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April 4, 2014

Mr. Jeff Thomas
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One Embarcadero Center, Suite 740
San Francisco, CA 94111

Re: Santa Cruz 115 kV Reinforcement Project (A.12-01-012)

Dear Mr. Thomas:

Thank you for your February 27, 2014 request for additional alternative analysis information and data regarding Pacific Gas and Electric Company's (PG&E's) application (A. 12-01-012) and Proponent's Environmental Assessment (PEA) for a Permit to Construct the Santa Cruz 115 Kilovolt (kV) Reinforcement Project (Project).

In this letter, PG&E provides responses to questions regarding Alternatives 1, 2, 3, 4A, 4B, 4C, 4E, and 4F. These Alternatives are depicted in Figure 1: Overview of Alternatives, in Attachment A: Figures. Responses regarding Alternative 4D, as well as the cost estimate for Alternative 3, will be provided in separate submittals to the California Public Utilities Commission (Commission) as soon as the information becomes available.

CPUC Data Request Question #1 – Alternative 1

Please provide data or documentation illustrating/supporting the claim that the alternative would not meet loading and voltage needs (i.e., what is the current load, how much load/voltage would this alternative provide and how was that determined).

PG&E's Response

Before addressing the specifics of Alternative 1, PG&E first provides, for background purposes, a brief summary of the existing transmission system and its limitations.

As discussed in Section 2.3 of the PEA, the objective of the Project is to add a second 115 kV circuit between Green Valley Substation and Rob Roy Substation in order to increase system reliability and prevent potential large-scale service interruptions if there are overlapping outages in the existing local electricity supply system.

Electricity in the service area is transmitted along two power line corridors—the Green Valley-Rob Roy-Paul Sweet Corridor on the south side of the service area, and the Green Valley-Camp Evers Corridor to the north. When equipment fails at a substation or along one of these corridors, electricity is rerouted to the area's distribution substations via the alternate corridor. As the "impaired" system tries to serve all customers, the power system in the Santa Cruz area is at risk for overload or low voltage should another system element fail.

More specifically, the Santa Cruz area is a winter-peaking area with electric demand reaching 170 megawatts (MW) during the winter months. Summer peak demand can exceed 140 MW. Winter peak conditions with a load of 170 MW and one line outage would result in the remaining line loading to 80 percent to 90 percent of its winter emergency rating. PG&E system operating standards only allow for 4 hours of operation at this rating. Similarly, on a hot summer day, an outage of either line results in the remaining line loading to more than 90 percent of its summer emergency rating. PG&E operating standards only allow 4 hours of operation at this rating. If the restoration time for the line that is out of service is greater than 4 hours, and if the loading on the remaining line is still well above its normal rating, then load shedding would be needed to reduce the loading on the line to ensure that the line conductors do not suffer additional deterioration due to the high loading.

While many past outages on transmission lines in this 115 kV system have been of short duration, there have been numerous outages of longer duration. Over the last 17 years, the Green Valley-Rob Roy-Paul Sweet Line has experienced seven outages averaging more than 7 hours in duration. The longest outage was almost 20 hours in duration. The Green Valley-Camp Evers Line has experienced six outages averaging more than 20 hours in duration.

Even more problematically, should voltage support equipment at Paul Sweet Substation be unavailable at the time of an outage on either line, the loading conditions would cause significant voltage drops in the area, as well as increased loading on the remaining in-service line and potentially even greater load shedding. Anticipated future load growth would only exacerbate these potential load-shedding scenarios. PG&E's distribution planners are projecting that the summer peak load in the Santa Cruz area could reach 158 MW within 10 years. At this load level, an outage of either the Green Valley-Rob Roy Line or the Green Valley-Camp Evers Line would result in an overload on the remaining line. The load would have to be shed to bring the remaining line back within its emergency rating. This overload caused by a single-element outage would also be a violation of North American Electric Reliability Corporation reliability standards, and PG&E could be subjected to fines if the system is not reinforced to eliminate the overload. In addition, the Santa Cruz area could be exposed to a complete area blackout should there be overlapping outages of both 115 kV lines. While this is a low-probability event, all customers in the area would be without power until one line could be returned to service.

Alternative 1 would "open" the existing Green Valley-Camp Evers Line near Cox Road, extending both line sections to Rob Roy Substation in a double-circuit configuration, thus creating the Green Valley-Rob Roy Line and Rob Roy-Camp Evers Line. With this system configuration, a single-line outage would still result in heavy loading on the remaining line, and

a two-line outage would still result in an area blackout.[1] Alternative 1 does not address the load-shedding scenarios described previously for the following reasons:

1. merely looping the proposed line does not create an increase in area capacity;
2. the existing line segments are limited by their present conductor ratings, which would not change in the looping scenario;
3. looping does not provide an additional circuit path from the area source at Green Valley Substation; and
4. looping does not provide any additional support should the voltage support equipment at Paul Sweet Substation fail.

In addition, Alternative 1 would require constructing the alignment with tubular steel poles (TSPs) due to the increased wire weight and extensive anchor requirements for wood pole construction. It would also require additional setback from the roadway due to the TSP foundation requirements, necessitating increased tree trimming along East Cox Road, Day Valley Road, McDonald Road, and Freedom Boulevard.

In short, Alternative 1 does not eliminate future loading problems on the existing 115 kV system because it does not provide for an additional circuit path into Rob Roy Substation or the area served by the existing Santa Cruz 115 kV loop; it instead uses the existing system with its present line capacity constraints outside of the location of these new "segments." Therefore, Alternative 1 does not provide any additional input capacity.

CPUC Data Request Question #2 – Alternative 2

Please provide data or documentation illustrating/supporting the claim that the alternative would not meet loading and voltage needs (i.e., what is the current load, how much load/voltage would this alternative provide and how was that determined).

PG&E's Response

Please see the response to Question #1 for details regarding the existing 115 kV system and the potential for outages and loading issues throughout the Santa Cruz area.

Alternative 2 would construct an approximately 1.7-mile tap line from the existing Green Valley-Camp Evers Line south to Rob Roy Substation, thus creating a "three-terminal" Green Valley-Rob Roy-Camp Evers Line. With this configuration, a single-line outage would still put heavy loading on the remaining line, and a two-line outage would still result in an area blackout.[2]

In addition, Alternative 2 does not address the load-shedding scenarios described previously with respect to future load growth. Because the existing line conductors in the 115 kV delivery system are not proposed to be reinforced, merely adding a line tap to Rob Roy Substation from the Green Valley-Camp Evers Line does not improve the area capacity, as no additional circuit

[1] This analysis assumes that only the new, approximately 1.7-mile line sections from the Green Valley-Camp Evers Line to Rob Roy Substation would have larger-capacity conductors; the existing lines would not be reconductored with larger conductors.

[2] This analysis assumes that only the new tap line section to Rob Roy Substation would have larger-capacity conductors; the existing lines would not be reconductored with larger conductors.

source from Green Valley Substation is created (as contrasted with the Project). Thus, the system would remain constrained by the existing conductor ratings of the Green Valley-Paul Sweet Line and Green Valley-Camp Evers Line segments.

Moreover, the new, approximately 1.7-mile tap line section—as contemplated in the proposed loop arrangement of Alternative 2—would make the area's transmission system more vulnerable because it would increase the overall length of the Green Valley-Camp Evers Line, thus increasing the system's exposure to potential car-pole accidents and insulator or conductor failure.

CPUC Data Request Question #3 – Alternative 3

Please define the components of "rebuilding" (e.g., pole replacement? Substation work involved? Can be generally described) and associated cost implications (again, in general terms). Please provide a map indicating conceptually where new facilities would be located (or existing facilities expanded) so that we can assess the "substantial environmental impacts" conclusion.

PG&E's Response

PG&E understands Alternative 3 to involve rebuilding the existing, approximately 31.7-mile 60 kV line extending from Monta Vista Substation to Point Moretti Substation and then to Crusher Substation with a new 115 kV wood pole transmission line as depicted in Figure 2: Alternative 3 Overview Map, in Attachment A: Figures. A new 115 kV power line would be built from Crusher Substation and would interconnect with Camp Evers Substation. Two existing 60 kV substations are interconnected with the 60 kV line between Monta Vista Substation in the City of Cupertino and Point Moretti Substation in unincorporated Santa Cruz County near the community of Davenport, including:

- Big Basin Substation, which is located approximately 3 miles northwest of the community of Boulder Creek off of Empire Grade Road in unincorporated Santa Cruz County, and

- Burns Substation, which is located approximately 2 miles southwest of the community of Boulder Creek off of Empire Grade Road in unincorporated Santa Cruz County.

Upgrades would be necessary to accommodate the rebuild of a 60 kV line to a 115 kV line at each of the following substations:

- Monta Vista Substation would require the extension of the 115 kV breaker-and-a-half bus, and the installation of two circuit breakers to accommodate the new 115 kV line termination.

- Big Basin Substation, which is a 60 kV substation, would need to be rebuilt for 115 kV service. This would involve the construction of a 115 kV bus and circuit breakers for the two line terminations, and the replacement of the existing distribution transformer with a new 115/12 kV transformer and a 115 kV circuit breaker for bank protection.

- Burns Substation, which is currently also connected by a 21 kV line to Camp Evers Substation, would require the replacement of the existing 60/12 kV distribution transformer with a new 115/12 kV transformer, including a 115 kV breaker for bank protection.

- Camp Evers Substation would require, at a minimum, the extension of the 115 kV bus so that the new 115 kV circuit breaker could be installed for the new transmission line. In addition, Camp Evers Substation is constrained by Mount Herman Road, adjacent commercial development, and a riparian drainage; it might be necessary to relocate existing adjacent commercial businesses to accommodate the required modifications to Camp Evers Substation.

Existing poles would be replaced with one to three wood poles at each location; these poles would range in height from 65 feet to 95 feet, depending on the final engineering design. Approximately 120 existing poles support the 60 kV transmission line between Monta Vista Substation and Big Basin Substation. Approximately 43 existing poles support the 60 kV transmission line between Big Basin Substation and Burns Substation. Approximately 112 existing poles support the 60 kV transmission line between Burns Substation and Point Moretti Substation. Approximately 13 existing poles support the approximately 2-mile long 60 kV transmission line between Point Moretti Substation to Crusher Substation. A new, approximately 10-mile transmission line between Crusher Substation and Camp Evers Substation would interconnect with the rebuilt line discussed previously. The new line would require a combination of approximately 3.1 miles of overhead greenfield line, 6.5 miles of overbuilt distribution electric line, and 0.3 mile of greenfield underground transmission line.

PG&E is currently evaluating the overall costs of design, procurement of equipment and materials, and construction for this alternative and will provide this information in a subsequent submittal.

As part of the current submittal, PG&E is providing Attachment B: GIS Data Transfer Summary, which provides a summary table of the geographic information system (GIS) layers for the existing 60 kV transmission line from Monta Vista Substation to Crusher Substation; the existing locations of Big Basin Substation, Burns Substation, and Point Moretti Substation; and a new proposed route from Crusher Substation to Camp Evers Substation. The GIS shapefiles are included with this submittal in the file named "Santa Cruz_Data_Request_8_Shapefiles".

CPUC Data Request Question #4 – Alternative 4A

Please provide the following requested information:

1. *Does this alignment convert all existing wood poles to steel? Please indicate the types of steel poles and height ranges.*

2. *Provide GIS files of the alignment.*

3. *It is our understanding that the ROW in several locations must be moved approximately 20-30 feet due to proximity to a gas pipeline, in order to minimize the likelihood of explosion. Please identify these locations where the alignment must be moved due to the*

gas pipeline on maps/GIS files. Please provide the supporting documentation used to determine the distance that poles/right-of-way would need to be moved, such as soil conductivity data, etc.

4. *Please identify if any homes or other structures would need to be moved or are otherwise impacted from new right-of-way requirements.*

5. *Please provide an estimate of how many trees could be impacted by this alignment – only an estimate is needed and doesn't need to be precise.*

6. *Please provide any data that was collected for this alternative pertaining to cultural resources and biological resources (including surveys for Santa Cruz long-toed salamander, cultural surveys and records searches). New data does not need to be collected, but any data previously collected would be helpful.*

PG&E's Response

The following response addresses the requested items for Alternative 4A – Southern Alignment Alternative:

1. Alternative 4A would convert all existing single-circuit wood transmission poles to double-circuit TSPs. An overview of Alternative 4A is depicted in Figure 3: Alternative 4A Overview Map, in Attachment A: Figures. The TSPs would most likely be the same as those proposed for the Project, as shown in Figure 4: Existing and Proposed Poles, in Attachment A: Figures. Pole heights would range from 70 feet to 105 feet.

2. A summary table of the GIS layers for Alternative 4A is provided in Attachment B: GIS Data Transfer Summary. The GIS shapefiles are included with this submittal in the file named "Santa Cruz_Data_Request_8_Shapefiles".

3. Figure 5: Alternative 4A Within 25 Feet of Gas Pipeline, in Attachment A: Figures, identifies the locations where the alignment must be moved due to the existing gas pipeline. **This figure is confidential pursuant to Public Utilities Code Section 583**. The corresponding GIS data is provided in the file named "Confidential_Gas_Line_Shapefile" **and should also be treated as confidential pursuant to Public Utilities Code Section 583.**

   Proper transmission line design requirements are necessary for the safe, reliable, and economic construction and operation of high-voltage transmission lines. Any deviations from PG&E's Overhead Transmission Line Design Criteria that result in the lowering of electrical clearances or mechanical safety factors below General Order (GO-) 95 are not allowed. As specified on page 10 of PG&E's Overhead Transmission Design Line Design Criteria, which is provided in Attachment C: Overhead Transmission Line Design Criteria, where transmission line rights-of-way (ROWs) are shared with underground metal pipeline, the concrete footing of a steel structure or the direct embedded portion of a steel or concrete structure should presumptively be a distance of 25 feet from the underground metal object.

4. Without the benefit of an engineering survey, PG&E estimates that the existing circuit following the backyard lot lines of the Calabasas Subdivision might need to be relocated to take the existing circuit around the subdivision—which is located near the intersection of Via Nicola and Calabasas Road—in order to comply with the GO-95 clearance requirements for a double-circuit 115 kV line. In addition, structures would also need to be relocated along Old Adobe Road to accommodate GO-95 clearance requirements for a double-circuit 115 kV line and safe operating separation from existing distribution gas mains. PG&E considered an alternative greenfield route to avoid these conflicts.

5. On March 28, 2014, Insignia Environmental (Insignia) biologists conducted a field assessment of Alternative 4A to determine the potential number of trees that would need to be cleared as a result of relocating the line to accommodate GO-95 clearance requirements. Figure 6: Alternative 4A Tree Survey/Removal Locations, in Attachment A: Figures, depicts the tree removal locations. In areas where there was access to public roads, Insignia biologists visually observed five approximately 100-foot by 100-foot areas of tree cover to determine tree species and representative tree densities along the potential alignment. Four of the areas surveyed consisted of mixed woodland with trees, including the following:

   - coast live oak (*Quercus agrifolia*),
   - acacia (*Acacia* sp.),
   - Monterey pine (*Pinus radiata*),
   - bishop pine (*Pinus muricata*),
   - canyon live oak (*Quercus chrysolepis*),
   - Fremont cottonwood (*Populus fremontii*),
   - willow (*Salix* sp.),
   - Douglas fir (*Pseudotsuga menziesii*), and
   - coast redwood (*Sequioia sempervirens*).

   The number of trees within the mixed woodland areas ranged from 25 to 40 trees within each approximately 100-foot by 100-foot area. One of the areas surveyed consisted of eucalyptus woodland. This area was dominated by eucalyptus (*Eucalyptus* sp.), but also contained one Monterey pine and one coast live oak. The total number of trees in this area was approximately 192.

   Based on these observed tree counts (25 to 40 trees in the approximately 100-foot by 100-foot mixed woodland areas and 192 trees in an 100-foot by 100-foot eucalyptus woodland area), Insignia used GIS to calculate tree densities of approximately 144 trees per acre in mixed woodland areas and 836 trees per acre in eucalyptus woodland areas. The tree relocation corridor for Alternative 4A is approximately 9.2 tree-covered acres, of which approximately 9 acres are mixed woodland and approximately 0.2 acre are eucalyptus woodland. Based on these acreages and densities, it is estimated that a total range of 1,300 to 1,600 trees would be removed under this alternative.

6. Data pertaining to biological resources is provided in Attachment D: Biological Resources Assessment for Alternatives for the Santa Cruz 115 kV Reinforcement Project. **Pursuant to California Government Code 6254.10, confidential data pertaining to**

cultural and paleontological resources is provided separately in Attachment E: Confidential Cultural and Paleontological Resources Assessment for Alternatives for the Santa Cruz 115 kV Reinforcement Project.

CPUC Data Request Question #5 – Alternative 4B

1. *Please indicate the type of poles that would be used for the single-circuit section of the alignment, including number and heights. Would these poles, like those used for the Cox-Freedom segment of the proposed project, follow an existing distribution alignment?*

2. *Please provide GIS files of the alignment.*

3. *Would additional ROWs be needed that could impact homes or other structures?*

4. *Please provide any biological and cultural resource data collected for this alignment. New data does not need to be provided but any previous studies would be helpful – such as habitat assessments or cultural records searches.*

PG&E's Response

The following response addresses the requested items for Alternative 4B – Valencia Alternative:

1. Alternative 4B is depicted in Figure 7: Alternative 4B Overview Map, in Attachment A: Figures. This alternative would likely extend west/northwest for approximately 1.2 miles along the existing 115 kV Green Valley-Camp Evers line beyond the currently designed crossover pole for the Project—at the intersection of Cox Road and the Northern Alignment—with six new double-circuit TSPs. The alignment would then turn southwest for approximately 0.4 mile with approximately four new single-circuit wood transmission poles (with a small portion of distribution underbuild). From there, the alignment would then turn south/southeast to rebuild a segment of the existing Rob Roy-Paul Sweet 115 kV single-circuit wood pole line with approximately 13 new double-circuit TSPs before heading to Rob Roy Substation. The types of poles used for this alternative would most likely be the same as those used for the Project, as shown in Figure 4: Existing and Proposed Poles, in Attachment A: Figures. New wood transmission poles would range in height from 79 feet to 93 feet, and the new TSPs would range in height from 70 feet to 105 feet.

2. A summary table of the GIS layers for Alternative 4B is provided in Attachment B: GIS Data Transfer Summary. The GIS shapefiles are included with this submittal in the file named "Santa Cruz_Data_Request_8_Shapefiles".

3. Residences on View Court near Huntington Drive are approximately 45 feet apart. Without the benefit of an engineering survey, PG&E believes it could be necessary to create a greenfield reroute around this location to accommodate GO-95 clearance requirements for a double-circuit 115 kV line.

4. Data pertaining to biological resources are provided in Attachment D: Biological Resources Assessment for Alternatives for the Santa Cruz 115 kV Reinforcement Project.

Pursuant to California Government Code 6254.10, confidential data pertaining to cultural and paleontological resources are provided separately in Attachment E: Confidential Cultural and Paleontological Resources Assessment for Alternatives for the Santa Cruz 115 kV Reinforcement Project.

CPUC Data Request Question #6 – Alternative 4C

1. *Please indicate the type of poles that would be used for the single-circuit section of the alignment, including number and heights. Would these poles, like those used for the Cox-Freedom segment of the proposed project, follow an existing distribution alignment?*

2. *Please provide GIS files of the alignment.*

3. *Would additional ROWs be needed that could impact homes or other structures?*

4. *Please provide any biological and cultural resource data collected for this alignment. Is there a historical resources report for the identified eligible resources? New data does not need to be provided but any previous studies would be helpful – such as habitat assessments or records searches.*

PG&E's Response

The following response addresses the requested items for Alternative 4C – West Cox Alternative:

1. Alternative 4C is depicted in Figure 8: Alternative 4C Overview Map, in Attachment A: Figures. This alternative would likely extend west/northwest for approximately 0.3 mile along the existing 115 kV Green Valley-Camp Evers line beyond the currently designed crossover pole for the Project—at the intersection of Cox Road and the Northern Alignment—with two new double-circuit TSPs, and would then transition to a single-circuit line at the intersection with West Cox Road. The line would overbuild an existing distribution line generally along the edge of West Cox Road and Valencia Road for approximately 0.7 mile with approximately 15 wood poles. Then a greenfield line would deviate through oak woodlands for approximately 0.2 mile with approximately three wood poles. The line would then continue to overbuild an existing distribution line along Valencia Road for approximately 0.5 mile with 10 wood poles and intersect the Cox-Freedom segment of the Project at the intersection of Freedom Boulevard. PG&E estimates that poles ranging in height from 75 feet to 95 feet would be necessary on Valencia Road.

2. A summary table of the GIS layers for Alternative 4C is provided in Attachment B: GIS Data Transfer Summary. The GIS shapefiles are included with this submittal in the file named "Santa Cruz_Data_Request_8_Shapefiles".

3. Construction of this alternative could require the removal of structures near the intersection of West Cox Road and Valencia Road. Alternatively, the rebuilt double-circuit 115 kV line would need to deviate out of the existing ROW to accommodate GO-95 clearance requirements.

4. Data pertaining to biological resources are provided in Attachment D: Biological Resources Assessment for Alternatives for the Santa Cruz 115 kV Reinforcement Project. **Pursuant to California Government Code 6254.10, confidential data pertaining to cultural and paleontological resources are provided separately in Attachment E: Confidential Cultural and Paleontological Resources Assessment for Alternatives for the Santa Cruz 115 kV Reinforcement Project**.

CPUC Data Request Question #7 – Alternative 4D

Assuming this alternative is technically feasible, please provide the following items so that we can include an equal level of analysis as for the proposed project in EIR for CPUC consideration:

1. *A revised project description for the underground segment describing the work to be completed including: a) the procedure and process for trench installation of the power line; b) temporary work areas (work and access corridors, staging areas); c) any additional vegetation, tree removals, or grading; d) materials and quantities for trenching and fill including cubic yards reused onsite versus disposed of offsite; e) equipment tables; f) construction crew composition and size; and g) maintenance associated with underground power lines (activity type and frequency).*

2. *Maps indicating revisions of project construction limits including access/work corridors and any added staging areas. Would additional right-of-way be required and if so, how much? Would it impact private yards or other existing structures?*

3. *Revisions to construction schedule.*

4. *Air Quality - Construction equipment summary (type of equipment, quantity and duration of use by activity) for undergrounding activities and modeling of air impacts with input and output data.*

5. *Aesthetics – visual simulations of transition structures and any tree trimming.*

6. *Biological Resources – assessment of Santa Cruz long-toed salamander impacts and vegetation mapping impacts covering additional work areas.*

7. *Cultural Resources – Report addendum documenting any potential effects associated with the revised limits of work where expanded beyond currently defined disturbance limits.*

8. *Hydrology & Water Quality – water usage required for undergrounding (compaction, dust control, etc.)*

9. *Transportation & Traffic – Provide traffic routing and road closure requirements for undergrounding; identify emergency access routes to be designated and limitations on emergency access.*

10. *Utilities – Potential impacts from construction to existing infrastructure, in particular the Central Water District's aging water pipeline system.*

PG&E's Response

PG&E is currently preparing a 30-percent design package for Alternative 4D. A revised Project Description for the underground segment will be prepared based on an assessment of design and construction at a 30-percent level of completion. PG&E anticipates submitting the Alternative 4D design to the Commission in May 2014. The environmental analysis for Alternative 4D is anticipated to be submitted to the Commission in June 2014.

CPUC Data Request Question #8 – Alternative 4E

1. *Please indicate the type of poles that would be used for the single-circuit section of the alignment, including number and heights. Would these poles, like those used for the Cox-Freedom segment of the proposed project, follow an existing distribution alignment?*

2. *Please provide GIS files of the alignment.*

3. *Would additional ROWs be needed that could impact homes or other structures?*

4. *Please provide any biological and cultural resource data collected for this alignment. New data does not need to be provided but any previous studies would be helpful – such as habitat assessments or cultural resources records searches.*

PG&E's Response

The following response addresses the requested items for Alternative 4E – White Road Alternative:

1. Without benefit of an engineering survey, PG&E estimates that the poles used for this alternative would be similar to the Proposed Project, ranging in height from 75 feet to 95 feet. This Alternative is depicted in Figure 9: Alternative 4E Overview Map, in Attachment A: Figures. The first approximately 1.5 miles would begin near the intersection of the Project and Hames Road. The line would then progress through greenfield without following any existing distribution alignment. PG&E estimates this would require between 20 and 25 new poles. Once the alignment intersected with White Road, the alignment would overbuild an existing distribution system for approximately 1.2 miles and would require approximately 20 to 25 additional poles to the intersection of the White Road alignment with the existing Rob Roy-Green Valley 115 kV circuit. PG&E estimates an additional 12 single-circuit wood poles would be replaced with TSPs until reaching the intersection with Rob Roy Substation.

2. A summary table of the GIS layers for Alternative 4E is provided in Attachment B: GIS Data Transfer Summary. The GIS shapefiles are included with this submittal in the file named "Santa Cruz_Data_Request_8_Shapefiles".

3. The entire approximately 1.5 miles of greenfield alignment would require an approximately 60-foot wide easement; however, the line could be located such that no direct impact to homes or structures would result. This greenfield alignment would not overbuild an existing circuit and, therefore, would introduce a new linear facility with

poles ranging from 75 feet to 95 feet in height across a landscape presently characterized as rolling hills covered by oak savannah.

4. Data pertaining to biological resources is provided in Attachment D: Biological Resources Assessment for Alternatives for the Santa Cruz 115 kV Reinforcement Project. **Pursuant to California Government Code 6254.10, confidential data pertaining to cultural and paleontological resources is provided separately in Attachment E: Confidential Cultural and Paleontological Resources Assessment for Alternatives for the Santa Cruz 115 kV Reinforcement Project**.

CPUC Data Request Question #9 – Alternative 4F

1. *Please provide data or documentation supporting the potentially significant scenic highway impacts and level of greenfield construction for admin record.*

2. *Please provide a map indicating conceptually where new facilities would be located (or existing facilities expanded) so that we can assess the "potentially significant scenic highway impacts" conclusion as well as qualitatively assess other potential resource impacts.*

3. *Please provide confirmation that alternative is technically constructible, including the additional ROW that would be required.*

PG&E's Response

The following response addresses the requested items for Alternative 4F – Power Corridor West of Highway 1:

1. Alternative 4F includes a combination of existing line replacement and installation of new line. Alternative 4F heads southwest from the Rob Roy line and crosses Highway 1 (i.e., Cabrillo Highway) west of Buena Vista Drive. This crossing would overbuild an existing distribution crossing at the present Highway 1 overcrossing structure at Buena Vista Drive. This location is on the west side of the bridge structure and it is estimated that the structures required for the overcrossing could be approximately 100 feet high for the approximately 500-foot crossing distance. After crossing Highway 1, the line follows Buena Vista Drive south for approximately 0.5 mile, and then heads southwest for approximately 0.9 mile over private land, after which it rejoins Buena Vista Drive and heads west for approximately 0.4 mile. The line then follows San Andreas Road for approximately 2 miles before heading north for approximately 1.1 miles. At Alta Drive, the line travels northwest for approximately 0.2 mile, then southwest along Mar Monte Avenue for approximately 0.2 mile. It then travels north, rejoining San Andreas Road for approximately 1.3 miles and continuing in that direction along Bonita Drive for approximately 0.6 mile. A second crossing is located at the present distribution crossing south of the Freedom Boulevard overpass of Highway 1. This is also an overbuild of an existing distribution line, which measures approximately 450 feet in length and originates on the north side of Highway 1 on Soquel Drive and ends on the south side of Highway 1 on Bonita Drive. PG&E estimates these structures could be 85 feet to 100 feet in height.

Highway 1 is an Eligible Scenic Highway, meaning that it is not officially designated by the State of California as a scenic highway. Santa Cruz County's General Plan/Local Coastal Program (1994) designates Highway 1—along with the sections of Bonita Drive, Buena Vista Drive, and San Andreas Road that correspond to Alternative 4F—as "Scenic Roads." The General Plan calls for public vistas from the roadways to be afforded the "highest level of protection." Policies included in the plan call for site planning of new developments so that they are hidden from these public roadways. In particular, the following four policies are directed toward the installation of transmission lines:

- 5.10.3: Protection of Public Vistas
  Protect significant public vistas as described in policy 5.10.2 from all publicly used roads and vista points by minimizing disruption of landform and aesthetic character caused by grading operations, timber harvests, utility wires and poles, signs, inappropriate landscaping and structure design. Provide necessary landscaping to screen development which is unavoidably sited within these vistas.

- 5.10.23: Transmission Lines and Facilities
  Require transmission line rights-of-way and facilities to be reviewed in accordance with the Zoning ordinance to minimize impacts on significant public vistas; especially in scenic rural areas, and to avoid locations which are on or near sensitive habitat, recreational, or archaeological resources, whenever feasible.

- Policy 5.10.24: Utility Service Lines
  Require underground placement of all other new or supplementary transmission lines within views from scenic roads where it is technically feasible, unless it can be shown that other alternatives are less environmentally damaging or would have unavoidable adverse impacts on agricultural operations. When underground facilities are installed parallel to existing above ground lines, require the existing lines to be placed underground with the new lines. When above ground facilities are necessary, require that the design of the support towers or poles be compatible with the surroundings and that lines cross roadways at low elevations or curves in the road in accordance with California Public Utility Commission regulations for public utility facilities.

- 7.26.2: Protecting Scenic Quality
  Discourage new high-voltage overhead transmission line corridors that impinge upon the scenic quality of the County and may pose a health hazard. Consider placing existing transmission lines underground.

Alternative 4F would have significant visual impacts on these scenic corridors. This alternative would include a total of approximately 1.9 miles of greenfield line, including construction of new overhead transmission lines along or directly visible from Bonita Drive (approximately 0.6 mile of overbuild line), Buena Vista Drive (approximately 0.7 mile of overbuild line), and San Andreas Road (approximately 0.6 mile of greenfield line). In addition, this alternative would cross Highway 1 at two places, having a visual impact on the view to and from this scenic roadway.

