways at the portal locations along the Lilac and Red Mountain Tunnels to enable future personnel access inside the tunnels for maintenance and inspection; two would be installed on the Lilac Tunnel and three on the Red Mountain Tunnel. A new access road leading to the new manway at portal 6 along the Red Mountain Tunnel would also be installed; the new manways and this associated access road would result in permanent impacts.

Construction is anticipated to commence in the winter of 2022/2023 and continue until project completion and closeout in summer 2023.

All sites with temporary impacts would be restored to pre-project conditions after completion of the project, as required by the NCCP/HCP, including habitat restoration where native habitat occurs, and restoration focusing on erosion control on sites devoid of native habitat.

1.4 Regulatory Setting

Subregional Natural Community Conservation Plan/Habitat Conservation Plan

The Water Authority prepared its NCCP/HCP (SDCWA 2010) pursuant to Section 2800 et seq. of the California Fish and Game Code and Section 10(a) of the Endangered Species Act (ESA) of 1973, as amended. The purpose of the NCCP/HCP is to fulfill the requirements for issuance of incidental take authorization under Section 2835 of the

2 The Water Authority will finalize the project's construction approach and associated impact boundaries prior to applying for permits. The approach taken in this report is intended for conservative disclosure of project impacts pursuant to the California Environmental Quality Act and the Water Authority's Natural Community Conservation Plan/Habitat Conservation Plan.

Natural Community Conservation Planning Act and an incidental take permit under Section 10 of the ESA. The NCCP/HCP identifies the types of activities proposed for coverage and an assessment of expected impacts. The NCCP/HCP does not preclude the Water Authority from processing federal permits or state permits with the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW), respectively (collectively, the Wildlife Agencies), if required for individual future projects that are not covered by the NCCP/HCP. The entire project is within the Water Authority's Probable Impact Zone covered by the NCCP/HCP.

The Water Authority's NCCP/HCP provides the mechanism for take authority of Covered Species consistent with the Natural Community Conservation Planning Act and federal and state ESAs. Section 6.3 of the NCCP/HCP (SDCWA 2010) explains the verification process whereby a project is assessed for compliance with the NCCP/HCP. This report is the first step in the verification process for the project, which is a Covered Activity under the NCCP/HCP. Section 4 of this report provides a discussion of project consistency with the NCCP/HCP.

Clean Water Act Section 404 Programmatic Master Plan Permit

The Water Authority obtained a Programmatic Master Plan Permit (PMPP) (Permit No. SPL-2012-00106-PJB) from U.S. Army Corps of Engineers (USACE) in May 2015. The PMPP establishes a framework to authorize impacts on waters of the United States (WOTUS) resulting from the Capital Improvement Program (CIP) and Operations and Maintenance projects described in the Water Authority's 2013 Regional Water Facilities Optimization and Master Plan Update. The PMPP identifies conditions that must be met by the Water Authority in implementing projects with impacts on WOTUS, and defines the Water Authority's habitat-based mitigation commitments. Project consistency with the PMPP is outlined in Section 4.5 of this report.

PMPP eligible projects do not require an individual Water Quality Certification (401 Certification) from the Regional Water Quality Control Board (RWQCB) because the USACE determined that the certification for the PMPP has been waived. The Regional Board deemed complete the Water Authority's 401 Certification Application 12C-087 for the PMPP on December 14, 2012. Because the RWQCB failed to act to approve or disapprove the project for 2 years after receipt of that valid request for water quality certification, the timeframe for issuance of a 401 Certification lapsed, and the USACE issued the PMPP without a 401 Certification. As part of the first five-year review of the PMPP, the USACE issued a letter to the Water Authority on June 30, 2020, acknowledging that no 401 Certification is needed for impacts on WOTUS when projects are authorized under the PMPP.

CDFW Lake and Streambed Alteration Program/Programmatic Routine Operations and Maintenance Streambed Alteration Agreement

The proposed project will be subject to CDFW authorization pursuant to Sections 1600–1603 of the California Fish and Game Code. In November of 2019 the Water Authority signed a Final Lake or Streambed Alteration Agreement (Maintenance Agreement; Notification No. 1600-2019-0153-R5) with CDFW for programmatic authorization of routine operations and maintenance projects that result in minor impacts on jurisdictional waters features regulated by CDFW pursuant to the California Fish and Game Code. The Maintenance Agreement applies to a variety of Water Authority activities involving maintenance and repairs at existing culverts, headwalls, Arizona crossings, access roads, unimproved stream crossings and inline structures/facilities (e.g., blow offs and pump wells).

The Maintenance Agreement separates permitted Water Authority activities into two categories—activities that maintain existing baseline conditions, such as removing sediment and debris from culverts and repairing erosion where access roads cross streams; and activities that "may substantially adversely affect an existing fish and wildlife resource," such as culvert replacement, erosion repair of road crossings that requires grading beyond the existing road width, and "placement of rock slope protection, fill, or other grading adjacent to existing inline structures," such as is proposed in this project. The first category is not subject to reporting under the Maintenance Agreement beyond what is already done pursuant to the NCCP/HCP. Notification and reporting are required for the second category of activities, and the Maintenance Agreement establishes a protocol for pre-construction reporting of covered activities, fee payment, and post-construction reporting.

Avoidance, minimization, and mitigation requirements of the Maintenance Agreement primarily reiterate commitments made by the Water Authority in the NCCP/HCP, but the Maintenance Agreement also specifies additional conditions pertaining to flow diversion, impacts on aquatic species, and pouring concrete, when those are relevant to the permitted activity. Compensatory mitigation pursuant to the Maintenance Agreement is limited to the mitigation obligations outlined in the NCCP/HCP.

The Water Authority will consult with CDFW to determine whether the proposed project is covered under the programmatic agreement or if a separate Lake and Streambed Alteration Agreement (LSAA) specific to the project will be required.

In the event the project is covered under the programmatic agreement, the Water Authority will submit a package of project information to CDFW as required by Section 2.1 of the Maintenance Agreement, provide fee payment as required by Section 2.2 of the Maintenance Agreement, and conduct post-construction reporting as required by Section 2.3 of the Maintenance Agreement.

In the event a separate LSAA specific to the project is required, the project will qualify for a streamlined permitting process with CDFW, as set forth in Section 6.7.2 of the NCCP/HCP. These streamlining provisions state that implementing NCCP/HCP minimization measures are sufficient to serve as permit conditions for a project's LSAA, and that no additional mitigation would be required as part of the CDFW authorization.

California Environmental Quality Act

The proposed project entails a discretionary action by the Water Authority Board of Directors to approve a design/build contract for project implementation. The project is subject to the environmental impact review, documentation, and public noticing requirements of the California Environmental Quality Act (CEQA), with the Water Authority serving as CEQA lead agency. The existing conditions information and impact conclusions presented in this biological resources report will be incorporated into the Water Authority's CEQA document. In addition, state agencies such as CDFW with permitting authority over aspects of the project would serve as responsible agencies under CEQA and would rely on the Water Authority's CEQA document for their respective permitting decisions.

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2 Survey Methods and Limitations

2.1 Desktop and Literature Review

- Prior to commencing biological resources fieldwork and reporting for the project, Dudek reviewed the following resources to assist with the biological resources analysis:
- UC Davis/NRCS SoilWeb (UC Davis/NRCS 2021)
- CDFW California Natural Diversity Database – RareFind, Version 5 (CDFW 2021)
- The Calflora Database (Calflora 2021)
- California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS 2021)
- USFWS Species Occurrence Data (USFWS 2021)
- San Diego Natural History Museum's Plant Atlas (SDNHM 2012)
- Aerial imagery (Google Earth 2021)

2.2 Field Reconnaissance

Biological field surveys for the project were conducted in May 2021 by Dudek biologists. Surveys conducted at each study area included general biological reconnaissance (including a habitat assessment for special-status and NCCP/HCP Covered Species and Narrow Endemic species) and vegetation mapping. A jurisdictional delineation was also conducted at all study areas. Table 2 lists the survey dates, times, surveying biologists, and weather conditions during the surveys.

Table 2. Schedule of Surveys

Date	Time	Personnel	Survey Type	Conditions
05/03/2021	8:30 a.m.–5:40 p.m.	Charles Adams, Cody Schaaf	Biological Reconnaissance, Vegetation Mapping, and Jurisdictional Delineation	63–75°F, 100%–0% cc, 1–5 mph winds
05/07/2021	8:30 a.m.–3:50 p.m.	Callie Amoaku, Cody Schaaf	Jurisdictional Delineation	55–70°F, 40%–0% cc, 1–7 mph winds

Notes:
°F = degrees Fahrenheit; cc = cloud cover; mph = miles per hour

2.2.1 Resource Mapping

Vegetation communities and land covers within each study area were mapped in the field using an ArcGIS mobile application (Esri 2021). Once in ArcGIS, the acreage of each vegetation community and land cover present within the study area was determined.

The vegetation community and land cover mapping follow the NCCP/HCP (SDCWA 2010).

2.2.2 Flora and Fauna

All plant species encountered during field surveys were identified and recorded directly in a field notebook. Those species that could not be identified immediately were brought into the laboratory for further investigation and final identification. A compiled list of plant species observed in all study areas is presented in Appendix A, Plant Compendium.

All wildlife species detected during the field survey by sight, calls, tracks, scat, or other signs were recorded directly into a field notebook. Binoculars (10×42 magnification) were used to aid in the identification of wildlife. A list of wildlife species observed in all study areas is presented in Appendix B, Wildlife Compendium.

No formal, protocol-level wildlife surveys or focused sensitive plant surveys were performed for this assessment, but sensitive species were recorded if encountered during general surveys. Surveys were performed in the spring when most plants were blooming and identifiable.

2.2.3 Jurisdictional Delineation

Dudek biologists completed a formal jurisdictional delineation of the extent of jurisdictional aquatic features in all applicable study areas. The delineation defined resources under the jurisdiction of CDFW pursuant to Sections 1600–1603 of the California Fish and Game Code, under the jurisdiction of the USACE pursuant to Section 404 of the federal Clean Water Act, and under the jurisdiction of the RWQCB pursuant to Clean Water Act Section 401 and the Porter–Cologne Water Quality Control Act.

A jurisdictional delineation memorandum for the project will be prepared separate from this report for purposes of permitting, addressing locations with potential impacts on jurisdictional resources. For purposes of impact analysis pursuant to CEQA and the NCCP/HCP, results of the delineation and study areas with potential jurisdictional aquatic resources are discussed in Section 3.4.4, Jurisdictional Aquatic Resources, of this report.

2.3 Special-Status Species Assessments

Potential for special-status species occurrence within study areas, as discussed in this report, was determined by known habitat preferences of local species and knowledge of their relative distributions in the area. After conducting biological field surveys, Dudek staff conducted a targeted search of the CDFW's California Natural Diversity Database (CNDDB) (CDFW 2021) and the USFWS's critical habitat data (USFWS 2021) around each study area and a corresponding 1-mile buffer to assist in the determination of potential for special-status and NCCP/HCP Covered Species (including Narrow Endemic species) to occur within each study area. Section 3.4, Special-Status Resources, of this report describes this process and the results of the assessments in greater detail.

2.4 Survey Limitations

Site visits were conducted during daylight hours. Complete inventories of biological resources present on a site often require numerous focused surveys at different times of day during different seasons. Some species, such as annual plants, may only be observable in the early spring, and nocturnal animals are difficult to detect during the day. Other species may be present in such low numbers that they could be missed. Due to such timing and seasonal variations, survey results are not an absolute list of all species that a study area may support. Special-status plant and wildlife species with potential to occur in the various study areas are described in Section 3.4.1, Special-Status Plants; Section 3.4.2, Special-Status Wildlife; Appendix C, Special-Status Plant Species Potentially Occurring within the Biological Study Area; and Appendix D, Special-Status Wildlife Species Potentially Occurring within the Biological Study Area.

3 Results

3.1 Vegetation Communities and Land Cover Types

The vegetation communities and land covers within each study area were mapped according to the Water Authority's NCCP/HCP (SDCWA 2010). There are 16 vegetation communities and land cover types mapped within study areas 1 through 7 (Figures 2.1A through 2.7). Table 3 provides an overview of the acreages of each vegetation community and land cover mapped within the overall project alignment, with communities and land cover types organized into three categories consisting of native, non-native and disturbed, and wetland including non-wetland waters. Table 3 also identifies the applicable habitat tier from the Water Authority's NCCP/HCP for each vegetation community and land cover type.

Table 3. Vegetation Communities and Land Cover Types in the Project Survey Area

Vegetation Community/Land Cover Type	Study Areas Containing the Community/Land Cover	Water Authority NCCP/HCP Tier[a]	Acreage[b]
Upland Habitats			
Coast Live Oak Forest	2; 5; 6; 7	I	5.97
Coastal Sage Scrub (Diegan)	1; 3; 5; 6; 7	II	37.47
Flat-Topped Buckwheat Scrub	4	II	0.15
Non-Native Grassland (Grassland)	1; 2; 5; 6	III	12.07
Southern Mixed Chaparral	1; 3; 4; 5; 7	III	35.73
Urban/Developed Land	1; 4; 5; 6; 7	IV	3.65
Bare Ground	1; 2; 3; 4; 5; 6; 7	IV	7.31
Disturbed	1; 2; 3; 5; 7	IV	7.32
Intensive Agriculture – Dairies, Nurseries, Chicken Ranches	2	IV	6.57
Orchards and Vineyards	1; 4–7	IV	53.17
Non-Native Woodland	1; 7	IV	4.93
		Subtotal	*174.34*
Wetland Habitats			
Southern Coast Live Oak Riparian Forest	3; 4; 7	I	7.41
Southern Cottonwood-Willow Riparian Forest	3; 4	I	0.60
Freshwater Marsh	4; 5	II	0.26
Mule Fat Scrub	4	II	0.12
Tamarisk Scrub	5	III	0.07
		Subtotal	*8.33*
		Total	**182.92**

Notes:
[a] SDCWA 2010.
[b] Some numbers may not sum due to rounding.

The following descriptions generally refer to all study areas where the vegetation community or land cover type was mapped, unless otherwise specified in the description. Vegetation communities, land cover types, and their general descriptions follow Section 4.2 of the NCCP/HCP (SDCWA 2010). Most study areas include a maintained paved or dirt access road and/or structure maintenance pad associated with the Water Authority's ROW.

The spatial distributions of vegetation communities and land cover types in each study area are presented in Figures 2.1A through 2.7. Each of these communities and land cover types is described in detail below.

3.1.1 Upland Habitats

Coast Live Oak Forest

Coast live oak woodland is dominated by a single evergreen species: coast live oak (*Quercus agrifolia*) and has a generally closed canopy. The shrub layer is often poorly developed, and the herbaceous species component, if present, is typically composed of grasses and/or vines. This community is classified as a Tier I under the NCCP/HCP (SDCWA 2010); therefore, impacts to coast live oak woodland would require mitigation.

This vegetation community occurs in small patches in the northern portion of study area 2 (Figure 2.2), the central portion of study area 5 (Figure 2.5; east of the dirt water authority access road between the two potential work areas), a large portion of study area 6 (Figure 2.6; surrounding the bifurcation structure and portal 9), and a small area of study area 7, within the work area of portal 10 (Figure 2.7). At these study areas, coast live oak is the dominant species and forms a closed canopy. The understory consists of mainly leaf litter and poison oak (*Toxicodendron diversilobum*) with a low cover of mixed non-native grasses, other herbaceous species and few shrubs.

Coastal Sage Scrub (Diegan)

Diegan coastal sage scrub is composed of relatively short, aromatic, drought-deciduous species. This community is characteristically dominated by shrubs such as California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), California encelia (*Encelia californica*), and sages (*Salvia spp.*), with scattered evergreen shrubs, including sugarbush (*Rhus ovata*) and laurel sumac (*Malosma laurina*). Coastal sage scrub is classified as a Tier II under the NCCP/HCP (SDCWA 2010); impacts to this native vegetation community would require mitigation.

This vegetation community is one of the most prevalent natural habitat type present within the study area, occurring at five of the seven study areas (1, 3, 5, 6, and 7) (Figures 2.1A, 2.1B, 2.3, 2.5, 2.6, and 2.7). Within these study areas, coastal sage scrub resembles the above description, with dominant shrubs including sagebrush, buckwheat, black sage (*Salvia mellifera*), and laurel sumac.

Flat-Topped Buckwheat Scrub

Flat-topped buckwheat refers to scrub that is dominated by California buckwheat/flat-topped buckwheat and may contain a small amount of California sagebrush and laurel sumac. This community is classified as Tier II under the NCCP/HCP (SDCWA 2010); impacts to flat-topped buckwheat scrub would require mitigation.

This vegetation community was mapped in the far western portion of study area 4 (Figure 2.4), where it is nearly a monoculture of California buckwheat.

Non-Native Grassland (Grassland)

Non-native grassland consists of areas with dense to sparse cover of non-native annual grasses. If shrubs or trees are present, they occupy less than 15% of the vegetation. The presence of wild oat, bromes, stork's bill (*Erodium cicutarium*), and mustard are common indicators. Impacts to this vegetation community may require mitigation due to the potential for this habitat to support reptiles, small mammals, and foraging for other wildlife. This community is classified as Tier III under the NCCP/HCP (SDCWA 2010).

This vegetation community occurs at four study areas (1, 2, 5, and 6) (Figures 2.1A, 2.1B, 2.2, 2.5, and 2.6). Within the study areas, non-native grassland was often dominated by a mix of invasive species such as foxtail brome (*Bromus rubens*), slender wild oat (*Avena barbata*), and ripgut grass (*Bromus diandrus*); native herbaceous annuals, small shrubs and broad-leafed non-native species like tree tobacco (*Nicotiana glauca*) were also present at low cover. Most non-native grass occurs in small patches in areas adjacent to orchards or areas that appear to have been subject to previous disturbance.

Southern Mixed Chaparral

This vegetation community is characterized by medium to tall woody chaparral with limited understory diversity. Chamise (*Adenostoma fasciculatum*) is typically a dominant species, but there are several other characteristic species, including blue-colored lilacs (*Ceanothus sp.*), toyon (*Heteromeles arbutifolia*), and mountain mahogany (*Cercocarpus minutiflorus*). Southern mixed chaparral is classified as Tier III under the NCCP/HCP (SDCWA 2010); impacts to this native vegetation community would require mitigation.

Southern mixed chaparral is a dominant vegetation community of rocky hillslopes that occurs at five of the seven study areas (1, 3, 4, 5, and 7) (Figures 2.1A, 2.3, 2.4, 2.5, and 2.7), typically outside of potential work areas. Within these study areas, dominant species that comprise this vegetation community include chamise, mission manzanita (*Xylococcus bicolor*), sugarbush, scrub oak (*Quercus berberidifolia*), laurel sumac, blue elderberry (*Sambucus nigra*) and toyon.

Urban/Developed Land

Urban/developed land refers to areas that have been constructed on or disturbed so severely that native vegetation is no longer supported. This includes areas with permanent or semi-permanent buildings, pavement or hardscape, and ornamental landscaping. This land cover is classified as Tier IV under the NCCP/HCP (SDCWA 2010); therefore, impacts to urban/developed land do not require mitigation.

This land cover type is typically associated with paved roads, buildings, and concrete pads associated with bifurcation structures. Urban/developed land was mapped at study areas 1, 4, 5, 6, and 7 (Figures 2.1A, 2.1B, 2.4, 2.5, 2.6, and 2.7) and consists of pavement and buildings

Bare Ground

This land cover type refers to graded and highly disturbed areas that do not support vegetation. This land cover type is classified as Tier IV under the NCCP/HCP (SDCWA 2010); therefore, impacts to bare ground do not require mitigation.

Bare ground occurs frequently within the study areas. This land cover type was mapped within all the study areas and consists of compacted and unvegetated dirt access roads, turnouts, un-paved parking areas, unvegetated trails, and maintenance aprons surrounding aqueduct structures.

Disturbed

Disturbed land refers to areas that support less than 20% cover of native plants at the time the area is assessed. Since this land cover type is classified as Tier IV under the NCCP/HCP (SDCWA 2010), impacts to disturbed land do not require mitigation.

This land cover type occurs within five of the seven study areas (1, 2, 3, 5, and 7) (Figures 2.1A, 2.1B, 2.2, 2.3, 2.5, and 2.7). Areas mapped as disturbed within the study area generally have a very low cover of native vegetation and/or grasses. Some of these areas are dominated by invasive species such as shortpod mustard (*Hirschfeldia incana*) and tocalote (*Centaurea melitensis*).

Intensive Agriculture (Dairies, Nurseries, Chicken Ranches)

Intensive agriculture includes dairies, nurseries, chicken ranches and open spaces used for livestock. There is usually no vegetation present except between greenhouses, row plantings or animal holding areas. This community is classified as Tier IV under the NCCP/HCP (SDCWA 2010); therefore, impacts to extensive agriculture would not require mitigation.

This land cover type was mapped in the western half of study area 2 (Figure 2.2) only, where an active nursery with greenhouses and row plantings is present.

Orchards and Vineyards

Orchards and vineyards refers to trees, shrubs, or vines that were intentionally planted to produce food or for other commercial purposes. Since this community is classified as Tier IV under the NCCP/HCP (SDCWA 2010), impacts to orchards would not require mitigation.

This vegetation community is present in a significant portions of five study areas (1, 4, 5, 6, and 7) (Figures 2.1A, 2.1B, 2.4, 2.5, 2.6, and 2.7) containing orchard trees (avocado, citrus, or a combination of species). Most of the areas mapped as Orchards and Vineyards consisted of actively producing avocado trees.

Non-Native Woodland

This vegetation community refers to stands of introduced or invasive trees or tree-like vegetation that can support wildlife foraging and breeding. This community is classified as Tier IV under the NCCP/HCP (SDCWA 2010); therefore, impacts to this vegetation would not require mitigation.

This community was mapped at two study areas (1 and 7) (Figures 2.1A, 2.1B, and 2.7) and consist of a variety of non-native tree species, with Eucalyptus (*Eucalyptus spp.*) and ornamental pines (*Pinus spp.*) being dominant species in study area 1. Peruvian pepper trees (*Schinus molle*), Brazilian pepper tree (*Schinus terebinthifolia*), Mexican fan palm (*Washingtonia robusta*), and castorbean (*Ricinus communis*), are present in non-native woodland along a hillside drainage at study area 7.

3.1.2 Wetland Habitats

Southern Cottonwood-Willow Riparian Forest

Southern cottonwood-willow riparian forest usually occurs along rivers or streams and refers to areas where tall, open, broad-leafed winter-deciduous riparian forests are present. They are typically dominated by Fremont cottonwood (*Populus fremontii*) and an understories usually made up of shrubby willows. Southern cottonwood-willow riparian forest is classified as Tier I under the NCCP/HCP (SDCWA 2010); impacts to this vegetation community would require mitigation.

This vegetation community occurs at study areas 3 and 4 (Figures 2.3 and 2.4) where it is associated with well-defined earthen channels (identified as NWW-07 and NWW-06, respectively; see Section 3.4.4). Dominant species include Fremont cottonwood, Goodding's willow (*Salix gooddingii*) and arroyo willow (*Salix lasiolepis*). Other associated species include red willow (*Salix laevigata*), salt cedar (*Tamarix ramosissima*), mule fat (*Baccharis salicifolia*), coast live oak, Mexican fan palm, and an understory of mostly herbaceous species.

Southern Coast Live Oak Riparian Forest

Southern coast live oak riparian forest describes an open or locally dense riparian forest where coast live oak is a dominant species, often with an herbaceous understory supporting few shrubs. This vegetation community typically occurs in bottomland and along creeks. This community is classified as Tier I under the NCCP/HCP (SDCWA 2010); impacts would require mitigation.

Southern coast live oak riparian forest is present at study areas 3, 4, and 7 (Figures 2.3, 2.4, and 2.7). At each of these study areas, this vegetation community is associated with earthen channels, and coast live oak is dominant with associated riparian species like willows and Douglas' sagewort (*Artemisia douglasiana*). At study area 3 (Figure 2.3), this community forms a riparian corridor through the potential work area where the original tunnel construction required blasting through rock and hillside; the remnant topographic depression in the landscape corresponds with a small drainage that flows through the area (NWW-08) and has allowed for establishment of dense coast live oak riparian forest in the area. The other stands of coast live oak riparian forest at study areas 4 and 7 (Figures 2.4 and 2.7) appear to have established in a more natural way but are also strongly associated with watercourses and showed some evidence of riparian species in the understory.

Mule Fat Scrub

This vegetation community refers to riparian scrub that is dominated by mule fat. This is an early seral community that is maintained by frequent flooding. This community is classified as Tier II under the NCCP/HCP (SDCWA 2010); impacts to mule fat scrub would require mitigation.

Mule fat scrub occurs study area 4 (Figure 2.4) where it forms dense stands along the banks of a well-defined drainage (NWW-06).

Freshwater Marsh

Freshwater marsh describes wetland areas that are dominated by perennial, emergent monocots like broadleaf cattail (*Typha latifolia*) to 4 to 5 meters tall and often forming completely closed canopies. This land cover type is classified as Tier II under the NCCP/HCP (SDCWA 2010) and impacts to freshwater marsh would require mitigation.

Freshwater marsh is mapped at study areas 4 and 5 (Figures 2.4 and 2.5). It is dominated by broadleaf cattail and occurs in areas where ponded water or saturated soil was observed. It is associated with an earthen drainage (NWW-05) in study area 4 (Figure 2.4) and wetlands (identified as WET-01 and WET-02; see Section 3.4.4) in study area 5 (Figure 2.5).

Tamarisk Scrub

This vegetation community describes areas dominated by tamarisk/salt cedar (*Tamarix ramosissima*). Tamarisk scrub is classified as a Tier III under the NCCP/HCP (SDCWA 2010); impacts to this vegetation community would require mitigation. In the northwestern corner of study area 5 (Figure 2.5), tamarisk scrub is present along a hillside drainage below an area of freshwater marsh.

3.2 Plant Species Observed within the Project Study Areas

A total of 132 species of vascular plants, 93 native (70%) and 39 non-native (30%), were recorded during the biological reconnaissance surveys for the project; none are considered NCCP/HCP Covered Species or Narrow Endemic species. A cumulative list of all plant species observed in all study areas is provided in Appendix A.

3.3 Wildlife Species Observed within the Project Study Areas

The various study areas contain habitat supporting coastal sage scrub, chaparral, woodland, grassland, and riparian wildlife species. These habitats provide foraging and nesting habitat for migratory and resident bird species. Open habitats in the project alignment likely provide foraging opportunities for raptors. Areas of dense cover within vegetated communities in the project alignment also likely provide cover and foraging opportunities for small reptiles and other mammal species. Wetland areas may be suitable for certain amphibians and aquatic invertebrates.

As noted in Section 2.2, Field Reconnaissance, wildlife species that were detected during the field survey by sight, calls, tracks, scat, or other signs were recorded directly in a field notebook. Binoculars (10×42) were used to aid in the identification of wildlife. A total of 46 wildlife species were recorded during reconnaissance surveys. Of the 46 wildlife species observed during surveys, three are considered NCCP/HCP Covered Species (none are Narrow Endemic species); they are shown in Figures 2.3, 2.4, 2.5, and 2.7, and described in further detail in Section 3.4.2, Special-Status Wildlife. A cumulative list of wildlife species observed in all study areas during field surveys is provided in Appendix B.

3.4 Special-Status Resources

Special-status (or sensitive) biological resources can include certain plant and wildlife species, native vegetation communities, and jurisdictional aquatic resources. For the purpose of analysis within a California Environmental Quality Act document, the Water Authority typically defines sensitive plant and wildlife species as those identified as Covered Species in the Water Authority's NCCP/HCP; those listed as endangered, rare, or threatened by the state or federal ESA; or those classified as Species of Special Concern (SSC) or Fully Protected (FP) species by CDFW. Sensitive plant species also include those with a California Native Plant Society (CNPS) California Rare Plant Rank (CRPR) of 1A, 1B, 2A, or 2B (CNPS 2021). For non-listed species and non-Covered Species, significance of impact is dependent on the severity of impact relative to the species' known populations and range, as well as other factors.

Dudek biologists assessed the potential for special-status species to occur within the project alignment through an analysis of CNDDB and USFWS data, field surveys and professional expertise related to species distribution in the region. Special-status species with potential to occur in the project alignment are listed in Appendices C and D with a rank of low, moderate, or high/present for each applicable study area where that species was listed as historically occurring or having potential to occur. The specific reasoning for the ranking of particular species is not listed in the table itself but generally follows the ranking scheme provided below:

Low: A species is recorded within a 1-mile radius of the study area based on CNDDB/USFWS records but the record is outdated (20 years or older), has unique habitat/soil/microclimate requirements that are not present within the study area, or is unlikely to move into the study area due to a highly restricted range/habitat requirement that the study area does not possess. Some conspicuous perennial plant species with low potential to occur that are easily observable year-round may have been downgraded to no potential to occur (and subsequently excluded from the tables) if they were not directly observed during field surveys.

Moderate: A species is recorded within a 1-mile radius of the study area based on CNDDB/USFWS records, the record is somewhat recent (within the last 20 years), some suitable habitat is present within the study area, and there is some degree of habitat connectivity between the occurrence and the study area. The potential work areas within the study area do not contain much (if any) suitable habitat; consequently. Some conspicuous perennial plant species with moderate potential to occur that are easily observable year-round may have been downgraded to low if they were not directly observed during field surveys. Additionally, some animal species with moderate potential to occur in the project alignment may have been downgraded to low within the potential work area due to the generally disturbed nature of the immediate area surrounding potential work areas. Moderate potential would not indicate a species-based impact pursuant to the NCCP/HCP.

High/Present: A species is observed within a project study area or corresponding potential work area during field surveys; a species is recorded within a 1-mile radius of the study area based on recent (within the last 15 to 20 years) CNDDB/USFWS records; and/or high quality, suitable habitat/soil conditions are present within the study area. There may be contiguous suitable habitat connectivity between the occurrence and the study area. High potential would indicate a species-based impact pursuant to the NCCP/HCP. For the purposes of NCCP/HCP compliance, impacts to these species are assumed only when they are observed within the study area during surveys or if they are considered to have a high potential to occur in the study area and/or the corresponding potential work area.

Additionally, if a special-status species was not listed in CNDDB/USFWS records but was believed to have some potential to occur based on habitats observed during field surveys and Dudek's professional knowledge, Dudek biologists included them in the analysis for potential to occur.

If a special-status species is not listed in the tables in Appendices C and D, it can be assumed that the species does not have potential to occur within the project impact or study area due to a complete and obvious lack of suitable habitat within the study area, extremely outdated CNDDB/USFWS records (50 years or older), or no applicable CNDDB/USFWS records within 1 mile. Some of the species excluded from the tables in Appendices C and D are Covered Species that have no potential to occur.

3.4.1 Special-Status Plants

The Water Authority's NCCP/HCP provides coverage for 26 plant species plus two major amendment plant species.[3] These 28 species were evaluated for potential to occur within the various study areas based on presence of suitable habitat and occurrences within a 1-mile radius of the study areas using the CNDDB (CDFW 2021). Four plant Covered Species have a potential to occur within the project alignment, and seven not-covered plant species with CRPRs of 1B.1 through 1B.3 were determined to have some level of potential to occur. These plants are listed, along with their potential to occur at the various study areas, in Appendix C. Dudek's knowledge of biological resources, the regional distribution of each species, and the results from field surveys, as well as elevation, habitat, and soils present within the potential work area and study areas, were evaluated to determine the potential for various special-status species to occur.

[3] Three species, California Orcutt grass (*Orcuttia californica*), Munz's onion (*Allium munzii*), and vernal pool fairy shrimp (*Branchinecta lynchi*), are identified as Major Amendment species in the NCCP/HCP, specific to the Riverside County portion of the NCCP/HCP Plan Area.

Reconnaissance surveys were conducted in spring of 2021 (within the bloom period for many plant species); focused surveys for special-status plant species were not conducted. Of the plant species evaluated for potential to occur within the project alignment based on NCCP/HCP coverage and database review, none were observed during surveys or determined to have a high potential to occur. No plant species listed as threatened or endangered under the federal or state ESA were observed in the project alignment. No Covered Species (including Narrow Endemic species) under the NCCP/HCP and no CNPS CRPR 1 or 2 species were observed or have a high potential to occur in the project alignment. Therefore, no sensitive plant or Covered Species impacts are expected to occur.

No NCCP/HCP plant Covered Species were determined to have a moderate or high potential to occur in any of the study areas. Three plant species not listed as Covered Species under the NCCP/HCP but possessing CRPRs 1B.1 through 1B.3 were determined to have moderate potential to occur in several study areas (Appendix C). Moderate potential to occur does not constitute an impact pursuant to the NCCP/HCP.

As required by the NCCP/HCP (SDCWA 2010), a pre-activity survey would be performed prior to project-related ground disturbance to verify there are no substantial changes to the biological baseline conditions described in this report, and to verify the absence of any plant Covered Species that could be impacted by the project.

3.4.2 Special-Status Wildlife

The Water Authority's NCCP/HCP provides coverage for 37 wildlife species and one major amendment species (vernal pool fairy shrimp [*Branchinecta lynchi*]) (SDCWA 2010). Species covered by the NCCP/HCP are federally listed and/or state-listed as rare, threatened, or endangered, or are likely candidates for future listing as rare, threatened, or endangered based on present population declines, diminishing habitat, or existing levels of sensitivity. These 37 species, in addition to those listed as endangered, rare, or threatened by the state or federal ESA, or those classified as an SSC or FP by CDFW, were evaluated for potential to occur within the various study areas based on known range and presence of suitable habitat.

Three wildlife Covered Species (none of which are Narrow Endemic Species) were observed within project study areas during reconnaissance surveys: orange-throated whiptail (*Aspidoscelis hyperythra*) (Figures 2.3 and 2.5), Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*) (Figures 2.5 and 2.7), and yellow warbler (*Setophaga petechia*) (Figure 2.4). No additional federally/state endangered, rare, or threatened species and no SSC or FP species that are not Covered Species under the NCCP/HCP were observed during surveys.

Review of CNDDB (CDFW 2021) data within a 1-mile radius of the study areas in addition to Dudek's knowledge of special-status species distribution was used to evaluate the potential for additional special-status wildlife species to occur within each study area and the potential work areas within each study area (Appendix D). Seven additional Covered Species were determined to have a high potential to occur within potential work or study areas: coastal (western)/San Diegan tiger whiptail (*Aspidoscelis tigris stejnegeri*), red diamondback rattlesnake (*Crotalus ruber*), coastal California gnatcatcher (*Polioptila californica californica*), Dulzura pocket mouse (*Chaetodipus californicus femoralis*), northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), mountain lion (*Felis concolor*), and San Diego desert woodrat (*Neotoma lepida intermedia*). No additional federally/state endangered, rare, or threatened species, and no SSC or FP species that are not Covered Species under the NCCP/HCP were determined to have a high potential to occur in the study area.

The 10 Covered Species observed during surveys for this study or deemed to have high potential to occur within project study areas are described in detail below. Table 4 lists these species and the study areas and portal work areas where they are assumed to be present.

Table 4. Special-Status Wildlife Potentially Impacted by Project Activities

Special-Status Species	Study Areas Assumed Occupied	Portals (Work Areas) Assumed Occupied
Belding's Orange-Throated Whiptail	1; **3**; 4; **5**; 6; 7	2A; **5**; 6; **7**; 8; 9; 10
Coastal (Western)/San Diegan Tiger Whiptail	1; 3; 4; 5; 6; 7	2A; 5; 6; 7; 8; 9; 10
(Northern) Red Diamond/Diamondback Rattlesnake	1; 3; 4; 5; 6; 7	2A; 5; 6; 7; 8; 9; 10
Southern California Rufous-Crowned Sparrow	1; 3; 4; **5**; 6; **7**	2A; 5; 6; 7; 8; 10
Coastal California Gnatcatcher	1; 5; 6; 7	2A; 7; 8; 10
Yellow Warbler	3; **4**; 6	5; **6**; 9
Dulzura Pocket Mouse	1; 3; 4; 5; 6; 7	2A; 6; 7; 8; 9; 10
Northwestern San Diego Pocket Mouse	1; 3; 4; 5; 6; 7	2A; 6; 7; 8; 9; 10
Mountain Lion	3; 4; 6; 7	5; 6; 9; 10
San Diego Desert Woodrat	1; 3; 4; 5; 6; 7	2A; 5; 6; 7; 8; 9; 10

Notes: Bolded study area/portal numbers are locations where the species was observed during reconnaissance project surveys. Some species located far from the direct impact/work area are only bolded and assumed present within the larger study areas.

Belding's Orange-Throated Whiptail (*Aspidoscelis hyperythra*) – Directly Observed at Study Areas 3 and 5

Belding's orange-throated whiptail is CDFW Watch List and NCCP/HCP Covered Species known to occupy low-elevation coastal scrub, chaparral, and valley–foothill woodland/riparian areas. This species was observed within the potential work areas at study areas 3 and 5. Given the mobility of this species, it is assumed that it has high potential to occur throughout these study areas.

Although it was not directly observed elsewhere, high-quality coastal sage scrub/riparian/chaparral habitat, the general mobility of this species, and/or historic occurrences adjacent to study areas 1, 4, 6, and 7 give this species high potential to occur within potential work areas and larger study areas at these locations.

Coastal (Western)/San Diegan Tiger Whiptail (*Aspidoscelis tigris stejnegeri*)

Coastal (western)/San Diegan tiger whiptail is an SSC and NCCP/HCP Covered Species known to occupy hot and dry areas with sparse foliage, including chaparral, woodland, and riparian areas. The species was not detected within any study areas or the CNDDB search conducted for the project, but high-quality coastal sage scrub/riparian/chaparral habitat and Dudek's knowledge of wildlife distribution in the region give this species high potential to occur within the potential work areas and larger study areas at study areas 1, 3, 4, 5, 6, and 7.

Northern Red Diamond Rattlesnake (*Crotalus ruber*)

Northern red diamond rattlesnake is an SSC and NCCP/HCP Covered Species known to occupy coastal scrub, chaparral, oak and pine woodlands, rocky grasslands, cultivated areas, and desert flats. The species was not detected within any study areas or the CNDDB search conducted for the project, but high-quality coastal sage scrub/chaparral/woodland habitat and Dudek's knowledge of wildlife distribution in the region give this species high potential to occur within the potential work areas and larger study areas at study areas 1, 3, 4, 5, 6, and 7.

Southern California Rufous-Crowned Sparrow (*Aimophila ruficeps canescens*) – Directly Observed at Study Areas 5 and 7

Southern California rufous-crowned sparrow is a CDFW Watch List species and NCCP/HCP Covered Species that is known to nest and forage in open coastal scrub and chaparral with low cover of scattered scrub interspersed with rocky and grassy patches. This species was directly observed outside of the potential work areas within coastal sage scrub at study areas 5 and 7. Given the mobility of this species, it is assumed that it has high potential to occur throughout these study areas.

Although it was not directly observed elsewhere, high-quality coastal sage scrub/chaparral habitat within or adjacent to study areas 1, 3, 4, and 6 give this species high potential to occur within the potential work areas or larger study areas there.

Coastal California Gnatcatcher (*Polioptila californica californica*)

Coastal California gnatcatcher is a federally threatened, SSC, and NCCP/HCP Covered Species that is known to nest and forage in various sage scrub communities, often dominated by California sagebrush and buckwheat.

Although it was not directly observed elsewhere, high-quality coastal sage scrub, Dudek's knowledge of regional wildlife distribution, and/or historic occurrences adjacent to study areas 1, 5, 6, and 7 give this species high potential to occur within the potential work areas and larger study areas at these locations.

Designated USFWS critical habitat for this species is mapped throughout study area 7 (see Figure 2.7). Much of the designated critical habitat for this species within study area 7, including a large portion of the potential work area, contains suitable coastal sage scrub habitat. A complete discussion of USFWS critical habitat at these study areas is presented in Section 3.4.2.1, Critical Habitat.

Yellow Warbler (*Setophaga petechia*) – Directly Observed at Study Area 4

Yellow warbler is a USFWS Bird of Conservation Concern, SSC, and NCCP/HCP Covered Species known to nest and forage in mature riparian woodlands. This species was directly observed inside the potential work area within southern cottonwood-willow riparian forest at study area 4. Given the mobility of this species, it is assumed that it has high potential to occur throughout this study area.

This species was not detected in any other study areas, but high-quality riparian woodland/scrub habitat at study areas 3 and 6 gives this species high potential to occur within the potential work areas and larger study areas there. No other study area within the project alignment offers high-quality habitat for this species.

Dulzura Pocket Mouse (*Chaetodipus californicus femoralis*)

This species is an SSC and NCCP/HCP Covered Species that prefers open habitats with rocky areas and sandy soils conducive for burrowing. Such habitats include coastal scrub, chaparral, oak woodland, chamise chaparral, and mixed-conifer habitats. This species is known to be a disturbance specialist, meaning it tolerates and adapts to habitat areas that have lost vegetation cover due to previous disturbances, particularly wildfire (Brehme et al. 2011). The species was not detected within any study area, but coastal sage scrub habitat, Dudek's knowledge of regional wildlife distribution, and/or historic occurrences in the region give this species high potential to occur within the potential work areas and larger study areas at study areas 1, 3, 4, 5, 6, and 7.

Northwestern San Diego Pocket Mouse (*Chaetodipus fallax fallax*)

Northwestern San Diego pocket mouse is an SSC and NCCP/HCP Covered Species that prefers habitat like that of Dulzura pocket mouse (see above). It is known to inhabit sparse or disturbed coastal sage scrub, chaparral, or grasslands with sandy soils. The species was not detected within any study area, but coastal sage scrub habitat, Dudek's knowledge of regional wildlife distribution, and/or historic occurrences in the region give this species high potential to occur within the potential work areas and larger study areas at study areas 1, 3, 4, 5, 6, and 7.

Mountain Lion (*Felis concolor*)

Mountain lion is an NCCP/HCP Covered Species that prefers foothill and mountain habitats where deer are present. This species was not documented in the CNDDB search conducted for the project, but was deemed to have high potential to occur within study areas 3, 4, 6, and 7 due to the high-quality, expansive, and contiguous woodland and riparian habitats there that provide cover.

San Diego Desert Woodrat (*Neotoma lepida intermedia*)

San Diego desert woodrat is an SSC and NCCP/HCP Covered Species that prefers drier Diegan coastal sage scrub, especially where there are rocky outcrops. The species was not detected within any study or in the CNDDB search conducted for the project, but high-quality coastal sage scrub habitat and observed woodrat middens within study areas 1, 3, 4, 5, 6, and 7 give this species high potential to occur within the excavation impact/work areas and larger study areas at these locations.

Various additional Covered Species or those listed as endangered, rare, or threatened by the state or federal ESA, or those classified as SSC or FP by CDFW, have moderate potential to occur within certain study areas (see Appendix D). Moderate potential to occur does not constitute an impact pursuant to the NCCP/HCP. Additionally, a pre-activity surveys would be conducted prior to construction to verify that there are no substantial changes to the biological baseline conditions described in this report, and to verify the absence of any wildlife Covered Species within or adjacent to project impact areas.

Several SSC bat species have potential to forage over the project alignment and various study areas without any direct project impacts. Generally, bats were analyzed for potential to occur based on the possibility of roosting within a study and/or potential work area. This roosting assessment limited the number of bats concluded to have potential to occur because most SSC bats that occur in the area roost in caves, cliffs, cavities, and crevices, and these types of features were not observed within any of the study areas during surveys. The few bats included in Appendix D are foliage roosters that had low to moderate potential to roost in foliage within various project study areas. Indirect impacts to bat species would likely be avoided through implementation of the General Conditions for Coverage outlined in Section 2.1 of Appendix B of the Water Authority's NCCP/HCP (SDCWA 2010).

All sensitive species with a potential to occur within the project's study areas are listed within Appendix D. Most of the Covered Species are more likely to occur within the larger study area (300-foot buffer) than within potential work areas, primarily because of the presence of higher-quality habitat. Appendix E shows representative study area photographs of the habitats surrounding all potential work areas.

3.4.2.1 Critical Habitat

USFWS-designated critical habitat for coastal California gnatcatcher occurs within and adjacent to study area 7 as shown in Table 5. This is the only study area that overlaps with critical habitat.

Table 5. Critical Habitat Within Project Study Areas

Study Area	USFWS Critical Habitat (Species)	Critical Habitat Status	Species Listing Status	Are Primary Constituent Elements[a] Within Temporary Impact/ Work Area?
7	Coastal California Gnatcatcher	Final	Threatened	Yes – 0.28 acres of coastal sage scrub

[a] According to USFWS (2000), only areas that contain the "primary constituent elements" required by a species are considered critical habitat. "Primary constituent elements" are those physical and biological features of a landscape that a species needs to survive and reproduce.

The locations of critical habitat, detailed in Table 5, are shown in Figure 2.7. Although there would likely be temporary impacts within critical habitat at this study area, all temporarily impacted habitat would be restored, in accordance with Section 6.5.1.4.2 of the Water Authority's NCCP/HCP (SDCWA 2010). Thus, project activities are not likely to impact the functions of critical habitat and would not permanently modify or remove critical habitat.

3.4.3 Special-Status Vegetation Communities

All of the vegetation communities/land cover types known to occur within the Water Authority's NCCP/HCP Plan Area are grouped into tiers (see Section 6.5.1.3 and Table 6-5 of the Water Authority's NCCP/HCP; SDCWA 2010) deemed to have similar ecological values based on rarity, Covered Species diversity, and environmental sensitivity. The vegetation and land cover categories and tiers into which vegetation communities are assigned are comparable to those used in other conservation plans within San Diego County (see Tables 4-2 and 6-5 of the Water Authority's NCCP/HCP; SDCWA 2010). Tier I, II, and III vegetation communities are considered sensitive and declining habitats. Tier IV includes land cover types (eucalyptus/non-native woodland, agriculture, disturbed habitat, and urban/developed land) that are not considered sensitive and do not require mitigation.

Ten sensitive vegetation communities occur within the project study areas: coast live oak forest, southern cottonwood-willow riparian forest, southern coast live oak riparian forest, coastal sage scrub (Diegan), flat-topped buckwheat scrub, mule fat scrub, southern mixed chaparral, non-native grassland (grassland), tamarisk scrub, and freshwater marsh (see Table 3).

Most impacts to sensitive vegetation communities would be temporary and the Water Authority would restore the vegetation on site at a 1:1 ratio after completion of construction, in accordance with Section 6.5.1.4.2 of the Water Authority's NCCP/HCP (SDCWA 2010). Similarly, the study areas and sensitive vegetation communities subject to permanent impacts would be mitigated off site in a Water Authority Preserve pursuant to ratios specified in the NCCP/HCP.

3.4.4 Jurisdictional Aquatic Resources

Dudek biologists conducted a formal delineation of jurisdictional aquatic resources within the project alignment and identified multiple resources within and adjacent to most study areas.

Most of the identified jurisdictional aquatic resources are considered non-wetland waters/streambeds assumed to be under the jurisdiction of USACE, CDFW, and RWQCB. Potential CDFW riparian habitat exists around several of these watercourses in vegetation communities dominated by hydrophytic plant species. Two assumed 3-parameter USACE/RWQCB/CDFW wetlands were identified during the delineation outside of the ROW in study area 5.

CDFW jurisdiction throughout all study areas totals 8.615 acres, including 1.209 acres under the jurisdictions of USACE, RWQCB, and CDFW, and an additional 7.406 acres exclusively under CDFW jurisdiction, which is the area beneath the extent of the riparian vegetation canopy. An additional 0.047 acre of road runoff erosional features are under the exclusive jurisdiction of RWQCB.

Non-wetland waters (NWW) and 3-parameter wetlands (WET) were identified within study areas are described below. Several small erosional features that direct road runoff (RR) through highly eroded hillside drainages are present in some study areas. A summary of the jurisdictional aquatic features throughout the overall project area is presented below in Table 6, followed by descriptions of the features occurring at each study area. Study Area 2 is the only study area lacking delineated waters features.

Table 6. Summary of Jurisdictional Features within Project Study Areas

Study Area	USACE, CDFW, and RWQCB Jurisdiction (Acres)	CDFW Riparian Vegetation Only (Acres)	RWQCB Jurisdiction Only (Acres)	Total (Acres)
1	0.007	—	—	0.007
2	—	—	—	—
3	0.497	4.909	—	5.406
4	0.217	0.733	—	0.949
5	0.167	0.065	0.044	0.276
6	0.061	—	—	0.061
7	0.260	1.700	0.002	1.963
Totals	**1.209**	**7.406**	**0.047**	**8.662**

Study Area 1: This study area contains one jurisdictional earthen channel that falls within the ROW but does not intersect potential work areas associated with portals 1, 2, and 3 (Figure 2.1B).

The only jurisdictional feature in this study area is a small, earthen hillside channel (unnamed tributary to San Luis Rey River; NWW-09) that flows northwest to southeast through an old orchard east of the southern access road associated with study area 1 (Figure 2.1B). It likely drains runoff from an existing orchard to the west and begins on the eastern end of a culvert under the access road that collects sheet flows from the active orchard uphill. This feature has a clear bed and bank and is likely regulated by USACE, CDFW, and RWQCB as a non-wetland water/streambed. The Lilac Tunnel bifurcation structures and potential work and portal areas 1, 2, and 3 are located far from the channel and do not intersect with NWW-09.

Study Area 3: This study area contains two jurisdictional earthen channels. Both intersect the ROW and one flows directly through the potential work area associated with portal 5 (Figure 2.3).

One channel is in the northwest extension of the study area and flows northeast to southwest underneath the Water Authority access road through a culvert (unnamed tributary to San Luis Rey River; NWW-07); the culverts and the feature are on the boundaries of the study area and are at least 20 feet away from the edges of the access road (Figure 2.3). This feature has a clear bed and bank and is likely regulated by USACE, CDFW, and RWQCB. Riparian vegetation along the feature outside of the channel (southern cottonwood-willow riparian forest) will likely be considered CDFW riparian habitat. Water was not observed in the channel during the delineation.

A second, larger channel is in the center of the main study area and flows east to west through the center of the potential work area of portal 5 (unnamed tributary to San Luis Rey River; NWW-08). This channel flows through a portion of the potential work area where the original tunnel construction required blasting through rock and hillside; this has created an approximately 40-foot-wide riparian area associated with the channel where the bed and bank of the channel corresponds with the blasted area in the Water Authority ROW. Outside of the blasted area in the ROW, the channel is much smaller (3-5 feet wide) and has a less-defined bed and bank; it is still dominated by riparian vegetation. Given the historical disturbance of the channel through the blast area and the dense riparian vegetation dominating this area, it is likely that the feature is regulated by USACE, CDFW, and RWQCB as a non-wetland water/streambed. Riparian vegetation along the feature (southern coast live oak riparian forest), but outside of the channel, will likely be considered CDFW riparian habitat. Small pools of standing water (likely associated with seeps in rocky areas) within the bottom of the channel/blasted area were present during the delineation.

Study Area 4: This study area contains two jurisdictional earthen channels. Both intersect the ROW and one flows directly through the potential work area associated with portal 6 (Figure 2.4).

One channel is in the central portion of the study area (at the bottom of a natural canyon) and conveys flow from northeast to southwest through the center of the potential work area of portal 6 (unnamed tributary to San Luis Rey River; NWW-06, Figure 2.4). This feature has a clear bed and bank and is likely regulated by USACE, CDFW, and RWQCB as a non-wetland water/streambed. Riparian vegetation along the feature outside of the channel (southern cottonwood-willow riparian forest) will likely be considered CDFW riparian habitat. The feature flows through a culvert underneath a dirt access road in the far western portion of the study area. One small pool of standing water within the channel was observed at this location.

A second, smaller channel is in the southern portion of the study area and flows east to west through the Water Authority ROW but south of the potential work area (unnamed tributary to San Luis Rey River; NWW-05, Figure 2.4). This feature has a defined bed and bank and/or possesses obvious riparian vegetation. Wetland sample point were taken but hydric soils were lacking and ruled out the possibility of this feature being a 3-parameter wetland. It is likely regulated by USACE, CDFW, and RWQCB as a non-wetland water/streambed. Riparian vegetation along the feature outside of the channel (freshwater marsh) will likely be considered CDFW riparian habitat. This channel flows through a culvert under the dirt access road in the southwestern portion of the study area. East of the access road, standing water within the channel was observed.

Study Area 5: This study area contains several jurisdictional earthen channels, road runoff features, and two assumed three parameter wetlands; most of these features are outside of the Water Authority ROW and all are outside of potential work areas associated with portals 7 and 8 (Figure 2.5).

The northwest portion of the study area contains two assumed three parameter wetlands associated with ponds or freshwater marsh (WET-1 and WET-02, Figure 2.5). These features are outside of the ROW and potential work areas and thus were not subject to wetland sampling points. They are likely regulated by USACE, CDFW, and RWQCB as non-wetland waters/streambed. Additional riparian vegetation along the features above the waterline (freshwater marsh) will likely be considered CDFW associated riparian habitat. These wetlands and associated riparian vegetation are outside of the ROW and the potential work area associated with portal 7.

South of the ponds, one earthen hillside channel (unnamed tributaries to San Luis Rey River; NWW-04 Figure 2.5), is present that drains WET-01. NWW-04 is likely regulated by USACE, CDFW, and RWQCB as a non-wetland water/streambed; tamarisk scrub at the north end of NWW-04 will likely be considered CDFW associated riparian habitat. This feature is outside of the ROW and the potential work area associated with portal 7.

A road runoff erosional feature is also present just west of the portal 7 potential work area (RR-04, Figure 2.5). RR-04 is likely only regulated by RWQCB. This is a steep, erosive, hillside feature that possess no riparian vegetation. This feature is outside of the ROW and the potential work area associated with portal 7.

In the southern portion of the site, one earthen hillside channel (unnamed tributary to San Luis Rey River; NWW-03, Figure 2.5) is present southwest of portal 8 and outside of the ROW. NWW-03 is likely regulated by USACE, CDFW, and RWQCB as a non-wetland water/streambed. Just north of this feature, two road runoff erosional features are also present (RR-02 and RR-03). RR-02 and RR-03 are likely only regulated by RWQCB. These are steep, erosive, hillside drainages that possess no riparian vegetation and are only present due to concentrated water flow from the existing road. Two of the erosive road runoff channels (RR-02 and RR-03) are partially within the ROW but none of these features directly overlap the potential work area associated with portal 8.

Study Area 6: This study area contains one jurisdictional earthen channel. It intersects the ROW but does not overlap with the potential work area associated with portal 9 (Figure 2.6).

Within study area 6, a well-defined earthen channel (unnamed tributary to San Luis Rey River; NWW-02) conveys flow from southwest to northeast just north of the potential work area/portal 9 (Figure 2.6). This feature has a clear bed and bank and is likely regulated by USACE, CDFW, and RWQCB as a non-wetland water/streambed. Coast live oak forest surrounds the channel, but this oak forest was lacking a dominance of hydrophytic plant species and will not be considered CDFW riparian habitat. The feature flows underneath a dirt access road through culverts in two locations in the northwest corner of the portal 9 potential work area. Flowing water, including a pool of standing water within the channel, was observed at this location.

A small tributary to this main channel exists in the far northern extension of the study area; it flows under the dirt access road through a culvert before meeting with the main channel. This portion of the channel is also likely regulated by USACE, CDFW, and RWQCB as non-wetland water/streambed.

Study Area 7: This study area contains several jurisdictional earthen channels. One channel and its tributary erosional features intersect the ROW and overlaps with the western and southeastern side of the potential work area associated with portal 10 (Figure 2.7).

The main channel in the study area is well-defined and flows north to south, spanning the entire study area (unnamed tributary to Escondido Creek; NWW-01, Figure 2.7). This feature has a clear bed and bank and is likely regulated by USACE, CDFW, and RWQCB as a non-wetland water/streambed. Riparian vegetation along the feature (southern coast live oak riparian forest) will likely be considered CDFW riparian habitat since it is associated with a streambed and contains hydrophytic plant species like willows. This channel partially overlaps with the western edge of the potential work area and Water Authority ROW (Figure 2.7). No standing water was observed in the channel during the delineation.

A smaller, earthen hillside tributary to NWW-01 joins the larger channel in the southern portion of the study area; it begins as an erosional feature that directs road runoff (RR-01) in the far eastern portion of the study area but becomes more defined as it travels through southern mixed chaparral toward the main channel of NWW-01 to the west (Figure 2.7). This tributary is a steep, erosive, hillside drainages that possess no riparian vegetation. RR-01 is likely only regulated by RWQCB. It does not overlap with the potential work area of portal 10 (Figure 2.7).

4 Consistency with the NCCP/HCP, PMPP, and CDFW Programmatic Agreement

The Water Authority's NCCP/HCP provides the mechanism for "take" authority of Covered Species consistent with the Natural Community Conservation Planning Act and federal and state ESAs. Section 6.3 of the NCCP/HCP (SDCWA 2010) explains the verification process whereby a project is assessed for compliance with the NCCP/HCP. This report is the first step in the verification process for the project, which is a Covered Activity under the NCCP/HCP. This section provides a discussion of project consistency with the NCCP/HCP. The section also addresses project consistency with the Water Authority's PMPP with the USACE and the Maintenance Agreement with CDFW, as described in Section 1.4, Regulatory Setting.

4.1 Covered Species General Conditions for Coverage

Section 2.1 of Appendix B of the Water Authority's NCCP/HCP discusses conservation policies for sensitive species. Specifically, Section 2.1 contains 18 conditions for coverage that apply to projects that may have an effect on sensitive species, unless it can be demonstrated that the conditions are not applicable. These 18 conditions for coverage, which are included in Appendix F of this document (Section F-1), would be implemented for this project, as applicable.

A final determination on the applicability of General Conditions for Coverage will come after preparation of the pre-activity survey prior to project construction. Sections 2.2 through 2.5 of Appendix B of the Water Authority's NCCP/HCP outline other policies that a project must either demonstrate that it complies with or that the conditions are not applicable: (1) Narrow Endemic Policy, (2) Vernal Pool Protection Policy, (3) Avian Breeding Season Policy, (4) Buffers, and (5) Biologically Superior Alternatives. Compliance with these policies is discussed below.

1. The Narrow Endemic Policy is not applicable to this project because no Narrow Endemic species subject to project-related impacts were observed during the general wildlife survey or were deemed to have high potential to occur in any of the project study areas.
2. No vernal pools or swales were observed during reconnaissance surveys within the study areas. Therefore, the conditions related to the Vernal Pool Protection Policy do not apply to this project. If vernal pools are discovered during pre-activity surveys, this policy will be revisited and reviewed for inclusion.
3. The project would comply with the Avian Breeding Season Policy, as discussed in Section 4.2, Special Conditions for Covered Species.
4. Species-specific buffers, where applicable, are identified in Section 4.2, Special Conditions for Covered Species.
5. No Biologically Superior Alternatives to the NCCP/HCP provisions are being proposed; therefore, the related requirements are not applicable.

4.2 Special Conditions for Covered Species

In addition to the General Conditions for Coverage (see Section 4.1, Covered Species General Conditions for Coverage), the Water Authority's NCCP/HCP identifies species-specific conditions for coverage for some Covered Species that may be impacted by a proposed project. These species-specific special conditions are addressed in Appendix B, Sections 5.0 through 9.0 of the NCCP/HCP (SDCWA 2010).

Ten Covered Species were detected within the study areas during the general wildlife survey, are known from historical surveys, or have a high potential to occur within or adjacent to project's potential work areas. Appendix F, NCCP/HCP Conditions for Coverage, of this report (Section F-3) lists the special conditions the project must implement for each of the 10 Covered Species determined to be potentially impacted by this project. Most special conditions involve implementing the general conditions for coverage described in Section 4.1, above, and avoiding or minimizing impacts to species habitat through project design and placement.

Certain special conditions for Covered Species require focused surveys or implementation of trapping programs; the Covered Species potentially impacted by this project with such conditions are highlighted below. The full special conditions of coverage for the 10 Covered Species determined to be potentially impacted by the project are listed in Appendix F of this report (Section F-3). Additional information on implementation of these measures can be found in Section 6.1.3.

<u>Southern California Rufous-Crowned Sparrow, Coastal California Gnatcatcher, and Yellow Warbler</u>: Time work so that it occurs outside of the nesting season (defined as March 15 to September 15 for yellow warbler and February 15 to August 15 southern California rufous-crowned sparrow and coastal California gnatcatcher). If work must occur during the nesting season, nest surveys must be conducted within 300 feet of all proposed activities. If encountered, no work shall occur within 100 feet of active nests.

<u>Dulzura Pocket Mouse, Northwestern San Diego Pocket Mouse, and San Diego Desert Woodrat</u>: Implement a small-mammal live trapping and identification program in suitable habitat located within impact areas to determine presence/absence within and adjacent to impact/work areas. If present and nests/burrows will be affected by project-related disturbance, a live trapping and relocation program will be implemented, and individuals will be relocated into adjacent suitable habitat and/or a biologist will provide measures to ensure exclusion during work activities.

Complete analysis of the project's impacts to Covered Species (and the study areas where these conditions would apply) is provided in Section 5.1.4, Direct Impacts to Special-Status Wildlife.

4.3 NCCP/HCP Minimization Measures

Section 6.4 of the NCCP/HCP presents the minimization measures that the Water Authority has committed to implementing during the planning, design, and construction of new facilities, and for operations and maintenance of existing facilities (SDCWA 2010). The project would implement the following NCCP/HCP minimization measures accordingly (see Appendix F of this report [Section F-2] for a complete list of these measures):

- Environmental Surveyor (Section 6.4.1.1 of the NCCP/HCP)
- Pre-Activity Survey Form (Section 6.4.1.2 of the NCCP/HCP)

- Field Personnel Education Training (Section 6.4.1.3 of the NCCP/HCP)
- Field Personnel (and Contractor) Responsibilities (Section 6.4.1.4 of the NCCP/HCP)
- Design and Construction Controls (Section 6.4.2.5 of the NCCP/HCP)
- Stormwater Best Management Practices (Section 6.4.2.6 of the NCCP/HCP)
- Cleanup (Section 6.4.2.8 of the NCCP/HCP)

The Water Authority would conduct a pre-activity survey and prepare a survey report prior to construction as a design measure for this project, which would review habitat conditions and potential species presence to ensure that no significant changes in existing conditions occur compared to those documented in this report. Appropriate minimization and avoidance measures, as required by the NCCP/HCP, have been incorporated into the project and will be included in the Mitigation and Monitoring Reporting Program. By implementing the appropriate minimization measures stated in Section 6.4 of the NCCP/HCP, the project would comply with this aspect of the NCCP/HCP.

Additionally, certain applicable NCCP/HCP minimization measures would be incorporated into the construction specifications to further ensure compliance with the NCCP/HCP.

4.4 Biologically Significant Resource Areas

There is County of San Diego Multiple Species Conservation Plan Pre-Approved Mitigation Areas land within or immediately adjacent to study areas 5, 6, and 7. These study areas overlap with biologically significant resource areas (BSRAs), as defined in the NCCP/HCP. Figure 3, Regional Context, depicts the locations of Pre-Approved Mitigation Areas within and around the various project features and associated study areas.

All potential work areas associated with the project (aside from potential access road improvements that will occur on existing bare ground) are located within the Water Authority ROW, which is exempt from BSRA designation.

4.5 Consistency with the PMPP and CDFW Programmatic Maintenance Agreement

4.5.1 Programmatic Master Plan Permit (PMPP)

The proposed project is an eligible activity under the PMPP, qualifying as a category 2 project (Repairs of Pipelines and Minor Support Facilities), a category 3/4 project (Access Road Maintenance and Repair, Access Road Grading and Re-establishment) and a category 6 project (Protection of Underground Facilities in Waterways).

Pursuant to PMPP protocol, the Water Authority will submit a package of pre-qualifying documents (including a complete USACE Regulatory Division application form, a Memorandum for the Record, a vicinity figure, a location figure, an eligible activity figure showing permanent and temporary impacts to WOTUS, engineering design overlaid on an aerial showing WOTUS, Section 106 forms, an Avoidance and Minimization Measure Form, a Temporary Impact Re-Establishment Plan, a Mitigation Checklist, and an annual impact ledger) to USACE and would seek to obtain a Letter of Permission to implement the project. Mitigation requirements would be finalized during this process.

4.5.2 CDFW Programmatic Maintenance Agreement

As discussed above in Section 1.4, the project will be subject to CDFW authorization pursuant to Sections 1600–1603 of the California Fish and Game Code for impacts on waters under state jurisdiction, and the Water Authority will coordinate with CDFW to determine the appropriate permitting approach, either coverage under the Water Authority's Maintenance Agreement or a project-specific LSAA. The proposed project includes the following activities that are covered under the Maintenance Agreement:

- "grading along existing access roads and unimproved stream crossings," some of which will extend beyond existing road widths;
- "removing sediment, vegetation and debris from work areas around existing inline structures (e.g., blow offs, pump wells) that are located within and adjacent to streams;" and
- "placement of rock slope protection, fill or other grading adjacent to existing inline structures to stabilize a channel bank."

If the project is permitted pursuant to the Maintenance Agreement, the project would adhere to all administrative measures, notification and reporting, avoidance/minimization, and mitigation measures for for temporary and permanent impacts occurring within CDFW jurisdiction. The Water Authority will submit fees and prepare a pre-construction notification package to CDFW for each activity at study areas where impacts to CDFW streambed or riparian vegetation are proposed. A post-construction memorandum will include all required project information. The Water Authority will mitigate all authorized project impacts in accordance with the NCCP/HCP, as required by the Maintenance Agreement. NCCP/HCP conditions for CDFW permitting, as set forth in Appendix I of the NCCP/HCP, are listed in Appendix F of this report (Section F-4).

5 Project Impacts

Project impacts may be considered direct or indirect for the purposes of analyzing impacts under the Water Authority's NCCP/HCP.

Direct impacts include both the loss of on-site habitat and the plant and wildlife species that it contains. Direct impacts associated with the project would likely occur from the preparation/grading of work areas, associated removal of vegetation, and excavations associated with pipe relining. Impacts were quantified by overlaying the proposed impact areas onto the biological resources map and evaluating the impacts by vegetation community. During this phase of initial conditions reporting, impact acreages are subject to change in the event that the finalized project design leads to differing impact footprints.

The Water Authority considers direct impacts to be either permanent or temporary. As stated in the NCCP/HCP, permanent impacts result from Covered Activities that cause the removal of habitat (e.g., sensitive vegetation community or Covered Species) that cannot be mitigated on site through revegetation or other restoration efforts. Temporary impacts may be a one-time disturbance during construction or a repeated disturbance during routine operation and maintenance activities within ROWs and around facilities. In areas where one-time temporary impacts occur, the Water Authority would restore the area to its original condition; native species would be used except in locations where the surrounding area is landscaped with non-native species. If the Water Authority determines that repeated disturbances would occur to an area, the Water Authority would treat the area of repeated disturbance as a permanent impact and would mitigate off site by debiting from a Water Authority's Preserve area established for that purpose. Future impacts to the same area would be revegetated on site with no additional requirement for off-site mitigation. The Water Authority would then be limited to conducting on-site revegetation for subsequent disturbances. Within the ROW, the Water Authority may decide to treat a one-time temporary impact as a "repeat impact," meaning the impact is known or expected to occur more frequently than the time period in which the restored area is scheduled to return to its fully restored status, and the Water Authority may mitigate for the impact off site. The decision to classify a one-time temporary impact as "repeated" is made by the Water Authority on a case-by-case basis, considering known future activities at that same location and the availability of credits at its habitat management areas.

For this project, most impacts at Water Authority structures and associated work areas are anticipated to be temporary, one-time impacts. Permanent direct project impacts are associated with five new manways and a new access road to the new manway at portal 6. Current direct impact reporting is based on generalized work areas that would likely be refined in the field to avoid biological resource impacts. Thus, current direct impact reporting is conservative and likely overestimates direct impacts.

Indirect impacts refer to off-site and on-site effects that are short-term impacts (i.e., temporary) due to project construction, or long-term impacts (i.e., permanent) due to the design of the project and the effects it may have on adjacent resources. For this project, it is assumed that the potential short-term indirect impacts resulting from construction activities may include dust, noise, lighting, construction-related soil erosion/runoff, and general human presence that may temporarily disrupt species and habitat vitality. Long-term indirect impacts are not expected given that Water Authority structures already exist at project locations. After maintenance and restoration associated with the project is complete, the study areas would return to pre-project conditions and indirect impacts would no longer occur.

5.1 Direct Impacts

5.1.1 Vegetation Communities and Land Cover Types

Assuming the current configuration of potential work areas remains unchanged, implementation of the project will result in direct temporary (and potentially permanent) impacts to coastal sage scrub (Diegan), non-native grassland (grassland), southern mixed chaparral, urban/developed land, bare ground, disturbed habitat, non-native woodland, orchards and vineyards, intensive agriculture, southern coast live oak riparian forest, and southern cottonwood-willow riparian forest (Figures 2.1A through 2.7). Impact acreages are subject to change but represent the most current project design and footprint.

No impacts outside of the ROW are proposed in BSRAs. However, access road improvements to existing dirt roads outside of the ROW may occur in BSRAs; these improvements are not likely to impact adjacent habitats.

Impacts to coastal sage scrub (Diegan), non-native grassland (grassland), southern mixed chaparral, southern coast live oak riparian forest, and southern cottonwood-willow riparian forest would require revegetation or mitigation because they are NCCP/HCP sensitive vegetation communities.

Other impact areas would be returned to their prior use after completion of construction. Developed areas that are part of existing roads and water infrastructure would be repaved; disturbed areas would be stabilized with a native seed mix for erosion-control purposes after construction is complete; orchards and existing agricultural sites would be stabilized and made available again for these uses by the property owner. Table 7 lists potential direct impacts to vegetation communities and land cover types that would occur within the project alignment. Corresponding Water Authority NCCP/HCP habitats and their associated tiers are also listed.

Table 7. Potential Direct Impacts to Vegetation Communities and Land Cover Types

Vegetation Community/ Land Cover Type	Study Areas with Impacts	Water Authority NCCP/HCP Tier[a]	Temporary Impacts (Acres)[b]	Permanent Impacts (Acres)[b]
Upland Habitats				
Coast Live Oak Forest	6; 7	I	0.70	—
Coastal Sage Scrub (Diegan)	1; 3; 5; 7	II	2.21	<0.01[c]
Non-Native Grassland (Grassland)	1; 2	III	0.90	—
Southern Mixed Chaparral	1; 3; 4; 5	III	1.90	0.05
Urban/Developed Land	1; 5; 6; 7	IV	1.06	—
Bare Ground	1; 2; 3; 5; 6; 7	IV	1.99	0.01
Disturbed	1; 5; 7	IV	1.84	0.01
Non-Native Woodland	1; 7	IV	2.57	—
Orchards and Vineyards	1; 5; 6	IV	3.44	0.01
Intensive Agriculture – Dairies, Nurseries, Chicken Ranches	2	IV	0.16	—
		Subtotal	*16.77*	*0.08*
Wetland Habitats				
Southern Coast Live Oak Riparian Forest	3	I	1.72	—

Table 7. Potential Direct Impacts to Vegetation Communities and Land Cover Types

Vegetation Community/ Land Cover Type	Study Areas with Impacts	Water Authority NCCP/HCP Tier[a]	Temporary Impacts (Acres)[b]	Permanent Impacts (Acres)[b]
Southern Cottonwood-Willow Riparian Forest	4	I	0.06	—
		Subtotal	*1.78*	—
		Project Total	**18.56**	**0.08**

Notes:
[a] SDCWA 2010.
[b] Some numbers may not sum due to rounding.
[c] Mapped area is 0.002 acre.

Impacts to sensitive vegetation communities through minor vegetation trimming to allow equipment to maneuver into position around manholes are not included in the impacts to sensitive vegetation communities because vegetation trimming is covered by the NCCP/HCP without identifying acreage-based impacts.

5.1.2 Waters of the United States, Including Wetlands

As currently designed, direct impacts would occur to jurisdictional non-wetland waters and riparian vegetation (CDFW jurisdictional only) within potential work areas at study areas 3, 4, and 7. Table 8 lists potential direct impacts to potential jurisdictional aquatic resources within the currently identified work areas. Impact acreage and linear footage are subject to change but represent the most current project design and footprint.

Table 8. Potential Direct Impacts to Jurisdictional Aquatic Resources

Study Area	Aquatic Resource	Jurisdiction	Temporary Impacts (Acres/Linear Feet)[a]	Permanent Impacts (Acres/Linear Feet)[a]
3	NWW-08	USACE, CDFW, and RWQCB	0.301/438.09	—
	CDFW Riparian Vegetation	CDFW	1.345/NA	—
4	NWW-06	USACE, CDFW, and RWQCB	0.025/58.44	—
	CDFW Riparian Vegetation	CDFW	0.040/NA	—
7	NWW-01	USACE, CDFW, and RWQCB	0.067/435.66	—
	CDFW Riparian Vegetation	CDFW	0.078/NA	—
		Total	**1.856/932.19**	—

Notes:
CDFW = California Department of Fish and Wildlife; NWW = non=wetland water; NA= not applicable; USACE = U.S. Army Corps of Engineers; RWQCB = Regional Water Quality Control Board
[a] Some numbers may not sum due to rounding.

Applicable permits for all impacts to these resources would be obtained prior to project initiation and would contain detailed impact information. No wetlands would be impacted by the project.

Indirect impacts to these aquatic features would be avoided by the mandatory implementation of a project-specific Stormwater Pollution Prevention Plan pursuant to the NCCP/HCP. The Stormwater Pollution Prevention Plan would identify best management practices to prevent construction-related erosion and stormwater runoff.

5.1.3 Direct Impacts to Special-Status Plants

No plant species listed as threatened or endangered under the federal or state ESA were observed in any of the project study areas. No Covered Species under the NCCP/HCP and no CNPS-listed species were observed or have a high potential to occur in the potential work areas. Therefore, no sensitive plant or Covered Species impacts are expected to occur.

5.1.4 Direct Impacts to Special-Status Wildlife

Since three Covered Species are confirmed to occur within project study areas and seven were determined to have a high potential to occur in or adjacent to proposed impact areas, 10 special-status (all NCCP/HCP Covered Species) wildlife species are assumed to be preset and occupying certain project impact and study areas (see Section 3.4.2. Special-Status Wildlife). However, with the required implementation of NCCP/HCP conditions of coverage for each species (briefly summarized in Section 4.2, Special Conditions for Covered Species, and listed in Appendix F of this report [Section F-3]) potential project impacts would be avoided and minimized to the fullest extent possible. If additional sensitive species are identified during the project's pre-activity surveys, which are required by the NCCP/HCP, then additional conditions of coverage for those species would be required prior to the start of construction. In summary, NCCP/HCP requirements would ensure that the project would avoid all potential impacts to the special-status wildlife species with high potential to occur within proposed project impact areas.

5.2 Indirect Impacts

Indirect impacts associated with project work would be temporary and minimized through incorporation of the NCCP/HCP minimization measures listed in Appendix F of this report (Section F-2). The only potential long-term indirect impacts would be those related to the installation of the five new manways and the associated access road at portal 6. These permanent impacts would be small (totaling 0.077 acre across five separate sites) and would not remove significant portions of vegetation communities or habitat. Instead, the installation of manways and the associated access road would make access to the underground tunnel infrastructure much easier and greatly reduce the need to remove vegetation or habitat to perform future tunnel maintenance; thus, there would be long-term benefits associated with manway and access road installation and no long-term indirect impacts are expected.

6 Mitigation and Avoidance/ Minimization Measures

6.1 Measures for Direct Impacts

6.1.1 Sensitive Vegetation Communities

Pursuant to Section 6.5.1.4.2 of the NCCP/HCP (SDCWA 2010), the project would mitigate all one-time temporary impacts to sensitive vegetation communities by on-site restoration and revegetation of the impacted area at a 1:1 ratio. Section 6.6.1 of the NCCP/HCP states that, under Water Authority supervision, a qualified restoration specialist would prepare and submit to the Wildlife Agencies for their review and concurrence a restoration plan for each restoration site exceeding 0.25 acres (SDCWA 2010). Several potential work areas that would require restoration are greater than 0.25 acres and would require restoration plans. The Water Authority would implement a plan for all study areas where native habitats are temporarily impacted. Restoration measures would be developed to restore a site's previous biological resources and minimize establishment of invasive nonnative plant species in accordance with Section 6.6 of the NCCP/HCP. Habitat restoration activities would occur under the supervision and direction of an environmental surveyor who has experience developing and implementing native restoration plans in Southern California. Required components of the restoration plan are outlined in Section 6.6.1 of the NCCP/HCP and would generally include defining plant/seed palettes and success criteria appropriate for each affected habitat type; establishing a maintenance and monitoring program generally lasting 5-years, or until success criteria is met; and an exotic plant control and removal program. The Water Authority must receive concurrence from the Wildlife Agencies that each restoration effort is successful, as discussed in Section 6.6.1 of the NCCP/HCP.

Temporary impacts to Tier IV communities (i.e., agriculture, disturbed habitat, and urban/developed land) do not require on-site habitat restoration because these communities are not sensitive. Developed areas that are currently paved would be repaved; disturbed areas would be stabilized with a native seed mix for erosion-control purposes after construction is complete; orchards and existing agricultural sites would be made available again for these uses by the property owner. Erosion control stabilization sites are monitored and maintained by the Water Authority for two years during the project's five-year restoration maintenance and monitoring period.

Permanent impacts (if any) to sensitive vegetation communities would be mitigated using credits at the San Miguel Conservation Bank/Habitat Management Area at the ratios required in Tables 6-6 and 6-7 of the NCCP/HCP. Impacts to Tier IV communities (i.e., agriculture, disturbed habitat, and urban/developed land) would not require off-site habitat mitigation because these communities are not considered sensitive resources under the NCCP/HCP.

Mitigation for all potential impacts to sensitive vegetation communities is subject to change but was calculated using the most current project design and footprint.

Estimated mitigation acreages for the project's temporary and permanent impacts to sensitive vegetation communities are presented in Table 9.

Table 9. Mitigation for Impacts to Sensitive Vegetation Communities

Vegetation Community/ Land Cover Type	Study Areas with Impacts	Water Authority NCCP/ HCP Tier[a]	Temporary Impacts (acres)[b]	Permanent Impacts (acres)[b]	On-Site Restoration Required (acres)[b]	Off-Site Mitigation Ratio	Off-Site Mitigation Required (acres)[b]
Upland Habitats							
Coast Live Oak Forest	6; 7	I	0.70	—	0.70	—	—
Coastal Sage Scrub (Diegan)	1; 3; 5; 7	II	2.21	**<0.01[d]**	2.21	1:1	<0.01[d]
Non-Native Grassland (Grassland)	1; 2	III	0.90	—	0.90	—	—
Southern Mixed Chaparral (Granitic)	1; 3; 4; 5	III	1.90	**0.05**	1.90	0.5:1	0.03
Urban/Developed Land	1; 5; 6; 7	IV	1.06	—	0.00[c]	—	—
Bare Ground	1; 2; 3; 5; 6; 7	IV	1.99	**0.01**	0.00[c]	N/A	0
Disturbed	1; 5; 7	IV	1.84	**0.01**	0.00[c]	—	—
Non-Native Woodland	1; 7	IV	2.57	—	0.00[c]	—	—
Orchards and Vineyards	1; 5; 6	IV	3.44	**0.01**	0.00[c]	N/A	0
Intensive Agriculture – Dairies, Nurseries, Chicken Ranches	2	IV	0.16	—	0.00[c]	—	—
		Subtotal	*16.77*	*0.08*	*5.71*	—	*0.03*
Wetland Habitats							
Southern Coast Live Oak Riparian Forest	—	I	1.72	—	1.72	—	—
Southern Cottonwood-Willow Riparian Forest	—	I	0.06	—	0.06	—	—
		Subtotal	*1.78*	—	*1.78*	—	—
		Project Total	18.56	0.08	7.49	—	0.03

a SDCWA 2010.
b Some numbers may not sum due to rounding.
c Developed areas that are currently paved would be repaved; all other Tier IV habitats (excluding Orchards and Vineyards and agricultural areas) would be stabilized with a native seed mix for erosion-control purposes after construction is complete.
d Mapped area is 0.002 acre.

6.1.2 Jurisdictional Aquatic Resources

According to the NCCP/HCP, for projects or portions of projects with one-time temporary impacts, restoration and revegetation of the impacted area would be implemented on site at a 1:1 ratio; this includes temporarily impacted jurisdictional aquatic resources within those areas. Several of the potential temporary impacts noted in Section 6.1.1, Sensitive Vegetation Communities, include jurisdictional aquatic resources at various study areas. These temporary impacts to non-wetland waters and CDFW riparian vegetation would be mitigated through the on-site restoration described in Section 6.1.1 and would conform with the temporary impact re-establishment plan outlined in Appendix D of the Water Authority's Programmatic Master Plan Permit (PMPP) (Permit No. SPL-2012-00106-PJB) from USACE; all drainages and riparian areas temporarily impacted would be restored to pre-project conditions.

No permanent impacts to jurisdictional aquatic resources are anticipated; accordingly, no off-site mitigation for permanent impacts is required.

Mitigation for all potential impacts to non-wetland waters or other jurisdictional aquatic resources is subject to change but was calculated using the most current project design and footprint.

Estimated mitigation acreages for the project's temporary and permanent impacts to jurisdictional aquatic resources are presented in Table 10.

Jurisdictional aquatic resource mitigation acreages shown in Table 10 are included in the overall on-site and off-site mitigation acreages listed in Table 9 and do not need to be mitigated for separately. They are shown for reference only.

Mitigation would be subject to discussion with USACE and CDFW during the project's permitting process.