2. A conceptual map of Alternative 4F is depicted in Figure 10: Alternative 4F Overview Map, in Attachment A: Figures. A summary table of the GIS layers for Alternative 4F is provided in Attachment B: GIS Data Transfer Summary. The GIS shapefiles are included with this submittal in the file named "Santa Cruz_Data_Request_8_Shapefiles".

3. Alternative 4F – Power Corridor West of Highway 1 is technically constructible. An approximately 60-foot ROW would be required, except in areas where the line is within an existing franchise.

We greatly appreciate the Commission's continued efforts to review the PEA filing and trust that the information provided herein is fully responsive to your requests. As noted previously, PG&E intends to respond to Question 7 regarding Alternative 4D in May and June 2014. Should you have any further questions in the meantime, please do not hesitate to contact me at (415) 973-7475.

Sincerely,

Matthew Fogelson
Attorney

ATTACHMENT A: FIGURES

Point Moretti Substation

Crusher Substation

Camp Evers Substation

Monta Vista Substation

Big Basin Substation

Burns Substation

DETAIL AREA

Rob Roy Substation

Green Valley Substation

Figure 1: Overview of Alternatives

Santa Cruz 115 kV Reinforcement Project

Northern Alignment
Alternative 3
Alternative 4A
Alternative 4B
Alternative 4C
Alternative 4E
Alternative 4F
Existing Substation

Pacific Gas and Electric Company

INSIGNIA ENVIRONMENTAL

1:104,000

0 1 2 4 6 Miles

Z:\Projects\PGE_Santa_Cruz\MXDs\CPUC_DataRequest_8\Overview_of_Alternatives.mxd

4/3/2014

Point Moretti Substation
Crusher Substation
Camp Evers Substation
Monta Vista Substation
Big Basin Substation
Burns Substation
DETAIL AREA
Pine Flat Rd
Cream Grade
Empire Grade
Graham Hill Rd
Bonny Doon Rd
Coast Rd
Scotts Valley Dr
Lawrence Expy
San Tomas Expy
Saratoga Ave
Blossom Hill Rd
Hwy 17
Hwy 9
Hwy 1
Hwy 35
Hwy 236
Hwy 85

Figure 2: Alternative 3 Overview Map

Santa Cruz 115 kV Reinforcement Project

Alternative 3

- Overhead Single-Circuit Greenfield
- Overhead Single-Circuit Overbuild
- Rebuild 60 kV to 115 kV
- Underground Greenfield

Existing Substation

Pacific Gas and Electric Company®

INSIGNIA ENVIRONMENTAL

N W E S

1:40,000

0 0.5 1 2 Miles

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4/4/2014

Figure 3: Alternative 4A Overview Map

Santa Cruz 115 kV Reinforcement Project

Alternative 4A

Overhead Double-Circuit

Route Variation

Existing Substation

Pacific Gas and Electric Company®

INSIGNIA ENVIRONMENTAL

N W E S

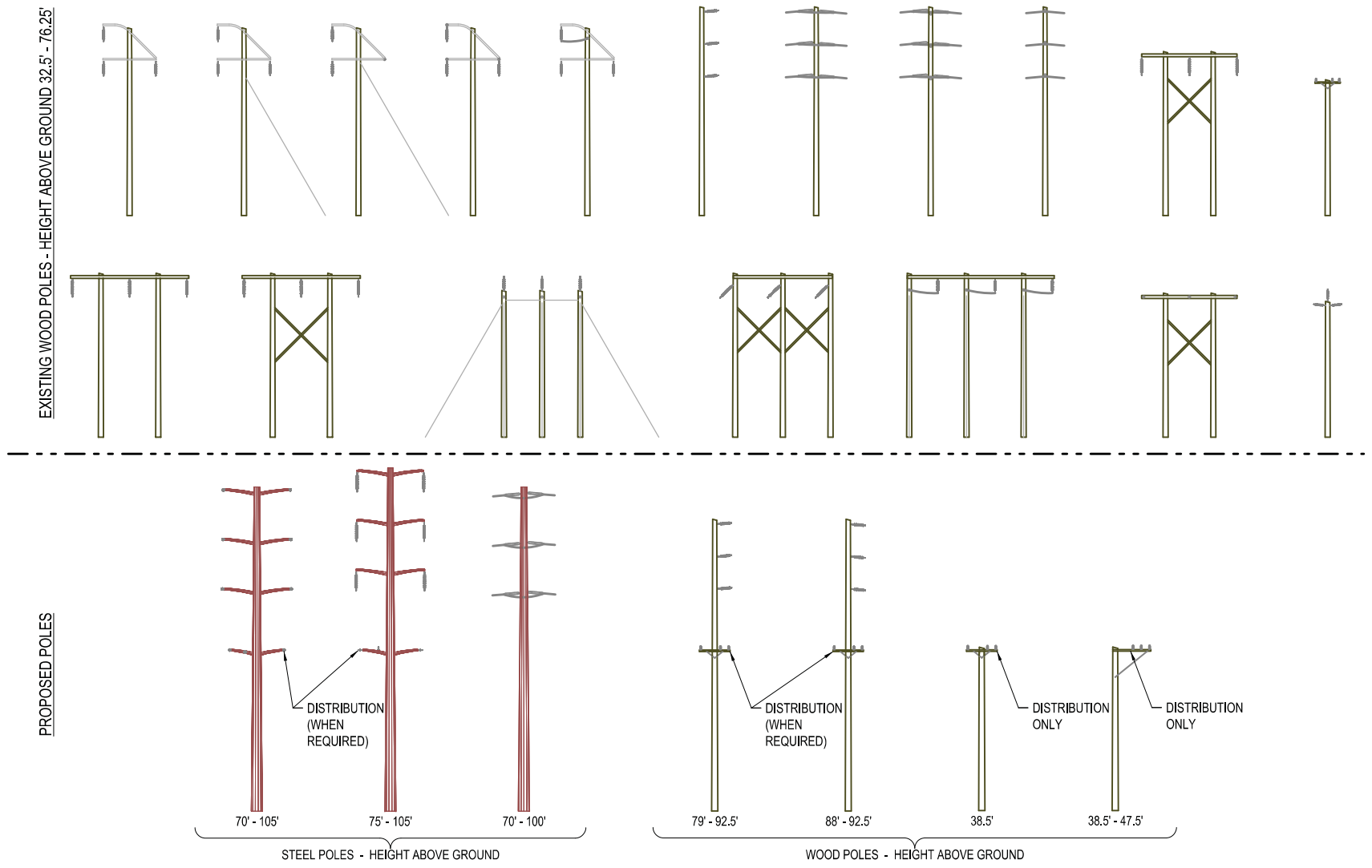
1:26,000

0 0.75 1.5 Miles

Z:\Projects\PGE_Santa_Cruz\MXDs\CPUC_DataRequest_8\Alternative_4A.mxd

4/4/2014

EXISTING AND PROPOSED POLES FOR CURRENT SANTA CRUZ 115kV REINFORCEMENT PROJECT DESIGN.
ANY NEW POLES FOR ALTERNATE ROUTES WOULD MOST LIKELY BE OF THE SAME OR SIMILAR DESIGN
AND HAVE SIMILAR HEIGHTS AS THE PROPOSED POLES SHOWN BELOW.



Pacific Gas and Electric Company®

Figure 4: Existing and Proposed Poles

Figure 5: Alternative 4A Within 25 Feet of Gas Pipeline

CONFIDENTIAL PURSUANT TO PUBLIC UTILITIES CODE SECTION 583 AND PROVIDED SEPARATELY

Figure 6: Tree Survey Locations

Santa Cruz 115 kV Reinforcement Project

- Alternative 4A Alignment
- Potential Tree Removal Area
- 100-Foot by 100-Foot Tree Survey Location
- Existing Substation

Pacific Gas and Electric Company®

INSIGNIA ENVIRONMENTAL

1:20,000

0 0.5 1 Miles

N W E S

Z:\Projects\PGE_Santa_Cruz\MXDs\CPUC_DataRequest_8\Alternative_4A_Tree_Removal_Locations.mxd

4/4/2014

Figure 7: Alternative 4B Overview Map

Santa Cruz 115 kV Reinforcement Project

Alternative 4B

- Overhead Double-Circuit
- Overhead Single-Circuit Greenfield
- Existing Substation

Pacific Gas and Electric Company®

INSIGNIA ENVIRONMENTAL

N W E S

1:30,000

0 0.75 1.5 Miles

Z:\Projects\PGE_Santa_Cruz\MXDs\CPUC_DataRequest_8\Alternative_4B.mxd

4/4/2014

Figure 8: Alternative 4C Overview Map

Santa Cruz 115 kV Reinforcement Project

Alternative 4C

- Overhead Double-Circuit
- Overhead Single-Circuit Greenfield
- Overhead Single-Circuit Overbuild

▲ Existing Substation

Pacific Gas and Electric Company®

INSIGNIA ENVIRONMENTAL

N W E S

1:30,000

0 0.75 1.5 Miles

Z:\Projects\PGE_Santa_Cruz\MXDs\CPUC_DataRequest_8\Alternative_4C.mxd

4/4/2014

Rob Roy Substation

Green Valley Substation

Figure 9: Alternative 4E Overview Map

Santa Cruz 115 kV Reinforcement Project

Alternative 4E

- Overhead Double-Circuit
- Overhead Single-Circuit Greenfield
- Overhead Single-Circuit Overbuild Distribution

- Existing Substation

Pacific Gas and Electric Company

INSIGNIA ENVIRONMENTAL

N W E S

1:26,000

0 0.75 1.5 Miles

Z:\Projects\PGE_Santa_Cruz\MXDs\CPUC_DataRequest_8\Alternative_4E.mxd

4/4/2014

Figure 10: Alternative 4F – Power Line Corridor West of Highway 1 Overview Map

Santa Cruz 115 kV Reinforcement Project

Alternative 4F

- Overhead Double-Circuit
- Overhead Single-Circuit Greenfield
- Overhead Single-Circuit Overbuild

Other Alternative

Existing Substation

Pacific Gas and Electric Company®

INSIGNIA ENVIRONMENTAL

1:36,000

0 0.5 1 2 Miles

Z:\Projects\PGE_Santa_Cruz\MXDs\CPUC_DataRequest_8\Alternative_4F.mxd

4/4/2014

ATTACHMENT B: GIS DATA TRANSFER SUMMARY

Santa Cruz 115 Kilovolt Reinforcement Project – Geographic Information System (GIS) Data Transfer Summary

The shapefiles provided in the zip file are described in the table that follows. All of the data is provided in the NAD_1983_UTM_Zone_10N coordinate system, in Meter units.

Shapefile Name	Description	Geometry	Source
Alternative_3	Alternative 3 Alignment	Polyline	PG&E, 2014; Insignia, 2014
Alternative_4A	Alternative 4A Alignment	Polyline	PG&E, 2014; Insignia, 2014
Alternative_4B	Alternative 4B Alignment	Polyline	PG&E, 2014; Insignia, 2014
Alternative_4C	Alternative 4C Alignment	Polyline	PG&E, 2014; Insignia, 2014
Alternative_4E	Alternative 4E Alignment	Polyline	PG&E, 2014; Insignia, 2014
Alternative_4F	Alternative 4F Alignment	Polyline	PG&E, 2014; Insignia, 2014
Substations	Substation Locations	Point	PG&E, 2014; Insignia, 2014

ATTACHMENT C: OVERHEAD TRANSMISSION LINE DESIGN CRITERIA

Prepared by: JTMZ

OVERHEAD TRANSMISSION LINE DESIGN CRITERIA 068177

Asset Type:	Electric Transmission	**Function:**	Construction and Maintenance
Issued by:	D. H. Shaffner (DHS3)	**Date:**	04-15-11

Rev. #09: This document replaces PG&E Document 068177, Rev. #08. For a description of the changes, see Page 13.

Purpose and Scope

Proper transmission line (T/L) design requirements are necessary for the safe, reliable, and economic construction and operation of high voltage transmission lines. This document outlines the minimum criteria to be used in the design of all PG&E overhead transmission lines. The electrical and structural limitations described in the criteria may be increased depending on local conditions or specific project-related requirements. The use of the criteria is intended only for experienced employees with a working knowledge of transmission line design and construction practices.

Any deviations from this design criteria resulting in the lowering of the electrical clearances or mechanical safety factors below *General Order (G.O) 95* are not allowed. Deviations resulting in less than criteria requirements but still meeting *G.O. 95* should be made only under unusual circumstances. If a deviation is made from the design criteria, the project engineer shall submit a letter describing the deviation and giving the reasons for the deviation or criteria change. If structural loading is involved, a civil engineer must approve and sign off on the letter. The supervisors of T/L engineering and T/L standards personnel must also approve and sign the letter. The signed letter shall be included in the job file for future reference.

References	Location	Document
Methods of Grounding Steel Transmission Poles and Towers	TIL	012566
Suspension-Type Insulators	OH: Transmission	015014
Vibration Damper Requirements for Various Types of Overhead Conductors	OH: Conductors	015073
Strength Requirements for Wood Poles	OH: Framing	015203
Method of Grounding Fences and Wire Trellises	OH: Transmission	020607
Installation of Grounds on Wood Pole Transmission and Distribution Lines	OH: Transformers	021904
Clearance Tables CPUC General Order 95	OH: Clearances	022158
Vertical Separation of Overhead Transmission, Distribution, and Telephone Circuits	OH: Clearances	022187
Insulation Districts for Overhead Lines and Stations	OH: General	026300
Transverse Loading Limitations Design Criteria for 44–115 kV Pole Lines	ELS	032550
Transverse Loading Design Criteria for 44–115 kV Pole Lines	ELS	032551
Single Vertical Limitations Design Criteria For 44–115 kV Pole Lines	FRO: Transmission	032552A
Structural Limitations Design Criteria For 44–70 kV Pole Lines	ELS	032553
Instructions Design Criteria for 44–70 kV Pole Lines	ELS	032583
Corrosion Area Overhead Lines	OH: General	032911
Application of Aluminum Conductors and Connections for Substation Use	TIL	037788
Triangular Construction 115 kV Wood Pole Lines	ELS	048873
Structural Limitations Design Criteria for 115 kV Wood Pole Lines	FRO: Transmission	048874A

Overhead Transmission Line Design Criteria

Line-Tension Type Air Switch Installation 44–70 kV Pole Lines	ELS	048876
Tubular Steel Poles	ELS	051742
Post-Type Insulators 60–115 kV Transmission Lines	OH: Transmission	051762
Snow Loading Map	EDM	054330
Conductors for Overhead Lines	OH: Conductors	059626
Installation of Fiberoptic Communication Cable on Wood Pole Distribution Lines	FRO: Framing	062719A
Installation of Switch Grounds on Steel Structure 60-230 kV Transmission Lines	ELS	065383
Post-Type Apparatus Insulators	TIL	067906
Grounding Requirements For Outdoor Electrical Substations	TIL	067910
115 kV and 230 kV Line Switches Mounted on Transmission Structures	ELS	463236
Electrical Clearances for 60 kV, 70 kV, 115 kV, and 230 kV Overhead Transmission Lines	ELS	470591
UO Guideline G11030, “Overhead Transmission Line Naming and Line Numbering”	TIL	G11030
UO Guideline G11073, “Numbering and Marking Overhead Transmission Line Structures”	TIL	G11073
General Order (G.O) 95	TIL	*G.O. 95*
UO Standard S1072, “Requirements for Marking, Guarding, and Stepping of T&D Towers and Lattice Steel Poles”	TIL	S1072
TD-1006S, “Transmission Line Air Switches”	TIL	TD-1006S
WP1902, “Evaluating Uses of Company Transmission Line Easements by Others”	TIL	WP1902

Wood Pole Transmission (Includes Light Duty Steel Poles)

The design criteria for wood pole line construction are described in Documents 048874A and 032583. The preferred design for all wood pole and LDS pole construction is 115 kV with the following exceptions:

1. Retain 60–70 kV switches and switch installations. Install spill gaps on 115 kV insulated structures ahead and back of 60–70 kV switches.
2. For reconductor projects, maintain 60–70 kV phase spacing if existing poles are correctly sized for the new conductor and pole replacements can be avoided.
3. On delta and vertical construction, do not mix 60–70 kV and 115 kV phase-to-phase separation.

Where 60–70 kV circuits are constructed at 115 kV, communicate the design information to system protection personnel and substation engineering personnel.

Structural Requirements

Light duty steel (LDS) is the preferred construction for “wood pole” type projects. For LDS poles, the preferred material type is corten (weathering) steel. Galvanized steel is preferred in coastal or other wet environments.

The minimum pole class, due to transverse loading and depth setting, shall be determined using Document 032550. The minimum pole class, due to column loading, shall be determined using Document 015203. Additional structural limitation drawings are shown in Table 1 below.

Table 1 Structural Limitation Drawings for 44–115 kV Wood Poles

Title	Document Number
Transverse Loading Design Criteria for 44–115 kV Pole Lines	032551
Single Vertical Limitations Design Criteria for 44–115 kV Pole Lines	032552A
Structural Limitations Design Criteria for 44–70 kV Pole Lines	032553
Structural Limitations Design Criteria for 115 kV Wood Pole Lines	048874A

The grade of construction for transmission wood pole lines 44 kV to 115 kV shall be in accordance with the following table (*G.O. 95*, Rule 42, Table 3):

Table 2 Grade of Construction

Circuit at Upper Level	Condition	Grade of Construction Required
All Voltages	Crossing Major Railway	A
Over 5,000 V	Crossing, Joint With, or in Conflict With Communication Circuit	A
All Voltages	Crossing Minor Railway	B
Over 5,000 V	No Crossing Involved	B
Over 5,000 V	Distribution Under Build	B

Where two or more conditions affecting the grade of construction exist, the grade of construction used shall be the highest required under any of the conditions (*G.O. 95*, Rule 42.1). Although minimum wood pole safety factors may be reduced by 2/3 of their required value “due to deterioration or changes in construction arrangement or other conditions subsequent to installation” (*G.O. 95*, Rule 44.2), any additional attachments to a pole will require that the pole be brought up to the full “at installation” safety factor requirements for the applicable grade of construction.

An extreme wind loading criteria shall be applied on new, relocated, and/or replaced transmission structures. This criteria is not applied whenever a pole is “touched,” such as when moving conductors or installing communication antennae on an existing structure. Wood poles that are installed or replaced for any reason, and are located in areas subject to winds greater than 70 mph, shall have the size increased by one pole class larger than the pole size required by Document 032550.

Electrical Clearances

General Notes

1. Measure all clearances from surface to surface. Measure all spacings from center to center.
2. For clearance measurements, consider live metallic hardware that is electrically connected to line conductors as part of the line conductors.
3. Increase all minimum clearances 3% for each 1,000 feet in excess of 3,300 feet above mean sea level.

Wood Pole Transmission (Includes Light Duty Steel Poles) (continued)

Electrical clearances for wood pole transmission lines should meet or exceed the requirements of *G.O. 95*. Use tables in this document for electrical clearance requirements. If specific clearances are not identified in this document, use Document 022158 for clearance requirements.

Where additional circuits are installed under a 115 kV transmission circuit, the required conductor separation at the pole between the transmission conductor and distribution conductor is shown in Document 048873. For 60 and 70 kV transmission wood pole lines, the required conductor separation at the pole between transmission conductor and distribution conductor is listed in Document 022187. The midspan conductor separation shall meet or exceed the electrical clearance requirements in Document 022158 (for 115 kV lines, use *G.O. 95*, Table 2, Cases 8–13).

For wood pole construction, non-ceramic insulators are preferred for post and dead-end applications. Determine the number and type of insulators required for suspension and dead-end-type insulator strings, or the type of post insulators required for post construction, by the insulation district or contamination area. The insulation districts are shown in Document 026300. The number of units for contaminated areas is shown on Document 015014. Post-type construction is shown in Document 051762.

In addition, all new, reconstructed, and/or re-permitted transmission structures that are located in raptor high-risk areas shall be designed and constructed to be raptor-safe in accordance with the specifications found in the Edison Electric Institute's "Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996."

For antenna installations on wood poles, minimum clearances are per Cal/OSHA, Section 2946, Table 1. The antenna and its support are considered to be part of the structure. CPUC *G.O. 95* electrical clearances are not the limiting factor.

Steel and Other Non-Wood Pole Transmission

Structural Requirements

Safety factors shall be based on the maximum conductor tension and under the maximum design wind load.

For the **intact** conditions, all steel transmission line facilities shall be designed for *G.O. 95*, Grade "A" construction safety factors. (See *G.O. 95*, Table 4, for a list of safety factors for each type of material.)

In addition to the above criteria, all steel structures shall be designed for **broken wire** criteria as described in Table 3. The conductors selected to calculate the broken wire longitudinal loads shall be selected so as to produce the maximum stress in the support structure. If the structure has an overhead ground wire, then the broken wire condition may include a broken ground wire in place of a broken conductor, if that produces the maximum stress. Grade A construction for steel structures is defined in CPUC *G.O. 95*, Rule 47.5. (Wood poles are normally not designed for broken wire capability, unless required by the CPUC's *G.O. 95* Rule 47.5.)

Table 3 Minimum Safety Factors

Structure Type	Number of Broken Wires	Safety Factor
Tangent Suspension	1/3 Wires Broken	1.0
Non-Terminal Dead End (new structure)	1/3 Wires Broken	1.5
Non-Terminal Dead End (rebuild)	1/3 Wires Broken	1.0
Terminal Dead End	All Wires Broken (see Note 1)	1.5
Substation Tap/Loop Dead End	All Wires Broken (see Note 2)	1.0

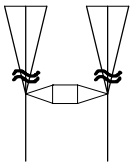


Figure 1
Terminal Dead End

Note:

1. A **terminal dead end** is defined as the first (or last) structure on a line at a substation or transition station. This structure should be capable of supporting the unbalanced load from the termination of all conductors on the high-tension or line side with a safety factor of 1.5 (see Figure 1).

Steel and Other Non-Wood Pole Transmission (continued)

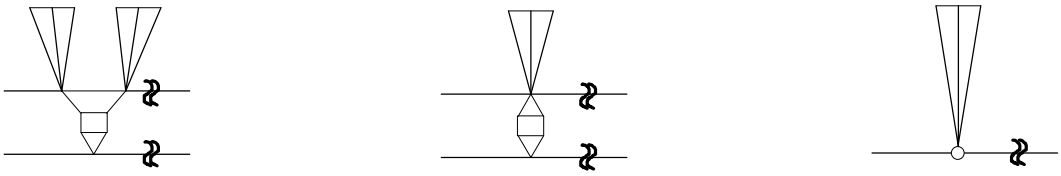


Figure 2
Substation Tap/Loop Dead End

Note:

2. A **substation tap/loop dead end** is defined as the structure in a transmission line that is used to tap-off or loop into a substation. This structure should be capable of supporting the termination of all conductors on the high-tension "main-line" side with a safety factor of 1.0 (see Figure 2).

Anti-Cascade Loading Criteria

Towers on some existing tower lines may not be able to meet the broken wire criteria as specified above. Except for towers over Grade A crossings, the broken wire requirements for existing towers may be waived by the transmission line engineering supervisor, however, the line shall meet the cascade mitigation criteria given below. Towers over Grade A crossings shall meet the broken wire conditions as required by *G.O. 95*.

Per Rule 61.3-B of *G.O. 95*, a transmission line, as a whole, shall be designed so that a failure of an individual support structure shall not cause successive failures of more than 10 additional support structures. This can be accomplished by:

1. Having stop towers at intervals less than 10 towers.
2. Designing all towers for a minimum residual static load (RSL) at 1/3 of the conductor attachment points. For a single-circuit tower, apply the RSL at the attachment of any one conductor or one shield wire. For a double-circuit tower, apply the RSL at the attachments of any two conductors, or two shield wires, or one conductor and one shield wire.
3. Using load limiters to reduce unbalanced loads.

The use of Methods 2 and 3 above need pre-approval of the transmission line engineering supervisor.

The RSL for the conductor is the broken wire load based on everyday tension (EDT) at 60°F, no wind, no ice, final sag. The RSL for the shield wire is the full EDT load.

Maximum Loading Condition Criteria

The maximum loading condition is used to determine the maximum conductor tension, the minimum safety factors, and the broken wire loads.

Table 4 Maximum Loading Conditions

Loading Condition	Elevation (feet)	Temperature (°F)	Ice (inches)	Wind (lbs./sq. ft.)	Time
Light	0-1,500	25	0	8	Initial
Intermediate	1,501-3,000	0	1/4	6	Initial
Heavy	Over 3,000	0	1/2	6	Initial
Extra Heavy	As Required	0	3/4 or More	6	Initial

Initial is defined as the conductor tension at 1 hour for all loading areas and conductor types.

Snow loading areas are shown in Document 054330. These maps are based on local experience and should be used regardless of structure elevation. However, structures located at elevations over 3,000 feet shall be designed for heavy loading or greater. Experience with very wet snows may indicate that a particular line should be designed for greater than heavy loading.

Differential Ice Loading Requirements

The minimum distance between phase conductors of the same circuit and between phase conductors and overhead ground wire on the same structure under differential ice loading conditions is given in Table 5.

Steel and Other Non-Wood Pole Transmission (continued)

Table 5 Minimum Separation in Any Direction Between Phase Conductors and Between Phase Conductors and Overhead Ground Wires

Voltage (kV)	Minimum Separation [1]	
	Phase-to-Phase (feet)	Phase-to-OHGW (feet)
60 and 70	1.8	1
115	3	1.8
230	6	3.5
500	NA [2]	8

[1] If one conductor is located directly above another, or if there is less than 1 foot of horizontal offset, maintain 2 feet of clearance, in addition to that specified in Table 5.

[2] In intermediate and heavy ice or snow loading areas, 500 kV construction shall be horizontal.

Conditions under which clearances apply:

- Upper Conductor – 32°F, final sag, with a radial thickness of ice equal to the maximum thickness of ice that can be reasonably expected for the geographical area.
- Lower Conductor – 32°F, final sag, no ice.

Extreme Wind Loading Criteria

The extreme wind loading criteria shall be applied on new construction, relocations, reconductor, and fiberoptic projects. This criteria is not applied whenever the tower is “touched”, such as when installing extensions to correct existing ground clearance infractions, modifications, or installation of communication antennae.

All new, relocated, replaced, and existing structures that are used for reconductoring and fiberoptic wire installations shall be designed for wind speed shown on PG&E’s extreme wind map. Wind pressure shall be calculated according to the National Electric Safety Code (NESC) 2002 based on 3-second gust wind speed and applied to the wires and structure with a safety factor of 1.0. A conversion factor of 1.2 shall be used to convert the 1-minute average wind speed value from PG&E’s extreme wind map to a 3-second gust value.

Maximum Conductor Tension Criteria

The conductor tensions listed in Table 6 are for horizontal, bottom of the catenary tensions. Under no condition, should the resultant tension exceed 50% (*G.O. 95*, Rule 44, Safety Factors).

Table 6 Maximum Conductor Tension Criteria

Conductor	Initial		Final
Type	Maximum Loaded	60°F	40°F
AAC	45%	35%	25% [1]
ACSR	45%	35%	25% [1]
ACSS	45%	35%	25% [1]
Copper	45%	35%	25% [1]

[1] For span lengths between 1,800–2,500 feet, the maximum conductor tension shall not be greater than 22.5%. For spans greater than 2,500 feet, the maximum conductor tension shall not be greater than 20%.

Calculate the final sag to produce the maximum sag at one of the following two conditions:

- Final conductor sag after creep at 40°F, bare conductor.
- Final conductor sag after creep, with the loaded condition as described in Table 4 on Page 5.

Insulation Criteria

Determine the number and type of insulators required for suspension and dead-end type insulator strings by the insulation district or contamination area. The insulation districts are shown in Document 026300. The number of units for contaminated areas is shown on Document 015014. Post-type construction is shown in Document 051762.

Insulation Criteria (continued)

For suspension and dead-end insulator strings, porcelain or glass insulators are the preferred construction material. In areas of high contamination where washing is required on porcelain or glass insulators, or in areas subject to gunshots, non-ceramic insulators may be substituted. For post insulators, non-ceramic insulators are preferred, though porcelain insulators may be substituted.

Requirements for hardware in corrosive areas are shown in Document 032911.

Electrical Clearances

General Notes

1. Measure all clearances from surface to surface. Measure all spacing from center to center.
2. For clearance measurements, consider live metallic hardware that is electrically connected to line conductors as a part of the line conductors.
3. Increase all minimum clearances 3% for each 1,000 feet in excess of 3,300 feet above mean sea level.

Criteria for Checking Minimum Electrical Clearances Above Ground, Roads, and Railroads

Table 7 Loading Conditions: Normal Clearances to Ground

Loading Condition	Temperature (°F)	Ice (inches)	Wind (lbs./sq. ft.)	Time
Light	60	0	0	Final
Intermediate	60 and 32	0 1/4	0 0	Final Final
Heavy	60 and 32	0 1/2	0 0	Final Final

Table 8 Loading Conditions: Emergency Clearances to Ground

Conductor Type	Temperature (°F)	Ice (inches)	Wind (lbs./sq. ft.)	Time
AAC	185 (85°C)	0	0	Final
ACSR	194 (90°C)	0	0	Final
ACSS	392 (200°C)	0	0	Final
Copper	185 (85°C)	0	0	Final

Table 9 Standard Design Clearances to Ground [1]

Voltage	Situation	Normal Clearance (feet)	Emergency Clearance (feet)
500 kV	Cultivated Agriculture	40	33
500 kV	Other New Lines	37	33
500 kV	County Roads and Highway “X”	56	33
230 kV	New Line	32	29
230 kV	Rebuild Line	31	28
115 kV	New Line	32	29
115 kV	Rebuild Line	31	28
60–70 kV	New Line	32	29
60–70 kV	Rebuild Line	31	28
12 kV	All	25	22.5
Telephone	All	18	–

[1] The criteria for minimum clearance over railroad tracks and bodies of water are outlined in *G.O. 95*, Rule 37.

Electrical Clearances (continued)

Criteria for Checking Minimum Electrical Clearances From Other Wires, Structures, and Supports

Table 10 Loading Conditions: Electrical Clearance (all situations)

Condition	Circuit	Temperature (°F)	Ice (inches)	Wind (lbs./sq. ft.)	Time
No Wind	Upper	60	0	0	Final
With Wind	Lower	60	0	8	Final

Table 11 Loading Conditions: Clearance to Other Structure (minimum required electrical clearances must be maintained for each of the conductor conditions and the conditions in Table 10)

Loading Condition	Temperature (°F)	Ice (inches)	Wind (lbs./sq. ft.)	Time
Light	25 25 130	0 0 0	8 0 2	Initial Initial Final
Intermediate	0 25 25 130	1/4 0 0 0	6 8 0 2	Initial Initial Initial Final
Heavy	0 25 25 130	1/2 0 0 0	6 8 0 2	Initial Initial Initial Final

Table 12 Loading Conditions: Clearance at Crossings and Underbuild (maintain the minimum required electrical clearances for each of the conditions and the conditions in Table 10)

Loading Condition	Case	Circuit	Temperature (°F)	Ice (inches)	Wind (lbs./sq. ft.)	Time
Light	1	Upper Lower	130 [1,2,3] 40	0 0	0 0	Final Final
Intermediate	1	Upper Lower	32 32	1/4 0	0 0	Final Final
	2	Upper Lower	130 [1,2,3] 40	0 0	0 0	Final Final
Heavy	1	Upper Lower	32 32	1/2 0	0 0	Final Final
	2	Upper Lower	130 [1,2,3] 40	0 0	0 0	Final Final

1 For steel construction, clearances should be based on “Upper” circuit at its maximum operating temperature.

2 For ACSS conductor, use 392°F as the upper circuit operating temperature.

3 For wood/ LDS pole construction use 130°F conductor temperature for the “Upper” circuit.

Minimum electrical clearances from other wires, structures, and supports are shown in Document 470591, “Electrical Clearances for 60 kV, 70 kV, 115 kV, and 230 kV Overhead Transmission Lines.” The clearances in this document have been established by an air gap analysis of PG&E’s voltage levels, maximum expected switching surges, and air quality. These values are very similar to the minimums set forth in the National Electric Safety Code (NESC). In all cases, these values meet or exceed the minimum values set forth in the CPUC’s *G.O. 95*.

In general, all new non-wood transmission lines should be designed to allow for live-line maintenance work. Live-line techniques are PG&E’s preferred maintenance method for transmission lines. Electrical clearances for barehand work are described in the Electric Transmission Live-Line Barehand Work Procedures Manual. In designing for barehand work, it is important to work with transmission line specialist(s) on the clearances because the requirements may vary depending on the structure type, conductor configuration, and access.

Electrical Clearances (continued)

In addition, all new, reconstructed, and/or re-permitted transmission structures that are located in raptor **high-risk areas** must be designed and constructed to be raptor-safe in accordance with the specifications found in the Edison Electric Institute's "Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996."

For antenna installations on towers, minimum clearances are per Cal/OSHA, Section 2946, Table 1. The antenna and its support are considered to be part of the tower. CPUC *G.O. 95* electrical clearances are not the limiting factor.

Right of Way Width

Determine the right of way width from the centerline for a single span by summing the following distances:

- Structure width from the centerline.
- Conductor and insulator swing under R/W loading conditions.
- 6-foot buffer.

When determining the right of way width for an entire line, the preferred practice is to use one width for the line and to base that width on a relatively long span within the line (not the longest span). Additional width shall then be added, as appropriate, for those spans that exceed this base span. For long canyon spans, if the minimum conductor height above ground exceeds 50 feet, do not expand the right of way width to accommodate the extra conductor sway.

For parallel transmission lines, determine the centerline separation by calculating the maximum clearance from the following criteria:

1. OSHA Clearance (required for the inside circuit of multiple-circuit corridors)
   - Structure width from the centerline.
   - Twice the OSHA Section 294, Table 2 clearances.
   - Crane width (4 feet).
   - Crane movement (5 feet).
2. Circuit-to-Circuit Sway Clearance
   - Conductor and insulator swing under non-stagger loading conditions.
   - Minimum circuit-to-circuit electrical clearances.
3. Stagger Limitations Clearance (where structures on adjacent lines are staggered)
   - Insulator and conductor swing under R/W loading condition.
   - Minimum circuit-to-steel electrical clearances.

Table 13 Right of Way Width Loading Conditions

Situation	Temperature (°F)	Ice (inches)	Wind (lbs./sq. ft.)	Time
Right of Way Width	60	0	8	Final

Table 14 Stagger Limitations Loading Conditions

Description	Loading Condition
No Stagger, Phase-to-Structure (check both conditions)	60°F, 8#, Final vs. 60°F, 6#, Final 60°F, 2#, Final vs. 60°F, 0#, Final
Unlimited Stagger, Circuit-to-Circuit	60°F, 8#, Final

Joint Use Corridors

Transmission line right of ways should normally be clear of encumbrances such as above ground structures or underground pipelines. The unencumbered right of way is required to allow for proper maintenance of the transmission facility and to minimize any electric hazards. PG&E right of way widths are generally adequate to protect structures located outside the right of way boundary. Refer to Utility Work Procedure WP1902 on the use of PG&E lands and easements by others.

Induction Distance Criteria

- If the underground metal pipeline is outside the right of way, no action is required by PG&E.
- If the pipeline is within the right of way and parallel to the transmission line for more than 1 mile, a detailed induction analysis must be performed to assess the specific condition and, if required, to determine the proper mitigation.
- No action is required if the pipeline is not parallel to the transmission line.
- Special analysis is required for transmission lines located adjacent to railroads.

Arc Distance Criteria (parallel or perpendicular metallic pipeline crossings, metal fences, etc.)

In no case shall the concrete footing of a steel structure or the direct embedded portion of a steel or concrete structure be located closer than the arc distance “D” to an underground metal object. A typical underground metal object is defined as a pipeline or metallic foundations (metal fences, power panels with ground rods, etc.)

If the underground metal object is more than 25 feet from the transmission steel structure, no additional study is required.

If the 25-foot distance cannot be maintained, the following formula may be used to estimate the arc distance “D” from the footing of a transmission structure to an underground metal object.

$D = 0.26\ (\rho J)^{1/2}$ where:

- “D” is the distance from the footing of a transmission structure to an underground metal object.
- “ρ” is the average soil resistivity in ohm-meters
  - If the soil resistivity is known, use actual values
  - if unknown, use 100 ohm-meters for non-mountainous areas and 1000 ohm-meters for mountainous areas.
- “J” is the fault current in kA

If the arc distance “D” cannot be achieved using the above formula, use detailed analysis techniques to provide specific mitigation.

Above Ground Touch Hazards

No above ground metal objects (chain link fences, metal streetlights, metal sheds, etc.) should be within 8 feet of a steel or concrete structure.

Parallel Ties Between Circuits

For protection reasons, when paralleling two circuits on the same structure, maintain a minimum of six parallel ties between circuits between any two substations, and one tie every 5 miles for 25-mile or longer lines. Use a maximum of 11 equidistant ties for lines 50 miles or longer. For short lines, the requirement may be reduced after being examined on a case-by-case basis by system protection personnel.

Mitigation of Inductive Interference With Communication Lines (G.O. 52)

Parallels

Every reasonable effort shall be made to avoid creating parallels with communication facilities. If the construction or reconstruction of a transmission line may create a parallel with a communication circuit, permission must be received from the communication companies to allow the parallel construction (G.O. 52, Rule IIb).

Transpositions

Transpositions can be installed on transmission lines to balance the capacitances to earth of their conductors. This equalizes the impedance of the three phases and minimizes inductive interferences with other lines. As a common practice, PG&E no longer installs transpositions on their transmission lines except for long lines. But, if a line longer than indicated below is contemplated, permission must be received from the communication companies in the area to omit transpositions (G.O. 52, Rule IIIc).

1. Horizontal single-circuit lines over 6 miles in length.
2. Triangular single-circuit lines over 12 miles in length.
3. Double-circuit lines over 9 miles in length.
4. If the line is in close proximity to multiple communication lines exceeding 1 mile in total length in each 10 consecutive miles of the transmission line.
5. If the line is in close proximity to one communication line exceeding 1 mile in total length in each 30 consecutive miles.

Transpositions (continued)

Close proximity is defined as separated from an existing communication line or highway where a future communication line may be constructed by less than 850 feet for 60 kV, and 1,000 feet for 115 kV and above. Crossings at angles over 30° are exempted from this requirement.

For 500 kV circuits, lines will be transposed to complete a barrel between terminals.

Overhead Ground Wires

Ground wires are installed on transmission lines to provide a path to ground for lightning strikes. This reduces the occurrence of lightning-related outages. Without overhead ground wires, a typical double-circuit, 230 kV tower line or single-circuit, 500 kV tower line will have approximately 5 outages/100 miles/year based on an isokeraunic level of 5 and a 25-ohm-footing resistance. This outage rate can be reduced to 1 outage/100 miles/year by the addition of two overhead ground wires.

In order to reduce power loss due to circulating induced current, the overhead ground wire on transmission lines greater than 2 miles in length should be insulated. When overhead ground wires are insulated, they are usually segmented into approximately 3-mile sections. Short lines, with a maximum length of 2 miles, shall be grounded.

Ground wire is normally required for:

- All high-capacity 230 kV lines.
- All 500 kV lines.
- In high isokeraunic level areas (5 strikes/year or greater).
- In close proximity to power plants (within 1 mile).
- In close proximity to 230 kV and 500 kV substations.

Short spans (less than 150 feet) into power plants and substations should not have a ground wire installed.

Transmission Line Switches

Transmission line switches shall be installed when required by transmission planning and/or system operations personnel. Before selecting the appropriate transmission line switch, a Line Switch Information Data Sheet must be completed and approved by system operations personnel.

Resistive glaze (RG) post insulators, as described in Document 067906, will be used in **all** insulation districts.

Table 15 Transmission Line Switch Standards and Guidelines

Title	Document
Line-Tension Type Air Switch Installation, 44-70 kV Pole Lines (For Reference Only)	048876
115 kV Pole-Mounted Switches	TD-1006S
Specifications for 115 kV Air Switch Poles	
115 kV Air Switch Pole, Miscellaneous Components	
Transmission Field Switch Operation Limitations	–
Installation of Switch Grounds on Steel Structures, 60-230 kV Transmission Lines	065383
Installation of Grounds on Wood Pole Transmission and Distribution Lines	021904
115 kV and 230 kV Line Switches Mounted on Transmission Structures	463236
Post-Type Apparatus Insulators	067906
Application of Aluminum Conductors and Connections for Substation Use	037788

Grounding Requirements

Electrical equipment and structures are grounded to eliminate potentially hazardous stray currents and/or voltages. For grounding requirements on wood poles, see Document 021904. For grounding steel structures, see Document 012566. For grounding fences, see Document 020607.

Grounding requirements for transmission line towers and poles inside the substation fence must be carefully designed. Treat these structures like any metallic structure inside the substation and conduct a specific analysis to determine the exact grounding requirements. If the structure is more than 8 feet outside the substation fence, then the structure should be independently grounded. If the structure is right up against or very close to the fence, conduct a specific grounding analysis. For grounding structures inside a substation fence, refer to Document 067910.

Fiberoptic Communication Cable (FOCC)

FOCC is optical ground wire (OPGW) or all dielectric self-supporting cable (ADSS). Minimum allowable electrical clearance requirements for FOCC are shown in Document 470591, Case 14.

When FOCC is in the overhead ground wire position, midspan separation between the FOCC and phase conductors is normally ensured by keeping the sag of the FOCC at 60°F, initial, 0# wind, sag to 80% of the phase conductor sag under the same conditions. Radial clearances should also be checked on steep incline spans and for differential ice loading conditions, when applicable.

On new structures, install OPGW to provide maximum 30° shielding angle to the phase conductor.

When ADSS fiberoptic cable is installed on transmission systems 115 kV and greater, the mounting location of the ADSS in relation to the phase conductors should be submitted to the cable manufacturer in order to perform an electric stress analysis. This is to determine if the electrical field strength exceeds the cable specifications and to evaluate if corona control is needed.

Table 16 Clearances for OPGW and ADSS in the Underbuild Position at 130°F, Final

Description	Rebuild	New Lines
FOCC Over Ground (urban areas)	18 ft.	20 ft.
FOCC Over Railway Track (not operated by overhead contact wires)	25 ft.	27 ft.
FOCC Over Railway Track (operated by overhead trolleys)	26 ft.	28 ft.
Distance of Conductor From Centerline of Pole (whether attached or unattached)	15 in.	15 in.
Distance of Conductor From the Surface of the Pole	3 in.	3 in.

OPGW fiberoptic cable on steel structures should be grounded at splice locations via a ground strap installed above the splice box. All conductive cable material (steel jacket and central core, if conductive) should be stripped beyond this point on the cable so that the remaining cable, when extended for splicing, is entirely non-conductive.

For fiberoptic cable installed at the distribution level, refer to Document 062719A for design and construction information.

Standard Material and Construction

All material and construction configurations shall meet PG&E standards as outlined in PG&E's Electric Overhead Construction Manual and the *Transmission Line Standards Manua*l.

The standard type conductor used by PG&E is shown is Document 059626*.* The standard conductor purchase should specify specular conductor. Non-specular conductor should only be purchased if required for environmental mitigation. AAC type conductor is the preferred conductor for new construction. For bundled conductor construction, subconductor separation shall be 18 inches.

The aluminum strands in ACSS conductor are soft by design. As a result, in high wind areas, jumper loops and long vertical drops are subject to strand damage caused by low frequency oscillation. To minimize strand damage, install jumper strings to reduce the amplitude of conductor movement.

The preferred conductors for new construction are AAC and ACSR type conductors. The most economic conductor size shall be selected. AAC and ACSR conductors are expected to have a longer service life than ACSS type conductor. ACSS conductor is not approved for use on wood pole transmission lines or for use on new lines. ACSS is an acceptable conductor for use when reconductoring existing tower or tubular steel pole circuits.

Vibration dampers should be installed on all non-ACSS conductor as specified in Document 015073. Dampers are generally not installed on ACSS conductors. For spans 1,800 feet or longer, contact the manufacturer to determine if the specific conditions require pre-stressing the ACSS conductor during installation. The pre-stress condition shall be held for 10 minutes.

All new and rebuilt towers must be evaluated for climbing guards, marking, and stepping per UO Standard S1072. UO Standard S1072 will be used during the design process for new and reconstructed facilities (including reconductor projects) to determine if guarding is required.

Antennas may be installed on transmission structures. If possible, the antenna should not be located on the first structure outside the substation (the terminal dead-end structure).

The structure design criteria for 115 kV tubular steel poles is described in Document 051742.

Transmission Line Compliance Commitments and Design Requirements

The following is a list of compliance commitments for the design and construction of transmission lines.

CPUC Regulatory Requirements

- *G.O. 95* – "Rules for Overhead Electric Line Construction"
- G.O. 128 – "Rules for Construction of Underground Electric Supply and Communication Systems"
- G.O. 26–D – "Regulations Governing Clearances on Railroads and Street Railroads with Reference to Side and Overhead Structures, Parallel Tracks, Crossings of Public Roads, Highways and Streets"
- G.O. 131D – "Rules Relating to the Planning and Construction of Electric Generation, Transmission/Power/Distribution Line Facilities"
- G.O. 52 – "Construction and Operation of Power and Communication Lines for the Prevention or Mitigation of Inductive Interference"

PG&E Design Requirements

- Document 470591 "Electrical Clearances for 60 kV, 70 kV, 115 kV, and 230 kV Overhead Transmission Lines"
- *Electric Overhead Construction Manual*
- *Transmission Line Standards Manuals* 1 and 2
- Transmission Line EMF Guidelines (PG&E)
- *Transmission Line Engineering Manual*
- *Transmission Line Design Manual*
- *Utility Operations Policies, Standards, and Guidelines*
- UO Guideline G11030 – "Overhead Transmission Line Naming and Line Numbering"
- UO Guideline G11073 – "Numbering Overhead Transmission Line Structures"
- UO Standard S1072 – "Requirements for Marking, Guarding, and Stepping of T&D Towers and Lattice Steel Poles"
- Civil Design Criteria Memorandum - DCM CST-04

Other Requirements

- Cal/OSHA Division of Occupational Safety and Health, Chapter 4, Subchapter 5, Group 2, Article 37– "Provisions for Preventing Accidents Due to Proximity to Overhead Lines"
- FAA Title 14, Code of Federal Regulations (14 CFR), Part 77– "Objects Affecting Navigable Airspace"
- FAA Order 8260 - "U.S. Standard for Terminal Instrument Procedures (TERPS)"
- FCC Title 47, Code of Federal Regulations (47 CFR), Telecommunication, Chapter I, Part 15 "Radio Frequency Devices"
- *Suggested Practices for Raptor Protection on Power Lines*: The State of the Art in 1996 (EEI)
- *Mitigating Bird Collisions With Power Lines*: The State of the Art in 1994 (EEI)

Other References

- National Electric Safety Code - 2002 (or most recent revision)
- CPUC *General Order (G.O.) 95* - 2007 (http://WWW.CPUC.CA.Gov/Published/Graphics/655.pdf)
- Cal/OSHA, Title 8, Chapter 4, Subchapter 5 (http://WWW.Dir.CA.Gov/Samples/Search/Query.htm)

Revision Notes

Revision 09 has the following changes:

1. Added reference to light duty steel (LDS) poles in the Wood Pole Transmission section.
2. Added criteria for use of corten (weathering) and galvanized LDS poles.
3. For wood and LDS pole construction, made reference to this document for electrical clearance criteria.
4. Revised clearance requirements in Table 9.
5. Revised clearance requirements in Table 12.
6. Added information for Joint Use Corridors.
7. Added information for Arc Distance Criteria.
8. Added information for Above Ground Touch Hazards.

ATTACHMENT D: BIOLOGICAL RESOURCES ASSESSMENT FOR ALTERNATIVES FOR THE SANTA CRUZ 115 KV REINFORCEMENT PROJECT

Biological Resources Assessment of Alternatives

for the

Santa Cruz 115 Kilovolt Reinforcement Project

Prepared for:

Pacific Gas and Electric Company®

Prepared by:

INSIGNIA ENVIRONMENTAL

April 2014

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1 – INTRODUCTION

Pacific Gas and Electric Company (PG&E) proposes to rebuild a portion of the existing Green Valley-Camp Evers 115 Kilovolt (kV) Power Line as part of the Santa Cruz 115 kV Reinforcement Project (project). The existing single-circuit line would be replaced with a double-circuit line (Northern Alignment) between Green Valley Substation and the vicinity of Cox Road and Leslie Lane. The project also includes the addition of a 115 kV power line (Cox-Freedom Segment) from the Northern Alignment to Rob Roy Substation. The project is located in unincorporated areas of southern Santa Cruz County, spanning approximately 8.8 miles between an unincorporated area north of Watsonville and the unincorporated community of Aptos, and crossing through the unincorporated communities of Amesti, Corralitos, Pleasant Valley, and Day Valley, as shown in Figure 1: Project Location.

PG&E filed an application for a Permit to Construct—inclusive of a Proponent's Environmental Assessment (PEA)—for the project with the California Public Utilities Commission (CPUC) on January 25, 2012. The CPUC released a Draft Initial Study/Mitigated Negative Declaration (IS/MND) pursuant to the California Environmental Quality Act (CEQA) for a 49-day public-review period on October 18, 2013. After reviewing the comments received on the Draft IS/MND, the CPUC determined that an Environmental Impact Report (EIR) should be prepared in accordance with CEQA. The CPUC is serving as the lead agency for the preparation of the EIR and has requested additional information from PG&E in order to prepare the EIR. Based on the alternatives provided by PG&E in Chapter 5 – Alternatives of the PEA, the CPUC has requested additional data pertaining to biological resources, in order to identify alternatives that would be either dismissed or analyzed in the Draft EIR. In response to that request, PG&E has prepared this report to summarize the findings of previous biological resources assessments conducted in 2010 for project alternatives. Given the time that has passed since the preparation of the initial assessments, the information in this assessment may not be current.

2 – PROJECT DESCRIPTION

PG&E evaluated the following four alternatives to rebuild all or a portion of two existing 115 kV power lines in the area:

- Alternative 4A – Southern Alignment Alternative,
- Alternative 4B – Valencia Alternative,
- Alternative 4C – West Cox Road Alternative, and
- Alternative 4E – White Road Alternative.

The alternative crossover sites were reviewed from public roads and used aerial photography, as PG&E does not currently possess right-of-entry authorizations for the properties where crossover sites might be built.

Figure 1: Project Location Map

Santa Cruz Reinforcement Project

Existing Substation
Existing Pole
Northern Alignment
Southern Alignment
New Alignment
Federally Owned Land

Pacific Gas and Electric Company®

INSIGNIA ENVIRONMENTAL

1:32,000

0 0.5 1 2 Miles

Z:\GIS\Projects and Data\California\Projects\PGE Santa Cruz\MXDs\Constraints_Report\Fig_1_Project_Location_10212010.mxd

12/09/2010

2.0 SOUTHERN ALIGNMENT

2.0.0 Alternative 4A – Southern Alignment Alternative

The Southern Alignment Alternative is the most direct option, and includes rebuilding the Southern Alignment to convert the single-circuit line to a double-circuit line. The existing Southern Alignment begins at Green Valley Substation and heads west across Pinto Lake near the community of Freedom. From Freedom, the alignment travels northwest—roughly parallel to Larkin Valley Road—through the communities of Larkin Valley and Aptos Hills, before crossing Aptos High School and Freedom Boulevard and entering Rob Roy Substation.

The Southern Alignment Alternative includes three realignments of the existing Southern Alignment that would be necessary to make it a feasible option. The first realignment would relocate a section of the alignment that runs along the shoulder of Amesti Road from approximately 0.1 mile south of Bencich Lane to approximately 0.1 mile south of Hawthorne Avenue. This section would be relocated within an apple orchard 20 to 40 feet south of the existing alignment. The second realignment would relocate a section of the alignment to the north between Calabasas Road and a private driveway approximately 0.3 mile north of Buena Vista Drive, away from an existing residential neighborhood. The third realignment would relocate a section of the alignment from approximately 0.5 mile north of the intersection of Old Adobe Road and Larkin Valley Road to approximately 0.3 mile north of the intersection of Larkin Valley Road and Larkin View to avoid an existing underground utility line located within a shared right-of-way (ROW).

2.1 NORTHERN ALIGNMENT

Alternatives 4B, 4C, and 4E involve combinations of rebuilding the Green Valley-Camp Evers 115 kV Power Line (Northern Alignment) to convert the single-circuit line to a double-circuit line, constructing a single-circuit crossover line, and potentially rebuilding a portion of the Southern Alignment to convert the single-circuit line to a double-circuit line. The Northern Alignment begins at Green Valley Substation in the City of Watsonville, heads northwest across the northern part of Pinto Lake and through the communities of Corralitos and Pleasant Valley, and continues on to the city of Santa Cruz. The potential for sensitive biological or hydrological constraints were not analyzed beyond pole 6/77, which is the location of the most northern potential alternative—the Valencia Alternative.

To implement Alternatives 4B, 4C, and 4E concomitant with the reconstruction of a portion of the Northern Alignment, a crossover line would be built to connect the line to Rob Roy Substation and/or the Southern Alignment. The crossover alternatives, which all originate from the Northern Alignment, are described in the following subsections.

2.1.0 Alternative 4B – Valencia Alternative

The Valencia Alternative would involve rebuilding the Northern Alignment from Green Valley Substation to pole 6/77. From pole 6/77—at the intersection of Fern Flat Road and Valencia School Road—a crossover line would be constructed to the south for approximately 0.36 mile before joining the Southern Alignment near pole 7/88. The Southern Alignment would then be rebuilt between pole 7/88 and Rob Roy Substation.

2.1.1 Alternative 4C – West Cox Road Alternative

The West Cox Road Alternative would involve rebuilding the Northern Alignment from Green Valley Substation to pole 6/72. From pole 6/72, a crossover line would be constructed to the south along Cox Road for approximately 0.25 mile, continuing south along Valencia Road for approximately 1.13 miles, and then southwest along Freedom Boulevard before entering Rob Roy Substation.

2.1.2 Alternative 4E – White Road Alternative

The White Road Alternative would involve rebuilding the Northern Alignment from Green Valley Substation to pole 5/60. From pole 5/60, a crossover line would be constructed overland to the south for approximately 1.6 miles before following White Road southwest for approximately 0.82 mile to pole 5/65. The Southern Alignment would then be rebuilt from pole 5/65 to Rob Roy Substation.

3 – BIOLOGICAL RESOURCE ANALYSIS

3.0 METHODOLOGY

A literature and database search—including a geographic information system search of the California Natural Diversity Database (CNDDB) maintained by the California Department of Fish and Wildlife (CDFW) (formerly the California Department of Fish and Game [CDFG])—was used to identify special-status wildlife and plant species with the potential to occur within a 5-mile buffer of the project area.[1] The California Native Plant Society's (CNPS's) Inventory of Rare and Endangered Vascular Plants of California was accessed online to obtain information regarding sensitive plant species, which were added to the CNDDB search results. Critical habitat designations provided by the United States Fish and Wildlife Service (USFWS) were also reviewed to identify any designated critical habitat that could be located in the project area. The recovery plans of federally listed species included in the CNDDB results were reviewed to obtain relevant information regarding local populations of the species. In addition, Insignia Environmental biologists DJ Allison and Kevin Kilpatrick conducted field surveys of the Northern Alignment, Southern Alignment, and proposed alternative locations between September 20 and September 29, 2010. During these surveys, vegetation communities and potentially sensitive biological resources were noted within 250 feet of the Northern and Southern Alignments. Only a limited review of the alternative crossover line sites was conducted due to issues with restricted access.

[1] Special-status wildlife and plant species include species that are:

- listed or proposed for listing as endangered, threatened, or candidate species under the federal Endangered Species Act or the California Endangered Species Act;
- listed by the CDFW as Fully Protected or California Species of Special Concern; and/or
- categorized by the California Rare Plant Ranking system as list 1 or 2 plant species.

Based on the literature review and field surveys, information for each species, their potential to occur in the project area—within the ROW of either alignment—was classified based on the following criteria:

- High Potential: Occurrences have been recorded within 0.25 mile of a project alternative and suitable habitat is present, or suitable habitat is present and potential individuals were observed during field surveys.

- Moderate Potential: Occurrences have been recorded within 5 miles of the project area and suitable habitat is present.

- Low Potential: Suitable or marginal habitat may occur in the project area, although no records of the species have been recorded within the past 50 years; or records of the species within 5 miles of the project may be extirpated or potentially misidentified.

- No Potential: The project area is not located within the range of the species; suitable habitat does not exist in the project area; the species is restricted to a specific area outside of the project area; or previous occurrences of the species in the project area may have been misidentified, or are known to be extirpated.

3.1 RESULTS

3.1.0 Vegetation Communities

Vegetation communities along the Northern Alignment and Southern Alignment were mapped during the field surveys conducted in September 2010. From these surveys, 11 vegetation communities were identified: coastal oak woodland, coastal scrub, mixed chaparral, coastal riparian, annual grassland, perennial grassland, fresh emergent wetland, non-native woodland, closed-cone pine cypress forest, upland redwood forest, and lacustrine. In addition, two additional classifications were identified: agricultural and disturbed/developed. These areas are shown in Attachment A: Vegetation Maps.

Coastal Oak Woodland

Coastal oak woodlands in the project area are typically dominated by mature coast live oak (*Quercus agrifolia*), but may also be interspersed with Pacific madrone (*Arbutus menziesii*), coast redwood (*Sequoia sempervirens*), Eucalyptus (*Eucalyptus* spp.), or Monterey pine (*Pinus radiata*). Coastal oak woodlands have a defined canopy with understory species that commonly include poison oak (*Toxicodendron diversilobum*), California blackberry (*Rubus ursinus*), Himalayan blackberry (*Rubus discolor*), California coffeeberry (*Rhamnus californica*), toyon (*Heteromeles arbutifolia*), and non-native or native grasses. Coastal oak woodlands are most common along south- and west-facing hillsides. Because of regular vegetation management along the ROWs, coastal oak woodlands typically grow outside of the ROW or in gullies where the height of the transmission line conductor subsequently increases, reducing the amount of tree-trimming necessary. This habitat is scattered throughout the project area.

Coastal Scrub

Coastal scrub communities in the project area are typically dominated by coyote brush (*Baccharis pilularis*), manzanita (*Arctostaphylos* spp.), Ceanothus (*Ceanothus* spp.), California coffeeberry, toyon, Pacific madrone, poison oak, and non-native broom (*Cytisus* spp. and *Spartium* spp.), as well as immature coast live oaks, which develop in the form of a shrub. Brush thickets of these species can reach between 5 and 10 feet in height, and are typically impenetrable. This community most commonly develops beneath existing transmission lines in coastal oak woodland areas where vegetation management has promoted the growth of shrub-forming species and hindered the growth of canopy-forming species, such as coast live oak. It also forms in more xeric or warmer hillsides where mature oak development is otherwise stunted. Coastal scrub is scattered throughout the project area.

Mixed Chaparral

Mixed chaparral communities form in the most xeric portions of the project area. The lack of water is often caused by well-drained sandy soils, southern or western exposure, the topographic position, or a combination of these features. These communities are found in small patches throughout the project area and along both alignments. Typical plants found in these communities include chamise (*Adenostoma fasciculatum*), sticky monkey-flower (*Mimulus aurantiacus*), manzanita, California sagebrush (*Artemisia californica*), coast buckwheat (*Eriogonum latifolium*), and yellow-bush lupine (*Lupinus arboreus*). Specific to the project area, this community often forms on soils developed from fossil marine sediments, creating unique habitats that are home to several rare endemic species.

Coastal Riparian

Coastal riparian habitat can be defined by thick, often impenetrable brush communities, including willows (*Salix* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), blackberry, various grasses, and poison oak. Scattered cottonwoods (*Populus* spp.) are often present as well. These communities form within coastal oak woodlands, coastal scrub, annual grassland, and perennial grassland communities, where intermittent or perennial drainages, streams, or other ephemeral waterbodies exist. In some locations along large creeks or drainages, such as Corralitos Creek, large stands of cottonwoods can develop. In the project area, these communities are often heavily impacted by livestock grazing and agricultural run-off.