Table 10. Mitigation for Temporary Impacts to Potential Jurisdictional Aquatic Resources

Study Area	Aquatic Feature	Jurisdiction	Impacts (acres/linear feet)[a]	Mitigation Ratio	Mitigation Required (acres/linear feet)[a]
Temporary Impact Mitigation (On-Site Revegetation)					
3	NWW-08	USACE, CDFW, and RWQCB	0.301/438.09	1:1	0.301/438.09
	CDFW Riparian Vegetation	CDFW	1.345/NA	1:1	1.345/NA
4	NWW-06	USACE, CDFW, and RWQCB	0.025/58.44	1:1	0.025/58.44
	CDFW Riparian Vegetation	CDFW	0.040/NA	1:1	0.040/NA
7	NWW-01	USACE, CDFW, and RWQCB	0.067/435.66	1:1	0.067/435.66
	CDFW Riparian Vegetation	CDFW	0.078/NA	1:1	0.078/NA
On-Site Mitigation Total (included in overall on-site restoration shown in Table 9)					**1.856/932.19**

Notes:
CDFW = California Department of Fish and Wildlife; NWW = non=wetland water; NA= not applicable; USACE = U.S. Army Corps of Engineers; RWQCB = Regional Water Quality Control Board
[a] Some numbers may not sum due to rounding.

6.1.3 Special-Status Wildlife and Plant Species

A total of 10 special-status wildlife species (all NCCP/HCP Covered Species) were detected during project surveys or have a high potential to occur in potential work or study areas based on CNDDB/USFWS occurrence data and Dudek's knowledge of species habitat preference and distribution. NCCP/HCP conditions of coverage relevant to these species would be implemented by the Water Authority. These species-specific conditions of coverage, listed in NCCP/HCP Appendix B, are included in Appendix F of this report (Section F-3). These conditions would be implemented and would serve as avoidance and minimization measures that would ensure no significant project impacts to special-status wildlife species occur. Several of the more notable measures for certain species are summarized below:

<u>Southern California Rufous-Crowned Sparrow, and Yellow Warbler</u>: The Water Authority shall time work so that it occurs outside of the nesting season at study areas where these species are deemed to have a high potential to occur. If work must occur during the nesting season, nest surveys must be conducted within 300 feet of all proposed activities. If encountered, no work shall occur within 100 feet of active nests.

<u>Coastal California Gnatcatcher:</u> The Water Authority shall conduct USFWS protocol surveys (or occupancy shall be assumed) at study areas 1, 5, 6 and 7 where coastal California gnatcatcher has potential to occur within or adjacent to potential work areas. If habitat is found to be occupied (or if occupancy is assumed and surveys are not performed), work shall be timed so that it occurs outside of the nesting season. If work must occur during the nesting season, nest surveys must be conducted within 300 feet of all proposed activities. If encountered, no work shall occur within 100 feet of active nests.

<u>Dulzura Pocket Mouse, Northwestern San Diego Pocket Mouse, and San Diego Desert Woodrat</u>: The Water Authority shall implement a small mammal live trapping and identification program in suitable habitat (or assume occupancy) at study areas 1, 3, 4, 5, 6 and 7 within impact areas to determine presence/absence within and adjacent to impact/work areas. If present (or assumed occupied) and nests/burrows would be affected by project-related disturbance, a live trapping and relocation program shall be implemented and individuals shall be relocated into adjacent suitable habitat and/or a biologist shall provide measures to ensure exclusion during work activities.

No NCCP/HCP plant Covered Species were detected or have high potential to occur, and therefore NCCP/HCP conditions of coverage or avoidance/minimization measures are necessary for plant species. As required by the NCCP/HCP, a pre-activity survey would be performed prior to project-related ground disturbance to verify that there are no substantial changes to the biological baseline conditions established by this report. If a sensitive/Covered Species is detected during the pre-activity survey and could be impacted by the project, applicable species-specific measures listed in Appendix B of the NCCP/HCP would be identified in the pre-activity survey report and implemented accordingly.

6.2 Avoidance and Minimization Measures for Indirect Impacts

All potential indirect impacts associated with project work would be temporary due to the finite duration of project construction and the project's commitment to return all temporarily impacted areas to pre-project conditions. Permanent project impacts (if any) would not indirectly impact adjacent habitat function or value in the long-term; rather, the installation of manways and the associated access road would make access to the underground tunnel infrastructure much easier and greatly reduce the need to remove vegetation or habitat to perform future tunnel maintenance. Indirect impacts during construction would be minimized through incorporation of the NCCP/HCP minimization measures listed in Appendix F of this report (Section F-2).

7 Acknowledgments

This report was prepared by Dudek biologists Cody Schaaf, with senior review by Brock Ortega, Patricia Schuyler and Alex Hardy. Graphics were provided by Carrie Kubacki and formatting was provided by Rachel Dobrolenski. Water Authority personnel providing input and guidance include Sean Paver, project manager; Summer Adleberg, principal water resources specialist; and engineers Brent Fountain and Kirk Whitaker.

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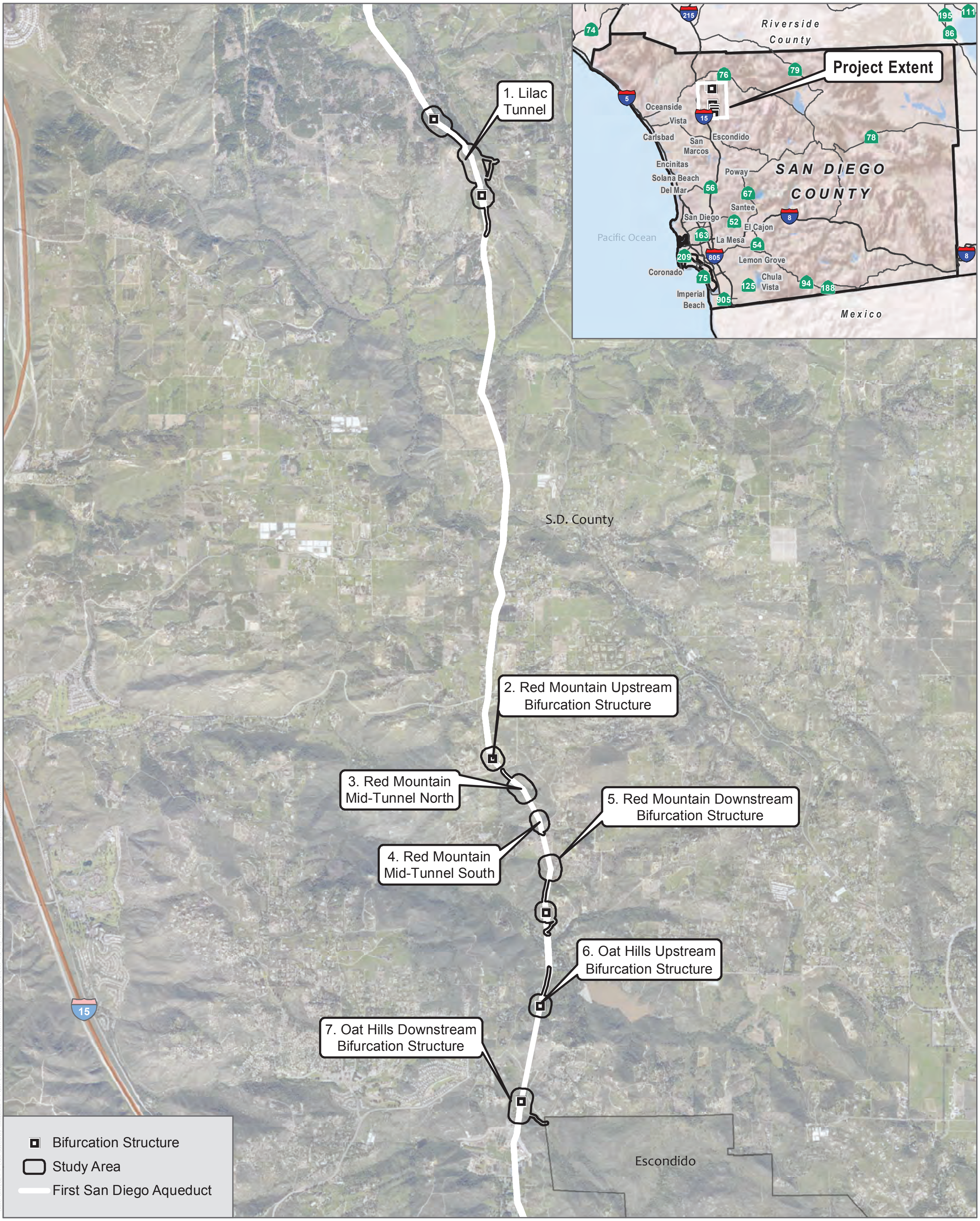

SOURCE: SanGIS 2017; Open Street Map 2019; SDCWA 2020

DUDEK

0 0.5 1 Miles

FIGURE 1

Project Location

1st Aqueduct Tunnels

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FIGURE 2.1A

Vegetation Communities and Biological Resources - Study Area 1 - Lilac Tunnel

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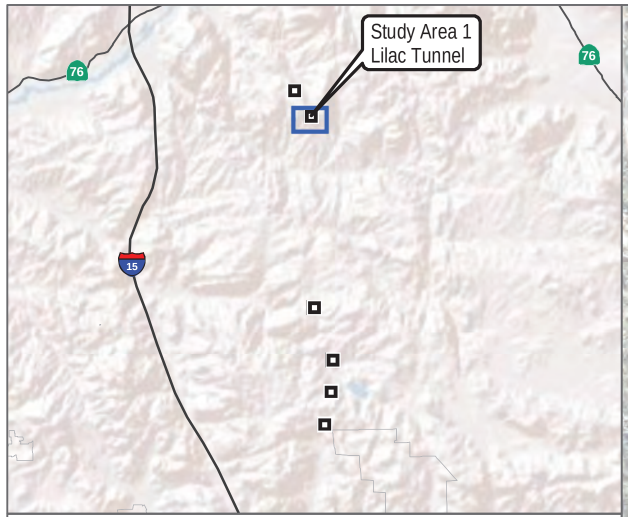

Study
Culvert
Jurisdictional Delineation
Vegetation Communities and Land Covers
BG; Bare Ground
CSS; Diegan Coastal Sage Scrub
DEV; Urban/Developed
DH; Disturbed Habitat
NNG; Non-Native Grassland
NNW; Non-Native Woodland
ORC; Orchards and Vineyards
Temporary Work Area
Portal Work Area
Lilac Tunnel Staging and Laydown Area
Access Road Improvements
Existing Features
SDCWA Right of Way
SDCWA Pipeline
Bifurcation Structure

SOURCE: SanGIS 2019; SDCWA 2020; USFWS 2020

DUDEK

0 137.5 275 Feet

FIGURE 2.1B
Vegetation Communities and Biological Resources - Study Area 1 - Lilac Tunnel

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SOURCE: SanGIS 2019; SDCWA 2020; USFWS 2020

DUDEK

FIGURE 2.2

Vegetation Communities and Biological Resources - Study Area 2 - Red Mountain Upstream Bifurcation Structure

1st Aqueduct Tunnels

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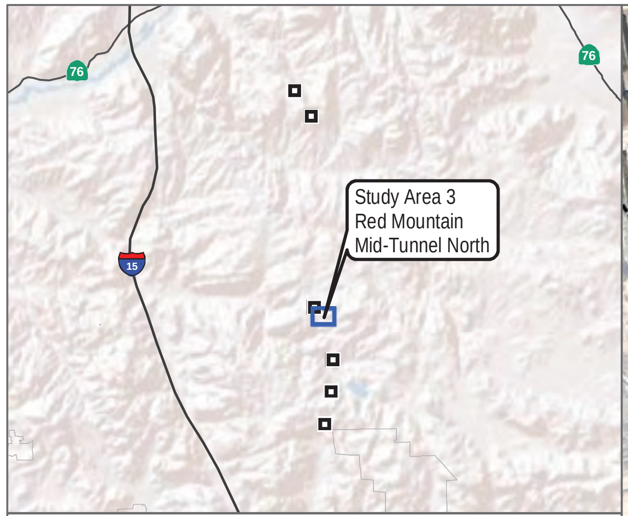


Study

Culvert

Jurisdictional Delineation

Riparian (CDFW)

Vegetation Communities and Land Covers

BG; Bare Ground

CSS; Diegan Coastal Sage Scrub

DH; Disturbed Habitat

IAGR; Intensive Agriculture - Dairies, Nurseries, Chicken Ranches

NNG; Non-Native Grassland

SCLO; Southern Coast Live Oak Riparian Forest

SCWRF; Southern Cottonwood-Willow Riparian Forest

SMX; Southern Mixed Chaparral

Wildlife

BOWH, Belding's orange-throated whiptail, *(Aspidoscelis hyperythra beldingi)*

Temporary Work Area

Portal Work Area

Permanent Impact

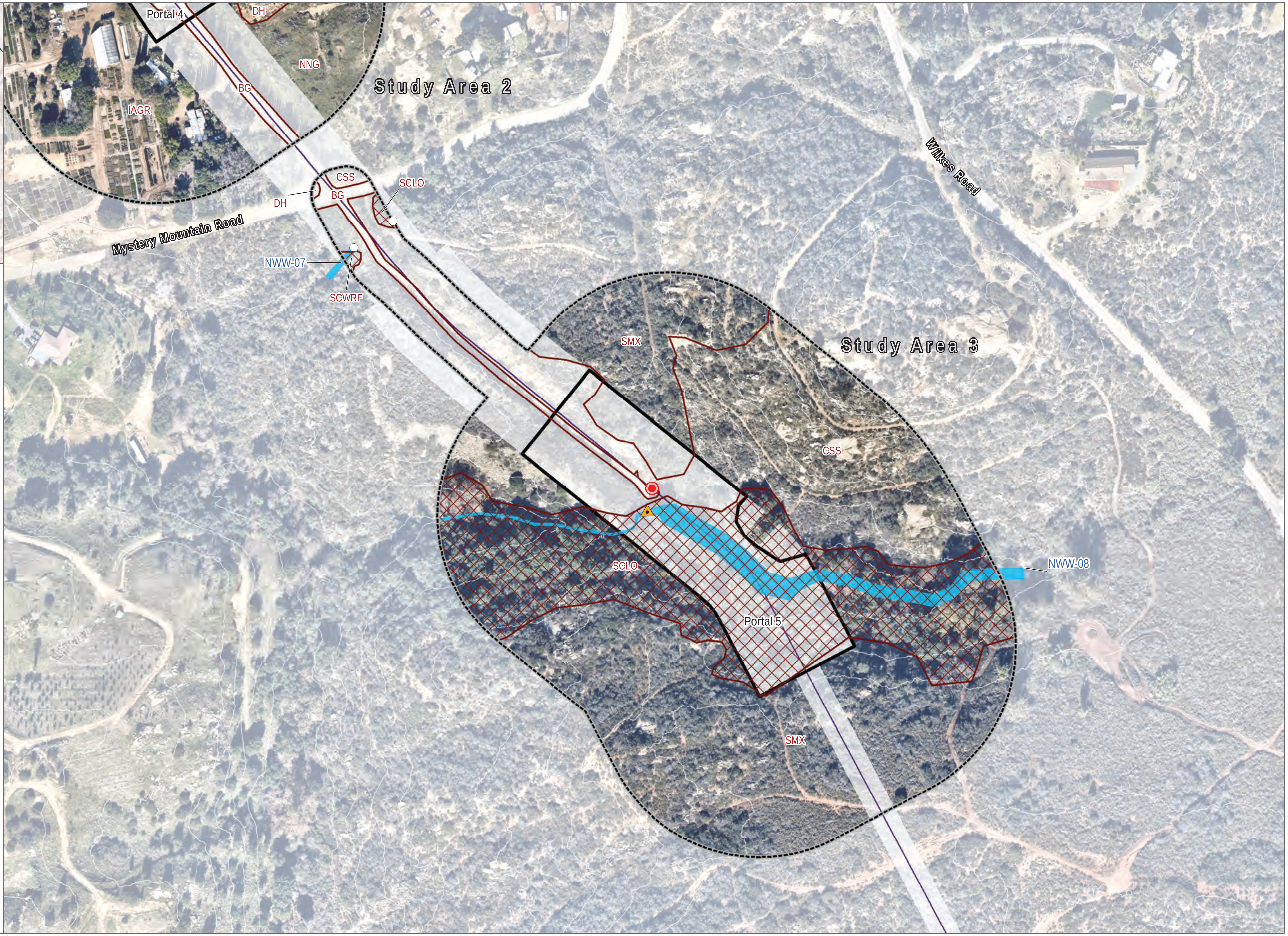
20 ft diameter permanent impact

Existing Features

SDCWA Right of Way

SDCWA Pipeline

Bifurcation Structure



SOURCE: SanGIS 2019; SDCWA 2020; USFWS 2020

DUDEK

0 90 180 Feet

FIGURE 2.3

Vegetation Communities and Biological Resources - Study Area 3 - Red Mountain Mid-Tunnel North

1st Aqueduct Tunnels

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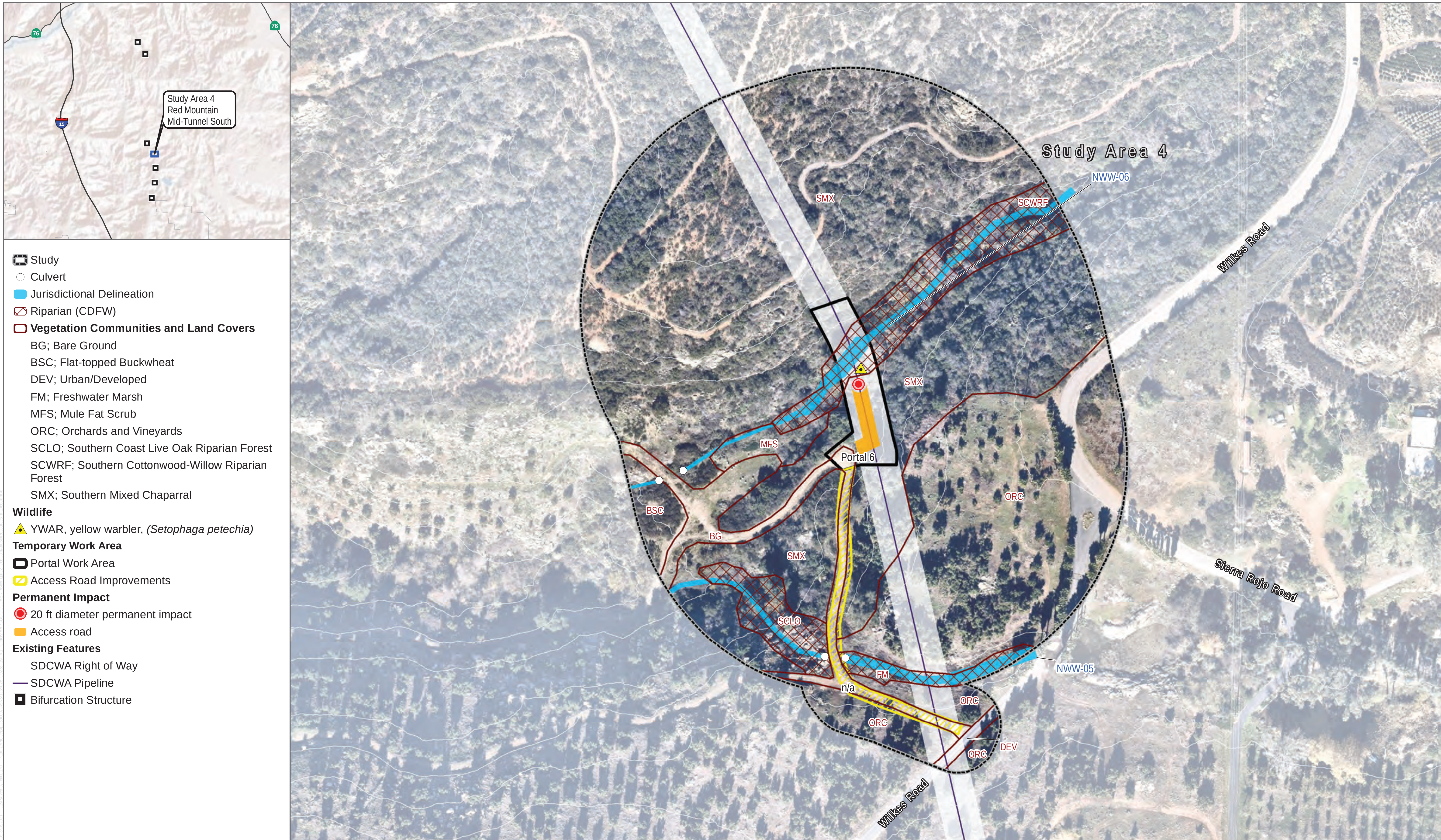

SOURCE: SanGIS 2019; SDCWA 2020; USFWS 2020

DUDEK 0 55 110 Feet

FIGURE 2.4

Vegetation Communities and Biological Resources - Study Area 4 - Red Mountain Mid-Tunnel South

1st Aqueduct Tunnels

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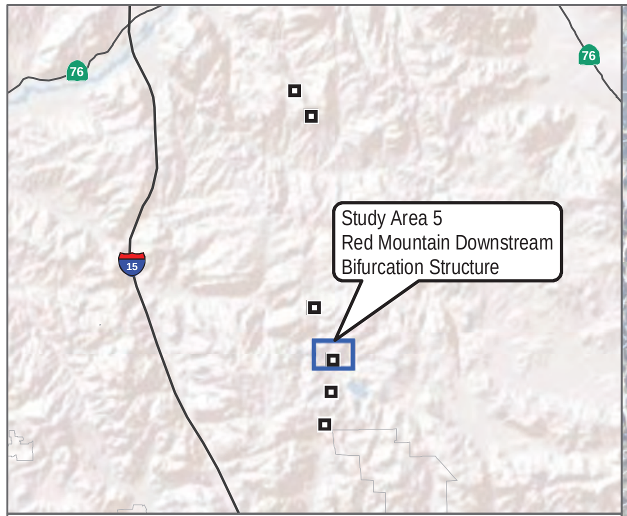


Study Area
Culvert
Jurisdictional Delineation
Riparian (CDFW)
Vegetation Communities and Land Covers
BG; Bare Ground
COLOF; Coast Live Oak Forest
CSS; Diegan Coastal Sage Scrub
DEV; Urban/Developed
DH; Disturbed Habitat
FM; Freshwater Marsh
NNG; Non-Native Grassland
ORC; Orchards and Vineyards
SMX; Southern Mixed Chaparral
TS; Tamarisk Scrub

Wildlife

BOWH, Belding's orange-throated whiptail, *(Aspidoscelis hyperythra beldingi)*

RCSP, rufous-crowned sparrow, *(Aimophila ruficeps)*

Temporary Work Area

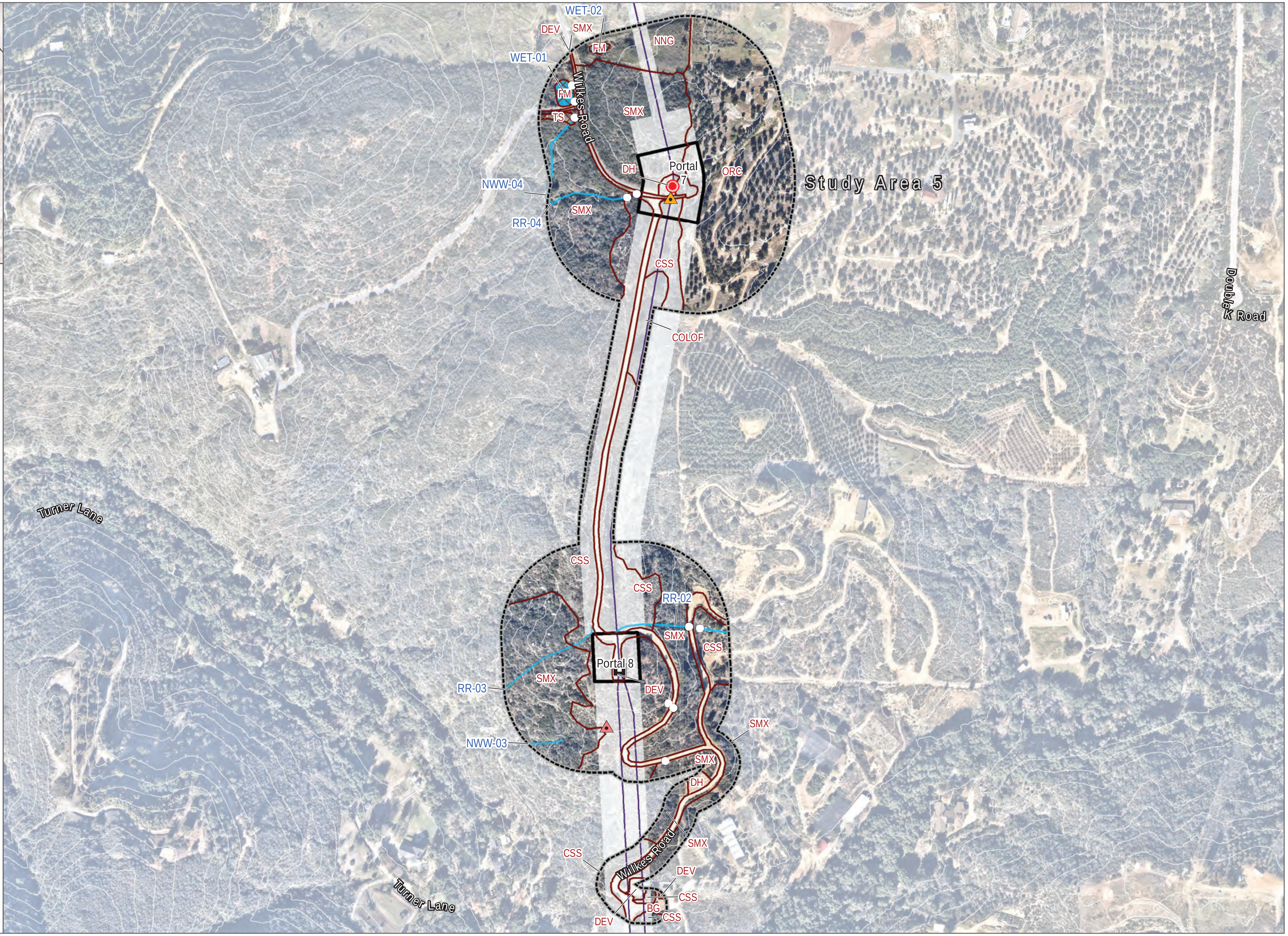
Portal Work Area

Permanent Impact

20 ft diameter permanent impact

Existing Features

SDCWA Right of Way
SDCWA Pipeline
Bifurcation Structure



SOURCE: SanGIS 2019; SDCWA 2020; USFWS 2020

DUDEK

0 165 330 Feet

FIGURE 2.5

Vegetation Communities and Biological Resources - Study Area 5 - Red Mountain Downstream Bifurcation Structure

1st Aqueduct Tunnels

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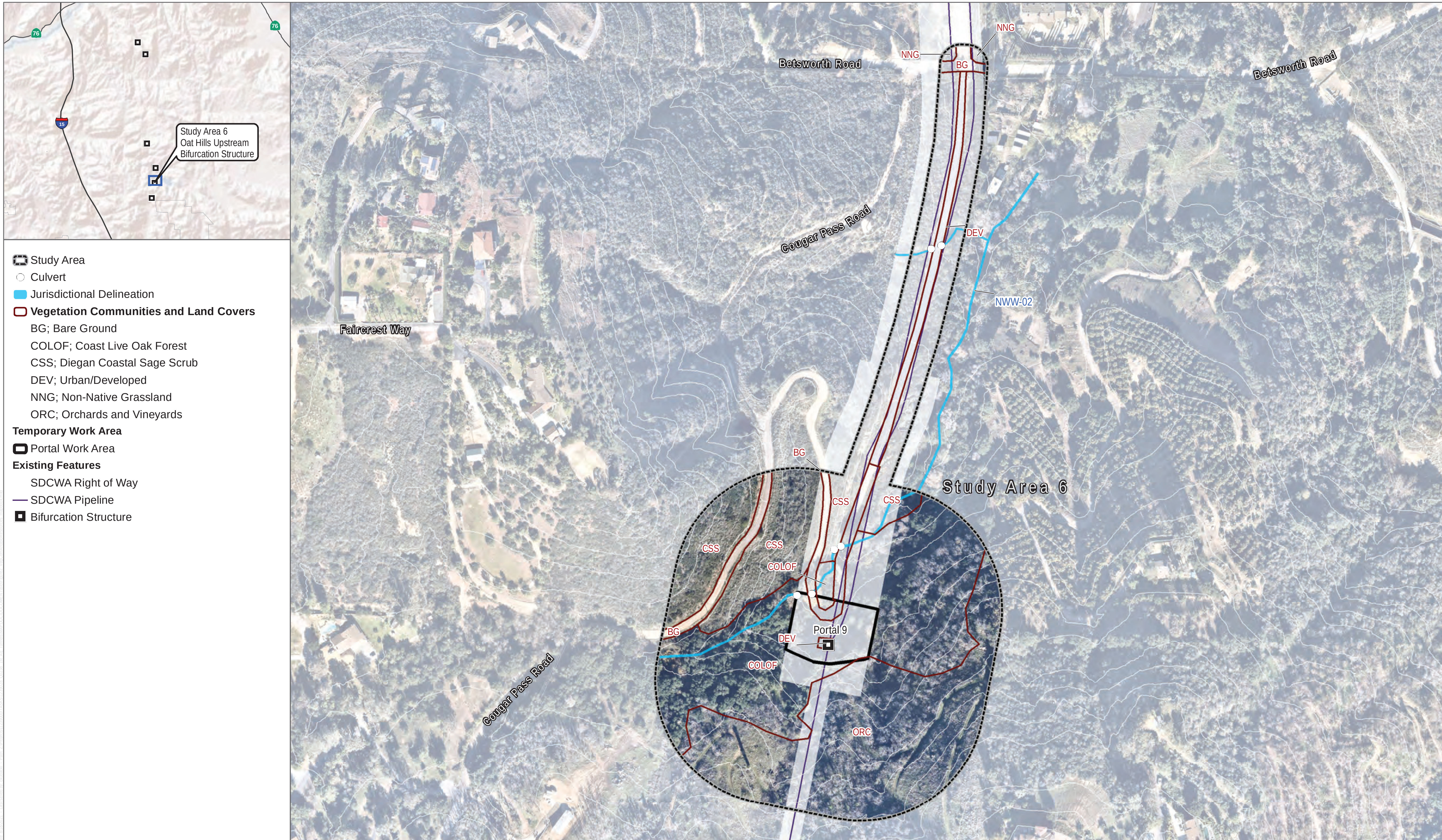

SOURCE: SanGIS 2019; SDCWA 2020; USFWS 2020

DUDEK

0 110 220 Feet

FIGURE 2.6

Vegetation Communities and Biological Resources - Study Area 6 - Oat Hills Upstream Bifurcation Structure

1st Aqueduct Tunnels

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SOURCE: SanGIS 2019; SDCWA 2020; USFWS 2020

DUDEK

FIGURE 2.7

Vegetation Communities and Biological Resources - Study Area 7 - Oat Hills Downstream Bifurcation Structure

1st Aqueduct Tunnels

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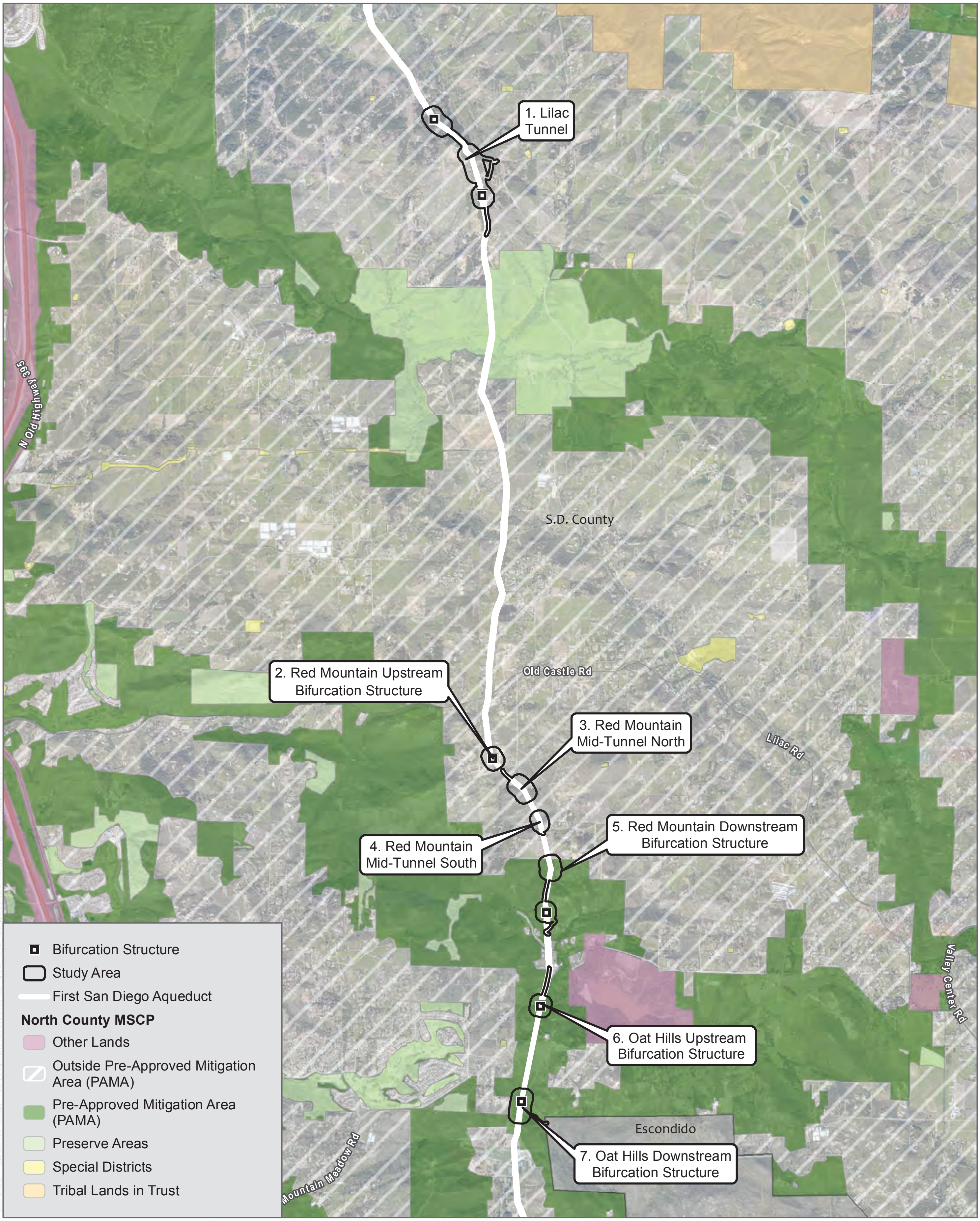

SOURCE: SanGIS 2017; Open Street Map 2019; SDCWA 2020

DUDEK

FIGURE 3

Regional Context

1st Aqueduct Tunnels

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Appendix A

Plant Compendium

Plant Species

Eudicots

ADOXACEAE—MUSKROOT FAMILY

Sambucus nigra—blue elderberry

AIZOACEAE—FIG-MARIGOLD FAMILY

* *Carpobrotus edulis*—hottentot fig

ANACARDIACEAE—SUMAC OR CASHEW FAMILY

Malosma laurina—laurel sumac
Rhus ovata—sugarbush
* *Schinus molle*—Peruvian peppertree
* *Schinus terebinthifolius*—Brazilian peppertree
Toxicodendron diversilobum—poison oak

APIACEAE—CARROT FAMILY

Daucus pusillus—American wild carrot
* *Foeniculum vulgare*—fennel

ASTERACEAE—SUNFLOWER FAMILY

Ambrosia psilostachya—western ragweed
Artemisia californica—California sagebrush
Artemisia douglasiana—Douglas' sagewort
Baccharis pilularis—coyote brush
Baccharis salicifolia—mulefat
Brickellia californica—California brickellbush
* *Carduus pycnocephalus*—Italian plumeless thistle
* *Centaurea melitensis*—Maltese star-thistle
Chaenactis glabriuscula—yellow pincushion
Cirsium occidentale—cobwebby thistle
Corethrogyne filaginifolia—sand-aster
* *Dittrichia graveolens*—stinkwort
Erigeron canadensis—Canadian horseweed
Erigeron foliosus—leafy fleabane
Eriophyllum confertiflorum—golden-yarrow
Gutierrezia sarothrae—broom snakeweed
Hazardia squarrosa—sawtooth golden bush
Heterotheca grandiflora—telegraphweed
* *Lactuca serriola*—prickly lettuce

Porophyllum gracile—slender poreleaf
Pseudognaphalium biolettii—two-color rabbit-tobacco
Pseudognaphalium californicum—ladies' tobacco
* *Pseudognaphalium luteoalbum*—Jersey cudweed
Pseudognaphalium stramineum—cottonbatting plant
* *Silybum marianum*—blessed milkthistle
* *Sonchus asper*—spiny sowthistle
* *Sonchus oleraceus*—common sowthistle
Stephanomeria virgata—rod wirelettuce
Stylocline gnaphaloides—mountain neststraw
Venegasia carpesioides—canyon sunflower

BIGNONIACEAE—BIGNONIA FAMILY

Chilopsis linearis—desert-willow

BORAGINACEAE—BORAGE FAMILY

Amsinckia menziesii—Menzies' fiddleneck
Cryptantha intermedia—Clearwater cryptantha
Phacelia cicutaria—caterpillar phacelia
Phacelia parryi—Parry's phacelia
Phacelia ramosissima—branching phacelia
Pholistoma membranaceum—white fiestaflower

BRASSICACEAE—MUSTARD FAMILY

* *Brassica nigra*—black mustard
* *Hirschfeldia incana*—shortpod mustard
Nasturtium officinale—watercress

CACTACEAE—CACTUS FAMILY

* *Opuntia ficus-indica*—Barbary fig

CAPRIFOLIACEAE—HONEYSUCKLE FAMILY

Lonicera subspicata—southern honeysuckle

CONVOLVULACEAE—MORNING-GLORY FAMILY

Calystegia macrostegia—island false bindweed
Cuscuta californica—chaparral dodder

CRASSULACEAE—STONECROP FAMILY

* *Crassula ovata*—jade plant
Dudleya lanceolata—lanceleaf liveforever
Dudleya pulverulenta—chalk dudleya

CUCURBITACEAE—GOURD FAMILY

Marah macrocarpa—Cucamonga manroot

ERICACEAE—HEATH FAMILY

Xylococcus bicolor—mission manzanita

EUPHORBIACEAE—SPURGE FAMILY

* *Ricinus communis*—castorbean

FABACEAE—LEGUME FAMILY

Acmispon americanus—Spanish clover
Acmispon glaber—deer weed
Lathyrus vestitus—Pacific pea
Lupinus truncatus—collared annual lupine
* *Melilotus indicus*—annual yellow sweetclover

FAGACEAE—OAK FAMILY

Quercus agrifolia—coast live oak
Quercus berberidifolia—Inland scrub oak
Quercus chrysolepis—canyon live oak
Quercus engelmannii—Engelmann oak

GERANIACEAE—GERANIUM FAMILY

* *Erodium cicutarium*—redstem stork's bill

JUGLANDACEAE—WALNUT FAMILY

Juglans californica—Southern California black walnut

LAMIACEAE—MINT FAMILY

* *Marrubium vulgare*—horehound
Salvia apiana—white sage
Salvia mellifera—black sage

MALVACEAE—MALLOW FAMILY

Malacothamnus fasciculatus—bush mallow

MELIACEAE—MAHOGANY FAMILY

* *Melia azedarach*—Chinaberrytree

MORACEAE—MULBERRY FAMILY

* *Ficus carica*—edible fig

MYRSINACEAE—MYRSINE FAMILY

* *Lysimachia arvensis*—scarlet pimpernel

MYRTACEAE—MYRTLE FAMILY

* *Eucalyptus camaldulensis*—river redgum

* *Eucalyptus globulus*—Tasmanian bluegum

NYCTAGINACEAE—FOUR O'CLOCK FAMILY

Mirabilis laevis—desert wishbone-bush

OLEACEAE—OLIVE FAMILY

Fraxinus latifolia—Oregon ash

ONAGRACEAE—EVENING PRIMROSE FAMILY

Clarkia purpurea—winecup clarkia

PAEONIACEAE—PEONY FAMILY

Paeonia californica—California peony

PHRYMACEAE—LOPSEED FAMILY

Diplacus aurantiacus—bush monkeyflower

PLANTAGINACEAE—PLANTAIN FAMILY

Antirrhinum nuttallianum—violet snapdragon

Keckiella antirrhinoides—bush penstemon

Keckiella cordifolia—heartleaf keckiella

Penstemon spectabilis—showy penstemon

* *Plantago lanceolata*—narrowleaf plantain

PLATANACEAE—PLANE TREE, SYCAMORE FAMILY

Platanus racemosa—California sycamore

POLEMONIACEAE—PHLOX FAMILY

Navarretia hamata—hooked pincushionplant

POLYGONACEAE—BUCKWHEAT FAMILY

Eriogonum fasciculatum—California buckwheat

RANUNCULACEAE—BUTTERCUP FAMILY

Clematis pauciflora—ropevine clematis

Thalictrum fendleri—Fendler's meadow-rue

RHAMNACEAE—BUCKTHORN FAMILY

Ceanothus crassifolius—hoary leaf ceanothus
Rhamnus crocea—redberry buckthorn
Rhamnus ilicifolia—hollyleaf redberry

ROSACEAE—ROSE FAMILY

Adenostoma fasciculatum—chamise
Cercocarpus betuloides—birch leaf mountain mahogany
Heteromeles arbutifolia—toyon

RUBIACEAE—MADDER FAMILY

Galium angustifolium—narrowleaf bedstraw

SALICACEAE—WILLOW FAMILY

Populus fremontii—Fremont cottonwood
Salix gooddingii—Goodding's willow
Salix laevigata—red willow
Salix lasiolepis—arroyo willow

SCROPHULARIACEAE—FIGWORT FAMILY

Scrophularia californica—California figwort

SOLANACEAE—NIGHTSHADE FAMILY

Datura wrightii—sacred thorn-apple
* *Nicotiana glauca*—tree tobacco
Solanum americanum—American black nightshade
Solanum douglasii—greenspot nightshade

URTICACEAE—NETTLE FAMILY

Urtica dioica—stinging nettle

VITACEAE—GRAPE FAMILY

Vitis girdiana—desert wild grape

Ferns and Fern Allies

POLYPODIACEAE—POLYPODY FAMILY

Polypodium californicum—California polypody

PTERIDACEAE—BRAKE FAMILY

Pentagramma triangularis—goldback fern

SELAGINELLACEAE—SPIKE-MOSS FAMILY

Selaginella bigelovii—bushy spikemoss

Monocots

AGAVACEAE—AGAVE FAMILY

Hesperoyucca whipplei—chaparral yucca

ARECACEAE—PALM FAMILY

* *Washingtonia robusta*—Washington fan palm

CYPERACEAE—SEDGE FAMILY

* *Carex pendula*—hanging sedge

POACEAE—GRASS FAMILY

* *Avena barbata*—slender oat
* *Bromus diandrus*—ripgut brome
* *Bromus madritensis*—compact brome
* *Bromus rubens*—red brome
* *Cortaderia jubata*—purple pampas grass
* *Ehrharta calycina*—perennial veldtgrass
* *Hordeum murinum*—mouse barley
* *Lamarckia aurea*—goldentop grass
Melica imperfecta—smallflower melicgrass
* *Pennisetum setaceum*—fountain grass
* *Stipa miliacea*—no common name

THEMIDACEAE—BRODIAEA FAMILY

Dipterostemon capitatus—bluedicks

TYPHACEAE—CATTAIL FAMILY

Typha latifolia—broadleaf cattail

*signifies introduced (non-native) species

Appendix B

Wildlife Compendium

Birds

Bushtits

AEGITHALIDAE—LONG-TAILED TITS AND BUSHTITS

Psaltriparus minimus—bushtit

Cardinals, Grosbeaks and Allies

CARDINALIDAE—CARDINALS AND ALLIES

Pheucticus melanocephalus—black-headed grosbeak

Finches

FRINGILLIDAE—FRINGILLINE AND CARDUELINE FINCHES AND ALLIES

Haemorhous mexicanus—house finch

Spinus psaltria—lesser goldfinch

Flycatchers

TYRANNIDAE—TYRANT FLYCATCHERS

Empidonax difficilis—Pacific-slope flycatcher

Myiarchus cinerascens—ash-throated flycatcher

Tyrannus vociferans—Cassin's kingbird

Hawks

ACCIPITRIDAE—HAWKS, KITES, EAGLES, AND ALLIES

Buteo jamaicensis—red-tailed hawk

Buteo lineatus—red-shouldered hawk

Hummingbirds

TROCHILIDAE—HUMMINGBIRDS

Calypte anna—Anna's hummingbird

Jays, Magpies and Crows

CORVIDAE—CROWS AND JAYS

Aphelocoma californica—California scrub-jay

Corvus brachyrhynchos—American crow

Kinglets

REGULIDAE—KINGLETS

Regulus calendula—ruby-crowned kinglet

Mockingbirds and Thrashers

MIMIDAE—MOCKINGBIRDS AND THRASHERS

Toxostoma redivivum—California thrasher

New World Quail

ODONTOPHORIDAE—NEW WORLD QUAIL

Callipepla californica—California quail

Pigeons and Doves

COLUMBIDAE—PIGEONS AND DOVES

Zenaida macroura—mourning dove

Roadrunners and Cuckoos

CUCULIDAE—CUCKOOS, ROADRUNNERS, AND ANIS

Geococcyx californianus—greater roadrunner

Swallows

HIRUNDINIDAE—SWALLOWS

Stelgidopteryx serripennis—northern rough-winged swallow

Titmice

PARIDAE—CHICKADEES AND TITMICE

Baeolophus inornatus—oak titmouse

Wood Warblers and Allies

PARULIDAE—WOOD-WARBLERS

Cardellina pusilla—Wilson's warbler

Setophaga occidentalis—hermit warbler

Setophaga petechia—yellow warbler

Leiothlypis celata—orange-crowned warbler

Woodpeckers

PICIDAE—WOODPECKERS AND ALLIES

Dryobates nuttallii—Nuttall's woodpecker

Wrens

TROGLODYTIDAE—WRENS

Troglodytes aedon—house wren

Thryomanes bewickii—Bewick's wren

New World Sparrows

PASSERELLIDAE—NEW WORLD SPARROWS

Aimophila ruficeps—rufous-crowned sparrow

Melospiza melodia—song sparrow

Melozone crissalis—California towhee

Pipilo maculatus—spotted towhee

Typical Warblers, Parrotbills, Wrentit

SYLVIIDAE—SYLVIID WARBLERS

Chamaea fasciata—wrentit

Invertebrates

Butterflies

LYCAENIDAE—BLUES, HAIRSTREAKS, AND COPPERS

Callophrys augustinus—brown elfin

Icaricia acmon acmon—Acmon blue

Leptotes marina—marine blue

NYMPHALIDAE—BRUSH-FOOTED BUTTERFLIES

Adelpha bredowii—California sister

Vanessa atalanta—red admiral

PAPILIONIDAE—SWALLOWTAILS

Papilio rutulus—western tiger swallowtail

Papilio zelicaon—anise swallowtail

PIERIDAE—WHITES AND SULFURS

Pieris rapae—cabbage white

Pontia protodice—checkered white

Mammals

Hares and Rabbits

LEPORIDAE—HARES AND RABBITS

Sylvilagus bachmani—brush rabbit

Rats, Mice, and Voles

CRICETIDAE—RATS, MICE, AND VOLES

Neotoma sp.—woodrat

Reptiles

Lizards

PHRYNOSOMATIDAE—IGUANID LIZARDS

Sceloporus occidentalis—western fence lizard

Sceloporus orcutti—granite spiny lizard

TEIIDAE—WHIPTAIL LIZARDS

Aspidoscelis hyperythra beldingi—Belding's orange-throated whiptail

Snakes

COLUBRIDAE—COLUBRID SNAKES

Lampropeltis californiae—California kingsnake

Appendix C

Special-Status Plant Species Potentially Occurring within the Biological Study Area

Scientific Name	Common Name	Status (Federal/State/CRPR/ HCCP-NCP)	Potential to Occur within the Work Area of Study Area			Potential to Occur in the Larger Study Area Outside of the Work Area		
			Low	*Moderate*	*High/ Present*	*Low*	*Moderate*	*High/Present*
Acanthomintha ilicifolia	San Diego thorn-mint	FT/SE/1B.1/ NCCP-HCP Covered		—	—	3, 4, 5, 6, 7	—	—
Adolphia californica	California adolphia	None/None/2B.1/ NCCP-HCP Covered	1, 3, 4, 5, 7	—	—	1, 3, 4, 5, 6, 7	—	—
Arctostaphylos rainbowensis	Rainbow manzanita	None/None/1B.1/ Not Covered	1, 3, 4, 5, 7	—	—	1, 3, 4, 5, 6, 7	—	—
Clarkia delicata	delicate clarkia	None/None/1B.2/ Not Covered	1, 4, 5, 7	3, 6	—	1, 4, 5, 7	3, 6	—
Comarostaphylis diversifolia ssp. *diversifolia*	summer holly	None/None/1B.2/ Not Covered	1, 3, 4, 5, 7	—	—	1, 3, 4	5, 6, 7	—
Horkelia truncata	Ramona horkelia	None/None/1B.3/ Not Covered	1, 3, 4, 5, 7	—	—	1, 3, 4, 6	5, 7	—
Lepechinia cardiophylla	heart-leaved pitcher sage	None/None/1B.2/ Not Covered	1, 3, 4, 5, 6, 7	—	—	1, 3, 4, 5, 6, 7	—	—
Monardella hypoleuca ssp. *intermedia*	intermediate monardella	None/None/1B.3/ Not Covered	1	—	—	1	—	—
Monardella hypoleuca ssp. *lanata*	felt-leaved monardella	None/None/1B.2/ NCCP-HCP Covered	3, 4, 5, 7	—	—	3, 4, 5, 6, 7	—	—
Nolina cismontana	chaparral nolina	None/None/1B.2/ NCCP-HCP Covered	1	—	—	1, 3	—	—
Tetracoccus dioicus	Parry's tetracoccus	None/None/1B.2/ Not Covered	1, 3, 4, 5, 7	—	—	1, 3, 4, 5, 6, 7	—	—

Notes:
If a study area number is not listed in the table, it can be assumed that the species has no potential to occur at that location.
If a special-status species is not included in this table, it can be assumed that it was not deemed to have any potential to occur within the vicinity of the overall project study area or was not required to be analyzed under the NCCP/HCP.
Statuses:
FE: Federally listed as endangered
FT: Federally listed as threatened

SE: State listed as endangered
ST: State listed as threatened
CRPR 1A: Plants presumed extirpated in California and either rare or extinct elsewhere
CRPR 1B: Plants rare, threatened, or endangered in California and elsewhere
CRPR 2A: Plants presumed extirpated in California but common elsewhere
CRPR 2B: Plants rare, threatened, or endangered in California but more common elsewhere

- .1 Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
- .2 Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
- .3 Not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

Appendix D

Special-Status Wildlife Species Potentially Occurring within the Biological Study Area

Row Labels	Common Name	Status (Federal/State/ NCCP-HCP)	Potential to Occur within the Work Area of Study Area			Potential to Occur in the Larger Study Area Outside of the Work Area		
			Low	*Moderate*	*High/Present*	*Low*	*Moderate*	*High/Present*
Reptiles								
Anniella stebbinsi	southern California legless lizard	None/SSC/ Not Covered	1, 5,	3, 4, 6, 7	—	5	1, 3, 4, 6, 7	—
Arizona elegans occidentalis	California glossy snake	None/SSC/ Not Covered	3, 6	1, 4, 5, 7	—	—	1, 3, 4, 5, 6, 7	—
Aspidoscelis hyperythra	orange-throated whiptail	None/WL/ NCCP-HCP Covered	2	—	1, 3, 4, 5, 6, 7	—	2	1, 3, 4, 5, 6, 7
Aspidoscelis tigris stejnegeri	coastal (western)/ San Diegan tiger whiptail	None/SSC/ NCCP-HCP Covered	2	—	1, 3, 4, 5, 6, 7	—	—	1, 3, 4, 5, 6, 7
Coleonyx variegatus abbottii	San Diego banded gecko	None/None/ NCCP-HCP Covered	3, 4, 6	1, 5, 7	—	—	1, 3, 4, 5, 6, 7	—
Crotalus ruber	northern red diamond rattlesnake	None/SSC/ NCCP-HCP Covered	2	—	1, 3, 4, 5, 6, 7	—	2	1, 3, 4, 5, 6, 7
Diadophis punctatus similis	San Diego ringneck snake	None/None/ NCCP-HCP Covered	1, 5,	3, 4, 6, 7	—	—	1, 2, 3, 4, 5, 6, 7	—
Lichanura trivirgata roseofusca	Coastal rosy boa	None/None/ NCCP-HCP Covered	2	1, 3, 4, 5, 6, 7	—	2	1, 3, 4, 5, 6, 7	—
Phrynosoma blainvillii	coast (San Diego)/Blainville's horned lizard	None/SSC/ NCCP-HCP Covered	2, 3, 4, 6	1, 5, 7	—	2	1, 3, 4, 5, 6, 7	—
Salvadora hexalepis virgultea	coast patch-nosed snake	None/SSC/ Not Covered	2, 3, 4, 6	1, 5, 7	—	—	1, 3, 4, 5, 6, 7	—
Thamnophis hammondii	two-striped gartersnake	None/SSC/ Not Covered	3, 4, 6	—	—	7	3, 4, 6	—

Row Labels	Common Name	Status (Federal/State/ NCCP-HCP)	Potential to Occur within the Work Area of Study Area			Potential to Occur in the Larger Study Area Outside of the Work Area		
			Low	*Moderate*	*High/Present*	*Low*	*Moderate*	*High/Present*
Birds								
Aimophila ruficeps canescens	Southern California rufous-crowned sparrow	None/WL/ NCCP-HCP Covered	3	4	1, 3, 4, 5, 7	—	—	1, 3, 4, 5, 6, 7
Ammodramus savannarum	grasshopper sparrow	None/SSC/ NCCP-HCP Covered	1, 2	—	—	2, 3, 4, 5, 7	1	—
Aquila chrysaetos	golden eagle	BCC/FP, WL/ Not Covered	—	—	—	1, 3, 4, 5, 7	—	—
Artemisiospiza belli belli	Bell's sage sparrow	BCC/WL/NCCP-HCP Covered	—	1, 3, 5, 6, 7	—	—	1, 3, 4, 5, 6, 7	—
Athene cunicularia	burrowing owl	BCC/SSC/ NCCP-HCP Covered	1, 2, 7	—	—	1, 2, 4, 5, 7	—	—
Campylorhynchus brunneicapillus sandiegensis	coastal/San Diego cactus wren	BCC/SSC/ NCCP-HCP Covered (Narrow Endemic)	—	—	—	1, 4, 5, 6, 7	—	—
Elanus leucurus	white-tailed kite	None/FP/ Not Covered	1, 2, 5	3, 4, 6, 7	—	—	1, 2, 3, 4, 5, 6, 7	—
Empidonax traillii extimus	southwestern willow flycatcher	FE/SE/NCCP-HCP Covered	3, 6, 7		—	3, 6, 7	—	—
Eremophila alpestris actia	California horned lark	None/WL/NCCP-HCP Covered	3, 4, 6	1, 2, 5, 7	—	—	1, 2, 3, 4, 5, 6, 7	—
Icteria virens	yellow-breasted chat	None/SSC/NCCP-HCP Covered	7	3, 4, 6	—	7	3, 4, 6	—
Polioptila californica californica	coastal California gnatcatcher	FT/SSC/NCCP-HCP Covered	3, 4, 6	—	1, 5, 7	4	3	1, 5, 6, 7
Setophaga petechia	yellow warbler	BCC/SSC/NCCP-HCP Covered	—	7	3, 4, 6	—	7	3, 4, 6
Vireo bellii pusillus	least Bell's vireo	FE/SE/NCCP-HCP Covered	7	3, 4, 6	—	—	3, 4, 6, 7	—

Row Labels	Common Name	Status (Federal/State/ NCCP-HCP)	Potential to Occur within the Work Area of Study Area			Potential to Occur in the Larger Study Area Outside of the Work Area		
			Low	*Moderate*	*High/Present*	*Low*	*Moderate*	*High/Present*
Mammals								
Chaetodipus californicus femoralis	Dulzura pocket mouse	None/SSC/ NCCP-HCP Covered	—	2, 3	1, 4, 5, 6, 7	—	2	1, 3, 4, 5, 6, 7
Chaetodipus fallax fallax	northwestern San Diego pocket mouse	None/SSC/ NCCP-HCP Covered	—	2, 3	1, 4, 5, 6, 7	—	2	1, 3, 4, 5, 6, 7
Felis concolor	Mountain lion	None/None/ NCCP-HCP Covered	2	1, 5	3, 4, 6, 7	2	1, 5	3, 4, 6, 7
Lasiurus blossevillii (Roosting)	western red bat	None/SSC/ Not Covered	1, 3	4, 6, 7	—	1, 3	4, 6, 7	—
Lasiurus xanthinus (Roosting)	western yellow bat	None/SSC /Not Covered	1, 3	4, 6, 7	—	1, 3	4, 6, 7	—
Lepus californicus bennettii	San Diego black-tailed jackrabbit	None/SSC/ NCCP-HCP Covered	2	1, 3, 4, 5, 6, 7	—	2	1, 3, 4, 5, 6, 7	—
Neotoma lepida intermedia	San Diego desert woodrat	None/SSC/ NCCP-HCP Covered	—	2	1, 3, 4, 5, 6, 7	—	2	1, 3, 4, 5, 6, 7
Invertebrates								
Euphyes vestris harbisoni	Harbison's dun skipper	None/None/ NCCP-HCP Covered	7	3, 4, 6	—	7	3, 4, 6	—

Notes: Underlined study area numbers are locations where the species was observed during reconnaissance project surveys. Some species located far from the direct impact/work area are assumed present within the larger study areas.
If a study area number is not listed in the table, it can be assumed that the species has no potential to occur at that location.
If a special-species is not included in this table, it can be assumed that it was not deemed to have any potential to occur within the vicinity of the overall project study area or was not required to be analyzed under the NCCP/HCP.
Statuses:
FE: Federally Endangered
FT: Federally Threatened
BCC: U.S. Fish and Wildlife Service Bird of Conservation Concern
SSC: California Species of Special Concern
FP: California Fully Protected Species
WL: California Watch List Species
SE: State Endangered
ST: State Threatened

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Appendix E

Study Area Photos

Photo 1: The northern potential work area within Study Area 1 is centered around the upstream Lilac Tunnel bifurcation structure. The structure is surrounded by active avocado orchards.

Photo 2: The southern potential work area within Study Area 1 is centered around the downstream Lilac Tunnel bifurcation structure. The structure and potential work area is surrounded by non-native woodland, non-native grassland, disturbed habitat and orchards.

Photo 3: Much of the northern portion of Study Area 1 near the upstream Lilac Tunnel bifurcation structure consists purely of active avocado orchards.

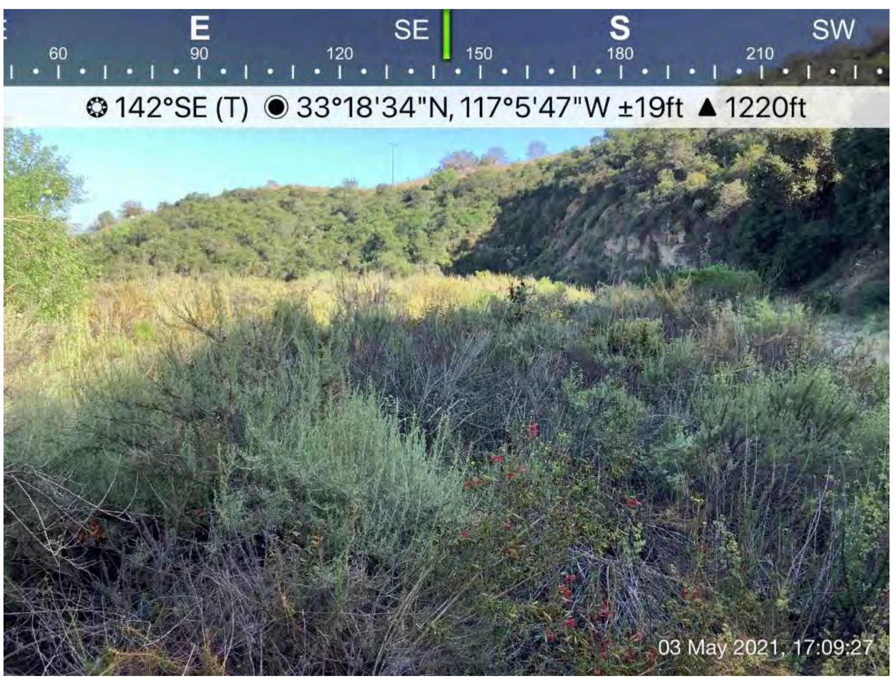

Photo 4: The central portion of Study Area 1 north of San Gabriel Way consists of costal sage scrub and southern mixed chapparal habitat; these habitats are just south of active avocado orchards. The northern portion of the exploratory potential work area between the upstream and downstream structures falls within these habitats.

Photo 5: The central portion of Study Area 1 south of San Gabriel Way consists of active avocado orchards (pictured here), non-native woodland and non-native grassland. The southern portion of the exploratory potential work area between the upstream and downstream structures falls within this habitat.

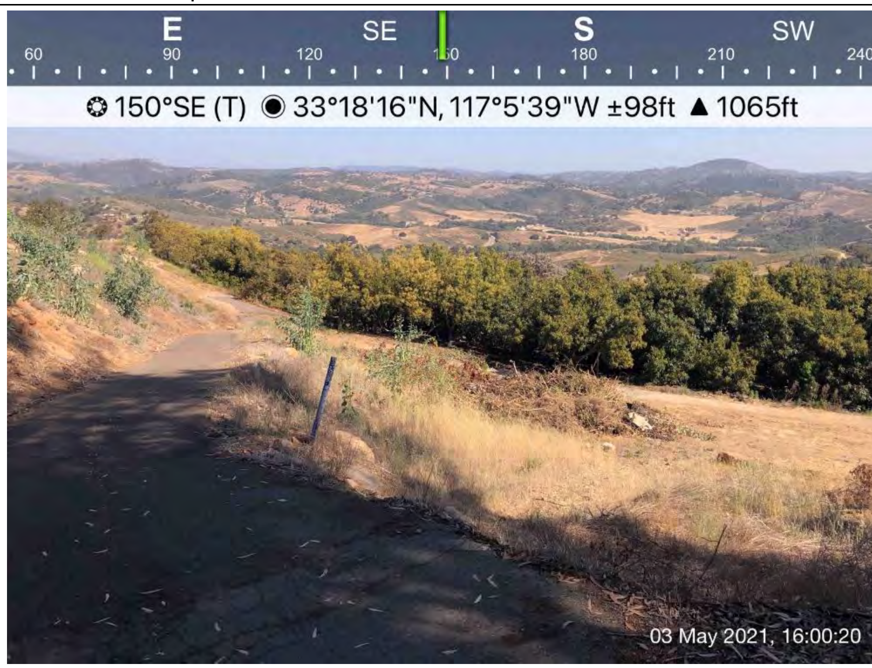

Photo 6: The southern potential work area within Study Area 1 consists mainly of disturbed habitat, non-native grassland, and orchards. An access road surrounded by orchards, non-native grassland and disturbed habitat extends south to Calle Oro Verde.

Photo 7: The potential work area within Study Area 2 is centered around the upstream Red Mountain Tunnel bifurcation structure. The structure is surrounded by bare ground, non-native grassland and intensive agriculture (a nursery). Non-native grassland with a few oak and avocado trees falls within the potential work area east of the bifurcation structure.

Photo 8: The exploratory potential work area within Study Area 3 is not centered around a bifurcation structure; it extends through coast live oak riparian forest associated with a jurisdictional stream that flows through the a gully of blasted rock associated with construction of the Red Mountain Tunnel.

Photo 9: The northern portion of the exploratory potential work area within Study Area 3 consists of coastal sage scrub adjacent to the dense coast live oak riparian forest.

Photo 10: The northern portion of Study Area 3 consists mainly of coastal sage scrub and bare ground along a graded Water Authority access road.

Photo 11: The exploratory potential work area within Study Area 4 is not centered around a bifurcation structure; it includes an area of southern cottonwood-willow riparian forest associated with a jurisdictional stream in a valley bottom. Southern mixed chapparal is present on the hillsides above the drainage.

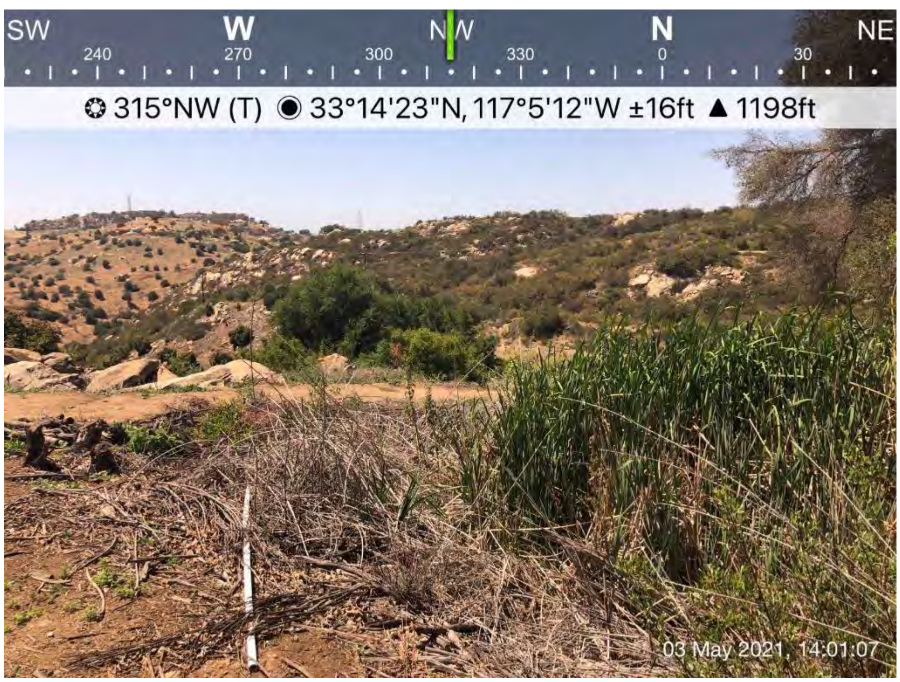

Photo 12: Study Area 4 includes an area of freshwater marsh associated with a jurisdictional stream in the southern portion of the study area adjacent to a dirt access road.

Photo 13: The exploratory potential work area in the northern portion of Study Area 5 is not centered around a bifurcation structure; it includes disturbed habitat, southern mixed chaparral, coastal sage scrub, active avocado orchards and bare ground.

Photo 14: The southern portion of the exploratory potential work area in Study Area 5 includes a gully of blasted rock associated with construction of the Red Mountain Tunnel. The gully is dominated by costal sage scrub but contains a small area of coast live oak forest south of the potential work area. The gully collects erosive runoff from an orchard to the east but no jurisdictional aquatic features are associated with it.

Photo 15: The central portion of Study Area 5 consists of a dirt access road surrounded by coastal sage scrub. The gully of blasted rock associated with construction of the Red Mountain Tunnel is seen to the left.

Photo 16: The southern portion of Study Area 5 is centered around the downstream Red Mountain Tunnel bifurcation structure. The structure is surrounded by coastal sage scrub and southern mixed chaparral.

Photo 17: The potential work area within Study Area 6 is centered around the upstream Oat Hills Tunnel bifurcation structure. The structure is surrounded by southern coast live oak riparian forest.

Photo 18: The northern portion of Study Area 6 includes an access road surrounded by coastal sage scrub. Dense coast live oak riparian forest surrounding the bifurcation structure can be seen to the south.

Photo 19: An example of the coast live oak riparian forest within Study Area 6. A well-defined jurisdictional stream flows through this habitat and underneath the access road north of the bifurcation structure and potential work area.

Photo 20: The potential work area within Study Area 7 is centered around the downstream Oat Hills Tunnel bifurcation structure. The structure is surrounded by non-native woodland, urban/developed land, disturbed habitat and coastal sage scrub.

Photo 21: The southern portion of the potential work area in Study Area 7 includes mainly disturbed habitat. A well-defined jurisdictional stream is present to the west of the work area and southern coast live oak riparian forest associated with this feature can be seen along the right edge of this photo.

Photo 22: The northern portion of the potential work area in Study Area 7 includes a well-defined jurisdictional stream within non-native woodland habitat west of the bifurcation structure.

Photo 23: The southeast portion of Study Area 7 includes southern mixed chaparral and coastal sage scrub. Several eroded, hillside jurisdictional channels run through this habitat and combine to join the main jurisdictional stream in the southern portion of the study area.

Photo 24: The eastern extension of Study Area 7 includes a dirt access road surrounded by southern mixed chapparal and coastal sage scrub. This road descends into the valley bottom where the bifurcation structure and potential work area are located.

Appendix F

NCCP/HCP Conditions for Coverage

F-1: General Conditions for Coverage

The following general measures apply to all Covered Species, as listed in Section 2.1 of Appendix B of the NCCP/HCP, and will be implemented on the project:

1. Conduct pre-activity surveys within suitable habitat to ensure that Covered Species are adequately addressed by impact avoidance, minimization, and mitigation. Surveys must be conducted by an Environmental Surveyor during the appropriate field conditions for detection prior to any proposed impacts in the Plan Area.
2. Avoid and minimize impacts to occupied Covered Species habitat or potential migration and/or dispersal corridors for all new facilities and O&M Activities of existing facilities through project design considerations.
3. Establish a habitat buffer when appropriate and feasible around covered plant species populations to support the natural suite of pollinators unless a biologically appropriate mitigation approach is agreed to with the Wildlife Agencies at the time of project-specific environmental review.
4. Fence and/or flag Covered Species populations and sensitive habitat in or adjacent to work areas. Where necessary, install signage to prohibit access and/or flag areas being restored or protected for their biological value.
5. Avoid driving or parking on sensitive and/or occupied habitat by keeping vehicles on roads and in designated staging areas.
6. Deter unauthorized activities (such as trampling and off-road vehicle use) and perform litter abatement, including proper disposal of illegally dumped materials, as part of routine patrol of access roads.
7. Monitor encroachment of non-native and invasive species into Covered Species populations and perform weed abatement as needed to improve the habitat.
8. Stabilize work areas to control erosion or sedimentation problems when working near Covered Species populations within the Plan Area. Populations within or adjacent to work areas would be protected from vehicular traffic, excessive foot traffic, or other activities that result in soil surface disturbance.
9. Control dust when working near Covered Species populations and/or habitat in accordance with applicable regulations.
10. All identified populations of Covered Species within rights-of-ways must be managed to control edge effects to the maximum extent possible.
11. Any restoration and monitoring program prepared as a component of the mitigation plan for impacts to a Covered Species shall include, but not be limited to, species propagation ratios, restoration site selection and assessment, site preparation, implementation strategies, weed control procedures, required management and monitoring in perpetuity, funding commitment, and reporting procedures. The program would be prepared in advance of project impacts and approved by the Wildlife Agencies.
12. Any planting stock used shall be inspected by an Environmental Surveyor to ensure that it is free of pest species that may invade natural areas, including, but not limited to, Argentine ants (*Iridomyrmex humii*), fire ants (*Solenopsis invicta*), and other pests. Any planting stock that is infested would not be allowed within restoration areas or within 300 feet of native areas unless documentation is provided to the Wildlife Agencies that these pests already occur in the native areas around the project site. The stock would be quarantined, treated, or disposed of according to best management principles by qualified

experts in a manner that precludes invasions into native habitat. Runoff from mitigation sites into native habitat would be minimized and managed.

13. To the maximum extent possible, conduct Covered Activities occurring within wetland habitats during the dry season when flows are at their lowest or nonexistent to minimize impacts to aquatic species and/or habitats.
14. Reseed temporary impact areas with an appropriate native seed mix and allow for natural recolonization of the area by adjacent populations.
15. For new facilities adjacent to native habitat, minimize ornamental landscaping or irrigation not associated with native habitat restoration.
16. Collection of covered plant and wildlife species by Water Authority personnel and contractors is prohibited.
17. Maintain and manage dispersal/movement corridors within the Plan Area that contribute to long-term population viability.
18. The use of outdoor lighting within or adjacent to potential Covered Species habitat will be discouraged. If lighting must be used for reasons of safety and security, light sources would be shielded away from habitat and only low-pressure sodium lighting would be used.

F-2: NCCP/HCP Minimization Measures

The following minimization measures listed in Section 6.4 of the NCCP/HCP will be incorporated as design features on the project:

Environmental Surveyor (Section 6.4.1.1)

1. The Water Authority will identify an Environmental Surveyor for the project to oversee pre-project evaluations/needs of Covered Activities and work with the project engineer and contractors to ensure implementation compliance of Covered Activities with Plan commitments.
2. If the Environmental Surveyor discovers that the Water Authority is out of compliance with the permits associated with this Plan, he/she will report the noncompliance to the Water Authority within one working day and to the Wildlife Agencies within five working days so that the Water Authority and Wildlife Agencies can determine how to put the Plan back into compliance.
3. Before any clearing and/or construction activities are performed in habitat areas that may support Covered Species, the Environmental Surveyor will review the site, identify any sensitive plant and animal species, and identify requirements pursuant to the Plan for impact avoidance and minimization. A standard PSF will be prepared for each project and submitted to the Water Authority for review and tracking purposes.
4. The Environmental Surveyor will determine the extent of potential Covered Species habitat and will flag the sensitive resources to be avoided. If a Covered Species is present, the Environmental Surveyor will refer to Appendix B of the NCCP/HCP for species-specific conservation measures. In the case of unavoidable impacts to a Covered Species, the Environmental Surveyor will determine the extent of impact, the appropriate mitigation measures, and recommend to the project engineer additional measures to minimize impacts in accordance with Appendix B of the NCCP/HCP.

5. The Environmental Surveyor will work with the project engineer to identify and mark areas appropriate for staging and temporary equipment storage, placement of heavy machinery, as well as vehicle turn around and access, that will result in the least amount of impact to sensitive vegetation and/or Covered Species. The Environmental Surveyor will verify that all areas specified on the plans to be avoided are marked with flagging in the field prior to construction start.
6. The Environmental Surveyor will attend pre-construction meetings for projects in sensitive areas. The Environmental Surveyor will provide brief presentations to field staff, as needed, to familiarize field personnel with the natural resources to be protected and avoid on project sites and outline environmental expectations. The Environmental Surveyor will also be available to answer questions and address any last-minute construction changes.
7. The Environmental Surveyor will be present during clearing, topsoil salvage, and construction activities located within sensitive habitat. The frequency and duration of required monitoring will be specified in the PSF that is completed by the Environmental Surveyor and submitted to the Water Authority on a project-by-project basis prior to the start of construction.
8. The Environmental Surveyor will advise the construction manager during construction to ensure compliance with all avoidance, minimization, and mitigation measures.
9. The Environmental Surveyor will conduct (and document) monitoring as required by the PSF. At the completion of the Covered Activity, the Environmental Surveyor will prepare a brief report to verify compliance with the avoidance and minimization recommendations in the PSF. This report will include documentation that the flagged areas were avoided and that minimization measures were properly implemented. The Environmental Surveyor will be responsible for the identification and monitoring of any Covered Species that are found on the project site prior to and during construction activities. Monitoring activities will be in accordance with the species-specific measures (see Appendix B of the NCCP/HCP).
10. If any previously unidentified Covered Species or otherwise sensitive species, nests, dens, or burrows are located on a project site during construction activities, the Environmental Surveyor will provide guidance, through the construction manager, as to how best to minimize or avoid impacting the resource(s).
11. The Environmental Surveyor will be on-call (via phone) to respond within 24 hours for potential emergency deployment to assess and monitor potentially critical biological issues.
12. If the Environmental Surveyor determines that the Covered Activity is out of compliance with the requirements of the Plan, the Environmental Surveyor will report it to the Water Authority. The Water Authority will be responsible for bringing the project back into compliance and determine the appropriate remedial action, if necessary, through coordination with the Wildlife Agencies.
13. The Environmental Surveyor or construction manager will be responsible for ensuring the removal of all habitat flagging from the construction site at completion of work.
14. If included in the PSF, the Environmental Surveyor will direct the relocation of Covered Species that can be moved from harm's way in coordination with the species-specific Conditions of Coverage in Appendix B of the NCCP/HCP (in non-emergency situations) with notification to the Wildlife Agencies.

Pre-Activity Survey Form (Section 6.4.1.2)

1. The PSF will include avoidance, minimization, and mitigation requirements based on the general measures outlined in this section and the species-specific conditions in Appendix B of the NCCP/HCP. USFWS biological survey protocols performed by qualified and appropriately authorized personnel will be conducted where appropriate and required.
2. The pre-activity survey will be valid for 30 days unless the project is scheduled to begin during the avian breeding season, in which case the nesting bird clearance must be conducted within five days of project implementation. If ground disturbance activities have not commenced within 30 days after the survey is completed, the Environmental Surveyor will conduct a verification survey to confirm that biological conditions have not significantly changed that would alter the specified avoidance, minimization and mitigation commitments prior to construction.

Field Personnel Education Training (Section 6.4.1.3)

1. Field personnel working within sensitive habitat areas, including both Water Authority employees and contractors, will participate in an education training program at the start of each project. The program will be conducted on-site by an Environmental Surveyor under the direction of the Water Authority. The training will include: an overview of Covered Species identification and the legal protections afforded to each species; a brief discussion of their biology; habitat requirements; status under ESA and CESA; conservation measures being taken by the project for the protection of the Covered Species and their habitats under this Plan; and penalties for non-compliance. The training program will also educate field personnel in the identification of invasive species that may be removed, as well as desirable seeded and planted species, to ensure that native species are not affected by invasive species control. A fact sheet conveying this information will also be available to all personnel working in the project area. The Water Authority, either directly or through the services of the Environmental Surveyor, will be responsible for the education and training for new field personnel coming on-site after the start of a project.

Field Personnel (and Contractor) Responsibilities (Section 6.4.1.4)

1. Contractors or other project personnel will not collect plants or wildlife, unless specifically authorized and directed by the Environmental Surveyor. Only qualified and appropriately authorized personnel will handle or collect plants or wildlife as required by species-specific measures.
2. Field personnel will not intentionally harm or harass wildlife or damage nests, burrows, rock outcrops, or other habitat components.
3. Drivers on unpaved roads in native habitats will not exceed a speed of 20 miles per hour in order to avoid injury to animals and minimize dust generation.
4. Impacts to adjacent native vegetation that would be significantly affected by excessive fugitive dust will be avoided and minimized through watering of access roads (except in areas with vernal pools) or other appropriate measures, such as reducing the number or speed of vehicles or adding inert materials that reduce dust. Projects with the potential for excessive dust generation include those that involve more than occasional use of roads in dust-prone soils (i.e., more than three to five vehicle roundtrips per day) or require multiple vehicles to transport heavy equipment and supplies.
5. Vehicles will not park in areas where catalytic converters may ignite vegetation. Construction vehicles will be equipped with shovels and fire extinguishers in order to reduce the risk of wildfires.

6. Littering will be strictly prohibited. All trash will be deposited in secured, closed containers or hauled out daily by field personnel.
7. No pets will be allowed on any construction site.
8. No firearms or other weapons will be allowed on any construction site except as carried by governmental law enforcement, or as authorized in writing by Water Authority staff.
9. Field personnel will be prohibited from pushing or dumping soil and brush into sensitive habitats.
10. All vehicles, tools, and machinery will be restricted to access roads, approved staging areas, or within designated construction zones.
11. If any field personnel identify a previously unnoticed Covered Species on a construction site, work activities will cease in order to immediately notify the Water Authority's construction manager, project engineer, and the Environmental Surveyor. In conjunction with Water Authority environmental staff, the Environmental Surveyor will determine what actions would be taken to avoid or minimize impacts to the species according to the species-specific conditions outlined in Appendix B of the NCCP/HCP.
12. Field personnel will notify the project engineer/environmental staff of any sick, injured, or dead wildlife found on site.
13. Parking or driving underneath oak trees, except in established traffic areas, will not be allowed in order to protect root structures.

Design and Construction Controls (Section 6.4.2.5)

1. Projects will be designed to avoid and minimize impacts to biological resources, to the extent feasible.
2. Construction and operation activities will be designed and implemented to avoid and minimize new disturbance, erosion on manufactured and other slopes, and off-site degradation from sedimentation.
3. Storage and staging areas will be located in disturbed areas or within the least biologically sensitive areas established by the Environmental Surveyor. No filling, excavating, trenching, or stockpiling of materials will be permitted outside of the approved construction footprint, unless the area to be used is already disturbed and does not support habitat for Covered Species.
4. Construction footprints will be delineated in the construction documents. In addition, if the construction footprint is located within or near sensitive habitat, the project footprint will be fenced or continuously flagged with streamers or a boundary rope barrier to ensure that habitat is not removed beyond the limits of work. These barriers will be established prior to any grading, grubbing, or clearing, and will be monitored by the Environmental Surveyor.
5. Projects will be refined, where possible, during the engineering and construction phases to further avoid and minimize impacts to Covered Species or their habitat through seasonal timing of work, minor realignments, and narrowing of construction limits.
6. Clearing and grubbing will be performed within the construction areas only as necessary for safe vehicle movement and construction activities.