Annual Grassland

Annual grasslands in the project area can be characterized by a variety of different types, including fallow fields, pastures, and previously cleared or disturbed areas where the dominant plants include annual, typically non-native grasses, and other weedy species. Characteristic plant species include wild oats (*Avena* spp.), big quaking grass (*Briza maxima*), chess (*Bromus* spp.), thistle (*Centaurea* spp.), and curly dock (*Rumex crispus*). Annual grassland areas are commonly used for livestock grazing or can develop in agricultural fields that are not under cultivation. Regardless, this plant community is often the most likely replacement for coastal prairies, a once-common habitat in the project area. Because of this, several special-status plants occur in annual grassland communities.

Perennial Grassland

Perennial grasslands in the project area are characterized by native or non-native bunchgrasses, which tend to extend their growing season throughout the entire year. These communities are less common than annual grasslands due to increased competition from fast-growing annual grasses. In the project area, this habitat is found in one location: between poles 4/53 and 4/54 of the Northern Alignment.

Fresh Emergent Wetland

Fresh emergent wetlands are comprised of annual or perennial grasslands where an increased amount of water collects seasonally or perennially, promoting the growth of mesic plant species. These communities typically form along valley bottoms or near seeps, where soils remain saturated year-round. These communities can form in livestock pastures and typically contain cattails (*Typhus* spp.), sedges, and/or rushes. During the spring, these areas may have the potential to support vernal pool species or other special-status grassland species associated with mesic sites. Because field surveys were conducted during the dry season, the identification of all wetlands, vernal pools, and other mesic features was not feasible, as seasonal precipitation, agricultural practices, and other factors can diminish or alter the indicators of these features. As a result, all potential wetland features were classified under this vegetation community. Should surveys be conducted during the rainy season, these and other features may be further classified into more distinctive wetland features, such as vernal pools, wet meadows, or freshwater marshes.

Non-Native Woodland

Non-native woodland describes nearly monotypic stands dominated by Eucalyptus or Acacia tree species. Understory development in these communities tends to be limited because of a combination of thick bark, leaves, or seed pods deposited below the trees, as well as potentially allelopathic compounds in these materials.[2] Common understory species include poison oak and varieties of non-native broom. Acacia woodland is found in only one instance in the project area: near pole 3/49 along the Northern Alignment. Eucalyptus woodlands are very common and are found throughout the entire project area. These areas do not typically support native vegetation; thus, a limited potential would exist for special-status plant species to occur.

Closed-Cone Pine Cypress Forest

Closed-cone pine cypress forests in the project area are dominated by stands of Monterey pine and Monterey cypress (*Cupressus macrocarpa*). Understory development in the area is typically sparse because of a thick layer of pine needle duff, although understory species can include California coffeeberry, poison oak, and non-native broom. This vegetation type is limited in the project area and only occurs in a select number of locations, the largest of which is located near pole 6/67 of the Southern Alignment.

[2] Allelopathy describes the process by which one plant produces compounds that inhibit or otherwise influence the growth or development of neighboring plants.

Upland Redwood Forest

Upland redwood forest is defined by dominant stands of coast redwood trees. These areas contain well-defined understories because of a layer of redwood duff and lack of available light. Common understory plants include tan oak (*Lithocarpus densiflorus*), big leaf maple (*Acer macrophyllum*), sword fern (*Polystichum munitum*), and western bracken fern (*Pteridium aquilinum*). These communities tend to form along north- or east-facing slopes within canyons, or in other areas where cooler temperatures and regular coastal fog are common. Although streams or creeks are sometimes present in these communities, often little to no change exists in vegetation types. This habitat community is found along the Northern Alignment in patches between poles 6/72 and 6/75, and along the Southern Alignment near poles 4/59, 6/80, and 7/87.

Lacustrine

Lacustrine habitat is defined by perennial fresh water, typically in the form of ponds, lakes, or reservoirs. In the project area, vegetation in this habitat often consists of duckweed (*Lemna* spp.) present in open-water portions of the feature, as well as in shallow or peripheral areas containing cattail, tule (*Scirpus* spp.), willows, sedges, and cottonwoods. In several instances, emergent vegetation is absent due to heavy livestock use of the area. No records exist of locally occurring special-status plant species having been found in these habitats.

Agricultural

Agricultural areas in the project site and along the proposed alternative routes include apple orchards, berry fields, vineyards, other row crops, and greenhouses. Livestock holding areas with little to no vegetation are also included in this classification. There is limited or no potential that these areas would support special-status plant species due to regular disturbance.

Disturbed or Developed

Disturbed or developed areas are classified for residential and commercial development and also include landscaped areas, paved areas, or bare dirt and gravel lots. No potential exists for these areas to support special-status plant species.

3.1.1 Special-Status Wildlife

Based on literature and database searches of the project area, 15 special-status wildlife species were found to have been recorded within 5 miles of the project area. Information regarding these species and their potential to occur in the project area is included in Table 1: Potential Special-Status Wildlife Species. In addition, Attachment B: CNDDB and Critical Habitat Map shows the locations of CNDDB records for these species within approximately 1 mile of the project area, based on spatial data provided by the CNDDB. Site-specific discussions of the potential for these species to occur along each project alternative are provided in Section 4 – Species Potential to Occur.

3.1.2 Special-Status Plant Species

Based on literature and database searches of the project area, 20 special-status plant species have been recorded within 5 miles of the project area. Information regarding these species and their potential to occur in the project area is included in Table 2: Potential Special-Status Plant Species. In addition, Attachment B: CNDDB and Critical Habitat Map shows the locations of

CNDDB occurrences of these species within approximately 1 mile of the project area, based on spatial data provided by the CNDDB. Site-specific discussions of the potential for these species to occur along each project alternative are provided in Section 4 – Species Potential to Occur.

3.1.3 Critical Habitat

Critical habitat designated by USFWS and National Oceanographic and Atmospheric Administration (NOAA) Fisheries for four species is crossed by one or more of the project alternatives. These species include robust spineflower (*Chorizanthe robusta robusta*), Monterey spineflower (*Chorizanthe pungens pungens*), steelhead central evolutionarily significant unit (ESU) (*Oncorhynchus mykiss irideus*), and steelhead south/central ESU (*Oncorhynchus mykiss irideus*).[3]

Robust Spineflower

The Aptos Critical Habitat Unit for robust spineflower is crossed by the Southern Alignment, approximately between poles 6/83 and 6/85. This span of the Southern Alignment would only be rebuilt under Alternative 4B. In addition, the Freedom Critical Habitat Unit is located near the Southern Alignment near pole 6/73, but could likely be avoided as it appears to be outside of the project ROW.

Monterey Spineflower

The Freedom Boulevard Critical Habitat Unit for Monterey spineflower is located south and east of Freedom Boulevard and northeast of Rob Roy Substation. However, none of the project alternatives are within the designated area, and thus would not be within critical habitat for this species.

Steelhead Central ESU

Valencia Creek is designated as critical habitat for the steelhead central ESU, which spawn in the area during the spring. This creek is spanned by Alternative 4B – Valencia Alternative, between poles 6/74 and 6/75 of the Northern Alignment, and between poles 6/80 and 6/81 of the Southern Alignment.

Steelhead South/Central ESU

Corralitos Creek is designated as critical habitat for the steelhead south/central ESU, which spawn in the area during the spring. This creek is spanned by all project alternatives, between poles 2/42 and 2/43 of the Northern Alignment and between poles 2/24 and 2/25 of the Southern Alignment.

[3] Evolutionarily significant units (ESUs) describe reproductively isolated populations of a species. Within salmonids (e.g., steelhead), these ESUs are typically identified by the natal streams of the populations. Each ESU is listed individually by NOAA Fisheries.

4 – SPECIES POTENTIAL TO OCCUR

The following is a comparison of species with a moderate to high potential to occur, analyzed for each of the alternatives.

Table 1: Potential Special-Status Wildlife Species

Species Name	Listing Status[4]	Life History	Project Area Occurrences	Potential to Occur by Project Alternative			
				4A	4B	4C	4E
Invertebrates							
Zayante band-winged grasshopper (*Trimerotropis infantilis*)	FE	Found in sandhill habitat in Zayante soils formations in the Santa Cruz Mountains. Suitable habitat consists of sand parkland habitat containing ponderosa pines (*Pinus ponderosa*) with a sparsely vegetated understory containing perennial herbs and grasses including Ben Lomond wallflower (*Erysimum teretifolium*). The flight period typically extends from May to August, and the peak occurs in June and July.	Restricted to sandhill habitats existing within the Zayante soil formations in northwestern Santa Cruz County. No suitable habitat is present within the project area.	None	None	None	None
Fish							
Tidewater goby (*Eucyclogobius newberryi*)	FE SSC	Requires brackish water habitats found in coastal estuarine habitats. Prefers sandy bottoms with depths of 20 to 100 centimeters near emergent vegetation beds.	No brackish habitat is present within the project area.	None	None	None	None
Steelhead central ESU (*Oncorhynchus mykiss irideus*)	FT	Requires cool, swift-moving streams with clean, unsilted gravel beds for spawning and egg incubation. Individuals within this ESU spawn during the winter only.	Found in the Aptos Creek watershed, including Valencia Creek, which is crossed by Alternative 4B. In addition, this waterbody is designated as critical habitat for the species.	None	High	None	None
Steelhead south/central ESU (*Oncorhynchus mykiss irideus*)	FT	Requires cool, swift-moving streams with clean, unsilted gravel beds for spawning and egg incubation. Wild-born individuals within this ESU spawn during the winter only.	Found in the Pajaro River basin, including Corralitos Creek, which is crossed by all project alternatives. In addition, this waterbody is designated as critical habitat for the species.	High	High	High	High
Amphibians							
California tiger salamander (*Ambystoma californiense*)	FT CT	Occurs in vernal pools and seasonal ponds, including stock ponds. Can inhabit a wide range of upland habitats, including woodlands and grasslands where dense vegetation, leaf litter, logs, and/or underground burrows large enough to provide cover exist. Spends most of the year underground in small mammal burrows. Breeds after the first rains in late fall and early winter, when the wet season allows the salamanders to migrate to the nearest pond—a journey that may be as far as 1 mile and can take several days. Lays eggs in small clusters or singly, which hatch after 14 to 21 days.	The project is located at the northern extent of the historic range of the species along Monterey Bay. Two occurrences exist for this species within 5 miles of the project area. Both records were recorded on the opposite sides of Highway 1, south of the project area. In addition, one of these records is believed to be introduced eastern tiger salamanders (*Ambystoma tigrinum*). Hybridization with eastern tiger salamanders has a high rate of occurrence in Monterey Bay populations. Because the species has not historically occurred in the project area and limited habitat is present for the species, limited potential would exist for it to occur.	Low	Low	Low	Low

[4] Explanation of state and federal listing codes:

Federal listing codes:

-FE: Federally Endangered Species
-FT: Federally Threatened Species

California listing codes:

-CT: State-listed as Threatened
-FP: Fully Protected Species
-SSC: Species of Special Concern

Species Name	Listing Status[4]	Life History	Project Area Occurrences	Potential to Occur by Project Alternative			
				4A	4B	4C	4E
Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*)	FE CE FP	Inhabits shallow, freshwater ponds and nearby woodland and coastal scrub. Breeding ponds are typically seasonal or must be free of permanent fish populations for larvae to reach adulthood. Adults migrate from upland small mammal burrows during the rainy season to breed. Following breeding, they return to upland habitat and typically coastal oak woodlands within 700 feet breeding ponds. This species has been confined to network ponds and wetlands in southeastern Santa Cruz County.	Several known and potential breeding ponds exist in the area. Specifically along the Northern Alignment, an unconfirmed potential breeding pond is located approximately 0.5 mile north of pole 4/54 and a confirmed breeding pond, Merk Pond, is located approximately 0.5 mile south of pole 3/47. Several known breeding ponds exist near Alternative 4A—including Calabasas Pond, Racehorse Lane Pond, Suess Pond, and Olive Pond—and they are located within 0.5 mile of poles 5/62, 5/64, and 6/70 of the Southern Alignment. Near pole 5/64, the Southern Alignment also crosses the Calabasas Unit of the Ellicott Slough National Wildlife Refuge, which was established, in part, to protect this species. Areas near these ponds would likely be considered suitable upland habitat. Alternative 4E crosses near the Millsap Pond and a CDFW Ecological Reserve established to protect this species.	High	High	High	High
Foothill yellow-legged frog (*Rana boylii*)	SSC	An obligate aquatic species found within or directly adjacent to cool stream habitats. Lays between 300 and 2,000 eggs on cobblestones submerged in water between April and July. Eggs hatch as tadpoles after approximately 1 week and transform, usually by October. Limited mobility in the summer.	Known occurrences in the area include Aptos Creek, Soquel Creek, and Harkins Slough, though none of these waterbodies are crossed by any project components. Similar suitable habitat exists along Alternatives 4B and 4C at Valencia Creek.	Moderate	Moderate	Moderate	None
California red-legged frog (*Rana draytonii*)	FT SSC	Inhabits permanent and seasonal pools, freshwater seeps, marshes, and low-velocity streams in lowlands and foothills. Uses adjacent upland habitat for foraging and refuge during the rainy season. Breeds during the wet season from December to March. Lays 300 to 4,000 eggs in a large cluster that is attached to plants near the water surface. Eggs hatch after about 4 weeks and metamorphose in 4 to 7 months. Found from sea level to 6,500 feet.	Several areas of suitable habitat are present in the area, typically in the form of stock ponds. Because of the agricultural nature of the surrounding area, stock ponds are fairly common. However, only two stock ponds are located directly adjacent to a project alternative—near pole 3/52 of the Southern Alignment and near pole 1/29 of the Northern Alignment—and they represent only marginal habitat. In addition, the species has been documented in the Calabasas Unit of the Ellicott Slough National Wildlife Refuge, though the Southern Alignment does not cross suitable habitat. This species is also known to occur at Millsap Pond, approximately 0.3 mile east of Alternative 4E.	Moderate	Moderate	Moderate	Moderate
Reptiles							
Western pond turtle (*Actinemys marmorata*)	SSC	Usually occurs in areas of calm, fresh water, but can also occur in brackish and salt water for short periods of time. Occupies a wide variety of aquatic habitats, including ponds, lakes, rivers, streams, marshes, sloughs, and wetlands. Digs nests and occupies upland habitats in woodlands and grasslands, usually close to water. Sexual maturity occurs at a minimum of 6 years old. Lays approximately 5 to 13 eggs from April through August up to 0.5 mile from water. Generally lays eggs once per year, but sometimes lays eggs twice in 1 year.	Suitable habitat and occurrences have been recorded at Pinto Lake in Watsonville, which is crossed by the Southern Alignment. Marginal habitat is present along the remainder of the project alignments, as most stock ponds are too small or seasonal to support the species.	High	Low	Low	Low
Black legless lizard (*Anniella pulchra nigra*)	SSC	Locally inhabits sandy and loamy soils in coastal and interior dune, chaparral, and pine or oak woodlands. Restricted to the Monterey Peninsula and southern coast Monterey Bay.	Suitable habitat is scattered through all project alternatives, in coastal scrub, coastal oak woodlands, mixed chaparral, and/or closed-cone pine cypress forest.	Moderate	Moderate	Moderate	Moderate

Species Name	Listing Status[4]	Life History	Project Area Occurrences	Potential to Occur by Project Alternative			
				4A	4B	4C	4E
Birds							
Tricolored blackbird (*Agelaius tricolor*)	SSC	Inhabits agricultural grain fields, ponds, sloughs, marshes, swamps, and estuaries. Nests in large dense stands of tall emergent vegetation such as cattails (*Typhus* spp.) or tules (*Scirpus* spp.). Breeds from March to June.	No suitable nesting habitat is present along any of the project alternatives. Limited suitable foraging habitat is present along the project alternatives.	Low	Low	Low	Low
Western snowy plover (*Charadrius alexandrinus nivosus*)	FT SSC	Inhabits and breeds on coastal beaches, including sand spits, dune-backed beaches, sparsely-vegetated dunes, beaches at creek and river mouths, and salt pans at lagoons and estuaries. In some instances, they have been known to nest on bluff-backed beaches, dredge spoil piles, salt pond levees, dry salt ponds, and river bars. Forages on marine or estuarine invertebrates. Breeds during the spring and summer months.	No suitable foraging or breeding habitat, such as coastal dune or beach habitat, is present in the project area.	None	None	None	None
Bank swallow (*Riparia riparia*)	CT	A neo-tropical migrant that nests in California from March to August, breeding from May to July. Nests within small holes in vertical finely textured clay or sandy cliffs or banks. Typically nests alongside large riparian systems in the Sacramento Valley, although scattered populations exist along the Pacific Coast from San Mateo County to Monterey County.	The nearest known population of the species occurs along Elkhorn Slough, south of the project area. No suitable breeding habitat was observed in the project area.	None	None	None	None
Mammals							
Pallid bat (*Antrozous pallidus*)	SSC	Inhabits arid desert regions and pine-oak woodlands. Typically forages in riparian and oak woodland habitats in coastal portions of the state. Roosts in caves, rock crevices, mines, hollow trees, buildings, and bridges. Forages almost exclusively for insects on the ground.	One occurrence of this species is known from either Soquel Creek or Uvas Creek, based on conflicting information. Similar habitat to these areas occurs along both project alignments at riparian crossings. This includes Valencia Creek, Trout Creek, Corralitos Creek, and other unnamed waterbodies.	Moderate	Moderate	Moderate	Moderate
American Badger (*Taxidea taxus*)	SSC	Requires uncultivated ground with friable soils to facilitate the digging of burrows. Prefers meadows, open forests, and grasslands. Feeds primarily on small burrowing mammals, such as ground squirrels, gophers, and mice. Breeds in late summer to early autumn and hibernates in the winter.	This species is locally rare in Santa Cruz County. One occurrence—recorded in 1909—was documented within 5 miles of the project area. Suitable habitat exists throughout the project area, in annual grassland and coastal oak woodland habitats.	Low	Low	Low	Low

Table 2: Potential Special-Status Plant Species

Species Name	Listing Status[5]	Life History	Blooming period	Project Area Occurrences	Potential to Occur by Project Alternative			
					4A	4B	4C	4E
Anderson's manzanita (*Arctostaphylos andersonii*)	1B.2	Found in the Santa Cruz Mountains from southeast Santa Cruz County and southern Santa Clara County to southern San Mateo County. Typically occurs in openings in Douglas fir (*Pseudotsuga menziesii*), coast live oak, and coast redwood forests. Distinguished from other local species by the lack of a basal burl. Typically found below 3,000 feet in elevation.	February to May	Suitable habitat exists in patches along the Northern and Southern Alignments, in coastal oak woodland and upland redwood forest habitats.	Moderate	Moderate	Moderate	Moderate
Hooker's manzanita (*Arctostaphylos hookeri hookeri*)	1B.2	Inhabits marine sandy soil deposits in closed-cone coniferous forest, maritime chaparral, coastal oak woodland, and coastal scrub from Monterey County to southern Santa Cruz County. Requires fire for germination.	January to June	Small populations of the species persist in Santa Cruz County, in undisturbed maritime chaparral habitat. Suitable habitat is present throughout the project area, in mixed chaparral, coastal oak woodland, coastal scrub habitats, and closed-cone pine cypress forest.	Moderate	Moderate	Moderate	Moderate
Pajaro manzanita (*Arctostaphylos pajaroensis*)	1B.1	Inhabits sandy soils within maritime chaparral or along the edges of less-developed coastal oak woodland. Endemic to northern Monterey County and southern Santa Cruz County. Requires fire for germination.	December to March	Suitable habitat exists in small patches along the Northern and Southern Alignments, in mixed chaparral and coastal scrub habitats. The project area is located north of the northern-most record of the species. In addition, all populations in Santa Cruz County are believed to be extirpated.	Low	Low	Low	Low
King Mountain manzanita (*Arctostaphylos regismontana*)	1B.2	Found in the Santa Cruz Mountains from San Mateo County to Santa Clara County, in broad-leafed upland forest, chaparral, and closed-cone coniferous forest.	January to April	One occurrence has been recorded within 5 miles of the project area, although this record is believed to have been a misidentified example of Anderson's manzanita.	None	None	None	None
Bristly sedge (*Carex comosa*)	1B.2	Occurs throughout California, Oregon, Idaho, and Washington, although the species is typically rare to encounter. Occurs along coastal marshes and fresh emergent wetlands.	May to September	Limited marginal habitat is present along both of the project alignments. In addition, only one record has been recorded of this species within 5 miles of the project area.	Low	Low	Low	Low
Congdon's tarplant (*Centromadia parryi congdonii*)	1B.2	Found in valley and foothill grassland habitat, between sea level and 760 feet in elevation. Often occurs along the peripherals of seasonal swales or vernal pools.	May to October (sometimes November)	Suitable habitat is scattered throughout the project area, in annual and perennial grassland habitats. Potential individuals were identified along Race Horse Lane between poles 6/70 and 6/71 of the Southern Alignment.	High	Low	Low	Low
Monterey spineflower (*Chorizanthe pungens pungens*)	FT 1B.2	Inhabits openings in maritime chaparral, grassland, and coastal scrub growing in marine sandy soil deposits, coastal dunes, and interior stabilized dune deposits.	April to June	Suitable sediment types and habitats were identified along the Northern Alignment near pole 6/70. This area was identified within 1,000 feet of a known species occurrence, which is crossed by the Green Valley-Camp Evers 115 kV Power Line. Suitable habitat is present along the Southern Alignment from approximately pole 6/71 to 6/86, in areas of sandy soils. No documented records occur along this alignment.	Moderate	High	High	Moderate

[5] Explanation of state and federal listing codes:

Federal listing codes:

-FE: Federally Endangered Species
-FT: Federally Threatened Species

California listing codes:

-CE: State-listed as Endangered

California Rare Plant Rank:

-1B.1: Rare, threatened, or endangered in California and elsewhere; seriously threatened in California
-1B.2: Rare, threatened, or endangered in California and elsewhere; fairly threatened in California

Species Name	Listing Status[5]	Life History	Blooming period	Project Area Occurrences	Potential to Occur by Project Alternative			
					4A	4B	4C	4E
Robust spineflower (*Chorizanthe robusta robusta*)	FE 1B.1	Inhabits openings in maritime chaparral, grassland, and coastal scrub growing in marine sandy soil deposits, coastal dunes, and interior stabilized dune deposits.	April to June	Suitable sediment types and habitats were identified along the Northern Alignment near pole 6/70, although no known populations are crossed by the alignment. Suitable habitat is present along the Southern Alignment, from approximately pole 6/71 to 6/86 in areas of sandy soils. Two known populations—the Aptos and Freedom populations, as well as their designated critical habitats—occur within the project ROW of Alternatives 4A, 4B, and 4E.	High	High	Moderate	High
Sand-loving wallflower (*Erysimum ammophilum*)	1B.2	Occurs in the interior sections of stabilized coastal dunes from San Mateo County to Monterey County, as well as on Santa Rosa Island in Santa Barbara County.	February to June	No coastal dunes are located in the project area.	None	None	None	None
Minute pocket moss (*Fissidens pauperculus*)	1B.2	Occurs in north coast coniferous forests from Santa Cruz County to Humboldt County. Locally found growing on damp soils along the edges of perennial or seasonal streams in redwood, Douglas fir, or tanoak (*Lithocarpus densiflorus*) woodlands.	January to May[6]	No occurrences have been documented by the project, although similar suitable habitat exists along both alignments at Valencia Creek.	None	Moderate	None	None
Sand gilia (*Gilia tenuiflora arenaria*)	FE CT 1B.2	Inhabits coastal dunes, coastal woodlands, and maritime chaparral with sandy fossil marine soil, with the majority of occurrences in coastal dunes.	April to June	The northernmost occurrence of this species is located in Moss Landing, south of the project area. In addition, limited suitable habitat is present in the project area.	Low	Low	Low	Low
Santa Cruz tarplant (*Holocarpha macradenia*)	FT CE 1B.1	Inhabits sandy or sandy-clay soils in coastal scrub, prairie, and grassland habitats along Monterey Bay, from Prunedale to Santa Cruz. Is often benefited by livestock grazing or seasonal mowing, which reduces competition with non-native grasses.	June to October	Several occurrences of this species have been recorded within 5 miles of the project area. Suitable habitat is located along the southeastern portions of both alignments, where pastures and other agricultural fields are more prevalent.	Moderate	Moderate	Moderate	Moderate
Kellogg's horkelia (*Horkelia cuneata sericea*)	1B.1	Inhabits old dunes and coastal sand hills in openings in closed-cone coniferous forest, maritime chaparral, and coastal scrub habitats.	April to September	Suitable sediment types and habitats were identified along the Northern Alignment near pole 6/70, although no known populations are crossed by the alignment. Suitable habitat is present along the Southern Alignment from approximately pole 6/71 to 6/86, in areas of sandy soils, although no known populations are crossed by the alignment.	Moderate	Moderate	Moderate	Moderate
Woodland monolopia (*Monolopia gracilens*)	1B.2	Inhabits openings within cismontane and north coast conifer forests. Often found near or in areas with serpentine soils or rocky soils. Local occurrences recorded near Hecker Pass or on the eastern side of the Santa Cruz Mountains in Santa Clara County.	March to July	Limited suitable habitat for this species is present in the project area, as most local occurrences were recorded at higher elevations and in areas with rocky or serpentine soils.	Low	Low	Low	Low

[6] Mosses do not produce flowers. The seasonal period provided corresponds to the period when fruiting bodies are typically developed.

Species Name	Listing Status[5]	Life History	Blooming period	Project Area Occurrences	Potential to Occur by Project Alternative			
					4A	4B	4C	4E
Dudley's lousewort (*Pedicularis dudleyi*)	1B.2	Limited information regarding the species is available, as only 10 recorded observations have been made. Believed to inhabit cool, moist stream banks and vertical cuts in coast redwood forests.	April to June	One local occurrence for this species was recorded in 1884, along Aptos Creek, although it has never been relocated again. No other occurrences have been recorded in the Monterey Bay area. Although marginal habitat may exist along Valencia Creek and Trout Creek, a low potential would exist for the species to occur because of its scarcity in the area.	Low	Low	Low	Low
Santa Cruz Mountains beardtongue (*Penstemon rattanii kleei*)	1B.2	Inhabits sandy shale slopes in recently burnt chaparral and openings in lower montane coniferous forest habitats between 1,200 and 3,500 feet in elevation.	May to June	Local occurrences of this species were recorded along the ridgeline of the Santa Cruz Mountains along the border of Santa Cruz County and Santa Clara County. The project is located outside of the elevational range of the species.	None	None	None	None
White-rayed pentachaeta (*Pentachaeta bellidiflora*)	FE CE 1B.1	Occurs in serpentine bunchgrass communities.	March to May	The only remaining extant populations of this species are believed to occur in San Mateo County. In addition, no serpentine bunchgrass communities were identified in the project area.	None	None	None	None
Choris' popcorn-flower (*Plagiobothrys chorisianus chorisianus*)	1B.2	Inhabits seasonally inundated wetlands or vernal pools in coastal prairies and openings in coastal oak woodlands and coastal scrub.	March to June	One population has been recorded within 1 mile of the project area, at the Watsonville Airport. Other seasonally mesic grassland sites are scattered throughout both project alignments and may serve as suitable habitat.	Moderate	Moderate	Moderate	Moderate
San Francisco popcorn-flower (*Plagiobothrys diffuses*)	CE 1B.1	Inhabits seasonally inundated wetlands or vernal pools in coastal prairies and serpentine bunchgrass communities.	March to June	One individual, observed within 5 miles of the project area, was recorded in 1993. All remaining populations have been observed from Santa Cruz west along the coast. No serpentine communities were identified within the project area.	Low	Low	Low	Low
Santa Cruz clover (*Trifolium buckwestiorum*)	1B.1	Occurs in moist coastal prairies or meadows in cismontane or conifer woodlands.	April to October	The nearest record of this species was documented in the Forest of Nisene Marks State Park in 1986, though it is believed to have been destroyed by rooting feral pigs. Limited marginal habitat is scattered in small patches throughout the project area.	Low	Low	Low	Low

4.0 SPECIAL-STATUS WILDLIFE SPECIES

4.0.0 Steelhead Central ESU

The steelhead central ESU is federally listed as threatened. This species utilizes freshwater streams to spawn, ranging from the Russian River basin in Sonoma County south to the Aptos Creek basin in Santa Cruz County. Steelhead are typically present in these freshwater systems during the spring, when adults travel from the Pacific Ocean to spawn. Juveniles then hatch and travel back to the ocean during the summer. This species has no potential to occur along Alternatives 4A, 4C, and 4E because no streams, rivers, or other known habitat are crossed by these alternatives.

Alternative 4B – Valencia Alternative

This species has a high potential to occur in Valencia Creek, which is designated as critical habitat for this species. This creek is crossed twice by Alternative 4B, including along the Northern Alignment near pole 6/74 and the Southern Alignment near pole 6/80.

4.0.1 Steelhead South/Central ESU

The steelhead south/central ESU is federally listed as threatened. This species utilizes freshwater streams to spawn, ranging from the Pajaro River basin in Santa Cruz County south to the Santa Maria River basin in Santa Barbara County. This species is typically present in these freshwater systems during the spring, when adults travel from the Pacific Ocean to spawn. Juveniles then hatch and travel back to the ocean during the summer.

Alternative 4A – Southern Alignment Alternative

This species has a high potential to occur within Corralitos Creek, which is designated as critical habitat for the species. This creek is crossed by Alternative 4A along the Southern Alignment near pole 2/25.

Alternatives 4B – Valencia Alternative, 4C – West Cox Road Alternative, and 4E – White Road Alternative

These alternatives have been analyzed together because they all share a common occurrence potential for this species. All of these alternatives share a common alignment between Green Valley Substation and pole 5/60 of the Northern Alignment. Within this span, these alternatives cross Corralitos Creek near pole 2/43, which has a high potential to support this species and is designated as critical habitat.

4.0.2 Santa Cruz Long-Toed Salamander

Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*) is federally and state-listed as endangered, and is also listed as a fully protected species by the CDFW. Habitat for this salamander includes a combination of aquatic breeding sites and upland aestivation sites. Typically, Santa Cruz long-toed salamander breeding habitat is defined by seasonal or perennial freshwater ponds, sloughs, wetlands, or drainages that hold water until at least May, and are free of invasive predatory animals, such as bullfrogs (*Lithobates catesbeiana*), mosquito fish (*Gambusia affinis*), or goldfish (*Carassius auratus*). Upland aestivation habitat typically includes small mammal burrows, tree roots, dense leaf litter, and the underside of fallen logs in coastal

oak woodlands, coastal riparian woodlands, coastal scrub, and closed-cone pine cypress forest. In addition, this species' range is highly restricted to a small number of breeding areas in southern Santa Cruz County and northern Monterey County.

Santa Cruz long-toed salamanders typically emerge from aestivation during or following the first significant precipitation event of the rainy season. During this time, they migrate up to 1 mile to breeding ponds or other aquatic breeding habitat. Following breeding, adults then return to upland aestivation habitat. During the winter and spring, the eggs develop into larvae, which develop and metamorphose into juveniles within 4 to 5 months. In perennial ponds, Santa Cruz long-toed salamander larvae can overwinter. Juveniles emerge from the desiccating aquatic habitat in May or June and travel to upland habitat to aestivate. The seasonality of breeding habitat (i.e., the fact that they dry out each year) is often a critical component, as it eliminates predatory non-native aquatic species. Although this species can breed every year, they have been known to skip years when conditions are not favorable. Because of this, breeding ponds that may not contain evidence of breeding during a particular year may still have a breeding population in the vicinity.

Alternative 4A – Southern Alignment Alternative

Several known breeding ponds exist along Alternative 4A, as shown in Figure 2: Santa Cruz Long-Toed Salamander Occurrence Map. Specifically, these breeding areas include the following:

- Olives Pond
- Suess Pond
- Calabasas Pond
- Racehorse Lane Pond
- Millsap Pond
- Palmer Pond
- Tucker Pond

Olives Pond, Suess Pond, and Calabasas Pond form a network of breeding sites that are hydrologically connected, and that eventually enters Harkins Slough. They exist in a linear pattern, paralleling the southern side of the Southern Alignment within 0.3 mile of poles 4/59 to 5/62. Calabasas Pond was last confirmed to contain breeding populations in 2008, whereas breeding in Olives and Suess ponds was last confirmed in 2004. Although the alternative crossover line does not cross any of these features, adjacent portions of the alignment are considered upland aestivation habitat for the species. In addition, this alternative crosses the Calabasas Unit of the Ellicott Slough National Wildlife Refuge near pole 5/64, which was established, in part, to promote the recovery of Santa Cruz long-toed salamander.

Racehorse Lane Pond is a small agricultural stock pond located adjacent to Racehorse Lane in Larkin Valley and approximately 0.25 mile southwest of pole 6/70. This pond was last confirmed to contain breeding individuals in 2008.

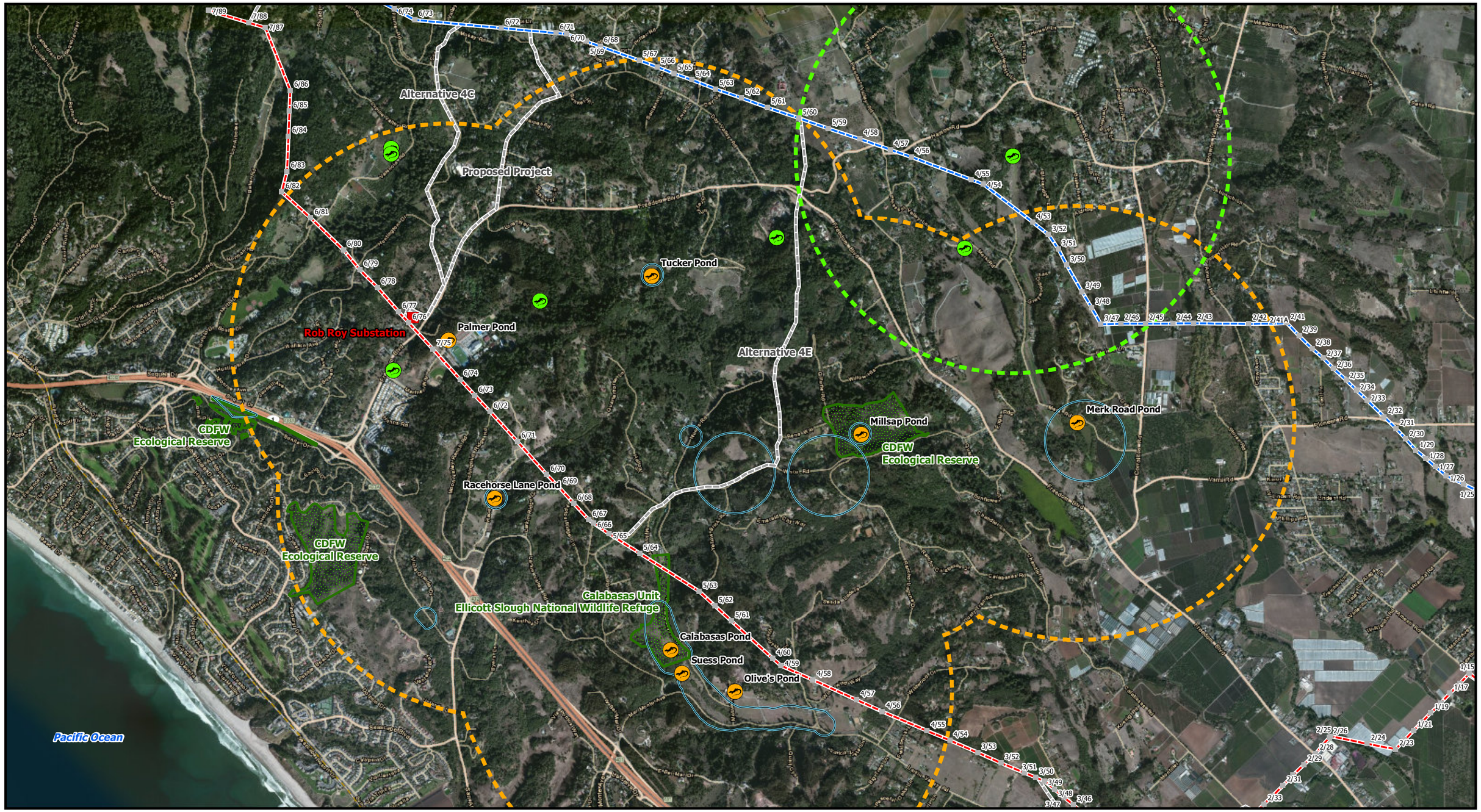

Figure 2: Santa Cruz Long-Toed Salamander Occurrence Map

Santa Cruz Reinforcement Project

- Existing Substation
- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- SCLTS Conservation Parcel
- SCLTS CNDDB Occurrence

Potential SCLTS Breeding Site

- Confirmed Site
- Unconfirmed Site

Potential Upland Habitat Range (1 Mile)

- From Confirmed Site
- From Unconfirmed Site

Pacific Gas and Electric Company

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Millsap Pond is located on a conservation parcel owned and managed by the CDFW. This pond is located approximately 1 mile northeast of pole 5/64. Two additional occurrences in close proximity to this pond indicate that other breeding habitat may exist in the surrounding area as well. This pond was last confirmed to contain breeding individuals in 2008.

Palmer Pond is a seasonal pond located adjacent to Aptos High School approximately 0.08 mile from pole 6/74 and 0.17 mile from Rob Roy Substation. Since the time of this initial discovery in 2004, no follow-up surveys have been conducted to confirm whether a breeding population continues to use this area. In addition, a development project completed since then possibly has altered or destroyed this feature.

Tucker Pond is located approximately 0.95 mile northeast of pole 6/71. Because of the distance to this feature and potential barriers (e.g., development and unsuitable habitat), migrating salamanders from this pond would be unlikely to aestivate along Alternative 4A. Because several breeding ponds exist on both sides of Alternative 4A, a large portion of the line spanning from approximately pole 4/58 to pole 6/77 could be considered suitable habitat where vegetation types are suitable. This species has a high potential to occur along this alternative.

Alternative 4B – Valencia Alternative

One known breeding pond, Merk Pond exists along Alternative 4B, approximately 0.5 mile south of pole 3/47 of the Northern Alignment near the intersection of Merk Road and Corralitos Road, as shown in Figure 2: Santa Cruz Long-Toed Salamander Occurrence Map. A breeding population was identified here in 2003, and was last confirmed in 2005. During the 2005 survey, catfish (*Ictalaurus* spp.) were noted to inhabit the pond, which could potentially reduce or eliminate future breeding. Although Santa Cruz long-toed salamanders can travel up to 1 mile to reach suitable upland aestivation habitat, much of the surrounding area between Merk Pond and Alternative 4B is either developed for agriculture or residences, or is overgrown with Eucalyptus trees; thus, it is not considered suitable upland aestivation habitat.

As shown in Figure 2: Santa Cruz Long-Toed Salamander Occurrence Map, an additional unnamed potential breeding pond is located approximately 0.17 mile northeast of pole 4/54. No known surveys of this pond have been conducted; however, based on aerial photographs, it appears to be suitable breeding habitat. Surveys would be needed to confirm whether this pond supports breeding of Santa Cruz long-toed salamanders.

Tucker Pond is located approximately 0.91 mile south of pole 5/64. The distance and significant migratory barriers—specifically Freedom Boulevard, Day Valley Road, and residential development along both of these major roads between the line and this pond—make it unlikely that individuals from this pond would be able to utilize the project area as upland habitat.

Similar to Alternative 4A, Alternative 4B terminates at Rob Roy Substation; therefore, upland areas surrounding the substation may be considered upland habitat for individuals utilizing Palmer Pond.

Alternative 4C – West Cox Road Alternative

The potential for Santa Cruz long-toed salamander to occur along Alternative 4C is equivalent to the analysis described for Alternative 4B.

Alternative 4E – White Road Alternative

Several known breeding ponds, shown in Figure 2: Santa Cruz Long-Toed Salamander Occurrence Map, exist within 1 mile of Alternative 4E, including the following:

- Merk Pond
- Millsap Pond
- Tucker Pond
- Calabasas Pond
- Suess Pond
- Racehorse Lane Pond
- Palmer Pond

In addition, one potential breeding pond is located approximately 0.17 mile northeast of pole 4/54 of the Northern Alignment. No surveys of this pond are known to have been conducted; however, based on aerial surveys, it appears to be suitable habitat. Surveys would be needed to confirm whether this pond supports the breeding of Santa Cruz long-toed salamanders.

Because this alternative shares portions of its alignment with other alternatives, the potential for Santa Cruz long-toed salamanders to occur as the line crosses near these known ponds is consistent with the potential described for the other alignments. Specifically, the potential for Santa Cruz long-toed salamander to occur near Merk Pond and at the potential breeding pond is consistent with that of Alternative 4B. In addition, the potential for this species to occur near Racehorse Lane Pond and Palmer Pond is consistent with that described in Alternative 4A.

The Millsap Pond is located approximately 0.3 mile east of the Alternative 4E crossover line near White Road. In addition, several occurrences of adults have been recorded near White Road along the crossover line. This pond was last confirmed to support breeding individuals in 2008.

Tucker Pond is located approximately 0.66 mile west of the crossover line. Because a continuous tract of upland habitats exist between Tucker Pond and the crossover line, a high potential exists for this species to occur in the project area.

Calabasas Pond and Suess Pond are located approximately 0.58 and 0.65 mile southeast of the tie-in between the crossover line and the Southern Alignment, respectively. These ponds are known to contain substantial breeding populations of Santa Cruz long-toed salamanders. Because of their proximity to this alternative and the suitable upland habitat and hydrologic corridors between these ponds and the proposed line, aestivating salamanders have a high potential to be present.

4.0.3 Foothill Yellow-Legged Frog

Foothill yellow-legged frog (*Rana boylii*) is a California Species of Special Concern that occurs in cool, perennial streams with rocky substrates in redwood forest, oak woodland, or chaparral habitats. Because this species is well-adapted for stream life, they do not occur in ponds, wetlands, or other non-moving bodies of water. Unlike other *Rana* spp., foothill yellow-legged frogs rarely occur far from these moving bodies of water and have a limited seasonal migration, which is often less than 50 feet. As a result, they typically are not found in seasonal streams,

even when water is present. Because of this need for perennial streams, suitable habitat for this species is not present along Alternative 4E – White Road Alternative because suitable perennial water features are absent along this alternative. Corralitos Creek, a major waterbody crossed by Alternative 4E, was noted to be a seasonal feature at the point of the Northern Alignment crossing. As a result, this feature and it seasonal tributaries do not represent suitable habitat.

Alternative 4A – Southern Alignment Alternative

Suitable habitat for foothill yellow-legged frog exists along Corralitos Creek, which is crossed by the Southern Alignment near pole 2/24. While Corralitos Creek appears to be a seasonal feature along the Northern Alignment, flowing water was present along the Southern Alignment. Although no records of foothill yellow-legged frogs were identified within this creek, suitable flowing water, rocky substrate, and sunny banks were present. Because of this, a moderate potential exists for this species to occur along Alternative 4A.

Alternative 4B – Valencia Alternative

Suitable habitat for foothill yellow-legged frog exists along Valencia Creek—which is crossed by the Northern Alignment near pole 6/74 and by the Southern Alignment near pole 6/80—and along an unnamed spring-fed creek along Cox Road near pole 6/73 of the Northern Alignment. Although no records of foothill yellow-legged frogs were identified in these two creeks, occurrences have been recorded in nearby Aptos and Soquel creeks, which exhibit similar habitat conditions. Because of this, a moderate potential exists for this species to occur along Alternative 4B.

Alternative 4C – West Cox Road Alternative

Suitable habitat for foothill yellow-legged frog exists along an unnamed spring-fed creek along Cox Road near pole 6/72 of the Northern Alignment. Because this alternative does not cross the spring-fed creek, foothill yellow-legged frogs would be unlikely to occur in the project area. However, because the final alignment of this alternative has not yet been identified, there is a potential for this species to occur if the crossover line is located near the bank of the creek.

4.0.4 California Red-Legged Frog

California red-legged frog (*Rana draytonii*) is federally listed as threatened and is a California Species of Special Concern. This frog can inhabit perennial and seasonal ponds, marshes, bogs, reservoirs, and slow-moving streams that occur in a wide range of habitat types, from grassland to forested areas. Though less desirable habitat, California red-legged frogs can sometimes occur in agricultural or roadside drainage ditches as well. Unlike the Santa Cruz long-toed salamander, which prefers ponds that dry each year, the California red-legged frog prefers perennial ponds that are deeper than 1 foot to help keep temperatures lower and oxygen levels higher during the dry season. Although California red-legged frogs are often closely associated with these aquatic habitats, juveniles and adults are known to travel up to 1 mile in search of new resident ponds following metamorphosis in the spring. This dispersal typically occurs through riparian corridors or other moist areas. Relatively few CNDDB occurrences of California red-legged frog exist in the project area; the only two records noted within 1 mile are from approximately 0.8 mile south of the Southern Alignment on the opposite side of Highway 1, and approximately 0.6 mile east of Alternative 4E at Millsap Pond. This species has also been reported to occur at Calabasas

Pond, though information regarding this occurrence is limited. In addition, because of the rural nature of the area, stock ponds are relatively common and are often suitable habitat for this species. Predatory bullfrogs and fish can have a detrimental effect on California red-legged frog populations in breeding ponds.

Alternative 4A – Southern Alignment Alternative

Suitable habitat is located in stock ponds near poles 1/17, 2/24, and 3/52 of the Southern Alignment. All three of these ponds lie within 500 feet of the existing transmission line. As a result, juveniles or adults dispersing or seeking upland or aquatic habitat could be present near these poles. In particular, a large number of seeps, which supply the water to the pond near pole 3/52, are located beneath the alignment, increasing the suitability of this upland habitat. Agricultural drainage ditches and seasonal drainages were noted near poles 2/23, 2/30, 3/42, and 4/58. These represent marginal habitat, as they likely would not have supported California red-legged frogs at the time of the field surveys due to low water levels.

As previously stated, the nearest CNDDB record of this species was documented approximately 0.8 mile from this alignment on the opposite side of Highway 1. A small number of individuals have been reported at the Calabasas Pond, which is located south of pole 5/64, but never in substantial numbers, which is potentially because of the seasonality of this pond. Individuals from this pond were also confirmed to carry the fungal infection *Batrachochytrium dendrobatidis*, which can be detrimental to populations of this species and to other amphibians. Because of the presence of marginal and suitable habitat, but a lack of known records or substation breeding ponds in the nearby vicinity, a moderate potential exists for this species to occur along Alternative 4A.

Alternative 4B – Valencia Alternative

Marginal to suitable habitat for this species is located at a series of three small stock ponds located adjacent to pole 1/29. Because two of these ponds appeared during field surveys to be fairly shallow with a lack of emergent vegetation needed by juveniles at the height of the dry season, their ability to support the species would be reduced. Because a third pond located outside the survey area, but in close proximity, might retain deeper water through the year, the two closer marginal ponds might be colonized during the winter or spring when more water was present. Additional seasonal drainages that may provide seasonal habitat are located between poles 1/27 and 2/31, between poles 2/41A and 2/42, and between poles 4/55 and 4/56. No records of California red-legged frogs have been documented within 2.75 miles of these ponds, and a limited potential exists for this pond to support active breeding populations. Three additional stock ponds are located between 650 and 1,000 feet from poles 1/24, 1/25, 1/27, and 4/54, although these ponds were not reviewed during field surveys because they were outside of the survey area. Because suitable habitat for this species exists in the area, but a lack of known occurrences is available, a moderate potential exists for this species to occur along Alternative 4B.

Alternative 4C – West Cox Road Alternative

The potential for California red-legged frogs to occur along Alternative 4C is consistent with that described in Alternative 4B. As a result, a moderate potential exists for this species to occur along this alternative.

Alternative 4E – White Road Alternative

The potential for California red-legged frogs to occur along Alternative 4E is consistent with that described in Alternative 4B, with the exception of one additional pond—Millsap Pond—located 0.6 mile east of the Alternative 4E crossover line. Millsap Pond is located on a parcel that is managed by the CDFW for Santa Cruz long-toed salamanders. Occurrences of California red-legged frogs have been recorded at this pond as recently as 2005. A moderate potential exists for this species to occur along Alternative 4E.

4.0.5 Western Pond Turtle

Western pond turtle (*Actinemys marmorata*) is a California Species of Special Concern and occurs in small to large permanent bodies of water, including marshes, streams, rivers, ponds, and lakes. The turtle favors habitats with large amounts of emergent logs or boulders where it can congregate to bask, but it also basks on top of aquatic vegetation or position itself just below the water surface where temperatures are elevated. Nesting takes places in surrounding upland habitat, typically oak or riparian woodlands. Most nests are within 300 feet of water, but female western pond turtles may travel as far as 0.5 mile from water for egg-laying. Because suitable habitat for this species is not present along Alternatives 4B, 4C, and 4E, a limited potential exists to support the species.

Alternative 4A – Southern Alignment Alternative

Suitable aquatic and upland habitat is present along the Southern Alignment between poles 0/6 and 0/7 where the line crosses Pinto Lake. Western pond turtles are known to inhabit Pinto Lake and could potentially utilize upland habitat beneath the line on either side of the lake for nesting habitat. As a result, a moderate potential exists for this species to occur along Alternative 4A.

4.0.6 Black Legless Lizard

Black legless lizard (*Anniella pulchra nigra*) is a melanistic variation of the California legless lizard found along Monterey Bay. Although recent research indicates that this species is not genetically distinct from the California legless lizard, it is still listed as a California Species of Special Concern by the CDFW. Locally, black legless lizards typically occur along the coast, in coastal dune scrub and inland areas with sandy substrate, or in thick detritus in coastal scrub, coastal oak woodland, mixed chaparral, and other woodland habitat. This species is heavily reliant on suitable substrates because it must be able to burrow below the surface. Because this species occurs in a variety of habitats where substrates are suitable, it has a moderate potential to occur throughout all project alternatives. Suitable substrates might exist within coastal scrub, mixed chaparral, coastal oak woodland, or closed-cone pine cypress woodlands.

4.0.7 Pallid Bat

Pallid bat (*Antrozous pallidus*) is a California Species of Special Concern, and although this species can occur throughout a large portion of California, populations within the Monterey Bay area typically forage along riparian systems in oak woodland or redwood forest habitat. This species typically forages from dusk until dawn, preying primarily on ground insects. Roosting habitat typically includes rock crevices, caves, hollow trees, and anthropomorphic features, such as old buildings, barns, and bridges. Because suitable habitat for this species is scattered

throughout the project area, a moderate potential exists for this species to occur along all project alternatives where suitable roosting habitat is present.

4.1 SPECIAL-STATUS PLANT SPECIES

4.1.0 Anderson's Manzanita

Anderson's manzanita is a list 1B.2 species that is found in the Santa Cruz Mountains from southeast Santa Cruz County and southern Santa Clara County to southern San Mateo County. This species typically occurs in openings in Douglas fir, coast live oak, and coast redwood forests, often along road cuts. It can be distinguished from other local species of manzanita by the lack of a basal burl. It typically is found below 3,000 feet in elevation and blooms from February to May. Records for this species have been recorded north and east of the project area, in the nearby foothills. Because upland redwood forest and/or coastal oak woodlands—both suitable habitats—occur along every project alternative, a moderate potential exists for this species to occur along each alternative.

4.1.1 Hooker's Manzanita

Hooker's manzanita is a list 1B.2 species that inhabits marine sandy soil deposits in closed-cone coniferous forest, maritime chaparral, coastal oak woodland, and coastal scrub from Monterey County to southern Santa Cruz County. This species blooms from January to June and requires wildfires for seeds to germinate. Although most extant populations of this species are located in Monterey County, small populations of the species persist in Santa Cruz County in undisturbed maritime chaparral habitat. Specifically, sightings have been recorded approximately 0.4 mile southwest of the Southern Alignment along Alternative 4A parallel to the line between poles 3/42 and 5/61. Sightings have also been recorded between the Northern and Southern Alignments east of the Alternative 4E crossover line. Because similar suitable habitat is present throughout the project area in mixed chaparral, coastal oak woodland, and coastal scrub habitats, a moderate potential exists for this species to occur in suitable habitat along all project alternatives.

4.1.2 Congdon's Tarplant

Congdon's tarplant, a list 1B.2 species, is a short spikeweed found in valley and foothill grassland habitats. This species often occurs along the peripherals of seasonal swales or vernal pools, along road shoulders, and other more mesic sites. This species blooms from May through October, sometimes extending into November, producing flowers containing both ray and disk arrangements. Only one occurrence of this species has been recorded in Santa Cruz County. This occurrence was recorded in 1909, and the species is believed to have been extirpated because surveys of the same area in 1994 and 1998 failed to identify it. As a result, this species has a low potential to occur along the project alternatives, with the exception of Alternatives 4A and 4E, which are further discussed.

Alternative 4A – Southern Alignment Alternative

Suitable habitat is scattered throughout this alternative, particularly in annual grassland habitats where hydrology is favorable. Potential individuals were identified along Racehorse Lane between poles 6/70 and 6/71 of the Southern Alignment, although they could not be confirmed

because the species is similar to the common spikeweed (*Hemizonia pungens*). Rare plant surveys would be necessary before the start of the project to confirm the presence of this species.

Alternative 4E – White Road Alternative

Potential individuals were identified along Racehorse Lane between poles 6/70 and 6/71 of the Southern Alignment, although they could not be confirmed because the species is similar to the common spikeweed. Rare plant surveys would be necessary before the start of the project to confirm the presence of this species.

4.1.3 Monterey Spineflower

Monterey spineflower, a federally threatened and list 1B.2 species, is a short annual plant in the buckwheat family, blooming from April to June. It inhabits openings in maritime chaparral, grassland, and coastal scrub growing in marine sandy soil deposits, coastal dunes, and interior stabilized dune deposits. These specific sediment types form unique communities where many species do not persist as a result of low moisture, low nutrients, and high instability. These specific soil formations, along with records of the species, have been identified in several locations in the project area.

Alternative 4A – Southern Alignment Alternative

No records of this species have been specifically recorded along this alternative; however, suitable soil type and vegetation communities have been identified between poles 6/72 and 6/73, as shown in Figure 3: Monterey and Robust Spineflower Occurrence Map. Because of this, a moderate potential exists for this species to occur along Alternative 4A.

Alternative 4B – Valencia Alternative

Suitable sediment types and vegetation communities were identified between poles 6/70 and 6/72 of the Northern Alignment, and between poles 6/83 and 6/86 and near pole 6/76 of the Southern Alignment. Occurrences of the Monterey spineflower have been recorded along Cox Road, at locations crossed by the Northern Alignment near poles 6/72 and 6/73, as shown in Figure 3: Monterey and Robust Spineflower Occurrence Map. Because of this, a high potential exists for this species to occur along Alternative 4B.

Alternative 4C – West Cox Road Alternative

Suitable sediment types occur between poles 6/70 and 6/72 of the Northern Alignment and along the Alternative 4C crossover line near Valencia Road. Occurrences of the Monterey spineflower have been recorded along Cox Road, at locations crossed by the Northern Alignment near poles 6/71 and 6/72. Because of these records and the presence of suitable habitat, a high potential exists for this species to occur along Alternative 4C.

Alternative 4E – White Road Alternative

The potential for Monterey spineflower to occur along Alternative 4E is consistent with that described in Alternative 4A. A moderate potential exists for this species to occur along Alternative 4B.

Figure 3: Monterey and Robust Spineflower Occurrence Map

Santa Cruz Reinforcement Project

Existing Substation
Existing Pole
New Alignment
Northern Alignment
Southern Alignment
Potential Spineflower Habitat

This information is based on locations of known Zayante soil formations and observations from the field survey

USFWS-Designated Critical Habitat
Monterey Spineflower
Robust Spineflower

CNDDB Occurrence
Monterey Spineflower
Robust Spineflower

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INSIGNIA ENVIRONMENTAL

1:19,000

0 0.25 0.5 1 Miles

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4.1.4 Robust Spineflower

Robust spineflower, a federally endangered and list 1B.1 species, is a short annual species in the buckwheat family, blooming from April to June. Similar to the Monterey spineflower, the robust spineflower inhabits openings in maritime chaparral, grassland, and coastal scrub growing in marine sandy soil deposits, coastal dunes, and interior stabilized dune deposits. These specific sediment types form unique communities where many species do not persist as a result of low moisture, low nutrients, and high instability. These specific soil formations, along with records of the species, have been identified in several locations in the project area.

Alternative 4A – Southern Alignment Alternative

Suitable habitat is present between poles 6/72 and 6/73 of the Southern Alignment, as shown in Figure 3: Monterey and Robust Spineflower Occurrence Map. This area is also designated as the Freedom Critical Habitat Unit. Occurrences of this species—including one of only 10 known populations—have been recorded in this area. Therefore, a high potential exists for this species to occur along Alternative 4A.

Alternative 4B – Valencia Alternative

Suitable habitat for this species occurs between poles 6/70 and 6/72 of the Northern Alignment, and between poles 6/83 and 6/86 and near pole 6/76 of the Southern Alignment, as shown in Figure 3: Monterey and Robust Spineflower Occurrence Map. Sightings of this species have been recorded adjacent to the Southern Alignment near pole 6/83. In addition, the area between poles 6/83 and 6/86 of the Southern Alignment is designated as the Aptos Critical Habitat Unit, and is crossed by the alignment. Because of the presence of known populations and critical habitat, a high potential exists for this species to occur along Alternative 4A.

Alternative 4C – West Cox Road Alternative

No records for this species have been recorded along the alternative; however, suitable habitat is present between poles 6/70 and 6/72 of the Northern Alignment and along the Alternative 4C crossover line near Valencia Road, as shown in Figure 3: Monterey and Robust Spineflower Occurrence Map. Based on the presence of suitable habitat, a moderate potential exists for this species to occur along Alternative 4C.

Alternative 4E – White Road Alternative

The potential for robust spineflower to occur along Alternative 4E is consistent with that described in Alternative 4A; therefore, a high potential exists for this species to occur along Alternative 4E.

4.1.5 Minute Pocket Moss

Minute pocket moss is a list 1B.2 species. It typically occurs on damp soils, rocks, or debris alongside perennial or seasonal streams within woodlands dominated by redwoods, tanoaks, or Douglas firs. Because this species is a bryophyte, it does not have a flowering period, although fruiting bodies are typically present from January to May. Contrary to flowering plants, the fruiting period is dependent on precipitation levels more than temperature or photoperiod. This species has no potential to occur along Alternatives 4A, 4C, or 4E.

Alternative 4B – Valencia Alternative

Suitable habitat for this species exists along Valencia Creek and an unnamed spring-fed creek near Cox Road. No occurrences have been recorded along these waterways; however, they exhibit suitable habitat conditions that are similar to those present at other documented occurrences. A moderate potential exists for this species to occur along Alternative 4B.

4.1.6 Santa Cruz Tarplant

Santa Cruz tarplant is a federally threatened species, a state-listed endangered species, and a list 1B.1 species that is found along Monterey Bay from the City of Santa Cruz to Monterey County. Historically, this species was found in association with coastal prairie habitat, although because of agricultural disturbances and the introduction of non-native grasses, it is now primarily found in annual grasslands. In addition, because propagation of this species is frequently dependent on competition with non-native annual grasses, populations can fluctuate from year to year, based on grazing, mowing, or other activities which limit annual grass development. This species blooms from June to October, producing clusters of yellow flowers.