Stormwater Best Management Practices (Section 6.4.2.6)

1. Prior to the start of ground disturbing activities, the Water Authority or their consultants will prepare a Storm Water Pollution Prevention Plan (SWPPP) to reduce or eliminate pollutants during and after construction. The most current and applicable Best Management Practices (BMPs) will be implemented

at all construction sites in or adjacent to native habitat in accordance with the project specifications. In addition to the approved manual, BMPs listed in the most recent National Pollutant Discharge Elimination System (NPDES) General Permit and the BMP Fact Sheet located in State Water Resources Control Board (SWRCB) General Permit for Small Linear Underground/Overhead Projects will apply. The fact sheet is attached as an Appendix G and the SWRCB or RWQCB will be contacted for the latest requirements.

Cleanup (Section 6.4.2.8)

1. Refuse and trash will be regularly removed from activity sites and disposed of in a lawful manner. Timing of refuse and trash removal will be determined by the Environmental Surveyor and comply with the project specifications that require debris to be removed as work is completed. Petroleum products, including gasoline, diesel, and hydraulic fluid, will be used during construction in accordance with all federal, state, and local laws, regulations, and permitting requirements. In the event that hazardous materials are encountered or generated during construction, contractors certified by the responsible regulatory agency will conduct all recovery operations and dispose of hazardous waste in accordance with existing regulations and required permits. As required, petroleum products, trash, and other materials will be taken to a disposal facility authorized to accept such materials.

F-3: Wildlife Species Conditions for Coverage

The following conditions for coverage for wildlife species, as listed in Sections 5, 6, 7, and 8 of NCCP/HCP Appendix B, will be incorporated into the project:

Belding's Orange-throated Whiptail (Section 6.3.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Avoid or minimize impacts to Belding's orange-throated whiptail habitat at all study areas through project design and placement.
3. Minimize and manage effects from introduced ant species that may exclude the termite prey base during restoration efforts. All nursery stock plants will be checked for nonnative ants before installation at restoration sites. Non-native ants that penetrate native habitats appear to be partially supported by artificial irrigation associated with landscaping (Suarez et al. 1998). Therefore, runoff from mitigation sites in native habitat would be minimized and managed.

Coastal (Western)/San Diegan tiger Whiptail (Section 6.4.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Avoid or minimize impacts to coastal whiptail habitat at study areas 1, 3, 4, 5, 6, and 7 through project design and placement.

Northern Red Diamond Rattlesnake (Section 6.9.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. If a northern red diamond rattlesnake is observed in the construction area, the snake should be moved by an Environmental Surveyor to the closest safe, suitable habitat in the area. Exclusionary fences may be used to keep snakes out of construction areas. These fences would be placed and monitored daily.
3. Avoid or minimize impacts to red diamond rattlesnake habitat at study areas 1, 3, 4, 5, 6, and 7 through project design and placement.

Southern California Rufous-crowned Sparrow (Section 7.11.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Minimize impacts through timing of work in suitable habitat at study areas 1, 3, 4, 5, 6, and 7 to avoid the nesting season for upland avian species (February 15 to August 15) whenever possible, or ensure that habitat is removed prior to the initiation of the upland avian breeding season. If construction activities must commence during the upland avian breeding season, minimize impacts through conducting nest surveys within 300 feet of all proposed activities (see Section 2.3 of the NCCP/HCP). If active nests are encountered, no Covered Activities shall be implemented within a minimum distance of 100 feet of the nest. A greater setback (up to 300 feet) may be required, as determined by the Environmental Surveyor, based on the site specific considerations, phase of the nesting cycle, and species or other biological considerations (see Section 2.4 of the NCCP/HCP). Direct take of individuals and destruction of nests within an active territory is not allowed.

Coastal California Gnatcatcher (Section 7.7.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Conduct USFWS protocol surveys for the California gnatcatcher at study areas 1, 5, 6 and 7 under favorable conditions in areas of potential foraging or breeding habitat for all new facilities and O&M Activities, or assume occupancy of potential habitat, to ensure that this species is adequately addressed by impact avoidance, minimization, and mitigation. A permitted Environmental Surveyor would conduct surveys.
3. Minimize impacts through timing of work in suitable California gnatcatcher habitat to avoid the nesting season for upland avian species (February 15 to August 15) whenever possible, or ensure that habitat is removed prior to the initiation of the breeding season. If construction activities must commence during the upland avian breeding season, minimize impacts through conducting nest surveys within 300 feet of all proposed activities (see Section 2.3 of the NCCP/HCP for the Avian Breeding Season Policy). If active nests are encountered, no Covered Activities shall be implemented within a minimum distance of 100 feet of the nest. A greater setback (up to 300 feet) may be required, as determined by the Environmental Surveyor, based on the site specific considerations, phase of the nesting cycle, and species or other biological considerations (see Section 2.4 of the NCCP/HCP).
4. Direct take of individuals and destruction of nests within an active territory are not allowed.
5. For temporary impacts to occupied California gnatcatcher habitat, the work site would be returned to preexisting contours, where feasible, and revegetation with appropriate locally native species. All revegetation plans would require written concurrence of the Wildlife Agencies. Also, see Section 6.4, Plan Minimization Measures, of the NCCP/HCP.

Yellow Warbler (Section 7.8.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Minimize impacts through timing of work in riparian habitat at study areas 3, 4, and 6 to avoid the nesting season for riparian avian species (March 15 to September 15) whenever possible, or ensure that habitat is removed prior to the initiation of the breeding season. If construction activities must commence during the riparian avian breeding season, minimize impact through conducting nest surveys within 300 feet of all proposed activities (see Section 2.3 of the NCCP/HCP). If active nests are encountered, no Covered Activities shall be implemented within a minimum distance of 100 feet of the nest. A greater setback (up to 300 feet) may be required, as determined by the Environmental Surveyor, based on the site specific considerations, phase of the nesting cycle, and species or other biological considerations (see Section 2.4 of the NCCP/HCP). Direct take of individuals and destruction of nests within an active territory is not allowed.
3. [not applicable, related to preserve management]

Dulzura Pocket Mouse (Section 8.4.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Implement a small-mammal live trapping and identification program in suitable habitat located within impact areas of study areas 1, 3, 4, 5, 6 and 7 to determine the presence or absence of Dulzura pocket mouse.
3. If the species is observed and burrows will be affected by project-related disturbance, apre-construction live trapping and relocation program will be implemented by the Environmental Surveyor at the impact areas in which this species was observed. Individuals will be relocated into adjacent suitable habitat areas or preserves, and/or the Environmental Surveyor will provide measures to ensure exclusion during construction activities. Relocation would be determined and conducted by an Environmental Surveyor in consultation with the Wildlife Agencies.
4. [not applicable, related to preserve management]

Northwestern San Diego Pocket Mouse (Section 8.5.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Implement a small-mammal live trapping and identification program in suitable habitat located within impact areas of study areas 1, 3, 4, 5, 6 and 7 to determine the presence or absence of northwestern San Diego pocket mouse.
3. If the species is observed and burrows will be affected by project-related disturbance, a pre-construction live trapping and relocation program will be implemented by the Environmental Surveyor at the impact areas in which this species was observed. Individuals will be relocated into adjacent suitable habitat areas or preserves, and/or the Environmental Surveyor will provide measures to ensure exclusion during construction activities. Relocation would be determined and conducted by an Environmental Surveyor in consultation with the Wildlife Agencies.

Mountain Lion (Section 8.8.3)

1. Implement general Conditions for Coverage (see Section G-1).

San Diego Desert Woodrat (Section 8.7.3)

1. Implement general Conditions for Coverage (see Section G-1).
2. Implement a small-mammal live trapping and identification program in suitable habitat located within impact areas of study areas 1, 3, 4, 5, 6 and 7 to determine the presence or absence of San Diego desert woodrat.
3. If the species is observed and nests would be affected by project-related disturbance, a pre-construction live trapping and relocation program will be implemented by the Environmental Surveyor at the impact areas in which this species was observed. Individuals will be relocated into adjacent suitable habitat areas or preserves, and/or the Environmental Surveyor will provide measures to ensure exclusion during construction activities. Relocation would be determined and conducted by an Environmental Surveyor in consultation with the Wildlife Agencies.
4. Avoid to the maximum extent possible impacts to San Diego desert woodrat sticknests.
5. For temporary impacts to occupied desert woodrat habitat, incorporate suitable habitat elements, such as rock and brush piles, into the habitat restoration plan.

F-4: Lake Stream and River Work Conditions

The following conditions to avoid or minimize substantial adverse effects on jurisdictional waters features, as listed in Appendix I of the NCCP/HCP, will be incorporated into project activities subject to permitting with the California Department of Fish and Wildlife:

1. CDFG employees are authorized to conduct on-site inspections relevant to San Diego County Water Authority NCCP/HCP Section 6.6.1.1, upon reasonable notice.
2. Silty/turbid water shall not be discharged into the stream. Such water shall be settled, filtered, or otherwise treated prior to discharge. The Crew's/Contractor's ability to minimize turbidity/siltation shall be the subject of pre-construction planning and design feature implementation.
3. Preparation shall be made so that runoff from steep, erodible surfaces will be diverted into stable areas with little erosion potential. Frequent water checks shall be placed on dirt roads, cat tracks, or other work trails to control erosion.
4. Water containing mud, silt, or other pollutants from equipment washing or other activities shall not be allowed to enter a lake or flowing stream or placed in locations that may be subjected to high storm flows.
5. If off-stream siltation pond(s) is/are used to control sediment, pond(s) shall be constructed in a location, or shall be designed, such that potential spills into the stream/lake during periods of high water levels/flow are precluded.
6. If silt catchment basin(s) is/are used, the basin(s) shall be constructed across the stream immediately downstream of the project site. Catchment basins shall be constructed of materials that are free from mud and silt. Upon completion of the project, all basin materials along with the trapped sediments shall be removed from the stream in such a manner that said removal shall not introduced sediment to the stream.
7. Silt settling basins shall be located away from the stream or lake to prevent discolored, silt-bearing water from reaching the stream or lake during any flow regime.

8. Notwithstanding the use of silt catchment basins, upon Department determination that turbidity/siltation levels resulting from project related activities constitute a significant threat to aquatic life, activities associated with the turbidity/siltation, shall be halted until effective Department approved control devices are installed or abatement procedures are initiated.
9. Precautions to minimize turbidity/siltation shall be taken into account during project planning and shall be installed prior to construction. This may require that the work site be isolated and that water be diverted around the work area by means of a barrier, temporary culvert, new channel, or other means approved by CDFG. Precautions may also include placement of silt fencing, straw bales, sand bags, and/or the construction of silt catchment basins so that silt or other deleterious materials are not allowed to pass to downstream reaches. The method used to prevent siltation shall be monitored and cleaned/repaired weekly, or more frequently if warranted by local conditions. CDFG shall provide any determinations or approvals in writing within 14 days of receiving from the Water Authority or its agents a written request which includes a plan sheet or diagram indicating how the work site will be isolated.
10. No equipment shall be operated in ponded or flowing areas except as otherwise addressed in Water Authority project's Notification of Lake or Streambed Alteration application, contract specifications, and any applicable regulatory permits.
11. Rock, gravel, and/or other materials shall not be imported to, taken from, or moved within the bed or banks of the stream except as otherwise specifically identified in the project's Notification of Lake or Streambed Alteration application.
12. Temporary fills shall be constructed of nonerodible materials and shall be removed immediately upon work completion.
13. If operations require moving equipment across a flowing stream, such operations shall be conducted without substantially increasing stream turbidity. Where repeated crossings could result in a substantial increase in stream turbidly, the Water Authority shall install a permanent or temporary bridge, culvert, or rock-fill crossing as approved by the Water Authority Project Engineer.
14. If a stream channel and/or gradient have been temporarily altered during construction, it shall be returned as nearly as possible to pre-project conditions without creating a possible future bank erosion problem. If a lake margin has been altered, it shall be returned as nearly as possible to pre-project conditions without creating a future bank erosion problem.
15. Structures and associated materials not designed to withstand high seasonal flows shall be removed to areas above the high water mark before such flows occur.
16. Spoil sites shall not be located within a stream/lake, or where spoil shall be washed back into a stream/lake, or where it will cover aquatic or riparian vegetation, unless the site is specifically identified in the project's Notification of Lake or Streambed Alteration application.
17. Staging/storage areas for equipment and materials shall be located outside of the stream, unless the area is specifically identified in the project's Notification of Lake or Streambed Alteration application.
18. Access to the work site shall be via existing roads and access ramps when legally available to the Water Authority and its contractors for such use.
19. No equipment maintenance shall be done within or near any stream channel where petroleum products or other pollutants from the equipment may enter these areas under any flow.
20. No debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete or washings thereof, oil or petroleum products or other organic or earthen material from any construction, or associated activity of whatever nature shall be allowed to enter into or placed where it may be washed by rainfall or runoff into

waters of the State. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any stream or lake.

21. The Water Authority and its contractors, subcontractors, and employees shall comply with all litter and pollution laws. It is the responsibility of the Water Authority to ensure compliance.
22. Any equipment or vehicles driven and/or operated within or adjacent to the stream/lake shall be checked and maintained daily to prevent leaks of materials that if introduced to water could be deleterious to aquatic life.
23. Stationary equipment such as motors, pumps, generators, and welders located within or adjacent to the stream/lake shall be positioned over drip pans or confined within berms capable of containing any spills.
24. The clean-up of all spills shall begin immediately. CDFG shall be notified immediately by the Water Authority of any spills that affect aquatic habitat, and shall be consulted regarding clean-up procedures.
25. Any materials placed in seasonally dry portions of a stream or lake that could be washed downstream or could be deleterious to aquatic life shall be removed from the project site prior to inundation by high flows.
26. Installation of bridges, culverts, or other structures shall be such that water flow is not impaired. Bottoms of temporary culverts shall be placed at or below stream channel grade, and bottoms of permanent culverts shall be placed below stream channel grade. Excavation of the streambed and banks shall be limited to the extent necessary, as determined by the Water Authority Project Engineer, to install bottoms of culverts below stream grade. Temporary culverts placed on existing streambed grade shall be done so with minimal disturbance.
27. The inlet and outlet of all permanent culverts shall be protected by the placement of head walls that shall be constructed of rock riprap, gabions, concrete, or other suitable nonerodible material as determined by the Water Authority project engineer. To prevent undercutting, the head walls shall be keyed in place. To prevent erosion, energy dissipaters will be installed.
28. Culverts shall be long enough to extend completely beyond the toe of the fill (unless both the up and downstream sides of the fill are adequately protected to the maximum high-water mark).
29. All in-stream structures shall be designed so that no sudden change in stream velocity shall occur above, below, or in the structure. If a sudden change in stream velocities occurs upon installation of the structure, the structure shall be removed immediately.
30. If any wildlife is encountered in the stream or lake zone during the course of construction, said wildlife shall be allowed to leave the construction area unharmed.
31. All diversion channels shall be designed to maintain velocities at levels acceptable to all native and recreational fish species determined to be in the project impact area and adjacent upstream and downstream reaches.

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Appendix D

Cultural Resources Technical Report

Cultural Resources Extended Phase I Survey Report for the

San Diego County Water Authority First Aqueduct Treated Water Tunnels Rehabilitation Project, San Diego County, California

SEPTEMBER 2021

Prepared for:

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Type of Study: Extended Phase I Cultural Resource Survey
USGS Quadrangle: Pala and Valley Center, California 7.5', T10S; R2W; Sections 16 and 21 and T11S; R2W; Sections 3, 4, 9, 10, 15, 16, 21, and 22
Area: 20-acre,
Key Words: Positive Survey, Extended Phase I, Aqueduct Rehabilitation, San Diego County Water Authority, Escondido, First San Diego Aqueduct, P-37-030107, CA-SDI-013494, CA-SDI-16844

Water Authority Project No.	Q0238	Water Authority Project Name	First Aqueduct Treated Water Tunnels Rehabilitation Environmental Compliance
Water Authority ENV No.	TBD	Water Authority Contract ID/Task No.	061904/28
Associated Permits	N/A		

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APPENDICES

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Management Summary

This report presents the results of a cultural resources Extended Phase I Survey performed by Dudek for San Diego County Water Authority's (Water Authority) First Aqueduct Treated Water Tunnels Rehabilitation Project (project) located in San Diego County, California. The project is located in Township 10 South; Range 2 West; Sections 16 and 21 and Township 11 South; Range 2 West; Sections 3, 4, 9, 10, 15, 16, 21, and 22, on the Pala and Valley Center United States Geological Survey (USGS) 7.5-minute Quadrangle maps (Figure 1).

The current cultural resources survey covers the 20-acre direct Area of Potential Effects (APE), which represents the maximum extent of direct temporary ground disturbance with potential to affect cultural resources. The APE is comprised of potential work areas where excavation will occur, staging and laydown areas, and associated access routes to the work areas identified by the Water Authority (Figures 2A – 2C).

The project is subject to impact review requirements of the California Environmental Quality Act (CEQA) and is anticipated to require permitting for impacts on waters under federal and state jurisdiction. The Water Authority will be the Lead Agency for compliance with CEQA. The Water Authority will be applying for a letter of permission under their Programmatic Master Plan Permit (PMPP) with the United States Army Corps of Engineers (Army Corps) pursuant to Section 404 of the Clean Water Act. It is anticipated that the Army Corps would act as lead agency for compliance with Section 106 of the National Historic Preservation Act (NHPA) associated with the PMPP review and approval process. The project is in the early design phase and impact areas have not been solidified. Water Authority engineers identified several likely excavation sites along the three tunnel alignments to be included in this study, as well as potential access roads and other parts of the Water Authority ROW that could be subject to disturbance. These areas, which together add up to approximately 20 acres, are considered to represent the APE for purposes of cultural resources impact analysis pursuant to CEQA and Section 106 of the NHPA.

A previous cultural constraints study was conducted by Dudek for this project in May and June 2021 (Wolf and Hale 2021, Confidential Appendix B). Archival research conducted for this constraints study identified one (1) Historic Built Environment Resource, the First San Diego Aqueduct, and one (1) cultural resource, a multicomponent habitation site (CA-SDI-013494), previously recorded partially within the APE. The research also identified two previously recorded resources within the Water Authority Right-of-Way (ROW) immediately adjacent to the project's APE; one isolated artifact (P-37-025397) and one prehistoric bedrock milling station (CA-SDI-016844). The isolated prehistoric artifact (P-37-025397) is considered not eligible for National Register of Historic Places (NRHP) or California Register of Historic Resources (CRHR) register listings and no further archaeological work is necessary for this resource. The two remaining resources located within the project APE have not been formally evaluated for cultural significance and/or listing on the NRHP or CRHR.

Dudek requested a NAHC search of their Sacred Lands File (SLF) on June 24, 2021, covering the project's original APE and a 1-mile buffer. The NAHC provided results on July 16, 2021. This search indicated the presence of Native American traditional cultural place(s) within this area (Confidential Appendix C). While the NAHC did not offer any specific information concerning the known resources, they provided a list of Native American tribes and individuals/organizations that might have knowledge of cultural resources in or near the Project APE. Following the NAHC response, the Water Authority sent letters to Tribal representatives pursuant to California Assembly Bill 52 (AB 52) to solicit interest in consulting regarding the project's impacts on Tribal resources (Appendix C).

Dudek archaeologists conducted an intensive cultural pedestrian survey of the project APE and the locations of the three previously recorded resources, CA-SDI-013494, CA-SDI-16844, and P-37-025397 on June 22, 2021. Surface visibility was moderate to high throughout much of the project's APE and most of the area has been altered by previous ground disturbance activities, including by construction and routine maintenance of the underlying Water Authority aqueduct facilities, agricultural activities, and access road construction and maintenance. The surface visibility surrounding the previously recorded resource CA-SDI-16844, however, was extremely poor due to a high volume of dense vegetation growth. This low visibility hindered identification to the point where surveyors were unable to positively relocate CA-SDI-16844. Additionally, the previously recorded isolated prehistoric artifact P-37-025397, a solitary volcanic core artifact was not relocated during this pedestrian survey.

Artifacts, features, and other associated elements of the previously recorded multicomponent habitation site, CA-SDI-013494, were positively identified within a section of the Red Mountain Tunnel Portal 5 segment of the project APE. Historic surface debris, artifacts (historic cans and glass fragments), a rock and mortar wall feature, as well as five prehistoric bedrock milling features associated with CA-SDI-013494 were positively relocated during the survey of the Portal 5 APE (Confidential Appendix A). However, this location was for years in the recent past been occupied by transient inhabitants, which heavily disturbed the immediate vicinity. Several shelters/tents and an array of trash and occupation refuse was dispersed across almost the entire previously recorded site location, obscuring much of the visibility of the ground surface at this site.

An Extended Phase I inventory was implemented within segments of CA-SDI-13494 where the site boundaries cross the Portal 5 APE. Additionally, limited subsurface testing was conducted near the southern edge of this work area to assess the possibility of buried cultural deposits associated with the previously recorded resource CA-SDI-16844. The intent of the extended Phase I effort was to assess the potential for subsurface resources to be present and to evaluate the severity and character of past disturbances in this area.

The Extended Phase I efforts consisted of limited subsurface excavations, photo-documentation, and Global Positioning Satellites (GPS) recording/mapping of features associated with site CA-SDI-13494. The limited subsurface STP evaluations consisted of a total of four (4) STPs; one (1) STP was excavated inside the boundary of site CA-SDI-13494, within the Portal 5 APE, and three (3) STPs were excavated in the APE along the edge closest to the previously recorded resource CA-SDI-16844. All four of the STPs were negative and contained no evidence of potential subsurface cultural deposits. However, GPS locational recording of the features associated with CA-SDI-13494, identified four out of six of the site's Features (Features 1, 2, 3 and 6) are located within the APE. The four features within the APE include three bedrock milling Features (Feature numbers 1, 2, and 3) and the remains of an undetermined historic-era rock and mortar wall alignment (See Confidential Appendix A, Figure 7). No additional prehistoric artifacts were identified on the ground surface associated with either CA-SDI-13494, or CA-SDI-16844. No inventory, subsurface excavations or extended documentation efforts for this project were conducted outside of the Water Authority Right of Way (ROW). As such, the portions of site CA-SDI-13494, outside of the Water Authority project APE have not been evaluated and are considered significant and potentially eligible for Federal, State or Local register listings.

Based on the results of Phase I Survey and Extended Phase I inventory, there is a low potential for the inadvertent discovery of intact cultural deposits associated with CA-SDI-13494 and CA-SDI-16844 within the Water Authority APE. However, while there is a low probability to encounter subsurface deposits associated with CA-SDI-13494, the three bedrock milling Features located within both the site boundary and Water Authority APE do warrant some level of mitigation considerations when dealing with possible ground-disturbing activities in the immediate vicinity.

One historic built environment resource over 50 years old was identified within the APE: the First San Diego Aqueduct (P-37-030107). The First San Diego Aqueduct was previously determined eligible for the NRHP under Criterion A as the first water infrastructure project that provided a permanent water supply for San Diego County (see Appendix D for SHPO concurrence Ref: COE110329C). As demonstrated in the previous report for this project prepared by Dudek, titled the *Cultural Resources Inventory Report for the Southern First Aqueduct Structures Rehabilitation Project, San Diego County, California*, project-related effects to the first San Diego Aqueduct will not be adverse and will not impact the resource's ability to continue to convey its significance under NRHP Criterion A (Pham et al 2021).

For future CEQA and NHPA Section 106 compliance, based on the constraints study and this project's Extended Phase I survey, Dudek recommends that the previously recorded cultural resource, CA-SDI-013494 identified within the APE be avoided, and limited mitigation efforts consisting of the presence of an archaeological and Native American monitors be implemented during ground-disturbing activities within the immediate vicinity of the cultural site. The second cultural resource, the bedrock milling site CA-SDI-16844, was previously recorded adjacent to, but outside of, the studied potential impact area, and is not anticipated to be affected by the project based on the assumed impact areas addressed in this report. While the current evaluations indicated a very low potential for undiscovered cultural deposits, if project design changes and this resource would be affected, it would also require additional mitigation efforts focused on monitoring disturbance near the resource. The third resource identified during the study, P-37-025397, is an isolate, and as such, is not considered significant under NRHP and CRHR, and requires no additional efforts for mitigation. Should cultural monitoring identify substantial archaeological deposits, or if Native American items/objects of a sensitive cultural nature, Dudek will follow applicable Federal, State and local laws and regulations. If substantial, intact, or significant cultural deposits are encountered, additional evaluation and potential mitigation of impacts to those deposits may be required.

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Introduction

Project Location and Description

This report presents the results of a cultural resources Extended Phase I Survey performed by Dudek for San Diego County Water Authority's (Water Authority) Task 28, First Aqueduct Treated Water Tunnels Rehabilitation Project (project) located in San Diego County, California. The project is located in Township 10 South; Range 2 West; Sections 16 and 21 and Township 11 South; Range 2 West; Sections 3, 4, 9, 10, 15, 16, 21, and 22, on the Pala and Valley Center United States Geological Survey (USGS) 7.5-minute Quadrangle maps (Figure 1). The project is located east of Interstate 15 and stretches from the northern limits of the unincorporated San Diego County community of Valley Center in the north to just north of the City of Escondido in the south.

The project would entail rehabilitation and replacement of existing pipeline infrastructure along an approximately 7-mile span of the First San Diego Aqueduct, which is made up of Pipeline 1 and Pipeline 2, including three tunnel pipelines referred to as the Lilac Tunnel, Red Mountain Tunnel, and Oat Hills Tunnel (Figures 2A -2C). Recent condition inspections of the tunnels identified multiple defects and groundwater infiltration in all three tunnels. As a result, the Water Authority is planning to implement tunnel rehabilitation to mitigate potential adverse water quality impacts to treated water carried through the tunnels, and to extend the service life of the facilities.

Project planning and design is currently underway, and the resource assessment and impact analysis presented in this report relies on assumptions of potential work areas and likely construction activities developed in coordination with Water Authority engineers. For purposes of conservative analysis, this report assumes all three tunnel pipelines would be rehabilitated by the slip-lining method, which would entail inserting sections of pipeline liner inside the existing pipelines and joining them together. Access to the interior of the pipe would be obtained by developing a series of portals, with crews excavating large pits to expose sections of pipe and cutting open the pipe. Other methods that may be used for pipeline rehabilitation would require smaller areas of disturbance. Ten potential portal locations have been identified, including each of the six bifurcation structure locations, one additional mid-tunnel location on the Lilac Tunnel, and three additional mid-tunnel locations on the Red Mountain Tunnel. All six bifurcation structures would be replaced after removal for portal development. Potential access road improvements may be incorporated into the project, typically along existing dirt roads that lead to bifurcation structures or exploratory sites.

The project would entail excavation and ground disturbance in areas disturbed by initial installation of the tunnel pipelines, which occurred in the 1940s and 1950s, and may also entail excavation and ground disturbance in native soils not disturbed by those prior activities. Construction is anticipated to commence in the winter of 2022/2023 and continue until project completion and closeout in summer 2023.

Regulatory Context

The following section provides a summary of the applicable regulations, policies and guidelines relating to the proper management of cultural resources.

Cultural Resources Regulations

National Historic Preservation Act

The NHPA established the National Register of Historic Places (NRHP) and the President's Advisory Council on Historic Preservation (ACHP), and provided that states may establish State Historic Preservation Officers (SHPOs) to carry out some of the functions of the NHPA. Most significantly for federal agencies responsible for managing cultural resources, Section 106 of the NHPA directs that "[t]he head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP." Section 106 also affords the ACHP a reasonable opportunity to comment on the undertaking (16 USC 470f).

36 Code of Federal Regulations, Part 800 (36 CFR 800) implements Section 106 of the NHPA. It defines the steps necessary to identify historic properties (those cultural resources listed in or eligible for listing in the NRHP), including consultation with federally recognized Native American tribes to identify resources with important cultural values; to determine whether or not they may be adversely affected by a proposed undertaking; and the process for eliminating, reducing, or mitigating the adverse effects.

The content of 36 CFR 60.4 defines criteria for determining eligibility for listing in the NRHP. The significance of cultural resources identified during an inventory must be formally evaluated for historic significance in consultation with the California SHPO to determine if the resources are eligible for inclusion in the NRHP. Cultural resources may be considered eligible for listing if they possess integrity of location, design, setting, materials, workmanship, feeling, and association. The criteria for determining eligibility are essentially the same in content and order as those outlined under the California Environmental Quality Act (CEQA), but the criteria under NHPA are labeled A through D (rather than 1-4 under CEQA).

Regarding criteria A through D of Section 106, the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, cultural resources, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that:

A. Are associated with events that have made a significant contribution to the broad patterns of our history; or
B. Are associated with the lives of persons significant in our past; or
C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. Have yielded or may be likely to yield, information important in prehistory or history [36 CFR 60.4].

The current cultural resources review is not designed to generate any new data, only to review the previously collected data under Section 106 guidelines and standards.

California Environmental Quality Act

As described further below, the following CEQA statutes and CEQA Guidelines are of relevance to the analysis of archaeological and historic resources:

1. California Public Resources Code section 21083.2(g): Defines "unique archaeological resource."
2. California Public Resources Code section 21084.1 and CEQA Guidelines section 15064.5(a): Define historical resources. In addition, CEQA Guidelines section 15064.5(b) defines the phrase "substantial adverse change in the significance of an historical resource;" it also defines the circumstances when a project would materially impair the significance of a historical resource.
3. California Public Resources Code section 5097.98 and CEQA Guidelines section 15064.5(e): Set forth standards and steps to be employed following the accidental discovery of human remains in any location other than a dedicated ceremony.
4. California Public Resources Code sections 21083.2(b)-(c) and CEQA Guidelines section 15126.4: Provide information regarding the mitigation framework for archaeological and historic resources, including options of preservation-in-place mitigation measures; preservation-in-place is the preferred manner of mitigating impacts to significant archaeological sites because it maintains the relationship between artifacts and the archaeological context, and may also help avoid conflict with religious or cultural values of groups associated with the archaeological site(s).

Under CEQA, a project may have a significant effect on the environment if it may cause "a substantial adverse change in the significance of an historical resource" (California Public Resources Code section 21084.1; CEQA Guidelines section 15064.5(b)). If a site is either listed or eligible for listing in the CRHR, or if it is included in a local register of historic resources, or identified as significant in a historical resources survey (meeting the requirements of California Public Resources Code section 5024.1(q)), it is a "historical resource" and is presumed to be historically or culturally significant for purposes of CEQA (California Public Resources Code section 21084.1; CEQA Guidelines section 15064.5(a)). The lead agency is not precluded from determining that a resource is a historical resource even if it does not fall within this presumption (California Public Resources Code section 21084.1; CEQA Guidelines section 15064.5(a)).

A "substantial adverse change in the significance of an historical resource" reflecting a significant effect under CEQA means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired" (CEQA Guidelines section 15064.5(b)(1); California Public Resources Code section 5020.1(q)). In turn, the significance of a historical resource is materially impaired when a project:

1. Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register; or
2. Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of section 5024.1(g)

of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or

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

The California Register of Historic Resources (Public Resources Code section 5020 et seq.)

In California, the term "historical resource" includes but is not limited to "any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California" (California Public Resources Code section 5020.1(j)). In 1992, the California legislature established CRHR "to be used by state and local agencies, private groups, and citizens to identify the state's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change" (California Public Resources Code section 5024.1(a)). A resource is eligible for listing in the CRHR if the State Historical Resources Commission determines that it is a significant resource and that it meets any of the following National Register of Historic Places (NRHP) criteria:

- Associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- Associated with the lives of persons important in our past.
- Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

  Has yielded, or may be likely to yield, information important in prehistory or history (California Public Resources Code section 5024.1(c)).

Resources less than 50 years old are not considered for listing in the CRHR, but may be considered if it can be demonstrated that sufficient time has passed to understand the historical importance of the resource (see 14 CCR, section 4852(d)(2)).

The CRHR protects cultural resources by requiring evaluations of the significance of prehistoric and historic resources. The criteria for the CRHR are nearly identical to those for the NRHP, and properties listed or formally designated as eligible for listing on the NRHP are automatically listed on the CRHR, as are the state landmarks and points of interest. The CRHR also includes properties designated under local ordinances or identified through local historical resource surveys. The State Historic Preservation Officer maintains the CRHR.

Native American Historic Cultural Sites (California Public Resources Code section 5097 et seq.)

State law addresses the disposition of Native American burials in archaeological sites and protects such remains from disturbance, vandalism, or inadvertent destruction; establishes procedures to be implemented if Native American skeletal remains are discovered during construction of a project; and establishes the NRHC to resolve disputes regarding the disposition of such remains. In addition, the Native American Historic Resource Protection Act makes it a misdemeanor punishable by up to 1 year in jail to deface or destroy an Indian historic or cultural site that is listed or may be eligible for listing in the CRHR.

California Native American Graves Protection and Repatriation Act

The California Native American Graves Protection and Repatriation Act (California Repatriation Act), enacted in 2001, required all state agencies and museums that receive state funding and that have possession or control over collections of human remains or cultural items, as defined, to complete an inventory and summary of these remains and items on or before January 1, 2003, with certain exceptions. The California Repatriation Act also provides a process for the identification and repatriation of these items to the appropriate tribes.

California Health and Safety Code section 7050.5

California law protects Native American burials, skeletal remains, and associated grave goods, regardless of their antiquity, and provides for the sensitive treatment and disposition of those remains. Health and Safety Code section 7050.5 requires that if human remains are discovered in any place other than a dedicated cemetery, no further disturbance or excavation of the site or nearby area reasonably suspected to contain human remains shall occur until the County coroner has examined the remains (section 7050.5b). If the coroner determines or has reason to believe the remains are those of a Native American, the coroner must contact the NAHC within 24 hours (section 7050.5c). The NAHC will notify the Most Likely Descendant. With the permission of the landowner, the Most Likely Descendant may inspect the site of discovery. The inspection must be completed within 24 hours of notification of the Most Likely Descendant by the NAHC. The Most Likely Descendant may recommend means of treating or disposing of, with appropriate dignity, the human remains and items associated with Native Americans.

Assembly Bill 52

California Assembly Bill 52, which took effect July 1, 2015, establishes a consultation process between California Native American Tribes and lead agencies in order to address tribal concerns regarding project impacts and mitigation to "tribal cultural resources" (TCR). Public Resources Code section 21074(a) defines TCRs and states that a project that has the potential to cause a substantial adverse change to a TCR is a project that may have an adverse effect on the environment. A TCR is defined as a site, feature, place, cultural landscape, sacred place, and object with cultural value to a California Native American tribe that is either:

1. listed or eligible for listing in the CRHR or a local register of historical resources, or
2. determined by a lead agency to be a TCR.

Traditional Cultural Properties

Native American Heritage Values

Federal and state laws mandate that consideration be given to the concerns of contemporary Native Americans with regard to potentially ancestral human remains associated funerary objects, and items of cultural patrimony. Consequently, an important element in assessing the significance of the study site has been to evaluate the likelihood that these classes of items are present in areas that would be affected by the proposed project.

Also potentially relevant to prehistoric archaeological sites is the category termed Traditional Cultural Properties in discussions of cultural resource management (CRM) performed under federal auspices. According to Patricia L. Parker and Thomas F. King (1998), "Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices. Examples of properties possessing such significance include:

1. A location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world;
2. A rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents;
3. An urban neighborhood that is the traditional home of a particular cultural group, and that reflects its beliefs and practices;
4. A location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; and
5. A location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historic identity.

A Traditional Cultural Property, then, can be defined generally as one that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community.

Guidelines for Determining Significance

According to CEQA (§15064.5b), a project with an effect that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. CEQA defines a substantial adverse change:

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

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

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

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

- When a project will impact an archaeological site, a lead agency shall first determine whether the site is an historical resource, as defined in subsection (a).
- If a lead agency determines that the archaeological site is a historical resource, it shall refer to the provisions of Section 21084.1 of the Public Resources Code, and this section, Section 15126.4 of the Guidelines, and the limits contained in Section 21083.2 of the Public Resources Code do not apply.
- If an archaeological site does not meet the criteria defined in subsection (a), but does meet the definition of a unique archaeological resource in Section 21083.2 of the Public Resources Code, the site shall be treated in accordance with the provisions of section 21083.2. The time and cost limitations described in Public Resources Code Section 21083.2 (c–f) do not apply to surveys and site evaluation activities intended to determine whether the project location contains unique archaeological resources.
- If an archaeological resource is neither a unique archaeological nor a historical resource, the effects of the project on those resources shall not be considered a significant effect on the environment. It shall be sufficient that both the resource and the effect on it are noted in the Initial Study or EIR, if one is prepared to address impacts on other resources, but they need not be considered further in the CEQA process.

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

> When an initial study identifies the existence of, or the probable likelihood of, Native American human remains within the project, a lead agency shall work with the appropriate Native Americans as identified by the Native American Heritage Commission as provided in Public Resources Code SS5097.98. The applicant may develop an agreement for treating or disposing of, with appropriate dignity, the human remains and any items associated with Native American burials with the appropriate Native Americans as identified by the Native American Heritage Commission. Action implementing such an agreement is exempt from:
>
> 1. The general prohibition on disinterring, disturbing, or removing human remains from any location other than a dedicated cemetery (Health and Safety Code Section 7050.5); and
> 2. The requirement of CEQA and the Coastal Act.

Under CEQA, an EIR is required to evaluate any impacts on unique archaeological resources (California Public Resources Code section 21083.2.) A “unique archaeological resource” is defined as:

> [A]n archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria (California Public Resources Code section 21083.2(g)):
>
> 1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
> 2. Has a special and particular quality such as being the oldest of its type or the best available example of its type.
> 3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

An impact to a non-unique archaeological resource is not considered a significant environmental impact and such non-unique resources need not be further addressed in the EIR (Public Resources Code section 21083.2(a); CEQA Guidelines section 15064.5(c)(4)).

As stated above, CEQA contains rules for mitigation of "unique archeological resources." For example, "[i]f it can be demonstrated that a project will cause damage to a unique archeological resource, the lead agency may require reasonable efforts to be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. Examples of that treatment, in no order of preference, may include, but are not limited to, any of the following:

1. Planning construction to avoid archeological sites.
2. Deeding archeological sites into permanent conservation easements.
3. Capping or covering archeological sites with a layer of soil before building on the sites.
4. Planning parks, greenspace, or other open space to incorporate archeological sites. (Pub. Resources Code section 21083.2(b)(1)-(4).)

Public Resources Code section 21083.2(d) states that "[e]xcavation as mitigation shall be restricted to those parts of the unique archeological resource that would be damaged or destroyed by the project. Excavation as mitigation shall not be required for a unique archeological resource if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource, if this determination is documented in the environmental impact report."

The rules for mitigating impacts to archeological resources to qualify as "historic resources" are slightly different. According to CEQA Guidelines section 15126.4(b), "[p]ublic agencies should, whenever feasible, seek to avoid damaging effects on any historic resource of an archeological nature. The following factors shall be considered and discussed in an EIR for a project involving such an archeological site:

A. Preservation in place is the preferred manner of mitigating impacts to archeological sites. Preservation in place maintains the relationship between artifacts and the archeological context. Preservation may also avoid conflict with religious or cultural values of groups associated with the site.
B. Preservation in place may be accomplished by, but is not limited to, the following:
    1. Planning construction to avoid archeological sites;
    2. Incorporation of sites within parks, greenspace, or other open space;
    3. Covering the archeological sites with a layer of chemically stable soil before building tennis courts, parking lots, or similar facilities on the site[; and]
    4. Deeding the site into a permanent conservation easement.

Thus, although section 21083.2 of the Public Resources Code, in addressing "unique archeological sites," provides for specific mitigation options "in no order of preference," CEQA Guidelines section 15126.4(b), in addressing "historical resources of an archeological nature," provides that "[p]reservation in place is the preferred manner of mitigating impacts to archeological sites."

Under CEQA, "[w]hen data recovery through excavation is the only feasible mitigation," the lead agency may cause to be prepared and adopt a "data recovery plan," prior to any excavation being undertaken. The data recovery plan must make "provision for adequately recovering the scientifically consequential information from and about the historic resource" (CEQA Guidelines section 15126.4(b)(3)(C)). The data recovery plan also "must be deposited with the California Historical Resources Regional Information Center" (*Ibid*.). Further, "[i]f an artifact must be removed during project excavation or testing, curation may be an appropriate mitigation" (*Ibid*.).

However, "[d]ata recovery shall not be required for an historical resource if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the archeological or historic resource, provided that determination is documented in the EIR and that the studies are deposited with the California Historical Resources Regional Information Center." (CEQA Guidelines section 15126.4(b)(3)(D)).

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SOURCE: ESRI 2019; SDCWA 2011, 2021

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FIGURE 1

Regional Map

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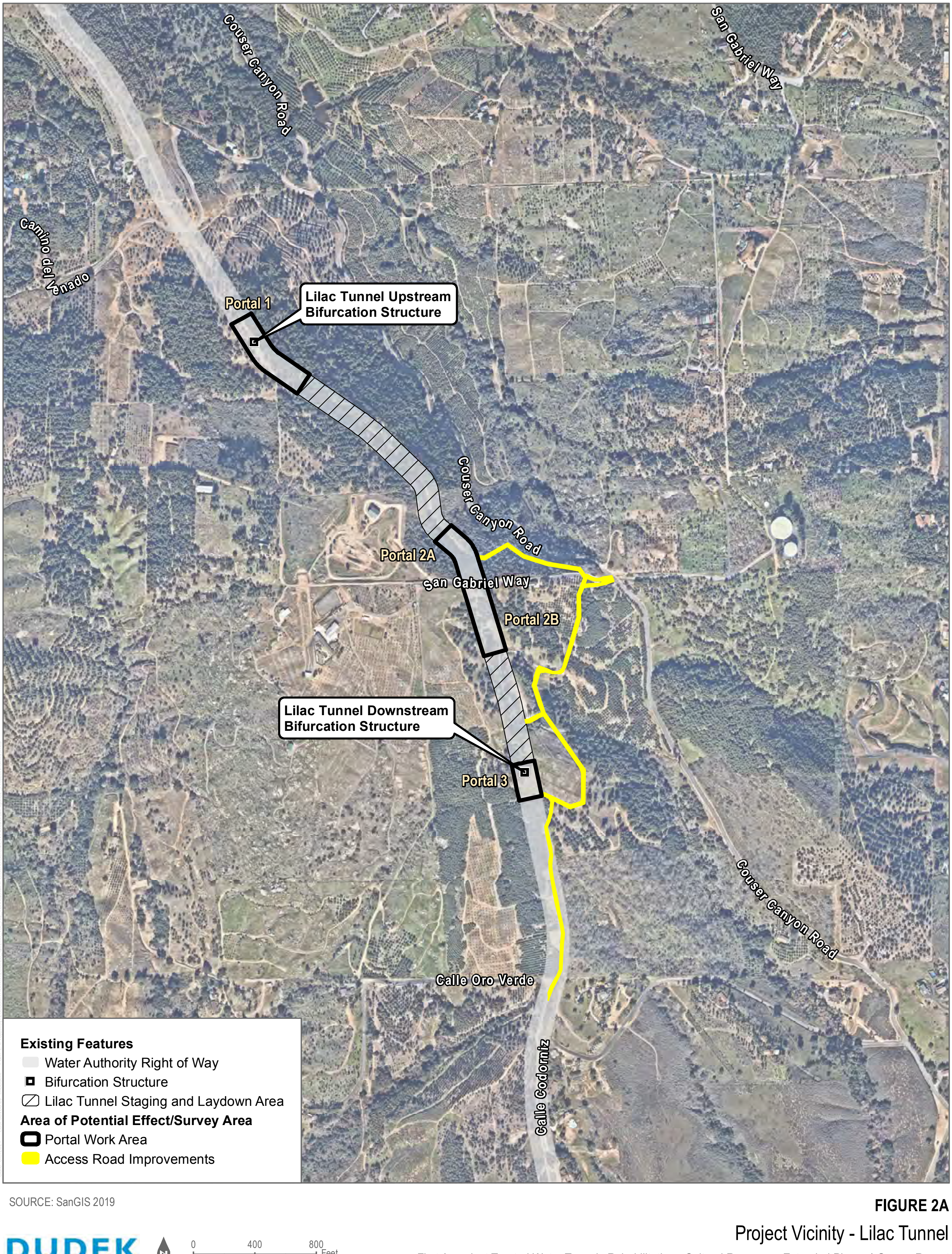

SOURCE: SanGIS 2019

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FIGURE 2A

Project Vicinity - Lilac Tunnel

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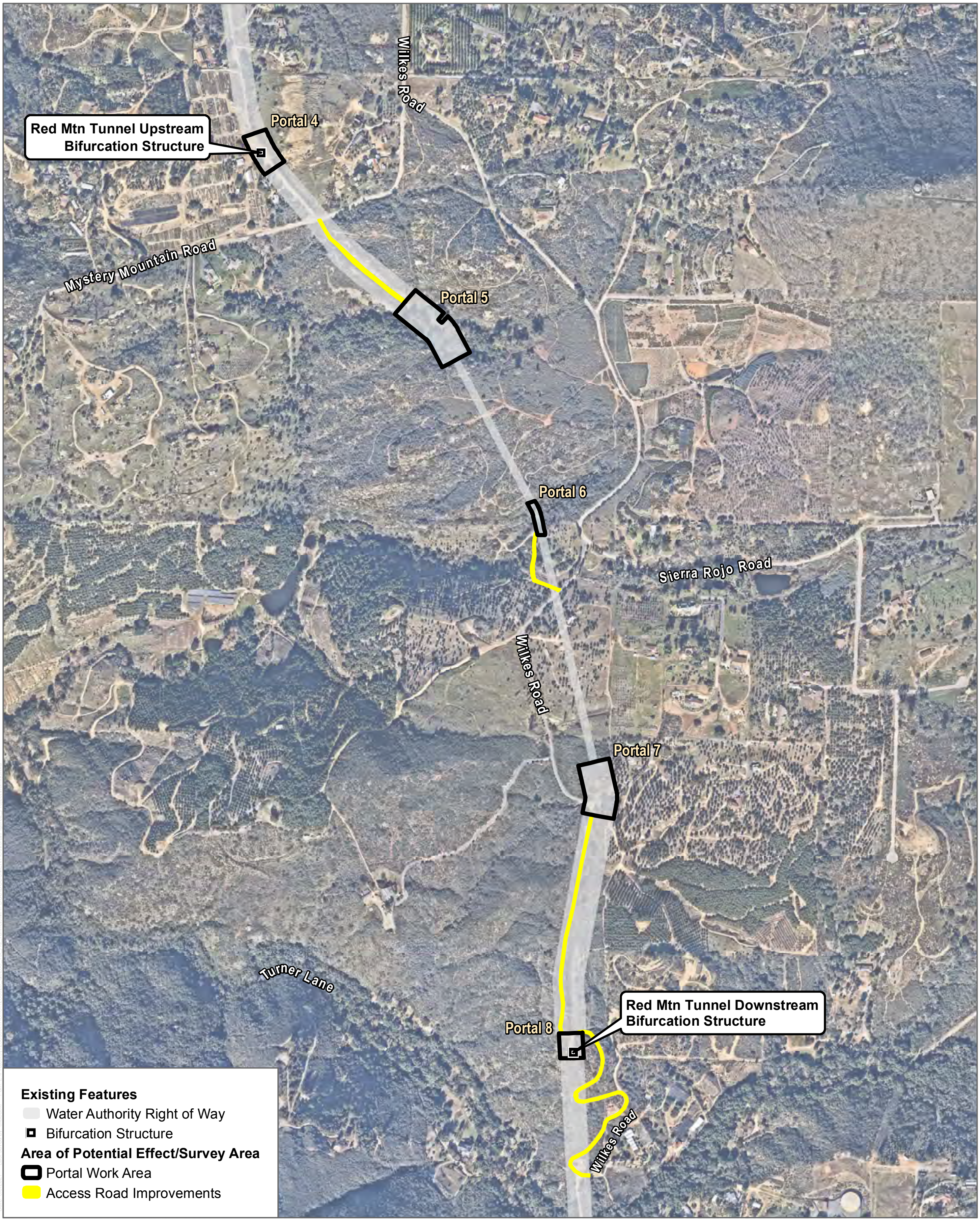

SOURCE: SanGIS 2019

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FIGURE 2B

Project Vicinity - Red Mountain Tunnel

First Aqueduct Treated Water Tunnels Rehabilitation - Cultural Resources Extended Phase 1 Survey Report

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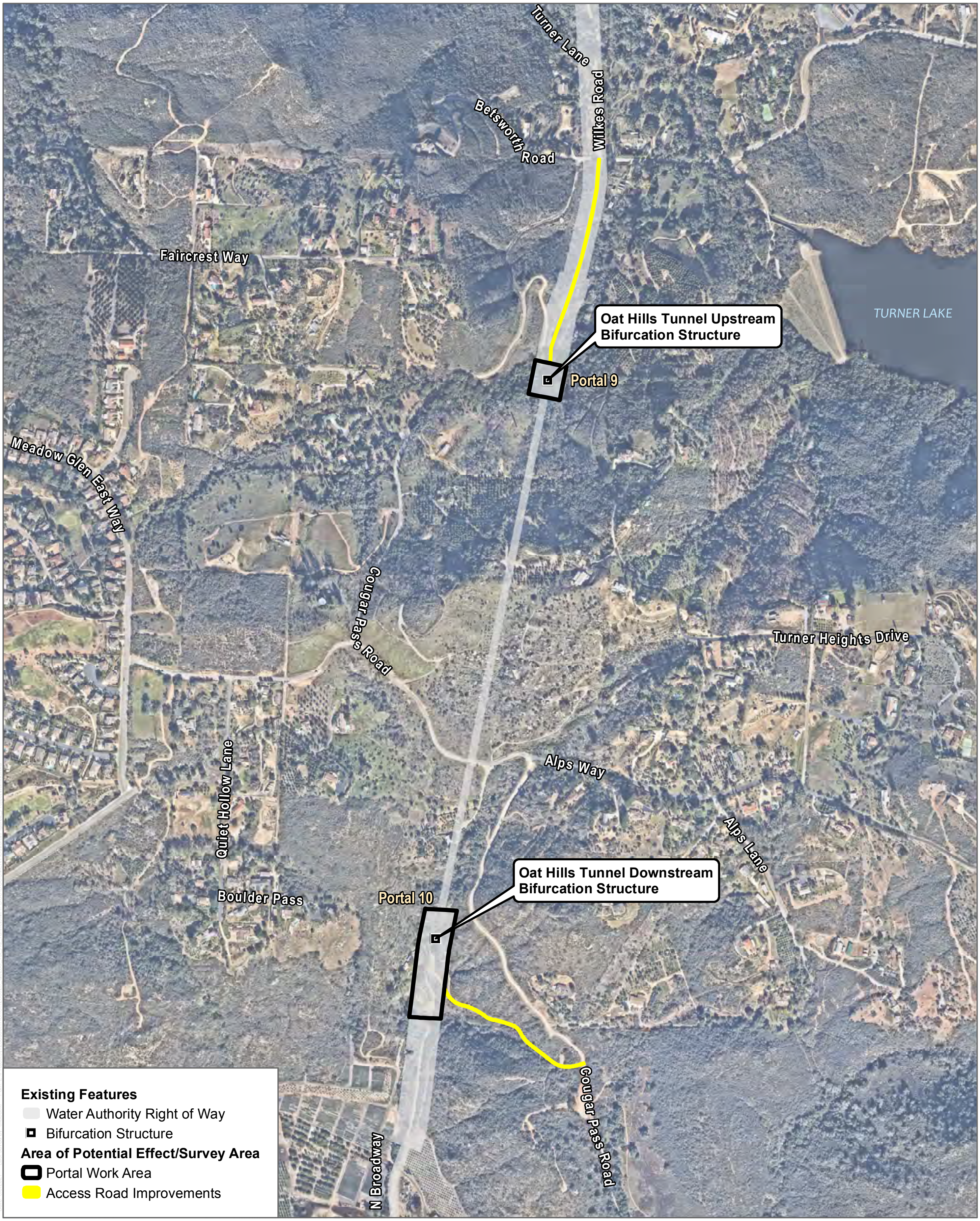

SOURCE: SanGIS 2019

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0 400 800 Feet

FIGURE 2C

Project Vicinity - Oat Hills Tunnel

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Project Context

Environmental Context

The project alignment occurs in a rural area that features a mixture of rural residential development, agricultural uses, and undeveloped areas. Surrounding lands are generally characterized by a mixture of existing rural properties, orchards, undeveloped open space, and native vegetation (including chaparral, scrub, oak woodland, and riparian areas), agricultural fields, and a variety of roads and highways. Partially aboveground concrete structures are visible at the bifurcation structures, along with visible disturbance associated with past construction of the aqueduct facilities.

The project alignment is generally very hilly with variable topography and varying vegetation types at each structure. Elevations along the project alignment range from 1000 feet to 1300 feet above mean sea level. Various ephemeral and intermittent creeks traverse several areas of the project. The discrete tunnel structures and proposed excavation areas within each APE are located within the Water Authority ROW and typically are immediately adjacent to dirt access roads.

Common animals within this area may include coyote (*Canis latrans*), California ground squirrel (*Spermophilus beecheyi*), striped skunk (*Mephitis mephitis*), Virginia opossum (*Didelphis virginica*), cottontail *(Sylvilagus audubonit),* black-tailed jackrabbit (*Lepus californicus bennettii)*, deer mouse *(Peromyscus maniculatus)* sparrow *(Melospiza melodia),* lesser goldfinch (*Cardeulis psaltria),*common yellowthroat (*Geothlypis trichas),* as well as a number of other species of birds, mammals, reptiles and amphibians.

Cultural Context

Evidence for continuous human occupation in the San Diego region spans the last 10,000 years. Various attempts to parse out variability in archaeological assemblages over this broad time frame have led to the development of several cultural chronologies; some of these are based on geologic time, most are based on temporal trends in archaeological assemblages, and others are interpretive reconstructions. Each of these reconstructions describes essentially similar trends in assemblage composition in more or less detail. This research employs a common set of generalized terms used to describe chronological trends in assemblage composition: Paleoindian (pre-5500 BC), Archaic (8000 BC.–AD 500), Late Prehistoric (AD 500–1750), and Ethnohistoric (post-AD 1750).

Paleoindian (pre-5500 BC)

Evidence for Paleoindian occupation in coastal Southern California is tenuous, especially considering the fact that the oldest dated archaeological assemblages look nothing like the Paleoindian artifacts from the Great Basin. One of the earliest dated archaeological assemblages in coastal Southern California (excluding the Channel Islands) derives from CA-SDI-4669/W-12, in La Jolla. A human burial from CA-SDI-4669 was radiocarbon dated to 9,590–9,920 years before present (95.4% probability) (Hector 2007). The burial is part of a larger site complex that contained more than 29 human burials associated with an assemblage that fits the Archaic profile (i.e., large amounts of groundstone, battered cobbles, and expedient flake tools). In contrast, typical Paleoindian assemblages include large stemmed Projectile points, high proportions of formal lithic tools, bifacial lithic reduction strategies, and relatively small proportions of groundstone tools. Prime examples of this pattern are sites that were studied by

Emma Lou Davis (1978) on China Lake Naval Air Weapons Station near Ridgecrest, California. These sites contained fluted and unfluted stemmed points and large numbers of formal flake tools (e.g., shaped scrapers, blades). Other typical Paleoindian sites include the Komodo site (MNO-679)—a multicomponent fluted point site, and MNO-680—a single component Great Basined Stemmed point site (Basgall et al. 2000). At MNO-679 and MNO-680, groundstone tools were rare while finely made Projectile points were common.

Turning back to coastal Southern California, the fact that some of the earliest dated assemblages are dominated by processing tools runs counter to traditional notions of mobile hunter–gatherers traversing the landscape for highly valued prey. Evidence for the latter—that is, typical Paleoindian assemblages—may have been located along the coastal margin at one time, prior to glacial desiccation and a rapid rise in sea level during the early Holocene (pre-7500 BP) that submerged as much as 1.8 kilometer of the San Diego coastline. If this were true, however, it would also be expected that such sites would be located on older landforms near the current coastline. Some sites, such as CA-SDI-210 along Agua Hedionda Lagoon, contained stemmed points similar in form to Silver Lake and Lake Mojave Projectile points (pre-8000 BP) that are commonly found at sites in California's high desert (Basgall and Hall 1990). CA-SDI-210 yielded one corrected radiocarbon date of 8520–9520 BP (Warren et al. 2004). However, sites of this nature are extremely rare and cannot be separated from large numbers of milling tools that intermingle with old Projectile point forms.

Warren et al. (2004) claimed that a biface manufacturing tradition present at the Harris site complex (CA-SDI-149) is representative of typical Paleoindian occupation in the San Diego region that possibly dates between 10,365 and 8200 BC (Warren et al. 2004, p. 26). Termed San Dieguito (Rogers 1945), assemblages at the Harris site are qualitatively distinct from most others in the San Diego region because the site has large numbers of finely made bifaces (including Projectile points), formal flake tools, a biface reduction trajectory, and relatively small amounts of processing tools (Warren 1964, 1968). Despite the unique assemblage composition, the definition of San Dieguito as a separate cultural tradition is hotly debated. Gallegos (1987) suggested that the San Dieguito pattern is simply an inland manifestation of a broader economic pattern. Gallegos' interpretation of San Dieguito has been widely accepted in recent years, in part because of the difficulty in distinguishing San Dieguito components from other assemblage constituents. In other words, it is easier to ignore San Dieguito as a distinct socioeconomic pattern than it is to draw it out of mixed assemblages.

The large number of finished bifaces (i.e., Projectile points and non-Projectile blades), along with large numbers of formal flake tools at the Harris site complex, is very different than nearly all other assemblages throughout the San Diego region, regardless of age. Warren et al. (2004) made this point, tabulating basic assemblage constituents for key early-Holocene sites. Producing finely made bifaces and formal flake tools implies that relatively large amounts of time were spent for tool manufacture. Such a strategy contrasts with the expedient flake-based tools and cobble-core reduction strategy that typifies non-San Dieguito Archaic sites. It can be inferred from the uniquely high degree of San Dieguito assemblage formality that the Harris site complex represents a distinct economic strategy from non-San Dieguito assemblages.

If San Dieguito truly represents a distinct socioeconomic strategy from the non-San Dieguito Archaic processing regime, its rarity implies that it was not only short-lived, but that it was not as economically successful as the Archaic strategy. Such a conclusion would fit with other trends in southern California deserts, wherein hunting-related tools are replaced by processing tools during the early Holocene (Basgall and Hall 1993).

Archaic (8000 BC–AD 500)

The more than 1500-year overlap between the presumed age of Paleoindian occupations and the Archaic period highlights the difficulty in defining a cultural chronology in the San Diego region. If San Dieguito is the only recognized Paleoindian component in the San Diego region, then the dominance of hunting tools implies that it derives from Great Basin adaptive strategies and is not necessarily a local adaptation. Warren et al. (2004) admitted as much, citing strong desert connections with San Dieguito. Thus, the Archaic pattern is the earliest local socioeconomic adaptation in the San Diego region (Hale 2001, 2009).

The Archaic pattern is relatively easy to define with assemblages that consist primarily of processing tools: millingstones, handstones, battered cobbles, heavy crude scrapers, incipient flake-based tools, and cobble-core reduction. These assemblages occur in all environments across the San Diego region, with little variability in tool composition. Low assemblage variability over time and space among Archaic sites has been equated with cultural conservatism (Byrd and Reddy 2002; Warren 1968; Warren et al. 2004). Despite enormous amounts of archaeological work at Archaic sites, little change in assemblage composition occurs until the bow and arrow is adopted at around AD 500, as well as ceramics at approximately the same time (Griset 1996; Hale 2009). Even then, assemblage formality remains low. After the bow is adopted, small arrow points appear in large quantities and already low amounts of formal flake tools are replaced by increasing amounts of expedient flake tools. Similarly, shaped millingstones and handstones decrease in proportion relative to expedient, unshaped groundstone tools (Hale 2009). Thus, the terminus of the Archaic period is equally as hard to define as its beginning because basic assemblage constituents and patterns of manufacturing investment remain stable, complimented only by the addition of the bow and ceramics.

Late Prehistoric (AD 500–1750)

The period of time following the Archaic and prior to Ethnohistoric times (AD 1750) is commonly referred to as the Late Prehistoric (M. Rogers 1945; Wallace 1955; Warren et al. 2004). However, several other subdivisions continue to be used to describe various shifts in assemblage composition, including the addition of ceramics and cremation practices. In northern San Diego County, the post-AD 1450 period is called the San Luis Rey Complex (True 1978), while the same period in southern San Diego County is called the Cuyamaca Complex and is thought to extend from AD 500 until Ethnohistoric times (Meighan 1959). Rogers (1929) also subdivided the last 1,000 years into the Yuman II and III cultures, based on the distribution of ceramics. Despite these regional complexes, each is defined by the addition of arrow points and ceramics, and the widespread use of bedrock mortars. Vagaries in the appearance of the bow and arrow and ceramics make the temporal resolution of the San Luis Rey and Cuyamaca complexes difficult. For this reason, the term Late Prehistoric is well-suited to describe the last 1,500 years of prehistory in the San Diego region.

Temporal trends in socioeconomic adaptations during the Late Prehistoric period are poorly understood. This is partly due to the fact that the fundamental Late Prehistoric assemblage is very similar to the Archaic pattern but includes arrow points and large quantities of fine debitage from producing arrow points, ceramics, and cremations. The appearance of mortars and pestles is difficult to place in time because most mortars are on bedrock surfaces; bowl mortars are actually rare in the San Diego region. Some argue that the Ethnohistoric intensive acorn economy extends as far back as AD 500 (Bean and Shipek 1978). However, there is no substantial evidence that reliance on acorns, and the accompanying use of mortars and pestles, occurred prior to AD 1400. True (1980) argued that acorn processing and ceramic use in the northern San Diego region did not occur until the San Luis Rey pattern emerged after approximately AD 1450. For southern San Diego County, the picture is less clear. The Cuyamaca Complex is the southern counterpart to the San Luis Rey pattern, however, and is most recognizable after AD 1450 (Hector 1984). Similar to True (1980), Hale (2009) argued that an acorn economy did not appear in the southern San Diego region until just prior to Ethnohistoric times, and that when it did occur, a major shift in social organization followed.

Ethnohistoric (post-AD 1750)

The history of the Native American communities prior to the mid-1700s has largely been reconstructed through later mission-period and early ethnographic accounts. The first records of the Native American inhabitants of the San Diego region come predominantly from European merchants, missionaries, military personnel, and explorers. The brief and generally peripheral, accounts were prepared with the intent of furthering respective colonial and economic aims and were combined with observations of the landscape. They were not intended to be unbiased accounts regarding the cultural structures and community practices of the newly encountered cultural groups. The establishment of the missions in the San Diego region brought more extensive documentation of Native American communities, though these groups did not become the focus of formal and in-depth ethnographic study until the early twentieth century (Boscana 1846; Fages 1937; Geiger and Meighan 1976; Harrington 1934; Laylander 2000). The principal intent of these researchers was to record the precontact, culturally specific practices, ideologies, and languages that had survived the destabilizing effects of missionization and colonialism. This research, often understood as “salvage ethnography,” was driven by the understanding that traditional knowledge was being lost due to the impacts of modernization and cultural assimilation. Alfred Kroeber applied his “memory culture” approach (Lightfoot 2005, p. 32) by recording languages and oral histories within the San Diego region. Kroeber’s 1925 assessment of the impacts of Spanish missionization on local Native American populations supported Kumeyaay traditional cultural continuity (Kroeber 1925, p. 711):

> San Diego was the first mission founded in upper California; but the geographical limits of its influence were the narrowest of any, and its effects on the natives comparatively light. There seem to be two reasons for this: first, the stubbornly resisting temper of the natives; and second, a failure of the rigorous concentration policy enforced elsewhere.

In some ways this interpretation led to the belief that many California Native American groups simply escaped the harmful effects of contact and colonization all together. This, of course, is untrue. Ethnographic research by Dubois, Kroeber, Harrington, Spier, and others during the early twentieth century seemed to indicate that traditional cultural practices and beliefs survived among local Native American communities. These accounts supported, and were supported by, previous governmental decisions which made San Diego County the location of more federally recognized tribes than anywhere else in the United States: 18 tribes on 18 reservations that cover more than 116,000 acres (CSP 2009).

The traditional cultural boundaries between the Luiseño and Kumeyaay Native American tribal groups have been well defined by anthropologist Florence C. Shipek:

> In 1769, the Kumeyaay national territory started at the coast about 100 miles south of the Mexican border (below Santo Tomas), thence north to the coast at the drainage divide south of the San Luis Rey River including its tributaries. Using the U.S. Geological Survey topographic maps, the boundary with the Luiseño then follows that divide inland. The boundary continues on the divide separating

> Valley Center from Escondido and then up along Bear Ridge to the 2240 contour line and then north across the divide between Valley Center and Woods Valley up to the 1880-foot peak, then curving around east along the divide above Woods Valley. [1993 summarized by the San Diego County Board of Supervisors 2007:6]

Based on ethnographic information, it is believed that at least 88 different languages were spoken from Baja California Sur to the southern Oregon state border at the time of Spanish contact (Johnson and Lorenz 2006, p. 34). The distribution of recorded Native American languages has been dispersed as a geographic mosaic across California through six primary language families (Golla 2007, p. 71). As the Project area is located approximately 30 km south of the San Luis Rey River, the Native American inhabitants of the region spoke using the Ipai language subgroup of the Yuman language group. Ipai and Tipai, spoken respectively by the northern and southern Kumeyaay communities, are mutually intelligible. For this reason, these two are often treated as dialects of a larger Kumeyaay tribal group rather than as distinctive languages, though this has been debated (Luomala 1978; Laylander 2010).

Victor Golla has contended that one can interpret the amount of variability within specific language groups as being associated with the relative “time depth” of the speaking populations (Golla 2007, p. 80) A large amount of variation within the language of a group represents a greater time depth then a group’s language with less internal diversity. One method that he has employed is by drawing comparisons with historically documented changes in Germanic and Romantic language groups. Golla has observed that the “absolute chronology of the internal diversification within a language family” can be correlated with archaeological dates (2007, p. 71). This type of interpretation is modeled on concepts of genetic drift and gene flows that are associated with migration and population isolation in the biological sciences.

Golla suggested that there are two language families associated with Native American groups who traditionally lived throughout the San Diego County region. The northern San Diego tribes have traditionally spoken Takic languages that may be assigned to the larger Uto–Aztecan family (Golla 2007, p. 74). These groups include the Luiseño, Cupeño, and Cahuilla. Golla has interpreted the amount of internal diversity within these language-speaking communities to reflect a time depth of 2,000 years. Other researchers have contended that Takic may have diverged from Uto–Aztecan ca. 2600 approximately BC–AD 1, which was later followed by the diversification within the Takic speaking San Diego tribes, occurring approximately 1500 BC–AD 1000 (Laylander 2010). The majority of Native American tribal groups in southern San Diego region have traditionally spoken Yuman languages, a subgroup of the Hokan Phylum. Golla has suggested that the time depth of Hokan is approximately 8,000 years (Golla 2007, p. 74). The Kumeyaay tribal communities share a common language group with the Cocopa, Quechan, Maricopa, Mojave, and others to east, and the Kiliwa to the south. The time depth for both the Ipai (north of the San Diego River, from Escondido to Lake Henshaw) and the Tipai (south of the San Diego River, the Laguna Mountains through Ensenada) is approximated to be 2,000 years at the most. Laylander has contended that previous research indicates a divergence between Ipai and Tipai to have occurred approximately AD 600–1200 (Laylander 1985). Despite the distinct linguistic differences between the Takic-speaking tribes to the north, the Ipai-speaking communities in central San Diego, and the Tipai southern Kumeyaay, attempts to illustrate the distinctions between these groups based solely on cultural material alone have had only limited success (Pigniolo 2004; True 1966).

The Kumeyaay generally lived in smaller family subgroups that would inhabit two or more locations over the course of the year. While less common, there is sufficient evidence that there were also permanently occupied villages, and that some members may have remained at these locations throughout the year (Owen 1965; Shipek 1982; Shipek 1985; Spier 1923). Each autonomous triblet was internally socially stratified, commonly including higher status individuals such as a tribal head (Kwaaypay), shaman (Kuseyaay), and general members with various responsibilities and skills (Shipek 1982). Higher-status individuals tended to have greater rights to land resources, and owned more goods, such as shell money and beads, decorative items, and clothing. To some degree, titles were passed along family lines; however, tangible goods were generally ceremonially burned or destroyed following the deaths of their owners (Luomala 1978). Remains were cremated over a pyre and then relocated to a cremation ceramic vessel that was placed in a removed or hidden location. A broken metate was commonly placed at the location of the cremated remains, with the intent of providing aid and further use after death. At maturity, tribal members often left to other bands in order to find a partner. The families formed networks of communication and exchange around such partnerships.

Areas or regions, identified by known physical landmarks, could be recognized as band-specific territories that might be violently defended against use by other members of the Kumeyaay. Other areas or resources, such as water sources and other locations that were rich in natural resources, were generally understood as communal land to be shared amongst all the Kumeyaay (Loumala 1978). The coastal Kumeyaay exchanged a number of local goods, such as seafood, coastal plants, and various types of shell for items including acorns, agave, mesquite beans, gourds, and other more interior plants of use (Luomala 1978). Shellfish would have been procured from three primary environments, including the sandy open coast, bay and lagoon, and rocky open coast. The availability of these marine resources changed with the rising sea levels, siltation of lagoon and bay environments, changing climatic conditions, and intensity of use by humans and animals (Gallegos and Kyle 1988; Pigniolo 2005; Warren and Pavesic 1963). Shellfish from sandy environments included *Donax*, *Saxidomas*, *Tivela*, and others. Rocky coast shellfish dietary contributions consisted of *Pseudochama*, *Megastraea*, *Saxidomus*, *Protothaca*, *Megathura*, and others. Lastly, the bay environment in the immediate vicinity of the Project area would have provided *Argopecten*, *Chione*, *Ostrea*, *Neverita*, *Macoma*, *Tagelus*, and others. While marine resources were obviously consumed, terrestrial animals and other resources likely provided a large portion of sustenance. Game animals consisted of rabbits, hares (*Leporidae*), birds, ground squirrels, woodrats (*Neotoma*), deer, bears, mountain lions (*Puma concolor*), bobcats (*Lynx rufus)*, coyotes (*Canus latrans*), and others. In lesser numbers, reptiles and amphibians may have been consumed.

A number of local plants were used for food and medicine. These were exploited seasonally, and were both traded between regional groups and gathered as a single triblet moved between habitation areas. Some of the more common of these that might have been procured locally or as higher elevation varieties would have included buckwheat (*Eriogonum fasciculatum*), *Agave*, *Yucca*, lemonade berry (*Rhus integrifolia*), sugar brush (*Rhus ovata*), sage scrub (*Artemisia californica*), yerba santa (*Eriodictyon*), sage (*Salvia*), *Ephedra*, prickly pear (*Opuntia*), mulefat (*Baccharis salicifolia*), chamise (*Adenostoma fasciculatum*), elderberry (*Sambucus nigra*), oak (*Quercus*), willow (Salix), and *Juncus* grass among many others (Wilken 2012).

The Historic Period (post-AD 1542)

European activity in the region began as early as AD 1542, when Juan Rodríguez Cabrillo landed in San Diego Bay. Sebastián Vizcaíno returned in 1602, and it is possible that there were subsequent contacts that went unrecorded. These brief encounters made the local native people aware of the existence of other cultures that were technologically more complex than their own. Epidemic diseases may also have been introduced into the region at an early date, either by direct contacts with the infrequent European visitors or through waves of diffusion emanating from native peoples farther to the east or south (Preston 2002). It is possible, but as yet unproven, that the precipitous demographic decline of native peoples had already begun prior to the arrival of Gaspar de Portolá and Junípero Serra in 1769.

Spanish colonial settlement was initiated in 1769, when multiple expeditions arrived in San Diego by land and sea, and then continued northward through the coastal plain toward Monterey. A military presidio and a mission to deal with the local Kumeyaay and Ipai were soon firmly established at San Diego, despite violent resistance to them from a coalition of native communities in 1776. Private ranchos subsequently established by Spanish and Mexican soldiers, as well as other non-natives, appropriated much of the remaining coastal or near-coastal locations (Pourade 1960–1967).

Mexico's separation from the Spanish empire in 1821 and the secularization of the California missions in the 1830s caused further disruptions to native populations in western San Diego County. Some former mission neophytes were absorbed into the work forces on the ranchos, while others drifted toward the urban centers at San Diego and Los Angeles or moved to the eastern portions of the county where they were able to join still largely autonomous native communities. United States conquest and annexation, together with the gold rush in Northern California, brought many additional outsiders into the region. Development during the following decades was fitful, undergoing cycles of boom and bust. With rising populations in the nineteenth century throughout the Southern California region, there were increased demands for important commodities such as salt.

First and Second San Diego Aqueducts (1945-1961)

The San Diego County Water Authority, originally consisting of five cities, three irrigation districts, and one public utility district, was organized June 9, 1944, under the County Water Authority Act. The Water Authority focused on arranging the import of water to the County rather than building new reservoirs. The next stage was to fulfill the City's contract with the U.S. Bureau of Reclamation and bring Colorado River water to San Diego. As the population of San Diego ballooned from 300,000 in 1940 to over 600,000 in 1944, even the new local water projects like San Vicente Dam were not sufficient to meet the demand. In 1945, construction began on the San Diego Aqueduct, which would bring Metropolitan Water District (MWD) water from the Colorado River Aqueduct at the San Jacinto Tunnel to the San Vicente Reservoir. The U.S.'s involvement in World War II limited the City's ability to get adequate amounts of steel and concrete to make a new pipeline or aqueduct, so it opted to branch off of the existing MWD Colorado River Aqueduct, which had been completed in 1939. To facilitate this, in 1944, the City of San Diego eventually ceded its rights to Colorado River water and control of the San Diego County Water Authority to the MWD, thereby becoming entitled to water from the MWD system (City of San Diego 2018; Crawford 2010, 2011; Fowler 1953; Pourade 1977; USBR 2020).

After the San Diego Aqueduct (now known as the First San Diego Aqueduct) route was inspected, contracts were awarded and W.E. Callahan Construction Company and Gunther & Shirley Company of Los Angeles began work on the project under the supervision of Chief Hydraulic Engineer for the City of San Diego, Fred Dale Pyle. Given that miners and steel could not be spared under the War Manpower restrictions in effect until January 1946, concrete was chosen as the primary aqueduct material out of necessity. In the fall of 1946, the City contract reassigned the Colorado River water point of delivery from Imperial Dam to Parker Dam and assigned its Colorado River water rights to the MWD (Figure 3) (San Diego Union 1945a, 1945b; USBR 2020).

The San Diego Aqueduct was delayed by a worker's strike in 1946 and again in early 1947. Delays from steel production also set the project back by several months. Despite issues and delays, the project was completed in November 1947 under budget at only $14.1 million versus the $17 million estimated for the project. Water from the Colorado River flowed into San Vicente Reservoir for the first time in late November 1947. The San Diego Aqueduct was dedicated in December of 1947; the San Diego County Water Authority was formally annexed by the MWD and became legally entitled to

Colorado River water from the MWD system. The San Vicente Dam was the first dam in the County to receive Colorado River Water (Crawford 2010; San Diego Union 1946, 1947a, 1947b, 1947c, 1947d).

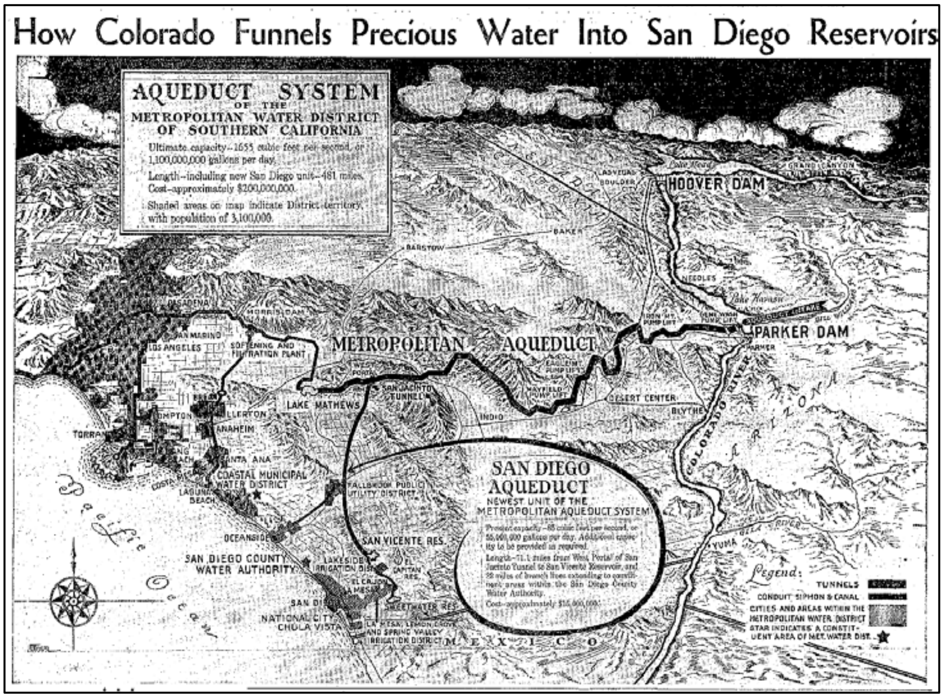

Figure 3. Newspaper article showing the San Diego Aqueduct route (San Diego Union 1947)

When San Diego began incorporating imported water into the City's supply in 1947, it started a new trend in the City's water storage and management. At the time of its completion, the First San Diego Aqueduct added 65,000 acre-feet/year (AFY) of water and accounted for 70-80% of the City's water supply, with the remainder coming from local reservoirs. A second barrel was added to the San Diego Aqueduct in 1954, adding another 65,000 AFY of water (Durfor and Becker 1964; Fraser 2007).

In 1958, the City started the Second San Diego Aqueduct Project, which also called for the construction of the Miramar Dam and Miramar Water Treatment Plant in the Scripps Ranch region. When the Second San Diego Aqueduct was completed in 1961, it added 200,000 AFY, but during dry years, the ratio of imported water increased. In 1961, after two drought years, imported Colorado River Water accounted for 92-94% of the city's water supply (City of San Diego 2018; Crawford 2011; Durfor and Becker 1964; Fraser 2007; Pourade 1977; SDU 1960).

Reservoir water originates from both the Colorado River Aqueduct and the California Aqueduct. The California Aqueduct, part of the State Water Project which captured water from the Feather River in Northern California, was approved by voters in 1959 and brought water to the Bay Area (1962), the San Joaquin Valley (1968), and finally Southern California and San Diego (1972). At the time of construction, the California Aqueduct added 325,000 AFY of water to San Diego's water supply. Today, roughly 17% of San Diego's water supply comes from the State Water Project (Center for Biological Diversity 2020, Water Authority 2020).

Methods

Records Search

Previous Cultural Studies

A records search for the entire project area and a 1-mile radius around the project was performed by South Coastal Information Center staff on behalf of Dudek on May 10, 2021, during Dudek's Cultural Constraints Study titled the *Cultural Resources Constraints for the San Diego County Water Authority's Task 28, First Aqueduct Treated Water Tunnels Rehabilitation Project, San Diego County, California* conducted for the Water Authority and the Project and submitted June 14, 2021 (Wolf and Hale 2021 – Included as Appendix B).

The records search identified 98 studies which have been performed within the 1-mile search radius of the project area, eleven (11) of which encompass at least a portion of the project area. The search also identified ninety-three (93) previously recorded cultural resources, seven (07) of which are located within or partially within the constraints project area. Research conducted for this constraints study also identified seven (07) cultural resources previously recorded within the project APE. These resources include one isolate and five archaeological sites and one Historic Built Environment. Of the seven cultural resources previously recorded within or partially within the project survey area, the one isolated artifact (P-37-025397) is considered not eligible for NRHP or CRHR register listings and no further archaeological work is necessary for this resource.

One historic built environment resource over 50 years old was identified within the APE: the First San Diego Aqueduct (P-37-030107). The First San Diego Aqueduct was previously determined eligible for the NRHP under Criterion A as the first water infrastructure project that provided a permanent water supply for San Diego County (see Appendix D). As demonstrated in the previous Water Authority project report by Dudek titled the *Cultural Resources Inventory Report for the Southern First Aqueduct Structures Rehabilitation Project, San Diego County, California*, project-related effects to the first San Diego Aqueduct will not be adverse and will not impact the resource's ability to continue to convey its significance under NRHP Criterion A (Pham et al 2021).

The five remaining resources (2 multicomponent habitation sites CA-SDI-013494, and CA-SDI-013495 and three prehistoric resource utilization sites CA-SDI-016842, CA-SDI-016844, and CA-SDI-016845 located within the project area have not been formally evaluated for cultural significance and/or listing on the NRHP or CRHR (Wolf and Hale 2021).

While seven resources were identified within the study area of the previous cultural resources constraints assessment, the constraints study area incorporated a slightly larger search area than the area designated for this the field survey presented in this report, including a buffer around potential construction work areas for purposes of conservative constraints analysis. The buffer was not included in the field survey.

Previously Recorded Sites in the Project Area

The single previously recorded cultural resources located within the project's APE and the two previously recorded resources within the project's ROW but immediately adjacent to the current APE are discussed below by resource number.