Alternative 4A – Southern Alignment Alternative

Santa Cruz tarplant occurs in drier grassland areas or in areas of intermixing grassland and coastal scrub. This habitat is present along the Southern Alignment in patches, typically in areas where grazing or other agricultural activities occur. This species is known from a limited number of populations, including two in the project area, located within 0.6 mile of the line south and southeast of pole 2/36. These areas are also designated as critical habitat for the species. Although no individuals were observed during field surveys of the project area, suitable habitat exists in many annual grassland areas, notably between poles 2/34 and 3/58. Because of nearby records and the presence of suitable habitat, a moderate potential exists for this species to occur along Alternative 4A.

Alternative 4B – Valencia Alternative

Potentially suitable annual grassland habitat is present along the Northern Alignment in patches, concentrated between poles 1/23 and 2/37. In addition, one sighting of Santa Cruz tarplant was recorded approximately 0.25 mile west of pole 2/31. Because of the presence of suitable habitat and a nearby occurrence of the species, a moderate potential exists for it to occur along Alternative 4B.

Alternatives 4C – West Cox Road Alternative

Because this species has the potential to occur along the eastern portion of the Northern Alignment and only in annual grassland habitat, the potential for this species to occur is consistent with that described in Alternative 4B; therefore, a moderate potential exists for it to occur along this alternative.

Alternative 4E – White Road Alternative

Because this species has the potential to occur along the eastern portion of the Northern Alignment and only in annual grassland habitat, the potential for this species to occur is consistent with that described in Alternative 4B; therefore, a moderate potential exists for it to occur along this alternative.

4.1.7 Kellogg's Horkelia

Kellogg's horkelia is a list 1B.1 species that occurs in chaparral or coastal scrub habitat with sandy soils or interior stabilized dunes, similar those needed to support Monterey and robust spineflowers. The nearest occurrence of this species was recorded in the Ellicott Slough National Wildlife Refuge, approximately 1.25 miles southwest of pole 3/49 of the Southern Alignment. Kellogg's horkelia typically occurs in the same habitat types as the robust spineflower and the Monterey spineflower; thus, it shares the same areas of suitable habitat. These areas include the following:

- Between poles 6/70 and 6/72 of the Northern Alignment
- Between poles 6/72 and 6/73 of the Southern Alignment
- Between poles 6/83 and 6/86 of the Southern Alignment
- Near pole 6/76 of the Southern Alignment
- Portions of the Alternative 4C crossover lines

Because of the presence of suitable habitat along each alternative, a moderate potential exists for this species to occur along all project alternatives.

4.1.8 Choris Popcorn-Flower

Choris popcorn-flower is a list 1B.2 species. It is a small plant in the borage family. Occurrences of this species have been recorded from San Francisco south to the Watsonville Airport, where the nearest occurrence to the project has been noted. The next nearest occurrence was recorded in Felton, indicating that this species is not known to be locally abundant. This species occurs in coastal prairie or annual grassland habitat that is seasonally inundated during the winter. These areas typically form around vernal pools, low-lying areas, and near drainages. Following the rainy season, the species blooms between March and May, producing small, white flowers.

Alternative 4A – Southern Alignment Alternative

Choris popcorn-flower occurs in mesic grassland areas or in areas of intermixing grassland and coastal scrub. This habitat is present along the Southern Alignment in patches, typically in areas where grazing or other agricultural activities occur. The nearest record of this species is located approximately 0.58 mile southeast of pole 2/35 near the Watsonville Airport. Although no individuals were observed during field surveys of the project area, suitable habitat exists in many annual grassland areas, notably between poles 2/34 and 3/58, which may have seasonally mesic or flooding areas. The presence of nearby records and suitable habitat indicates that a moderate potential exists for this species to occur.

Alternative 4B – Valencia Alternative

Potentially suitable annual grassland habitat is present along the Northern Alignment in patches, concentrated between poles 1/23 and 2/37. These places are likely to contain seasonally mesic grassland areas during the winter. The nearest record of this species is the Watsonville Airport occurrence, located approximately 1.9 miles south of pole 1/25 of the Northern Alignment. The presence of suitable habitat and a nearby occurrence of the species indicate that a moderate potential exists for this species to occur along Alternative 4B.

Alternatives 4C – West Cox Road Alternative

This species has the potential to occur in mesic grassland habitat along the eastern portion of the Northern Alignment only. The potential for this species to occur is consistent with that described in Alternative 4B. As a result, there is a moderate potential for this species to occur along this alternative.

Alternative 4E – White Road Alternative

This species has the potential to occur in mesic grassland habitat along the eastern portion of the Northern Alignment only. The potential for this species to occur is consistent with that described in Alternative 4B. As a result, there is a moderate potential for this species to occur along this alternative.

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ATTACHMENT A: VEGETATION MAPS

Northern Alignment Vegetation Communities Map 1 of 21

Santa Cruz Reinforcement Project

Existing Pole
New Alignment
Northern Alignment
Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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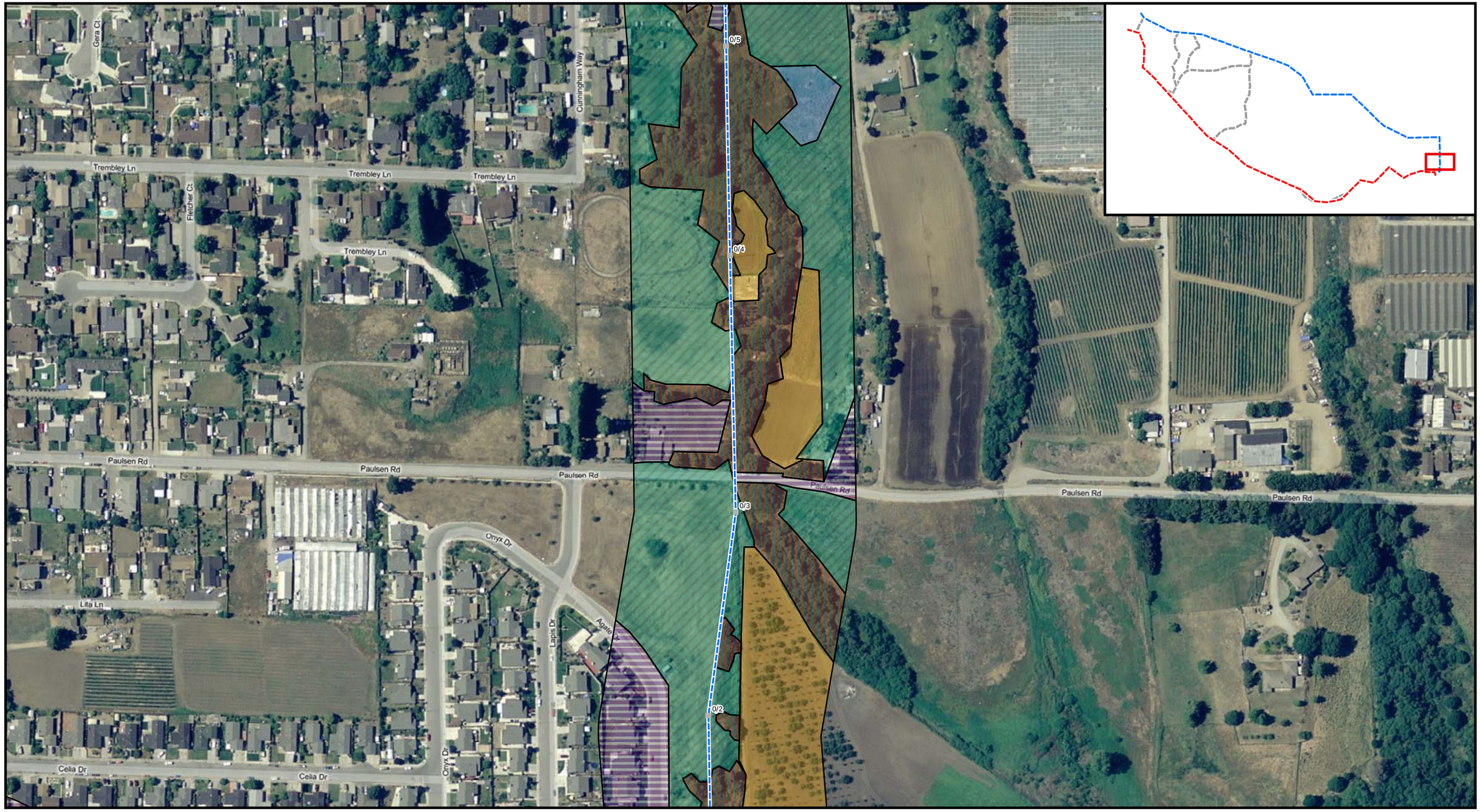

Northern Alignment Vegetation Communities Map 2 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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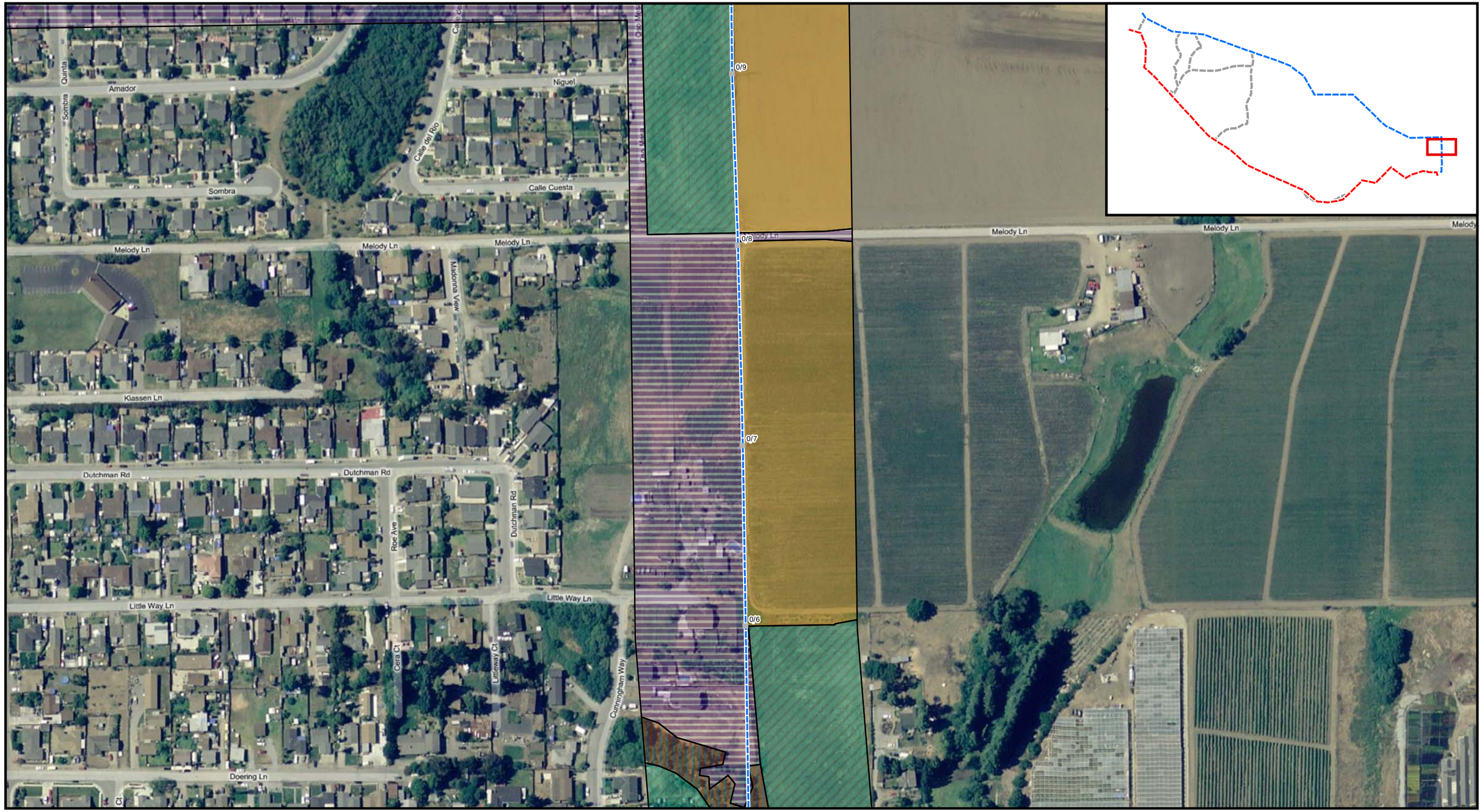

Northern Alignment Vegetation Communities Map 3 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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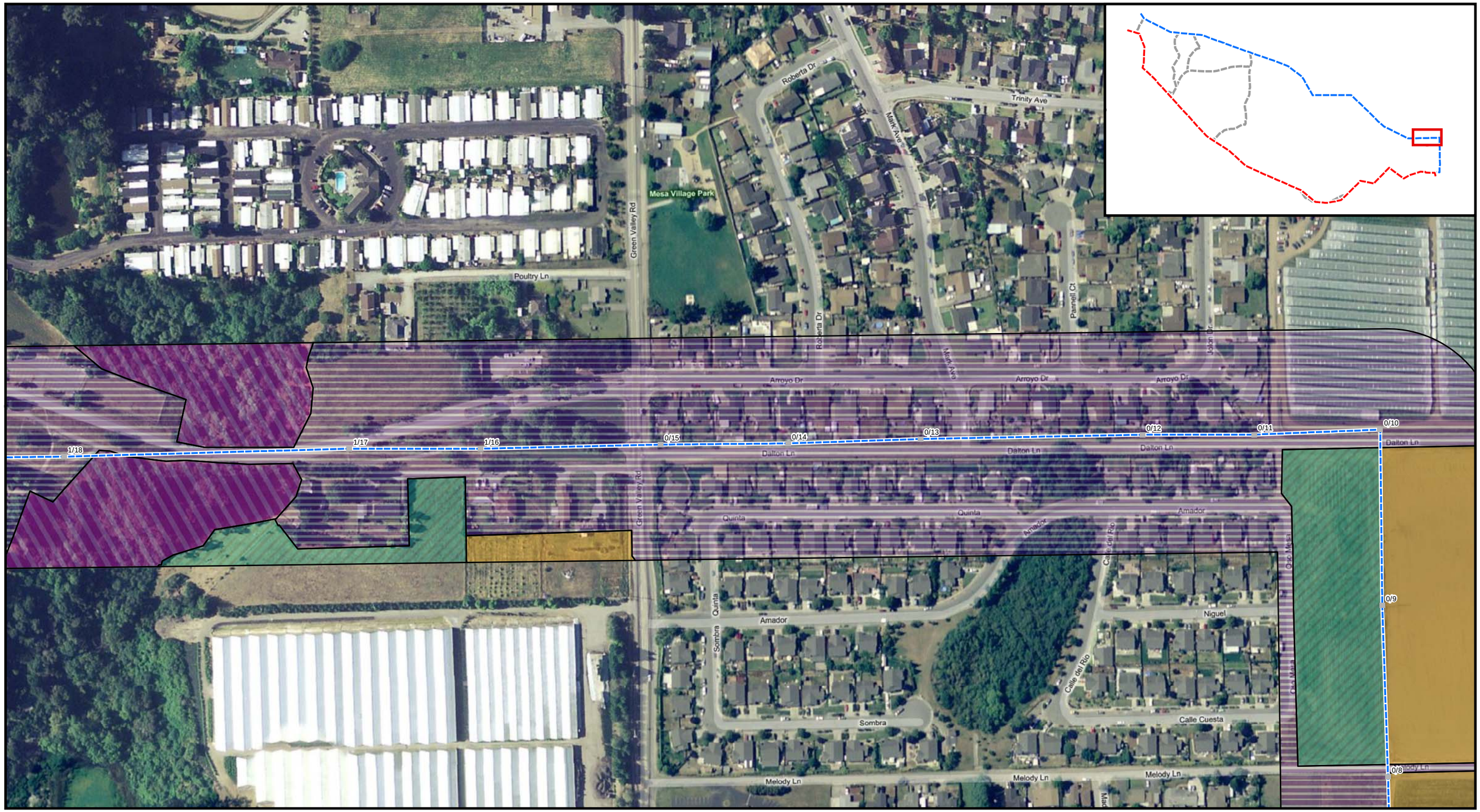

Northern Alignment Vegetation Communities Map 4 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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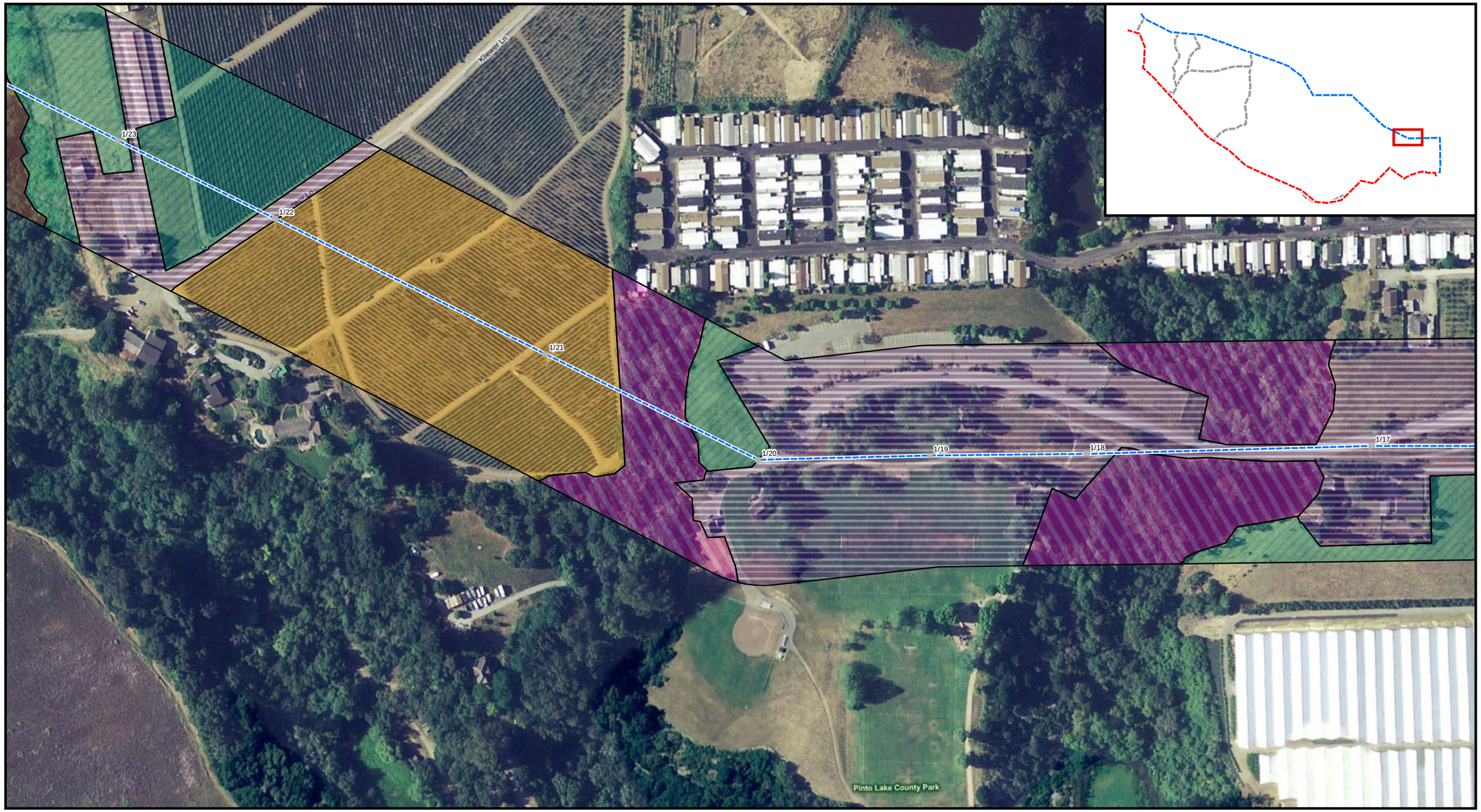

Northern Alignment Vegetation Communities Map 5 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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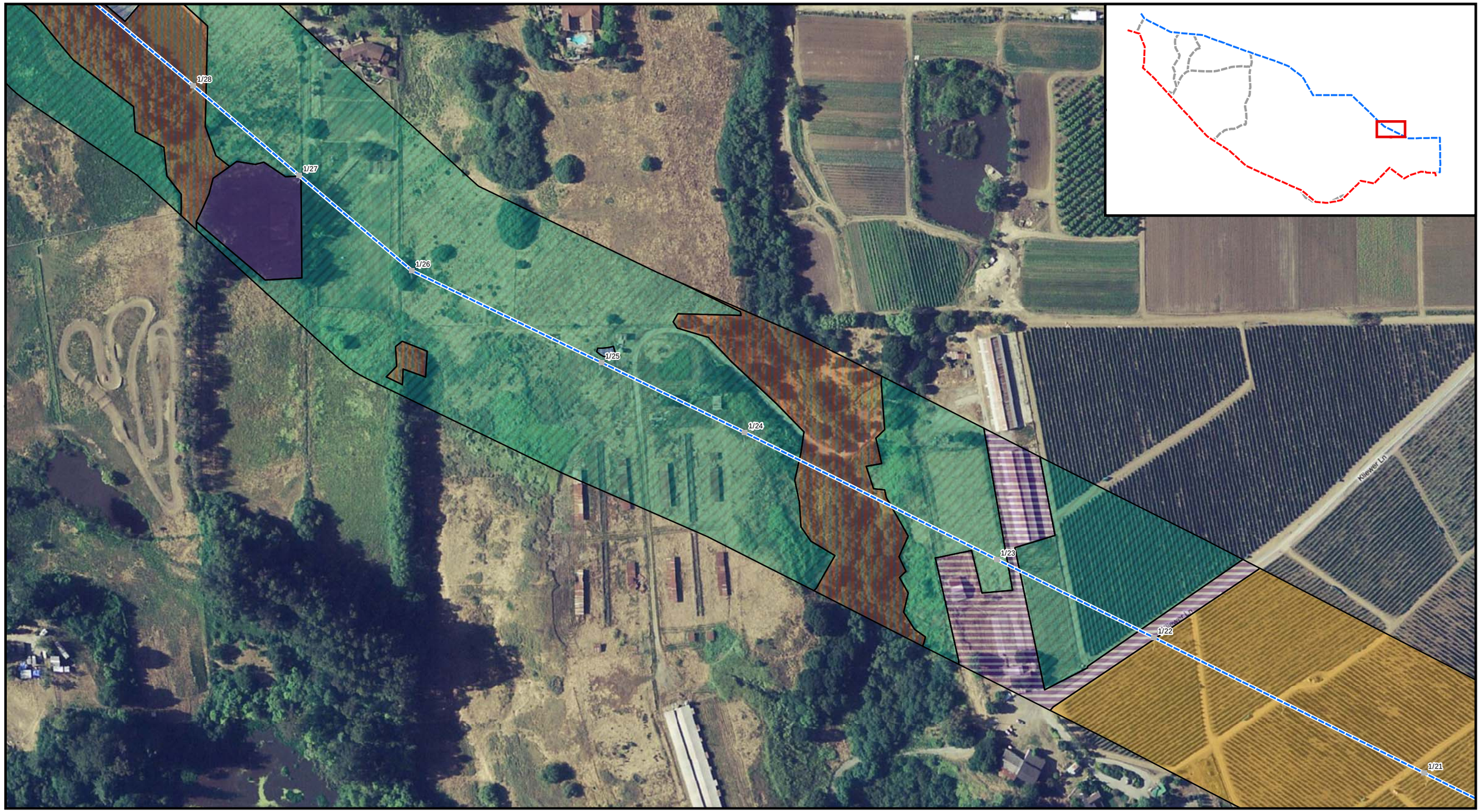

Northern Alignment Vegetation Communities Map 6 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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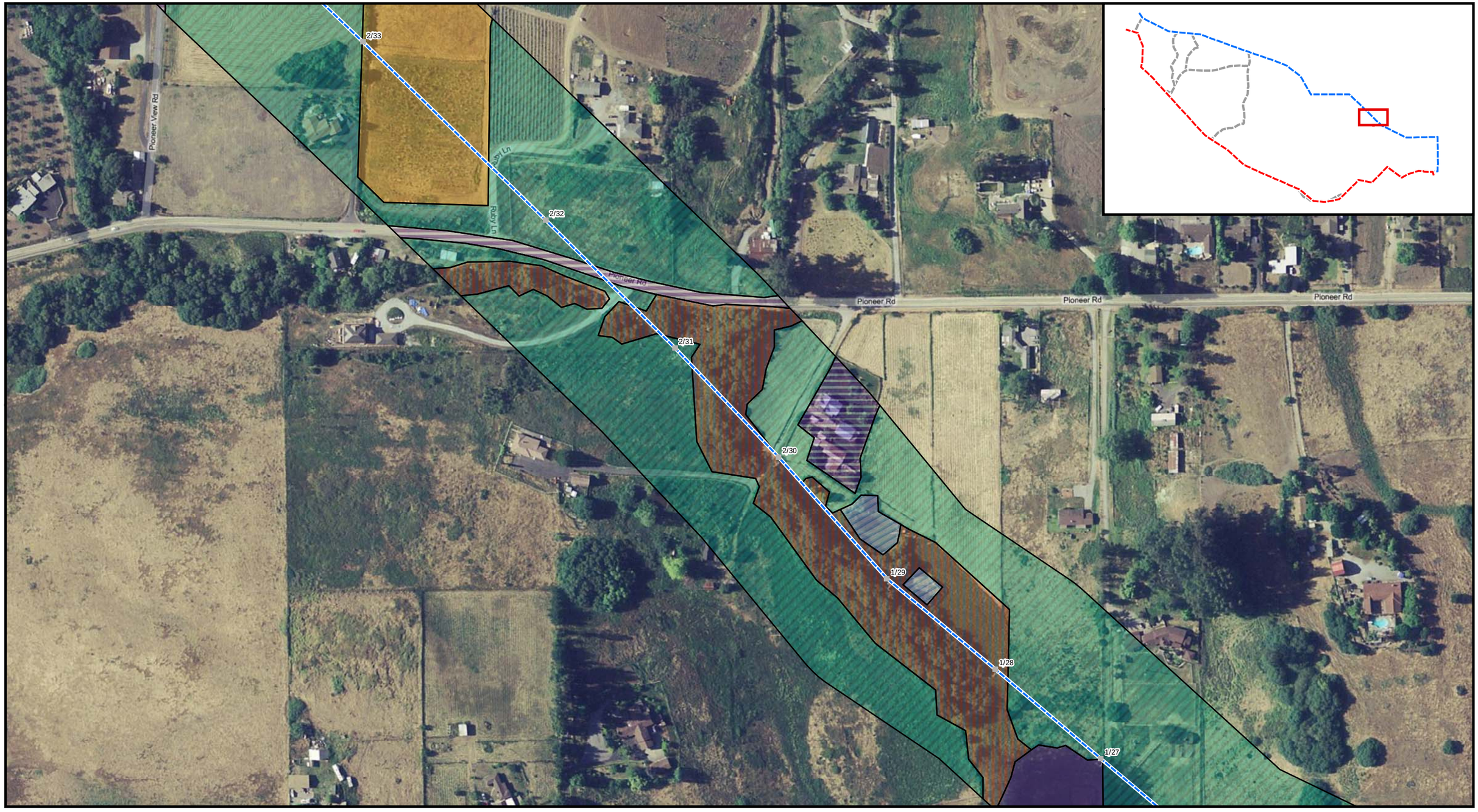
Northern Alignment Vegetation Communities Map 7 of 21

Santa Cruz Reinforcement Project



- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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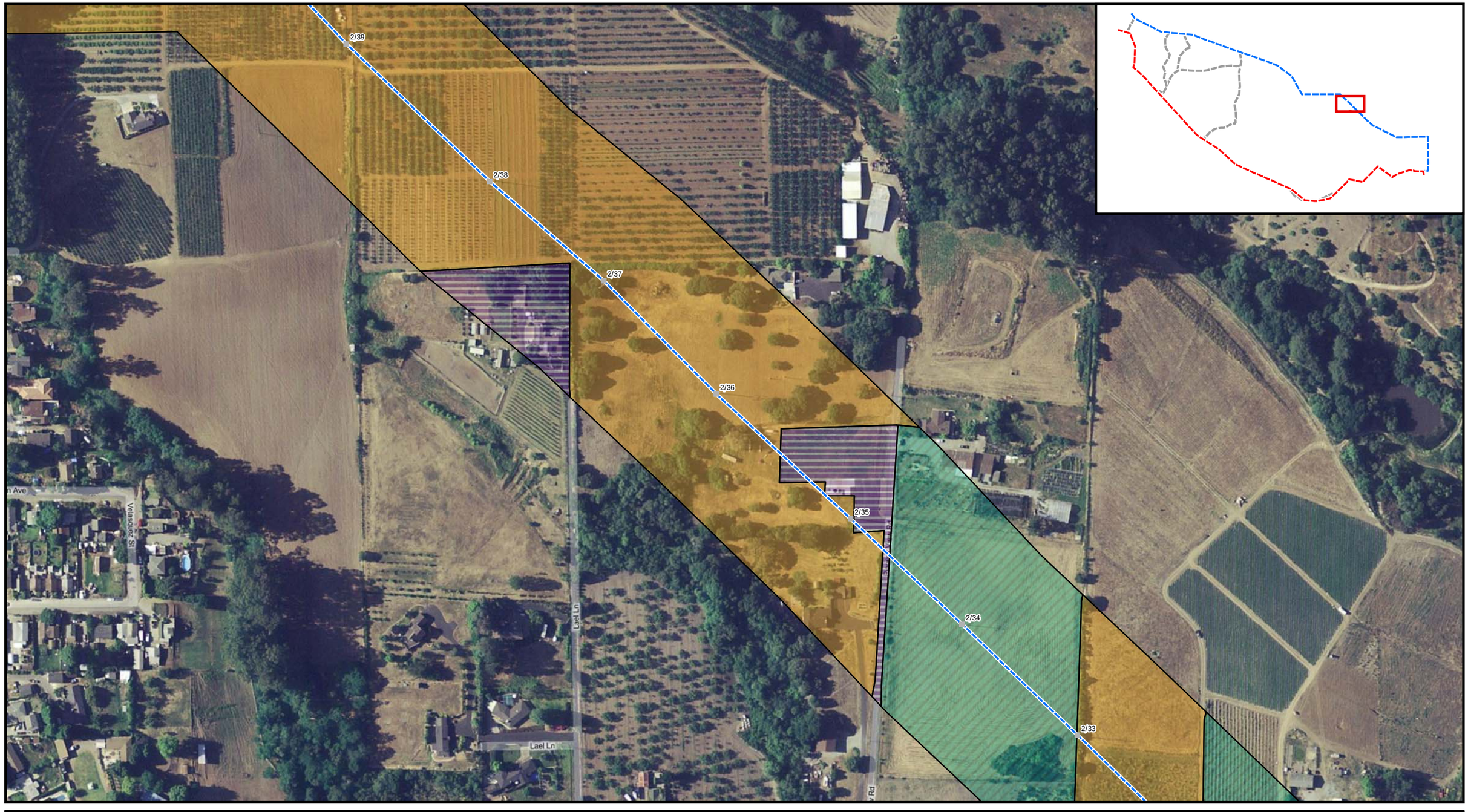