P-37-013494/CA-SDI-13494

Resource P-37-013494 includes both historic and prehistoric habitation elements. The site was originally recorded by S. Briggs and B. Glenn with Ogden Environmental Inc. in 1993 as a Bedrock Milling Station with two loci with milling elements including mortars, slicks, and basins. Historic features included a rock wall and reservoir. In 2003, the site was updated and a third milling loci added which extended the boundaries. During a 2008 survey conducted by P. McGinnis, all the previously identified features were relocated. Also noted on site was an abandoned campsite of recent historic origin. The historic features include a tent, wooden lean-to, clothesline, and hearth. A fair amount of associated trash was also present noted at the site during the last cultural site update conducted in 2008. No cultural evaluation investigations have been conducted at this site.

P-37-025394/CA-SDI-16844

Resource P-37-025394 is recorded as a prehistoric Bedrock Milling Station. The site was originally recorded by D. James with James & Briggs Archaeological Services Inc. in 2003. The Bedrock Milling Station was recorded as a single bedrock milling feature with one slick element. No other feature artifacts or cultural materials were ever identified associated with this single milling feature. This site was revisited in 2008 by archaeologist P. McGinnis and noted to be in similar condition was it was initially recorded. No cultural evaluation investigations have been conducted at this site.

P-37-025397

Resource P-37-025397 is recorded as an isolated prehistoric lithic core artifact. The isolate was originally recorded by D. James with James & Briggs Archaeological Services Inc. in 2003. The isolated artifact was identified as a single small patinated volcanic core. This isolate was relocated by archaeologist P. McGinnis in 2008. No additional cultural materials, features or artifacts were identified associated with this isolated prehistoric core artifact.

P-37-030107-The San Diego Aqueduct

The First San Diego Aqueduct has been recorded in various segments by a variety of consultants over the years. It appears that not all of these recordings and evaluations have occurred under the same primary number. Segment recorded in 2008 included the associated above-ground concrete features, such as vents, access points and regulators. In 2010, the San Diego Aqueduct was revaluated by HDR Inc. Their survey only consisted of portions of SDG&E access roads that overlap previously recorded resources. They were able to relocate one of the venting stations consisting of two concrete structures. A 2017 study by ASM Affiliates relocated the aqueduct and indicated its condition was as it was previously recorded. The report indicated that the resource was not evaluated for the NRHP. However, this overlooked a previous finding made in 2012, when the San Diego Aqueduct was determined eligible for the NRHP under Criterion A as the first water infrastructure project that provided a permanent water supply for San Diego County. This finding was reached as part of the *Section 106 Consultation for Issuance of 404 Permit, Gregory Canyon Landfill, near San Luis Rey River, San Diego County* between the USACE and SHPO (see Appendix D for SHPO concurrence see Ref: COE110329C, Pham et al. 2021).

NAHC Sacred Lands File Search

DUDEK requested a NAHC search of their Sacred Lands File (SLF) on June 24, 2021 for the proposed project's APE. The NAHC provided results on July 16, 2021. This search indicated the presence of Native American traditional cultural place(s) within this area (Confidential Appendix C). While the NAHC did not offer any specific information concerning the known resources, they provided a list of Native American tribes and individuals/organizations that might have knowledge of cultural resources in or near the Project APE.

Tribal Correspondence

Following the NAHC request, the Water Authority prepared and submitted letters to local Tribal representatives AB 52 letters were subsequently drafted by Dudek for use by the lead agency. These AB 52 letters were sent by the lead agency to the listed tribal representatives to initiate formal AB 52 consultations between the lead agency and the Native Tribal entities with the intent of requesting information, opinions or concerns relating to the proposed Project impacts (Appendix C). These letters contained a brief description of the planned Project, reference maps, and a summary of the NAHC SLF results.

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Survey Methods

The current cultural survey methods can be classified as an intensive pedestrian survey, applying short interval transect spacing and full documentation of cultural resources. Archaeological survey staff exceeded the applicable Secretary of Interior Professional Qualifications Standards for archaeological survey and evaluation. The project APE was subject to a 100% survey, however, small areas of the property were not intensively investigated due to the occupation of areas by transient and/or homeless inhabitants. All cultural resources identified through the records search and during the survey were recorded using a Global Positioning System (GPS) receiver with sub-meter accuracy, recording, at a minimum, the horizontal extents of the resource (i.e., site boundary), a sample of surface artifacts, cultural features, and any notable landform features within or adjacent to the site limits. Evidence for buried cultural deposits was opportunistically sought through inspection of natural or artificial erosion exposures and the spoils from rodent burrows. No artifacts were collected during the survey. Field recording and photo documentation of artifacts, as appropriate, was completed.

Documentation of cultural resources complied with the Office of Historic Preservation (OHP) and Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716-44740), and the California Office of Historic Preservation Planning Bulletin Number 4(a), December 1989, Archaeological Resource Management Reports (ARMR): Recommended Contents and Format (ARMR Guidelines) for the Preparation and Review of Archaeological Reports. All prehistoric and historic sites identified during this inventory were recorded on California Department of Parks and Recreation Form DPR 523 (Series 1/95), using the Instructions for Recording Historical Resources (Office of Historic Preservation 1995).

During the survey, varied levels of vegetation growth were noted to obscure some areas of the APE's ground surface; however, most areas were more open, or previously disturbed and offered better ground surface visibility. The construction of the aqueduct itself would suggest a high level of ground (surface and subsurface) disturbance throughout the project APE. The proposed access routes for this project likewise have been moderately to heavily disturbed with the current and continued use of these designated routes. The portions of land that were not previously disturbed within the current APE typically included extreme slopes or highly undulating drainage/erosional cuts. The sediments observed below the ground cover consists mainly of a brown compact alluvial sandy loam and areas of decomposing granite bedrock.

Disturbances

The entire Project APE has been disturbed and subjected to past impacts of the aqueduct construction and maintenance, as well as to varying degrees, disturbed by limited historic and modern residential development and occupation activities. The existing aqueduct infrastructure, including above-ground structures and underground pipelines, are in full operation; the immediate surrounding area of the potential work areas have been graded and are currently maintained. Intermittent and irregular surface topography, areas of grade excavations, debris from the previously standing water-facility structures and the minor presence of other modern trash and debris are evidence for these disturbances.

One exception to the generally consistent level of disturbance was the identification of an either currently occupied, or recently occupied transient camp/shelter, located in the immediate location of the previously recorded cultural resource, CA-SDI-013494 (Figure 03). This multicomponent site is the one and only cultural resource identified within the project's APE and has been apparently occupied by transient inhabitants for an extended but undetermined volume of time. A significant volume of occupation-related trash and debris (clothing items, food refuse and general consumer goods trash) is scattered surrounding a makeshift shelter and tent. This modern camp-habitation is located directly in the center of the previously recorded location of CA-SDI-013494. Several features, such as several of the prehistoric bedrock milling elements and a historic rock and mortar wall were identified within the debris of the modern camp, but much of the previously recorded artifacts were completely obscured by refuse and debris.

Extended Phase I Evaluations

Based on the results of the pedestrian survey, limited subsurface exploratory evaluations were conducted on July 21, 2021. Archaeologists included Scott Wolf (field director), Makayla Murillo, P.K. Sharpe-Garcia, and Patrick Hadel. A Luiseno Native American monitor employed by Saving Sacred Sites was present for all excavation and expressed no concerns relating to methodology followed in the field.

Sites CA-SDI-13494 and CA-SDI-16844 were last recorded in 2008, roughly 13 years ago. At the time of the site's original recordation, sites were hand-drawn on U.S. Geological Survey maps within limited features for geographical reference, and therefore larger potential for error. These generalized spatial boundaries have since been directly traced into digital geographic information system (GIS) format and provided by the SCCIC (and other information centers) for use with contemporary GPS and mapping technology capable of real-time of sub-decimeter (or greater) accuracy. Additional uncertainty relating to the present condition of CA-SDI-13494 has been introduced through the disturbances that have occurred to these areas since. In order to account for these uncertainties, an Extended Phase I evaluation program was implemented. The intent of this program was to identify the extent of previous disturbance within CA-SDI-13494, and to assess the potential for archaeological subsurface potential associated with the resources CA-SDI-13494 and CA-SDI-16844. The Extended Phase I plan included the following procedures:

- All diagnostic artifacts and features are GPS recorded and photographed on site. Photographs are be tracked using a Photographic Record Form. GPS data will be then be used to create new report figures and associated maps.
- Subsurface testing of the area is conducted through excavation of STPs, each measuring 50 x 25 cm, in 20 cm arbitrary levels from the surface. STPs are distributed in either approximate 20 meter intervals along the planned edge of the APE, or in judgmental placement where the APE intersects the boundaries of the recorded archaeological site CA-SDI-13494.
- Subsurface STP wall profiles are photographed upon completion and prior to backfilling. Additional information is sampled for depths of a meter or more below the surface through use of a 4-inch hollow-stem auger. Documentation of all subsurface sediment profiles, visible disturbances, and content is included on Dudek STP Forms. The location of each Feature and STP location is taken using a Trimble with sub-decimeter accuracy and a 3rd Generation Apple iPad equipped with an internal GPS, Avenza PDF Maps, and a high-resolution georeferenced aerial map.
- Documentation of cultural resources will comply with the Office of Historic Preservation (OHP) and Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44720 et seq.) and the California Office of Historic Preservation Planning Bulletin Number 4(a).

Results

Survey Results

No new cultural resources were identified within the project's APE during the pedestrian survey. The cultural resource previously recorded within the project's APE, CA-SDI-013494 was positively relocated within the previously recorded location as determined from the record search data (confidential Appendix A). However, as described in the disturbance section above, it is also the current location of an indeterminant transient camp/shelter.

The prehistoric lithic isolate, P-37-025397, previously identified as being in the ROW immediately adjacent to the Portal 5 APE was not relocated during the pedestrian survey. The single artifact might have been inadvertently moved or was simply obscured during the recent search of the previously recorded location. Furthermore, the previously recorded location of this single artifact was determined with methods used prior to the standardization of GPS systems for recording resource locations, and as such the mapped location shows a vastly larger location than physical space the actual artifact occupies. While it was not positively relocated, as an isolate, this resource would not significantly hinder the implementation of the proposed project.

The third previously recorded cultural resource, CA-SDI-16844, located in the Water Authority ROW, outside of, but immediately adjacent to the Portal 5 APE was not relocated during the current survey of the APE. The area where this bedrock milling station was previously recorded was extremely dense with thick unmanaged vegetation, heavily obscuring any ground surface visibility. While granite bedrock outcropping boulders were present in the vicinity, the previously recorded milling features were not positively relocated. On the assumption that this resource was originally mapped accurately, it is unlikely that this resource would inhibit the current project as it is recorded outside of the proposed project boundaries.

Extended Phase I Inventory Results

Extended Phase I efforts resulted in the identification at least 6 Features in the location of previously recorded site CA-SDI-13494. Many of these Features (four out of six) were observed in the western portion of the originally mapped site boundary, within the Portal 5 APE. The individual Features are described below.

Features Recorded

Feature 1 consists of a small granite boulder (50 x 75 x 20 cm) with one oval slick (15 x 10 cm) located within the APE.

Feature 2 is a low-laying granitic boulder (150 x 110 x 30 cm) located within the APE with one round saucer mortar (15 x 15 x 5 cm) and at least 1 possible ephemeral slick (18 x 20 cm).

Feature 3 is a low-laying granitic boulder (180 x 250 x 40 cm) immediately east of Feature 2, with ephemeral one slick (25 x 20 cm).

Feature 4 is a granitic boulder (75 x 90 x 30 cm) with one slick (18 x 17 cm).

Feature 5 is a larger granitic boulder (550 x 120 x 10 cm) with one slick (18 x 17 cm) and one round mortar (30 x 30 cm)

Feature 6 is the remains of an undetermined historic-era granite cobble/rock and cement mortar wall alignment. The alignment appeared to at one time been staked one or two rocks high and curved in a rounded shape, encircling the make-shift camp area. The rock wall feature during the current extended Phase I efforts while somewhat discernable from the old site form, is now heavily disturbed, mostly dismantled, and buried below a substantial volume of recent trash, debris and fallen tent/shelter debris.

Shovel Test Pits

Locations of the four STPs can be seen in Appendix A, Figure 7. All STPs were negative and were excavated two sterile levels, to an approximate depth of 40 cmbs. STP 1 was placed within CA-SDI-13494 while STPs 2 through 4 were excavated along the southern edge of the Portal 5 APE, closest to the previously recorded location of CA-SDI-16844.

STP 1 was negative. This STP was placed in order to potentially locate any subsurface deposits associated with the prehistoric bedrock milling at CA-SDI-13494. Soil here consists of compact, brown sandy silt. Additional STPs were planned for this site, but the physical environment actually was so limited due to exposed bedrock granite boulders and the extreme slope and drop off to the west (along the Aqueduct's previously disturbed alignment), that there were no additional suitable locations to place more STP excavations. Subsurface cultural deposits will not be located under bedrock and all other areas where STPs could be placed were physically outside of the APE.

STP 2 was negative. Soil here consists of very compact brown fine silt from 0-10 cmbs and compact red-brown decomposing Granite gravels from 10-40 cmbs.

STP 3 was negative. Soil here consists of compact brown fine silt from 0-20 cm and compact red-brown decomposing Granite gravels from 20-40 cmbs.

STP 4 was negative. Soil here consists of loosely compact brown slightly sandy silt from 0-40 cmbs.

Summary and Management Considerations

Outside of the obvious identifications of the Historic Built Environment resource known as the First San Diego Aqueduct (P-37-030107), previously recorded cultural resource features and materials (prehistoric bedrock milling, historic rock features and historic trash) were relocated within the vicinity of the previously recorded resource CA-SDI-013494 and also identified within the project's APE.

Impact Analysis

CEQA Guidelines and Section 106 of the NHPA provide that a Project that demolishes or alters those physical characteristics of an historical resource that convey its historical significance (i.e., its character-defining features) can be considered to materially impair the resource's significance. To best mitigate the effects of the proposed Project on cultural resources, a reasonable, good faith effort must be applied to determining their archaeological character and eligibility for listing in the CRHR and NRHP.

This cultural pedestrian survey of the APE identified two (2) resources within the project's APE; P-37-030107, the First San Diego Aqueduct, and the previously recorded multi-component site CA-SDI-013494. Two other previously recorded resources (P-37-025394/CA-SDI-16844 and P-37-025397) were previously identified within the Water Authority ROW, and immediately adjacent to the potential work area boundaries, but were not relocated during this survey. While the First San Diego Aqueduct has been previously evaluated, the other three previously recorded cultural resources identified have not previously been evaluated for archaeological significance.

At present, it is understood that the project design is still being developed and that construction methods and proposed work area boundaries can be modified to ensure avoidance of known archaeological resources. Accordingly, the project APE studied in the field and presented in this report does not indicate final boundaries of project construction. P-37-025397, being classified of an archaeological isolate, is not NRHP/CRHR eligible. Per regulatory requirements, any unevaluated archaeological site, including P-37-025394 and portions of site CA-SDI-13494 that were not investigated during this extended Phase I project, must be assumed NRHP/CRHR eligible and, as such, adverse changes to these resources may constitute a significant effect on the environment. It is understood that there may be construction strategies that avoid direct impacts to these archaeological sites and their immediate surrounding area. By avoiding CA-SDI-013494 and P-37-025394 and a surrounding distance of 50 feet, it is anticipated any impacts to known or unknown components of these archaeological sites would be avoided.

Recommendations

This cultural survey report recommendation is based on the project's constraints study results, the pedestrian survey and the Extended Phase I inventory results to inform project planning. For future CEQA compliance and NHPA Section 106 compliance, Dudek recommends that if subsequent project design indicates previously recorded resources cannot be avoided, any affected archaeological and historical resources will need to be evaluated for their potential for NRHP and CRHR listing and their significance pursuant to CEQA and NHPA Section 106.

Based on the Records Search results, four previously recorded cultural resources were determined to potentially be adversely affected by the currently proposed Water Authority project, P-37-025397, CA-SDI-13494, CA-SDI-16844, and the Historic Built Environment P-37-030107 (the First San Diego Aqueduct).

The First San Diego Aqueduct was determined eligible for the NRHP under Criterion A as the first water infrastructure project that provided a permanent water supply for San Diego County (see Appendix D). Project-related effects to the first San Diego Aqueduct will not be adverse and will not impact the resource's ability to continue to convey its significance under NRHP Criterion A. The Aqueduct is significant for its function and its alignment, not for its design or materials. Further, because it is a below-ground resource, there are no specific protection measures required during Project implementation. As a result of the current study, Dudek recommends a finding of **No Adverse Effect to Historic Properties.**

P-37-025397, being classified of an archaeological isolate, is not NRHP/CRHR eligible and no further cultural work is recommended for this resource. This resource does not constitute a Historic Property.

The third previously recorded resource CA-SDI-13494, was re-located during the initial pedestrian survey and found to be partially within the currently proposed Portal 5 APE. Due to extreme disturbance from the transient camp and ground covering vegetation the portions of this site located within the Water Authority APE were subjected to Extended Phase I investigations. During these efforts, it was determined that while there is a low potential for subsurface deposits with this site, four site features (Features 1, 2, 3 and 6) were identified within the APE and should be avoided. CA-SDI-13494 should be considered to remain unevaluated for NRHP/CRHR listing. With implantation of the recommended mitigation, including project avoidance, Dudek recommends a finding of **No Adverse Effect to Historic Properties.**

The fourth previously recorded resource, CA-SDI-16844, should be considered to remain unevaluated for NRHP/CRHR listing. If not avoided, will require additional evaluation efforts. However, this cultural resource does not extend into the current APE and, therefore, was not directly investigated by archaeologists. The Extended Phase I efforts along the southern edge of the Portal 5 APE demonstrate an extremely low potential for encountering significant subsurface deposits associated with this resource during the Project's implementation with the current proposed work area boundaries. With implantation of the recommended mitigation, including project avoidance, Dudek recommends a finding of **No Adverse Effect to Historic Properties.**

Dudek recommends that archaeological and Native American monitors be present during ground-disturbing activities for the project near the previously recorded sites at Portal 5 (not including the Aqueduct alignment and the isolate) to properly treat inadvertent discoveries. Refer to the mitigation discussed below for additional details.

Mitigation Measures

If it is feasible for the project to avoid direct impacts to CA-SDI-013494 and CA-SDI-16844, Dudek recommends the following mitigation measures to ensure or otherwise minimize impacts to known and unanticipated cultural resources.

Conduct Archaeological Sensitivity Training for Construction Personnel.

Dudek recommends that construction personnel training include a discussion concerning resources located in proximity to designated work areas. As resources are located within or adjacent to anticipated work areas, the potential to impact these resources can be mitigated, provided construction personnel communicate and work with archaeological and/or Native American monitors on site.

Monitor and Report Construction Excavations for Archaeological Resources.

Dudek recommends that archaeological and Native American monitors be on site during ground disturbing activities (such as grubbing, grading, trenching, and drilling) at Portal 5. In the event that additional archaeological resources (additional artifacts and/or possible features) are exposed during construction activities for the project, all construction work occurring within 100 feet of the find shall immediately stop and be diverted to elsewhere on the project property, until a qualified archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards, can assess the find and determine whether or not additional study is warranted. If the resource is not significant, the archaeologist may simply record the find and allow work to continue. If the discovery is potentially significant under CEQA, additional work, such as preparation of an archaeological treatment plan and formal evaluation may be warranted. In accordance with the County and State's regulations, the priority is to avoid impacts to significant archaeological resources and to place the resources in an open space easement. If avoidance is not feasible, then additional mitigation will be required. Finally, a cultural monitoring report would be written and submitted to the Water Authority after the conclusion of the cultural monitoring program.

Unanticipated Discovery of Human Remains

In accordance with Section 7050.5 of the California Health and Safety Code, if human remains are found, the County Coroner shall be notified within 24 hours of the discovery. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the County Coroner has determined, within two working days of notification of the discovery, the appropriate treatment and disposition of the human remains. If the remains are determined to be Native American, the Coroner shall notify the NAHC in Sacramento within 24 hours. In accordance with California Public Resources Code, Section 5097.98, the NAHC must immediately notify those persons it believes to be the most likely descended (MLD) from the deceased Native American. The MLD shall complete their inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the disposition of the human remains.

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Warren, C.N., G. Siegler, and F. Dittmer. 2004. “Paleoindian and Early Archaic Periods.” In *Prehistoric and Historic Archaeology of Metropolitan San Diego: A Historic Properties Background Study*. Prepared for the Metropolitan Wastewater Department, City of San Diego. Encinitas, California: ASM Affiliates.

Waters, M.R. 1992. *Principles of Geoarchaeology: A North American Perspective*. Tucson, Arizona: University of Arizona Press.

Wilken, M. 2012. “An Ethnobotany of Baja California’s Kumeyaay Indians.” Master’s thesis; San Diego State University.

Yohe, R., and P. Chace. 1995. “The Archaeology of Las Montanas (CA-SDI-10246): A Paleo-economic Interpretation of a Millingstone Horizon Site, San Diego County, California.” Coyote Press Archives of California Prehistory. 42. Edited by G. Breschini and T. Haversat.

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Appendix A

Project Area Cultural Resources Maps (Confidential)

Appendix B

Project Constraints Report (Confidential)

Appendix C

NAHC and Tribal Correspondence

DUDEK

MAIN OFFICE
605 THIRD STREET
ENCINITAS, CALIFORNIA 92024
T 760.942.5147 T 800.450.1818 F 760.632.0164

June 24, 2021

NAHC Staff
Associate Government Program Analyst
Native American Heritage Commission

Subject: NAHC Sacred Lands File Records Search Request for San Diego County Water Authority's (SDCWA) Task 28 1st Aqueduct Treated Water Tunnels Rehabilitation Project, San Diego County, California

Dear NAHC Staff,

Dudek has been contracted to do a cultural resources Inventory for San Diego County Water Authority's (SDCWA) Task 28 1st Aqueduct Treated Water Tunnels Rehabilitation Project, San Diego County, California. The project is located in Township 10 South; Range 2 West; Sections 16 and 21 and Township 11 South; Range 2 West; Sections 3, 4, 9, 10, 15, 16, 21, and 22, on the Pala and Valley Center United States Geological Survey (USGS) 7.5-minute Quadrangle maps (Figure 1).

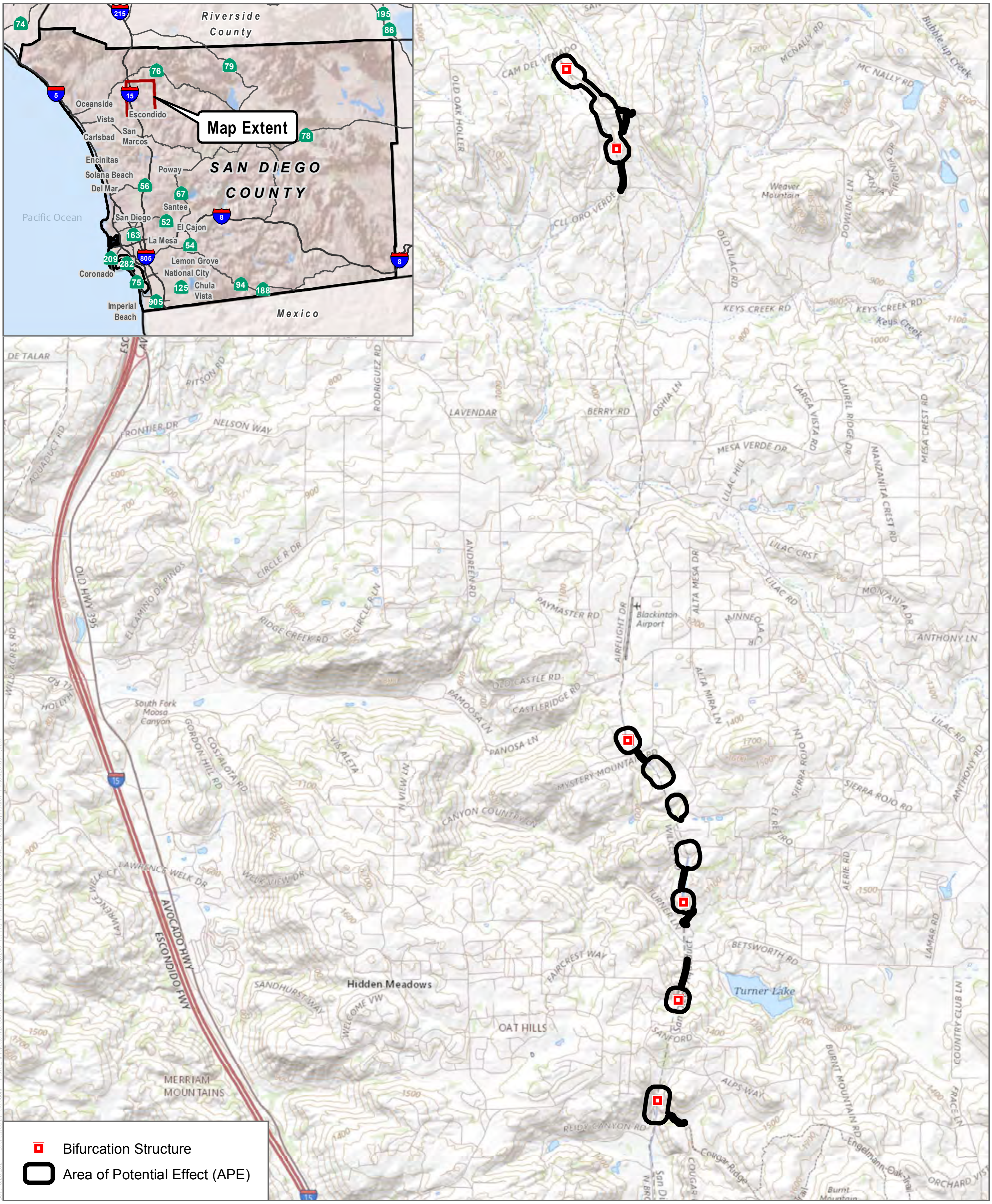
Dudek is requesting a NAHC search for any sacred sites or other Native American cultural resources that may fall within the proposed project location or a surrounding one-mile buffer. Please provide a Contact List with all Native American tribal representatives that may have traditional interests in this parcel or the surrounding search area. The results of this search can be faxed to 760-632-0164.

If you have any questions relating to this investigation, please contact me directly by email or phone.

Regards,

Scott Wolf, B.S.
Archaeologist
DUDEK
Phone: (760) 479-4164
Cell: (760) 942-8404
Email: swolf@dudek.com

Attachments:
SLF Records Search Request Map & Project Regional & Vicinity Map



SOURCE: USGS 7.5-Minute Series Pala and Valley Center Quadrangles

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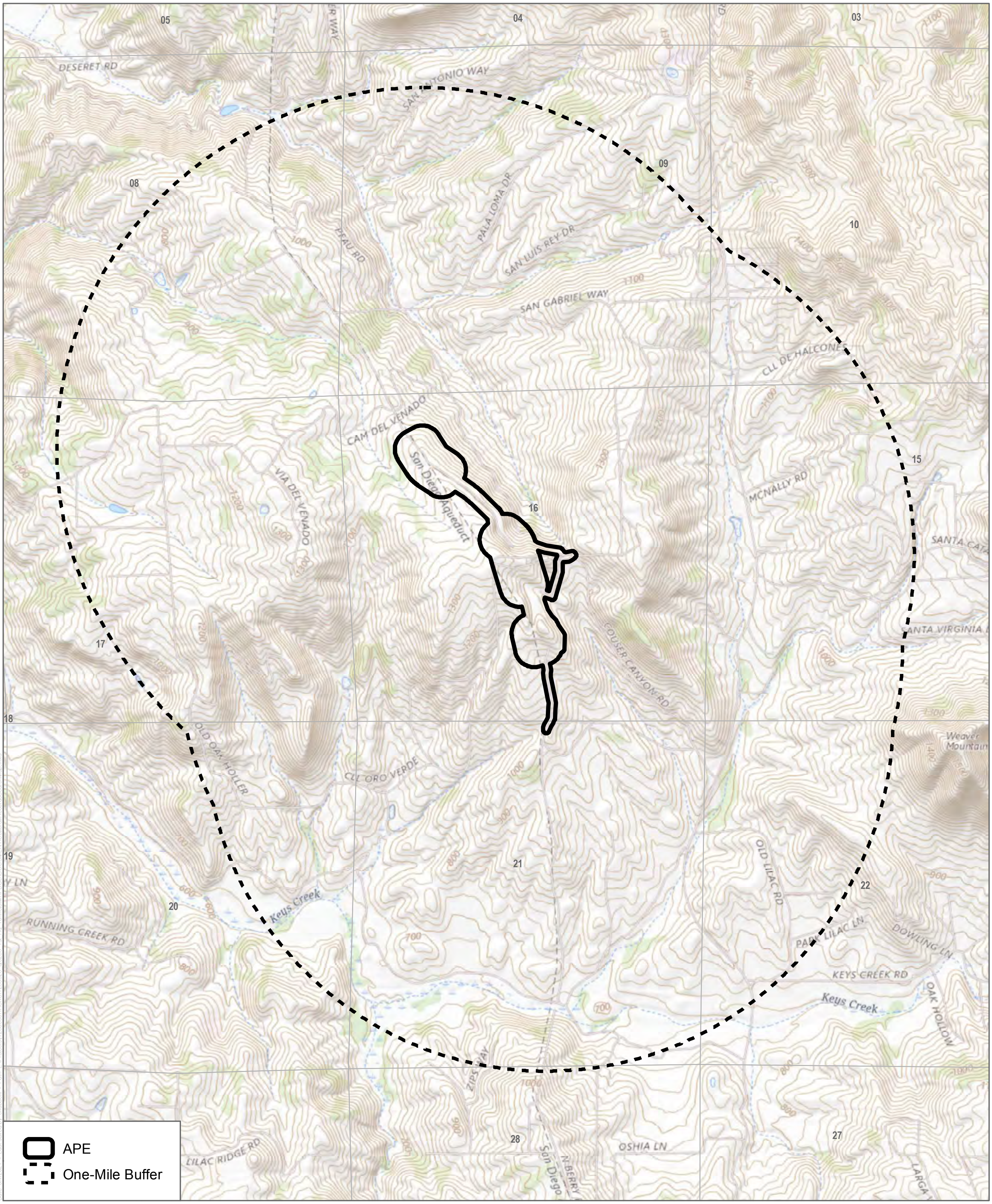
FIGURE 1

Project Location

Q0238 1st Aqueduct Tunnels



SOURCE: USGS 7.5-Minute Series Pala Quadrangle
Township 10S / Range 2W / Sections 16, 21

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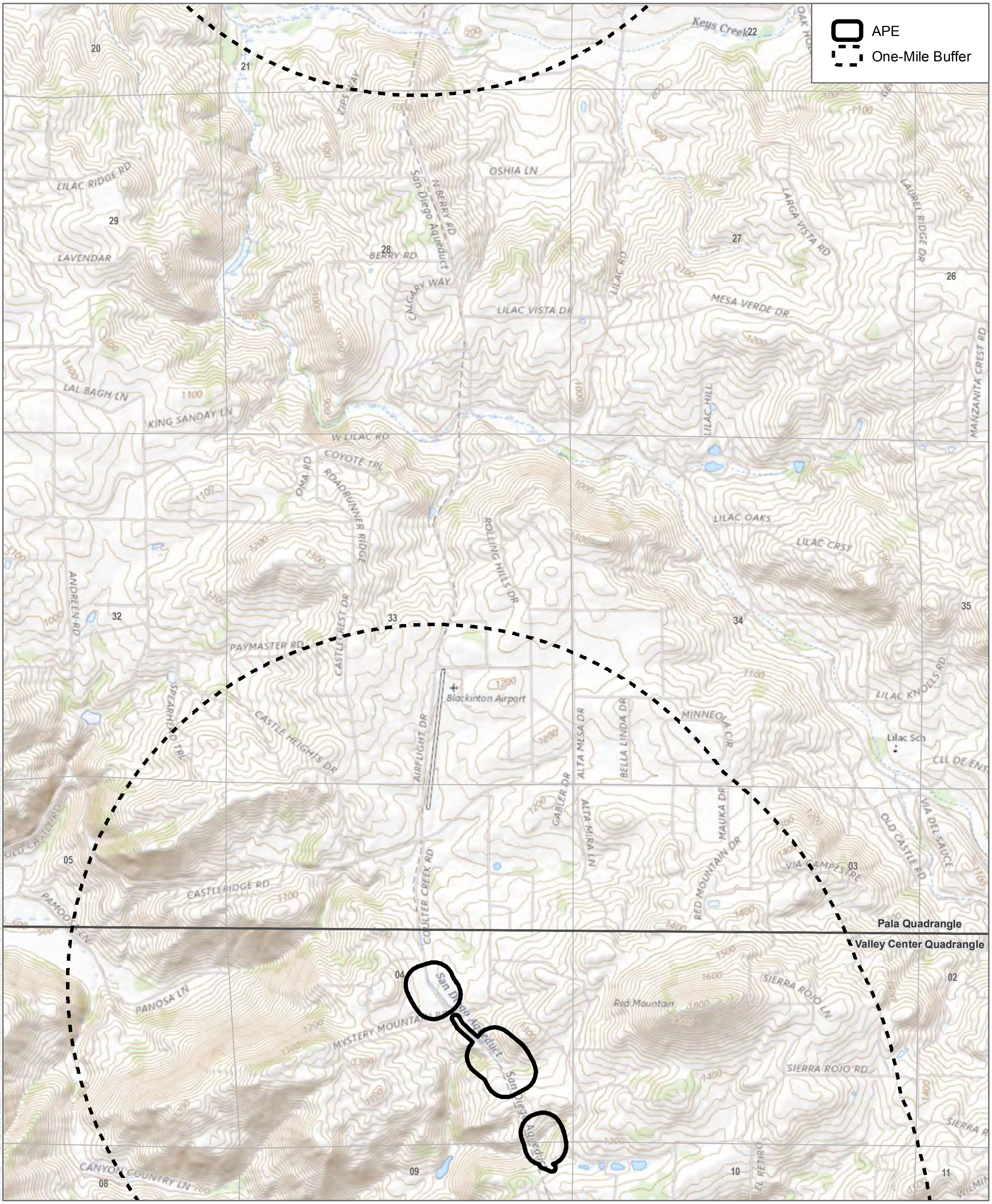
FIGURE 1

Records Search Map

Q0238 1st Aqueduct Tunnels



SOURCE: USGS 7.5-Minute Series Pala and Valley Center Quadrangles
Township 11S / Range 2W / Sections 4, 9

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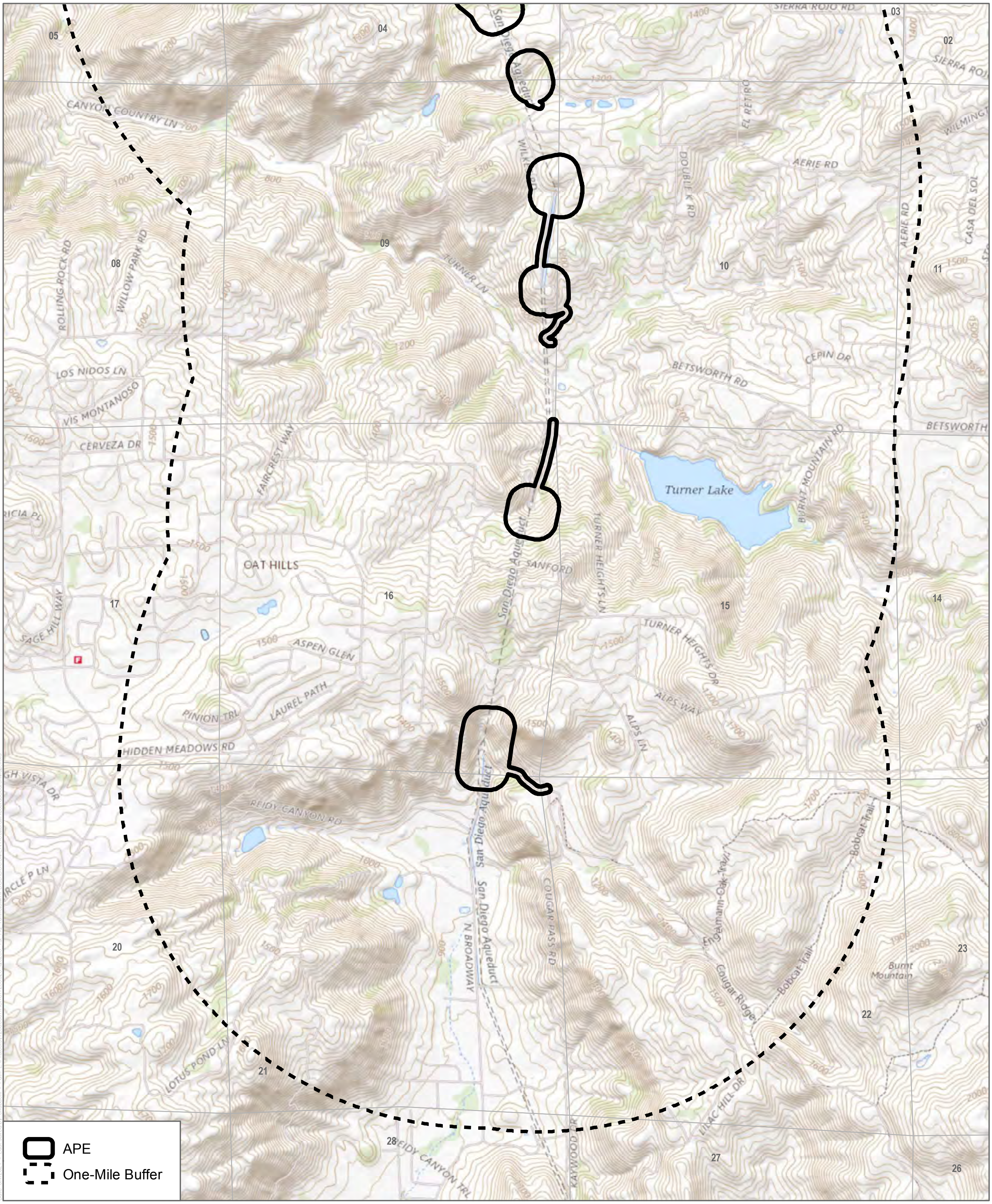
FIGURE 2
Records Search Map
Q0238 1st Aqueduct Tunnels



SOURCE: USGS 7.5-Minute Series Valley Center Quadrangle
Township 11S / Range 2W / Sections 3, 4, 9, 10, 15, 16, 21, 22

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FIGURE 3
Records Search Map
Q0238 1st Aqueduct Tunnels

STATE OF CALIFORNIA Gavin Newsom, *Governor*

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

July 16, 2021

Scott Wolf
DUDEK

Via Email to: swolf@dudek.com

Re: San Diego County Water Authority's (SDCWA) Task 28 1st Aqueduct Treated Water Tunnels Rehabilitation Project, San Diego County

Dear Mr. Wolf:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information submitted for the above referenced project. The results were positive. Please contact the Pala Band of Mission Indians and the San Pasqual Band of Diegueno Mission Indians on the attached list for information. Please note that tribes do not always record their sacred sites in the SLF, nor are they required to do so. A SLF search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with a project's geographic area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites, such as the appropriate regional California Historical Research Information System (CHRIS) archaeological Information Center for the presence of recorded archaeological sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. Please contact all of those listed; if they cannot supply information, they may recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our lists contain current information.

If you have any questions or need additional information, please contact me at my email address: Andrew.Green@nahc.ca.gov.

Sincerely,

Andrew Green

Andrew Green
Cultural Resources Analyst

Attachment

Native American Heritage Commission
Native American Contact List
San Diego County
7/16/2021

Barona Group of the Capitan Grande
Edwin Romero, Chairperson
1095 Barona Road — Diegueno
Lakeside, CA, 92040
Phone: (619) 443 - 6612
Fax: (619) 443-0681
cloyd@barona-nsn.gov

Campo Band of Diegueno Mission Indians
Ralph Goff, Chairperson
36190 Church Road, Suite 1 — Diegueno
Campo, CA, 91906
Phone: (619) 478 - 9046
Fax: (619) 478-5818
rgoff@campo-nsn.gov

Ewiiaapaayp Band of Kumeyaay Indians
Robert Pinto, Chairperson
4054 Willows Road — Diegueno
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
wmicklin@leaningrock.net

Ewiiaapaayp Band of Kumeyaay Indians
Michael Garcia, Vice Chairperson
4054 Willows Road — Diegueno
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
michaelg@leaningrock.net

Iipay Nation of Santa Ysabel
Clint Linton, Director of Cultural Resources
P.O. Box 507 — Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 803 - 5694
cjlinton73@aol.com

Iipay Nation of Santa Ysabel
Virgil Perez, Chairperson
P.O. Box 130 — Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 765 - 0845
Fax: (760) 765-0320

Inaja-Cosmit Band of Indians
Rebecca Osuna, Chairperson
2005 S. Escondido Blvd. — Diegueno
Escondido, CA, 92025
Phone: (760) 737 - 7628
Fax: (760) 747-8568

Jamul Indian Village
Erica Pinto, Chairperson
P.O. Box 612 — Diegueno
Jamul, CA, 91935
Phone: (619) 669 - 4785
Fax: (619) 669-4817
epinto@jiv-nsn.gov

Jamul Indian Village
Lisa Cumper, Tribal Historic Preservation Officer
P.O. Box 612 — Diegueno
Jamul, CA, 91935
Phone: (619) 669 - 4855
lcumper@jiv-nsn.gov

Kwaaymii Laguna Band of Mission Indians
Carmen Lucas,
P.O. Box 775 — Kwaaymii Diegueno
Pine Valley, CA, 91962
Phone: (619) 709 - 4207

La Jolla Band of Luiseno Indians
Norma Contreras, Chairperson
22000 Highway 76 — Luiseno
Pauma Valley, CA, 92061
Phone: (760) 742 - 3771

La Posta Band of Diegueno Mission Indians
Gwendolyn Parada, Chairperson
8 Crestwood Road — Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
LP13boots@aol.com

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed San Diego County Water Authority's (SDCWA) Task 28 1st Aqueduct Treated Water Tunnels Rehabilitation Project, San Diego County.

Native American Heritage Commission
Native American Contact List
San Diego County
7/16/2021

La Posta Band of Diegueno Mission Indians
Javaughn Miller, Tribal Administrator
8 Crestwood Road — Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
jmiller@LPtribe.net

Manzanita Band of Kumeyaay Nation
Angela Elliott Santos, Chairperson
P.O. Box 1302 — Diegueno
Boulevard, CA, 91905
Phone: (619) 766 - 4930
Fax: (619) 766-4957

Mesa Grande Band of Diegueno Mission Indians
Michael Linton, Chairperson
P.O Box 270 — Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 782 - 3818
Fax: (760) 782-9092
mesagrandeband@msn.com

Pala Band of Mission Indians
Shasta Gaughen, Tribal Historic Preservation Officer
PMB 50, 35008 Pala Temecula Rd. — Cupeno, Luiseno
Pala, CA, 92059
Phone: (760) 891 - 3515
Fax: (760) 742-3189
sgaughen@palatribe.com

Pauma Band of Luiseno Indians
Temet Aguilar, Chairperson
P.O. Box 369 — Luiseno
Pauma Valley, CA, 92061
Phone: (760) 742 - 1289
Fax: (760) 742-3422
bennaecalac@aol.com

Pechanga Band of Luiseno Indians
Mark Macarro, Chairperson
P.O. Box 1477 — Luiseno
Temecula, CA, 92593
Phone: (951) 770 - 6000
Fax: (951) 695-1778
epreston@pechanga-nsn.gov

Pechanga Band of Luiseno Indians
Paul Macarro, Cultural Resources Coordinator
P.O. Box 1477 — Luiseno
Temecula, CA, 92593
Phone: (951) 770 - 6306
Fax: (951) 506-9491
pmacarro@pechanga-nsn.gov

Rincon Band of Luiseno Indians
Bo Mazzetti, Chairperson
One Government Center Lane — Luiseno
Valley Center, CA, 92082
Phone: (760) 749 - 1051
Fax: (760) 749-5144
bomazzetti@aol.com

Rincon Band of Luiseno Indians
Cheryl Madrigal, Tribal Historic Preservation Officer
One Government Center Lane — Luiseno
Valley Center, CA, 92082
Phone: (760) 297 - 2635
crd@rincon-nsn.gov

San Luis Rey Band of Mission Indians
San Luis Rey, Tribal Council
1889 Sunset Drive — Luiseno
Vista, CA, 92081
Phone: (760) 724 - 8505
Fax: (760) 724-2172
cjmojado@slrmissionindians.org

San Luis Rey Band of Mission Indians
1889 Sunset Drive — Luiseno
Vista, CA, 92081
Phone: (760) 724 - 8505
Fax: (760) 724-2172
cjmojado@slrmissionindians.org

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This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed San Diego County Water Authority's (SDCWA) Task 28 1st Aqueduct Treated Water Tunnels Rehabilitation Project, San Diego County.

Native American Heritage Commission
Native American Contact List
San Diego County
7/16/2021

San Pasqual Band of Diegueno Mission Indians
Allen Lawson, Chairperson
P.O. Box 365
Valley Center, CA, 92082
Phone: (760) 749 - 3200
Fax: (760) 749-3876
allenl@sanpasqualtribe.org
Diegueno

San Pasqual Band of Diegueno Mission Indians
John Flores, Environmental Coordinator
P. O. Box 365
Valley Center, CA, 92082
Phone: (760) 749 - 3200
Fax: (760) 749-3876
johnf@sanpasqualtribe.org
Diegueno

Soboba Band of Luiseno Indians
Isaiah Vivanco, Chairperson
P. O. Box 487
San Jacinto, CA, 92581
Phone: (951) 654 - 5544
Fax: (951) 654-4198
ivivanco@soboba-nsn.gov
Cahuilla
Luiseno

Soboba Band of Luiseno Indians
Joseph Ontiveros, Cultural Resource Department
P.O. BOX 487
San Jacinto, CA, 92581
Phone: (951) 663 - 5279
Fax: (951) 654-4198
jontiveros@soboba-nsn.gov
Cahuilla
Luiseno

Sycuan Band of the Kumeyaay Nation
Kristie Orosco, Kumeyaay Resource Specialist
1 Kwaaypaay Court
El Cajon, CA, 92019
Phone: (619) 445 - 6917
Kumeyaay

Sycuan Band of the Kumeyaay Nation
Cody Martinez, Chairperson
1 Kwaaypaay Court
El Cajon, CA, 92019
Phone: (619) 445 - 2613
Fax: (619) 445-1927
ssilva@sycuan-nsn.gov
Kumeyaay

Viejas Band of Kumeyaay Indians
Ernest Pingleton, Tribal Historic Officer, Resource Management
1 Viejas Grade Road
Alpine, CA, 91901
Phone: (619) 659 - 2314
epingleton@viejas-nsn.gov
Diegueno

Viejas Band of Kumeyaay Indians
John Christman, Chairperson
1 Viejas Grade Road
Alpine, CA, 91901
Phone: (619) 445 - 3810
Fax: (619) 445-5337
Diegueno

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed San Diego County Water Authority's (SDCWA) Task 28 1st Aqueduct Treated Water Tunnels Rehabilitation Project, San Diego County.

July 6, 2021

Recipient Name
Recipient Title
Affiliation
Address

Via USPS certified mail and email

SUBJECT: ASSEMBLY BILL 52 NOTIFICATION OF THE PROPOSED SAN DIEGO COUNTY WATER AUTHORITY FIRST AQUEDUCT TUNNELS REHABILITATION PROJECT LOCATED IN SAN DIEGO COUNTY, CALIFORNIA

Dear Recipient Name,

Pursuant to California Assembly Bill (AB) 52, the San Diego County Water Authority (Water Authority) is providing you with notification of the proposed First Aqueduct Treated Water Tunnels Rehabilitation Project, located at multiple sites in northern San Diego County, California (Figure 1).

PROJECT NAME: San Diego County Water Authority's First Aqueduct Treated Water Tunnels Rehabilitation Project, San Diego County, California

PROJECT LOCATION: San Diego County, California, in Township 10 South; Range 2 West; Sections 16 and 21 and Township 11 South; Range 2 West; Sections 3, 4, 9, 10, 15, 16, 21, and 22, on the Pala and Valley Center United States Geological Survey (USGS) 7.5-minute Quadrangle maps.

PROJECT DESCRIPTION: The project would entail rehabilitation and replacement of existing pipeline infrastructure along an approximately 7-mile span of the First San Diego Aqueduct, which is made up of Pipeline 1 and Pipeline 2, including three tunnel pipelines referred to as the Lilac Tunnel, Red Mountain Tunnel, and Oat Hills Tunnel. The project is located east of Interstate 15 and stretches from the northern limits of the unincorporated San Diego County community of Valley Center in the north to just north of the City of Escondido in the south. The project would entail excavation and ground disturbance in areas disturbed by initial installation of the tunnel pipelines, which occurred in the 1940s and 1950s, and may also entail excavation and ground disturbance in native soils not disturbed by those prior activities.

The project is subject to impact review requirements of the California Environmental Quality Act, with the Water Authority serving as lead agency. The project may also require permitting for impacts on waters under federal and state jurisdiction. If needed, the U.S. Army Corps of Engineers would serve as lead agency pursuant to compliance with Section 106 of the National Historic Preservation Act. The project is in the early design phase and impact areas have not been solidified. Water Authority engineers identified several potential work areas along the three tunnel alignments to be included in their impact analysis, as well as potential access roads and other parts of the Water Authority ROW that could be subject to disturbance (Figure 2).

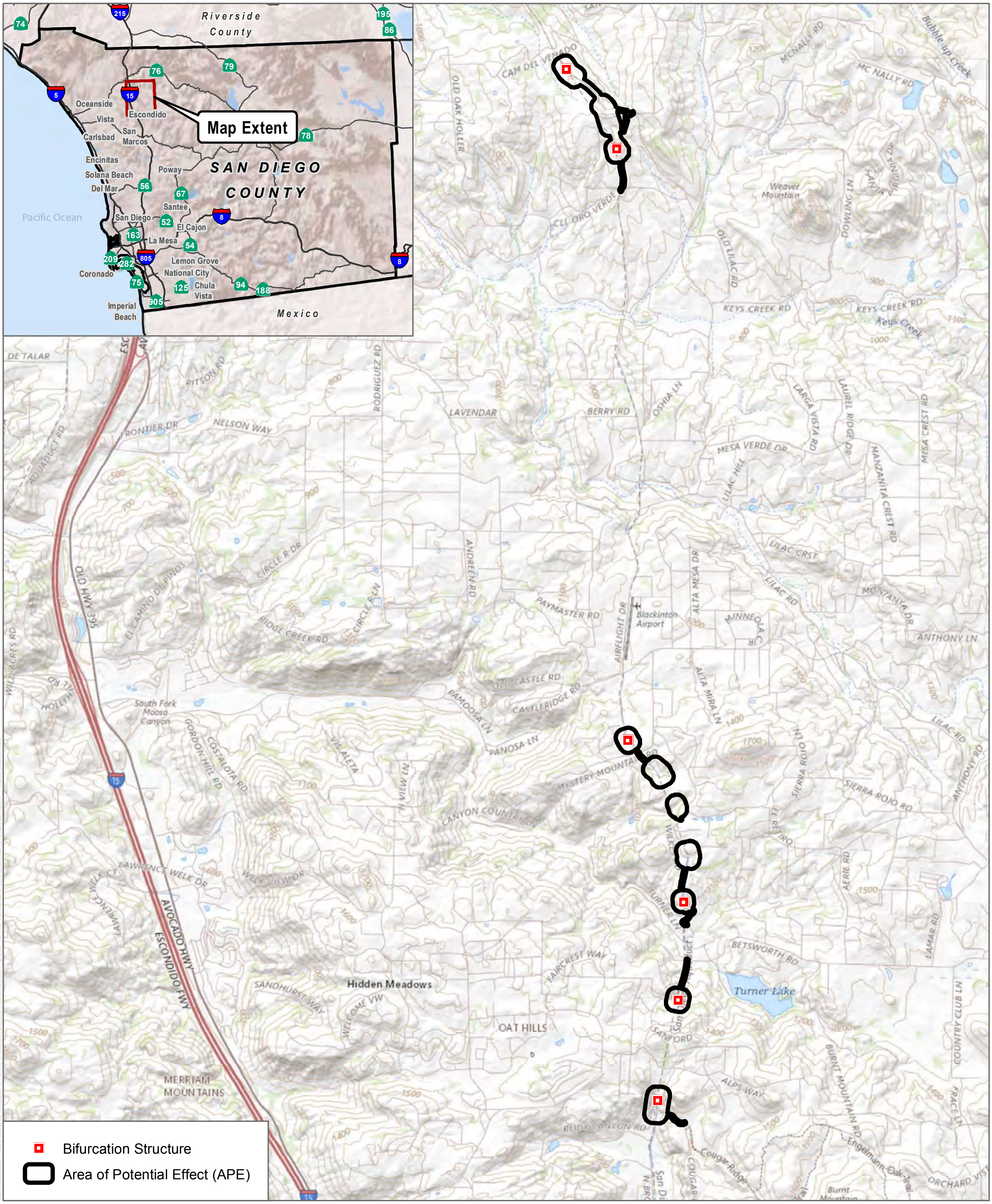
Cultural resource identification efforts undertaken for the project to date include a records search of the project area obtained from the South Coastal Information Center (SCIC) in 2021; a subsequent review of historical maps and aerial imagery depicting the project area; and a supplemental cultural resources field survey of the project area by Dudek in June of 2021. These efforts identified one previously recorded multicomponent site with both historic and Native American cultural resources (P-37-013494/CA-SDI-13494) within the project area. The records search identified other previously recorded Native American cultural resources within a one mile of the project area.

If you have any comments or concerns regarding tribal cultural resources (as defined in California Public Resources Code section 21074) in relation to the proposed project and seek to consult on the project pursuant to AB 52, please provide a written request for consultation via email to SPAVER@SDCWA.ORG. Pursuant to California Public Resources Code section 21080.3.1, the California Native American tribe has **30 days** from receipt of this notice to request consultation. Please include the name of a designated lead contact person. If you have any questions, please do not hesitate to contact SPAVER@SDCWA.ORG.

Sincerely,

Sean Paver
Senior Water Resource Specialist

Attachments: Figure 1 – Project Location
Figure 2 – Record Search Map



SOURCE: USGS 7.5-Minute Series Pala and Valley Center Quadrangles

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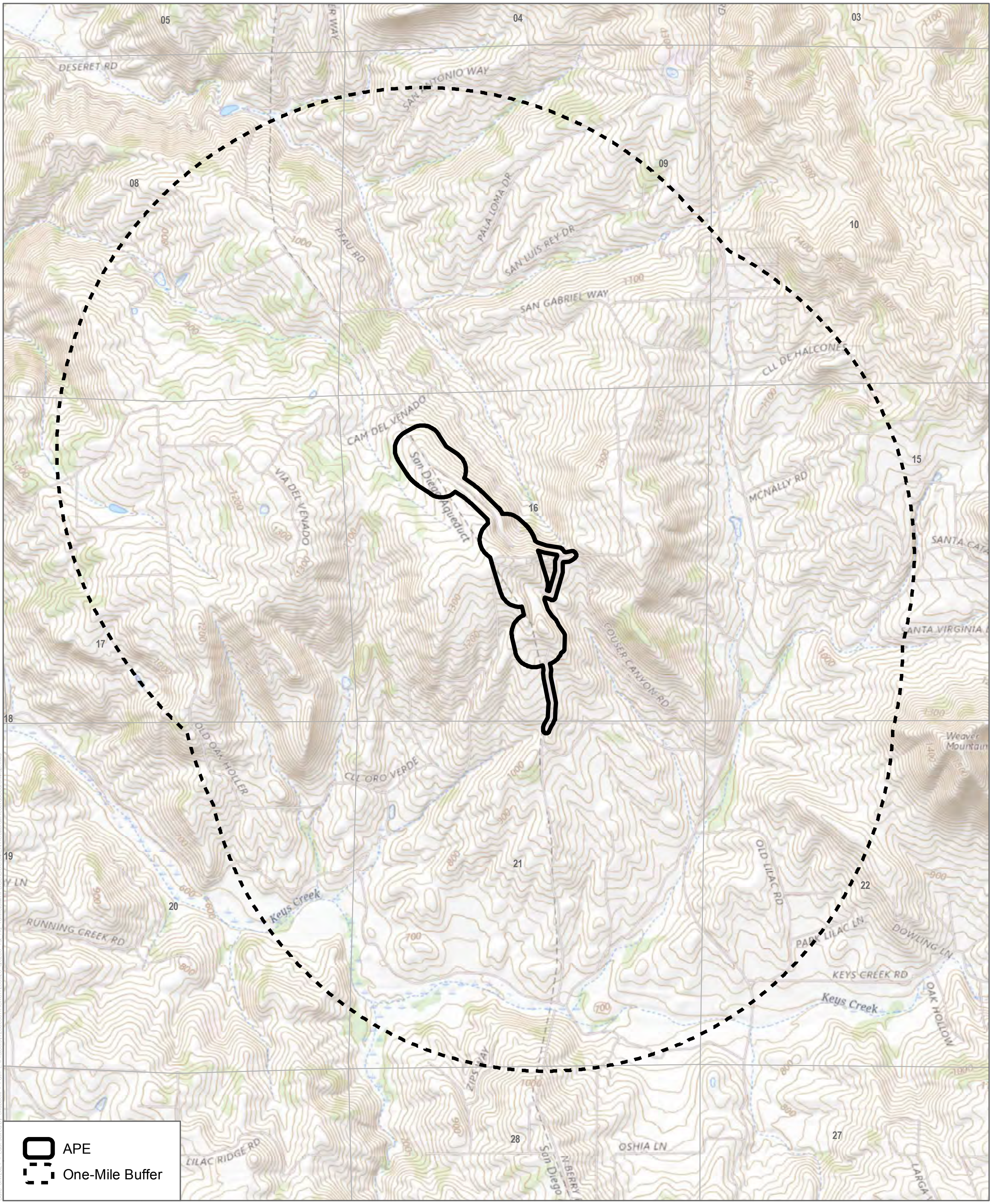
DUDEK

FIGURE 1

Project Location

Q0238 1st Aqueduct Tunnels



SOURCE: USGS 7.5-Minute Series Pala Quadrangle
Township 10S / Range 2W / Sections 16, 21

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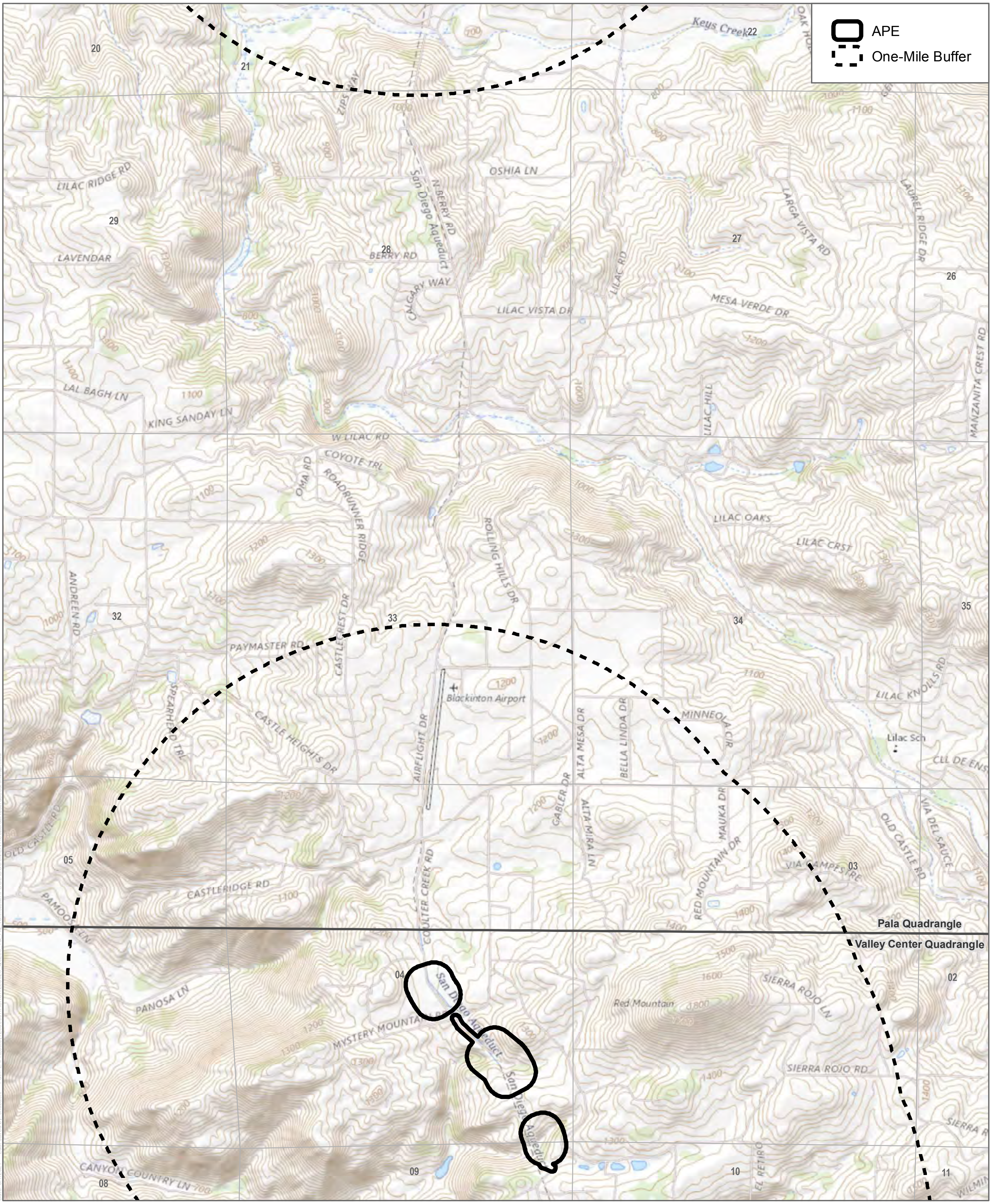
FIGURE 1

Records Search Map

Q0238 1st Aqueduct Tunnels



SOURCE: USGS 7.5-Minute Series Pala and Valley Center Quadrangles
Township 11S / Range 2W / Sections 4, 9

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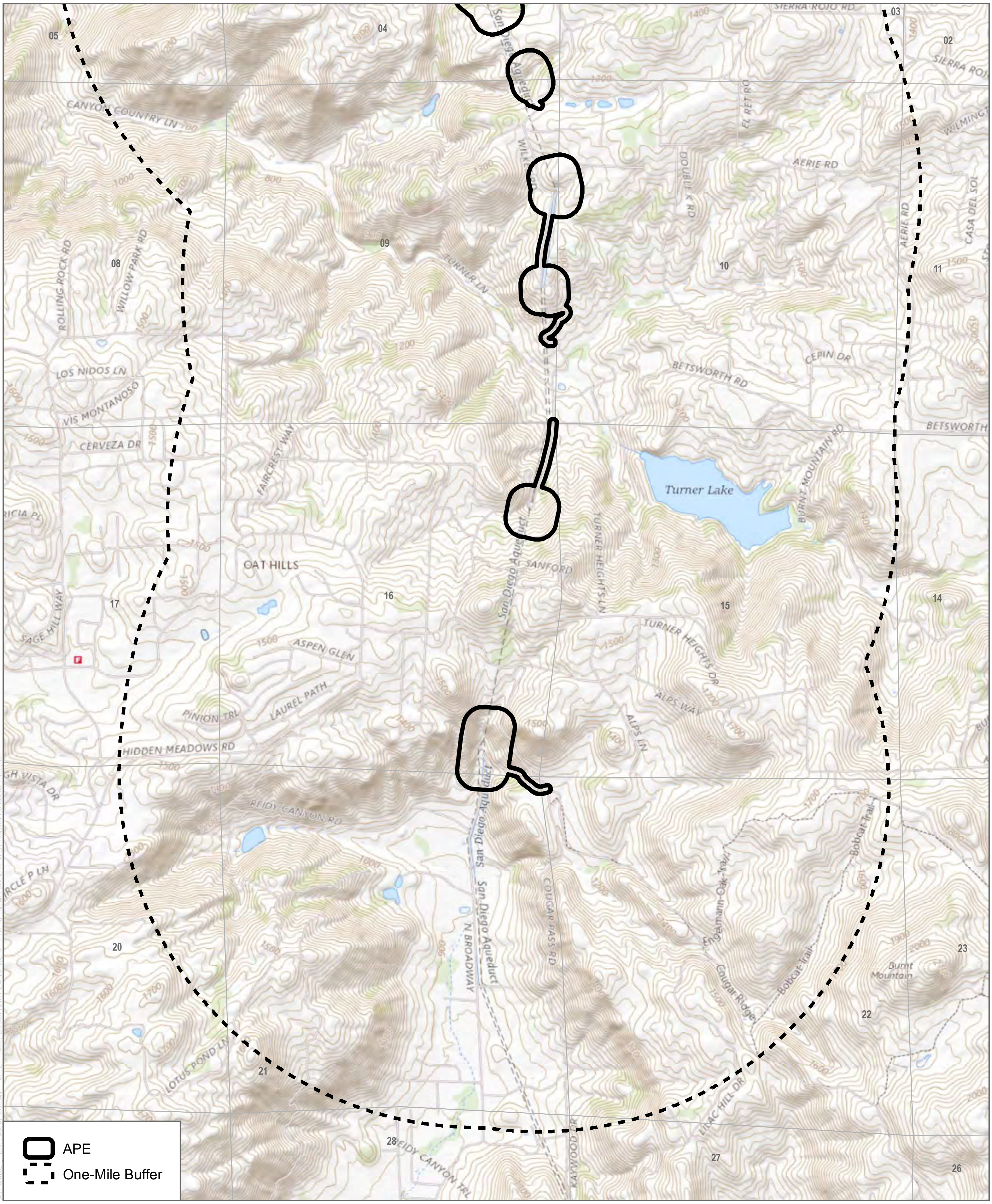
FIGURE 2
Records Search Map
Q0238 1st Aqueduct Tunnels



SOURCE: USGS 7.5-Minute Series Valley Center Quadrangle
Township 11S / Range 2W / Sections 3, 4, 9, 10, 15, 16, 21, 22

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FIGURE 3

Records Search Map

Q0238 1st Aqueduct Tunnels

Appendix D

SHPO Concurrence Letter

STATE OF CALIFORNIA – THE NATURAL RESOURCES AGENCY EDMUND G. BROWN, JR., *Governor*

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
1725 23rd Street, Suite 100
SACRAMENTO, CA 95816-7100
(916) 445-7000 Fax: (916) 445-7053
calshpo@parks.ca.gov
www.ohp.parks.ca.gov

September 13, 2012

Reply in Reference To: COE110329C

David J. Castanon
Chief, Regulatory Division
Los Angeles District, Army Corps of Engineers
PO Box 532711
Los Angeles, CA 90053-2325

Re: Section 106 Consultation for Issuance of 404 Permit, Gregory Canyon Landfill, near San Luis Rey River, San Diego County

Dear Mr. Castanon:

Thank you for continuing consultation regarding the United States Army Corps of Engineers (COE) efforts to comply with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f), as amended, and its implementing regulation found at 36 CFR Part 800.

In your efforts to identify and manage historic properties within the above referenced undertaking's APE, you are seeking my concurrence with your National Register (NRHP) eligibility determinations for 41 cultural resources.

COE has determined the Lucio Dairy Historic District to be eligible under NRHP Criteria A and C, and the first San Diego Aqueduct to be eligible under Criterion A. These two resources will be directly affected.

Gregory Mountain or *Chokla,* home to the first shaman Taakwic has been determined by the COE to be eligible for the NRHP as a Traditional Cultural Property (TCP) under Criteria A and B. *Chokla* is prevalent in oral history and has been identified as the most important traditional cultural place in the region to contemporary Native Americans; many people claim a sacred and spiritual connection to it today that extends far back in time. *Chokla* will be both directly and indirectly affected by this undertaking.

CA-SDI-4356 or Medicine Rock is a rock art site well known to all Luiseño people and is considered to have been sacred and extremely important to their ancestors as well as to contemporary Native Americans. The COE has determined this site to be a Traditional Cultural Property and to be NRHP eligible under criteria A, B, C, and D. Medicine Rock is located within the indirect APE.

The COE has determined that the following sites are eligible for the NRHP under Criterion D and will be directly affected by construction and operation of the landfill: CA-SDI-745, CA-SDI-14607, CA-SDI-14610H, CA-SDI-14611, and CA-SDI-19943.

The COE in addition has determined the following archaeological sites to be eligible for the NRHP under Criterion D: CA-SDI-683, CA-SDI-744, CA-SDI-12584, CA-SDI-12585, and CA-SDI-14609; these sites are located in areas of reserved open space and it is believed will not be affected by construction or operation of the landfill.

The following eighteen resources are located within the indirect APE and will not be affected by construction activity. As they will not be disturbed, the COE has determined it would be imprudent to conduct destructive archaeological studies and is therefore assuming NRHP eligibility under Criterion D; these sites are: CA-SDI-773, CA-SDI-4502, CA-SDI-4503, CA-SDI-4910, CA-SDI-8871, CA-SDI-12208, CA-SDI-12582, CA-SDI-12583, CA-SDI-13004, CA-SDI-13005, CA-SDI-13006, CA-SDI-13007, CA-SDI-13766, CA-SDI-13767, CA-SDI-13768, CA-SDI-13769, CA-SDI-17759, and P-37-027910.

One site within the indirect APE, P-37-016051, has been determined to be ineligible for the NRHP based on a previous study discussed in the attached report.

The following eight resources will be directly affected by construction and operation of the landfill and have been determined by the COE to be ineligible for the NRHP: CA-SDI-786, CA-SDI-14585, CA-SDI-14608, P-37-016165, P-37-030856, P-37-030857, Welty-Higgins Homestead, and the Verboom Dairy.

The COE has determined that the demolition of all buildings and structures associated with the Lucio Dairy, the realignment of a 3,200 linear foot segment of the First San Diego Aqueduct pipeline and the effects of the proposed landfill on Gregory Mountain and archeological properties within the project area will adversely affect historic properties. The COE will be inviting the Advisory Council on Historic Preservation to participate in the consultation process pursuant to 36 CFR 800.6(a)(1) and will continue to consult with the Tribes and the Applicant.

The COE has submitted the following report in support of this determination and undertaking:

- *Cultural Resources Assessment for the Gregory Canyon Landfill Project, Northern San Diego County, California* (ASM: January 2012)

After reviewing this report, I have the following comments:

1) I concur with the determination that the first San Diego Aqueduct is NRHP eligible under Criterion A.

2) I concur with the determination that the following sites located in the proposed reserved open spaces are NRHP eligible under Criterion D: CA-SDI-683, CA-SDI-744, CA-SDI-12584, CA-SDI-12585, and CA-SDI-14609.

3) I concur with the determination that the following sites located within the direct APE are NRHP eligible under Criterion D: CA-SDI-745, CA-SDI-14607, CA-SDI-14610H, CA-SDI-14611, and CA-SDI-19943.

4) I concur with the assumption of eligibility for the purposes of this undertaking only for the eighteen resources located in the indirect APE: CA-SDI-773, CA-SDI-4502, CA-SDI-4503, CA-SDI-4910, CA-SDI-8871, CA-SDI-12208, CA-SDI-12582, CA-SDI-12583, CA-SDI-13004, CA-SDI-13005, CA-SDI-13006, CA-SDI-13007, CA-SDI-13766, CA-SDI-13767, CA-SDI-13768, CA-SDI-13769, CA-SDI-17759, and P-37-027910. These resources will be avoided from all construction and operational activities.

5) The State Historic Preservation Officer (SHPO) and the State Historical Resources Commission (SHRC) have previously determined Gregory Mountain or Chokla to be NRHP eligible as a TCP under both criteria A and B, this remains unchanged.

6) Based on the information provided, I am unable to concur with the determination that the Lucio Dairy complex, consisting of 26 contributing buildings and structures, is eligible for NRHP inclusion as a historic district. While the dairy may be representative of mid-century large scale dairy operations in San Diego County, it does not rise to the requisite level of significance for NRHP inclusion.

7) I concur with the determination that the following sites are *not* eligible for listing on the NRHP: CA-SDI-786, CA-SDI-14585, CA-SDI-14608, P-37-016165, P-37-030856, P-37-030857, P-37-016051, Welty-Higgins Homestead, and the Verboom Dairy.

8) *At this time*, based on the information and analysis provided, I am unable to concur with the determination that Medicine Rock is NRHP eligible as a Traditional Cultural Property under criteria A, B, C, and D. This is not a determination that the resource is ineligible as the nomination makes the case why the traditional cultural property meets National Register criteria A and B. The events in this nomination are those associated with *Taakwic* visits to his home on Gregory Mountain. While not discussed, a case can be made that shaman visits to the mountain to acquire power are also important events in Luiseno history. *Taakwic* and shamans are noted as important individuals that contribute to the significance of the mountain. A short discussion of Criterion C as it relates to rock art is presented. The nomination concludes that the property does not meet this criterion. It is possible that the property could be demonstrated to meet criterion C, but there is insufficient documentation at this time.

9) Based on these NRHP eligibility determinations and the project description this undertaking will result in adverse effects to historic properties pursuant to 36 CFR Part 800.5(d)(2). It has yet to be determined whether project activities will adversely affect historic properties (as noted on page three of your 24 May 2012 letter) located beyond the direct APE.

I look forward to continuing consultation with the COE as the COE prepares a draft Memorandum of Agreement per 36 CFR Part 800.6(c) identifying means of taking the adverse effects to historic properties into account. Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions, I may be reached at (916) 445-7000.

Sincerely,

Milford Wayne Donaldson

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

Appendix E

Geotechnical Study

Desktop Geotechnical Study
San Diego County Water Authority
First Aqueduct Treated Water Tunnels Rehabilitation Project

Prepared for

Mr. Peter Symonds
Kennedy Jenks

July 14, 2021

Helenschmidt Geotechnical, Inc.

Helenschmidt Geotechnical, Inc.

July 14, 2021
121196

San Diego County Water Authority
c/o Mr. Peter Symonds
Kennedy Jenks
1676 N. California Blvd., Suite 430
Walnut Creek, CA 94596

SUBJECT: Desktop Geotechnical Study

RE: San Diego County Water Authority
First Aqueduct Treated Water Tunnels Rehabilitation Project

Dear Mr. Symonds:

In accordance with your request and authorization, **Helenschmidt Geotechnical, Inc. (HGI)** has performed a desktop geotechnical study for the subject project. The following report presents the results of our desktop study. Our study has included review of relevant documents provided by the San Diego County Water Authority (SDCWA) and public sources, limited site reconnaissance of eleven project areas and identification of geotechnical hazards pertaining to the proposed aqueduct rehabilitation.

We appreciate the opportunity to provide our geotechnical services on this project. If you have any questions regarding our report, please call at your earliest convenience.

Respectfully,

Helenschmidt Geotechnical, Inc.

Stanley Helenschmidt

Stanley Helenschmidt
Principal Geotechnical Engineer
GE 2064

Michael W. Hart
Consulting Engineering Geologist
CEG 706

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STATE OF CALIFORNIA

DESKTOP GEOTECHNICAL STUDY
SAN DIEGO COUNTY WATER AUTHORITY
FIRST AQUEDUCT TREATED WATER
TUNNELS REHABILITATION PROJECT

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Tables, Figures, Appendices and Plates

Appendices

Plates

1.0 EXECUTIVE SUMMARY

The study area includes 11 locations along the first aqueduct alignment between Valley Center and Escondido (Figure 1). The locations are numbered north to south (direction of flow) and are designated below.

TABLE 1

Summary of Site Rehabilitation Locations

Site #	Name	Approx. Station	Latitude	Longitude
1	Lilac Upstream Bifurcation	N 2165+50	33.312226	-117.100195
2	Lilac Entrance (Upstream)	N 2186+00	33.308474	-117.095901
3	Lilac Exit (Downstream)	N 2191+00	33.307528	-117.095486
4	Lilac Downstream Bifurcation	N 2200+02	33.304765	-117.094494
5	Red Mountain Upstream Bifurcation	N 2412+04	33.247385	-117.092601
6	Red Mountain Entrance (Upstream)	S 1422+03	33.244348	-117.089009
7	Red Mountain Exit and Entrance (Midpoint)	S 1410+00	33.241091	-117.086888
8	Red Mountain Exit (Downstream)	S 1391+51	33.241259	-117.086979
9	Red Mountain Downstream Bifurcation	S 1374+30	33.231872	-117.086334
10	Oat Hills Entrance (Upstream) and Bifurcations	S 1339+52	33.222316	-117.086488
11	Oat Hills Exit (Downstream) and Bifurcations	S 1303+57	33.212642	-117.088840

The purpose of this geotechnical study is to identify significant geologic hazards and geotechnical constraints to the proposed rehabilitation plan. Secondly, the results of this study may be used to assist in developing a scope of work for additional geotechnical investigation and analysis as part of the design/build process.

The geotechnical conclusions and recommendations in this report are based on documentation provided by the client or data that are available to the public. We have assumed for purposes of this report that these data and documentation are accurate. However, HGI assumes no responsibility or liability for their accuracy.

A summary of geologic hazards and geotechnical constraints is provided below:

- The study areas are generally underlain by granitic bedrock with minor amounts of manmade fill around existing structures.

- No known active faults cross the alignment in the study area. An unnamed fault is indicated near the Oat Hills tunnel. This fault was mentioned in the 2018 Kleinfelder ***System Seismic Vulnerability Assessment*** and indicated on both the ***Geologic Map of the Oceanside 30'X60' Quadrangle*** and ***Geologic Map of the Valley Center 7.5' Quadrangle***, DMG geologic map and identified on aerial photos. This fault may indicate the presence of highly fractured material that may be contributing to groundwater seepage through the Oat Hills tunnel lining.

- Seismic analysis presented in the 2018 Kleinfelder ***System Seismic Vulnerability Assessment*** was based on the 2016 California Building Code (CBC) which was subsequently superseded by the 2019 CBC (current code). Seismic analyses presented in Hazen Sawyer's ***First Aqueduct – Treated Water Renewal*** report and ***First Aqueduct Bifurcations Study*** and presented herein, have been updated to the current CBC. Ground shaking during a "design" seismic event is expected to result in peak horizontal ground accelerations between 0.44 and 0.52 g.

- Liquefaction occurs in loose saturated sands subjected to repeated shaking during a significant seismic event. The subject tunnels and bifurcation structures are predominately situated on bedrock or weathered granitic soils. Accordingly, liquefaction is not a concern in the study area.

- Published groundwater data in the vicinity of the study area is sparse and not useful for evaluating current groundwater conditions affecting seepage through the tunnel lining. Records found in our search are shown on Figure 2. Groundwater effects are mainly the result of water migration along contiguous bedrock fractures which extend well beyond the immediate tunnel and bifurcation structure locations. In addition, some areas of the alignment are occupied by groves whereby irrigation may be contributing to fracture stored groundwater and infiltration of water into cut and cover tunnel backfill. Groundwater pressures in the Oat Hills tunnel area may be as high as 210 pounds per square inch (psi) and at the Lilac and Red Mountain tunnels as high as 66 psi. These pressures have been considered in recommended mitigation techniques for tunnel seepage presented by Hazen Sawyer (Hazen, 2020).

- The quality of existing fill soils for re-use as backfill has not been evaluated. Presence of oversize rock materials or organics within the soil may preclude its use as backfill without processing. In addition, in areas where irrigation is present adjacent to the alignment over optimum moisture conditions in existing structure backfill soils may be present. If soil moisture contents are high enough to prevent adequate recompaction, soils would require drying prior to re-use. Preliminary construction cost estimates prepared by Hazen Sawyer (Hazen, 2020) have assumed that all backfill will consist of import soils.

- Ultimate repair techniques for the tunnels and bifurcation structures will be in part dependent on site access considerations, available areas for staging and cycle time for hauling concrete if appropriate for repair.

2.0 INTRODUCTION

Helenschmidt Geotechnical, Inc. (HGI) has completed a Geotechnical Desktop Study of the Lilac, Red Mountain and Oat Hills sites. Our study was performed using:

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation Project Location Map

SDCWA 200-scale Site Maps/Aerial Photos for - Lilac Tunnel STA:2165+50 to STA:2200+02, Sheets 1 and 2; Oat Hills Tunnel S STA: 1339+52 to S STA:1303+57, Sheets 1 and 2; Red Mountain Tunnel N STA: 2412+04 to S STA:1374+30, Sheets 1 and 2

System Seismic Vulnerability Assessment, Report, dated June 26, 2018, by Kleinfelder

Geotechnical Desktop Evaluation and Site Reconnaissance, First Aqueduct Bifurcation Study, San Diego County, California, Report, dated March 26, 2020 by Ninyo and Moore

SDCWA Facility Planning - Task 2: First Aqueduct Bifurcations Study, Report, dated January 21, 2021 by Hazen and Sawyer

SDCWA Facility Planning Services: Task 2 - First Aqueduct Bifurcations Study Site Assessment Summary (February 25, 2020), Memo, dated March 27, 2020

SDCWA Facility Planning - First Aqueduct - Treated Water Renewal, Report, dated December 30, 2020 by Hazen and Sawyer

The Administration and Construction of the US Navy San Diego Aqueduct Project, Master's Thesis dated January 1948 by Robert D. Thornton

US Geological Survey 3D Elevation Program, Lidar Data

State of California SGMA Data Viewer, online groundwater research tool, Spring 2020

State Water Resources Control Board, GeoTracker Data Management System

County of San Diego Department of Environmental Health, Well Application Records

Reports with geotechnical findings in the vicinity of sites 1 through 11 are summarized on Figure 3.

3.0 SITE HISTORY AND CONSTRUCTION

The SDCWA first aqueduct consists of two parallel pipelines (Pipelines 1 and 2) that converge into single bore tunnels where aqueduct alignment and site topography required deep excavation beyond the limits of cut and cover construction techniques. The aqueduct construction was originally undertaken by the US Navy beginning in 1946 and was a 71-mile link between the Metropolitan Water District (MWD) system at San Jacinto and the San Vicente Reservoir in Lakeside, California. In 1946 control of the aqueduct was reportedly transferred to the newly created San Diego County Water Authority (Thornton, 1948). Pipelines 1 and 2 were completed in 1947 and 1954, respectively and are capable of providing 100 mgd. In the 1970s the northern portion of the pipelines was switched to deliver treated water from MWD's Water Treatment Plant at Lake Skinner. A detail of first aqueduct construction is provided in the Robert D. Thornton thesis referenced above. A description of current aqueduct alignment and ancillary features is presented in Hazen and Sawyer's Report entitled ***SDCWA Facility Planning Task 2: First Aqueduct Bifurcations Study*** dated January 21, 2021.

The Lilac, Red Mountain and Oat Hills tunnels are three of seven six-foot diameter tunnels along the First Aqueduct. Tunnels were constructed through hard rock by sequential drilling and blasting and excavation of spoils. Although the Thornton thesis indicates that shoring was not required at these three tunnels, field notes (referenced by Hazen and Sawyer, 2020) indicate shoring was required in certain areas of each of the tunnels. The bottom of the tunnel was cast as concrete invert followed by construction of a horse-shoe shaped arch supported by temporary steel forms. Packing material was reportedly placed above the cast archway but specific details about the packing material have not been identified. It appears based on Hazen's review that contact grouting was not performed above the archway and that packing may have included wood and/or rock from cuttings.

Beyond the tunnels in the upstream and downstream directions, the pipelines consist of 72-inch diameter reinforced concrete pipe (RCP). The RCP was in 16-foot long segments and placed by cut and cover techniques. The aqueduct pipelines are gravity flow and in the tunnel areas the aqueduct acts as an open-lined channel (aqueduct is only partially filled). At the entrance and exits of each of the tunnels, bifurcation structures are present consisting of buried concrete vaults.

The aqueduct alignment had very little adjacent development at the time of construction 1946 to 1954. Plates 1 through 6 provide 1953 aerial images along the alignment along with aerial images of current development along the alignment. Current development consists of widely scattered residential structures with little vegetation except in grove areas.

4.0 GEOLOGIC SETTING

The project is situated within the western portion of the Peninsular Ranges Geomorphic Province that is generally underlain by pre-batholithic metamorphic and granitic rocks (Kennedy and Tan, 2005). Westerly draining inter-montane valleys occupied by thick alluvium are developed within north to northwesterly trending mountain blocks making up the Peninsular Ranges.

Faulting and deformation of this portion of the Peninsular Range province occurs along several faults including the active Elsinore fault located near the base of the Agua Tibia and Palomar Mountains to the northeast (Jennings, 1994; Vaughn, 1987). This fault, as well as other regional active faults that could produce ground shaking at the site during large earthquakes, are discussed later in this report. A minor fault is shown on a published geologic map of the area (Kennedy, 1999) as being located near Site 11 (Figures 4 and 5). This unnamed fault extends over 10 miles in a northwesterly direction from a point south of Escondido to approximately one mile northwest of Site 11. The fault appears to cross the tunnel approximately 1000 feet north of Site 11.

5.0 SITE GEOLOGY

The results of geologic reconnaissance mapping for this study indicate the pipeline alignment is predominantly underlain by four plutonic (granitic) geologic units. In the valley bottoms the alignment crosses relatively thin surficial deposits consisting of colluvium and alluvium (Figures 4 and 5). The plutonic rocks, while identified on geologic maps by different names, consist principally of two types; tonalite and monzogranite. Tonalite, and its close relative, quartz diorite, is a light grey, medium-grained crystalline rock chiefly composed of feldspar and minor quartz. Monzogranite contains a higher percentage of quartz than tonalite and quartz diorite and therefore is a lighter colored rock and more resistant to erosion.

6.0 SUBSURFACE CONDITIONS

The excavation characteristics of the several rock types will vary significantly over the length of the alignment as the degree of weathering varies from highly decomposed to highly fractured and relatively unweathered. A summary of observed surface soil conditions for each of the Sites 1 through 11 is presented below. A photo survey was performed on our site visit on June 15, 2021. Key maps and associated photos are shown on Figures 6 through 28.

6.1 Surface Soil Conditions

6.1.1 Site 1 - (Lilac Tunnel, Upstream Bifurcation, N Sta. 2165+50) - Site 1 is underlain by tonalite of Couser Canyon. Inspection of the area adjacent to the vent indicates the tonalite is highly weathered on the surface with no adjacent rock outcrops present to determine the thickness of the weathering or degree of fracturing and jointing.

6.1.2 Site 2 - (Lilac Tunnel Entrance, Approx. N Sta. 2186+00) - Site 2 is located at the base of a high headwall above the entrance to the tunnel. Excavation for the tunnel entrance has resulted in a steep, approximately 65-foot cut slope into highly fractured, relatively unweathered tonalite. The fractures are relatively closely spaced at three to four feet intervals with primary fractures dipping steeply to the northeast.

6.1.3 Site 3 - (Lilac Tunnel Exit, N Sta. 2191+00) - Site 3 was not accessible due to heavy growth of trees and underbrush. Inspection of nearby outcrops indicates the underlying rocks in this area are similar to that of Site 2.

6.1.4 Site 4 - (Lilac Tunnel, Downstream Bifurcation, N Sta. 2200+02) - Site 4 is also located in the Couser Canyon Tonalite. Rock exposures near the vent at the top of the tunnel are poor; however, the degree of weathering here appeared to be similar to Site 1. It is our understanding that depth to the pipe invert at this location is approximately 20 feet.

6.1.5 Site 5 - (Red Mountain Tunnel, Upstream Bifurcation, N Sta. 2412+04) - The terrain surrounding this location is relatively level with no nearby rock exposures. The exposures in nearby roadcuts along Mystery Mountain Road suggest this area is underlain by highly weathered monzogranite of Merriam Mountain and fresh unweathered rock is not anticipated in the upper 10 feet of excavations, however, isolated boulders of relatively fresh unweathered rock may be encountered at all levels in excavations.

6.1.6 Site 6 - (Red Mountain Tunnel Entrance, S Sta. 1422+03) - The approach to this tunnel entrance is through a deep trench made for a cut and cover portion of the alignment. Slopes along the alignment of the trench vary in height from approximately 15 to 20 feet in relatively fresh fractured monzogranite. The entrance area is obscured by heavy brush and trees and could not be inspected.

6.1.7 Site 7 - (Red Mountain Tunnel Exit and Entrance, S Sta. 1410+00) - The exit and entrance area for this section is also obscured by heavy brush and trees and rock conditions and could not be inspected in detail. Adjacent slopes are covered with large outcrops of monzogranite or quartz diorite and relatively fresh unweathered rock is likely to be present at the tunnel exit and entrance.

6.1.8 Site 8 - (Red Mountain Tunnel Exit, S Sta. 1391+51) - The tunnel exit area has been excavated into tonalite with large inclusions or zenoliths of dark grey gabbro. Cut slopes in the exit area are up to 45 feet in height. The exposed is rock slightly to moderately weathered with few tight fractures and appears to have been mostly rippable with heavy effort.

6.1.9 Site 9 - (Red Mountain Tunnel, Downstream Bifurcation, S Sta. 1374+30) - This location is a relatively flat graded pad at elevation 1140. The site is underlain by monzogranite that in nearby outcrops to the north made for cut and cover portions of the pipeline is relatively unweathered and lightly fractured.

6.1.10 Site 10 - (Oat Hills Tunnel, Upstream Bifurcation, S Sta. 1339+52) - The rocks at this location are relatively well exposed in an approximately 60 feet high cut at the tunnel entrance. Rocks exposed at the base of the cut appear to be fractured, marginally rippable, monzogranite.

6.1.11 Site 11 - (Oat Hills Tunnel, Downstream Bifurcation, S Sta. 1303+57) - Site 11 is situated in a narrow drainage. The rock at this location consists of granodiorite and monzogranite. Mapping by Kennedy (1999) indicates that the tunnel alignment is crossed by a pair of faults as shown on Figures 4 and 5 (see discussion of Local Faulting in Section 7.1). This fault juxtaposes two rock units; granodiorite and monzogranite of Merriam Mountain. Heavy fracturing that is typically associated with faults in crystalline rock is a conduit for groundwater and may be the reason for the reported groundwater problems in this portion of the tunnel.

7.0 FAULTING AND LANDSLIDING

7.1 Local Faulting

Review of the published geologic maps (Kennedy and Tan, 2005 and Kennedy, 1999) indicates the presence of a northwest trending fault that crosses the tunnel alignment just north of Site 11 (Oat Hills Tunnel, Downstream Bifurcation, S Sta. 1303+57, See Geologic Map, Figures 4 and 5). This fault extends more than 10 miles from a point southeast of Escondido to approximately one mile northeast of Site 11 where it terminates in granitic rocks (Figures 4 and 5). Although this fault is unlikely to be active or a potential source of seismic shaking, the rock that bounds these types of faults in crystalline rocks can be highly fractured for distances of 5 to 20 feet (+/-) from the fault. Therefore rocks within the fault zone where intersected by the tunnel can be subject to caving and a source of heavy groundwater seepage.

7.2 Regional Faulting and Seismicity

Generally, seismicity within California can be attributed to periodic ground rupturing events along regional northwest trending active faults. These include the Elsinore, Rose Canyon, Coronado Bank, San Jacinto, San Andreas, and related sub-parallel faults.

The nearest active fault, and the most significant fault with respect to the potential for seismic activity, is the Elsinore Fault located approximately six miles to the northeast. Vaughn (1987) indicates that the closest portion of the fault (south of the Agua Tibia Mountains and Mt. Palomar) seems to be in a "locked mode" and that the characteristic earthquakes are probably large, around M7 with recurrence times varying from 175 years for a M7 earthquake and 400 years for a M7.3 earthquake.

The Elsinore Fault, which has had numerous small quakes but no known large historical earthquakes within 10 miles of the site, trends approximately N50W for a distance of about 160 miles from the Mexican border to near Whittier (Merifield and Lamar, 1976). Holocene movement along this fault zone southeast of this section of the aqueduct near Julian, California is indicated by features such as offset stream channels, scarps in alluvium, as well as offset topsoil.

A M6 earthquake is believed to have occurred on the Elsinore Fault just northwest of Lake Elsinore on May 15, 1910 approximately 25 miles to the north. According to information obtained from the Southern California Earthquake Center (SCEC), the earthquake was not particularly strong or damaging although it toppled some chimneys in the Lake Elsinore area. SCEC further states that no other earthquakes as large as or greater than M6 have been historically recorded.

Other active faults, the Rose Canyon, San Jacinto, and San Andreas Faults lie approximately 18, 30, and 58 miles, respectively, from the aqueduct.

8.0 SEISMIC PARAMETERS

In accordance with the guidelines of the 2019 CBC, the spectral parameters for the aqueduct have been estimated with the U.S. Geological Survey Seismic Design Maps, U.S. Geological Survey Unified Hazard Tool and the ASCE 7 Hazard Tool. We have assumed seismic parameters in accordance with the guidelines of the 2019 CBC which assume a 2 percent probability of exceedance in 50 years.

The proposed structure should be designed and constructed to resist the effects of seismic ground motions as provided in Section 1613 of the 2019 California Building Code. The aqueduct is considered an essential facility, Risk Category IV. A long period transition of TL=8 seconds is provided for use in San Diego County. Using the locations as summarized in Table 1, seismic parameters have been tabulated in Table 2 below. Final selection of the appropriate seismic design coefficients should be made by the structural consultant based on the local laws and ordinances, expected building response, and desired level of conservatism.

TABLE 2

Seismic Parameters (ASCE 7-16)

Site	Location	Site Class (Table 20.3-1)	S_s (Figs. 22-1 to 22-8)	S_1 (Figs. 22-1 to 22-8)	F_a (Table 11.4-1)	F_v (Table 11.4-2)	Sm_s (Sect. 11.4.4)	Sm_1 (Sect. 11.4.4)	Sd_s (Sect. 11.4.5)	Sd_1 (Sect. 11.4.5)	Seismic Design Category (Table 11.6-1 and 11.6-2)	PGA (Figs. 22-9 to 22-13)	F_{PGA} (Table 11.8-1)	PGA_M (Sect. 11.8.3)
1	Lilac Upstream Bifurcation	C	1.186	0.428	1.2	1.5	1.423	0.642	0.949	0.428	D	0.521	1.2	0.626
2	Lilac Tunnel	C	1.192	0.431	1.2	1.5	1.43	0.646	0.953	0.431	D	0.524	1.2	0.629
3	Lilac Tunnel	C	1.191	0.43	1.2	1.5	1.43	0.646	0.953	0.43	D	0.524	1.2	0.629
4	Lilac Downstream Bifurcation	C	1.189	0.43	1.2	1.5	1.427	0.644	0.951	0.43	D	0.523	1.2	0.628
5	Red Mtn. Upstream Bifurcation	C	1.065	0.385	1.2	1.5	1.278	0.577	0.852	0.385	D	0.464	1.2	0.557
6	Red Mtn. Tunnel	C	1.064	0.384	1.2	1.5	1.277	0.576	0.851	0.384	D	0.463	1.2	0.556
7	Red Mtn. Tunnel	C	1.06	0.383	1.2	1.5	1.272	0.575	0.848	0.383	D	0.462	1.2	0.554
8	Red Mtn. Tunnel	C	1.061	0.383	1.2	1.5	1.273	0.575	0.848	0.383	D	0.462	1.2	0.554
9	Red Mtn. Downstream Bifurcation	C	1.044	0.377	1.2	1.5	1.253	0.566	0.835	0.377	D	0.454	1.2	0.545
10	Oat Hills Upstream Bifurcation	C	1.026	0.371	1.2	1.5	1.231	0.557	0.821	0.371	D	0.446	1.2	0.535
11	Oat Hills Downstream Bifurcation	C	1.007	0.365	1.2	1.5	1.208	0.547	0.805	0.365	D	0.437	1.2	0.524

9.0 LANDSLIDES AND ROCKFALL

The results of our field observation of the tunnel entrances, tunnel exits and right of way, review of topographic maps and aerial imagery indicates no geomorphic evidence to suggest the presence of ancient deep-seated landsliding on or adjacent to the aqueduct alignment. During seismic events, some displacement of surficial soils such as colluvium or highly weathered bedrock should be anticipated at tunnel entrance and exits. Rockfall potential is suspected at the Red Mountain midpoint transitions (to and from cut and cover), the Red Mountain downstream tunnel exit and the Oat Hills tunnel entrance and exit because of the combination of steep cut slopes and fractured rock at these localities.

10.0 GROUNDWATER

Relatively little information was available regarding groundwater levels in close proximity to the subject portions of the First Aqueduct alignment. Well records and recorded depth to groundwater encountered along the alignment are indicated on Figure 2. In general, groundwater affecting the tunnel linings will be the result of stored water within fractures in bedrock. The source of this water could be irrigation or rainfall. Quantity of flow is dependent on the extent of fracturing and water pressure will be a function of the vertical extent of contiguous fractures. It should be noted that in highly fractured materials, water may travel from an area well beyond the immediate area of observation of seepage. Several topographic lineaments have been identified by HGI crossing the alignment as indicated on Figure 4. These approximate locations correspond to areas of either minor faulting or master joint systems where bedrock is likely to be highly fractured and therefore prone to high permeability. Adjacent high points along the trend of the alignment allow an estimation of pressures that might be experienced in these areas which may be useful in decisions regarding potential tunnel repairs. For each of the tunnel areas we have estimated the following pressures as a relatively conservative upper end by using the highest topographic point along the alignment within approximately 800 feet horizontally. The maximum anticipated pressure at Lilac tunnel is 66 psi, at Red Mountain, 66 psi and at Oat Hills 210 psi. In cut and cover portions of the pipeline, groundwater is expected to be primarily affected by irrigation and rainwater. Pressures in these areas will be limited to the vertical distance from the pipeline to the ground surface.

It is interesting to note that during construction, the Oat Hills tunnel experienced the most groundwater seepage and currently appears to be in the worst condition in regard to seepage and number of leaks. The other two tunnels had minor seepage during construction that dissipated during construction. This may suggest less void space for groundwater storage at the Lilac and Red Mountain tunnels but reduced fractures may also contribute to short term spikes in water pressure at the tunnel liner elevations following rainfall.

Since backfill soils are generally much higher in permeability than weathered bedrock, water accumulation/saturated conditions can be expected in trench backfill along cut and cover sections. Plates 1 through 6 provide false color infrared images of vegetation along the aqueduct alignment. The “redness” of the images indicates higher near infrared reflectance caused by higher chlorophyll which in turn indicates areas of higher soil water content. This visual aid provides a general sense of areas where near surface moisture may be contributing to groundwater along the alignment. Review of the 1953 aerial images on these plates, current aerial images and false color infrared images demonstrate how surface vegetation conditions have substantially changed since aqueduct construction. In the 1953 photos, many of the areas were stripped of vegetation, presumably in preparation of planting groves that are present today.

11.0 GEOTECHNICAL SUMMARY OF PREVIOUS STUDIES

The following provides a brief summary of geotechnical findings of four desktop studies. Note that structural findings and other aspects of these studies such as structural upgrades and cost estimates are not discussed herein.

11.1 Kleinfelder System Seismic Vulnerability Assessment, Report dated June 26, 2018

Kleinfelder performed a desktop study of the condition of existing infrastructure and to identify needed structural upgrades to restore aging infrastructure and mitigate structural/seismic risks. Facilities included in the study pertaining to the subject areas include First Aqueduct bifurcations and tunnels. A site reconnaissance was performed to assess conditions of the Oat Hills upstream and downstream bifurcations. The upstream bifurcation was observed from the outside only and the lower bifurcation was observed from looking inside the structure from the top. Kleinfelder also reviewed available geologic maps, topographic maps, aerial photographs, seismic hazard maps and geotechnical information provided by the Water Authority. Seismic parameters were based on the 2016 California Building Code (CBC) which has subsequently been superseded by the current (2019) CBC. Geological, Earth Design and Seismic Parameters excerpts from the report for the Lilac, Red Mountain and Oat Hills bifurcations are tabulated below:

TABLE 3

Geological Parameters at Bifurcation Sites

Structure Name	Mapped Geologic Conditions		Estimated Soil Parameters	
	Structure Geology	V_{s30} (m/s^2	Angle of Internal Friction (degrees)	Unit Weight (pcf)
Lilac Up	Crystalline rock - Monzogranite	710.1	36	140
Lilac Down	Crystalline rock - Tonalite	710.1	36	140
Red Mtn Up	Crystalline rock - Monzogranite	710.1	36	140
Red Mtn Down	Crystalline rock - Tonalite	710.1	36	140
Oat Hills Up	Crystalline rock - Granite	710.1	36	140
Oat Hills Down	Crystalline rock - Granodiorite	710.1	36	140

TABLE 4

Earth Design Parameters at Bifurcation Sites

Structure Name	Estimated Lateral Earth Pressures				Foundation Parameters (per 2016 CBC)	
	At-Rest Lateral Earth Pressure in EFW (pcf)	Active Lateral Earth Pressure in EFW (pcf)	Passive Lateral Earth Pressure in EFW (pcf)	Seismic Lateral Force (lb/ft)	Coefficient of Friction between Soil and Concrete	Allowable Bearing Pressure (psf)
Lilac Up	57.7	36.3	270	10.4	0.35	4000
Lilac Down	57.7	36.3	270	12.3	0.35	4000
Red Mtn Up	57.7	36.3	270	12.2	0.35	4000
Red Mtn Down	57.7	36.3	270	10.1	0.35	4000
Oat Hills Up	57.7	36.3	270	9.8	0.35	4000
Oat Hills Down	57.7	36.3	270	9.5	0.35	4000

Seismic design parameters and ground motion parameters were issued in the Kleinfelder study based on the 2016 CBC and ASCE 7-10. These have been superseded by the 2019 CBC and ASCE 7-16. Accordingly, the previously determined seismic and ground motion parameters have not been reprinted here. For all sites, Kleinfelder cited High Potential for strong ground shaking and a Low Potential for fault rupture, seismic slope instability and liquefaction.

A relative risk rating was presented for structures that considered a combination of probability of failure and consequence of failure with a score of greater than 10 being “High Risk” and 10 or below “Low Risk”. The Lilac Up, Red Mountain Up, Red Mountain Down and Oat Hills Down bifurcations structures were categorized as “High-Risk” requiring immediate work. Lilac Down and Oat Hills Up were classified as “Low Risk”.

Kleinfelder evaluated the integrity and vulnerability of the seven tunnels along the First Aqueduct to seismic exposure based on a desktop study of available geologic data, construction reports and available Water Authority inspection reports. The tunnels were not available for field inspections at the time of the evaluation. The following table summarizes Kleinfelder’s assessment of subsurface conditions and potential geologic hazards at each of the three tunnel locations.

TABLE 5

Subsurface Conditions and Potential Geologic Hazards

Tunnel	Subsurface Conditions	Fault Rupture Displacement Potential	Shear Wave Velocity Vs_{30} (m/s)	Site Class	Strong Ground Shaking Peak Ground Acceleration (g)*	Liquefaction Potential	Seismic Slope Instability Potential
Lilac	Tonalite/granodiorite/ quartzite Six inch gouge zone and minor seepage mapped during mining	None	360-760	C	0.541	Low	Low- Seismic displacements near inlet of 3 to 12 inches
Red Mountain	Quartz diorite/monzonite/ quartz diorite. Two small clay gouge zones and abundant small seeps during mining	Low	360-1520	B to C	0.464	Low	Deep seated- Low Possible localized failure near cut and cover section of tunnel. Seismic slope displacements near bored tunnels. Small to moderately sized earth and rock displacement at bored tunnel entries and exists
Oat Hills	Quartz diorite/monzonite/ granodiorite/chlorite schist. Heavy water flow from fault zone between Stations 1238+20 to 1333+12 and 1301+95 to 1311+70	Low	360-760	C	0.439	Low	Deep seated- Low 2 to +12 inch displacement 60 to 130 feet NE and NW of outlet

*Based on ASCE 7-10

11.2 Ninyo and Moore, Geotechnical Desktop Evaluation and Site Reconnaissance, First Aqueduct Bifurcation Study San Diego County, California, Report dated March 26, 2020

Ninyo and Moore's evaluation included four bifurcation structures. Of these four, two (Red Mountain Upstream and Oat Hills Upstream) are relevant to this study. The report identifies low potential for ground rupture at the sites but indicates lurching or cracking of the ground surface as a result of nearby seismic events is possible. A low potential for liquefaction was concluded for the Red Mountain Upstream and Oat Hills Upstream bifurcation sites. A low potential for deep-seated landsliding have been assigned to the two sites but the report indicates that rock falls and surficial failure are possible at the Oat Hills Upstream site.

Ninyo and Moore discussed upgrade of the code to the 2019 CBC and ASCE 7-16 after issuance of Kleinfelder's study. The report indicates that "…the geotechnical recommendations presented in the Kleinfelder, Inc. report dated June 22, 2018, are reasonable and should remain applicable to the project sites."

11.3 Hazen SDCWA Facility Planning - Task 2: First Aqueduct Bifurcations Study, Report dated January 21, 2021

Hazen evaluated 11 bifurcation structures of the First Aqueduct including the six relevant to this study. Hazen's evaluation included consideration of the loading requirements of the 2019 CBC. Hazen also considered the previous evaluation by Kleinfelder, discussed above, as part of their evaluation. The study included site visits of the structures. Hazen relied on the geotechnical study of Ninyo and Moore above as part of their study. The study was performed in conjunction with a structural evaluation by TJCAA. The study concluded that minor repairs to the tops of structures and replacement of covers were the only remedial actions required for the Lilac, Red Mountain and Oat Hills bifurcation structures. Several alternative site improvements were developed which included new isolation valves, new isolation valve vaults, slide gates within existing bifurcation structures and replacement of bifurcation structures with new structures. Detailed descriptions of options may be viewed in the referenced report. Some of these options will require geotechnical considerations such as earth pressures, seismic design parameters, backfill suitability and operations and groundwater. The following lateral earth pressures were used in their evaluation:

TABLE 6

Lateral Earth Pressures for Bifurcation Structures

Structure	**Terrain**	**At-Rest Pressure w/o GW (pcf)**	**Unit Weight (pcf)**	**Internal Friction Angle (degrees)**	**At Rest Pressure w/ GW (pcf)**			**Horiz. Surcharge Pressure (psf)**	**E_{soil} N&M (pcf)**
					Soil Component	Water Component	Total		
Lilac Up	Flat	57.7	140	36	32	62.4	94.4	124	
Lilac Down	2.5:1	57.7	140	36	44	62.4	106.4	124	
Red Mtn Up	Flat	57.7	140	36	32	62.4	94.4	124	25.7
Red Mtn Down	Flat	57.7	140	36	32	62.4	94.4	124	
Oat Hills Up	3:1	57.7	140	36	42	62.4	104.4	124	24.4
Oat Hills Down	3:1	57.7	140	36	42	62.4	104.4	124	

11.4 <u>Hazen SDCWA Facility Planning – Task 4: First Aqueduct – Treated Water Tunnel Renewal, Report dated December 30, 2020</u>

Hazen was contracted to evaluate additional repairs for short term and long term design to address infiltration issues and concrete degradation in the three tunnels. The Hazen study was performed after emergency repairs of seepage had been performed by SDCWA in 2019. The Hazen study considered various alternatives for rehabilitation of the three tunnels based upon groundwater seepage, tunnel condition, repair longevity, seismic resilience, cost, and risk. It appears that the currently preferred alternatives include slip lining the Oat Hills tunnel with welded steel pipe slightly smaller than the existing tunnel, and spray on or trowel applied polymer treatment of the Lilac and Red Mountain tunnels in specific areas needing repair. The extent of repairs has not yet been determined. For access considerations, at least three new portals (and possible four or five) will be constructed and left in place after construction for future access.

12.0 CONCLUSIONS AND RECOMMENDATIONS

The following is a summary of our conclusions based on review of the aforementioned studies, our limited site reconnaissance and review of in-house and publicly available data.

Based on our review, geologic and geotechnical conditions have generally been adequately addressed in the previous studies by Kleinfelder, Ninyo and Moore and Hazen Sawyer. Some additional geotechnical aspects that should be considered during design and construction phases include consideration of possible excess potential groundwater seepage and pressure in tunnel areas due to minor faulting as indicated by lineaments identified crossing the tunnel alignments and presence of clay gouge zones (also an indicator of past fault movement). If surface repair of tunnel linings is anticipated (such as recommended for the Lilac and Red Mountain tunnels), selected materials should be designed to withstand the pressures discussed in the groundwater section of this report (Section 9.0) with an appropriate safety factor.

Soil pressure parameters developed by Kleinfelder and Hazen Sawyer should be verified by subsurface investigation if installation of new improvements below ground is anticipated or for development of insertion pits for tunnel rehabilitation. Due to the anticipated haul distance for import and export of soils, SDCWA may wish to consider re-use of site soils as backfill. The suitability of backfill soils can be evaluated during subsurface investigation and could likely be accomplished by test pits in the area of proposed subsurface improvements and excavations. The quality of existing backfill soils is currently unknown and these soils may contain organics, oversize rock and high moisture content. These conditions may be evaluated by subsurface investigation. If soils are saturated but otherwise suitable for re-use a designated area for spreading and drying will be required which may be constrained by site conditions.

Based on review of site photos during construction (Thornton, 1946), cut and cover excavation side slopes were vertical to 1:1 (horizontal to vertical) or steeper. As backfill soils are re-excavated, there is a potential for slab-type topples or shallow surficial failures along the fill/natural interface. This is a particular issue if soils are saturated during construction. Current engineering protocol is to bench backfill soils into side slopes as they are placed but this was likely not done during original construction. Excavation of these soils in areas of new improvements will require scouring to original excavation limits before workers are allowed into excavations. Trench side slope configurations can be evaluated during subsurface investigation to be incorporated with worker safety protocols and shoring recommendations.

Joints may be present in weathered bedrock and even in hard rock that may create potential failures when vertical or near vertical cuts are made. These joints are often obscured by spoils and may not be recognizable before mobilization occurs. If vertical or near vertical cuts over five feet in height are planned in any areas that may pose a risk to workers or adjacent improvements, cuts should be mapped by the engineering geologist or geotechnical engineer. Any excavation deemed unsafe should be laid back or shored in accordance with the geotechnical engineer's recommendations.

Stockpiling of soil or storage of heavy equipment or supplies should not be allowed adjacent to open excavations. Stockpiled soil, equipment and supplies should generally be maintained beyond a line projected at 45 degrees from the base of the cut.

Slope stability should be evaluated under static and seismic conditions for potential surficial failure.

Potential rockfall effects have not been fully evaluated and should be considered and evaluated as part of the design-build process. The areas that may be susceptible to rockfall include the Red Mountain midpoint transitions (to and from cut and cover), the Red Mountain downstream tunnel exit and the Oat Hills tunnel entrance and exit. The alignment has recently been flown for creation of topographic maps. Stereo imagery from those flights may be used for initial evaluation of rock prone to toppling on the slopes above proposed tunnel entrance and exits if improvements, at or above ground, may be damaged by falling rock. The Colorado Rockfall Simulation Program (CRSP) or similar software can be used to statistically evaluate velocity, energy and bounce heights of rock for design of mitigation if appropriate. Mitigation may include reinforced fencing or walls around structures, netting, scaling of slopes to remove rocks or diversion structures.

If concrete is required as part of construction, distance to batch plants should be considered due to the remote location of most of the sites. Haul times may necessitate the use of initial set retarders or possible on-site batching. Chemical testing of soils for potential sulfate and chloride attack should be performed as part of design geotechnical investigation.

Seismic design and ground motion parameters provided in this report are informational only and will likely be superseded by parameters based on new codes by the time the tunnel rehabilitation design is submitted. Seismic design and ground motion parameters for tunnels and structural improvements should be updated to reflect the most current codes at the time of design submittal.

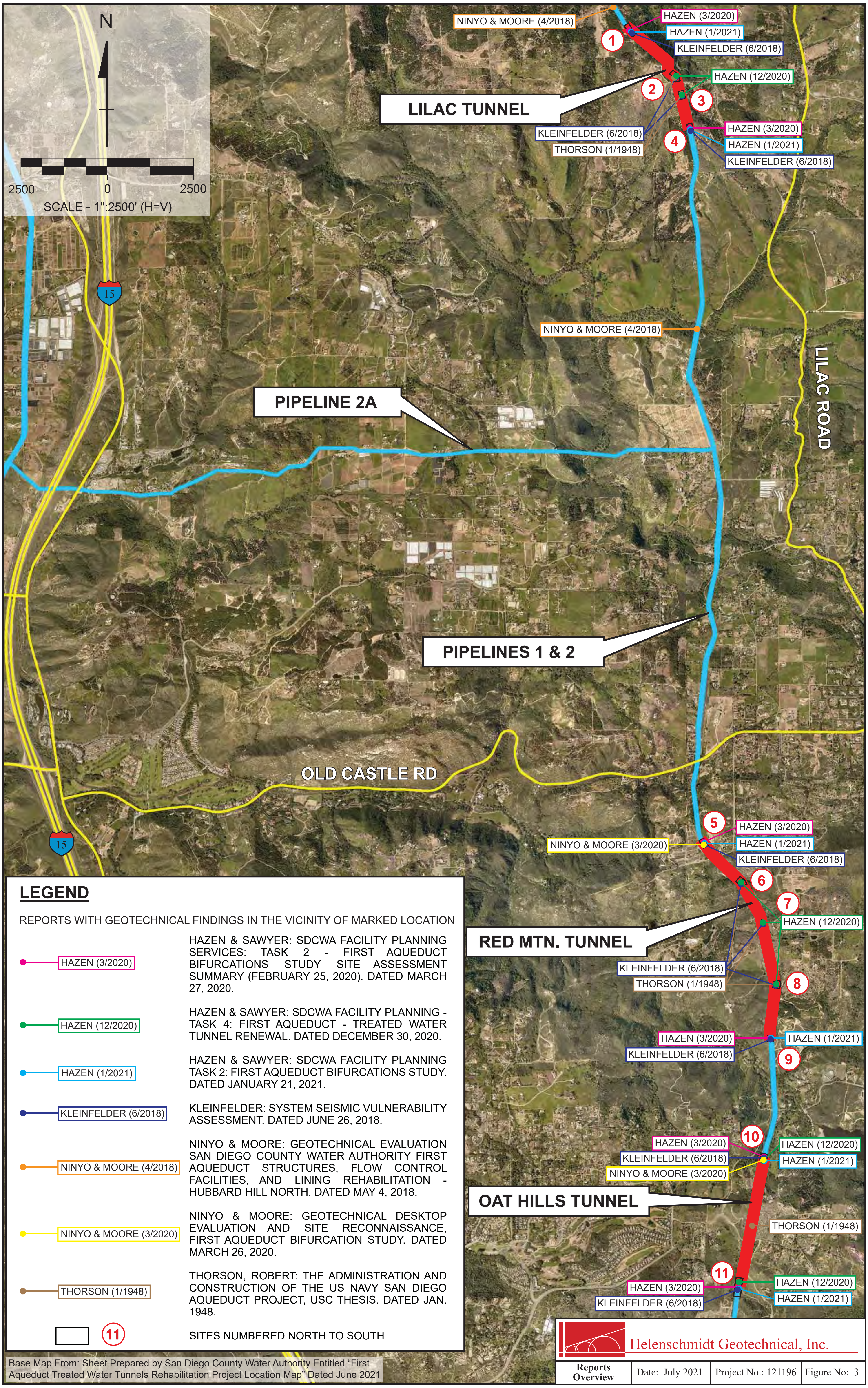
13.0 LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical engineering principles and practices. No warranty, express or implied, or merchantability of fitness, is made or intended in connection with our work, by the proposal for consulting or other services, or by the furnishing of oral or written reports or findings. Evaluation of waste or other environmental contaminants was not included in our scope of services.

Helenschmidt Geotechnical, Inc.

Site Plan and Key Map	Date: July 2021	Project No.: 121196	Figure No: 1


N
2500
0
2500
SCALE - 1":2500' (H=V)
15
21.61'
(11/26/2019)
1
2
3
4
LILAC TUNNEL
LILAC ROAD
PIPELINE 2A
PIPELINES 1 & 2
OLD CASTLE RD
16'
(9/5/2006)
5
20'
(11/6/1991)
6
7
RED MTN. TUNNEL
8
9
5.95'
(3/18/195)
10
OAT HILLS TUNNEL
11
35'
(10/7/2002)
15
CHAMPAGNE BLVD
LEGEND
LOCATION OF GROUND WATER DATA WITHIN 1/4-MILE RADIUS OF WORK AREAS
21.61'
(11/26/2019)
INDICATES DEPTH OF GROUND WATER BELOW SURFACE
INDICATES DATE OF READING
11
SITES NUMBERED NORTH TO SOUT
*DATA OBTAINED FROM STATE WATER CONTROL RESOURCES BOARD, STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES, COUNTY OF SAN DIEGO DEPARTMENT OF ENVIRONMENTAL HEALTH
Base Map From: Sheet Prepared by San Diego County Water Authority Entitled "First Aqueduct Treated Water Tunnels Rehabilitation Project Location Map" Dated June 2021
Helenschmidt Geotechnical, Inc.
Groundwater
Date: July 2021
Project No.: 121196
Figure No: 2



LEGEND

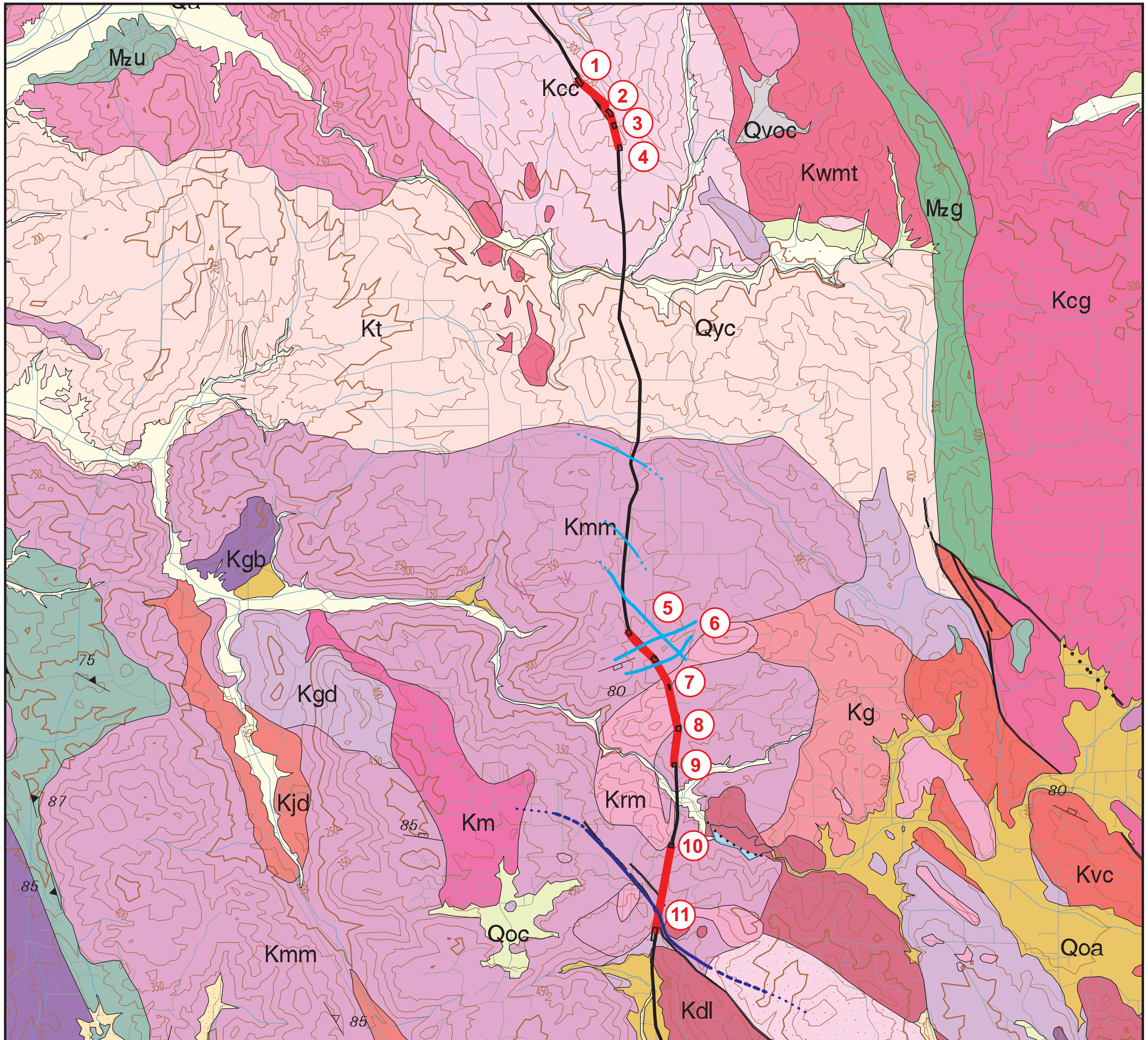
REPORTS WITH GEOTECHNICAL FINDINGS IN THE VICINITY OF MARKED LOCATION

HAZEN (3/2020)	HAZEN & SAWYER: SDCWA FACILITY PLANNING SERVICES: TASK 2 - FIRST AQUEDUCT BIFURCATIONS STUDY SITE ASSESSMENT SUMMARY (FEBRUARY 25, 2020). DATED MARCH 27, 2020.
HAZEN (12/2020)	HAZEN & SAWYER: SDCWA FACILITY PLANNING - TASK 4: FIRST AQUEDUCT - TREATED WATER TUNNEL RENEWAL. DATED DECEMBER 30, 2020.
HAZEN (1/2021)	HAZEN & SAWYER: SDCWA FACILITY PLANNING TASK 2: FIRST AQUEDUCT BIFURCATIONS STUDY. DATED JANUARY 21, 2021.
KLEINFELDER (6/2018)	KLEINFELDER: SYSTEM SEISMIC VULNERABILITY ASSESSMENT. DATED JUNE 26, 2018.
NINYO & MOORE (4/2018)	NINYO & MOORE: GEOTECHNICAL EVALUATION SAN DIEGO COUNTY WATER AUTHORITY FIRST AQUEDUCT STRUCTURES, FLOW CONTROL FACILITIES, AND LINING REHABILITATION - HUBBARD HILL NORTH. DATED MAY 4, 2018.
NINYO & MOORE (3/2020)	NINYO & MOORE: GEOTECHNICAL DESKTOP EVALUATION AND SITE RECONNAISSANCE, FIRST AQUEDUCT BIFURCATION STUDY. DATED MARCH 26, 2020.
THORSON (1/1948)	THORSON, ROBERT: THE ADMINISTRATION AND CONSTRUCTION OF THE US NAVY SAN DIEGO AQUEDUCT PROJECT, USC THESIS. DATED JAN. 1948.
11	SITES NUMBERED NORTH TO SOUTH

Base Map From: Sheet Prepared by San Diego County Water Authority Entitled "First Aqueduct Treated Water Tunnels Rehabilitation Project Location Map" Dated June 2021

Helenschmidt Geotechnical, Inc.

Reports Overview	Date: July 2021	Project No.: 121196	Figure No: 3



LEGEND

Kcc	TONALITE OF COUSER CANYON
Kmm	MONZOGRANITE OF MERRIAM MOUNTAIN
Krm	QUARTZ DIORITE OF RED MOUNTAIN
Kt	TONALITE
Kdl	GRANITE OF DIXON LAKE
	PRIMARY FRACTURE SYSTEM
	FAULT OR MASTER JOINT SYSTEM
	AQUEDUCT ALIGNMENT
	TUNNEL AREAS
11	SITES NUMBERED NORTH TO SOUTH

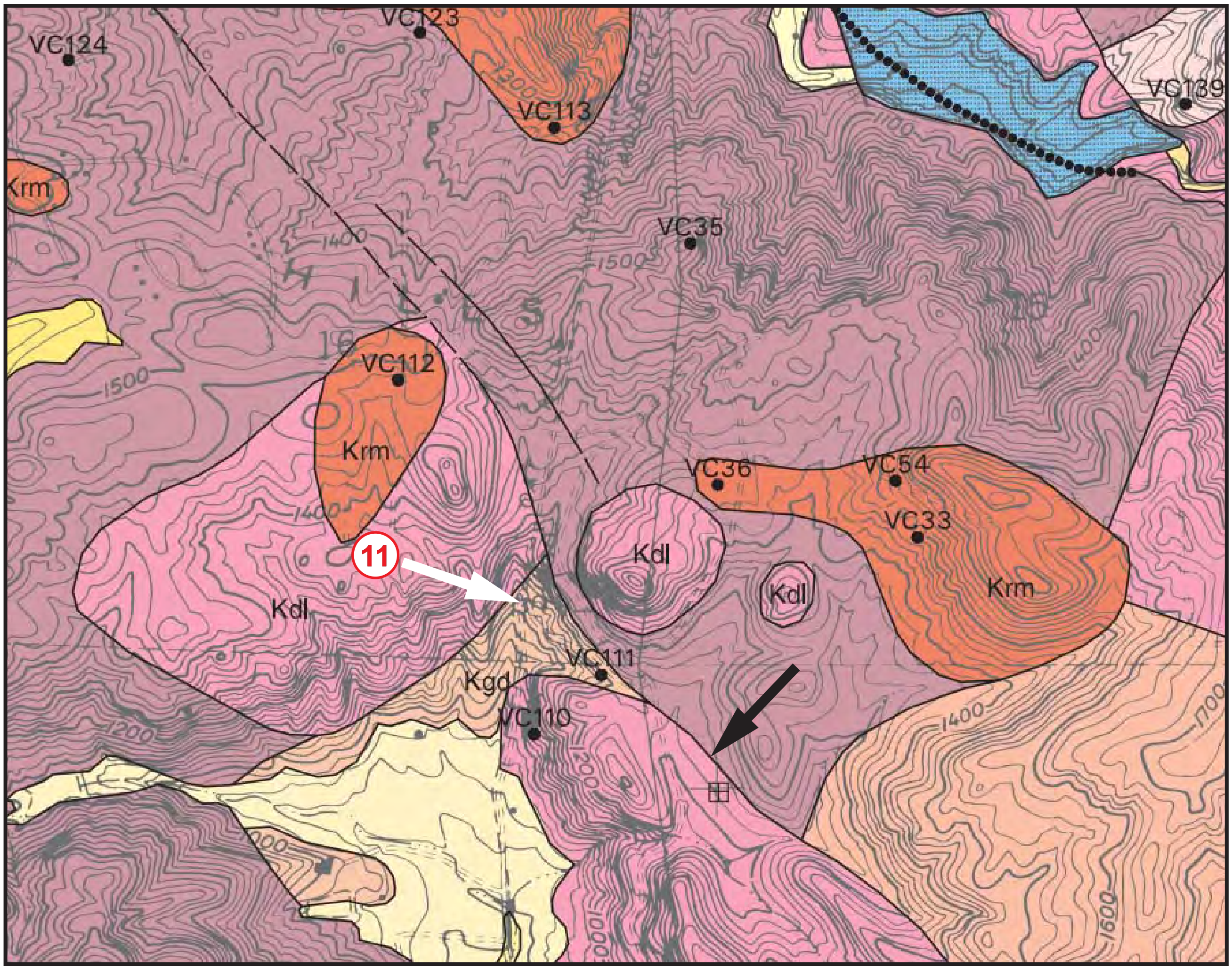
GEOLOGIC MAP FROM: KENNEDY, M.P., TAN, S.S. (2005): GEOLOGIC MAP OF THE OCEANSIDE 30 X 60' QUADRANGLE, CALIFORNIA, CALIFORNIA GEOLOGICAL SURVEY REGIONAL GEOLOGIC MAP SERIES, MAP NO 2, SHEET NO. 2.

Helenschmidt Geotechnical, Inc.

Geologic Map

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: 1" = 5000' (Approx.)	Figure Number: 4



GEOLOGIC MAP FROM: KENNEDY, M.P. (1999): GEOLOGIC MAP OF THE VALLEY CENTER 7.5' QUADRANGLE

LEGEND

Km	QUARTZ DIORITE OF MOUNTAIN MEADOWS
Kmm	MONZOGRANITE OF MERRIAM MOUNTAIN
Kgd	GRANODIORITE
Kdl	GRANITE OF DIXON LAKE
	AQUEDUCT ALIGNMENT
11	SITE 11, OAT HILL DOWNSTREAM BIFURCATION S STA 1303+57
	FAULT LOCATION

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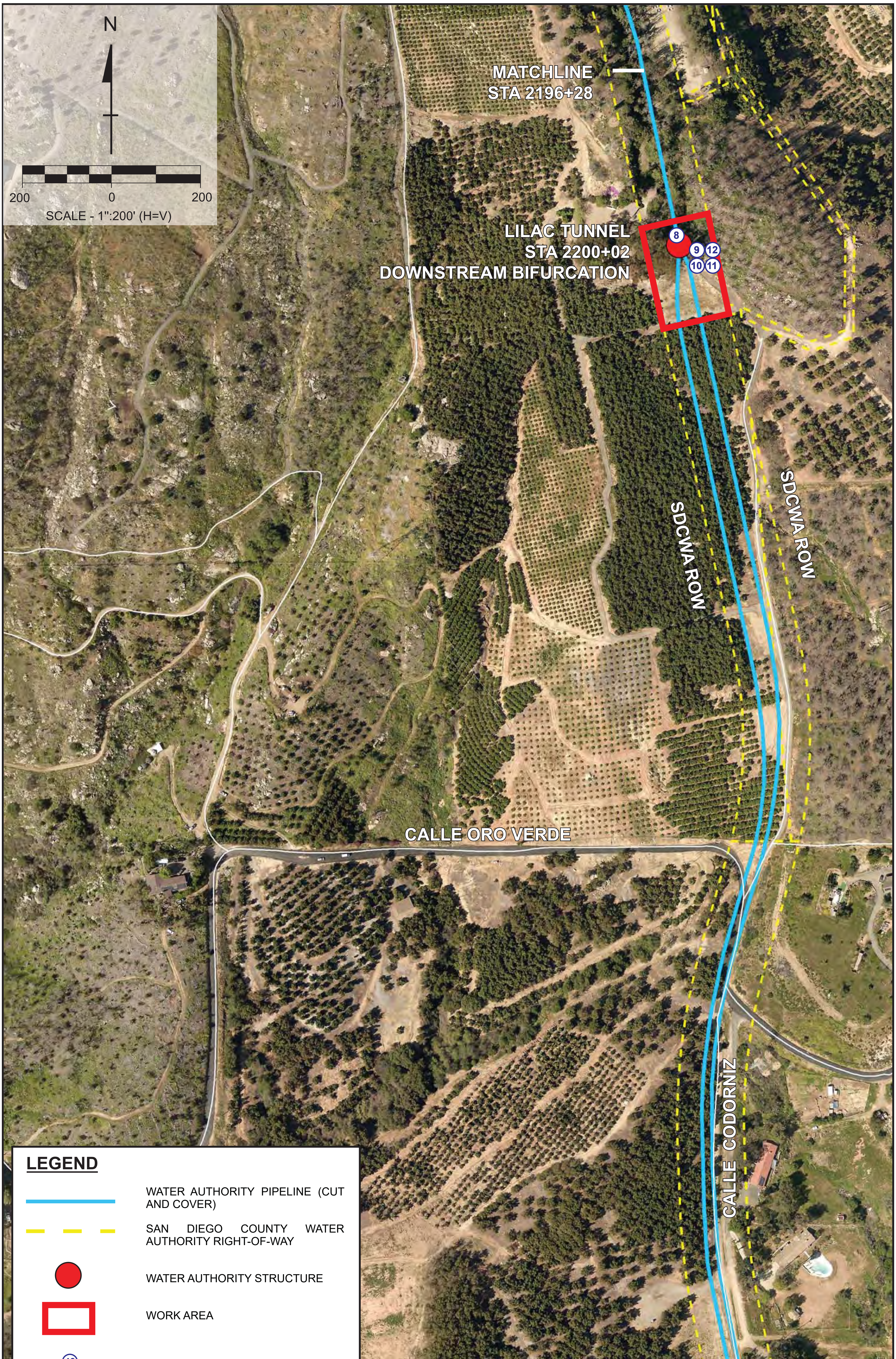
Geologic Map at Site 11
S Sta 1303+57

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

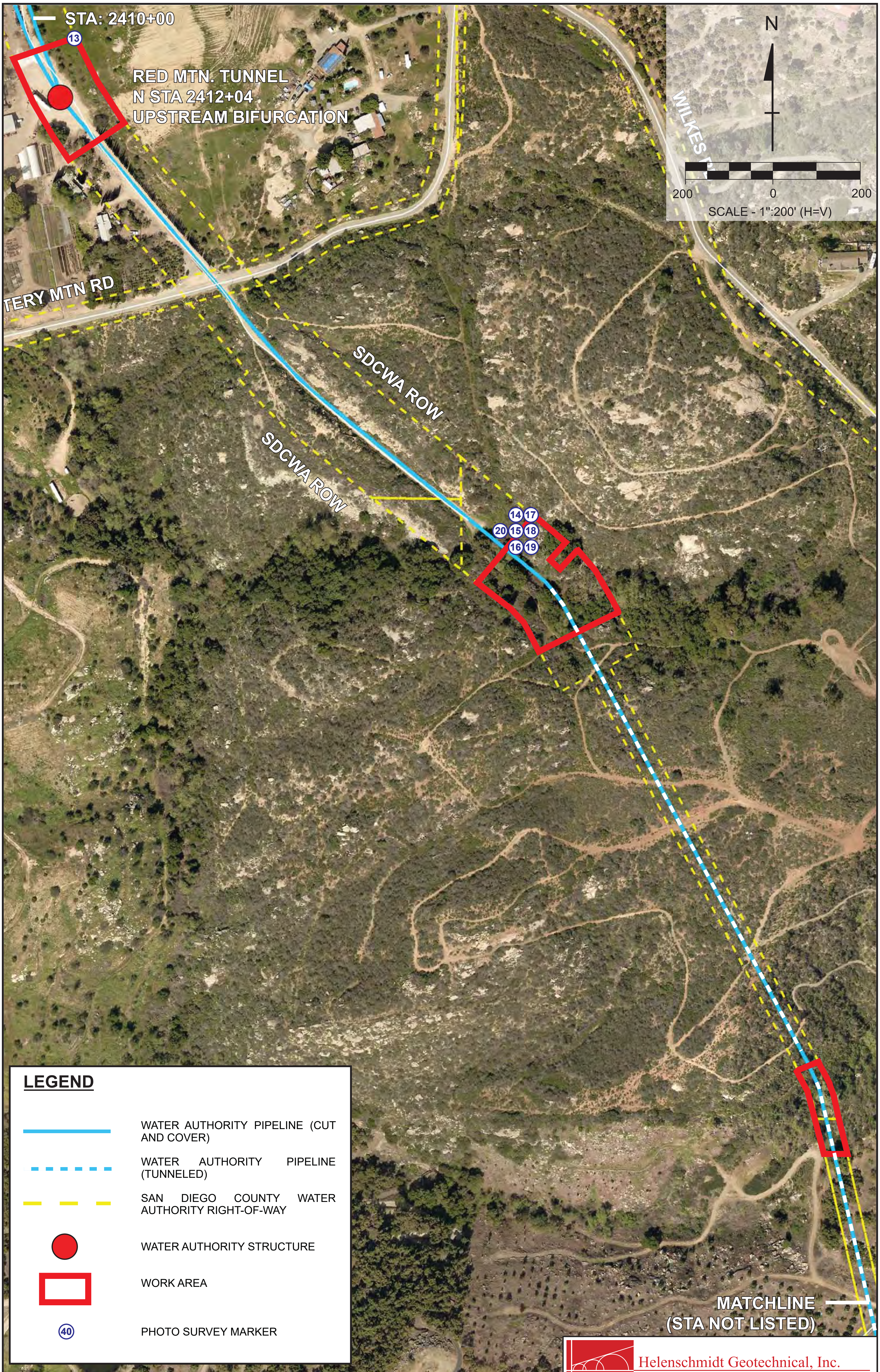
Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: NTS	Figure Number: 5


N
200
0
200
SCALE - 1":200' (H=V)
LILAC TUNNEL
STA 2165+50
UPSTREAM BIFURCATION
COUSER CANYON RD
SDCWA ROW
SDCWA ROW
PRIVAT
MATCHLINE
STA 2196+28
LEGEND
WATER AUTHORITY PIPELINE (CUT AND COVER)
WATER AUTHORITY PIPELINE (TUNNELED)
SAN DIEGO COUNTY WATER AUTHORITY RIGHT-OF-WAY
WATER AUTHORITY STRUCTURE
WORK AREA
PHOTO SURVEY MARKER
Base Map From: Sheet Prepared by San Diego County Water Authority Entitled "First Aqueduct Treated Water Tunnels Rehabilitation Project Lilac Tunnel STA: 2165+50 to STA:2200+02" Sheet 1 of 2 Dated June 2021
Helenschmidt Geotechnical, Inc.
Field Photos
Date: July 2021
Project No.: 121196
Figure No: 6



Helenschmidt Geotechnical, Inc.

Field Photos	Date: July 2021	Project No.: 121196	Figure No: 7



Base Map From: Sheet Prepared by San Diego County Water Authority Entitled "First Aqueduct Treated Water Tunnels Rehabilitation Project Red Mountain Tunnel N STA: 2412+04 to S STA:1374+30" Sheet 1 of 2 Dated June 2021

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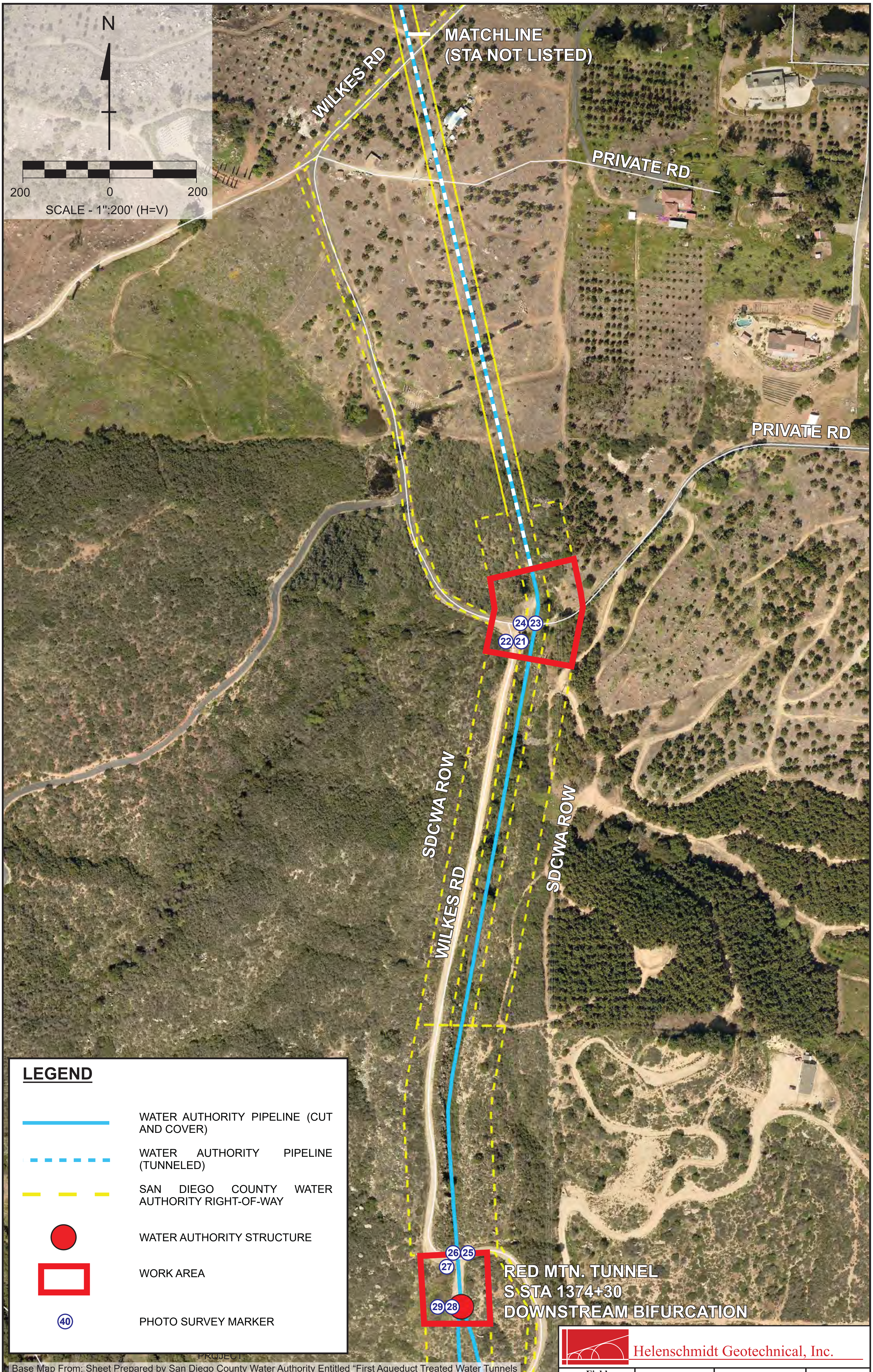
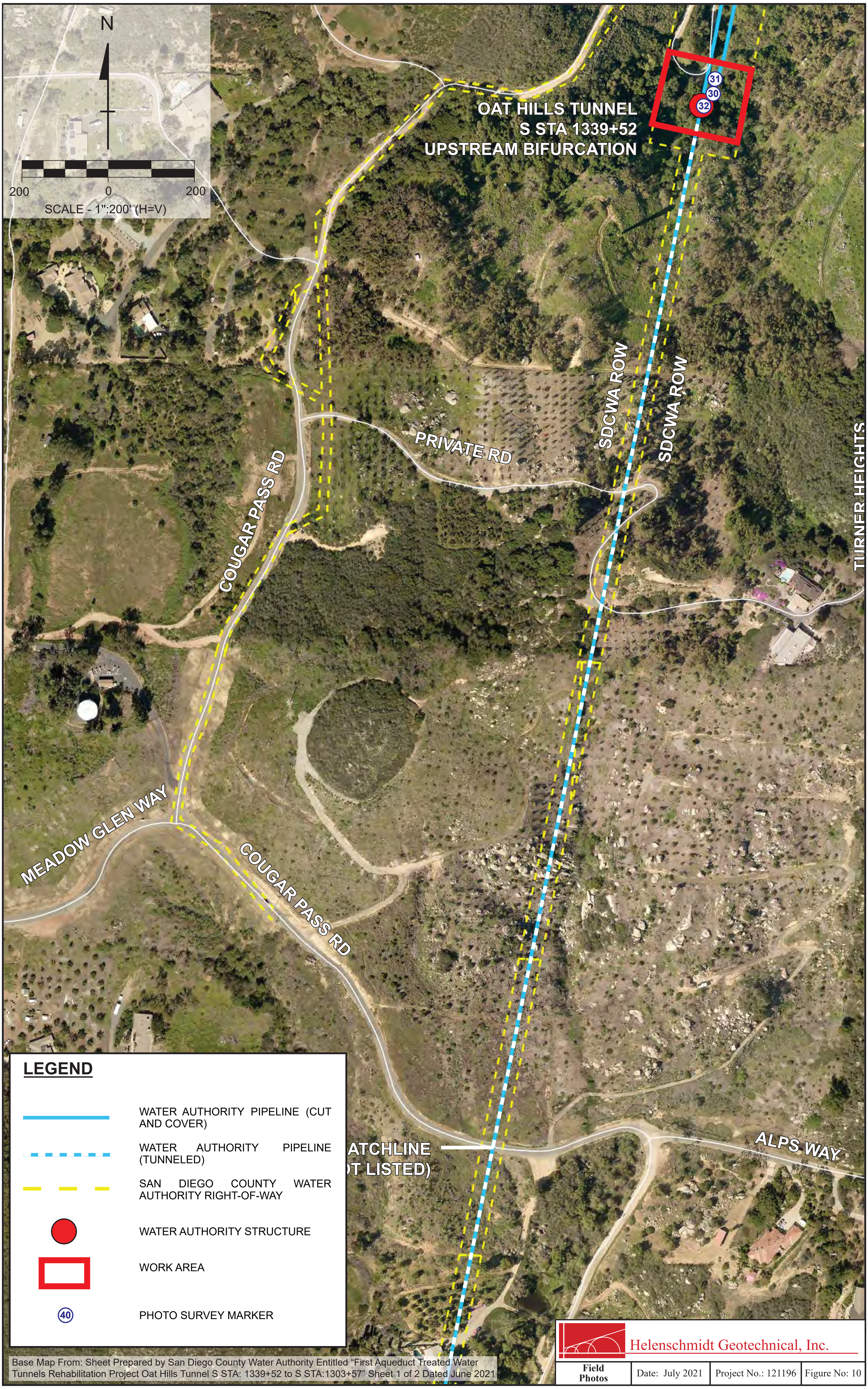
Field Photos	Date: July 2021	Project No.: 121196	Figure No: 8



Field Photos	Date: July 2021	Project No.: 121196	Figure No: 9



LEGEND

WATER AUTHORITY PIPELINE (CUT AND COVER)

WATER AUTHORITY PIPELINE (TUNNELED)

SAN DIEGO COUNTY WATER AUTHORITY RIGHT-OF-WAY

WATER AUTHORITY STRUCTURE

WORK AREA

40 PHOTO SURVEY MARKER

Base Map From: Sheet Prepared by San Diego County Water Authority Entitled "First Aqueduct Treated Water Tunnels Rehabilitation Project Oat Hills Tunnel S STA: 1339+52 to S STA:1303+57" Sheet 1 of 2 Dated June 2021

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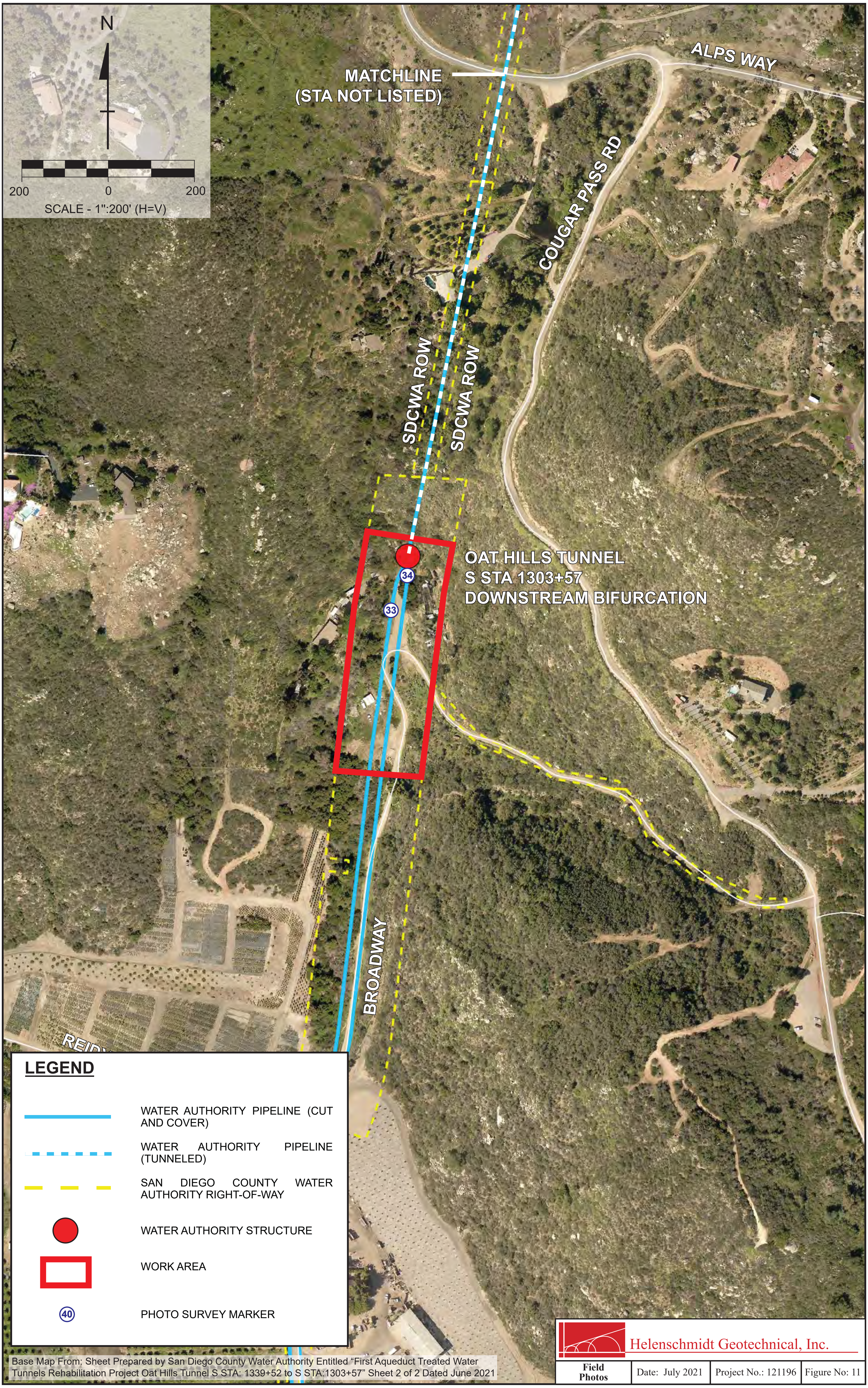
Field Photos	Date: July 2021	Project No.: 121196	Figure No: 10


N
200
0
200
SCALE - 1":200' (H=V)
MATCHLINE
(STA NOT LISTED)
ALPS WAY
COUGAR PASS RD
SDCWA ROW
SDCWA ROW
OAT HILLS TUNNEL
S STA 1303+57
DOWNSTREAM BIFURCATION
34
33
BROADWAY
LEGEND
WATER AUTHORITY PIPELINE (CUT AND COVER)
WATER AUTHORITY PIPELINE (TUNNELED)
SAN DIEGO COUNTY WATER AUTHORITY RIGHT-OF-WAY
WATER AUTHORITY STRUCTURE
WORK AREA
40
PHOTO SURVEY MARKER
Base Map From; Sheet Prepared by San Diego County Water Authority Entitled "First Aqueduct Treated Water Tunnels Rehabilitation Project Oat Hills Tunnel S STA: 1339+52 to S STA:1303+57" Sheet 2 of 2 Dated June 2021
Helenschmidt Geotechnical, Inc.
Field Photos
Date: July 2021
Project No.: 121196
Figure No: 11

1. VIEW FROM LILAC UPSTREAM BIFURCATION STA 2165+50 - PHOTO TAKEN 6/15/21

2. VIEW FROM LILAC UPSTREAM BIFURCATION STA 2165+50 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 12

3. VIEW FROM LILAC TUNNEL APPROX. STA 2186+00 - PHOTO TAKEN 6/15/21

4. VIEW FROM LILAC TUNNEL STA 2186+00 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 13

5. VIEW FROM LILAC TUNNEL STA 2191+00 - PHOTO TAKEN 6/15/21

6. VIEW FROM LILAC TUNNEL APPROX. STA 2191+00 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 14

7. VIEW FROM LILAC TUNNEL APPROX. STA 2191+00 - PHOTO TAKEN 6/15/21

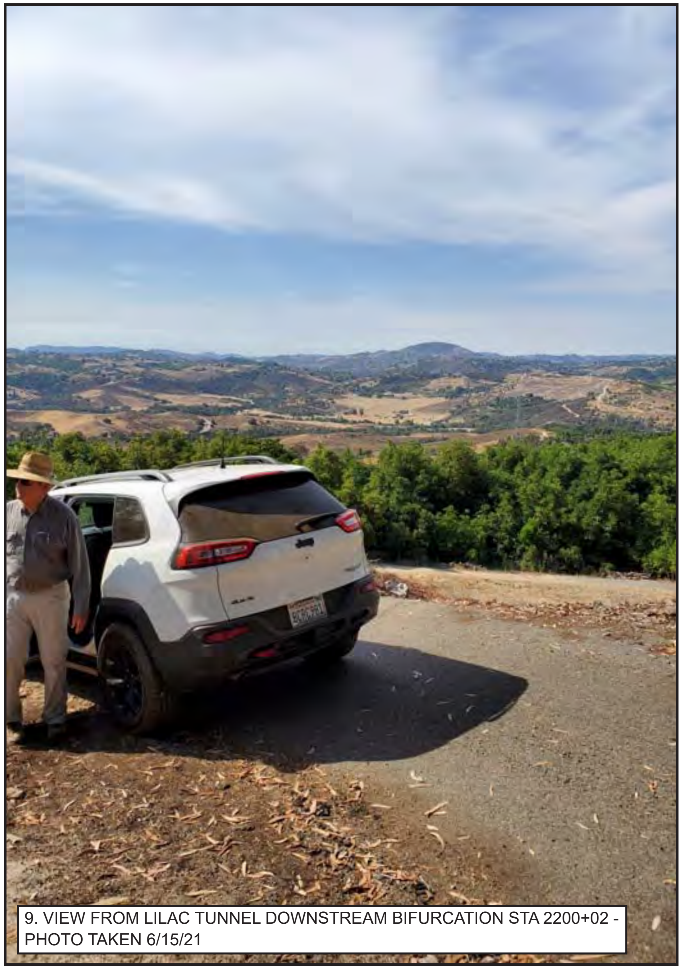
8. VIEW FROM LILAC TUNNEL DOWNSTREAM BIFURCATION STA 2200+02 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 15



9. VIEW FROM LILAC TUNNEL DOWNSTREAM BIFURCATION STA 2200+02 - PHOTO TAKEN 6/15/21

10. VIEW FROM LILAC TUNNEL DOWNSTREAM BIFURCATION STA 2200+02 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 16

11. VIEW FROM LILAC TUNNEL DOWNSTREAM BIFURCATION STA 2200+02 - PHOTO TAKEN 6/15/21

12. VIEW FROM LILAC TUNNEL DOWNSTREAM BIFURCATION STA 2200+02 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 17

13. VIEW FROM RED MTN. TUNNEL UPSTREAM BIFURCATION N STA 2412+04 - PHOTO TAKEN 6/15/21

14. VIEW FROM RED MTN. TUNNEL APPROX. S STA 1422+03 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 18

15. VIEW FROM RED MTN. TUNNEL APPROX. S STA 1422+03 - PHOTO TAKEN 6/15/21

16. VIEW FROM RED MTN. TUNNEL APPROX. S STA 1422+03 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 19

17. VIEW FROM RED MTN. TUNNEL APPROX. S STA 1422+03 - PHOTO TAKEN 6/15/21

18. VIEW FROM RED MTN. TUNNEL APPROX. S STA 1422+03 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 20

19. VIEW FROM RED MTN. TUNNEL APPROX. S STA 1422+03 - PHOTO TAKEN 6/15/21

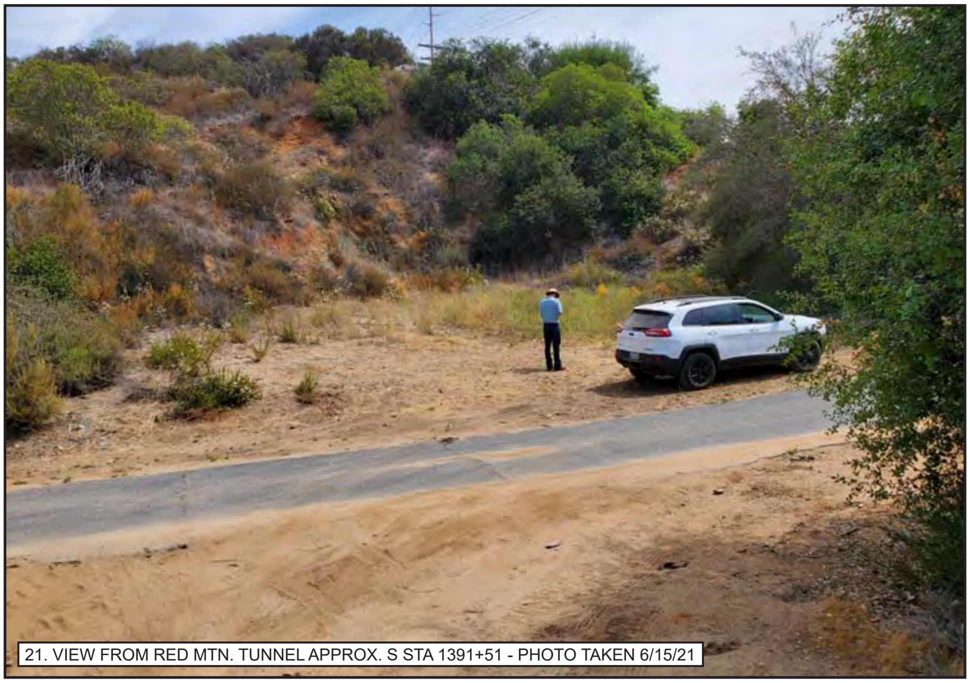
20. VIEW FROM RED MTN. TUNNEL APPROX. S STA 1422+03 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 21



21. VIEW FROM RED MTN. TUNNEL APPROX. S STA 1391+51 - PHOTO TAKEN 6/15/21

22. VIEW FROM RED MTN. TUNNEL APPROX. S STA 1391+51 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 22

23. VIEW FROM RED MTN. TUNNEL APPROX. S STA 1391+51 - PHOTO TAKEN 6/15/21

24. VIEW FROM RED MTN. TUNNEL APPROX. S STA 1391+51 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 23

25. VIEW FROM RED MTN. TUNNEL DOWNSTREAM BIFURCATION S STA 1374+30 - PHOTO TAKEN 6/15/21

26. VIEW FROM RED MTN. TUNNEL DOWNSTREAM BIFURCATION S STA 1374+30 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 24

27. VIEW FROM RED MTN. TUNNEL DOWNSTREAM BIFURCATION S STA 1374+30 - PHOTO TAKEN 6/15/21

28. VIEW FROM RED MTN. TUNNEL DOWNSTREAM BIFURCATION S STA 1374+30 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 25

29. VIEW FROM RED MTN. TUNNEL DOWNSTREAM BIFURCATION S STA 1374+30 -
PHOTO TAKEN 6/15/21

30. VIEW FROM OAT HILLS TUNNEL UPSTREAM BIFURCATION S STA 1339+52 -
PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 26

31. VIEW FROM OAT HILLS TUNNEL UPSTREAM BIFURCATION S STA 1339+52 - PHOTO TAKEN 6/15/21

32. VIEW FROM OAT HILLS TUNNEL UPSTREAM BIFURCATION S STA 1339+52 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: N/A	Figure Number: 27

33. VIEW FROM OAT HILLS TUNNEL DOWNSTREAM BIFURCATION S STA 1303+57 - PHOTO TAKEN 6/15/21

34. VIEW FROM OAT HILLS TUNNEL DOWNSTREAM BIFURCATION S STA 1303+57 - PHOTO TAKEN 6/15/21

Helenschmidt Geotechnical, Inc.