Northern Alignment Vegetation Communities Map 8 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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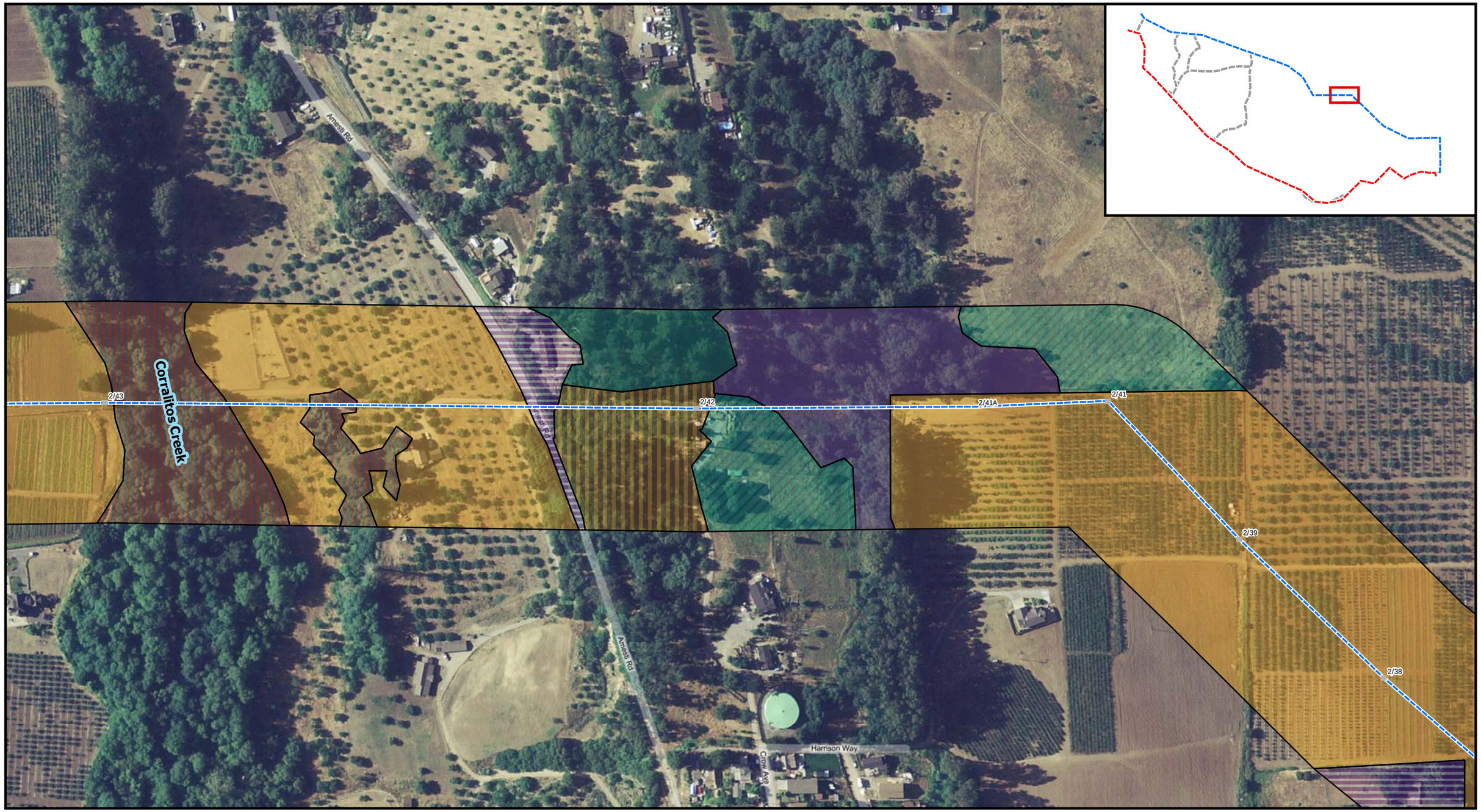

Northern Alignment Vegetation Communities Map 9 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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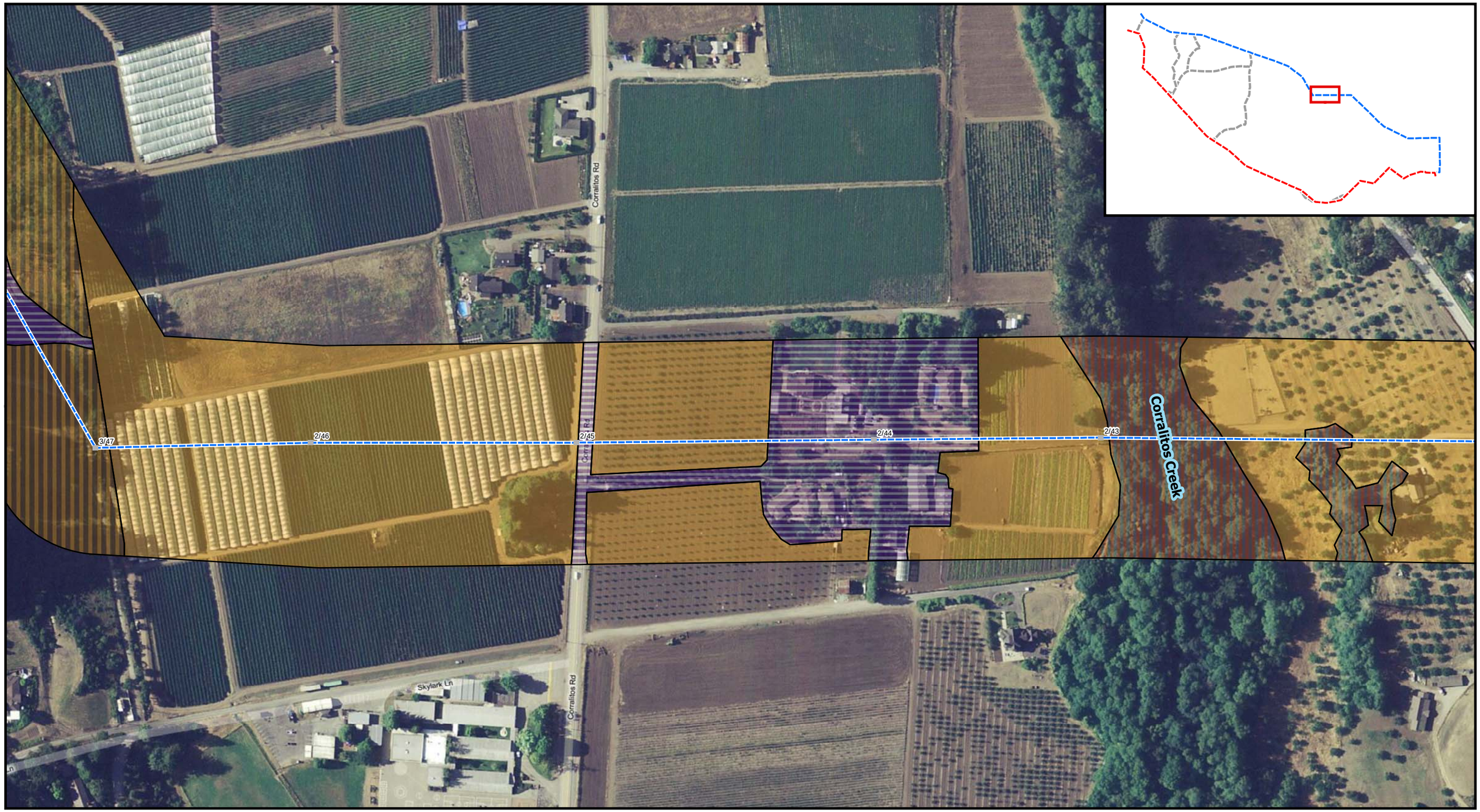

Northern Alignment Vegetation Communities Map 10 of 21

Santa Cruz Reinforcement Project

Existing Pole
New Alignment
Northern Alignment
Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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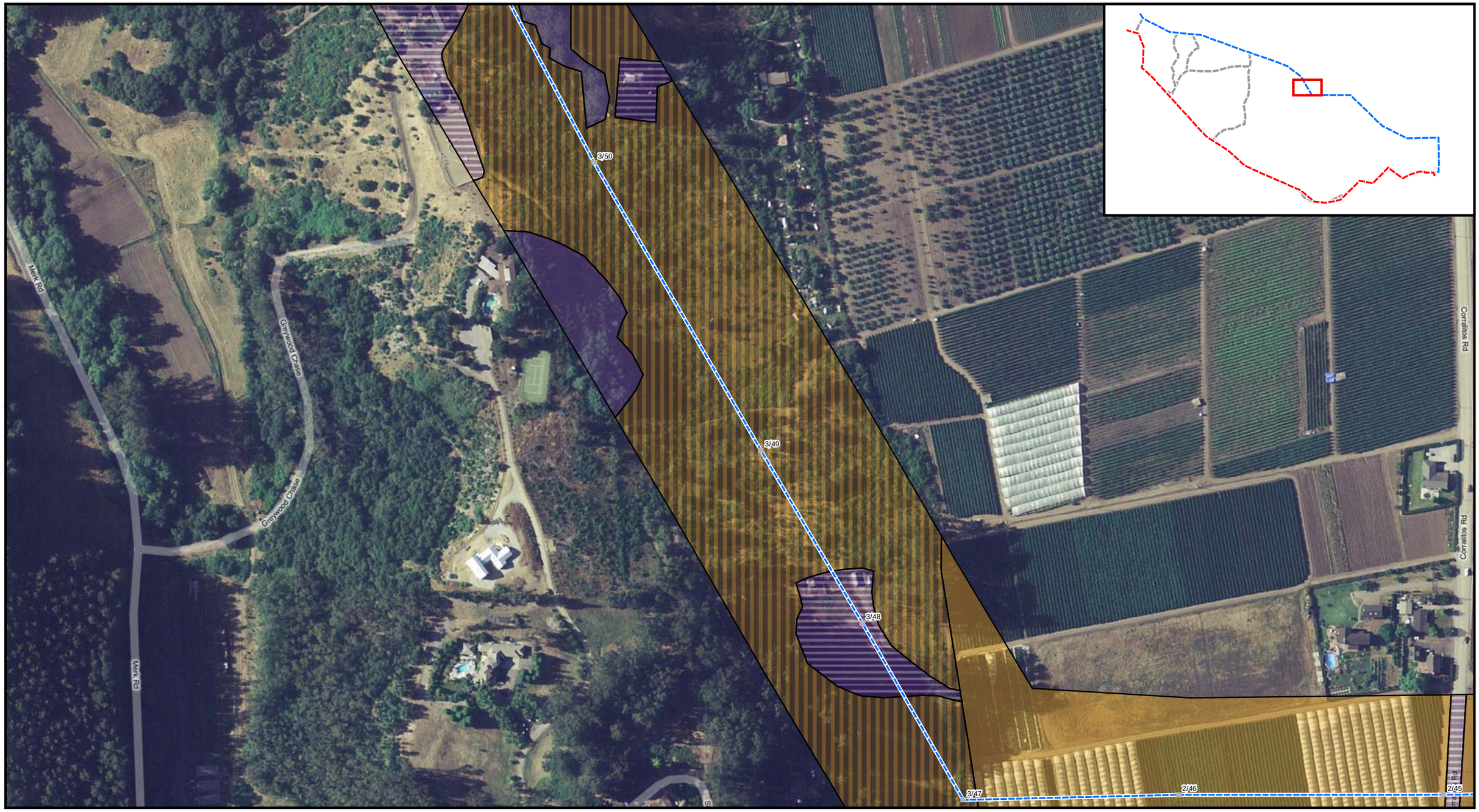

Northern Alignment Vegetation Communities Map 11 of 21

Santa Cruz Reinforcement Project

Existing Pole
New Alignment
Northern Alignment
Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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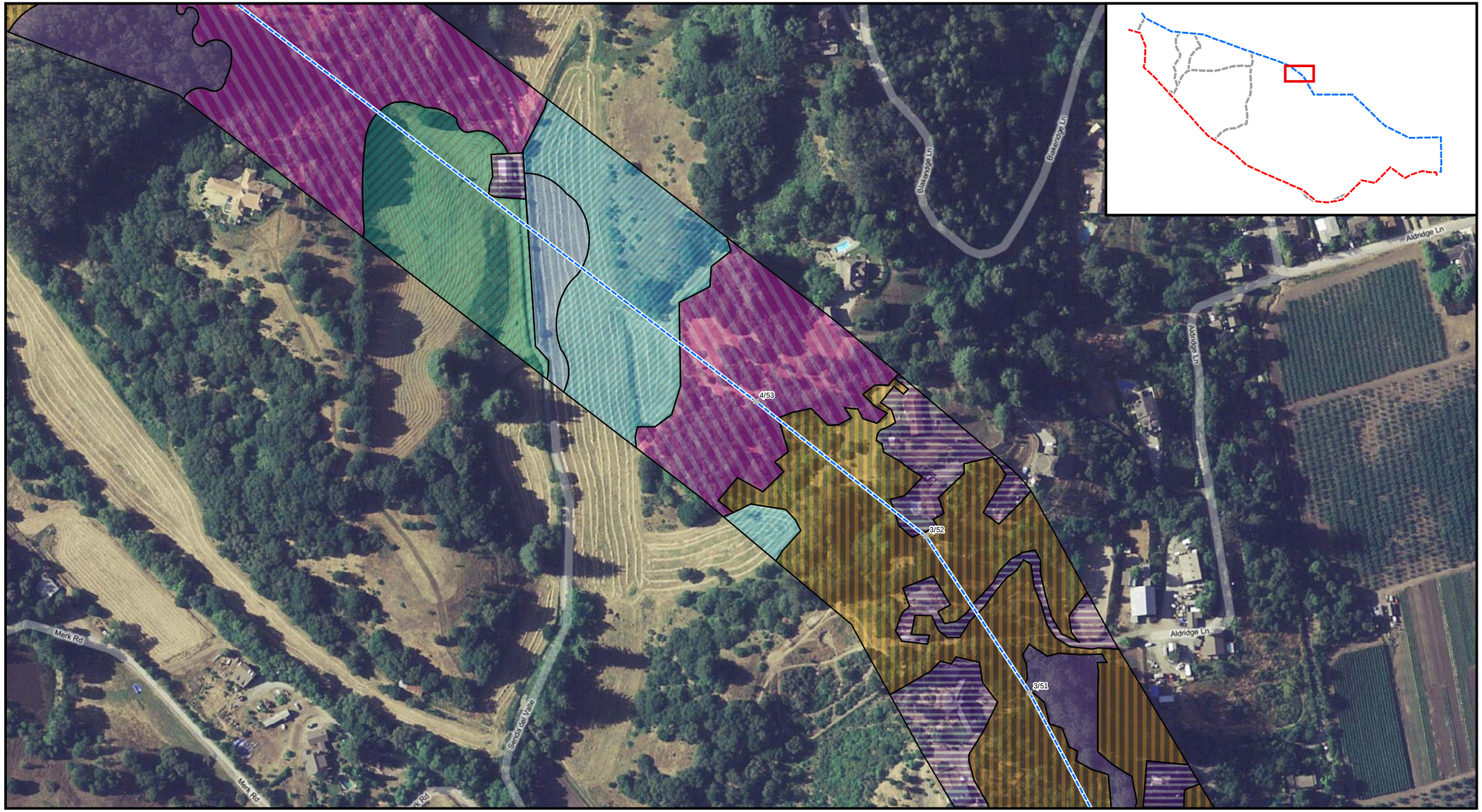
Northern Alignment Vegetation Communities Map 12 of 21

Santa Cruz Reinforcement Project



- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
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- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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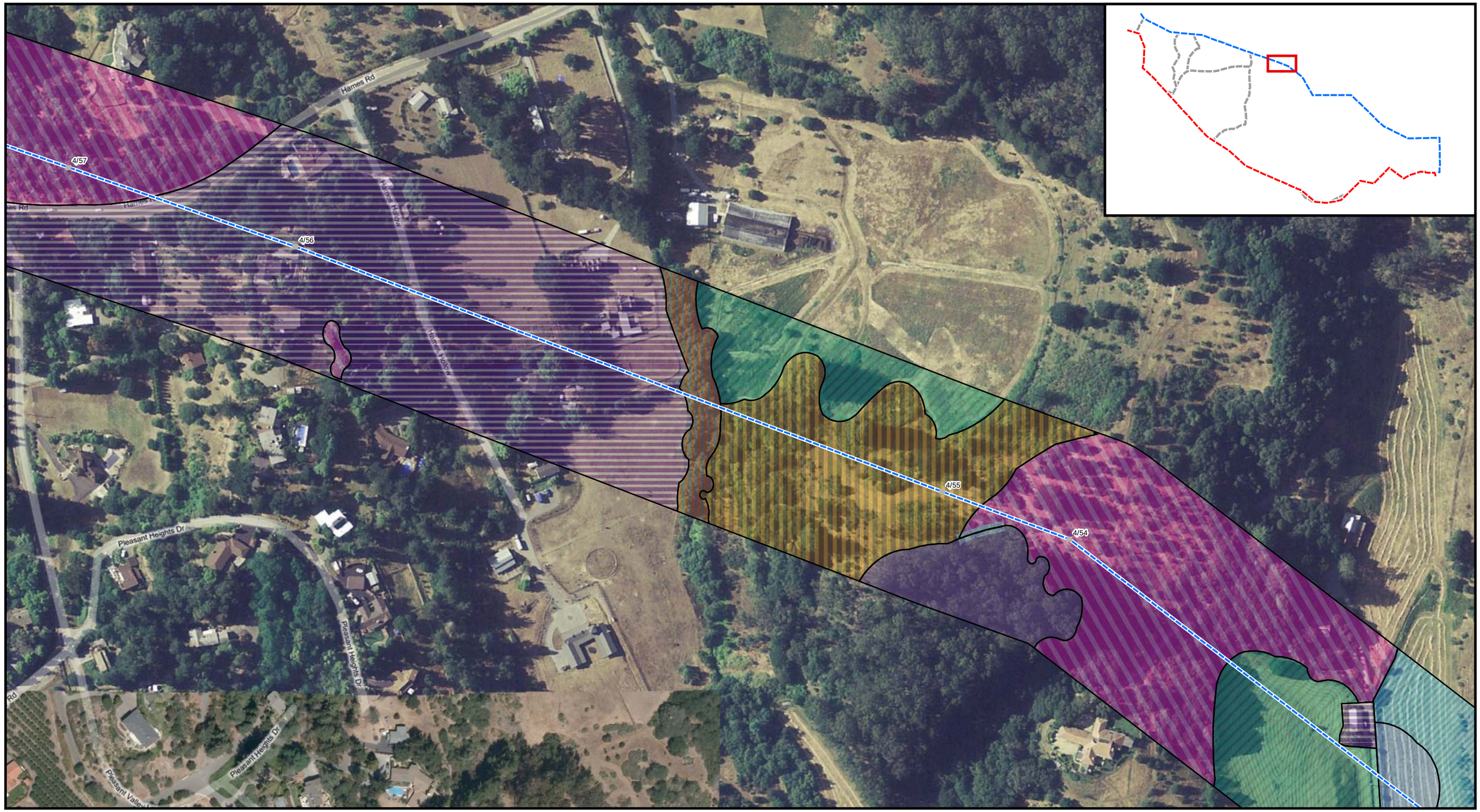

Northern Alignment Vegetation Communities Map 13 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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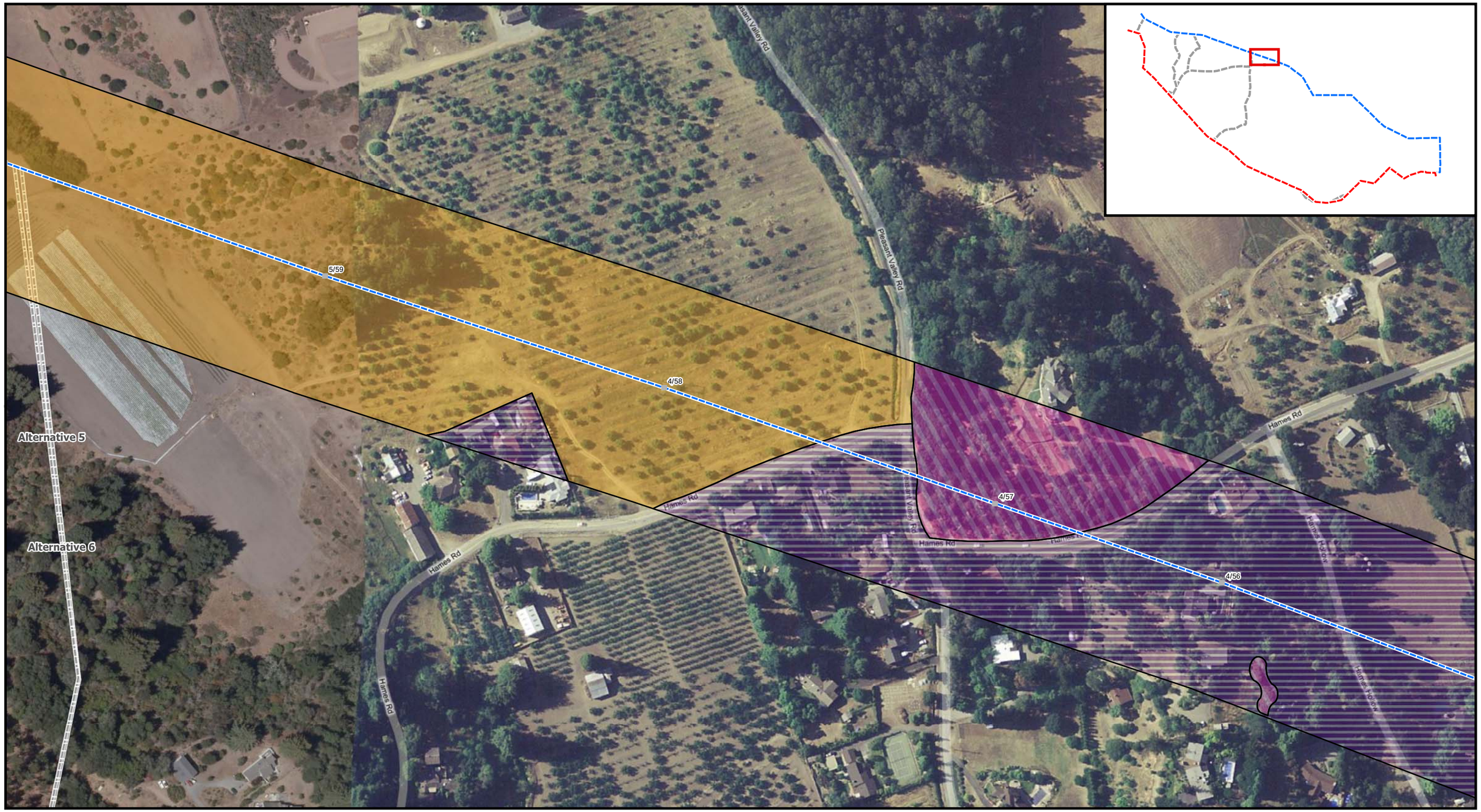

Northern Alignment Vegetation Communities Map 14 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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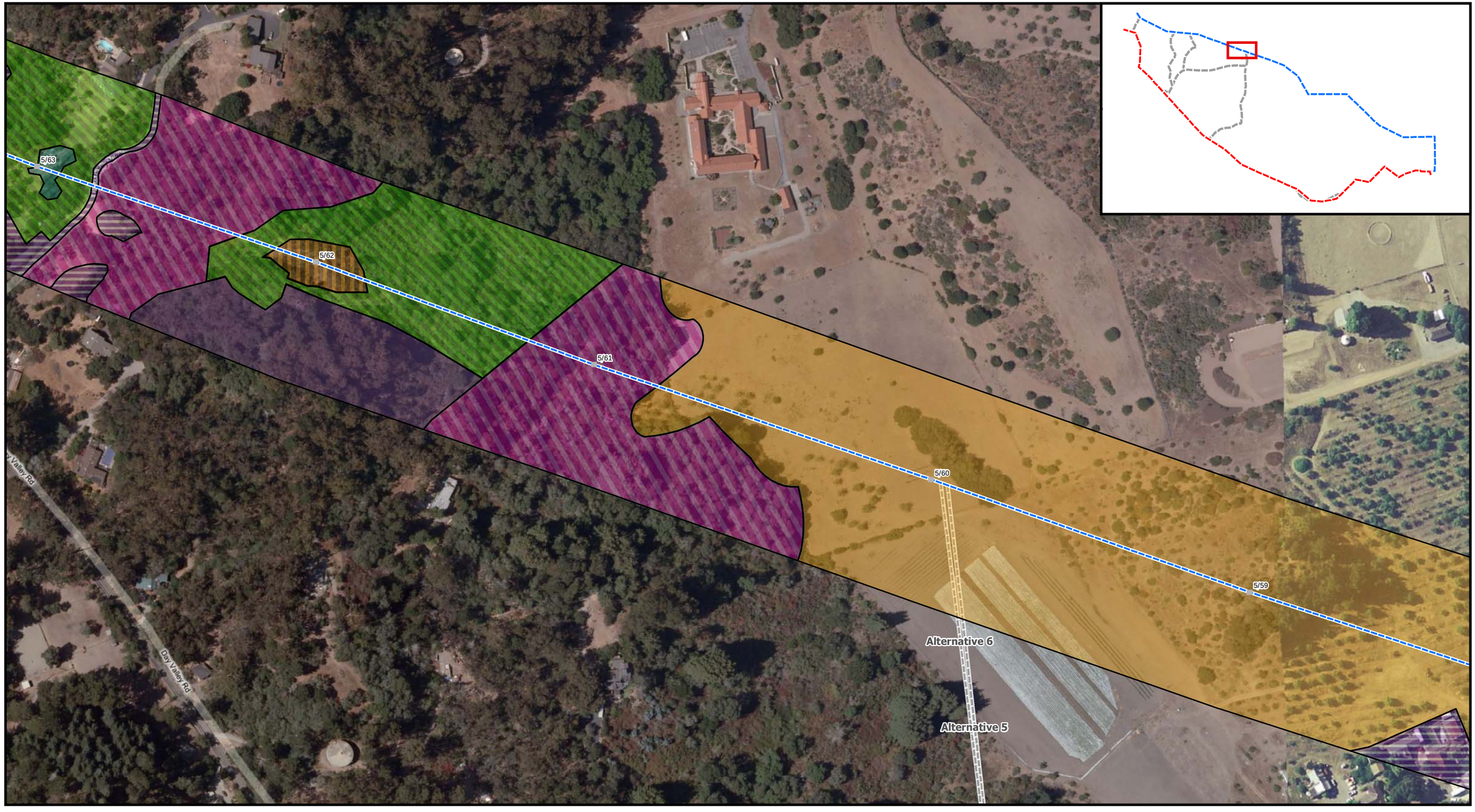

Northern Alignment Vegetation Communities Map 15 of 21

Santa Cruz Reinforcement Project

Existing Pole
New Alignment
Northern Alignment
Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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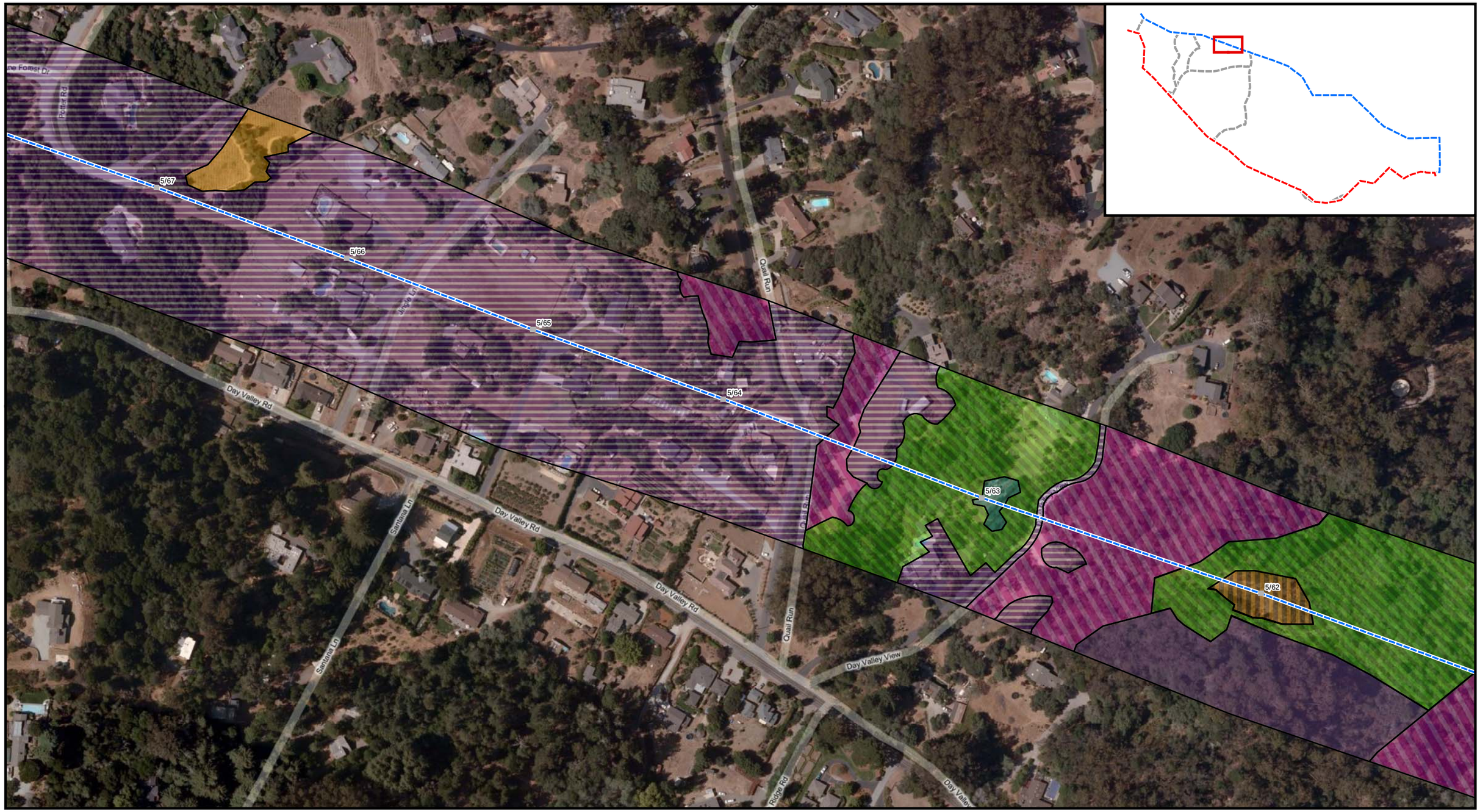