Field Photos

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
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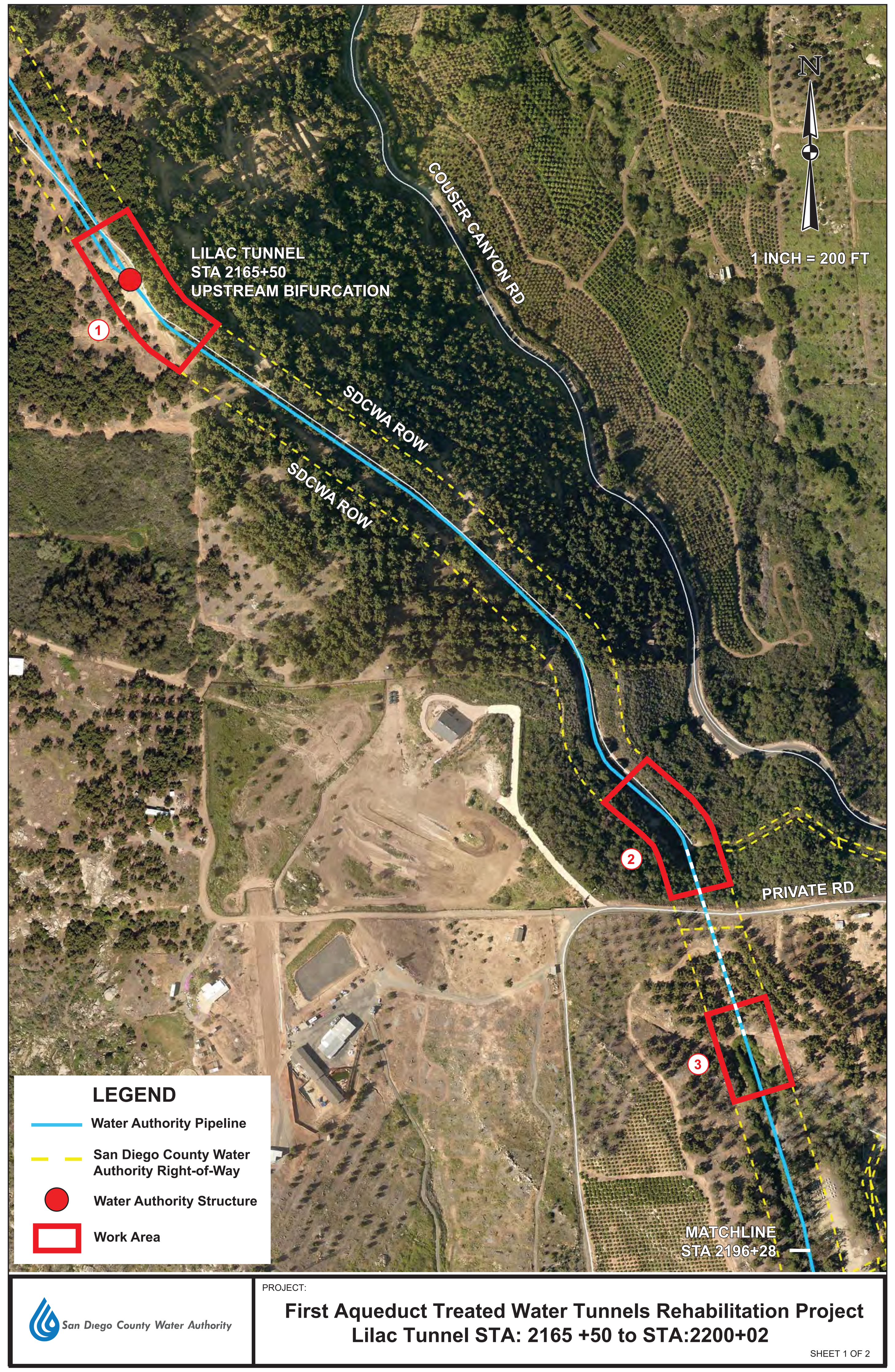

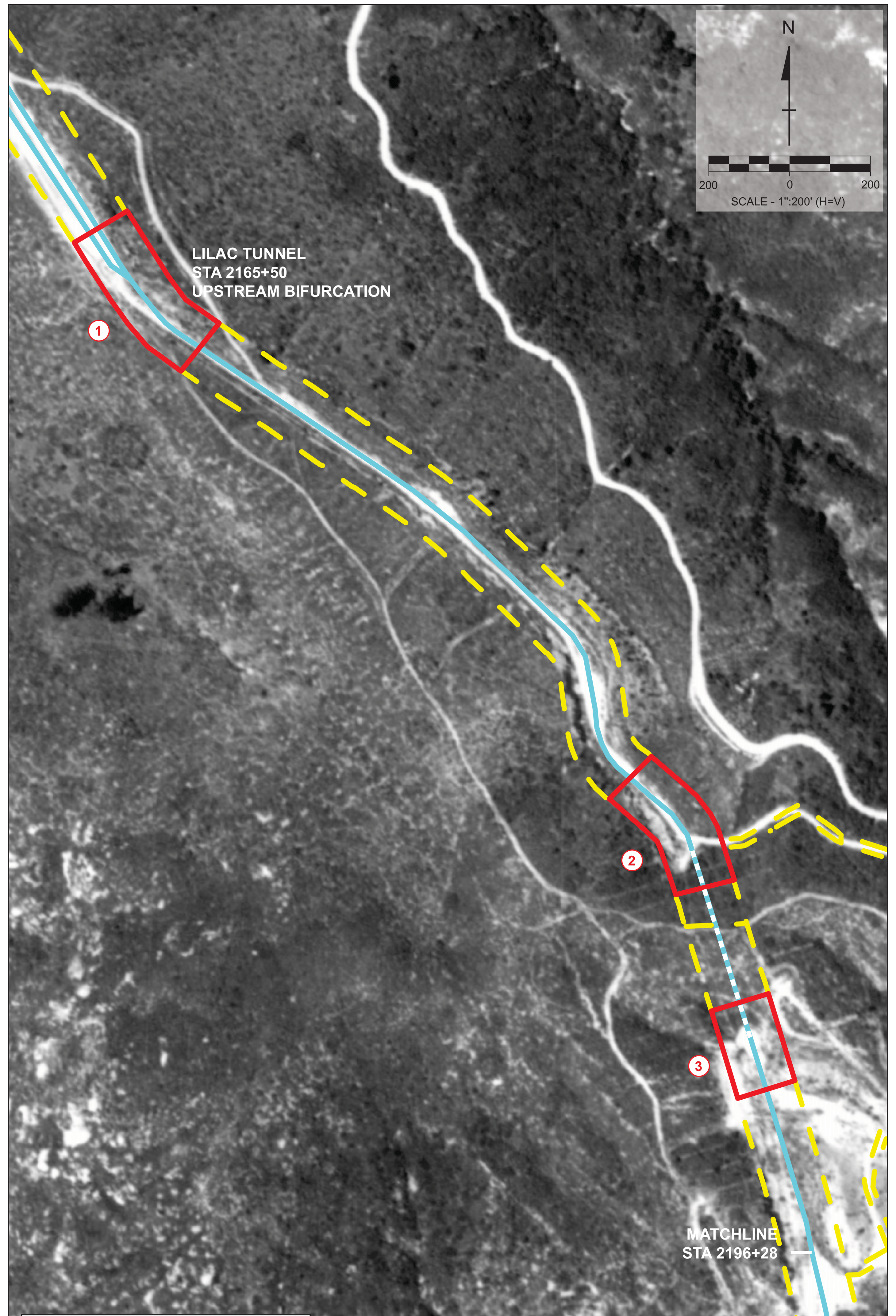

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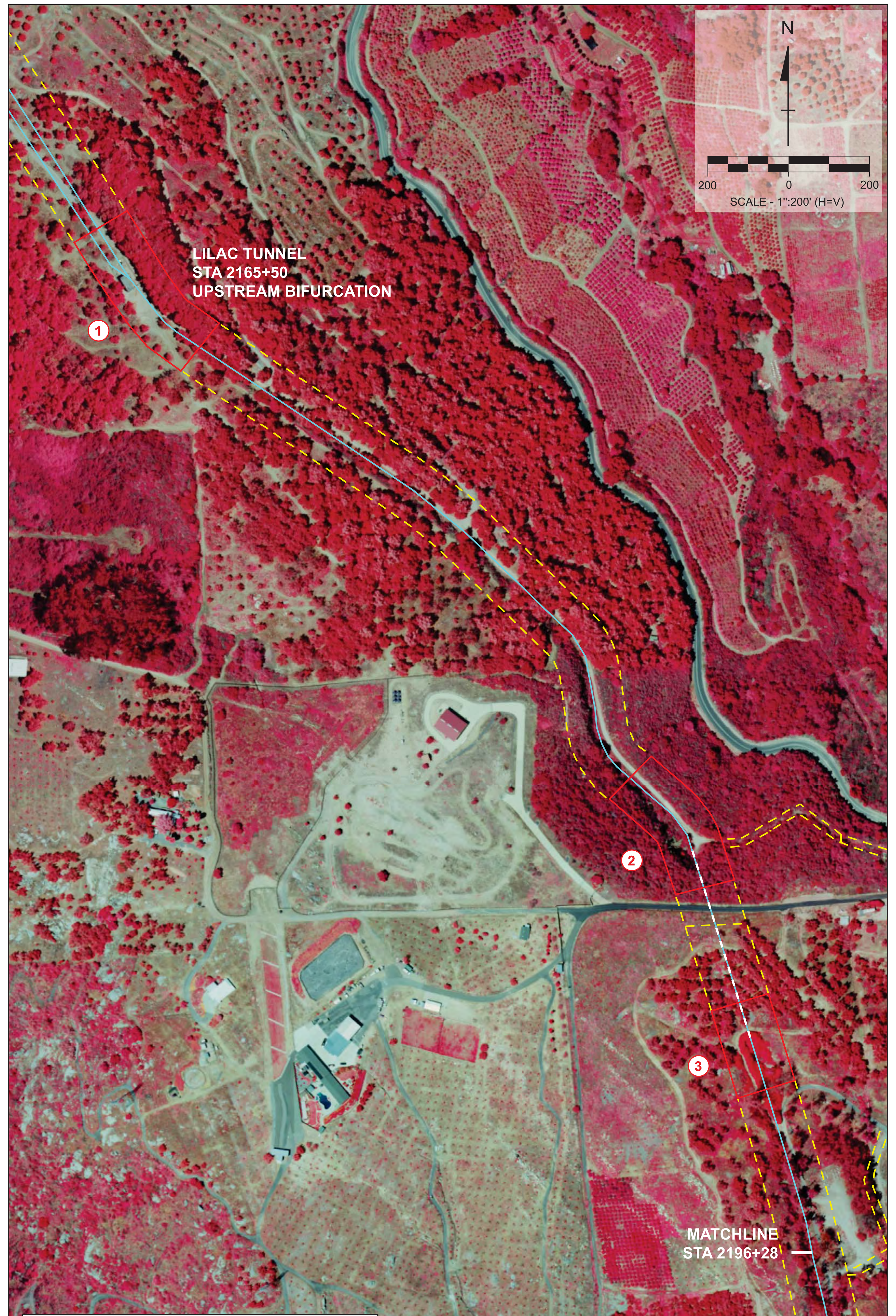

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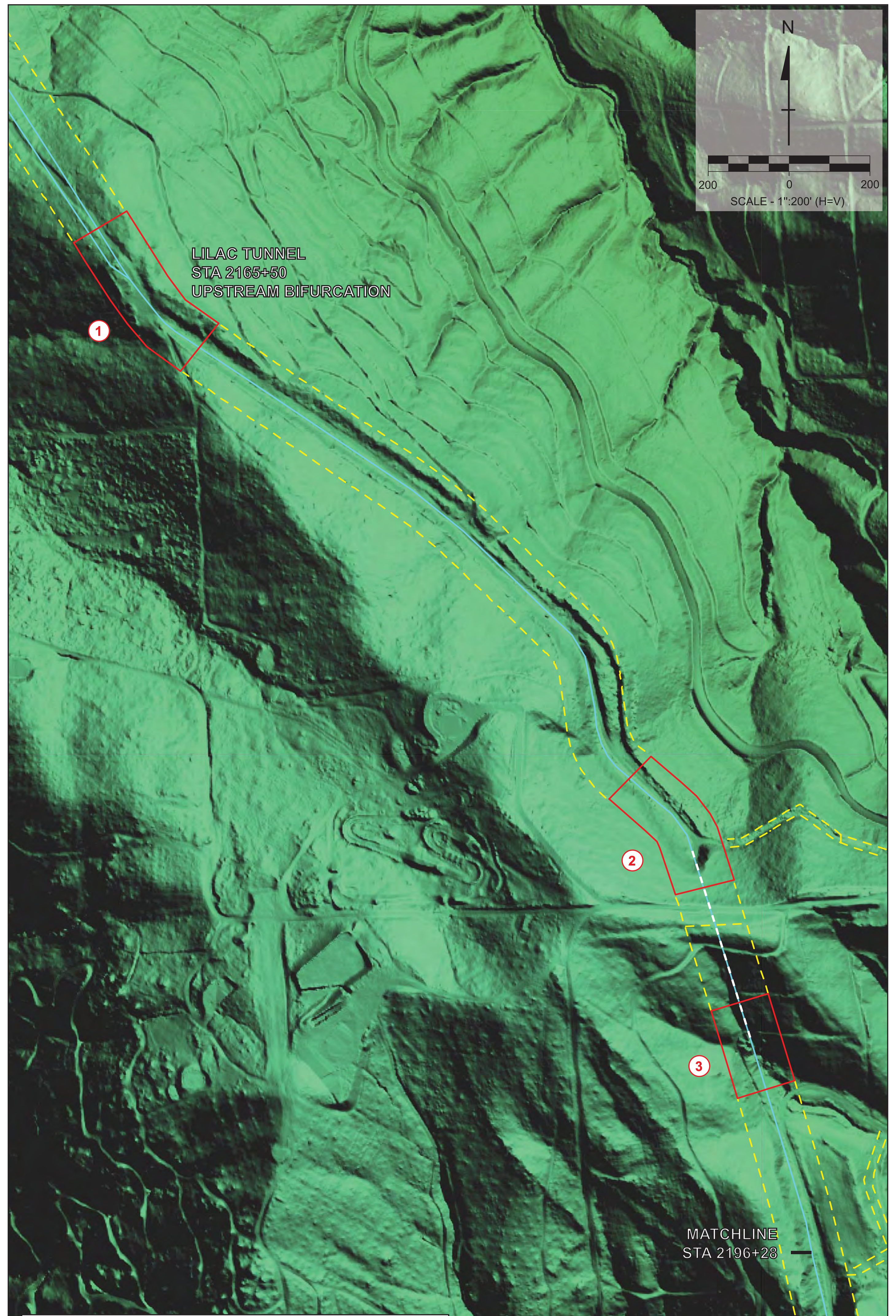


2014 LIDAR ELEVATION MODEL

LEGEND

(solid blue line)	WATER AUTHORITY PIPELINE (CUT AND COVER)
(dotted blue line)	WATER AUTHORITY PIPELINE (TUNNELED)
(dashed yellow line)	SAN DIEGO COUNTY WATER AUTHORITY RIGHT-OF-WAY
(red dot)	WATER AUTHORITY STRUCTURE
(red box)	WORK AREA
11	SITES NUMBERED NORTH TO SOUTH

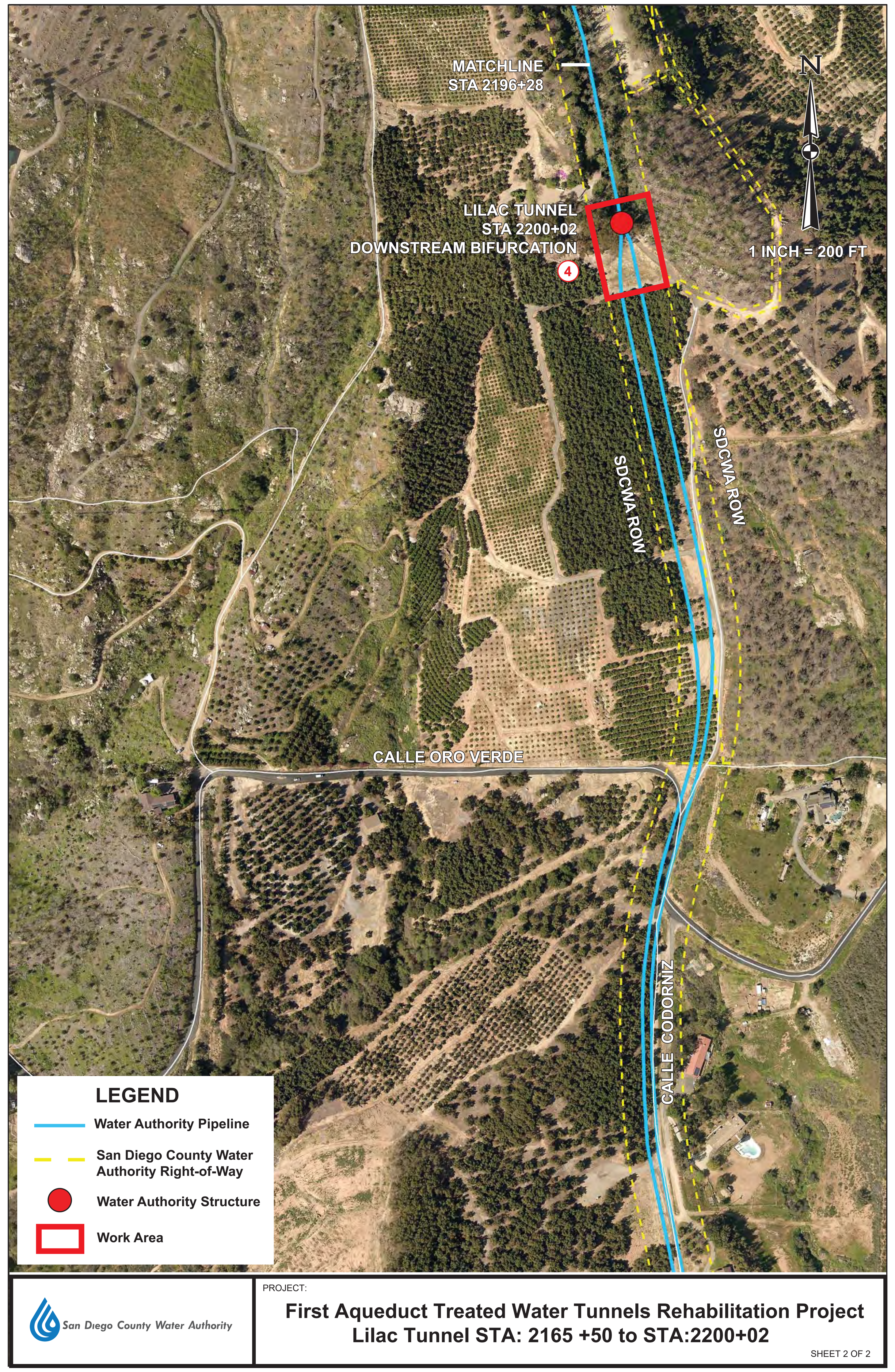
Site Plan From: Sheet Prepared by San Diego County Water Authority Entitled "First Aqueduct Treated Water Tunnels Rehabilitation Project Lilac Tunnel STA: 2165+50 to STA:2200+02" Sheet 1 of 2 Dated June 2021; 1953 Aerial Photo Flight AXN-17M, Photo 85; California Department of Fish and Wildlife CIR 2020; USGS 3D Elevation Progam 2014

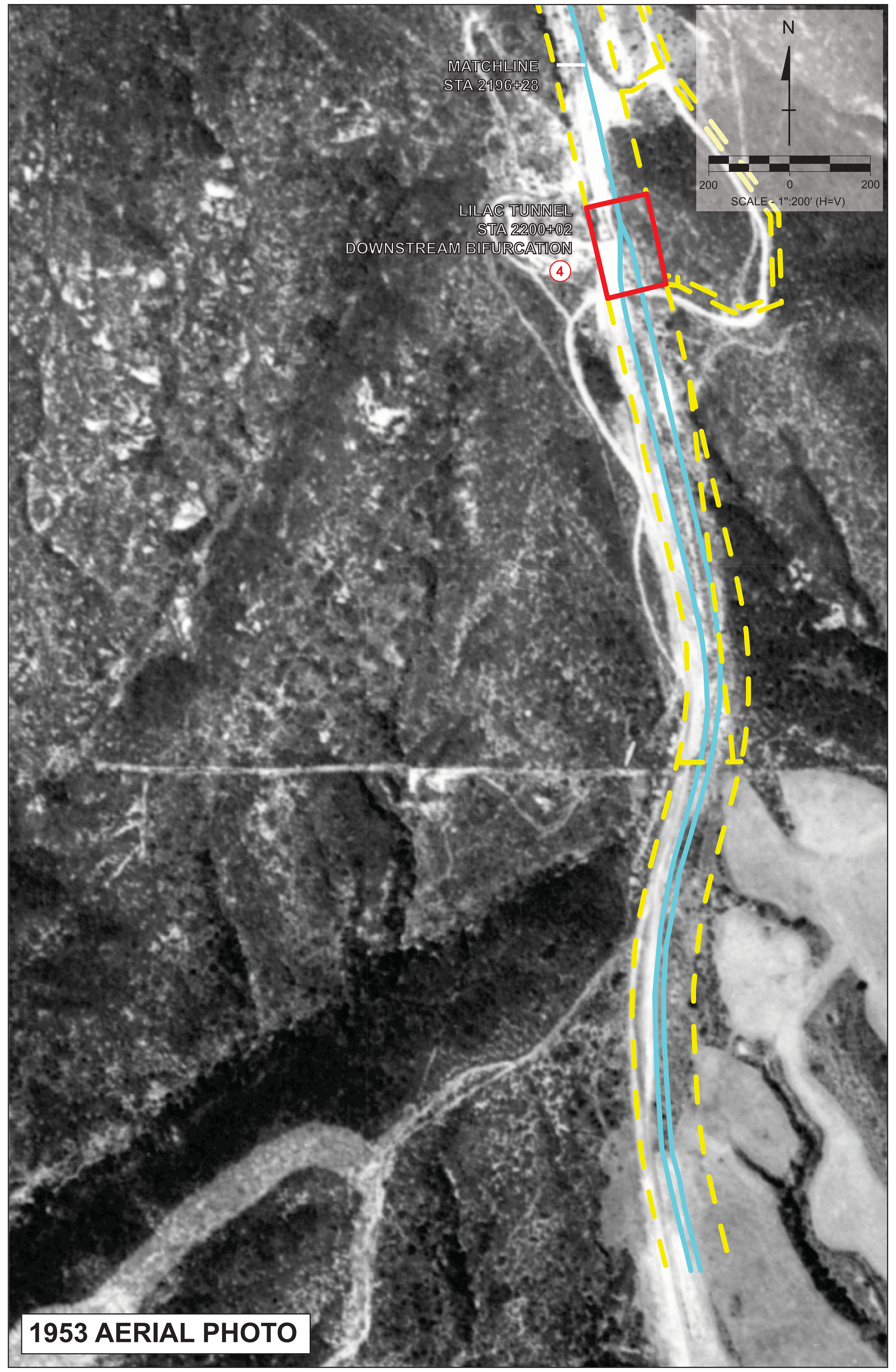
Helenschmidt Geotechnical, Inc.

Lilac Tunnel Sta 2165+50 to 2196+28

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: 1" = 200'	Plate Number: 1





LEGEND

- WATER AUTHORITY PIPELINE (CUT AND COVER)
- SAN DIEGO COUNTY WATER AUTHORITY RIGHT-OF-WAY
- WATER AUTHORITY STRUCTURE
- WORK AREA
- 11 SITES NUMBERED NORTH TO SOUTH

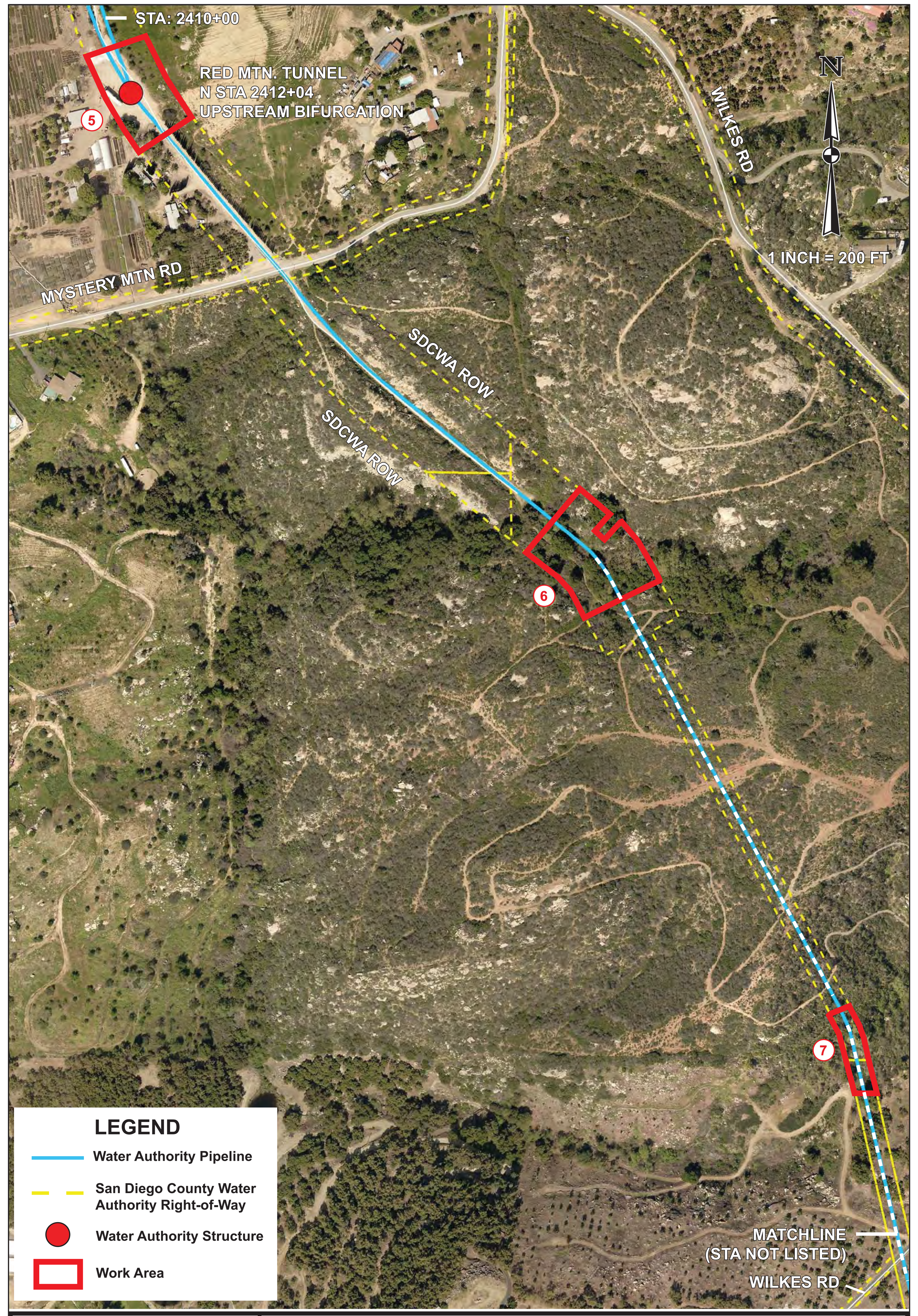
Helenschmidt Geotechnical, Inc.

Lilac Tunnel Sta 2196+28 to 2200+02

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: 1" = 200'	Plate Number: 2

Site Plan From: Sheet Prepared by San Diego County Water Authority Entitled “First Aqueduct Treated Water Tunnels Rehabilitation Project Lilac Tunnel STA: 2165+50 to STA:2200+02” Sheet 2 of 2 Dated June 2021; 1953 Aerial Photo Flight AXN-17M, Photo 85; California Department of Fish and Wildlife CIR 2020; USGS 3D Elevation Progam 2014

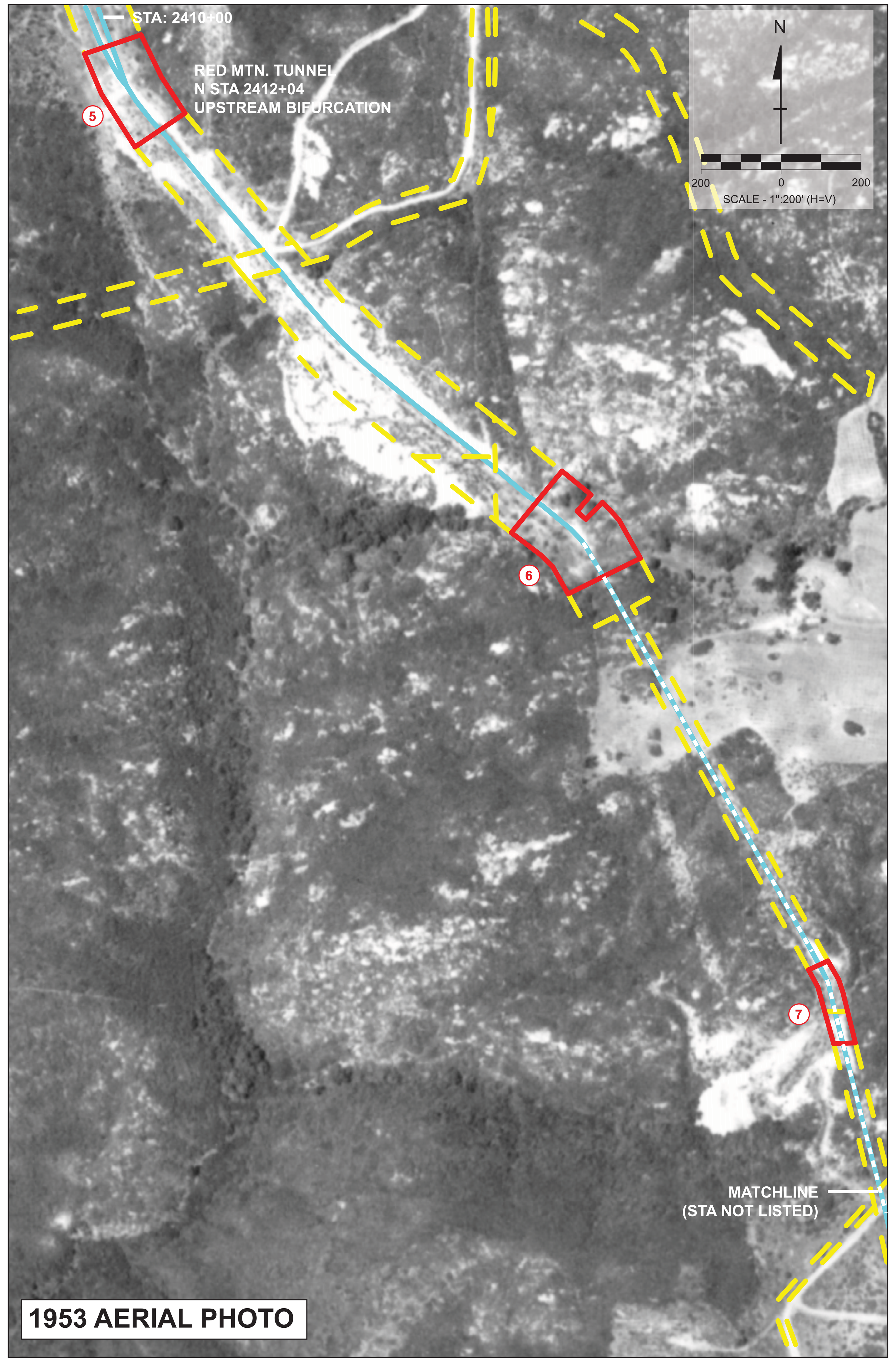


San Diego County Water Authority

PROJECT:

First Aqueduct Treated Water Tunnels Rehabilitation Project
Red Mountain Tunnel N STA: 2412+04 to S STA:1374+30

SHEET 1 OF 2



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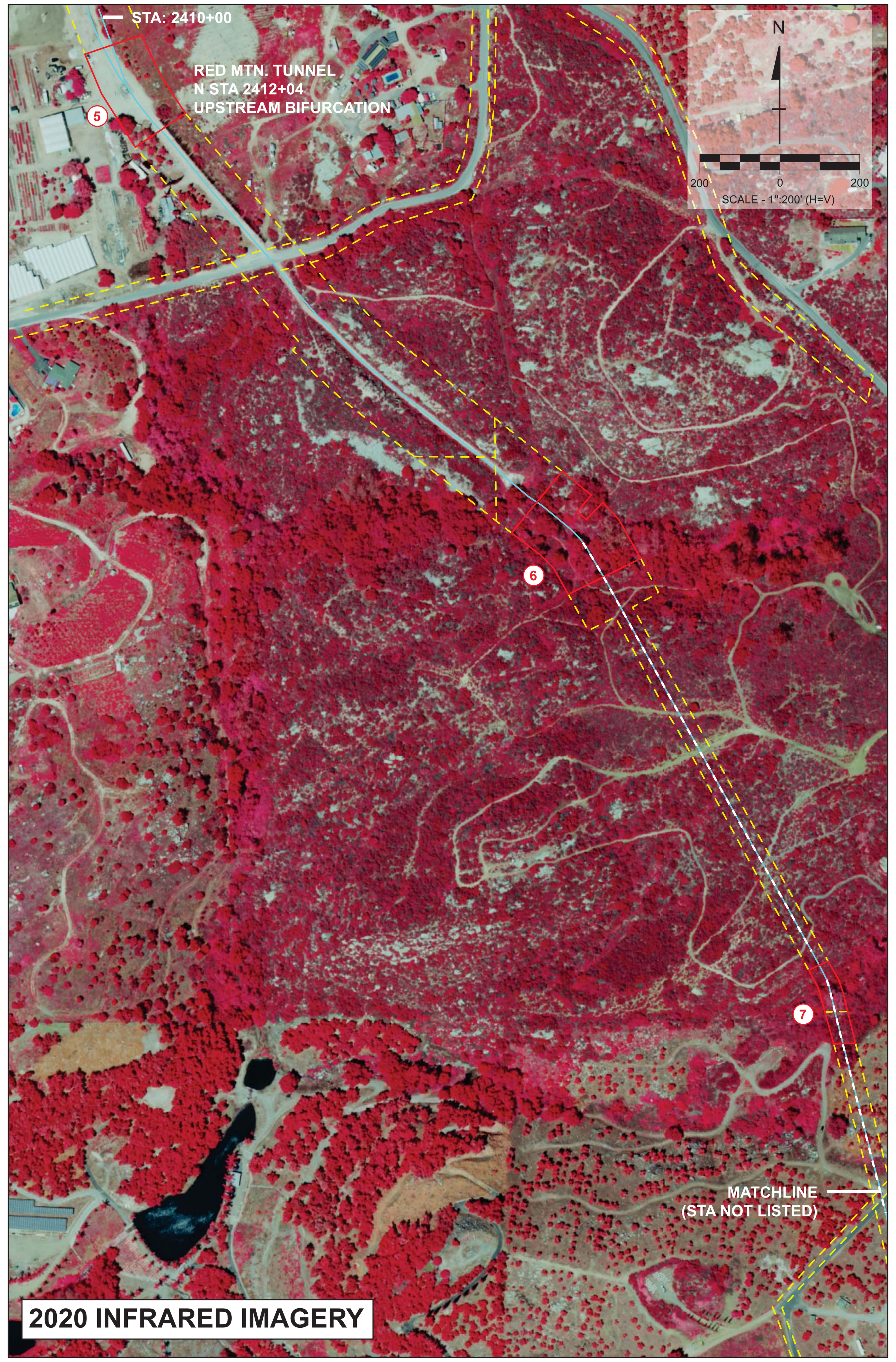

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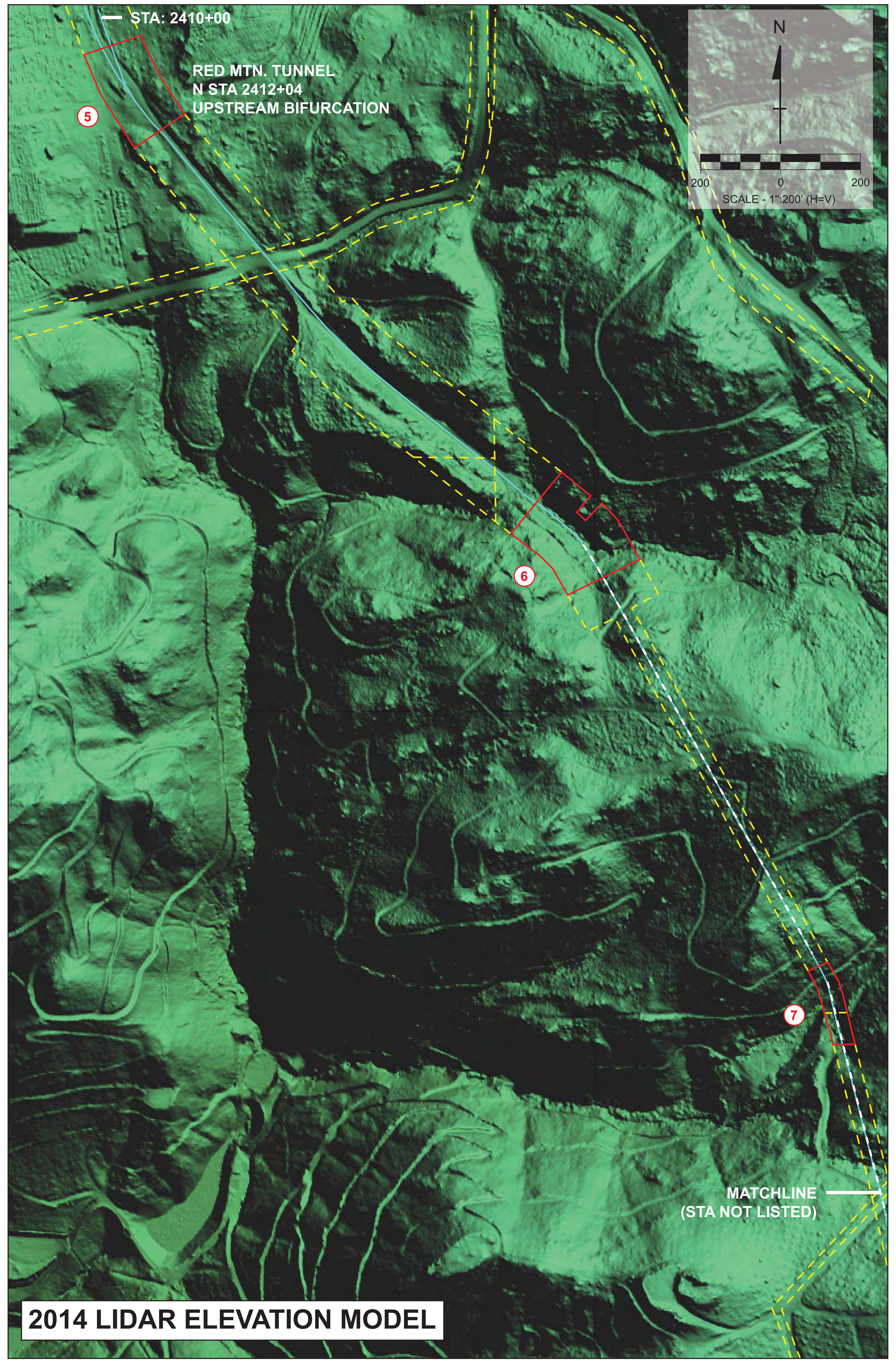


2014 LIDAR ELEVATION MODEL

LEGEND

- WATER AUTHORITY PIPELINE (CUT AND COVER)
- WATER AUTHORITY PIPELINE (TUNNELED)
- SAN DIEGO COUNTY WATER AUTHORITY RIGHT-OF-WAY
- WATER AUTHORITY STRUCTURE
- WORK AREA
- (11) SITES NUMBERED NORTH TO SOUTH

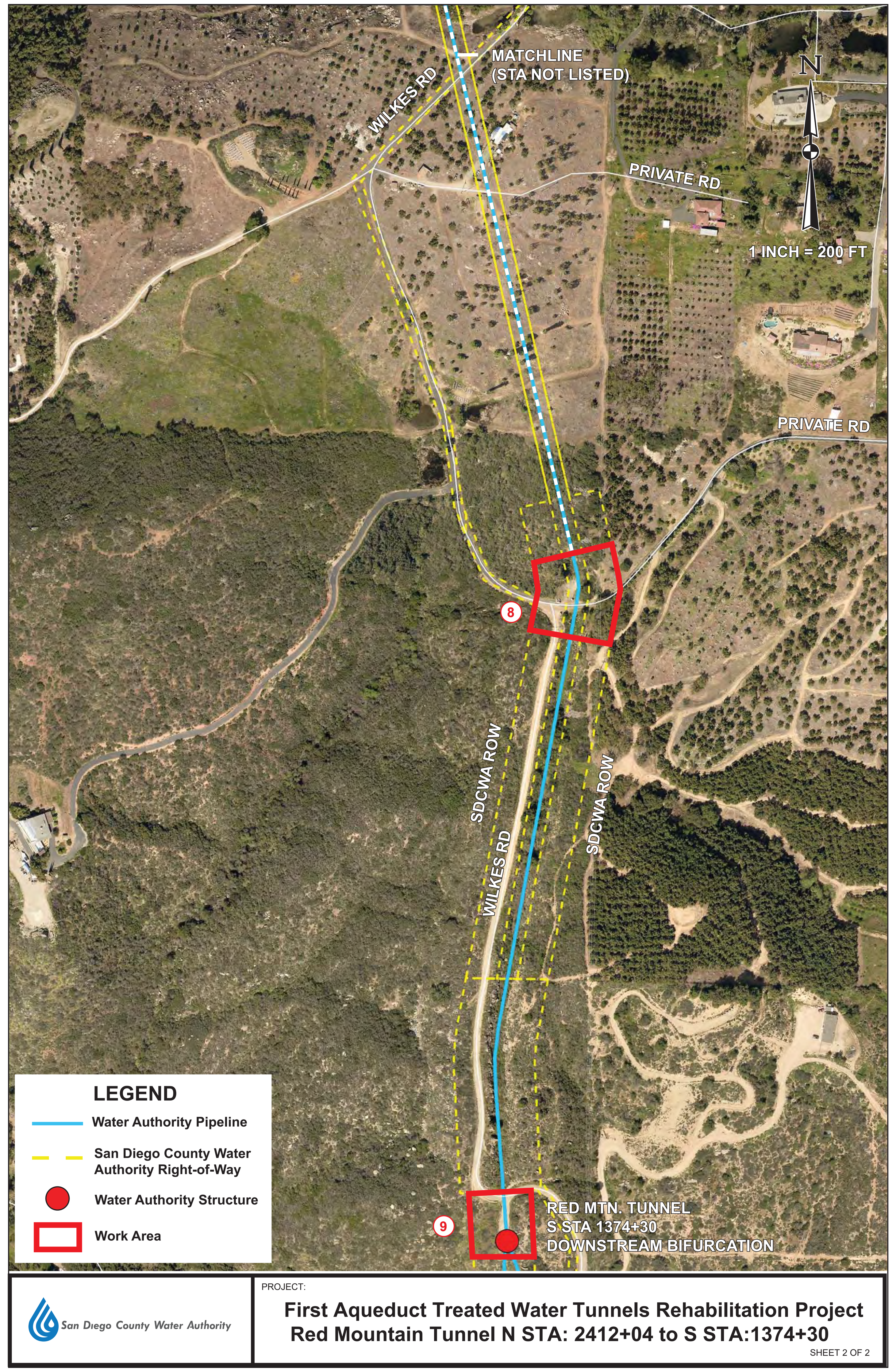
Site Plan From: Sheet Prepared by San Diego County Water Authority Entitled "First Aqueduct Treated Water Tunnels Rehabilitation Project Red Mountain Tunnel N STA: 2412+04 to S STA:1374+30" Sheet 1 of 2 Dated June 2021; 1953 Aerial Photo Flight AXN-17M, Photo 90; California Department of Fish and Wildlife CIR 2020; USGS 3D Elevation Progam 2014

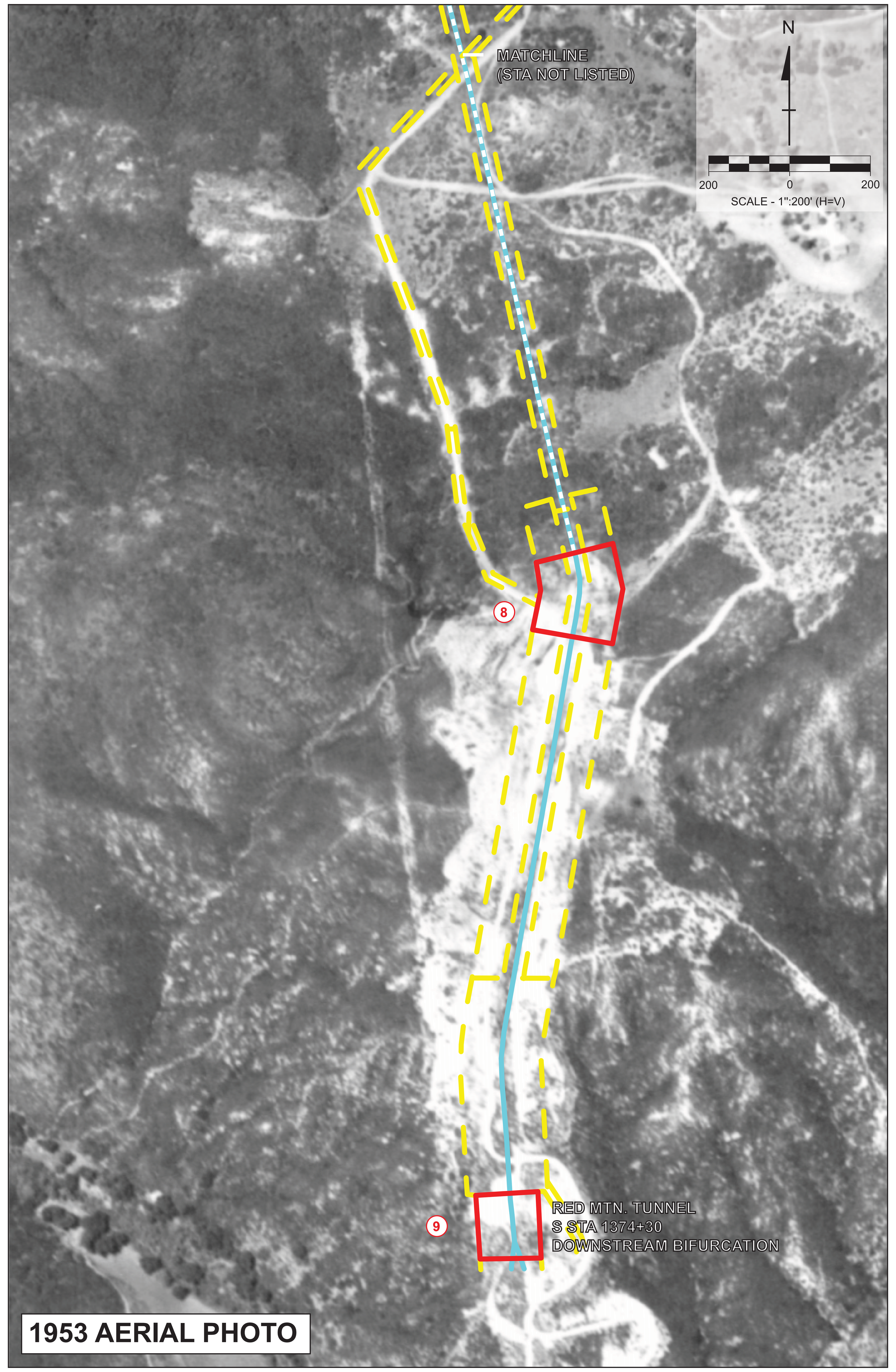
Helenschmidt Geotechnical, Inc.

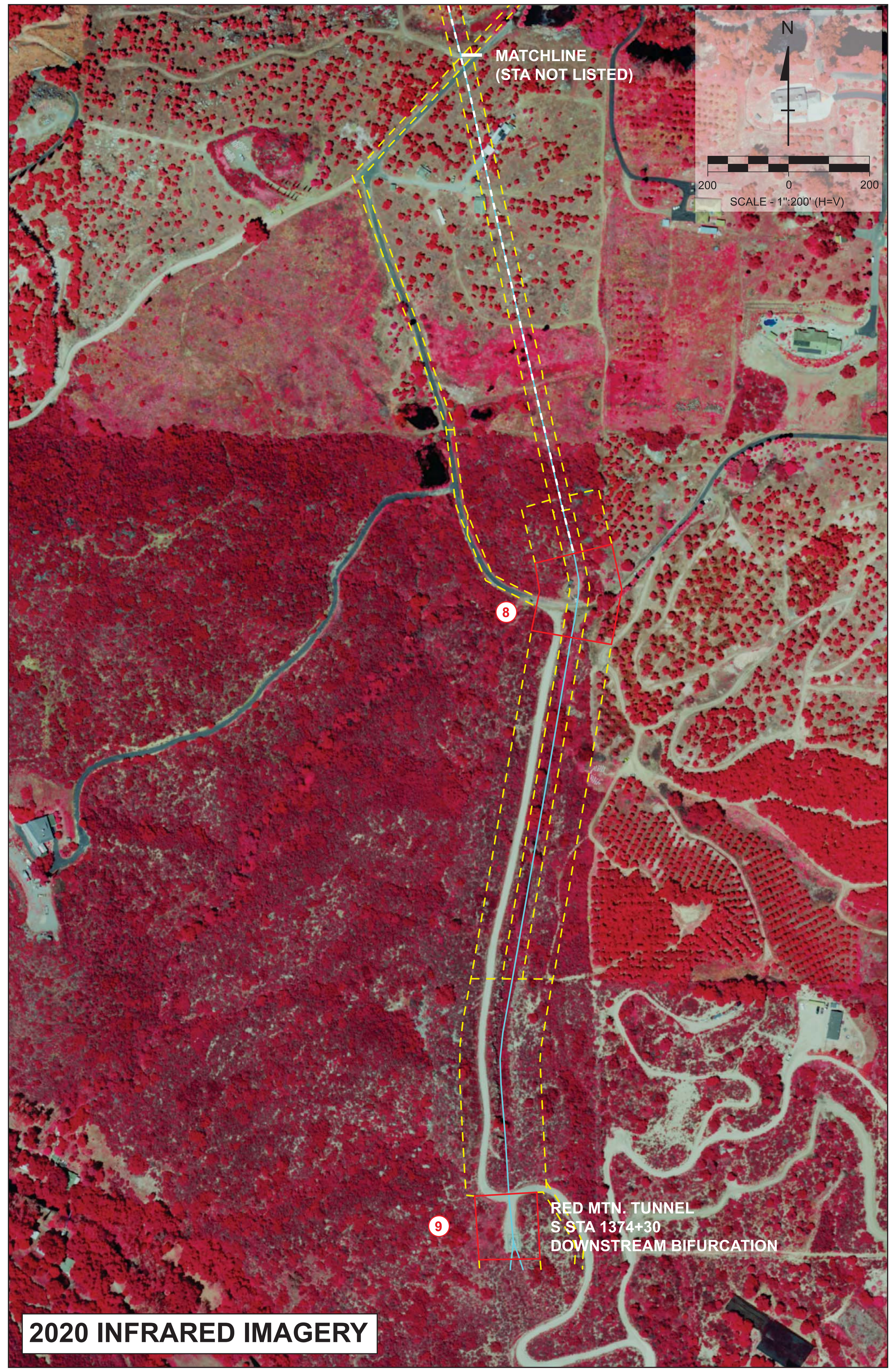
Red Mtn. Tunnel N Sta 2412+04 to S Sta 1405+00

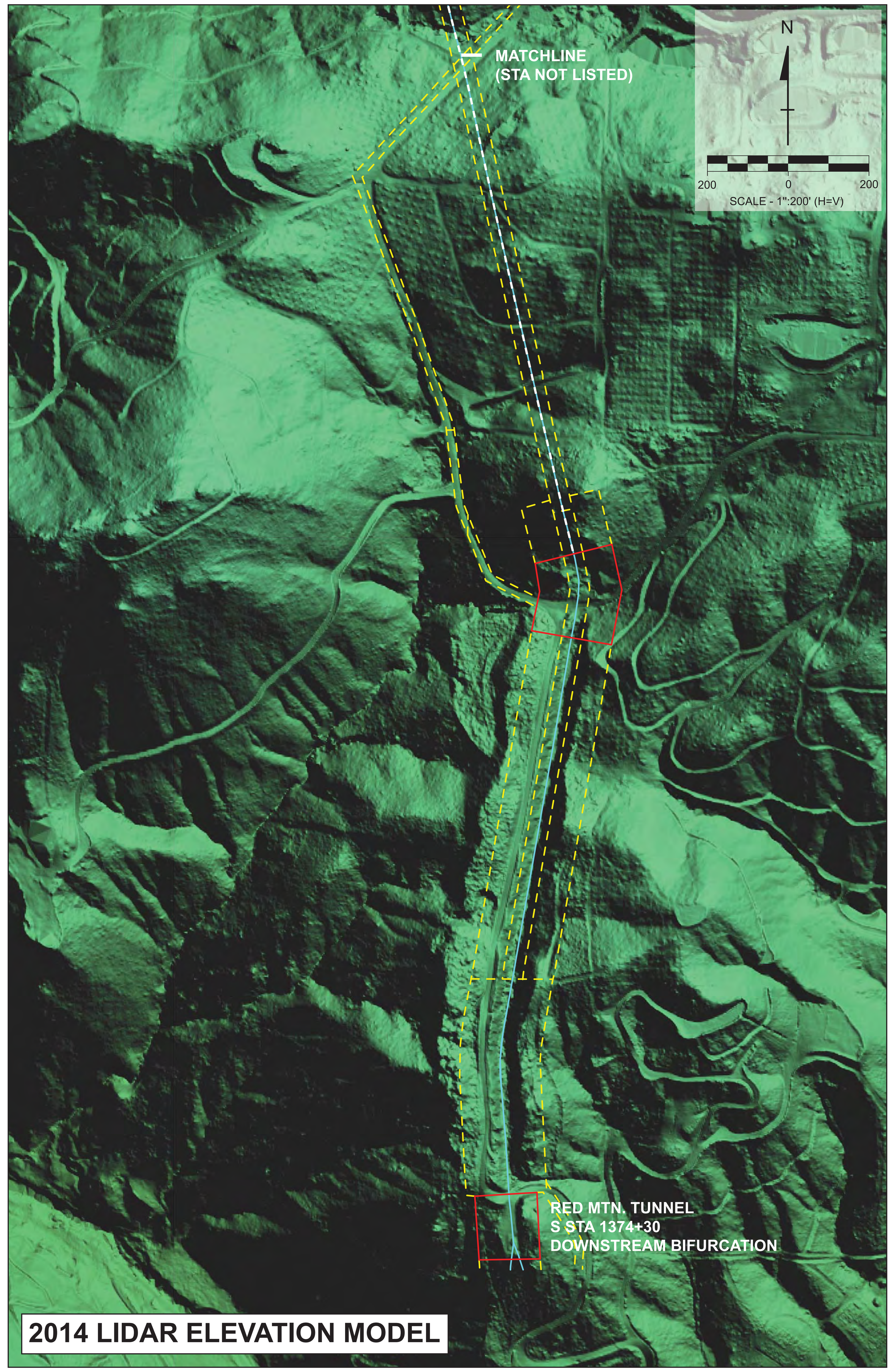
SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: 1" = 200'	Plate Number: 3









LEGEND

(solid blue line)	WATER AUTHORITY PIPELINE (CUT AND COVER)
(dotted blue line)	WATER AUTHORITY PIPELINE (TUNNELED)
(dashed yellow line)	SAN DIEGO COUNTY WATER AUTHORITY RIGHT-OF-WAY
(red dot)	WATER AUTHORITY STRUCTURE
(red box)	WORK AREA
11	SITES NUMBERED NORTH TO SOUTH

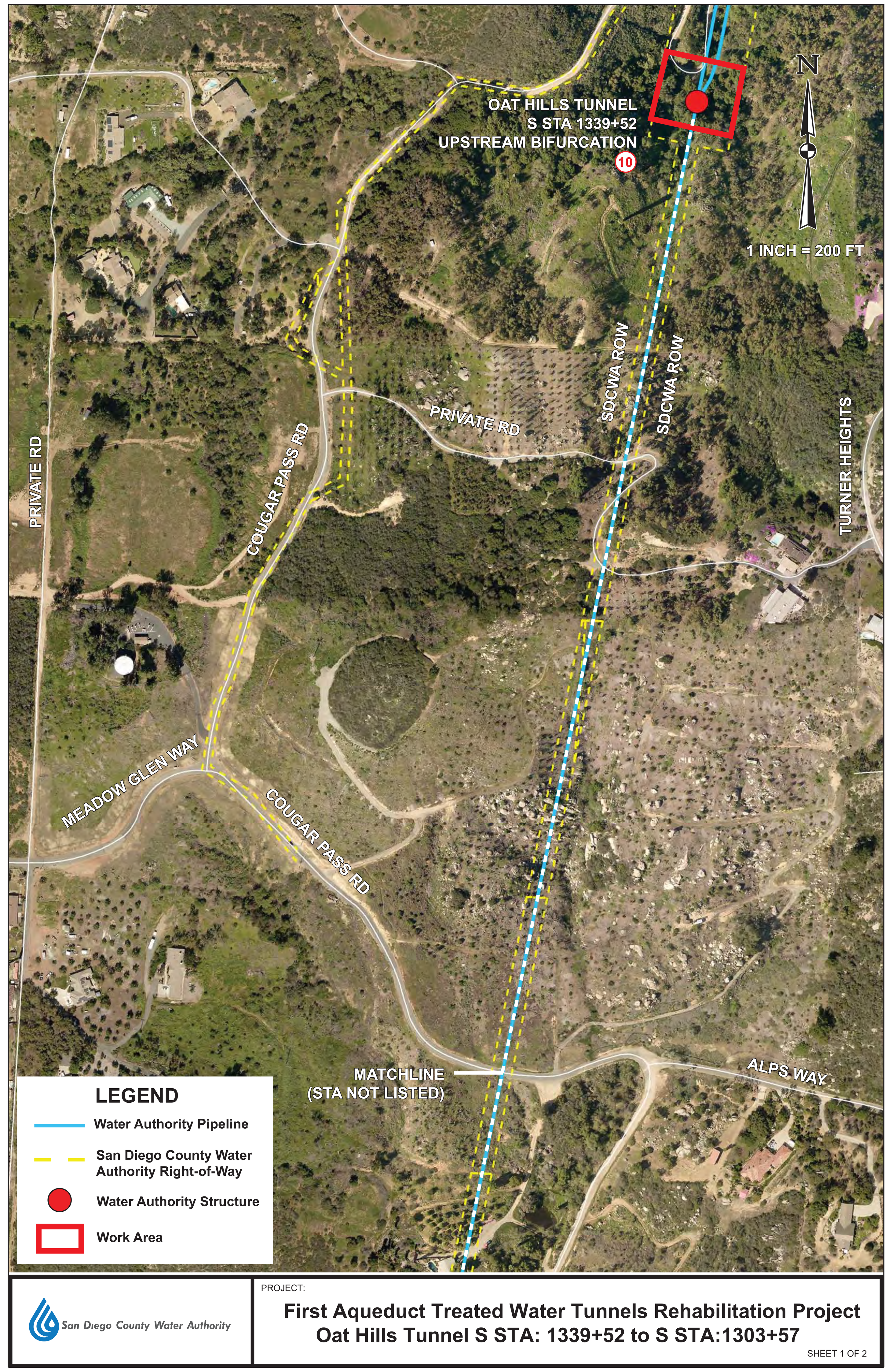
Site Plan From: Sheet Prepared by San Diego County Water Authority Entitled “First Aqueduct Treated Water Tunnels Rehabilitation Project Red Mountain Tunnel N STA: 2412+04 to S STA:1374+30” Sheet 2 of 2 Dated June 2021; 1953 Aerial Photo Flight AXN-17M, Photo 90; California Department of Fish and Wildlife CIR 2020; USGS 3D Elevation Progam 2014

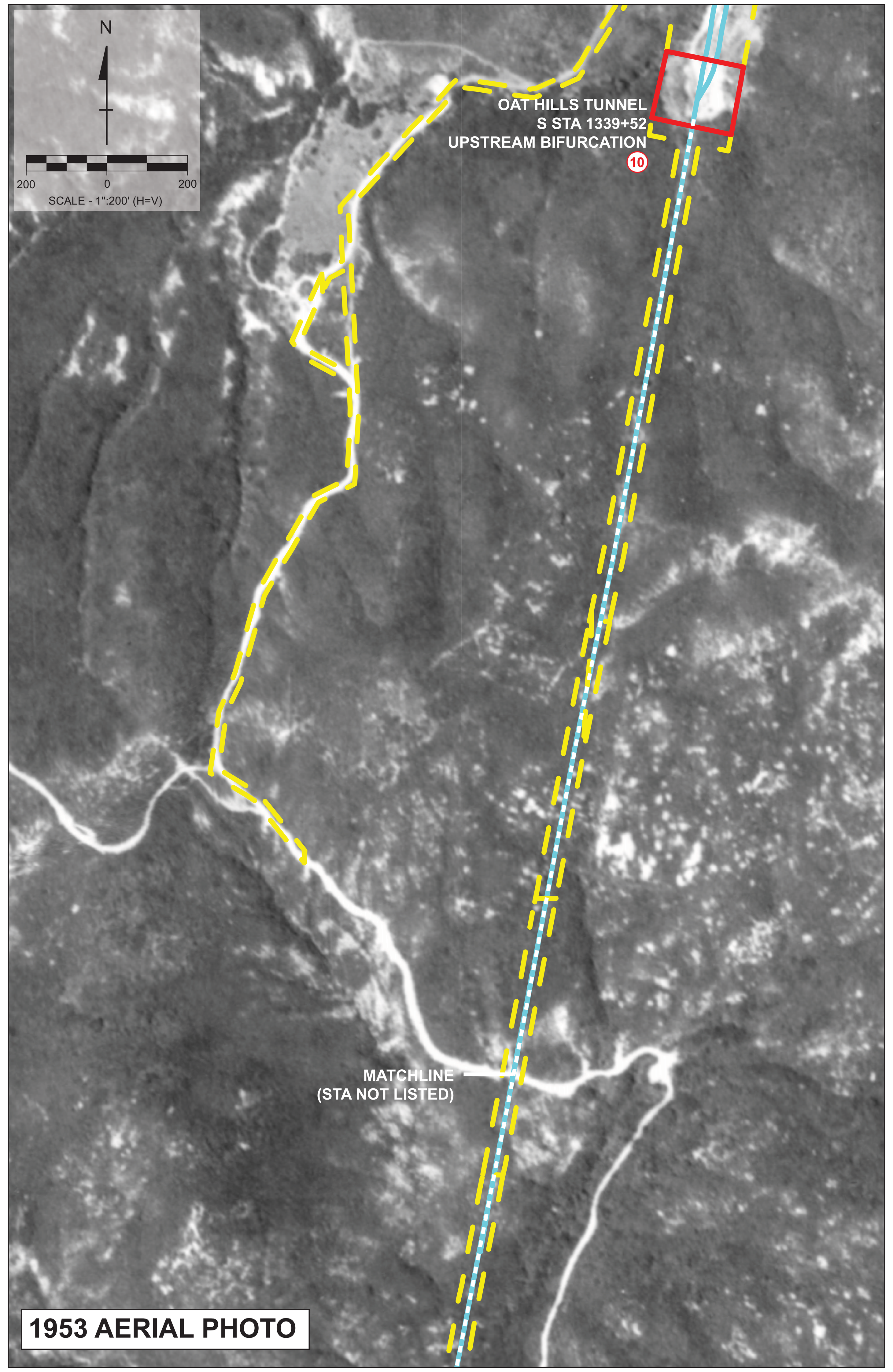
Helenschmidt Geotechnical, Inc.

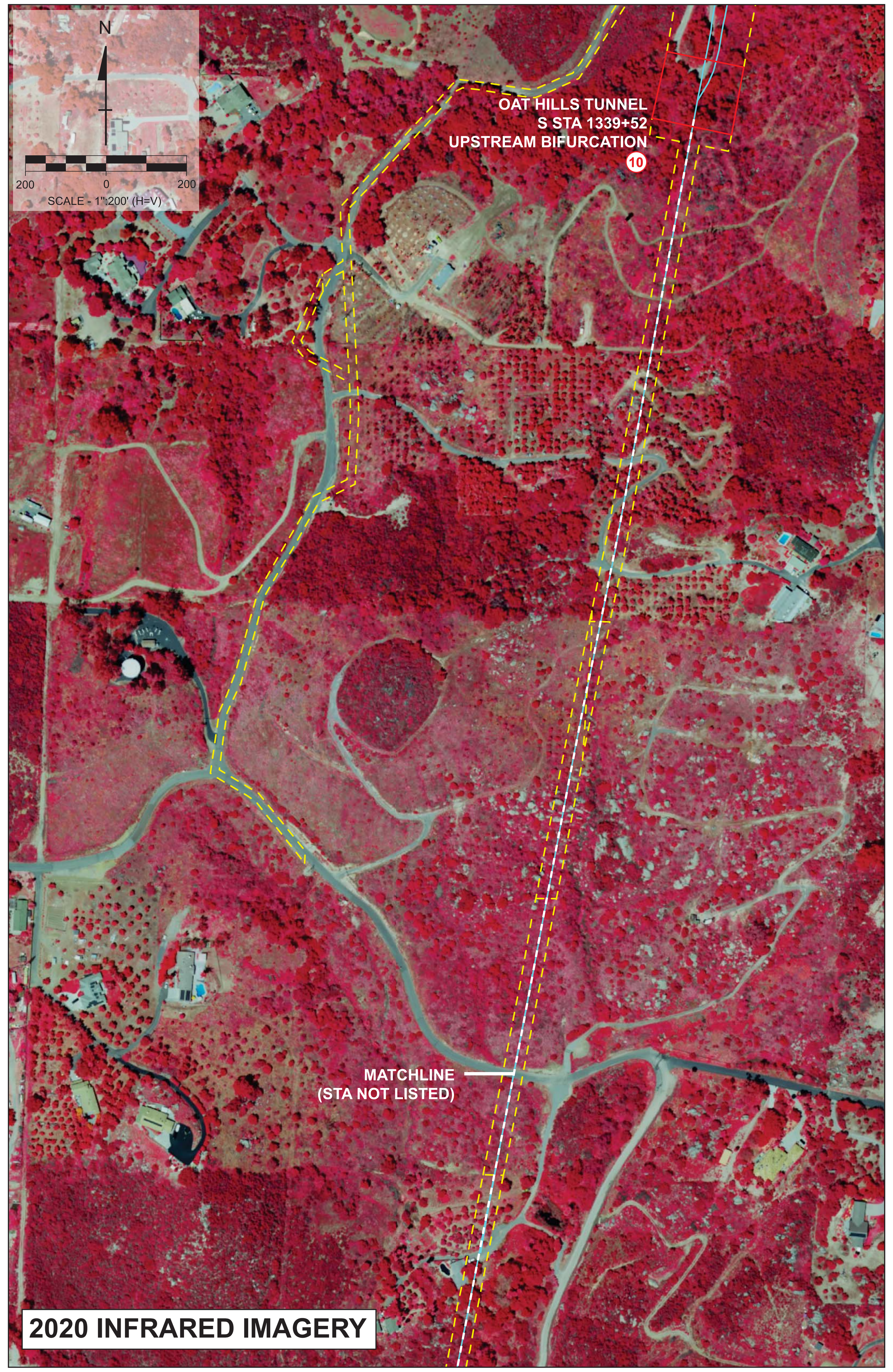
Red Mtn. Tunnel S Sta 1405+00 to 1374+30

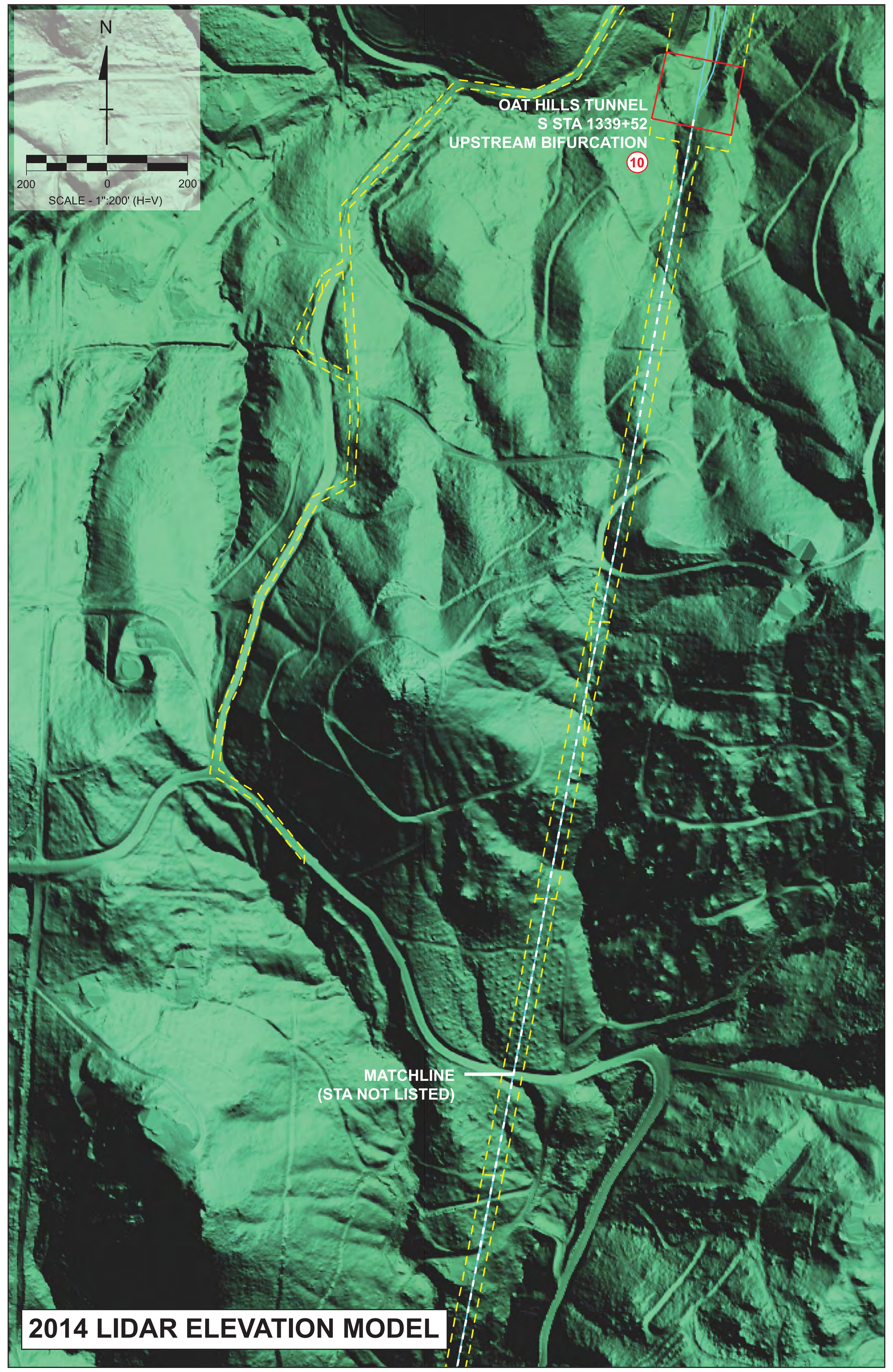
SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: 1" = 200'	Plate Number: 4









LEGEND

- WATER AUTHORITY PIPELINE (CUT AND COVER)
- WATER AUTHORITY PIPELINE (TUNNELED)
- SAN DIEGO COUNTY WATER AUTHORITY RIGHT-OF-WAY
- WATER AUTHORITY STRUCTURE
- WORK AREA
- (11) SITES NUMBERED NORTH TO SOUTH

Site Plan From: Sheet Prepared by San Diego County Water Authority Entitled "First Aqueduct Treated Water Tunnels Rehabilitation Project Oat Hills Tunnel S STA: 1339+52 to S STA:1303+57" Sheet 1 of 2 Dated June 2021; 1953 Aerial Photo Flight AXN-17M, Photo 91; California Department of Fish and Wildlife CIR 2020; USGS 3D Elevation Progam 2014

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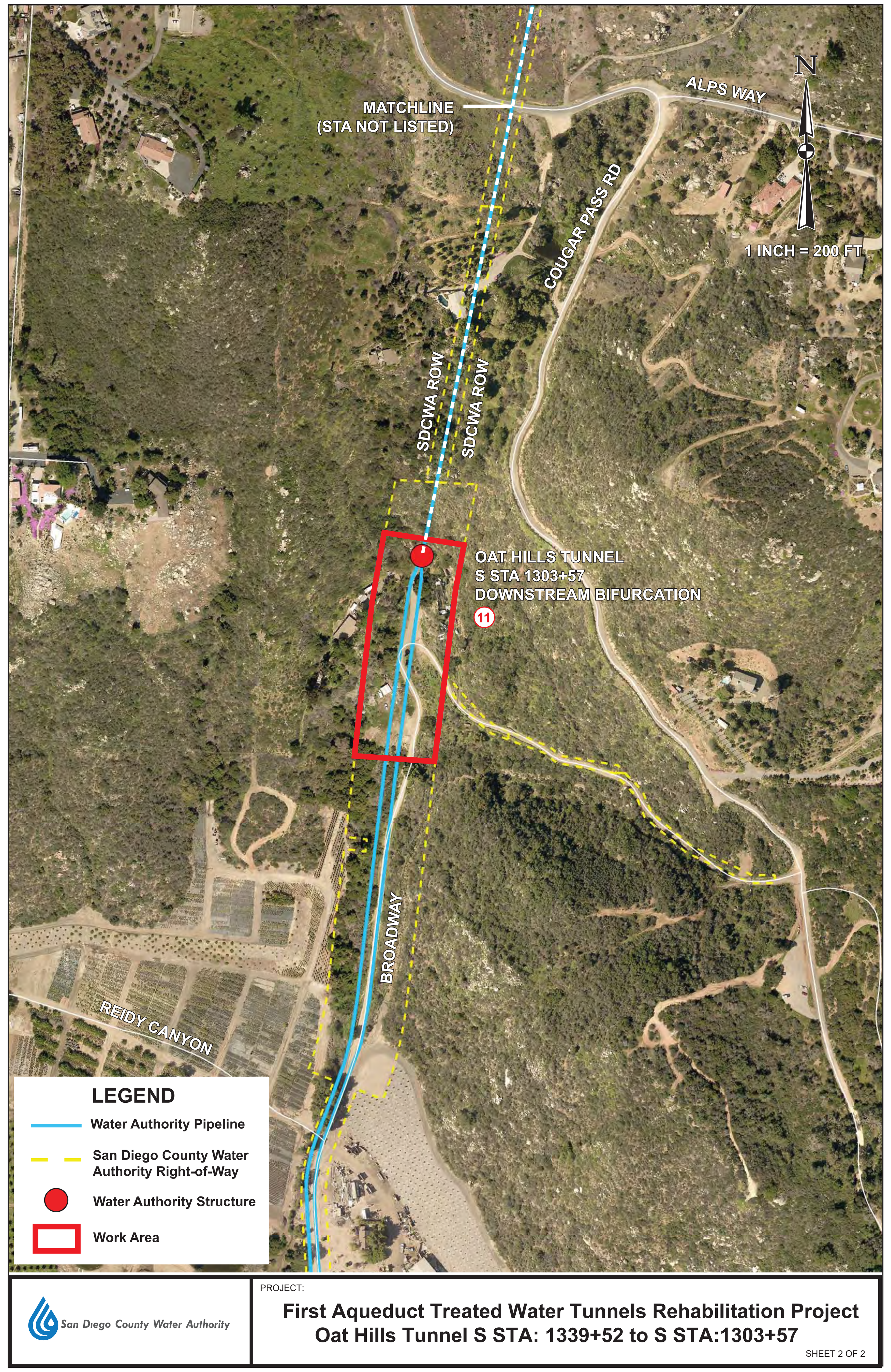
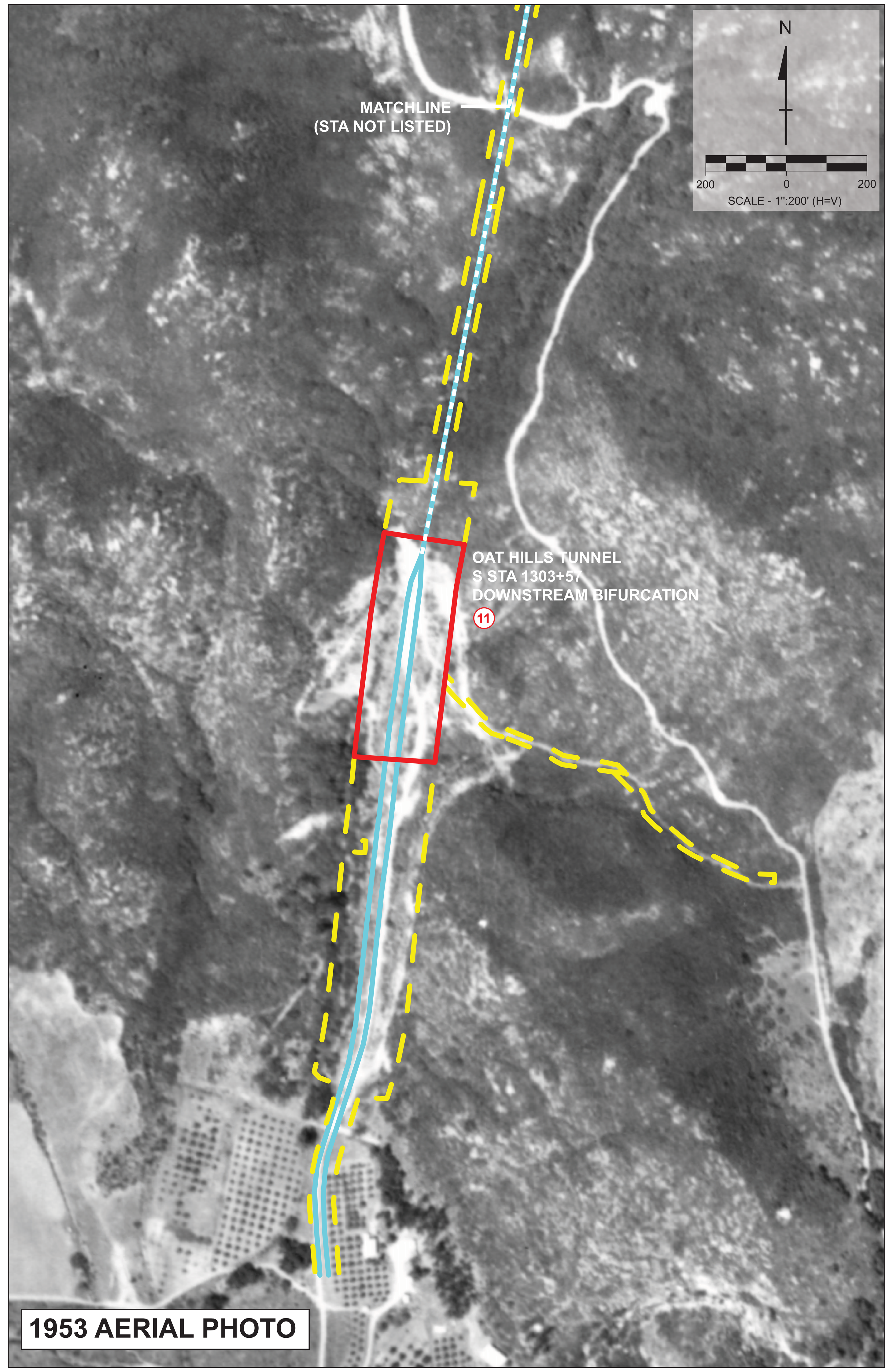
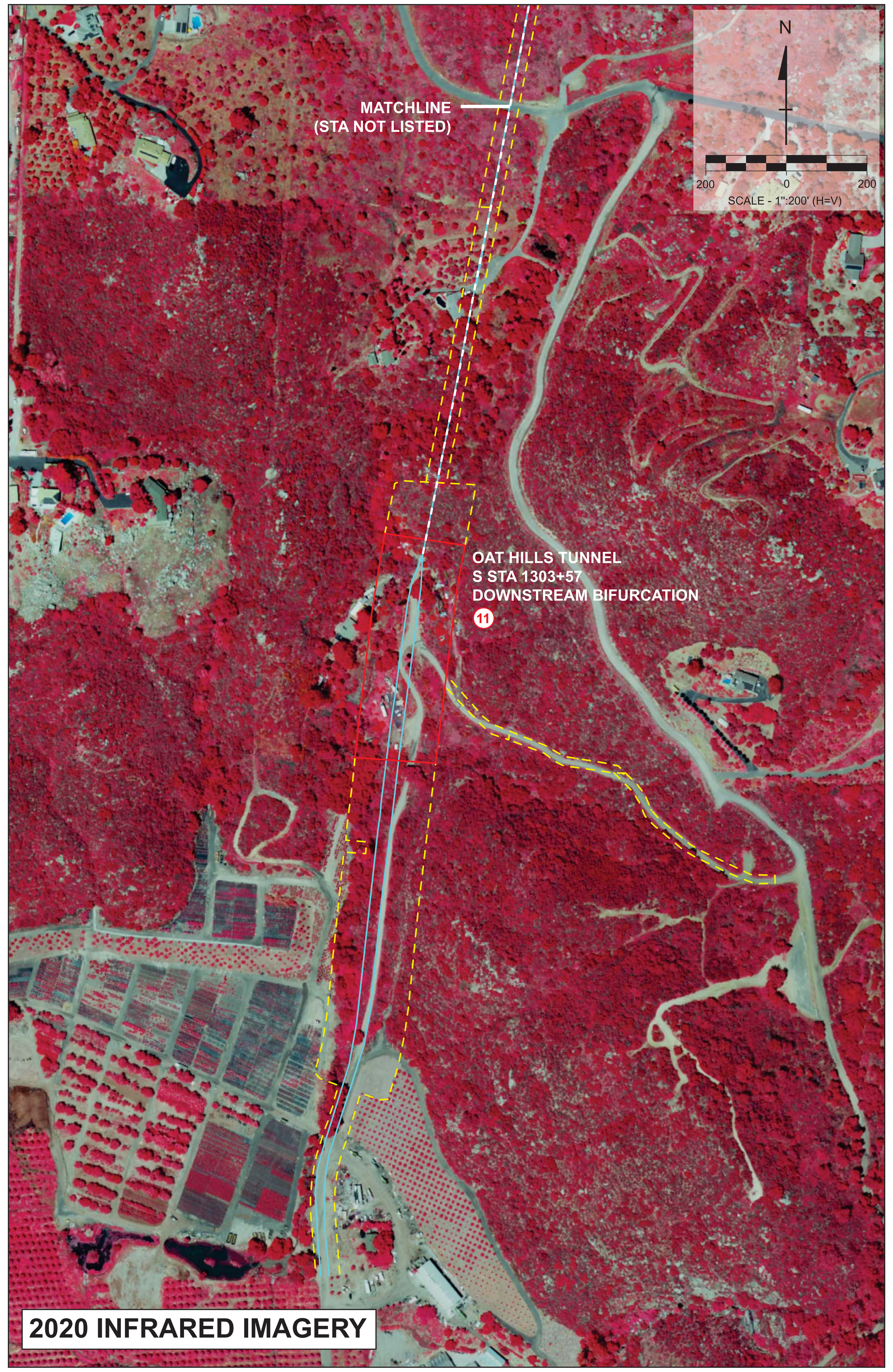
Oat Hills Tunnel S Sta 1339+52 to 1315+00

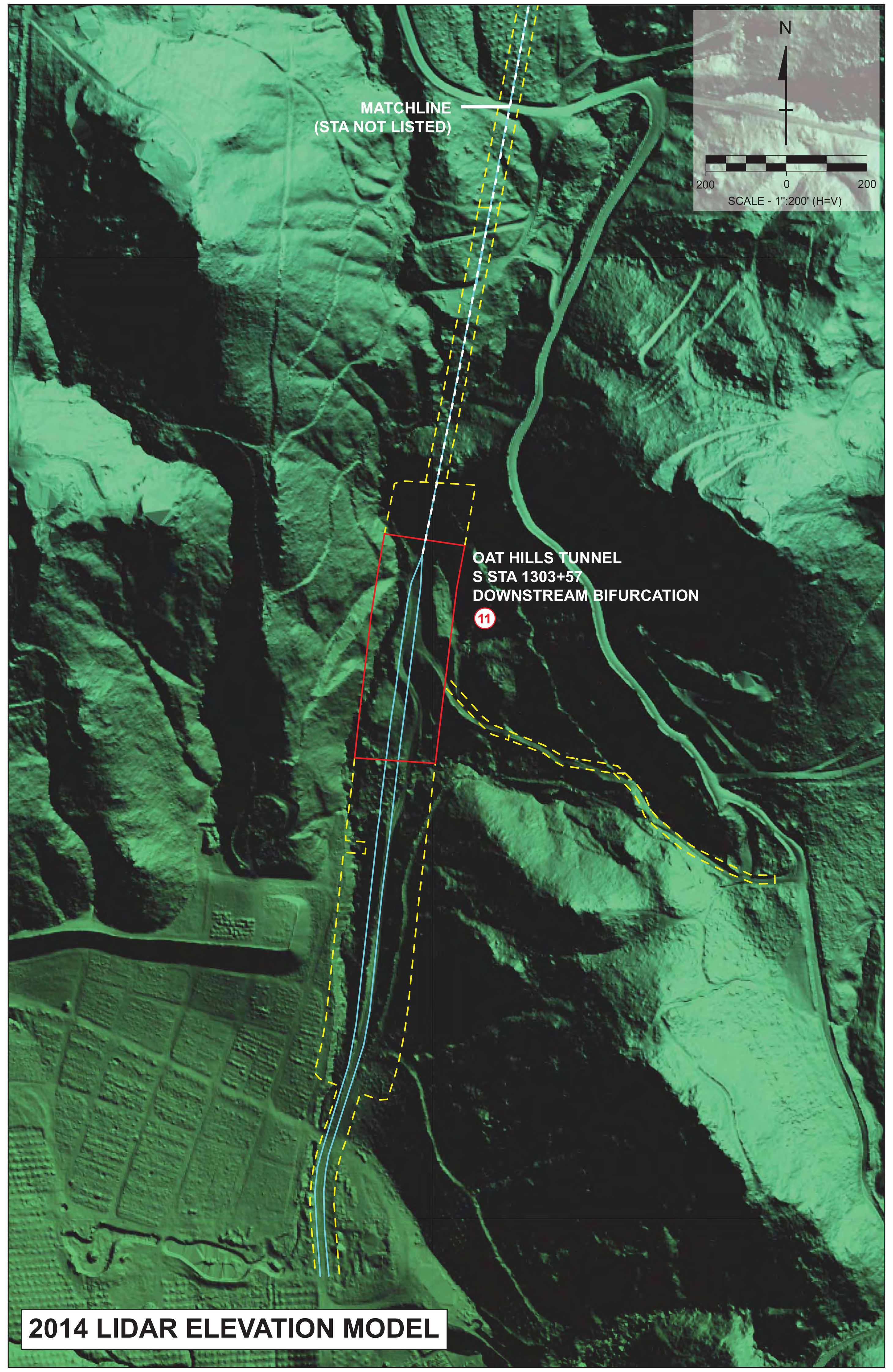
SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: 1" = 200'	Plate Number: 5









LEGEND

	WATER AUTHORITY PIPELINE (CUT AND COVER)
	WATER AUTHORITY PIPELINE (TUNNELED)
	SAN DIEGO COUNTY WATER AUTHORITY RIGHT-OF-WAY
	WATER AUTHORITY STRUCTURE
	WORK AREA
11	SITES NUMBERED NORTH TO SOUTH

Site Plan From: Sheet Prepared by San Diego County Water Authority Entitled "First Aqueduct Treated Water Tunnels Rehabilitation Project Oat Hills Tunnel S STA: 1339+52 to S STA:1303+57" Sheet 2 of 2 Dated June 2021; 1953 Aerial Photo Flight AXN-17M, Photo 91; California Department of Fish and Wildlife CIR 2020; USGS 3D Elevation Progam 2014

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Oat Hills Tunnel S Sta 1315+00 to 1303+57

SDCWA First Aqueduct Treated Water Tunnels Rehabilitation
San Diego County, CA

Project Number: 121196	Date: July 2021
Drafted: VC	Eng/Geo: SRH/MH
Scale: 1" = 200'	Plate Number: 6

APPENDIX A

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AERIAL PHOTOS

May 17, 1953 Flight AXN-17M, photos 85-92

Helenschmidt Geotechnical, Inc.
5931 Sea Lion Place, Suite 102
Carlsbad, CA 92008
Telephone 760-579-0333
Fax 760-579-0230
www.hgiengineering.com

Appendix F

Paleontological Records Search Results

13 May 2021

Sarah Siren
Dudek
605 Third Street
Encinitas, CA 92024

RE: Paleontological Records Search – Q0238 1st Aqueduct Tunnels

Dear Ms. Siren:

This letter presents the results of a paleontological records search conducted for the Q0238 1st Aqueduct Tunnels project (Project), located in the communities of Valley Center and Hidden Meadows in an unincorporated area of northwestern San Diego County, California. The Project site lies east of Interstate 15, and is located along the San Diego Aqueduct in the vicinity of Turner Lake and Couser Canyon.

Methods

A review of published geological maps covering the Project site and surrounding area was conducted to determine the specific geologic units underlying the Project site. Each geologic unit was subsequently assigned a paleontological resource sensitivity (Deméré and Walsh, 1993). In addition, a search of the paleontological collection records housed at the San Diego Natural History Museum (SDNHM) was conducted in order to determine if any documented fossil collection localities occur along the Project site or within the immediate surrounding area.

Results

Published geological reports (e.g., Kennedy and Tan, 2007) covering the Project area indicate that the proposed Project has the potential to impact Cretaceous-age intrusive igneous rocks. This geologic unit and its paleontological sensitivity are summarized below. The SDNHM does not have any recorded fossil localities that lie within one mile of the Project site.

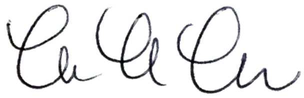
Cretaceous intrusive igneous rocks – Early Cretaceous-age intrusive igneous rocks (namely the tonalite of Couser Canyon, granite of Dixon Lake, granodiorite, Monzogranite of Merrium Mountain, and quartz-bearing diorite of Red Mountain, as mapped by Kennedy and Tan, 2007) underlie the entire Project site, and comprise part of the northern end of the Peninsular Ranges Batholith. Plutonic igneous rocks do not preserve fossils because they crystallize at extremely high temperatures and pressures several miles below the earth's surface, so these rocks are assigned no paleontological sensitivity.

Summary and Recommendations

Given the zero sensitivity of the geologic units underlying the Project site and the lack of nearby fossil collection localities, construction of the Project is unlikely to result in impacts to paleontological resources. As a result, implementation of a paleontological resource mitigation program is not recommended.

If you have any questions concerning these findings please feel free to contact me at (619) 255-0264 or kmccomas@sdnhm.org.

Sincerely,



Katie McComas, M.S.
Paleontological Report Writer & GIS Specialist
San Diego Natural History Museum

Enc: Figure 1: Project map

Literature Cited

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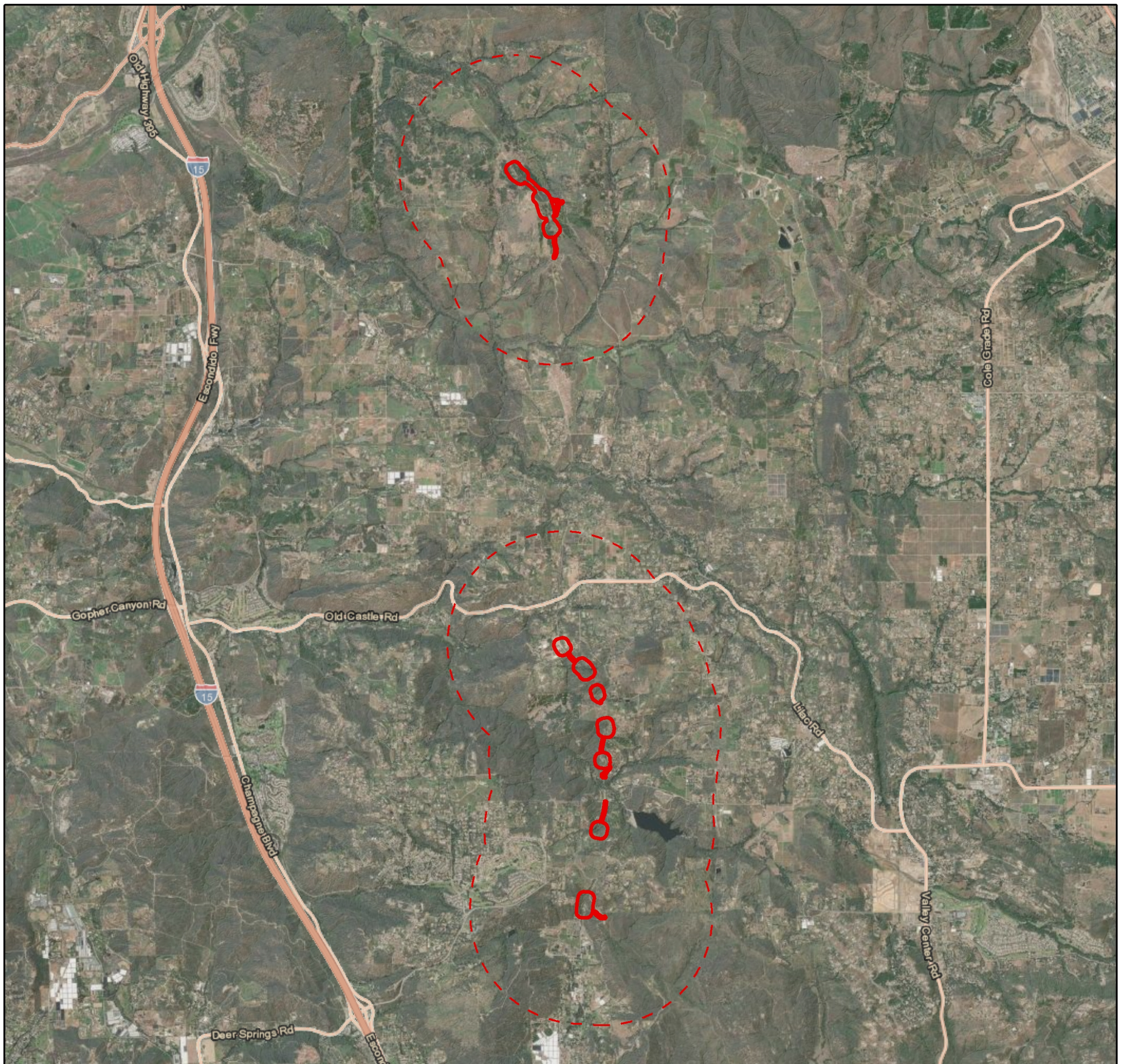
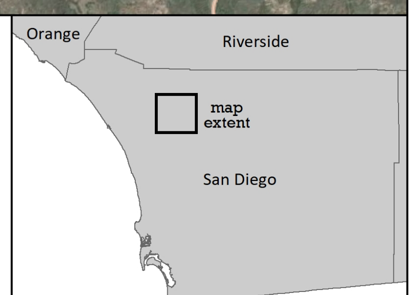
San Diego Natural History Museum (SDNHM), unpublished paleontological collections data.



Sources: World Transportation, World Imagery, and Terrain Hillshade, Esri et al., 2021

Project boundary

1 mile radius buffer



PALEOSERVICES
SAN DIEGO NATURAL HISTORY MUSEUM

Figure 1: Project Map
Q0238 1st Aqueduct Tunnels
San Diego County, California

0 2
scale in miles

Appendix G

Construction Noise Assessment

605 THIRD STREET
ENCINITAS, CALIFORNIA 92024
T 760.942.5147 F 760.632.0164

MEMORANDUM

To:	San Diego County Water Authority
From:	Connor Burke (Dudek)
Subject:	Construction Noise Assessment for the First Aqueduct Treated Water Tunnels Rehabilitation Project
Date:	July 28, 2021
Attachments:	Attachment A, Baseline Noise Measurement Field Data Attachment B, Construction Noise Modeling Input and Output

As part of Dudek's approved Task Order 28 (Environmental Compliance Review for the proposed First Aqueduct Treated Water Tunnels Rehabilitation Project) under San Diego County Water Authority (Water Authority) Contract ID 061904, this technical memorandum presents the results of a predictive noise and vibration study to determine potential environmental impacts associated with project-related construction anticipated in the vicinity of the First San Diego Aqueduct treated water tunnels, referred to as the Lilac, Red Mountain, and Oat Hills tunnels (collectively discussed herein as the "project").

1 Background

1.1 Project Description and Context

As described in the Executive Summary of the project's Basis of Design Report (SDCWA 2021), the First San Diego Aqueduct (First Aqueduct) consists of Pipeline 1 and Pipeline 2, which are 48-inch-diameter pipes constructed and placed into service by 1947 and 1954, respectively. Both pipelines were originally built to convey chlorinated Colorado River water from the Metropolitan Water District to Water Authority member agencies. In the 1970s, the northern portion of the aqueduct was switched to deliver treated water from the Metropolitan Water District's Water Treatment Plant at Lake Skinner, in Riverside County. When Pipeline 1 was built, tunnels were constructed at several locations to convey water by gravity through hilly and mountainous terrain and avoid the need for pumping. When Pipeline 2 was constructed, the two pipelines were connected at the pre-existing tunnels, effectively creating a single pipeline from an operational standpoint. The pipelines converge on the northern (upstream) end and diverge on the southern (downstream) end at what are referred to as bifurcation structures, which feature mechanical equipment for aqueduct operations, enable personnel and equipment access to the tunnels and their adjoining pipeline segments, and ventilate the pipelines.

The Water Authority is planning to implement the proposed First Aqueduct Treated Water Tunnels Rehabilitation Project (project) to repair and/or replace existing aqueduct infrastructure associated with the three treated water

SDCWA Project No.	Q0238	SDCWA Project Name	First Aqueduct Treated Water Tunnels Rehabilitation Project
SDCWA ENV No.	TBD	SDCWA Contract ID/Task No.	061904/28
Associated Permits	2810-2011-001-05; TE03216A-0; waters permits TBD		

tunnels. Prospective work areas identified by the Water Authority are located in the unincorporated County of San Diego (County) communities of Lilac and Valley Center, and north of the City of Escondido, as shown in Figure 1, Regional Map.

The Lilac Tunnel, the northernmost tunnel, is located within the unincorporated County of San Diego community planning area of Valley Center, just west of Couser Canyon Road, and shown in Figures 2A and 2B, Project Work Areas – Lilac Tunnel. The northern bifurcation structure is located approximately 1,000 feet southwest of the intersection of Camino del Venado and Couser Canyon Road. The southern bifurcation structure is located approximately 1,400 feet southwest of the intersection of San Gabriel Way and Couser Canyon Road. The Lilac Tunnel spans a length of approximately 3,450 feet.

The Red Mountain Tunnel is located near the southern boundary of the Valley Center community planning area, from approximately 570 feet north of the intersection of Mystery Mountain Road and Coulter Creek Road to approximately 1,500 feet north of the intersection of Wilkes Road and Turner Lane, as shown in Figures 2C and 2D, Project Work Areas – Red Mountain Tunnel. The Red Mountain Tunnel alignment follows portions of Coulter Creek Road and Wilkes Road. The Red Mountain Tunnel spans a length of approximately 6,000 feet.

The Oat Hills Tunnel is located near the northern boundary of the County's unincorporated North County Metropolitan Subregion, north of the City of Escondido and east of Valley Center, as shown in Figures 2E and 2F, Project Work Areas – Oat Hills Tunnel. The northern tunnel entrance is located approximately 3,400 feet (or 0.64 miles) south of the southern end of the Red Mountain Tunnel, along Cougar Pass Road. The southern end of the Oat Hills Tunnel is located just north of North Broadway, approximately 1,500 feet north of the intersection of Reidy Canyon Road and North Broadway. The Oat Hills Tunnel is approximately 3,600 feet long.

These three tunnels and associated bifurcation structures and facilities are the focus of the proposed project addressed in this noise assessment.

The Water Authority requested a noise impact assessment of project-related work at these locations for input into environmental impact analysis and documentation pursuant to the California Environmental Quality Act (CEQA).

1.2 Noise Characteristics

Sound is mechanical energy transmitted by pressure waves in a compressible medium, such as air. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired. The sound pressure level has become the most common descriptor used to characterize the loudness of an outdoor ambient sound level. The unit of measurement of sound pressure is a decibel (dB). Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern changes in sound levels of 1 dB when exposed to steady, single-frequency signals in the mid-frequency range. Outside such controlled conditions, the trained ear can detect changes of 2 dB in normal environmental noise. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dB. A change of 5 dB is readily perceptible, and a change of 10 dB is perceived as twice or half as loud (Caltrans 2013a). A doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g., doubling the number of daily trips along a given road) would result in a barely perceptible change in sound level.

Sound may be described in terms of level or amplitude (measured in dB), frequency or pitch (measured in hertz or cycles per second), and duration (measured in seconds or minutes). Because the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale is used to relate noise to human sensitivity. The A-weighted decibel (dBA) scale performs this compensation by discriminating against low and very high frequencies in a manner approximating the sensitivity of the human ear.

Several descriptors of noise (a.k.a., noise metrics) exist to help predict average community reactions to the adverse effects of environmental noise, including traffic-generated noise. These descriptors include the equivalent noise level over a given period (L_{eq}), the day–night average noise level (L_{dn}), and the community noise equivalent level (CNEL). Each of these descriptors uses units of dBA.

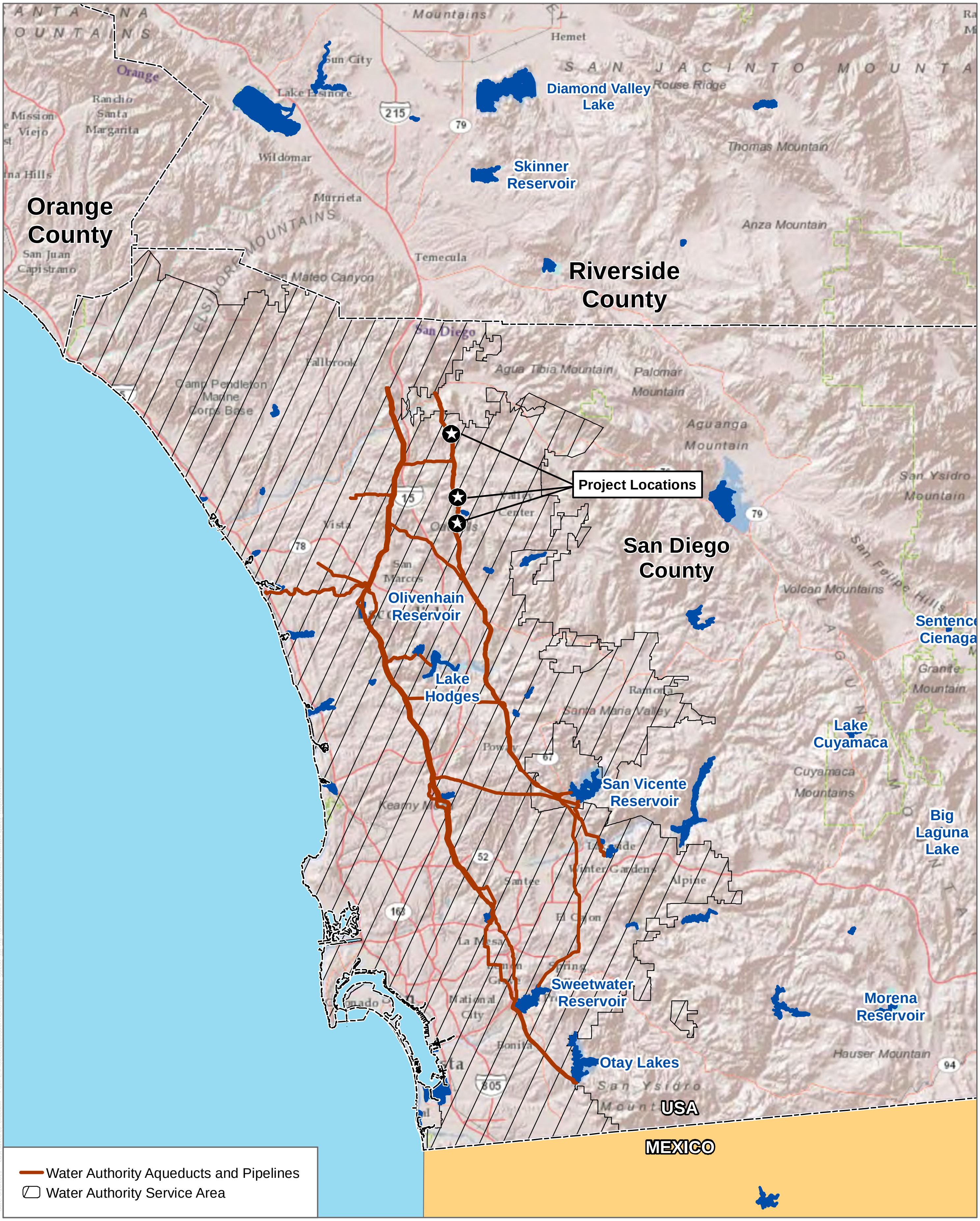
The L_{eq} value is a decibel quantity that represents the constant or energy-averaged value equivalent to the amount of variable sound energy received by a receptor during a time interval. For example, a 1-hour L_{eq} measurement of 60 dBA would represent the average amount of energy contained in all the noise that occurred in that hour. The L_{eq} value is an effective noise descriptor because of its ability to assess the total time-varying effects of noise on sensitive receptors, which can then be compared to an established L_{eq} standard or threshold of the same duration. Another descriptor is maximum sound level (L_{max}), which is the greatest sound level measured during a designated time interval or event. The minimum sound level (L_{min}) is often called the floor of a measurement period.

Unlike the L_{eq}, L_{max}, and L_{min} metrics, L_{dn} and CNEL descriptors always represent 24-hour periods and differ from a 24-hour L_{eq} value because they apply a time-weighted factor designed to emphasize noise events that occur during the non-daytime hours (when speech and sleep disturbance is of more concern). "Time weighted" refers to the fact that L_{dn} and CNEL penalize noise that occurs during certain sensitive periods. In the case of CNEL, noise occurring during the daytime (7:00 a.m. to 7:00 p.m.) receives no penalty. Noise during the evening (7:00 p.m. to 10:00 p.m.) is penalized by adding 5 dB to the actual levels, and nighttime (10:00 p.m. to 7:00 a.m.) noise is penalized by adding 10 dB to the actual levels. L_{dn} differs from CNEL in that the daytime period is longer (defined instead as 7:00 a.m. to 10:00 p.m.), thus eliminating the dB adjustment for the evening period. L_{dn} and CNEL are the predominant criteria used to measure roadway noise affecting residential receptors. These two metrics generally differ from one another by no more than 0.5–1 dB and are often considered or defined as being essentially equivalent by many jurisdictions.

1.3 Vibration Fundamentals

Vibration is oscillatory movement of mass (typically a solid) over time. It is described in terms of frequency and amplitude and can be expressed as displacement, velocity, or acceleration. For environmental studies, vibration is often studied as a velocity that, akin to the discussion of sound pressure levels, can also be expressed in dB in order to cast a wide range of vibration levels in a more convenient scale and with respect to a reference quantity. Vibration impacts to buildings are generally discussed in terms of inches per second (ips) peak particle velocity (PPV), which will be used herein to discuss vibration levels for ease of reading and comparison with relevant standards.

Vibration can also be annoying and thereby impact occupants of structures, and vibration of sufficient amplitude can disrupt sensitive equipment and processes (Caltrans 2013b), such as those involving the use of electron microscopes and lithography equipment. Common sources of vibration within communities include construction activities and railroads. Groundborne vibration generated by construction projects is usually highest during pile driving, rock blasting, soil compacting, jack hammering, and demolition-related activities where sudden releases of subterranean energy or powerful impacts of tools on hard materials occur. Depending on their distances to a sensitive receptor, operation of large bulldozers, graders, loaded dump trucks, or other heavy construction equipment and vehicles on a construction site also have the potential to cause high vibration amplitudes.



SOURCE: ESRI 2019; SDCWA 2011, 2021

DUDEK

0 5 10 Miles

FIGURE 1

Regional Map

First Aqueduct Treated Water Tunnels Rehabilitation Mitigated Negative Declaration

2 Regulatory Setting and Guidelines

2.1 State

California Department of Transportation

The project is not subject to review or approval by the California Department of Transportation (Caltrans), but this analysis considers Caltrans guidance with respect to analyzing vibration impacts because the Water Authority does not have its own established thresholds for assessing vibration impacts. In its Transportation and Construction Vibration Guidance Manual (Caltrans 2013b), Caltrans recommends 0.5 ips PPV as a threshold for the avoidance of structural damage to typical newer residential buildings exposed to continuous or frequent intermittent sources of groundborne vibration. For transient vibration events, such as blasting, the damage risk threshold would be 1.0 ips PPV (Caltrans 2013b) at the same type of newer residential structures. For older structures, these guidance thresholds would be more stringent: 0.3 ips PPV for continuous/intermittent vibration sources, and 0.5 ips PPV for transient vibration events. With respect to human annoyance, Caltrans guidance indicates that building occupants exposed to continuous groundborne vibration in the range of 0.2 ips to 0.6 ips PPV would find it “unpleasant” or “annoying” and thus a likely significant impact. Although these Caltrans guidance thresholds are not regulations and the project is not subject to Caltrans authorization, they can serve as quantified standards in the absence of such limits at the local jurisdictional level.

2.2 Local

County of San Diego Noise Ordinance

The subject work area is located in the boundaries of the County of San Diego. The Water Authority is not bound by County noise regulations, but the Water Authority has elected to consider the project’s impacts in the context of the County Noise Ordinance for purposes of disclosure and impact analysis pursuant to CEQA.

The County’s Noise Ordinance (codified within the San Diego County Code of Regulatory Ordinances as Title 3, Division 6, Chapter 4, Sections 36.401–36.435) establishes prohibitions for disturbing, excessive, or offensive noise, as well as provisions such as sound level limits for the purpose of securing and promoting the public health, comfort, safety, peace, and quiet for its citizens. Planned compliance with sound level limits and other specific parts of the Noise Ordinance allows presumption that the noise is not disturbing, excessive, or offensive. Limits are specified depending on the zoning placed on a property (e.g., varying densities and intensities of residential, industrial, and commercial zones). Where two adjacent properties have different zones, the sound level limit at a location on a boundary between two properties is the arithmetic mean of the respective limits for the two zones, except for extractive industries. It is unlawful for any person to cause or allow the creation of any noise that exceeds the applicable limits of the Noise Ordinance at any point on or beyond the boundaries of the property on which the sound is produced.

Section 36.404 of the Noise Ordinance contains sound level limits specific to receiving land uses and with respect to durable or permanent stationary sources of sound emission, such as heating, ventilating, and air-conditioning equipment (HVAC). Sound level limits are in terms of a 1-hour average sound level. The allowable noise limits depend on the County’s zoning district and time of day, as presented in Table 1.

Table 1. County of San Diego Exterior Noise Standards

Zone	Time	One-Hour Sound Level Limits (dB)
R-S, R-D, R-R, R-MH, A-70, A-72, S-80, S-81, S-87, S-90, S-92 and R-V and R-U with a density of less than 11 dwelling units per acre	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	50 45
S-94, V4 and all commercial zones (C-44)	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	60 55
M50, M52, M54	anytime	70
S-88 (see subsection (c)) in the County Noise Ordinance		

Source: County of San Diego Noise Ordinance, Section 36.404

However, the County considers temporary noise from construction activities separately. Section 36.408 of the Noise Ordinance limits allowable construction hours from 7:00 a.m. to 7:00 p.m. on Mondays through Saturdays, and on Sundays and designated holidays, construction activity is prohibited. Thus, when construction activity is permitted, Section 36.409 of the Noise Ordinance limits allowable construction noise to no more than 75 dBA over an 8-hour period between 7:00 a.m. and 7:00 p.m. when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is being received.

For performance of work on a public utility facility, Sections 36.423 through 36.435 of the County's Noise Ordinance provide opportunity for a variance request, approval, and continuance process that could permit an applicant to "temporarily deviate from the requirements of this chapter" and thus potentially operate—subject to the County's noise control officer review and approval—construction equipment outside of the aforesaid allowable hours and/or at levels that may exceed the 75 dBA 8-hour L_{eq} threshold.

3 Existing Conditions

Dudek conducted sound pressure level measurements at representative positions near the project site on June 8, 2021, to quantify and characterize the existing outdoor ambient sound environment and thus establish a quantified baseline for assessment of potential adverse effects at nearby existing off-site receptors in the project area. Table 2 provides the location, date, and time period at which these pre-project (or baseline) noise level measurements were performed by an attending Dudek field investigator using a Rion-branded Model NL-52 sound level meter equipped with a 0.5-inch, pre-polarized condenser microphone with pre-amplifier. The sound level meter meets the current American National Standards Institute standard for a Type 1 (Precision Grade) sound level meter. The accuracy of the sound level meter was verified using a field calibrator before and after the measurements, and the measurements were conducted with the microphone positioned approximately 5 feet above the ground.

Six short-term (ST) noise level measurement locations (ST1 through ST6) were selected along the Water Authority's right-of-way to represent outdoor ambient sound environmental conditions considered comparable to those of existing off-site noise-sensitive receivers in the project vicinity. For instance, short-term noise level measurement position ST6 is located at a comparable distance from the Lilac Tunnel northern bifurcation structure as the apparent nearest occupied property position "LN2," as shown in Figure 2A. Noise measurement locations were chosen within the Water Authority's right-of-way using the construction work area proximity consideration, to facilitate and secure performance of the field survey, and using investigator judgment in the field with the assistance of aerial imagery. These locations are depicted as receivers ST1 through ST6 in Figures 2A, 2B, 2C, 2D, 2E, and 2F. The measured L_{eq} and L_{max} noise levels are provided in Table 2. The primary noise sources at the sites identified in Table 2 consisted of birdsong, the sounds of leaves rustling, and distant traffic. As shown in Table 2, the measured sound pressure level ranged from approximately 35.0 dBA L_{eq} at ST5 to 44.9 dBA L_{eq} at ST2. Beyond the summarized information presented in Table 2, detailed noise measurement data is included in Attachment A, Baseline Noise Measurement Field Data.

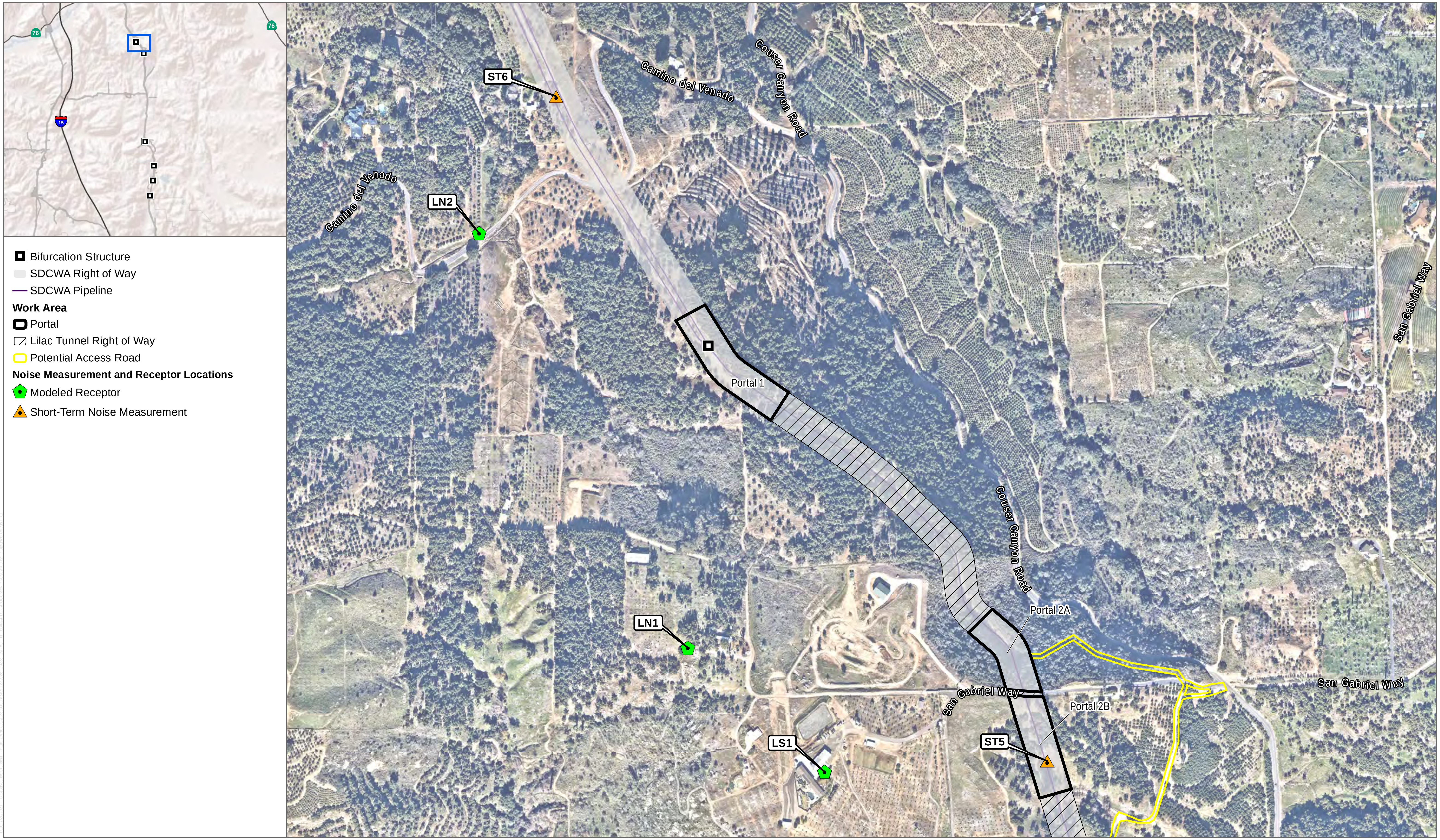
Table 2. Measured Baseline Outdoor Ambient Noise Levels

Site	Location/Address	Date/Time	L_{eq} (dBA)	L_{max} (dBA)
ST1	Approximately 250 feet south of Oat Hills Tunnel downstream bifurcation structure	2021-06-08, 09:40 AM to 09:50 AM	43.7	56.1
ST2	Western property line of 11501 Betsworth Road, Valley Center, CA 92082	2021-06-08, 10:30 AM to 10:40 AM	42.6	59.3
ST3	Approximately 100 feet west of Moosa Creek Nursery	2021-06-08, 11:20 AM to 11:30 AM	40.3	50.2
ST4	East of 29636 Wilkes Road, Valley Center, CA 92082	2021-06-08, 12:20 PM to 12:30 PM	44.9	55.6
ST5	Approximately 700 feet north of Lilac Tunnel downstream bifurcation structure	2021-06-08, 01:15 PM to 01:25 PM	35.0	46.0
ST6	North of Camino del Venado, within project's right-of-way	2021-06-08, 02:00 PM to 02:10 PM	36.6	45.4

Source: Attachment A.
Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); dBA = A-weighted decibels; L_{max} = maximum sound level during the measurement interval.

Generally, the measured samples of daytime L_{eq} agree, with expectations: ST1 through ST6 are below 50 dBA due largely to their remoteness from nearby major roadways.

One long-term noise level measurement was taken near the project site. Due to the relatively uniform environmental setting across the project work area, which could be generally categorized as rural residential and/or agricultural and distant from major surface transportation noise sources, this long-term measurement location was chosen to be sufficiently representative of all sensitive receptors within the vicinity of the project and thus collect data to quantify project vicinity noise levels during evening and nighttime hours. This location is depicted as LT1 in Figure 2F. This 24-hour unattended sound pressure level monitor recorded outdoor ambient sound levels at night that ranged from 33.9 dBA L_{eq} to as 58 dBA L_{eq}. Detailed noise measurement data is included in Attachment A.



SOURCE: SanGIS 2019; SDCWA 2020

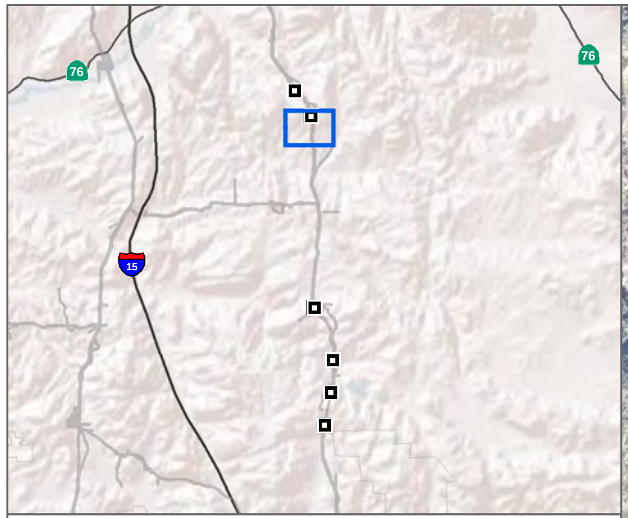
DUDEK

0 200 400 Feet

FIGURE 2A

Project Work Areas - Lilac Tunnel

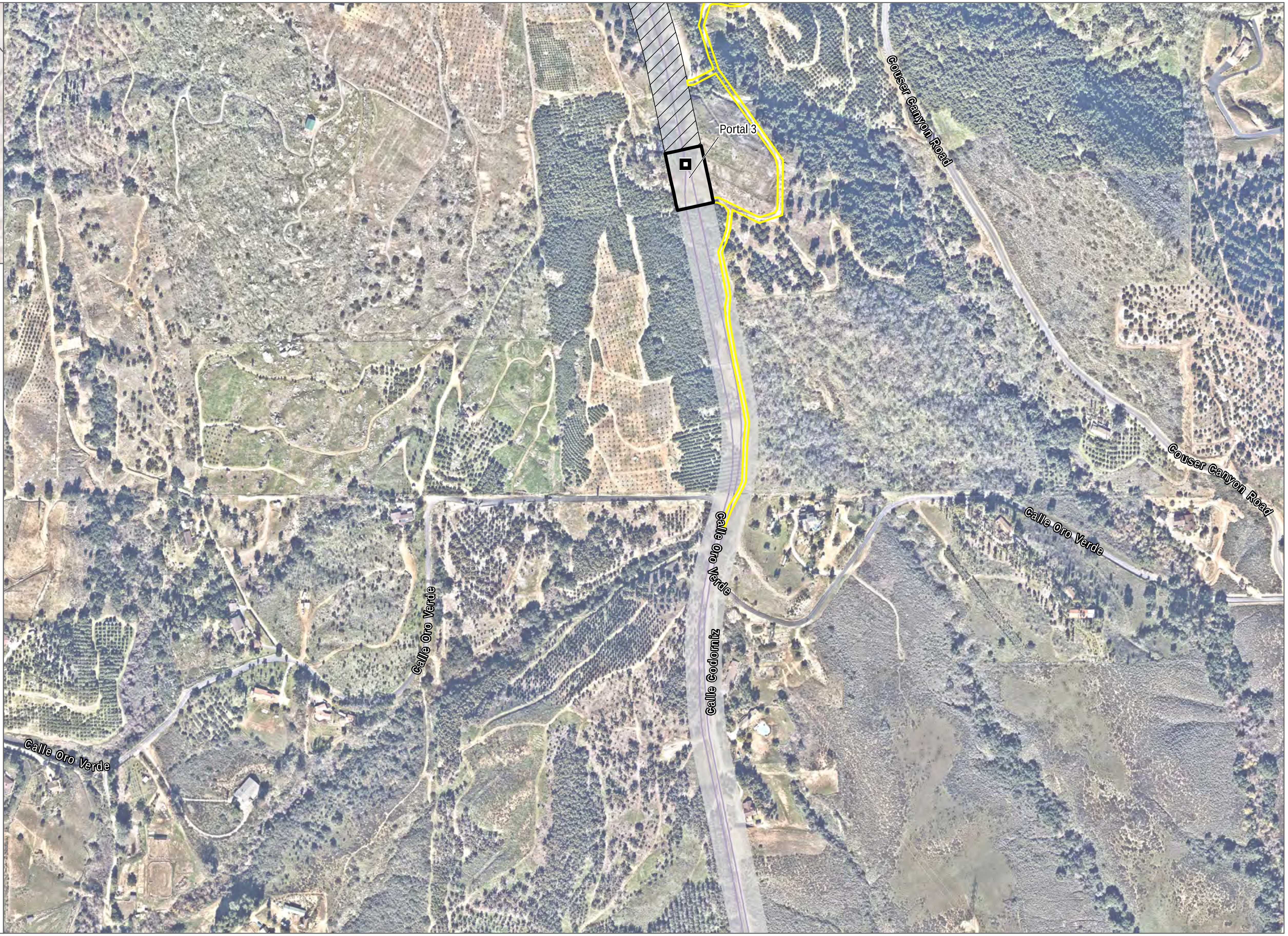
First Aqueduct Treated Water Tunnels Rehabilitation



- Bifurcation Structure
- SDCWA Right of Way
- SDCWA Pipeline

Work Area

- Portal
- Lilac Tunnel Right of Way
- Potential Access Road Improvements



SOURCE: SanGIS 2019; SDCWA 2020

DUDEK

0 200 400 Feet

FIGURE 2B

Project Work Areas - Lilac Tunnel

First Aqueduct Treated Water Tunnels Rehabilitation

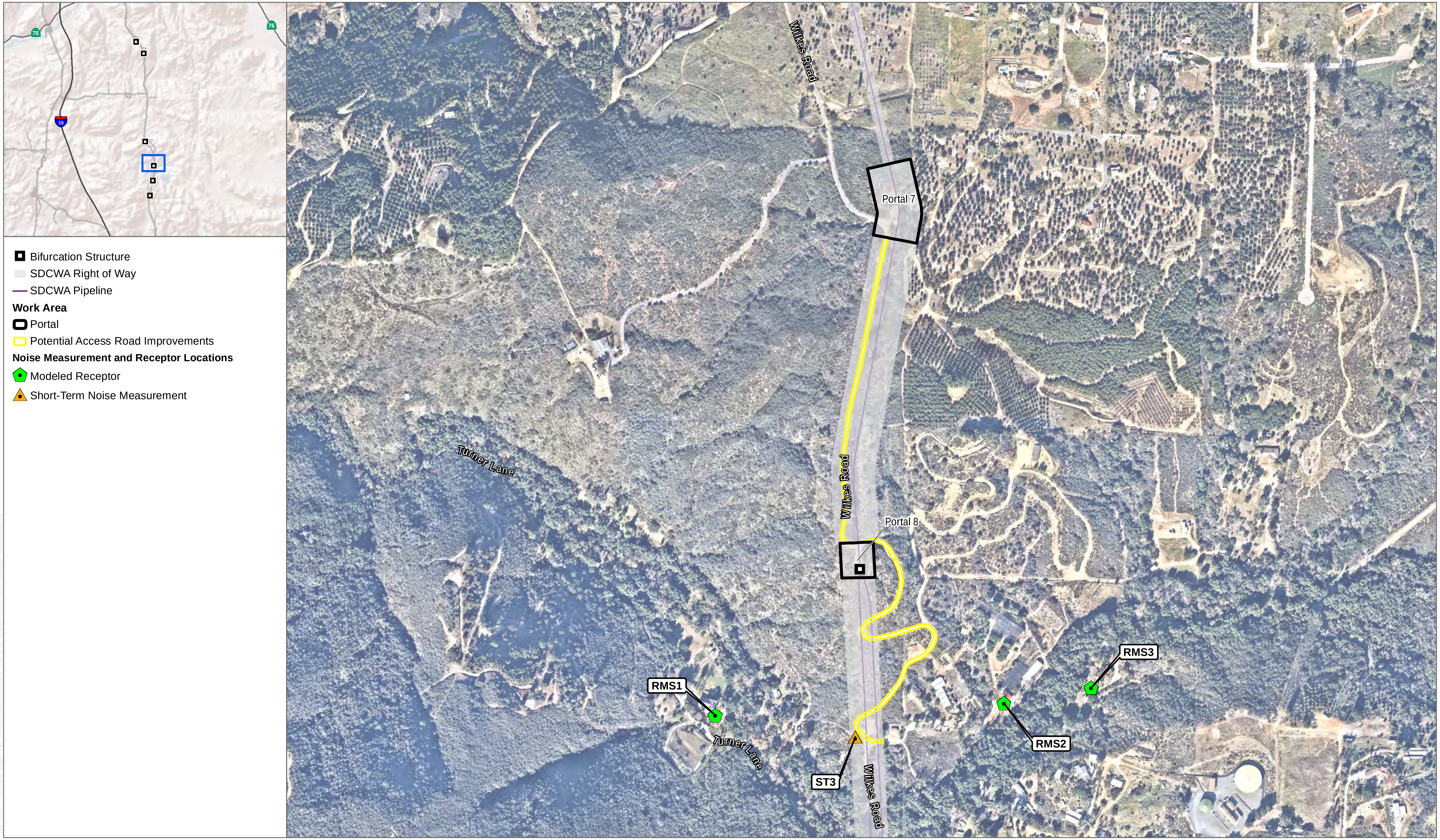
SOURCE: SanGIS 2019; SDCWA 2020

DUDEK

FIGURE 2C

Project Work Areas - Red Mountain Tunnel

First Aqueduct Treated Water Tunnels Rehabilitation



SOURCE: SanGIS 2019; SDCWA 2020

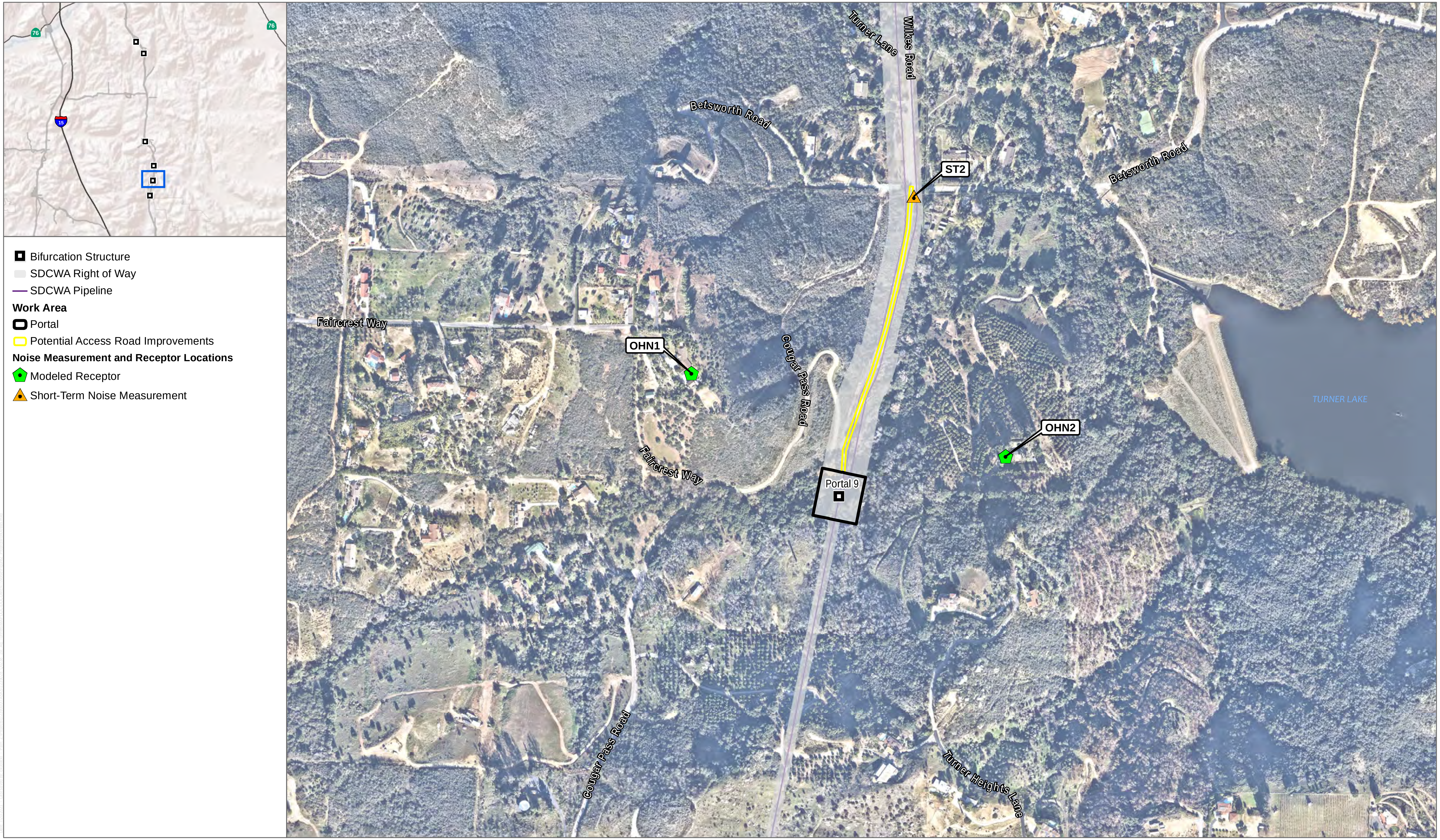
DUDEK

0 200 400 Feet

FIGURE 2D

Project Work Areas - Red Mountain Tunnel

First Aqueduct Treated Water Tunnels Rehabilitation



SOURCE: SanGIS 2019; SDCWA 2020

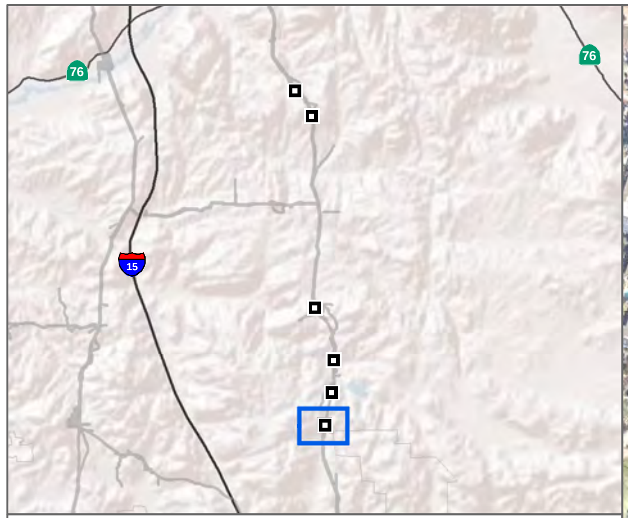
DUDEK

0 200 400 Feet

FIGURE 2E

Project Work Areas - Oat Hills Tunnel

First Aqueduct Treated Water Tunnels Rehabilitation



Bifurcation Structure
SDCWA Right of Way
SDCWA Pipeline
Work Area
Portal
Potential Access Road Improvements
Noise Measurement and Receptor Locations
Modeled Receptor
Long-Term Noise Measurement
Short-Term Noise Measurement

SOURCE: SanGIS 2019; SDCWA 2020

DUDEK

0 200 400 Feet

FIGURE 2F

Project Work Areas - Oat Hills Tunnel

First Aqueduct Treated Water Tunnels Rehabilitation

4 Impact Thresholds

4.1 Noise

Project construction subject to this assessment would occur within unincorporated County of San Diego boundaries, so construction activities have been analyzed in light of noise standards established in the County of San Diego Noise Ordinance, which is San Diego County Ordinance 9962 that amends Title 3, Division 6, Chapter 4 of the San Diego County Code of Regulatory Ordinances relating to noise control and abatement. Noise Ordinance Section 36.409, Construction Equipment, specifies that noise due to construction may not exceed a 75 dBA average over an 8-hour period (L_{eq8hr}) at any time. This 75 dBA L_{eq8hr} threshold applies from Monday through Saturday between the allowable hours of construction per Section 36.408 (i.e., 7:00 a.m. to 7:00 p.m.).

Construction activities will also occur during the evening (7:00 p.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) over 10-day periods when the aqueduct is deactivated and cleared of water. Round-the-clock work is needed during these periods to limit the duration that the aqueduct is out of service. Under such evening and nighttime conditions, the Water Authority, as lead agency under CEQA, has selected to adopt an hourly noise level threshold (L_{eq1hr}) of 50 dBA for analysis of project impacts pursuant to CEQA. Although this noise threshold is a potentially perceptible 5 dB louder than the corresponding 45 dBA hourly L_{eq} threshold at night (10:00 p.m. to 7:00 a.m.) for Noise Zone 1 properties under County jurisdiction (see Table 1), it is still much quieter than the magnitude of the County's abovementioned construction noise threshold (75 dBA) during daytime hours, and is a reasonable threshold at which to analyze short-duration night construction for critical infrastructure work. For purposes of this assessment, noise exposure levels from construction noise activities were evaluated at the nearest project property line. However, due to construction areas of multiple project structure locations lying within property lines of neighboring occupied parcels, the noise exposure levels for some locations have been evaluated herein at the exteriors of apparent occupied properties and compared with this adopted quantified nighttime 1-hour L_{eq} standard.

4.2 Vibration

For construction vibration impacts, guidance from Caltrans indicates that a vibration velocity level of 0.2 ips PPV received at a structure would be considered annoying by occupants within (Caltrans 2013b). As for the receiving structure itself, Caltrans guidance, as discussed in Section 3, Existing Conditions, recommends that a vibration level of 0.3 ips PPV would represent the threshold for building damage risk.

5 Impact Discussion

Construction noise and vibration are temporary phenomena. Although construction noise and vibration levels vary from hour to hour and day to day, depending on the equipment in use, the operations performed, and the distance between the source and receptor, noise exposure levels from the aggregate of concurrently operating equipment can be accurately predicted with industry-proven and standardized sound propagation modeling techniques.

5.1 Construction Noise Prediction and Impact Assessment

5.1.1 Bifurcation Structures

Prediction Methodology

Several of the work areas where construction activities will occur are surrounded by topography that may occlude direct line of sight between project-attributed sources of noise emission and the nearest occupied properties. To account for the effects of these natural terrain features on sound propagation, Dudek performed predictive sound propagation modeling of the anticipated construction activities in the vicinity of each bifurcation structure with commercially available Datakustik CadnaA software, which incorporates relevant International Organization of Standardization (ISO) 9613-2 algorithms and reference data that are generally considered to be industry standard for outdoor noise modeling. Key modeling assumptions and parameters are as follows:

- Topographical contours, at a granularity of 2-foot increments, for the rectangular geographic area containing the project construction zone and the nearest occupied property were incorporated into the CadnaA three-dimensional (3-D) model space. Isometric views of these 3-D model spaces, one for each of the six bifurcation structures, appear in Attachment B, Construction Noise Modeling Input and Output.
- Normally, project construction equipment is expected to operate (and thus generate noise) during daytime hours (7:00 a.m. to 7:00 p.m.), so that the quantified aggregate energy-equivalent sound level (L_{eq}) for a consecutive 8-hour duration at a receiving property boundary or occupied building may be compared directly with the County's daytime construction noise level standard. However, during pipeline shutdown periods, less-intensive construction activity is expected to occur in the evening and night hours during the 10-day aqueduct shutdown periods, so that the quantified aggregate hourly L_{eq} during any hour within this period (7:00 p.m. to 7:00 a.m.) at a receiving property boundary or occupied building, as applicable, may be compared directly with the identified standard of 50 dBA.
- Acoustical ground absorption of the project surroundings, which appears to be vegetative cover, highly textured and fissured rock facings and boulders, loose or tilled soils, or some naturally occurring combination thereof, is set at a coefficient value of 1.0.
- The anticipated operating construction equipment were modeled as a "snapshot" in time, so that their positions are static and represent an average location within the construction area associated with the bifurcation structure.
- Meteorological conditions presume "calm" wind conditions (i.e., less than 0.5 meters per second in any direction) and average air temperature and relative humidity of 68°F and 50%, respectively.

Dudek consulted with Water Authority engineers to develop a list of construction equipment that are likely to be used during project implementation. Daytime equipment would include, in part, excavators, cement mixers, articulated dump trucks, wheeled cranes, generators, welders, and occasional concrete saws. During nighttime work, equipment would include cement mixers, telescopic handlers, welders, generators, wheeled cranes, hand-held circular saws, and ventilation fans. No earthwork (i.e., excavator and articulated dump trucks) is anticipated during night work. The typical maximum (L_{max}) and energy-equivalent (L_{eq}) noise levels for anticipated various pieces of daytime and nighttime construction equipment at a distance of approximately 33 feet are presented in Table 3. Note that the difference in these two metrics corresponds with exhibited equipment operation intensity and duration: usually, construction equipment operates in alternating cycles of full power and low power, producing average noise levels over time that are less than the maximum noise level. The average sound level of construction activity also depends on the amount of time that the equipment operates and the intensity of construction activities during that time.

Table 3. Sound Levels for the Modeled Individual Sources of Outdoor Noise Emission

Modeled Construction Equipment (Source)	Reference Source Sound Power Level (dB) per Octave Band Center Frequency (OBCF, Hz)									Overall Sound Level (dBA)
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Excavator	120	123	112	107	101	98	96	92	85	105.5
Articulated Dump Truck	105	108	104	101	98	97	94	91	86	102
Concrete Mixer Truck	108	111	102	94	97	98	106	88	83	108
Telescopic Handler	110	113	107	97	95	92	90	84	75	98.5
Hand-Held Welder	92	95	96	97	96	97	94	89	84	100.9
Generator for Welding	100	103	100	95	96	98	94	90	88	101.4
Wheeled Mobile Crane	105	108	104	99	91	92	91	84	78	97.8
Hand-Held Circular Saw	109	112	114	106	106	105	106	110	108	114.6
Ventilation Fan	111	107	104	103	100	97	93	88	81	113.6

Source: DEFRA 2005
Notes: dB = decibel; dBA = A-weighted decibels; Hz = hertz.

Prediction Results

Representing application of the sound prediction methodology described in the preceding paragraphs, Table 4 presents predicted noise level exposures from project-attributed construction activity sources at the indicated receptor locations, which appear in Figures 2A through 2F.

Table 4. Unmitigated Predicted Daytime Sound Levels at Modeled Receptor Locations

Modeled Receptor Locations	Nearby Portal Location	Site Location	Predicted 8-hour L_{eq} (dBA)
OHS1	10	27440 Broadway Escondido, CA 92026	67.1
OHS2	10	11175 Boulder Pass Escondido, CA 92026	40.6
OHS3	10	27435 Cougar Pass Road Escondido, CA 92026	33.2
OHN1	9	28797 Faircrest Way Escondido, CA 92026	33.1
OHN2	9	11477 Betsworth Road Valley Center, CA 92082	37.5
RMS1	8	11401 Betsworth Road Valley Center, CA 92082	46.5
RMS2	8	11760 Betsworth Road Valley Center, CA 92082	38.8
RMS3	8	11760 Betsworth Road Valley Center, CA 92082	37.5

Table 4. Unmitigated Predicted Daytime Sound Levels at Modeled Receptor Locations

Modeled Receptor Locations	Nearby Portal Location	Site Location	Predicted 8-hour L_{eq} (dBA)
RMN1	4	11050 Mystery Mountain Road Valley Center, CA 92082	71.8
RMN2	4	11050 Mystery Mountain Road Valley Center, CA 92082	55.8
RMN3	4	11050 Mystery Mountain Road Valley Center, CA 92082	72.2
RMN4	4	29660 Wilkes Road Valley Center, CA 92082	51.7
LS1	2B	0 Couser Canyon Road Valley Center, CA 92082	38.5
LN1	2A	0 Couser Canyon Road Valley Center, CA 92082	47.9
LN2	1	0 Camino del Venado Valley Center, CA 92082	46.4

Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); dBA = A-weighted decibels

As presented in Table 4, the estimated construction noise levels are predicted to be 72 dBA L_{eq} or less over an 8-hour period at the nearest occupied properties (as close as 65 feet away) when site work activities take place near the bifurcation structures. Under these conditions, predicted operation of daytime construction equipment and processes would not exceed the County-based threshold (i.e., Section 36.409 of the County's Noise Ordinance) identified for this assessment.

However, it is anticipated that for pipeline shutdown periods, work would occur during evening and nighttime hours. For this nighttime work, the threshold of 50 dBA would apply, and the prediction results shown in Table 4 suggest that the magnitude of this hourly L_{eq} may be exceeded. Because the construction equipment considered for the daytime hours are expected to operate during each of 8 consecutive hours, the predicted 8-hour L_{eq} levels appearing in Table 4 can be considered equivalent to hourly L_{eq} values for any hour. Hence, Table 4 shows that five predicted construction locations would exceed the measurement-based hourly threshold of 50 dBA L_{eq}. Furthermore, for these time periods outside of weekday and Saturday daytime hours where 75 dBA hourly L_{eq} is permitted, construction noise mitigation would be required to reduce noise levels below the evening and nighttime threshold identified for this assessment.

Iterative modeling efforts have yielded predicted construction noise levels reflecting the insertion of soundpath-occluding temporary noise barriers (having recommended top-edge height above grade and horizontal extent) that enable evening and nighttime construction activity to be compliant with the 50 dBA L_{eq} hourly threshold. These path-specific scenarios between a project construction work area and the identified nearest noise-sensitive receptor are described in Table 5. Further detailed information about these mitigated modeling scenarios can be found in Attachment B.

Table 5. Mitigated Predicted Nighttime Sound Levels at Modeled Receptor Locations

Modeled Receptor Locations	Nearby Portal Location	Site Location	Predicted Hourly Leq (dBA)
OHS1	10	27440 Broadway Escondido, CA 92026	49
RMN1	4	11050 Mystery Mountain Road Valley Center, CA 92082	50
RMN2	4	11050 Mystery Mountain Road Valley Center, CA 92082	45
RMN3	4	11050 Mystery Mountain Road Valley Center, CA 92082	50
RMN4	4	29660 Wilkes Road Valley Center, CA 92082	40

Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); dBA = A-weighted decibels

Table 5 assumes that at least a 16-foot-tall temporary noise wall installed around the project work area boundaries of portals 4 and 10 (as depicted in the Attachment B displays of predicted noise levels) would be required to yield combined construction equipment noise levels that do not exceed the 50 dBA hourly L_{eq} threshold. In addition to the recommended 16-foot-tall temporary noise walls, it is assumed that louder equipment, such as the hand-held circular saw and stationary ventilation fan, will have localized sound abatement or adequate noise control so that their respective sound emission levels within the project work areas are less than those appearing in Table 3. With installation of the recommended 16-foot-tall temporary barriers prior to and during nighttime project construction work, temporary construction-related noise impacts would not exceed the threshold identified for this assessment.

The temporary noise barrier would likely resemble an assembly of framing-supported “sound blanket” type barrier elements, such as the sample appearing in Figure 3.

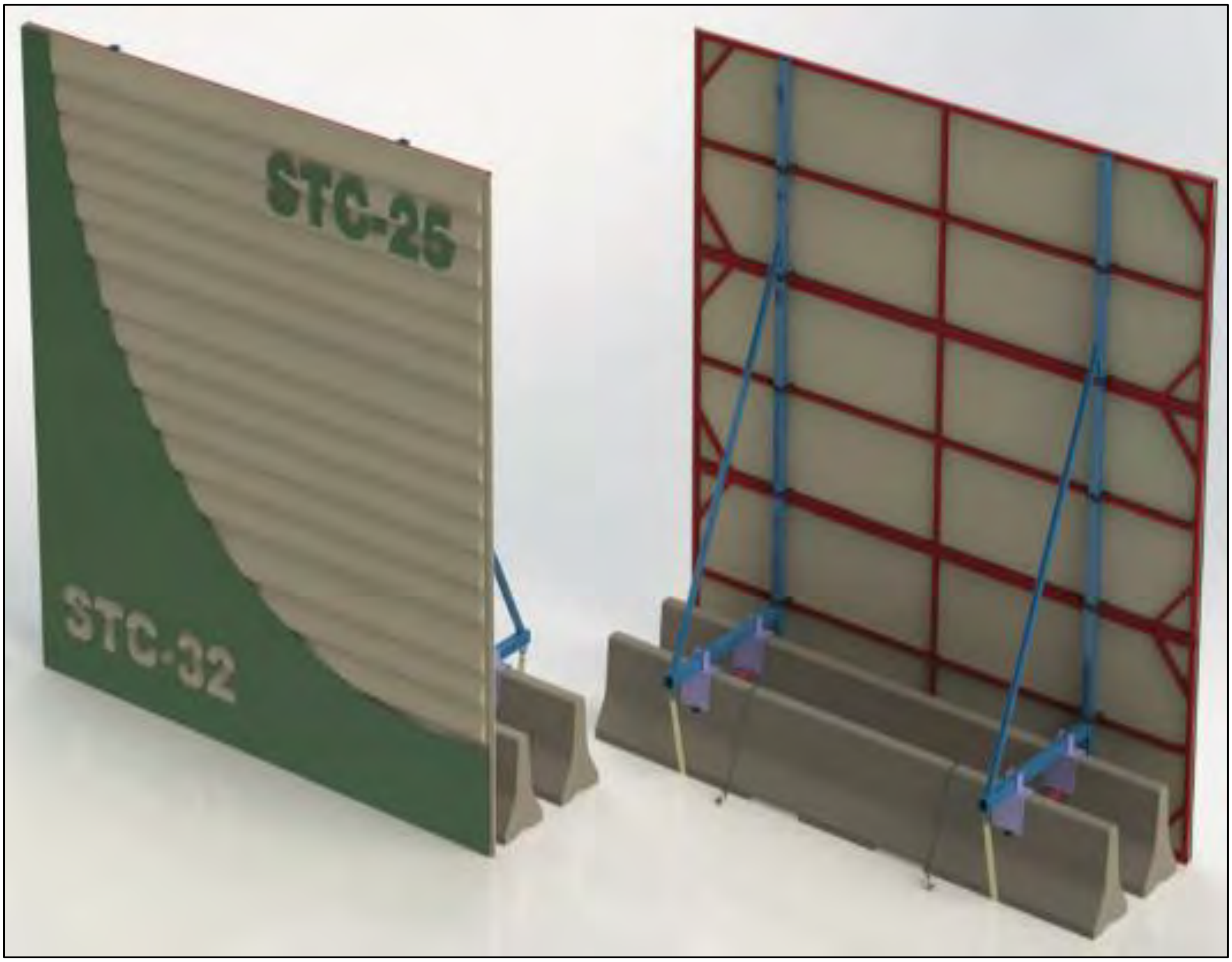


Figure 3. Temporary Construction Noise Barrier Sample for Project Boundary Positions: "K-Rail Mounted" Variety
Source: Environmental Noise Control 2021.

Temporary sound barrier elements like the sample shown in Figure 3 typically feature an outdoor-use vinyl-covered multi-layer of materials comprising one or more materials that demonstrate a sound transmission class of 25 or better. The "K-rail" supporting structure shown in Figure 3 represents one of a variety of means to install such temporary barriers at a work site. The sound transmission class 25 value is at least 10 dB greater than the highest predicted noise reduction effect due to barrier intervention, and is thus consistent with Caltrans Technical Noise Supplement guidance that states, "any material may be used for a barrier between a noise source and a noise receiver as long as it has a TL [transmission loss] of at least 10 dBA more than the desired noise reduction" (Caltrans 2013a).

5.1.2 Additional Tunnel Access Portals

Prediction Methodology

The proposed project is likely to include construction of additional tunnel access portals at locations other than the existing bifurcation structures. Figures 2A, 2C, and 2D depict Portals 2A and 2B, 5, 6, and 7 as work areas bounded by the Water Authority's right-of-way and within which these additional portals may be constructed. Hence, due to the uncertainty of geographic position for these anticipated portals, a screening-level construction noise model was used to determine a maximum horizontal distance from the project tunnel alignment center-line. If an existing occupied property is located within this screening distance, then there exists the potential for portal construction noise levels to exceed the County's applicable standard.

Equipment that would be in use during construction activities for these portal structures would include, in part, excavators, cement mixers, heavy trucks, wheeled cranes, generators, welders, and fans. The typical maximum (L_{max}) noise levels for these anticipated pieces of construction equipment at a distance of approximately 50 feet are presented in Table 6.

Table 6. Anticipated Portal Construction Equipment Maximum Noise Levels

Equipment Type	Typical Equipment (Lmax, dBA at 50 Feet)
Concrete Pump Truck	79
Crane	81
Excavator	81
Flat Bed Truck	74
Front End Loader	79
Generator	72
Ventilation Fan	79
Welder/Torch	73

Source: DOT 2006.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels.

Using a Microsoft Excel–based outdoor sound propagation prediction model that features ISO 9613-2 algorithms, and using reference data from the Federal Highway Administration's Roadway Construction Noise Model (RCNM) (FHWA 2008), construction noise exposure levels at the nearest occupied noise-sensitive land uses were predicted. (Although the RCNM was funded and promulgated by the Federal Highway Administration, it is often used for non-roadway projects because the same types of construction equipment used for roadway projects are often used for other types of facility construction.) Input variables for the predictive modeling consist of the equipment type and number of each, the duty cycle (a.k.a., acoustical usage factor) for each piece of equipment (e.g., percentage of time within a specific time period, such as an hour, when the equipment is expected to operate at full power or capacity and thus make noise at a level comparable to what is presented in Table 6), and the distance from the occupied property. The RCNM has default acoustical usage factor values for the various pieces of equipment, which were derived from an extensive research study of typical construction activity patterns and were thus used for this noise analysis, as detailed in Attachment B.

Conservatively, for the purpose of evaluating these screening distances between the potential portal construction work areas and the nearest noise-sensitive land uses, potential sound-path-occluding topographical features have been ignored. However, the Excel-based sound prediction model used herein also includes capability to consider up to two opportunities of noise reduction, as follows:

- Installation of a single temporary sound-occluding barrier, such as plywood sheeting or flexible sound-insulating acoustic curtains or blankets, having sufficient horizontal extent so that flanking around its vertical ends can be ignored.
- Quantified localized sound abatement or noise control of the equipment, expressed as an overall dB value.

Prediction Results

During daytime hours, the horizontal distance from the tunnel alignment center-line to the receptor location at which aggregate noise emission from multiple concurrent operating equipment for portal construction would remain below the 75 dB threshold is 121 feet, within which there are no apparent occupied properties. This assumes no inclusion of temporary barriers at the work area boundary or localized noise reduction measures. However, to remain below the adopted nighttime threshold of 50 dBA hourly L_{eq}, this horizontal distance increases to 1,075 feet without mitigation. Such a longer distance is greater than that of the distance between some of the work areas and the nearest occupied land uses; hence, Table 7 shows mitigated construction noise levels for the listed additional portal locations and the corresponding anticipated installation of temporary noise barriers having a specified minimum height above local grade of the construction work site.

Table 7. Mitigated Predicted Noise Levels at Additional Portal Locations

Portal Location*	Horizontal Distance (Feet) to Nearest Sensitive Receptor	Temporary Barrier Height Needed (Feet)	Suggested Barrier Location	Resulting Predicted Noise Level (L_{eq} dBA)
2A & 2B	260	12	Surround work area, with access gate to the north	49
5	790	8	Surround work area, with access gate to the south	46
6	670	8	Surround work area, with access gate to the north	47
7	590	10	Surround work area, with access gate to the south	46

Notes: dBA = A-weighted decibels.
*Identifying number is the same as appearing in Figures 2A–2F.

Table 7 shows that at the four listed additional portal locations, there are occupied properties within the 1,075-foot screening distance. Without properly implemented noise mitigation, these occupied properties would be exposed to noise levels exceeding 50 dBA during the evening and/or nighttime hours when construction during pipeline shutdown periods may be required. By using temporary noise barriers installed around the portal work area, aggregate estimated noise from these nighttime construction activities can be reduced to a level compliant with or less than the adopted 50 dBA threshold. In addition to the listed temporary barriers, the noise mitigation that helps yield the sub-50 dBA levels in Table 7 includes the following common localized noise control measures:

- Implementation of a portable sound-insulating shroud (or tent, multi-sided blanket or wall, or other means) or quieter equipment (e.g., lower noise emission due to slotted blades) associated with operation of the circular saw so that its resultant A-weighted L_{max} prior to propagation beyond the work area is 80 dBA at 50 feet—a difference of 10 dB from the Federal Highway Administration's RCNM reference value of 90 dBA L_{max} at 50 feet (FHWA 2006).

- Implementation of a surrounding barrier or fan inlet/outlet port sound attenuation, so that the resultant A-weighted L_{max} prior to propagation beyond the work area is 74 dBA at 50 feet—a difference of 5 dB from the Federal Highway Administration's RCNM reference value of 79 dBA L_{max} at 50 feet (FHWA 2006).

These above measures for the two identified construction equipment pieces would only be required outside the 12-hour daytime period (7:00 a.m. to 7:00 p.m.), but could remain during daytime hours and would serve to reduce daytime construction noise levels as well.

5.2 Conventional Construction Activity Vibration

Under certain conditions, construction activities may expose persons to excessive groundborne vibration or groundborne noise, causing a potentially significant impact. Caltrans has collected groundborne vibration information related to construction activities (Caltrans 2013b). Information from Caltrans indicates that continuous vibrations with a PPV of approximately 0.2 ips is considered annoying. For context, heavier pieces of construction equipment, such as a bulldozer, that may be expected on the project site, have PPVs of approximately 0.089 ips or less at a reference distance of 25 feet (DOT 2006).

Groundborne vibration attenuates rapidly, even over short distances. The attenuation of groundborne vibration as it propagates from source to receptor through intervening soils and rock strata can be estimated with expressions found in Federal Transit Administration and Caltrans guidance. By way of example, for a bulldozer operating on site and as close as the northern project boundary (i.e., 65 feet from the nearest receiving sensitive land use), the estimated vibration velocity level would be 0.02 ips per the equation that follows (FTA 2006):

$$PPV_{rcvr} = PPV_{ref} * (25/D)^\wedge1.5 = 0.02 = 0.089 * (25/65)^\wedge1.5$$

where PPV_{rcvr} is the predicted vibration velocity at the receiver position, PPV_{ref} is the reference value at 25 feet from the vibration source (the bulldozer), and variable "D" is the actual horizontal distance (in feet) to the receiver.

Therefore, at this predicted PPV, the potential impact of vibration-induced annoyance to occupants of nearby existing homes would not exceed the thresholds identified for this assessment.

Construction vibration, at sufficiently high levels, can also present a building damage risk. However, the predicted 0.02 ips PPV at the nearest residential receiver 65 feet away from on-site operation of the excavator during site work around bifurcation structure would not surpass the guidance limit of 0.3 to 0.5 ips PPV for preventing damage to residential structures (Caltrans 2013b). Because the predicted vibration level at 65 feet is less than both the annoyance and building damage risk thresholds, vibration from project conventional construction activities would not exceed the thresholds identified for this assessment.

6 Conclusions

This technical noise memorandum was conducted to predictively quantify potential construction noise and vibration adverse effects attributed to the proposed project at the nearest existing occupied properties along the studied tunnel alignments. The results indicate that potential noise levels from anticipated project construction activities may cause temporary and substantial increases to the existing outdoor sound environment, but would be compliant with the 75 dBA 8-hour L_{eq} standard per Section 36.409 from the County of San Diego Noise Ordinance when construction occurs during daytime hours of 7:00 a.m. to 7:00 p.m. Work occurring outside of these hours at the anticipated work areas of portal locations 2A, 2B, 4, 5, 6, 7, and 10 are predicted to exceed the identified evening and nighttime threshold of 50 dBA hourly L_{eq}. However, with temporary noise barriers of 16 feet in height along recommended portions of the project work area perimeter at bifurcation structures 4 and 10, and noise barriers of up to 12 feet in height at portals 2A, 2B, 5, 6, and 7, as well as localized mitigation of certain construction equipment, nighttime construction activities would not exceed 50 dBA, and would thereby comply with the adopted standard.

With respect to groundborne vibration received by occupied residential structures at these aforementioned studied nearest occupied properties, predicted PPV values are less than thresholds for annoyance and building damage risk per appropriate Caltrans guidance.

We trust that this technical memorandum meets your project needs at this time. Should you have any questions or require additional information, please do not hesitate to contact Connor Burke at 760.479.4272 or cburke@dudek.com.

Sincerely,

Connor Burke,
Environmental Analyst

7 References

Caltrans (California Department of Transportation). 2013a. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. September.

Caltrans. 2013b. *Transportation and Construction Vibration Guidance Manual*. Division of Environmental Analysis, Environmental Engineering, Hazardous Waste, Air, Noise, Paleontology Office. Sacramento, California. September.

DEFRA (Department of Environment, Food and Affairs). 2005. *Update of Noise Database for Prediction of Noise on Construction and Open Sites*.

DOT (U.S. Department of Transportation). 2006. *FHWA Roadway Construction Noise Model: User's Guide*. Final Report. FHWA-HEP-06-015. DOT-VNTSC-FHWA-06-02. Cambridge, Massachusetts: DOT, Research and Innovative Technology Administration. August.

Environmental Noise Control. 2021. "K-Rail Mounted Temporary Sound Wall." Accessed July 2021. https://www.environmental-noise-control.com/products/k-rail-mounted-temporary-sound-wall/.

FHWA (Federal Highway Administration). 2008. *Roadway Construction Noise Model (RCNM)*. Accessed May 2017. https://www.fhwa.dot.gov/Environment/noise/construction_noise/rcnm/.

FTA (Federal Transit Administration). 2006. *Transit Noise and Vibration Impact Assessment*. Final Report. FTA-VA-90-1003-06. May.

SDCWA (San Diego County Water Authority). 2021. *First Aqueduct Treated Water Tunnel Rehabilitations Basis of Design Report*. March.

Attachment A

Baseline Noise Measurement Field Data

FORMS FIELD DATA REPORT

Field Noise Measurement Data

Record: 1359	
Project Name	San Diego Water Authority
Observer(s)	Connor Burke
Date	2021-06-08

Instrument and Calibrator Information	
Instrument Name List	(ENC) Rion NL-52
Instrument Name	(ENC) Rion NL-52
Instrument Name Lookup Key	(ENC) Rion NL-52
Manufacturer	Rion
Model	NL-52
Serial Number	553896
Calibrator Name	(ENC) LD CAL150
Calibrator Name	(ENC) LD CAL150
Calibrator Name Lookup Key	(ENC) LD CAL150
Calibrator Manufacturer	Larson Davis
Calibrator Model	LD CAL150
Calibrator Serial #	5152
Pre-Test (dBA SPL)	94
Post-Test (dBA SPL)	94
Windscreen	Yes
Weighting?	A-WTD
Slow/Fast?	Slow
ANSI?	Yes

Monitoring	
Record #	1
Site ID	ST1
Site Location Lat/Long	33.211967, -117.069002
Begin (Time)	09:40:00
End (Time)	09:50:00
Leq	43.7
Lmax	56.1
Lmin	29
Other Lx?	L90, L50, L10
L90	31.8
L50	34.9
L10	47.8
Other Lx (Specify Metric)	L
Primary Noise Source	Birds
Other Noise Sources (Background)	Birds, Distant Aircraft, Distant Traffic, Rustling Leaves
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

FORMS FIELD DATA REPORT

Description / Photos

Site Photos	
Photo	

Monitoring	
Record #	*2*
Site ID	*ST2*
Site Location Lat/Long	*33.226140, -117.065620*
Begin (Time)	*10:30:00*
End (Time)	*10:40:00*
Leq	*42.6*
Lmax	*59.3*
Lmin	*32.2*
Other Lx?	*L90, L50, L10*
L90	*34.6*
L50	*39.8*
L10	*43.6*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Birds*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Traffic, Rustling Leaves*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

FORMS FIELD DATA REPORT

Description / Photos

Site Photos	
Photo	

Monitoring	
Record #	*3*
Site ID	*ST3*
Site Location Lat/Long	*33.229934, -117.086077*
Begin (Time)	*11:20:00*
End (Time)	*11:30:00*
Leq	*40.3*
Lmax	*50.2*
Lmin	*31*
Other Lx?	*L90, L50, L10*
L90	*31.5*
L50	*36.6*
L10	*43.5*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Birds*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Rustling Leaves*
Other Noise Sources Additional Description	*Electrical noise.*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

FORMS FIELD DATA REPORT

Description / Photos

Site Photos	
Photo	

Monitoring	
Record #	4
Site ID	ST4
Site Location Lat/Long	33.246932, -117.092335
Begin (Time)	12:20:00
End (Time)	12:30:00
Leq	44.9
Lmax	55.6
Lmin	40.7
Other Lx?	L90, L50, L10
L90	41.9
L50	44
L10	46.7
Other Lx (Specify Metric)	L
Primary Noise Source	Workers on farm.
Other Noise Sources (Background)	Birds, Distant Conversations / Yelling, Rustling Leaves
Other Noise Sources Additional Description	Distant generator. Radio playing. Back up alarm.
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

FORMS DUDEK FIELD DATA REPORT

Description / Photos

Site Photos	
Photo	

Monitoring	
Record #	5
Site ID	ST5
Site Location Lat/Long	33.306542, -117.094827
Begin (Time)	13:15:00
End (Time)	13:25:00
Leq	35
Lmax	46
Lmin	26.7
Other Lx?	L90, L50, L10
L90	27.8
L50	31.8
L10	39.3
Other Lx (Specify Metric)	L
Primary Noise Source	Birds
Other Noise Sources (Background)	Birds, Distant Aircraft, Rustling Leaves
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

FORMS FIELD DATA REPORT

Description / Photos

Site Photos

Photo	

Monitoring

Record #	6
Site ID	ST6
Site Location Lat/Long	33.314550, -117.102055
Begin (Time)	14:00:00
End (Time)	14:10:00
Leq	36.6
Lmax	45.4
Lmin	32.8
Other Lx?	L90, L50, L10
L90	33.8
L50	35.8
L10	38.5
Other Lx (Specify Metric)	L
Primary Noise Source	Birds
Other Noise Sources (Background)	Birds, Distant Aircraft, Distant Traffic, Rustling Leaves
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

Description / Photos

Site Photos

Photo	
	

Attachment B

Construction Noise Modeling Input and Output

Oat Hills Tunnel South

Predicted Noise Results

Name	M.	ID	Level Lr Day (dBA)	Level Lr Night (dBA)	Limit. Value Day (dBA)	Limit. Value Night (dBA)	Land Use Type	Land Use Auto	Noise Type	Height (ft)	Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
OHS1			67.1	67.1	0	0		x	Total	5 r	6304909	2021911	1146.55
OHS2			40.6	40.6	0	0		x	Total	5 r	6304467	2022133	1351.89
OHS3			33.2	33.2	0	0		x	Total	5 r	6305853	2021727	1349

Noise Sources

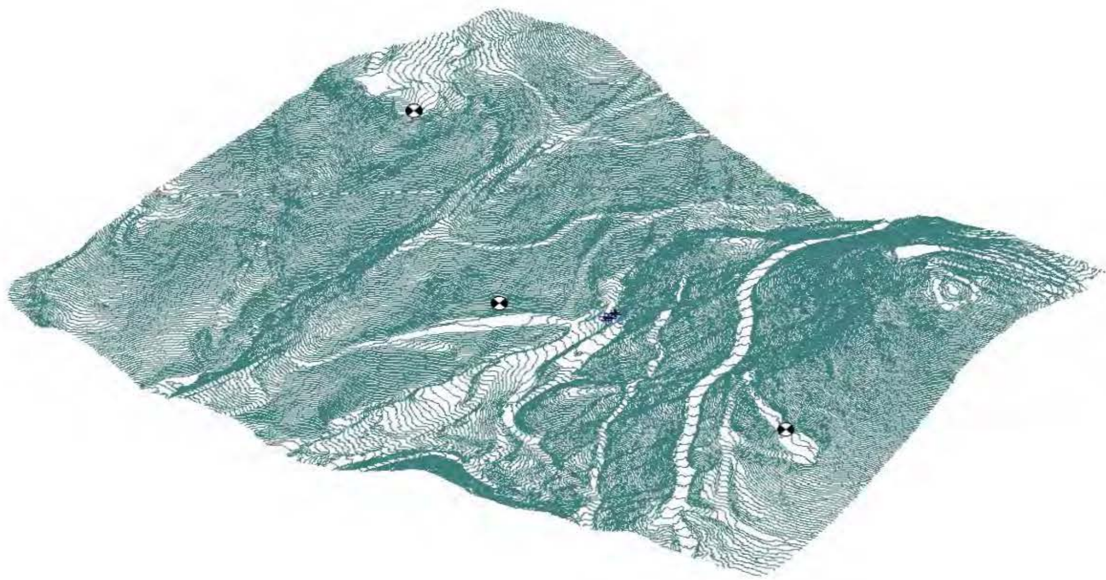
Name	M.	ID	Result. PWL Day (dBA)	Result. PWL Evening (dBA)	Result. PWL Night (dBA)	Lw / Li Type	Lw / Li Value	Height (ft)	Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
Heavy Truck		Truck	102	102	102	Lw	Truck	5 r	6305088	2022016	1131.63
Excavator		EX	105.5	105.5	105.5	Lw	Exc	5 r	6305078	2022024	1131.74
Man Lift		Lift	98.5	98.5	98.5	Lw	Manlift	5 r	6305081	2022038	1133.83
Welder		Weld	100.9	100.9	100.9	Lw	Weld	5 r	6305088	2022041	1138.14
Generator		Gen	101.4	101.4	101.4	Lw	Gen	5 r	6305095	2022038	1137.85
Crane		Crane	97.8	97.8	97.8	Lw	Crane	5 r	6305084	2022026	1132.27
Concrete Mixer Truck		Concrete	108	108	108	Lw	Con	5 r	6305087	2022024	1132.35
Concrete Saw		Saw	114.6	114.6	114.6	Lw	ConSaw	5 r	6305091	2022027	1133.22

Source Library

Name	ID	Type	Oktave Spectrum (dB) Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	Source
Excavator	Exc	Lw (c)		120	123	112	107	101	98	96	92	85	105.5	125.1	Defra 125kw 25t #19
Heavy Truck	Truck	Lw (c)		105	108	104	101	98	97	94	91	86	102	111.7	Defra Articulated Dump Truck #33
Concrete Mixer Truck	Con	Lw (c)		108	111	102	94	97	98	106	88	83	108	114.1	Defra Concrete Mixer Truck # 20
Man Lift	Manlift	Lw (c)		110	113	107	97	95	92	90	84	75	98.5	115.6	Defra Telescopic Handler #35
Welder	Weld	Lw (c)		92	95	96	97	96	97	94	89	84	100.9	104.2	Defra Hand Held Welder # 31
Generator	Gen	Lw (c)		100	103	100	95	96	98	94	90	88	101.4	107.6	Defra Generator for Welding #32
Wheeled Mobile Crane	Crane	Lw (c)		105	108	104	99	91	92	91	84	78	97.8	111.2	Defra Wheeled Mobile Crane #43
Concrete Saw	ConSaw	Lw (c)		109	112	114	106	106	105	106	110	108	114.6	119	Defra Hand Held Circular Saw #36

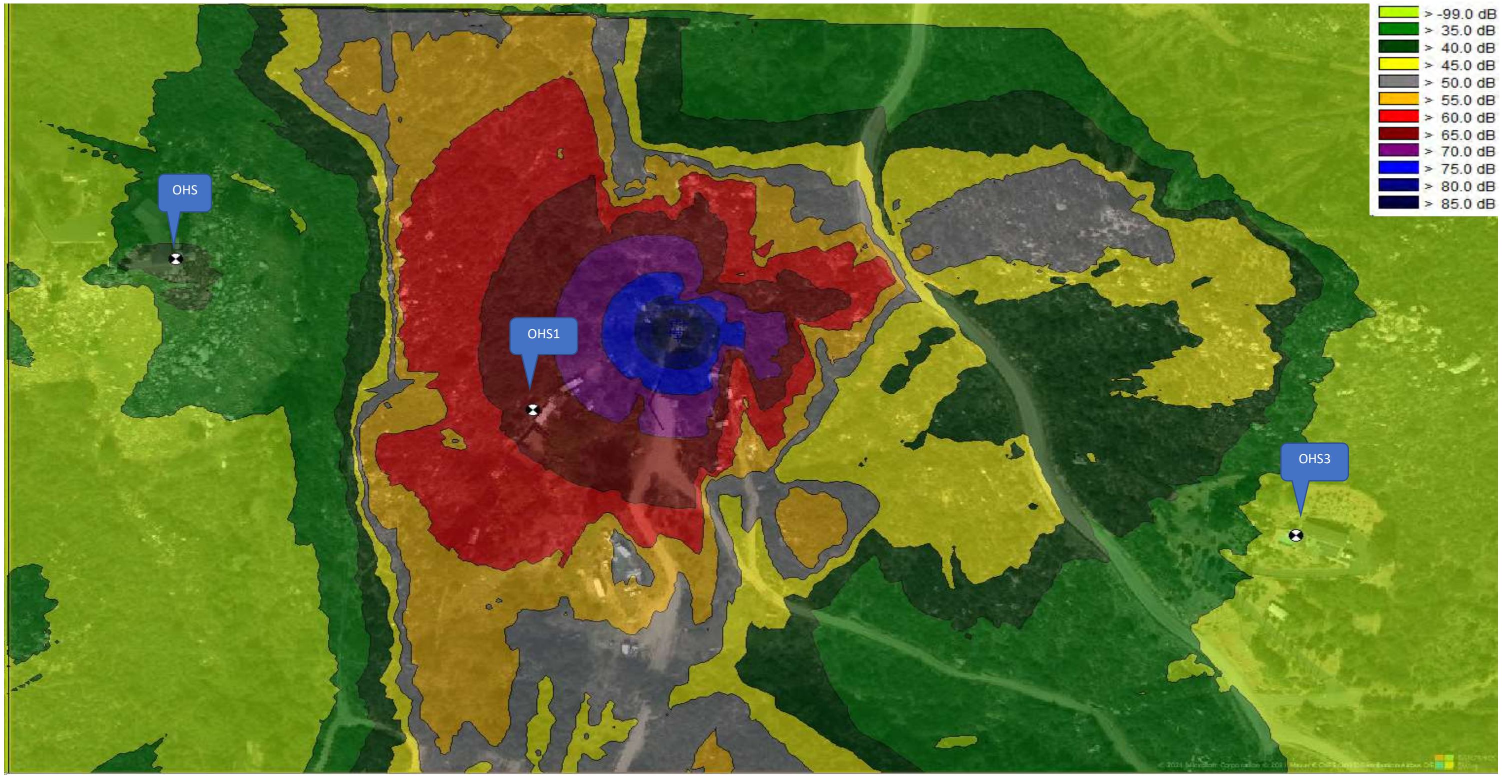
Isometric of Terrain:

Oat Hills Tunnel South



Noise Contour Map:

Oat Hills Tunnel South



Oat Hills Tunnel North

Predicted Noise Results

Name	M.	ID	Level Lr Day (dBA)	Level Lr Night (dBA)	Limit. Value Day (dBA)	Limit. Value Night (dBA)	Land Use Type	Land Use Auto	Land Use Noise Type	Height (ft)		Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
OHN1			33.1	33.1	0	0		x	Total	5	r	6305165	2026050	1367
OHN2			37.5	37.5	0	0		x	Total	5	r	6306594	2025729	1220.53
OHN3			60.2	60.2	0	0		x	Total	5	r	6306150	2025558	1255.02

Noise Sources

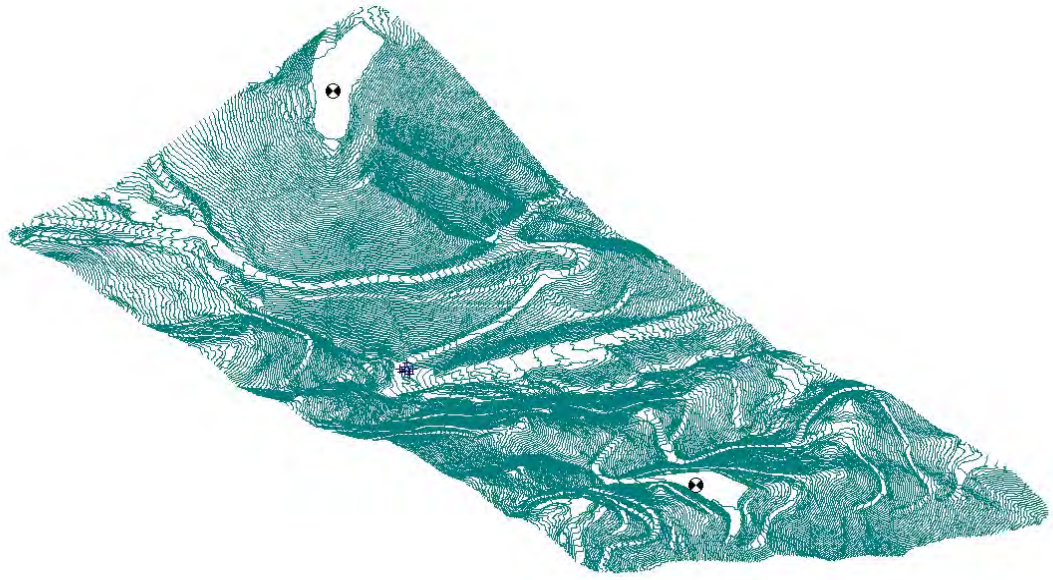
Name	M.	ID	Result. PWL Day (dBA)	Result. PWL Evening (dBA)	Result. PWL Night (dBA)	Lw / Li Type	Lw / Li Value	Direct.	Height (ft)		Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
Heavy Truck			102	102	102	Lw	Truck	(none)	5	r	6305749	2025690	1133.89
Excavator			105.5	105.5	105.5	Lw	Exc	(none)	5	r	6305770	2025688	1128.37
Man Lift			98.5	98.5	98.5	Lw	Manlift	(none)	5	r	6305758	2025678	1132.5
Welder			100.9	100.9	100.9	Lw	Weld	(none)	5	r	6305778	2025673	1128.49
Generator			101.4	101.4	101.4	Lw	Gen	(none)	5	r	6305765	2025661	1132.92
Crane			97.8	97.8	97.8	Lw	Crane	(none)	5	r	6305754	2025665	1133.51
Concrete Mixer Truck			108	108	108	Lw	Con	(none)	5	r	6305765	2025668	1131.48
Concrete Saw			114.6	114.6	114.6	Lw	ConSaw	(none)	5	r	6305768	2025679	1128.81

Source Library

Name	ID	Type	Oktave Spectrum (dB) Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	Source
Excavator	Exc	Lw (c)		120	123	112	107	101	98	96	92	85	105.5	125.1	Defra 125kw 25t #19
Heavy Truck	Truck	Lw (c)		105	108	104	101	98	97	94	91	86	102	111.7	Defra Articulated Dump Truck #33
Concrete Mixer Truck	Con	Lw (c)		108	111	102	94	97	98	106	88	83	108	114.1	Defra Concrete Mixer Truck # 20
Man Lift	Manlift	Lw (c)		110	113	107	97	95	92	90	84	75	98.5	115.6	Defra Telescopic Handler #35
Welder	Weld	Lw (c)		92	95	96	97	96	97	94	89	84	100.9	104.2	Defra Hand Held Welder # 31
Generator	Gen	Lw (c)		100	103	100	95	96	98	94	90	88	101.4	107.6	Defra Generator for Welding #32
Wheeled Mobile Crane	Crane	Lw (c)		105	108	104	99	91	92	91	84	78	97.8	111.2	Defra Wheeled Mobile Crane #43
Concrete Saw	ConSaw	Lw (c)		109	112	114	106	106	105	106	110	108	114.6	119	Defra Hand Held Circular Saw #36

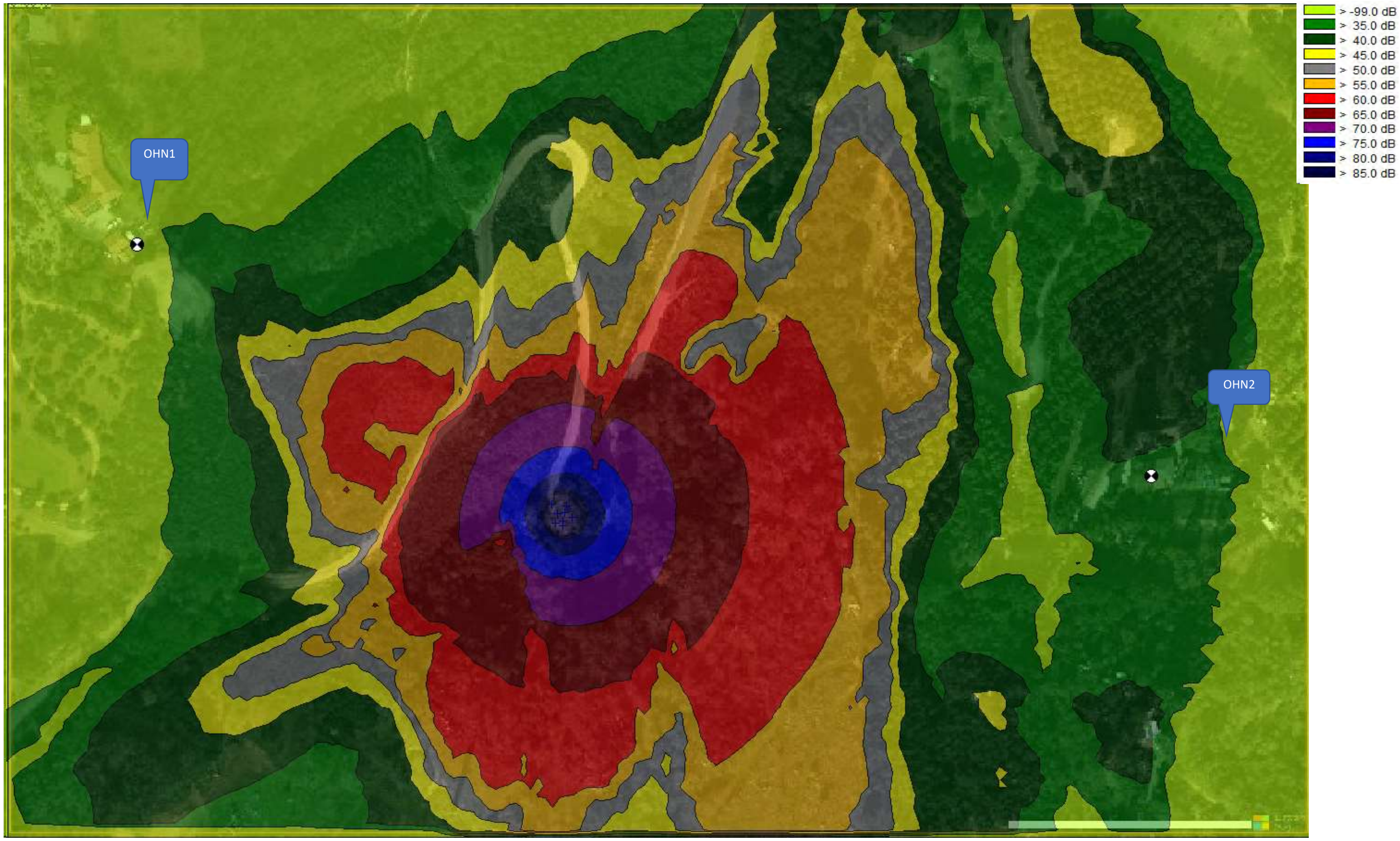
Oat Hills Tunnel North

Isometric of Terrain:



Oat Hills Tunnel North

Noise Contour Map:



Red Mountain Tunnel South

Predicted Noise Results

Name	M.	ID	Level Lr Day (dBA)	Level Lr Night (dBA)	Limit. Value Day (dBA)	Limit. Value Night (dBA)	Land Use Type	Land Use Auto	Noise Type	Height (ft)		Coordinates X (ft)	Y (ft)	Z (ft)
RMS1			46.5	46.5	0	0		x	Total	5	r	6305358	2028372	931
RMS2			38.8	38.8	0	0		x	Total	5	r	6306684	2028392	967.52
RMS3			37.5	37.5	0	0		x	Total	5	r	6307038	2028456	974.64

Noise Sources

Name	M.	ID	Result. PWL Day (dBA)	Evening (dBA)	Night (dBA)	Lw / Li Type	Value		Direct. (ft)	Height		Coordinates X (ft)	Y (ft)	Z (ft)
Excavator			105.5	105.5	105.5	Lw	Exc	(none)		5	r	6305968	2029007	1145.24
Heavy Truck			102	102	102	Lw	Truck	(none)		5	r	6305981	2029018	1146.58
Concrete Mixer Truck			108	108	108	Lw	Con	(none)		5	r	6305997	2029023	1147.73
Man Lift			98.5	98.5	98.5	Lw	Manlift	(none)		5	r	6305990	2029000	1147.21
Welder			100.9	100.9	100.9	Lw	Weld	(none)		5	r	6305989	2028982	1146.88
Generator			101.4	101.4	101.4	Lw	Gen	(none)		5	r	6306013	2028995	1148.48
Wheeled Crane			97.8	97.8	97.8	Lw	Crane	(none)		5	r	6306014	2028981	1148.36
Concrete Saw			114.6	114.6	114.6	Lw	ConSaw	(none)		5	r	6306007	2029036	1148.33

Source Library

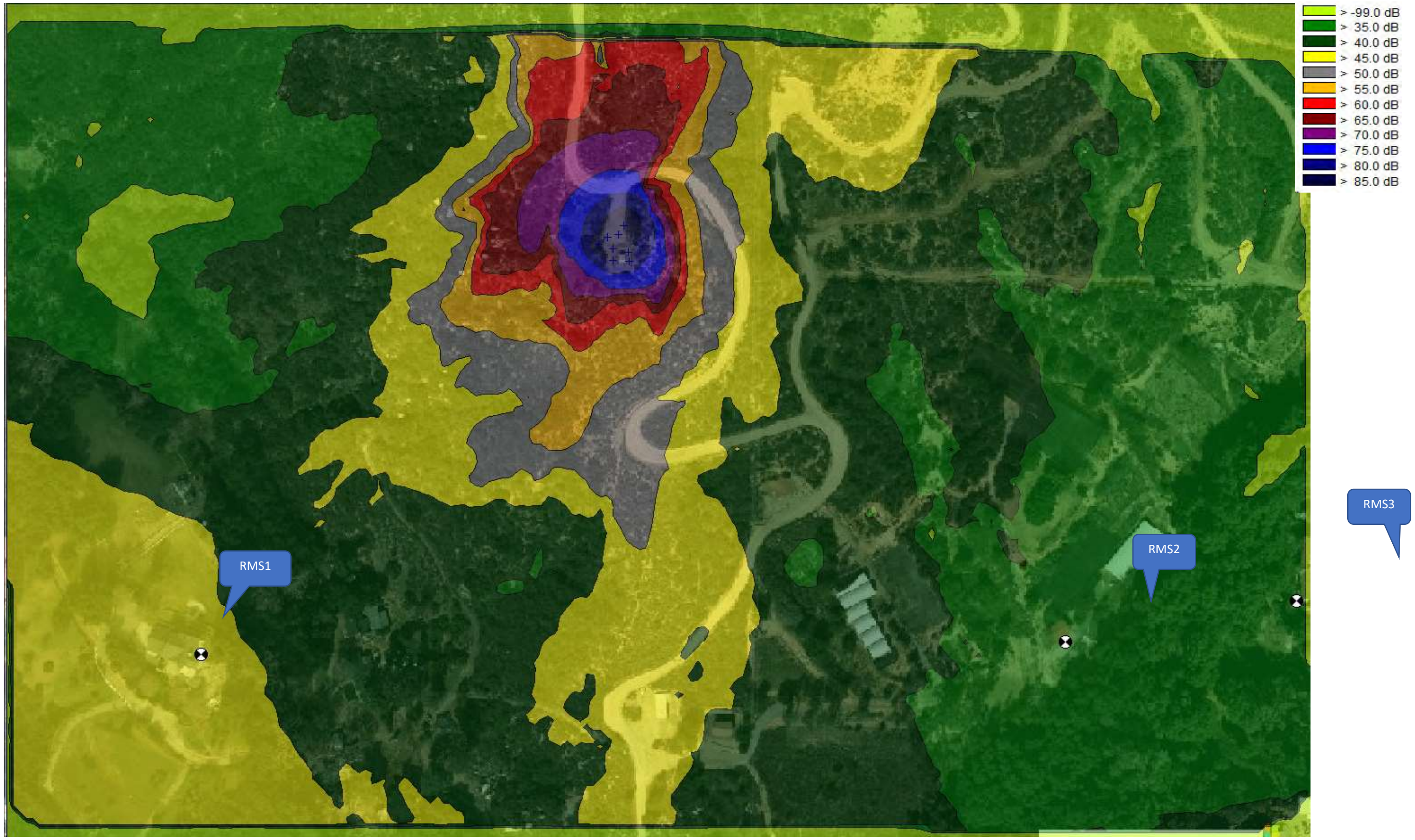
Name	ID	Type	Oktave Spectrum (dB) Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	Source
Excavator	Exc	Lw (c)		120	123	112	107	101	98	96	92	85	105.5	125.1	Defra 125kw 25t #19
Heavy Truck	Truck	Lw (c)		105	108	104	101	98	97	94	91	86	102	111.7	Defra Articulated Dump Truck #33
Concrete Mixer Truck	Con	Lw (c)		108	111	102	94	97	98	106	88	83	108	114.1	Defra Concrete Mixer Truck # 20
Man Lift	Manlift	Lw (c)		110	113	107	97	95	92	90	84	75	98.5	115.6	Defra Telescopic Handler #35
Welder	Weld	Lw (c)		92	95	96	97	96	97	94	89	84	100.9	104.2	Defra Hand Held Welder # 31
Generator	Gen	Lw (c)		100	103	100	95	96	98	94	90	88	101.4	107.6	Defra Generator for Welding #32
Wheeled Mobile Crane	Crane	Lw (c)		105	108	104	99	91	92	91	84	78	97.8	111.2	Defra Wheeled Mobile Crane #43
Concrete Saw	ConSaw	Lw (c)		109	112	114	106	106	105	106	110	108	114.6	119	Defra Hand Held Circular Saw #36

Isometric of Terrain:

Red Mountain Tunnel South

Noise Contour Map:

Red Mountain Tunnel South



Red Mountain Tunnel North

Predicted Noise Results

Name	M.	ID	Level Lr Day (dBA)	Level Lr Night (dBA)	Limit. Value Day (dBA)	Limit. Value Night (dBA)	Land Use Type	Land Use Auto	Noise Type	Height (ft)		Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
RMN1			67.1	67.1	0	0		x	Total	5	r	6303898	2034692	1155.99
RMN2			53	53	0	0		x	Total	5	r	6304136	2034422	1154.83
RMN3			67.6	67.6	0	0		x	Total	5	r	6303925	2034612	1156.99
RMN4			48	48	0	0		x	Total	5	r	6304598	2034733	1185

Noise Sources

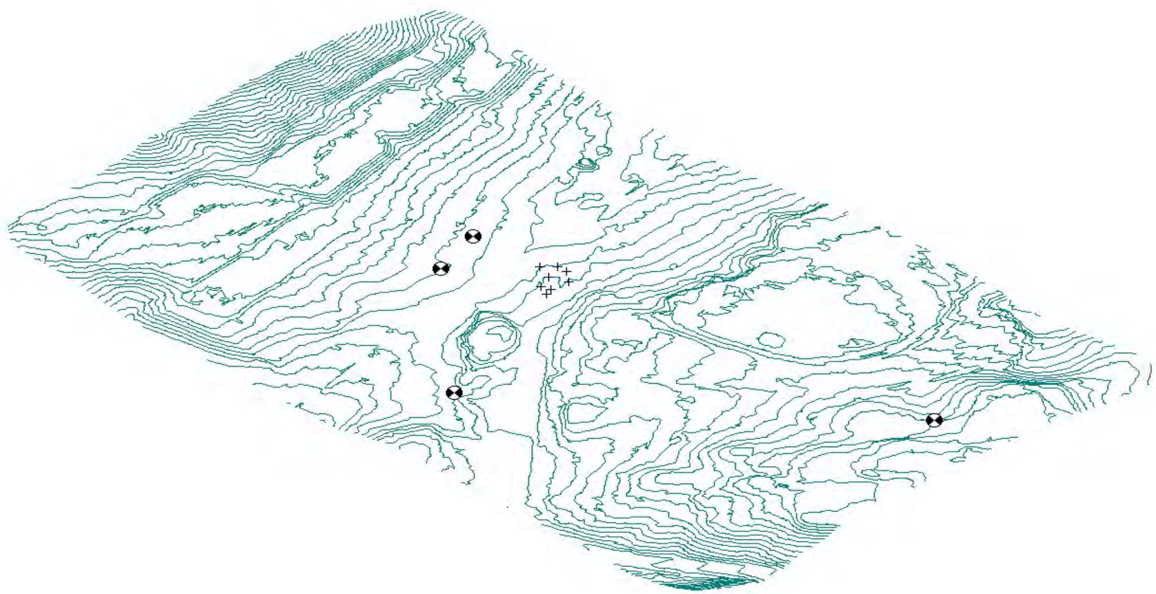
Name	M.	ID	Result. PWL Day (dBA)	Result. PWL Evening (dBA)	Result. PWL Night (dBA)	Lw / Li Type	Value	Height (ft)		Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
Excavator			105.5	105.5	105.5	Lw	Exc	5	r	6304035	2034663	1157.01
Heavy Truck			102	102	102	Lw	Truck	5	r	6304049	2034666	1157.56
Concrete Mixer Truck			108	108	108	Lw	Con	5	r	6304049	2034693	1157.41
Man Lift			98.5	98.5	98.5	Lw	Manlift	5	r	6304031	2034709	1156.76
Welder			100.9	100.9	100.9	Lw	Weld	5	r	6304015	2034710	1155.67
Generator			101.4	101.4	101.4	Lw	Gen	5	r	6304000	2034696	1155.14
Wheeled Crane			97.8	97.8	97.8	Lw	Crane	5	r	6304054	2034654	1158.03
Concrete Saw			114.6	114.6	114.6	Lw	ConSaw	5	r	6304027	2034685	1157

Source Library

Name	ID	Type	Oktave Spectrum (dB) Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	Source
Excavator	Exc	Lw (c)		120	123	112	107	101	98	96	92	85	105.5	125.1	Defra 125kw 25t #19
Heavy Truck	Truck	Lw (c)		105	108	104	101	98	97	94	91	86	102	111.7	Defra Articulated Dump Truck #33
Concrete Mixer Truck	Con	Lw (c)		108	111	102	94	97	98	106	88	83	108	114.1	Defra Concrete Mixer Truck # 20
Man Lift	Manlift	Lw (c)		110	113	107	97	95	92	90	84	75	98.5	115.6	Defra Telescopic Handler #35
Welder	Weld	Lw (c)		92	95	96	97	96	97	94	89	84	100.9	104.2	Defra Hand Held Welder # 31
Generator	Gen	Lw (c)		100	103	100	95	96	98	94	90	88	101.4	107.6	Defra Generator for Welding #32
Wheeled Mobile Crane	Crane	Lw (c)		105	108	104	99	91	92	91	84	78	97.8	111.2	Defra Wheeled Mobile Crane #43
Concrete Saw	ConSaw	Lw (c)		109	112	114	106	106	105	106	110	108	114.6	119	Defra Hand Held Circular Saw #36

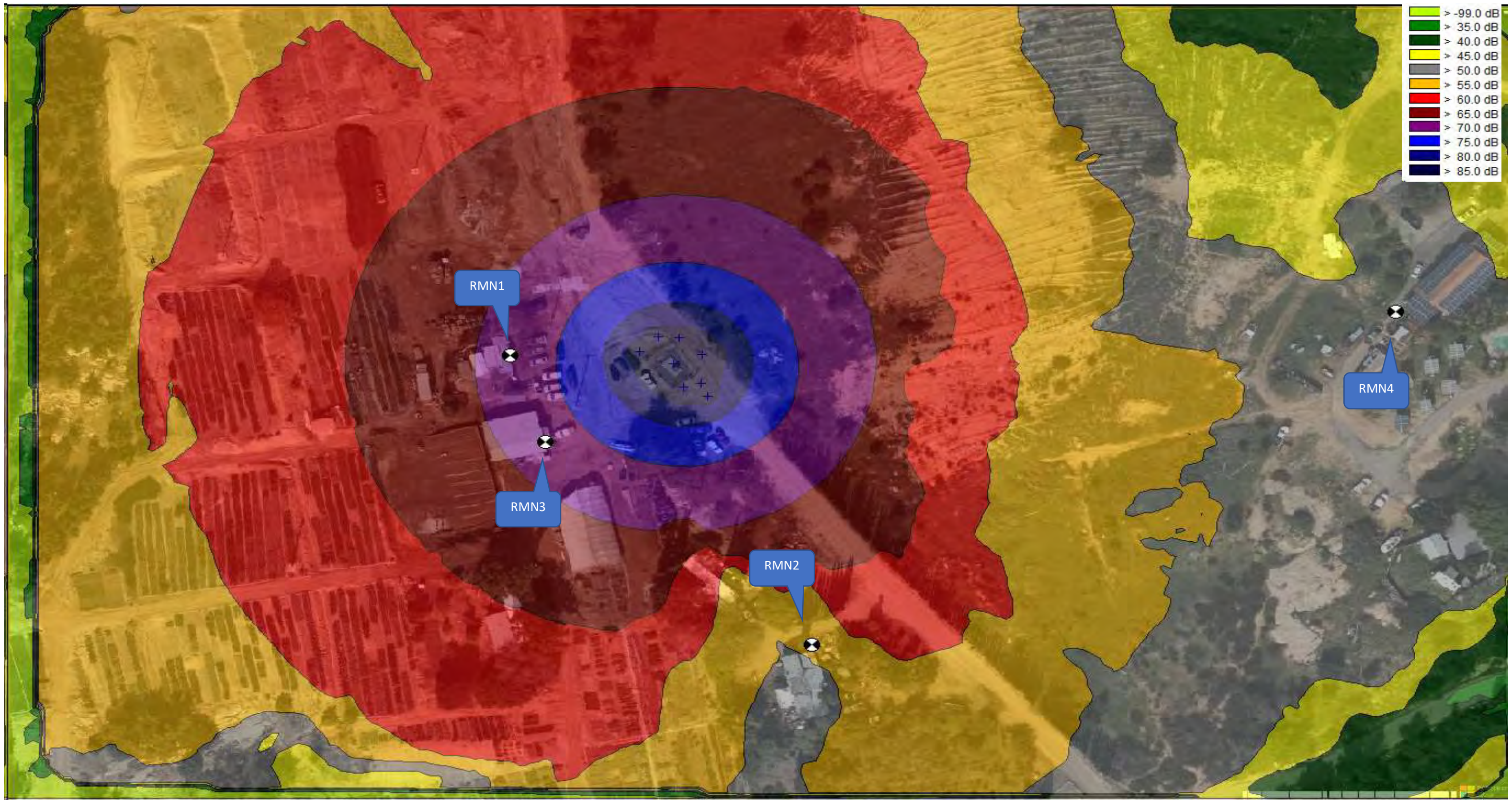
Isometric of Terrain:

Red Mountain Tunnel North



Noise Contour Map:

Red Mountain Tunnel North



Lilac Tunnel South

Predicted Noise Results

Name	M.	ID	Level Lr Day (dBA)	Level Lr Night (dBA)	Limit. Value Day (dBA)	Limit. Value Night (dBA)	Land Use Type	Land Use Auto	Land Use Noise Type	Height (ft)		Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
LS1			38.5	38.5	0	0		x	Total	5	r	6302453	2056420	1327.17

Noise Sources

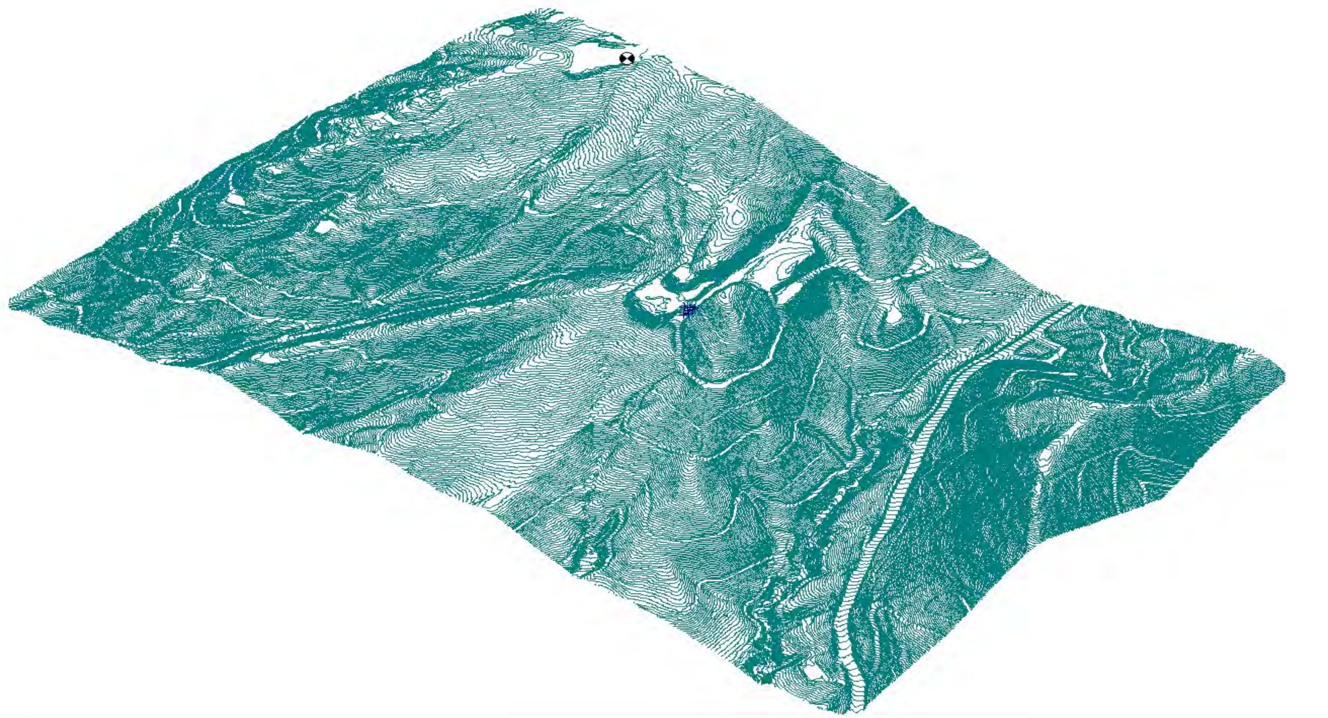
Name	M.	ID	Result. PWL Day (dBA)	Result. PWL Evening (dBA)	Result. PWL Night (dBA)	Lw / Li Type	Lw / Li Value	Height (ft)		Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
Excavator			105.5	105.5	105.5	Lw	Exc	5	r	6303633	2055516	1195.75
Heavy Truck			102	102	102	Lw	Truck	5	r	6303656	2055518	1209.24
Concrete Mixer Truck			108	108	108	Lw	Con	5	r	6303634	2055497	1194.47
Man Lift			98.5	98.5	98.5	Lw	Manlift	5	r	6303646	2055538	1203.26
Welder			100.9	100.9	100.9	Lw	Weld	5	r	6303616	2055520	1198.63
Generator			101.4	101.4	101.4	Lw	Gen	5	r	6303651	2055501	1195.73
Wheeled Crane			97.8	97.8	97.8	Lw	Crane	5	r	6303644	2055488	1193
Concrete Saw			114.6	114.6	114.6	Lw	ConSaw	5	r	6303626	2055533	1197

Source Library

Name	ID	Type	Oktave Spectrum (dB) Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	Source
Excavator	Exc	Lw (c)		120	123	112	107	101	98	96	92	85	105.5	125.1	Defra 125kw 25t #19
Heavy Truck	Truck	Lw (c)		105	108	104	101	98	97	94	91	86	102	111.7	Defra Articulated Dump Truck #33
Concrete Mixer Truck	Con	Lw (c)		108	111	102	94	97	98	106	88	83	108	114.1	Defra Concrete Mixer Truck # 20
Man Lift	Manlift	Lw (c)		110	113	107	97	95	92	90	84	75	98.5	115.6	Defra Telescopic Handler #35
Welder	Weld	Lw (c)		92	95	96	97	96	97	94	89	84	100.9	104.2	Defra Hand Held Welder # 31
Generator	Gen	Lw (c)		100	103	100	95	96	98	94	90	88	101.4	107.6	Defra Generator for Welding #32
Wheeled Mobile Crane	Crane	Lw (c)		105	108	104	99	91	92	91	84	78	97.8	111.2	Defra Wheeled Mobile Crane #43
Concrete Saw	ConSaw	Lw (c)		109	112	114	106	106	105	106	110	108	114.6	119	Defra Hand Held Circular Saw #36

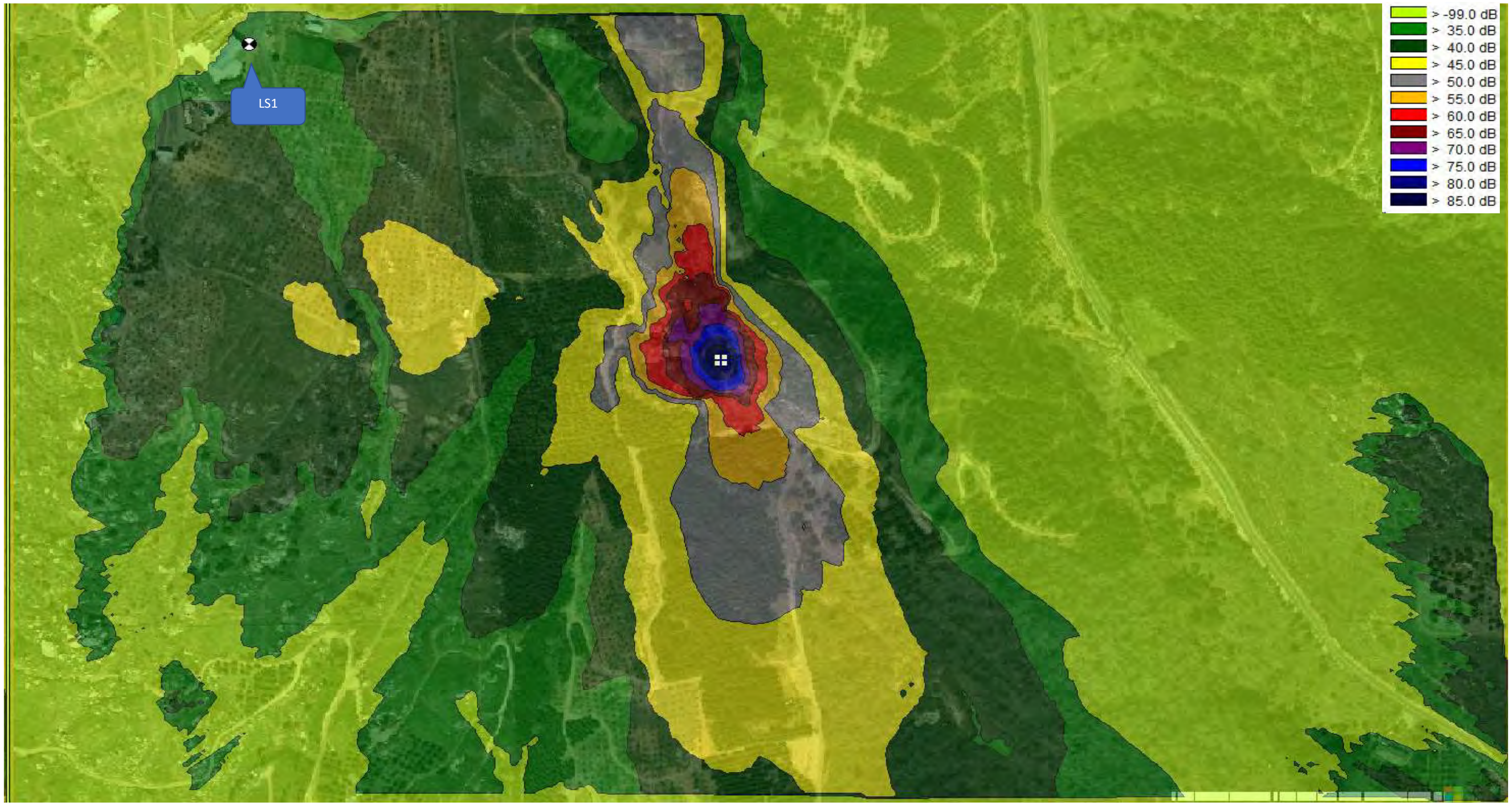
Isometric of Terrain:

Lilac Tunnel South



Noise Contour Map:

Lilac Tunnel South



Lilac Tunnel North

Predicted Noise Results

Name	M.	ID	Level Lr Day (dBA)	Level Lr Night (dBA)	Limit. Value Day (dBA)	Limit. Value Night (dBA)	Land Use Type	Land Use Auto	Land Use Noise Type	Height (ft)		Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
LN1			47.9	47.9	0	0		x	Total	5	r	6301017	2057574	1132.8
LN2			46.4	46.4	0	0		x	Total	5	r	6300866	2058751	1041.29

Noise Sources

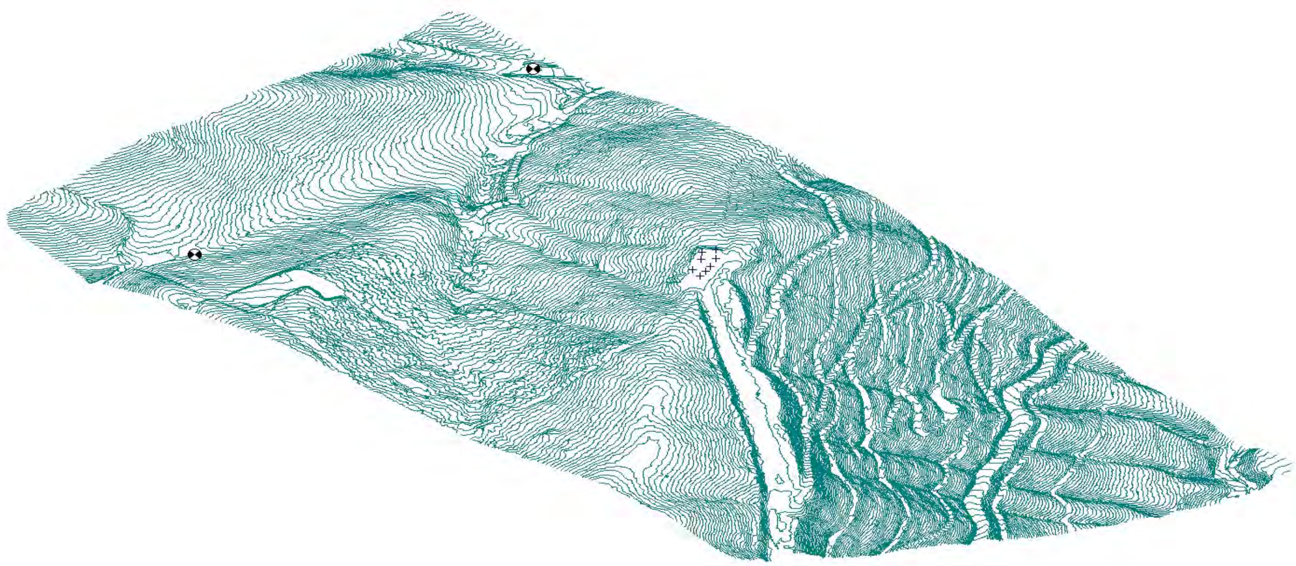
Name	M.	ID	Result. PWL Day (dBA)	Result. PWL Evening (dBA)	Result. PWL Night (dBA)	Lw / Li Type	Lw / Li Value	Height (ft)		Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
Excavator			105.5	105.5	105.5	Lw	Exc	5	r	6301883	2058288	1196.2
Heavy Truck			102	102	102	Lw	Truck	5	r	6301899	2058255	1196.43
Concrete Mixer Truck			108	108	108	Lw	Con	5	r	6301908	2058233	1196.26
Man Lift			98.5	98.5	98.5	Lw	Manlift	5	r	6301880	2058219	1195.26
Welder			100.9	100.9	100.9	Lw	Weld	5	r	6301910	2058210	1196.09
Generator			101.4	101.4	101.4	Lw	Gen	5	r	6301861	2058263	1195.53
Wheeled Crane			97.8	97.8	97.8	Lw	Crane	5	r	6301855	2058315	1195
Concrete Saw			114.6	114.6	114.6	Lw	ConSaw	5	r	6301839	2058288	1195

Source Library

Name	ID	Type	Oktave Spectrum (dB) Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	Source
Excavator	Exc	Lw (c)		120	123	112	107	101	98	96	92	85	105.5	125.1	Defra 125kw 25t #19
Heavy Truck	Truck	Lw (c)		105	108	104	101	98	97	94	91	86	102	111.7	Defra Articulated Dump Truck #33
Concrete Mixer Truck	Con	Lw (c)		108	111	102	94	97	98	106	88	83	108	114.1	Defra Concrete Mixer Truck # 20
Man Lift	Manlift	Lw (c)		110	113	107	97	95	92	90	84	75	98.5	115.6	Defra Telescopic Handler #35
Welder	Weld	Lw (c)		92	95	96	97	96	97	94	89	84	100.9	104.2	Defra Hand Held Welder # 31
Generator	Gen	Lw (c)		100	103	100	95	96	98	94	90	88	101.4	107.6	Defra Generator for Welding #32
Wheeled Mobile Crane	Crane	Lw (c)		105	108	104	99	91	92	91	84	78	97.8	111.2	Defra Wheeled Mobile Crane #43
Concrete Saw	ConSaw	Lw (c)		109	112	114	106	106	105	106	110	108	114.6	119	Defra Hand Held Circular Saw #36

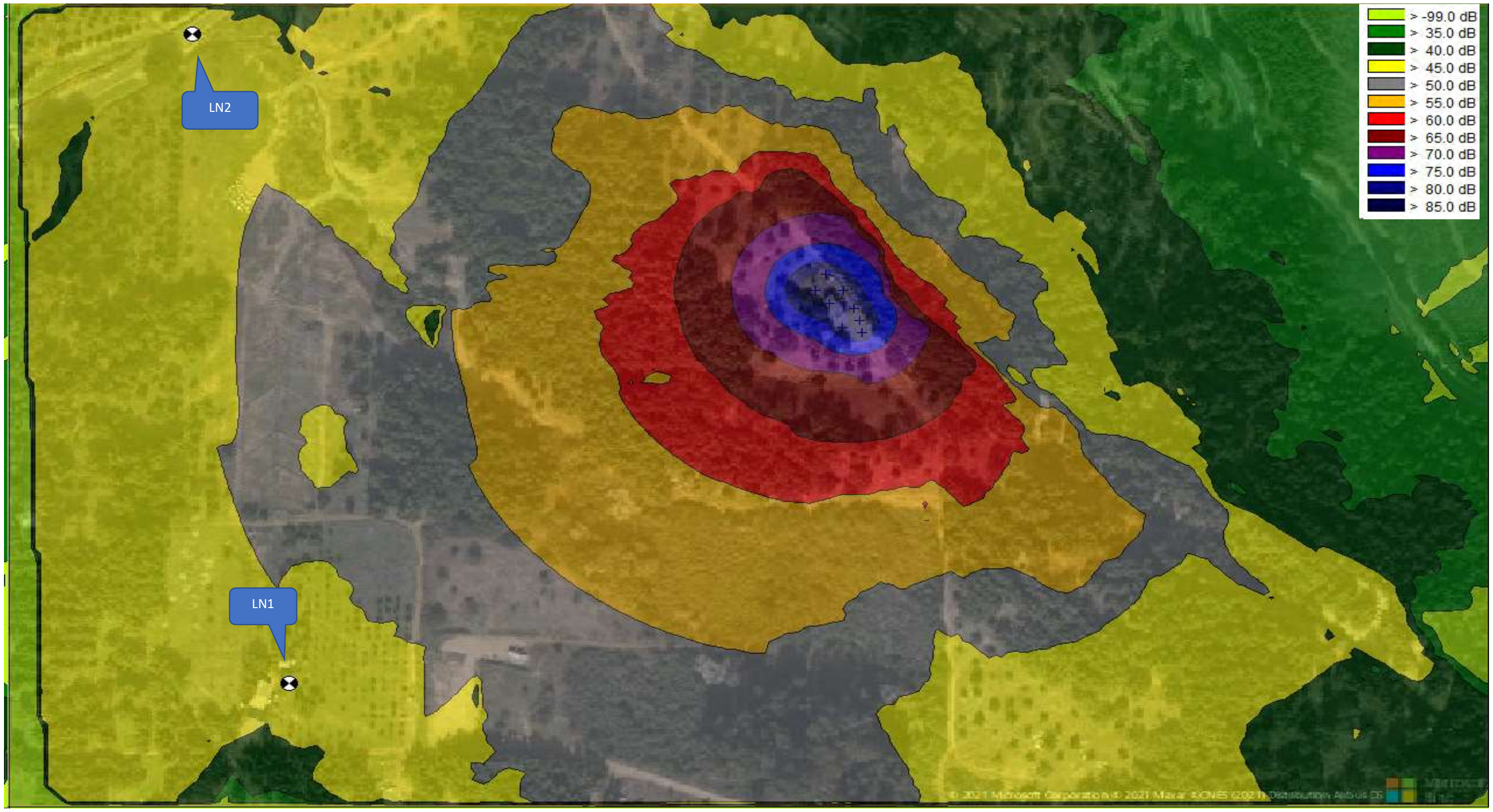
Isometric of Terrain:

Lilac Tunnel North



Noise Contour Map:

Lilac Tunnel North



Oat Hills Tunnel South - Night-time

Predicted Noise Results

Name	M.	ID	Level Lr Day (dBA)	Level Lr Night (dBA)	Limit. Value Day (dBA)	Limit. Value Night (dBA)	Land Use Type	Auto	Noise Type	Height (ft)	Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
OHS1			49	49	0	0		x	Total	5 r	6304938	2021914	1128.74
OHS2			30.8	30.8	0	0		x	Total	5 r	6304467	2022133	1351.89
OHS3			27.2	27.2	0	0		x	Total	5 r	6305853	2021727	1349

Noise Sources

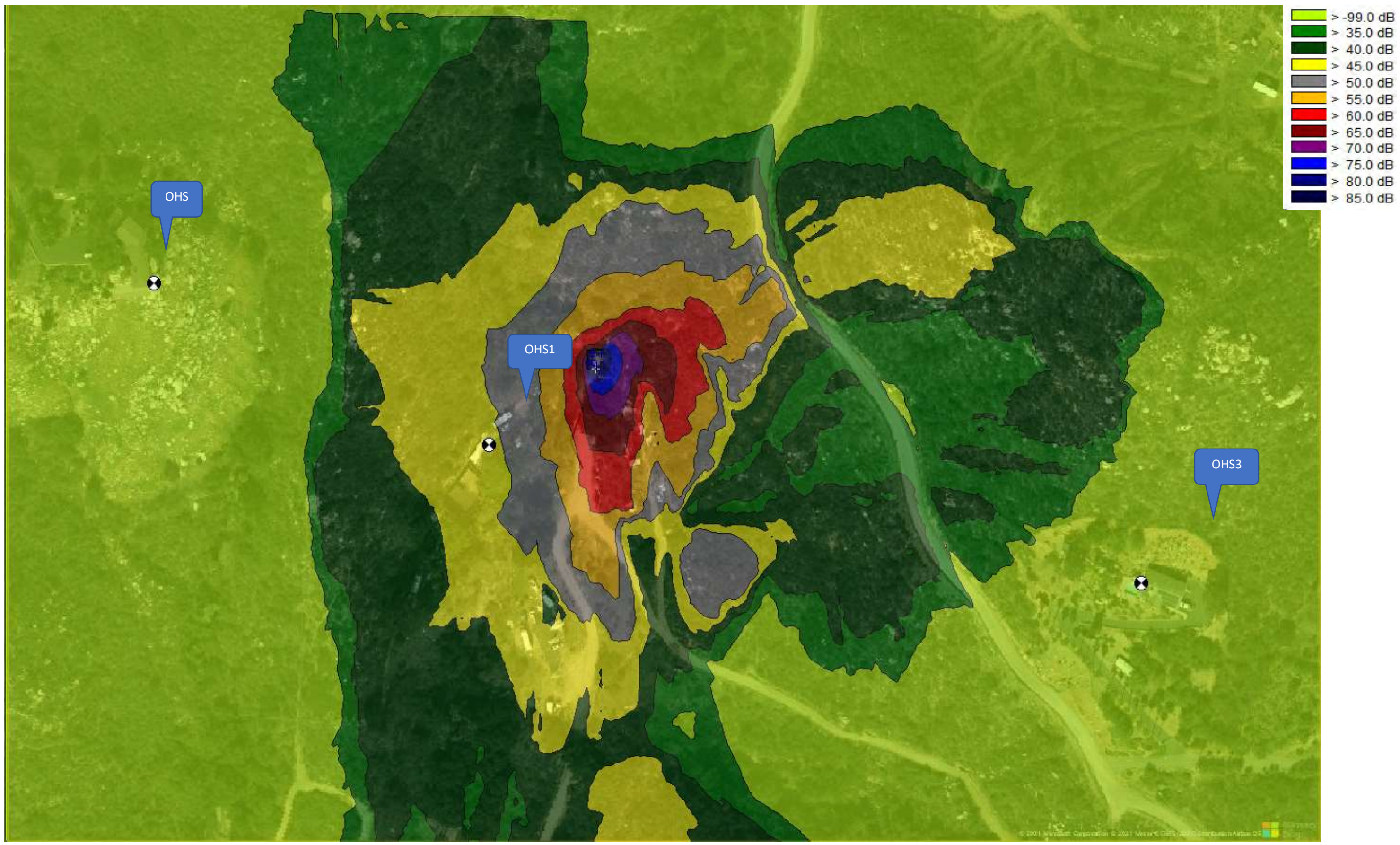
Name	M.	ID	Result. PWL Day (dBA)	Result. PWL Evening (dBA)	Result. PWL Night (dBA)	Lw / Li Type	Lw / Li Value	Attenuatio	Operating Time Day (min)	Operating Time Special (min)	Operating Time Night (min)	K0 (dB)	Freq. (Hz)	Direct.	Height (ft)	Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
Heavy Truck	-	Truck	102	102	102	Lw	Truck					0		(none)	5 r	6305088	2022016	1131.63
Vent Fan		Fan	105	105	105	SET						0		(none)	5 r	6305078	2022024	1131.74
Man Lift		Lift	91.5	91.5	91.5	Lw	Manlift	7				0		(none)	5 r	6305081	2022038	1133.83
Welder		Weld	96.9	96.9	96.9	Lw	Weld	4				0		(none)	5 r	6305084	2022040	1134.72
Generator		Gen	98.4	98.4	98.4	Lw	Gen	3				0		(none)	5 r	6305095	2022038	1137.85
Crane		Crane	89.8	89.8	89.8	Lw	Crane	8				0		(none)	5 r	6305088	2022021	1132.13
Concrete Mixer Truck		Concrete	104	104	104	Lw	Con	4				0		(none)	5 r	6305081	2022022	1131.54
Concrete Saw		Saw	104.6	104.6	104.6	Lw	ConSaw	10				0		(none)	5 r	6305082	2022029	1132.47

Source Library

Name	ID	Type	Oktave Spectrum (dB) Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	Source
Excavator	Exc	Lw (c)		120	123	112	107	101	98	96	92	85	105.5	125.1	Defra 125kw 25t #19
Heavy Truck	Truck	Lw (c)		105	108	104	101	98	97	94	91	86	102	111.7	Defra Articulated Dump Truck #33
Concrete Mixer Truck	Con	Lw (c)		108	111	102	94	97	98	106	88	83	108	114.1	Defra Concrete Mixer Truck # 20
Man Lift	Manlift	Lw (c)		110	113	107	97	95	92	90	84	75	98.5	115.6	Defra Telescopic Handler #35
Welder	Weld	Lw (c)		92	95	96	97	96	97	94	89	84	100.9	104.2	Defra Hand Held Welder # 31
Generator	Gen	Lw (c)		100	103	100	95	96	98	94	90	88	101.4	107.6	Defra Generator for Welding #32
Wheeled Mobile Crane	Crane	Lw (c)		105	108	104	99	91	92	91	84	78	97.8	111.2	Defra Wheeled Mobile Crane #43
Concrete Saw	ConSaw	Lw (c)		109	112	114	106	106	105	106	110	108	114.6	119	Defra Hand Held Circular Saw #36

Noise Contour Map:

Oat Hills Tunnel South - Night-time



Noise Barrier Alignment

Oat Hills Tunnel South - Night-time

Red Mountain Tunnel North - Night-time

Predicted Noise Results

Name	M.	ID	Level Lr Day (dBA)	Level Lr Night (dBA)	Limit. Value Day (dBA)	Limit. Value Night (dBA)	Land Use Type	Land Use Auto	Noise Type	Height (ft)		Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
RMN1			50.2	50.2	0	0		x	Total	5	r	6303898	2034692	1155.99
RMN2			44.8	44.8	0	0		x	Total	5	r	6304136	2034422	1154.83
RMN3			50.4	50.4	0	0		x	Total	5	r	6303925	2034612	1156.99
RMN4			39.8	39.8	0	0		x	Total	5	r	6304598	2034733	1185

Noise Sources

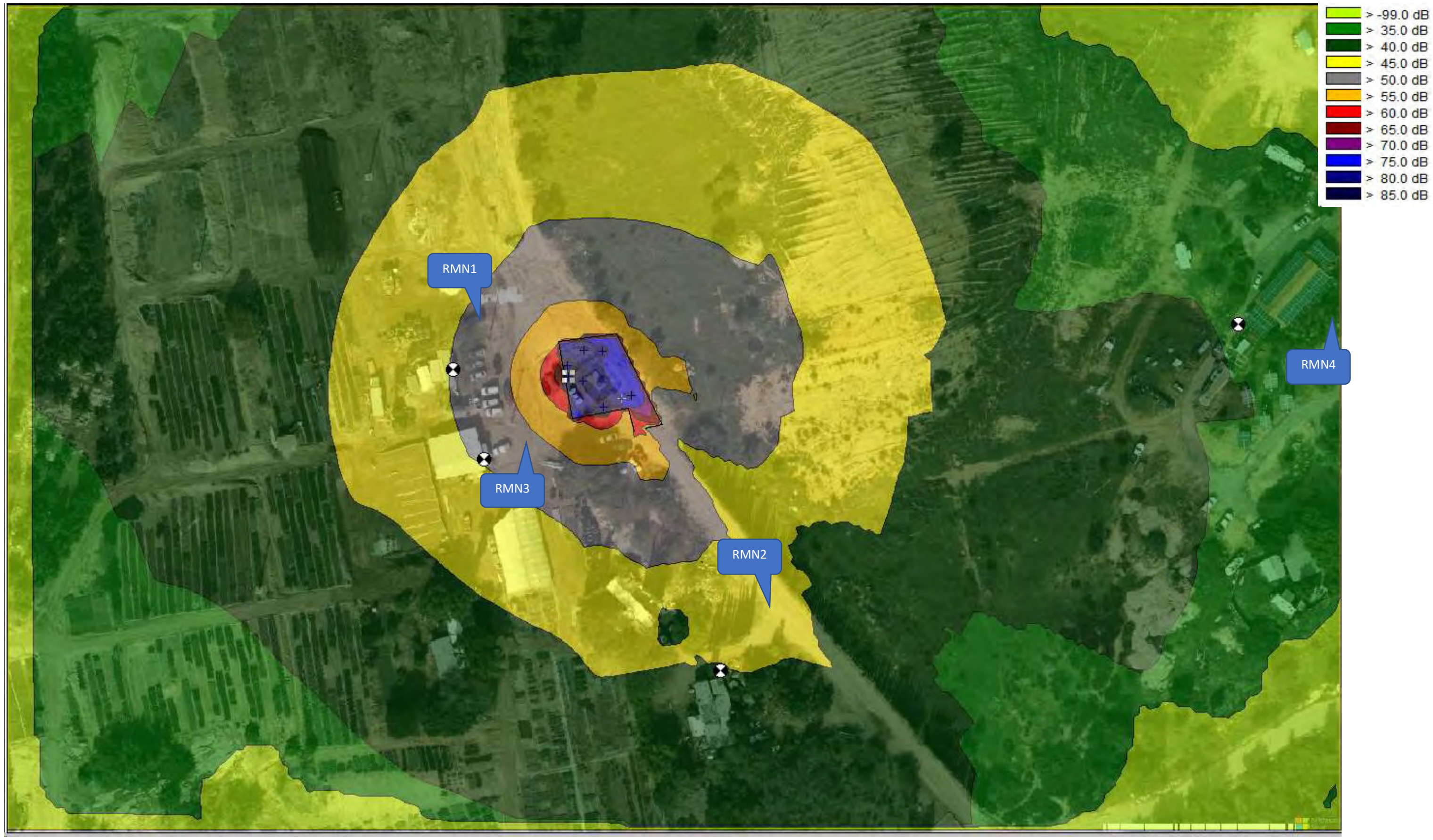
Name	M.	ID	Result. PWL Day (dBA)	Result. PWL Evening (dBA)	Result. PWL Night (dBA)	Lw / Li Type	Lw / Li Value	Attenuatio	Operating Time Day (min)	Operating Time Special (min)	Operating Time Night (min)	K0 (dB)	Freq. (Hz)	Direct.	Height (ft)		Coordinates X (ft)	Coordinates Y (ft)	Coordinates Z (ft)
Ventilation Fan			105	105	105	SET						0		(none)	5	r	6304001	2034686	1155
Heavy Truck	-		102	102	102	Lw	Truck					0		(none)	5	r	6304049	2034666	1157.56
Concrete Mixer Truck			104	104	104	Lw	Con	4				0		(none)	5	r	6304032	2034659	1157
Man Lift			91.5	91.5	91.5	Lw	Manlift	7				0		(none)	5	r	6304031	2034709	1156.76
Welder			96.9	96.9	96.9	Lw	Weld	4				0		(none)	5	r	6304015	2034710	1155.67
Generator			98.4	98.4	98.4	Lw	Gen	3				0		(none)	5	r	6304000	2034696	1155.14
Wheeled Crane			89.8	89.8	89.8	Lw	Crane	8				0		(none)	5	r	6304057	2034669	1157.87
Concrete Saw			104.6	104.6	104.6	Lw	ConSaw	10				0		(none)	5	r	6304013	2034682	1156

Source Library

Name	ID	Type	Oktave Spectrum (dB) Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	Source
Excavator	Exc	Lw (c)		120	123	112	107	101	98	96	92	85	105.5	125.1	Defra 125kw 25t #19
Heavy Truck	Truck	Lw (c)		105	108	104	101	98	97	94	91	86	102	111.7	Defra Articulated Dump Truck #33
Concrete Mixer Truck	Con	Lw (c)		108	111	102	94	97	98	106	88	83	108	114.1	Defra Concrete Mixer Truck # 20
Man Lift	Manlift	Lw (c)		110	113	107	97	95	92	90	84	75	98.5	115.6	Defra Telescopic Handler #35
Welder	Weld	Lw (c)		92	95	96	97	96	97	94	89	84	100.9	104.2	Defra Hand Held Welder # 31
Generator	Gen	Lw (c)		100	103	100	95	96	98	94	90	88	101.4	107.6	Defra Generator for Welding #32
Wheeled Mobile Crane	Crane	Lw (c)		105	108	104	99	91	92	91	84	78	97.8	111.2	Defra Wheeled Mobile Crane #43
Concrete Saw	ConSaw	Lw (c)		109	112	114	106	106	105	106	110	108	114.6	119	Defra Hand Held Circular Saw #36

Noise Contour Map:

Red Mountain Tunnel North - Night-time



Noise Barrier Alignment

Red Mountain Tunnel North - Night-time

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase at occupied building, per San Diego County (36.409) = 75
allowable hours over which Leq is to be averaged (example: 8 per SD County 36.409) = 8

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	*Temporary Barrier Insertion Loss (dB)*	*Additional Noise Reduction*	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	ILbarr (dB)	Notes
New Portal Construction - Night-time	Concrete Mixer Truck	1	40	79		1075	0.0		46.6	8	480	43	5	5	0	10	1065	1075	11.2	1065.0	1075.0	0.00	0.1	0.0	
	Man lift	1	20	75		1075	0.0		42.6	8	480	36	5	5	0	10	1065	1075	11.2	1065.0	1075.0	0.00	0.1	0.0	
	Generator	1	50	72		1075	0.0		39.6	8	480	37	5	5	0	10	1065	1075	11.2	1065.0	1075.0	0.00	0.1	0.0	
	Welder / Torch	1	40	73		1075	0.0		40.6	8	480	37	5	5	0	10	1065	1075	11.2	1065.0	1075.0	0.00	0.1	0.0	
	Crane	1	16	81		1075	0.0		48.6	8	480	41	5	5	0	10	1065	1075	11.2	1065.0	1075.0	0.00	0.1	0.0	
	Concrete Saw	1	20	90	Noise Shroud,	1075	0.0	10.0	47.6	8	480	41	5	5	0	10	1065	1075	11.2	1065.0	1075.0	0.00	0.1	0.0	
	Ventilation Fan	1	100	79	localized barrier	1075	0.0	5.0	46.6	8	480	47	5	5	0	10	1065	1075	11.2	1065.0	1075.0	0.00	0.1	0.0	
								Total for New Portal Construction - Night-time Phase:				**50.0**													
New Portal Construction - Daytime	front end loader	1	40	79		121	0.0		68.5	8	480	65	5	5	0	21	100	121	21.6	100.1	121.0	0.00	0.1	0.0	
	pumps	1	50	77		121	0.0		66.5	8	480	63	5	5	0	21	100	121	21.6	100.1	121.0	0.00	0.1	0.0	
	excavator	1	40	81		121	0.0		70.5	8	480	67	5	5	0	21	100	121	21.6	100.1	121.0	0.00	0.1	0.0	
	flat bed truck	1	40	74		121	0.0		63.5	8	480	60	5	5	0	21	100	121	21.6	100.1	121.0	0.00	0.1	0.0	
	Concrete Mixer Truck	1	40	79		121	0.0		68.5	8	480	65	5	5	0	21	100	121	21.6	100.1	121.0	0.00	0.1	0.0	
	crane	1	16	81		121	0.0		70.5	8	480	63	5	5	0	21	100	121	21.6	100.1	121.0	0.00	0.1	0.0	
	Generator	1	50	72		121	0.0		61.5	8	480	58	5	5	0	21	100	121	21.6	100.1	121.0	0.00	0.1	0.0	
	Welder / Torch	1	40	73		121	0.0		62.5	8	480	59	5	5	0	21	100	121	21.6	100.1	121.0	0.00	0.1	0.0	
								Total for New Portal Construction - Daytime Phase:				**72.2**													
Nighttime Portal Construction - Portal 1	Concrete Mixer Truck	1	40	79		1060	0.0		46.8	8	480	43	150	0	150	10	1050	1060	10.0	1060.7	1070.6	0.10	4.0	0.0	
	Man lift	1	20	75		1060	0.0		42.8	8	480	36	150	0	150	10	1050	1060	10.0	1060.7	1070.6	0.10	4.0	0.0	
	Generator	1	50	72		1060	0.0		39.8	8	480	37	150	0	150	10	1050	1060	10.0	1060.7	1070.6	0.10	4.0	0.0	
	Welder / Torch	1	40	73		1060	0.0		40.8	8	480	37	150	0	150	10	1050	1060	10.0	1060.7	1070.6	0.10	4.0	0.0	
	Crane	1	16	81		1060	0.0		48.8	8	480	41	150	0	150	10	1050	1060	10.0	1060.7	1070.6	0.10	4.0	0.0	
	Concrete Saw	1	20	90	Noise Shroud.	1060	0.0	10.0	47.8	8	480	41	150	0	150	10	1050	1060	10.0	1060.7	1070.6	0.10	4.0	0.0	
	Ventilation Fan	1	100	79	localized barrier	1060	0.0	5.0	41.8	8	480	42	150	0	150	10	1050	1060	10.0	1060.7	1070.6	0.10	4.0	0.0	
								Total for Nighttime Portal Construction - Portal 1 Phase:				**48.5**													
Nighttime Portal Construction - Portal 2	Concrete Mixer Truck	1	40	79		260	12.6		47.8	8	480	44	5	5	12	10	250	260	12.2	250.1	260.0	2.30	15.0	12.6	
	Man lift	1	20	75		260	12.6		43.8	8	480	37	5	5	12	10	250	260	12.2	250.1	260.0	2.30	15.0	12.6	
	Generator	1	50	72		260	12.6		40.8	8	480	38	5	5	12	10	250	260	12.2	250.1	260.0	2.30	15.0	12.6	
	Welder / Torch	1	40	73		260	12.6		41.8	8	480	38	5	5	12	10	250	260	12.2	250.1	260.0	2.30	15.0	12.6	
12 foot wall needed	Crane	1	16	81		260	12.6		49.8	4	240	39	5	5	12	10	250	260	12.2	250.1	260.0	2.30	15.0	12.6	
	Concrete Saw	1	20	90	Noise Shroud,	260	12.6	10.0	48.8	8	480	42	5	5	12	10	250	260	12.2	250.1	260.0	2.30	15.0	12.6	
	Ventilation Fan	1	100	79	localized barrier	260	12.6	5.0	42.8	8	480	43	5	5	12	10	250	260	12.2	250.1	260.0	2.30	15.0	12.6	
								Total for Nighttime Portal Construction - Portal 2 Phase:				**49.2**													
Nighttime Portal Construction - Portal 3	Concrete Mixer Truck	1	40	79		1310	0.0		44.7	8	480	41	5	5	0	10	1300	1310	11.2	1300.0	1310.0	0.00	0.1	0.0	
	Man lift	1	20	75		1310	0.0		40.7	8	480	34	5	5	0	10	1300	1310	11.2	1300.0	1310.0	0.00	0.1	0.0	
	Generator	1	50	72		1310	0.0		37.7	8	480	35	5	5	0	10	1300	1310	11.2	1300.0	1310.0	0.00	0.1	0.0	
	Welder / Torch	1	40	73		1310	0.0		38.7	8	480	35	5	5	0	10	1300	1310	11.2	1300.0	1310.0	0.00	0.1	0.0	
	Crane	1	16	81		1310	0.0		46.7	8	480	39	5	5	0	10	1300	1310	11.2	1300.0	1310.0	0.00	0.1	0.0	
	Concrete Saw	1	20	90	Noise Shroud.	1310	0.0	10.0	45.7	8	480	39	5	5	0	10	1300	1310	11.2	1300.0	1310.0	0.00	0.1	0.0	
	Ventilation Fan	1	100	79	localized barrier	1310	0.0	5.0	39.7	8	480	40	5	5	0	10	1300	1310	11.2	1300.0	1310.0	0.00	0.1	0.0	
								Total for Nighttime Portal Construction - Portal 3 Phase:				**46.4**													
Nighttime Portal Construction - Portal 4	Concrete Mixer Truck	1	40	79		70	14.5		61.1	8	480	57	5	5	16	10	60	70	14.9	61.0	70.0	5.87	15.0	14.5	
	Man lift	1	20	75		70	14.5		57.1	8	480	50	5	5	16	10	60	70	14.9	61.0	70.0	5.87	15.0	14.5	
	Generator	1	50	72		70	14.5		54.1	8	480	51	5	5	16	10	60	70	14.9	61.0	70.0	5.87	15.0	14.5	
See additional cadnaA	Welder / Torch	1	40	73		70	14.5		55.1	8	480	51	5	5	16	10	60	70	14.9	61.0	70.0	5.87	15.0	14.5	
	Crane	1	16	81		70	14.5		63.1	8	480	55	5	5	16	10	60	70	14.9	61.0	70.0	5.87	15.0	14.5	
	Concrete Saw	1	20	90	Noise Shroud,	70	14.5	10.0	62.1	8	480	55	5	5	16	10	60	70	14.9	61.0	70.0	5.87	15.0	14.5	
	Ventilation Fan	1	100	79	localized barrier	70	14.5	5.0	56.1	8	480	56	5	5	16	10	60	70	14.9	61.0	70.0	5.87	15.0	14.5	
								Total for Nighttime Portal Construction - Portal 4 Phase:				**62.9**													
Nighttime Portal Construction - Portal 5	Concrete Mixer Truck	1	40	79		790	5.6		44.1	8	480	40	5	5	8	10	780	790	10.4	780.0	790.0	0.45	9.5	5.6	
	Man lift	1	20	75		790	5.6		40.1	8	480	33	5	5	8	10	780	790	10.4	780.0	790.0	0.45	9.5	5.6	
	Generator	1	50	72		790	5.6		37.1	8	480	34	5	5	8	10	780	790	10.4	780.0	790.0	0.45	9.5	5.6	
8 ft wall needed	Welder / Torch	1	40	73		790	5.6		38.1	8	480	34	5	5	8	10	780	790	10.4	780.0	790.0	0.45	9.5	5.6	
	Crane	1	16	81		790	5.6		46.1	8	480	38	5	5	8	10	780	790	10.4	780.0	790.0	0.45	9.5	5.6	
	Concrete Saw	1	20	90	Noise Shroud,	790	5.6	10.0	45.1	8	480	38	5	5	8	10	780	790	10.4	780.0	790.0	0.45	9.5	5.6	
	Ventilation Fan	1	100	79	localized barrier	790	5.6	5.0	39.1	8	480	39	5	5	8	10	780	790	10.4	780.0	790.0	0.45	9.5	5.6	
								Total for Nighttime Portal Construction - Portal 5 Phase:				**45.9**													
Nighttime Portal Construction - Portal 6	Concrete Mixer Truck	1	40	79		670	5.8		45.4	8	480	41	5	5	8	10	660	670	10.4	660.0	670.0	0.45	9.5	5.8	
	Man lift	1	20	75		670	5.8		41.4	8	480	34	5	5	8	10	660	670	10.4	660.0	670.0	0.45	9.5	5.8	
8 ft wall needed	Generator	1	50	72		670	5.8		38.4	8	480	35	5	5	8	10	660	670	10.4	660.0	670.0	0.45	9.5	5.8	
	Welder / Torch	1	40	73		670	5.8		39.4	8	480	35	5	5	8	10	660	670	10.4	660.0	670.0	0.45	9.5	5.8	
	Crane	1	16	81		670	5.8		47.4	8	480	39	5	5	8	10	660	670	10.4	660.0	670.0	0.45	9.5	5.8	
	Concrete Saw	1	20	90	Noise Shroud.	670	5.8	10.0	46.4	8	480	39	5	5	8	10	660	670	10.4	660.0	670.0	0.45	9.5	5.8	
	Ventilation Fan	1	100	79	localized barrier	670	5.8	5.0	40.4	8	480	40	5	5	8	10	660	670	10.4	660.0	670.0	0.45	9.5	5.8	
								Total for Nighttime Portal Construction - Portal 6 Phase:				**47.2**													
Nighttime Portal Construction - Portal 7	Concrete Mixer Truck	1	40	79		590	8.5		43.9	8	480	40	5	55	10	10	580	590	11.2	581.7	592.1	0.81	12.1	8.5	
	Man lift	1	20	75		590	8.5		39.9	8	480	33	5	55	10	10	580	590	11.2	581.7	592.1	0.81	12.1	8.5	
	Generator	1	50	72		590	8.5		36.9	8	480	34	5	55	10	10	580	590	11.2	581.7	592.1	0.81	12.1	8.5	
10 ft wall needed	Welder / Torch	1	40	73		590	8.5		37.9	8	480	34	5	55	10	10	580	590	11.2	581.7	592.1	0.81	12.1	8.5	
	Crane	1	16	81		590	8.5		45.9	8	480	38	5	55	10	10	580	590	11.2	581.7	592.1	0.81	12.1	8.5	
	Concrete Saw	1	20	90	Noise Shroud,	590	8.5	10.0	44.9	8	480	38	5	55	10	10	580	590	11.2	581.7	592.1	0.81	12.1	8.5	
	Ventilation Fan	1	100	79	localized barrier	590	8.5	5.0	38.9	8	480	39	5	55	10	10	580	590	11.2	581.7	592.1	0.81	12.1	8.5	
								Total for Nighttime Portal Construction - Portal 7 Phase:				**45.7**													
Nighttime Portal Construction - Portal 8	Concrete Mixer Truck	1	40	79		850	1.1		47.8	8	480	44	150	5	150	10	840	850	10.0	852.4	862.3	0.14	5.2	1.1	
	Man lift	1	20	75		850	1.1		43.8	8	480	37	150	5	150	10	840	850	10.0	852.4	862.3	0.14	5.2	1.1	
	Generator	1	50	72		850	1.1		40.8	8	480	38	150	5	150	10	840	850	10.0	852.4	862.3	0.14	5.2	1.1	
	Welder / Torch	1	40	73		850	1.1		41.8	8	480	38	150	5	150	10	840	850	10.0	852.4	862.3	0.14	5.2	1.1	
	Crane	1	16	81		850	1.1		49.8	8	480	42	150	5	150	10	840	850	10.0	852.4	862.3	0.14	5.2	1.1	
	Concrete Saw	1	20	90	Noise Shroud.	850	1.1	10.0	48.8	8	480	42	150	5	150	10	840	850	10.0	852.4	862.3	0.14	5.2	1.1	
	Ventilation Fan	1	100	79	localized barrier	850	1.1	5.0	42.8	8	480	43	150	5	150	10	840	850	10.0	852.4	862.3	0.14	5.2	1.1	
								Total for Nighttime Portal Construction - Portal 8 Phase:				**49.6**													
Nighttime Portal Construction - Portal 9	Concrete Mixer Truck	1	40	79		560	11.5		41.5	8	480	37	135	5	145	10	550	560	14.1	567.5	574.9	6.79	15.0	11.5	
	Man lift	1	20	75		560	11.5		37.5	8	480	30	135	5	145	10	550	560	14.1	567.5	574.9	6.79	15.0	11.5	
	Generator	1	50	72		560	11.5		34.5	8	480	31	135	5	145	10	550	560	14.1	567.5	574.9	6.79	15.0	11.5	
10 ft wall needed	Welder / Torch	1	40	73		560	11.5		35.5	8	480	31	135	5	145	10	550	560	14.1	567.5	574.9	6.79	15.0	11.5	
	Crane	1	16	81		560	11.5		43.5	8	480	35	135	5	145	10	550	560	14.1	567.5	574.9	6.79	15.0	11.5	
	Concrete Saw	1	20	90	Noise Shroud,	560	11.5	10.0	42.5	8	480	35	135	5	145	10	550	560	14.1	567.5	574.9	6.79	15.0	11.5	
	Ventilation Fan	1	100	79	localized barrier	560	11.5	5.0	36.5	8	480	36	135	5	145	10	550	560	14.1	567.5	574.9	6.79	15.0	11.5	
								Total for Nighttime Portal Construction - Portal 9 Phase:				**43.2**													
Nighttime Portal Construction - Portal 10	Concrete Mixer Truck	1	40	79		160	13.3		52.1	8	480	48	5	5	16	10	150	160	14.9	150.4	160.0	5.27	15.0	13.3	
	Man lift	1	20	75		160	13.3		48.1	8	480	41	5	5	16	10	150	160	14.9	150.4	160.0	5.27	15.0	13.3	
	Generator	1	50	72		160	13.3		45.1	8	480	42	5	5	16	10	150	160	14.9	150.4	160.0	5.27	15.0	13.3	
see additional cadnaA	Welder / Torch	1	40	73		160	13.3		46.1	8	480	42	5	5	16	10	150	160	14.9	150.4	160.0	5.27	15.0	13.3	
	Crane	1	16	81		160	13.3		54.1	8	480	46	5	5	16	10	150	160	14.9	150.4	160.0	5.27	15.0	13.3	
	Concrete Saw	1	20	90	Noise Shroud,	160	13.3	10.0	53.1	8	480	46	5	5	16	10	150	160	14.9	150.4	160.0	5.27	15.0	13.3	
	Ventilation Fan	1	100	79	localized barrier	160	13.3	5.0	47.1	8	480	47	5	5	16	10	150	160	14.9	150.4	160.0	5.27	15.0	13.3	
								Total for Nighttime Portal Construction - Portal 10 Phase:				**53.8**													