Northern Alignment Vegetation Communities Map 16 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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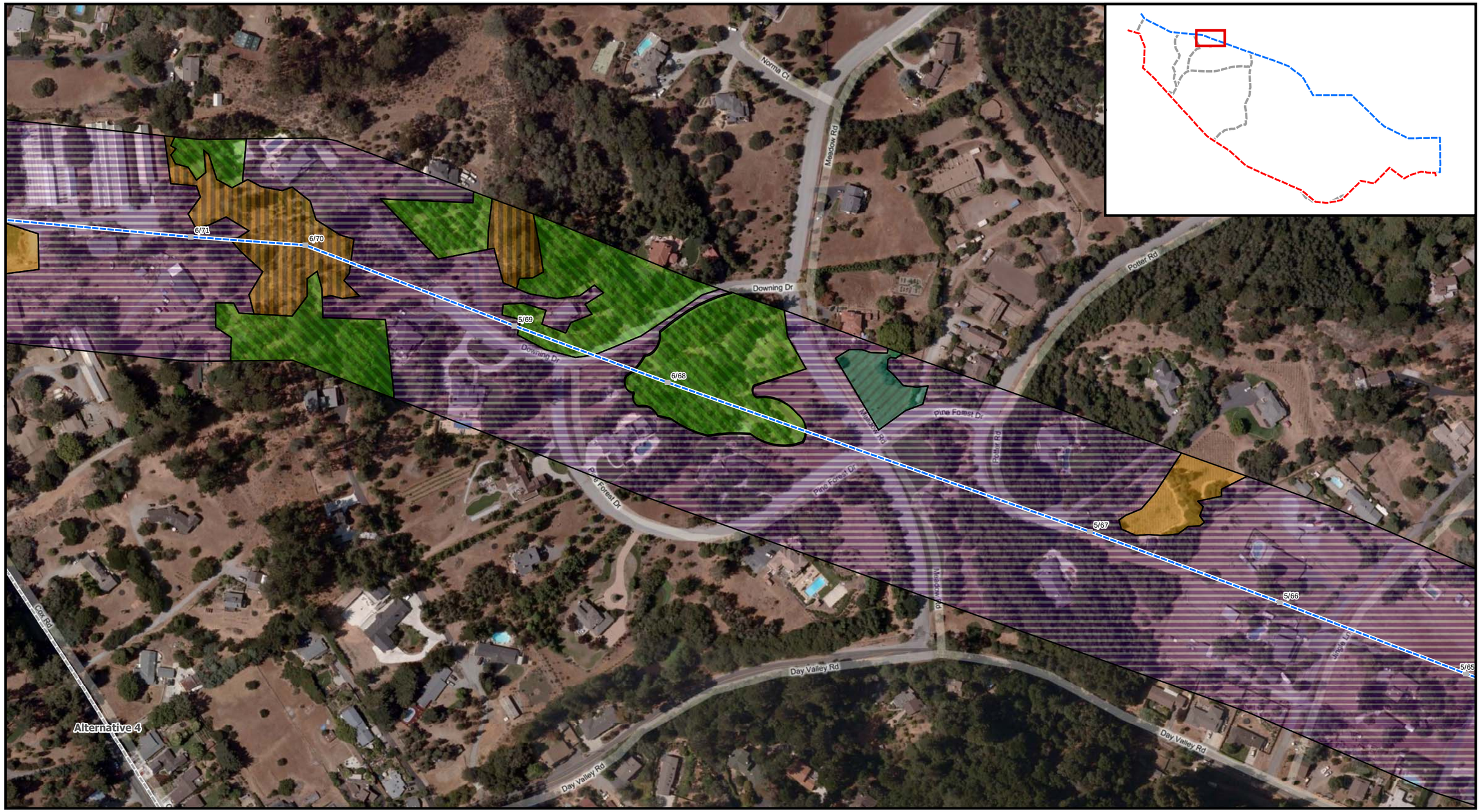

Northern Alignment Vegetation Communities Map 17 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
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- Disturbed/Developed
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- Upland Redwood Forest

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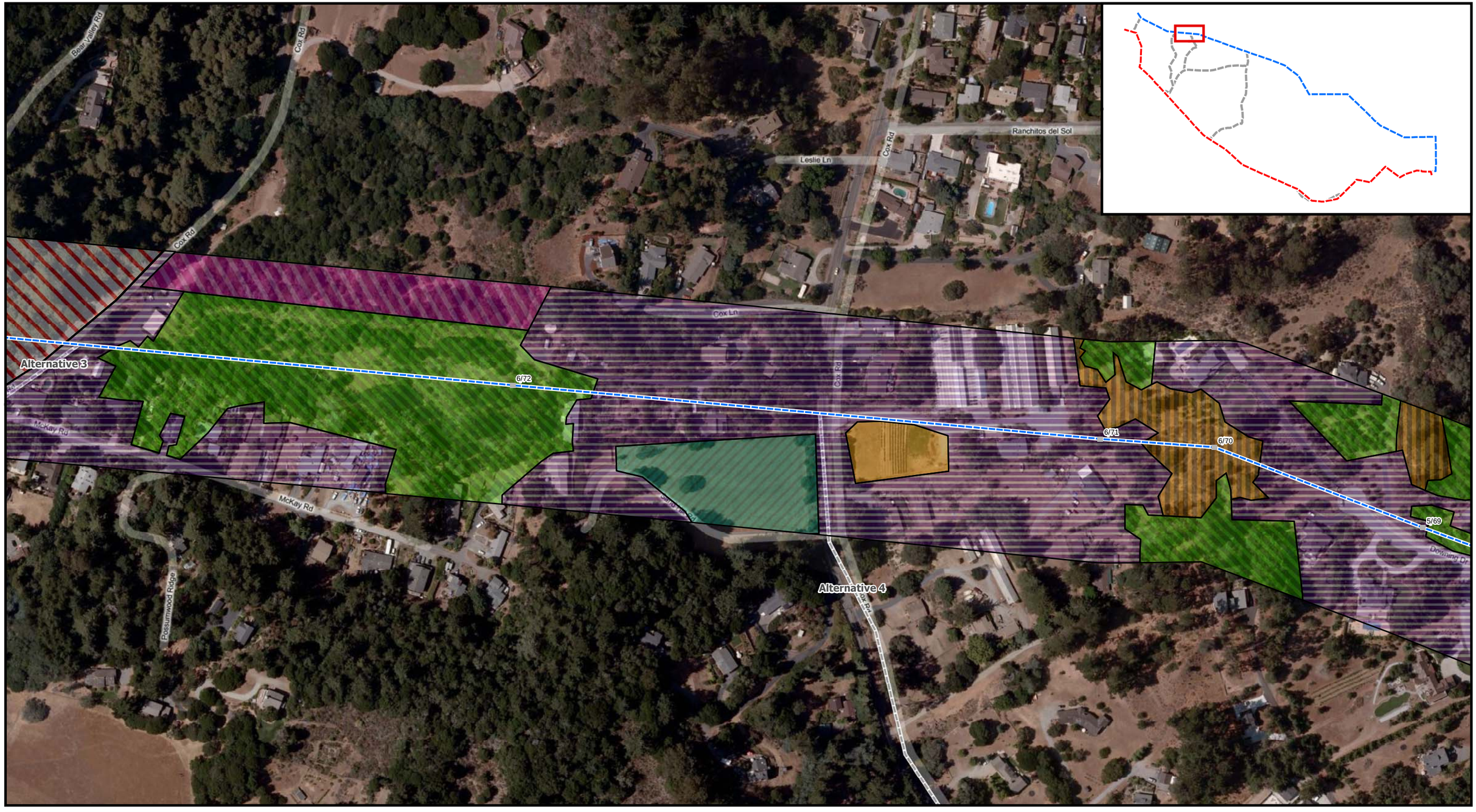

Northern Alignment Vegetation Communities Map 18 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
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- Upland Redwood Forest

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Northern Alignment Vegetation Communities Map 19 of 21

Santa Cruz Reinforcement Project

Existing Pole
New Alignment
Northern Alignment
Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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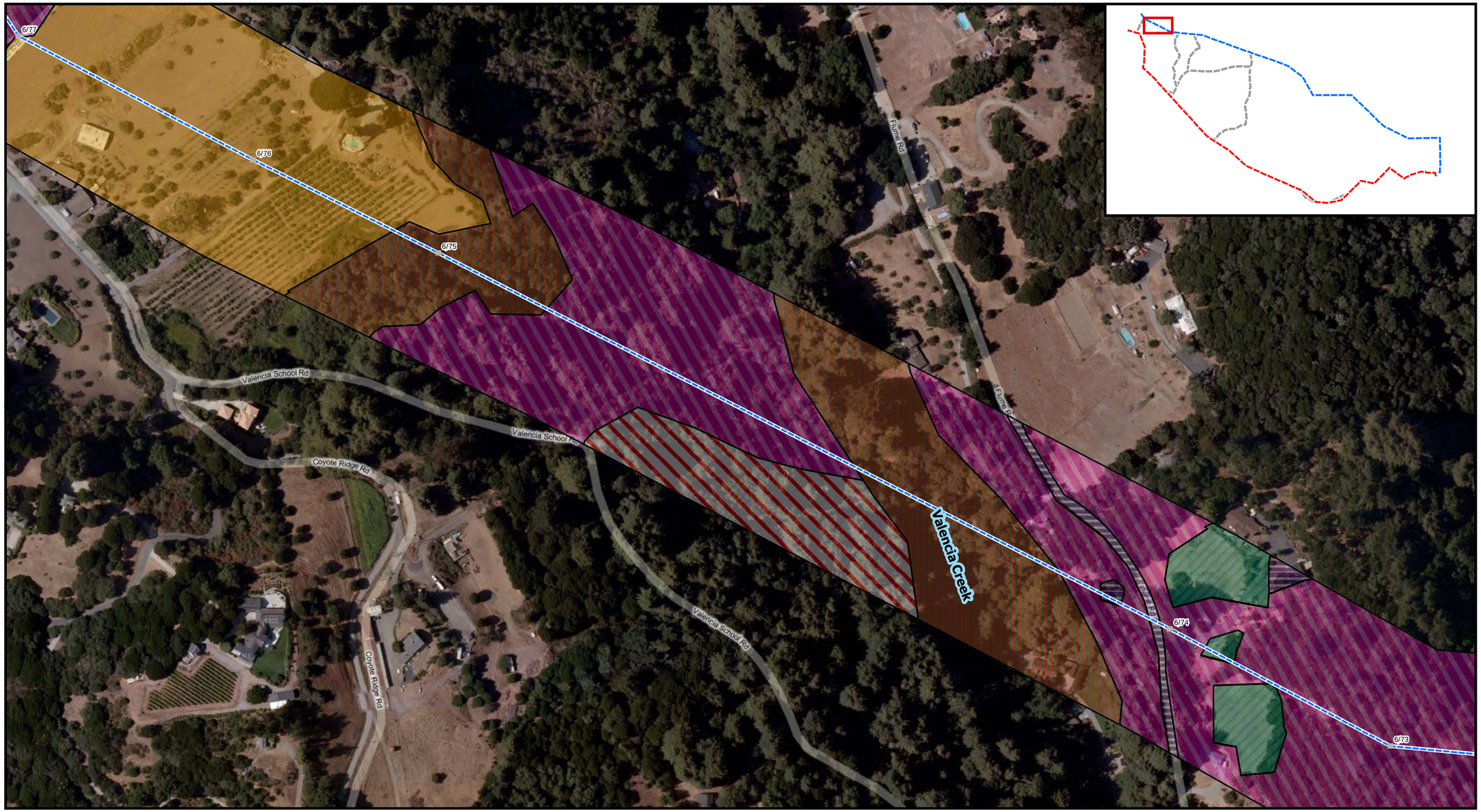

Northern Alignment Vegetation Communities Map 20 of 21

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
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- Upland Redwood Forest

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Northern Alignment Vegetation Communities Map 21 of 21

Santa Cruz Reinforcement Project

Existing Pole
New Alignment
Northern Alignment
Southern Alignment

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
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- Disturbed/Developed
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- Lacustrine
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Southern Alignment Vegetation Communities Map 1 of 19

Santa Cruz Reinforcement Project

Existing Pole
New Alignment
Northern Alignment
Southern Alignment
Potential Rare Plant

Vegetation Classification

Agricultural
Annual Grassland
Coastal Oak Woodland
Coastal Riparian
Closed-Cone Pine Cypress Woodland
Coastal Scrub
Disturbed/Developed
Fresh Emergent Wetland
Lacustrine
Mixed Chaparral
Non-Native Woodland
Perennial Grassland
Upland Redwood Forest

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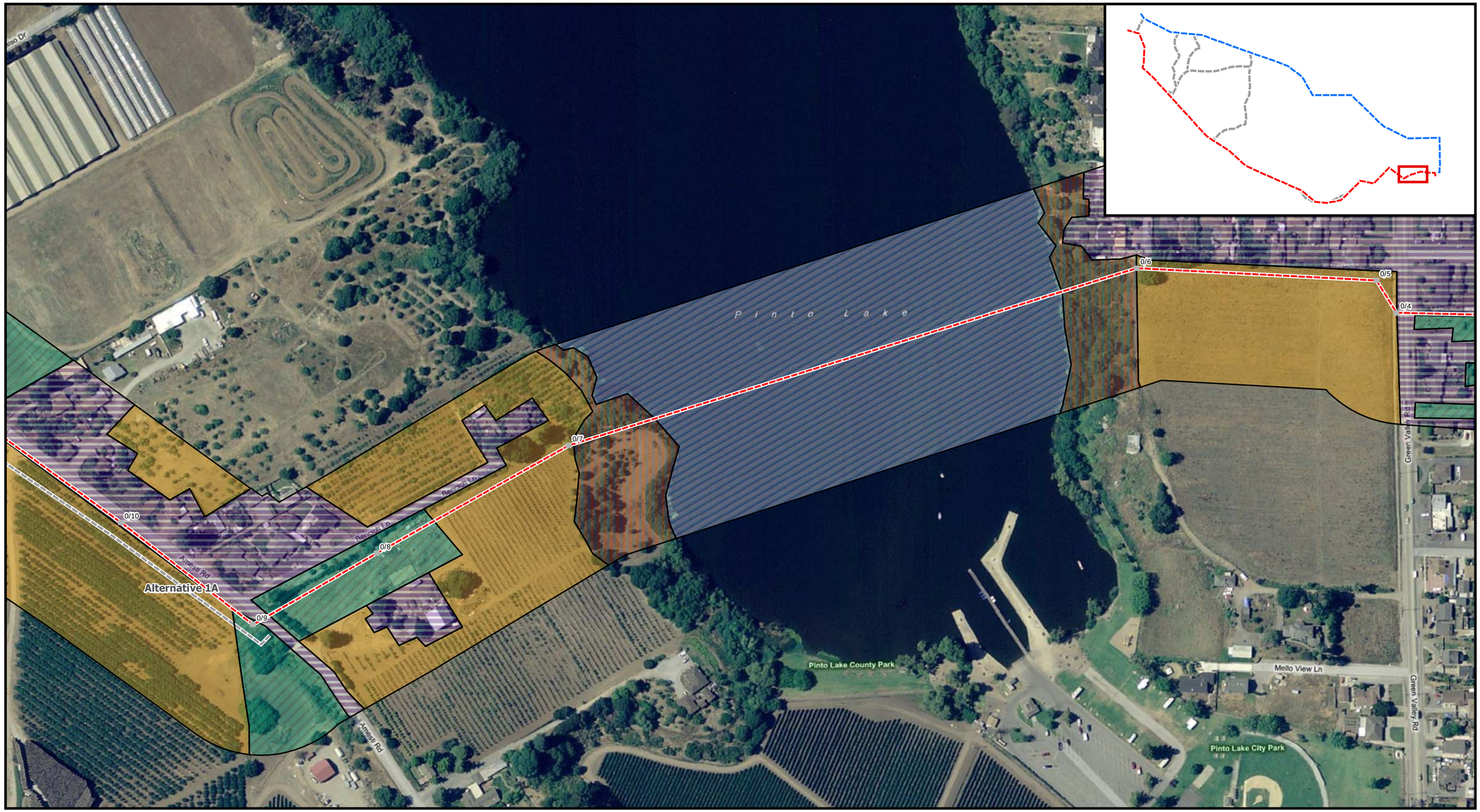

Southern Alignment Vegetation Communities Map 2 of 19

Santa Cruz Reinforcement Project

Existing Pole
New Alignment
Northern Alignment
Southern Alignment
Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

Pacific Gas and Electric Company®

INSIGNIA ENVIRONMENTAL

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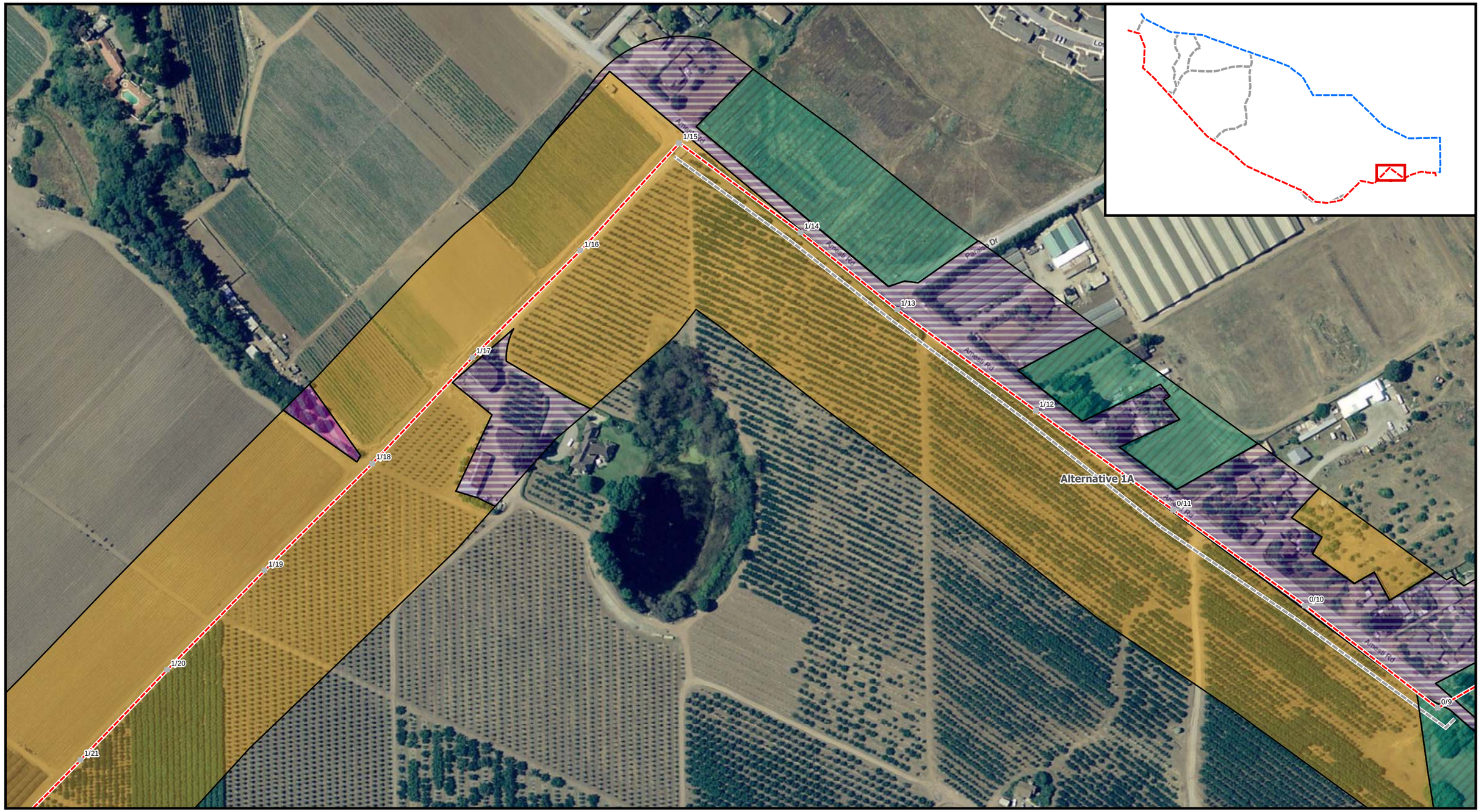

Southern Alignment Vegetation Communities Map 3 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

Pacific Gas and Electric Company

INSIGNIA ENVIRONMENTAL

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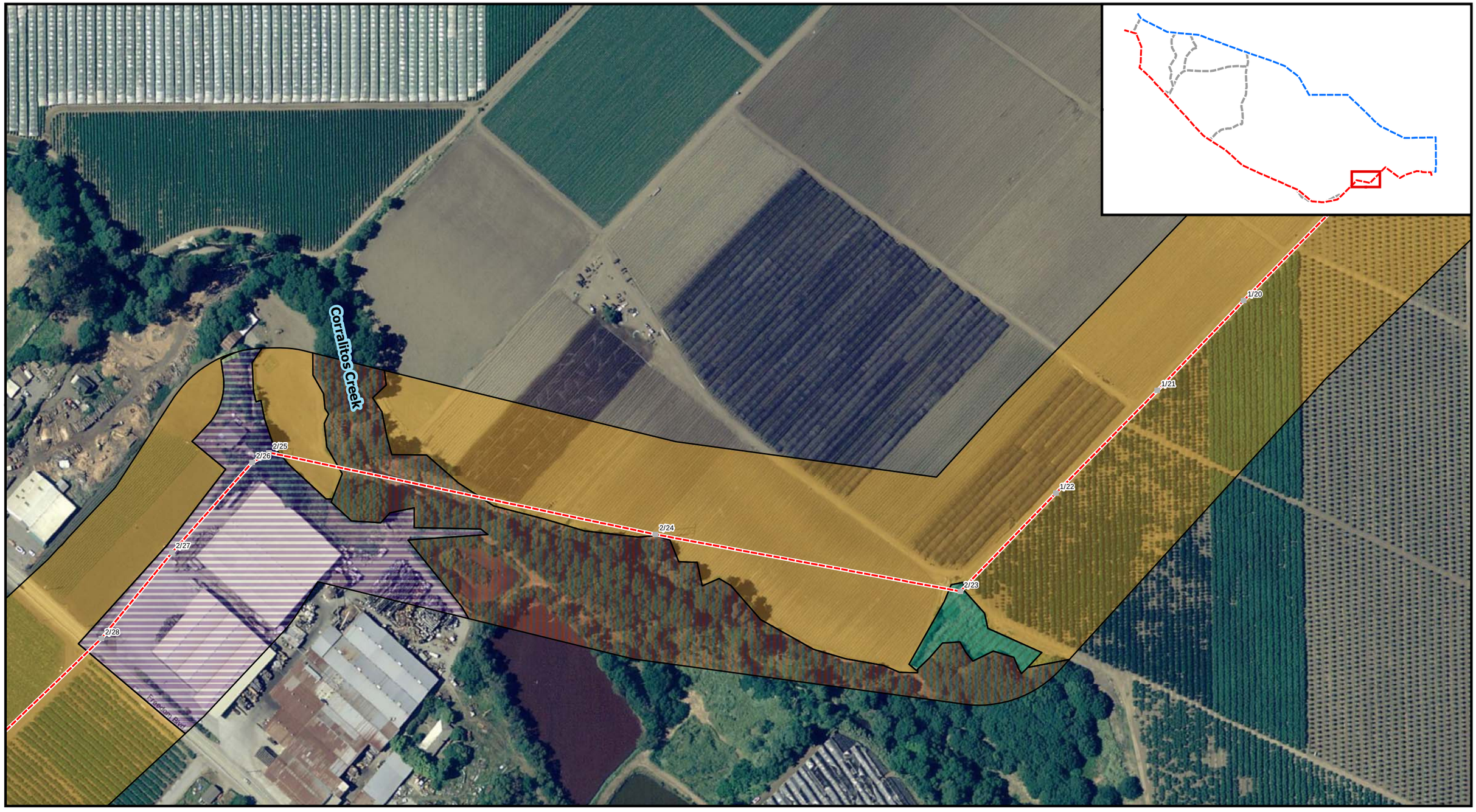

Southern Alignment Vegetation Communities Map 4 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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INSIGNIA ENVIRONMENTAL

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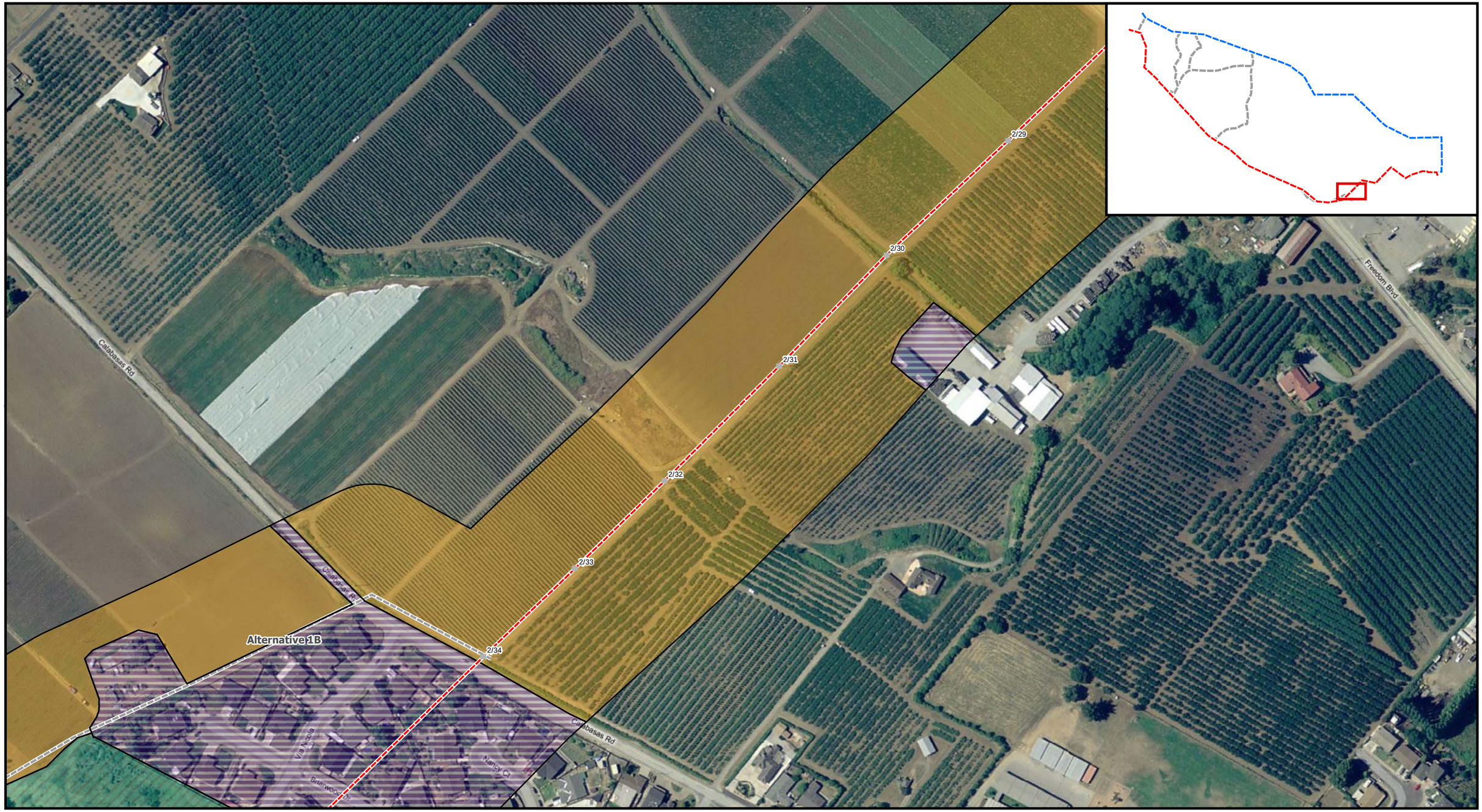

Southern Alignment Vegetation Communities Map 5 of 19

Santa Cruz Reinforcement Project

Existing Pole
New Alignment
Northern Alignment
Southern Alignment
Potential Rare Plant

Vegetation Classification

Agricultural
Annual Grassland
Coastal Oak Woodland
Coastal Riparian
Closed-Cone Pine Cypress Woodland
Coastal Scrub
Disturbed/Developed
Fresh Emergent Wetland
Lacustrine
Mixed Chaparral
Non-Native Woodland
Perennial Grassland
Upland Redwood Forest

Pacific Gas and Electric Company®

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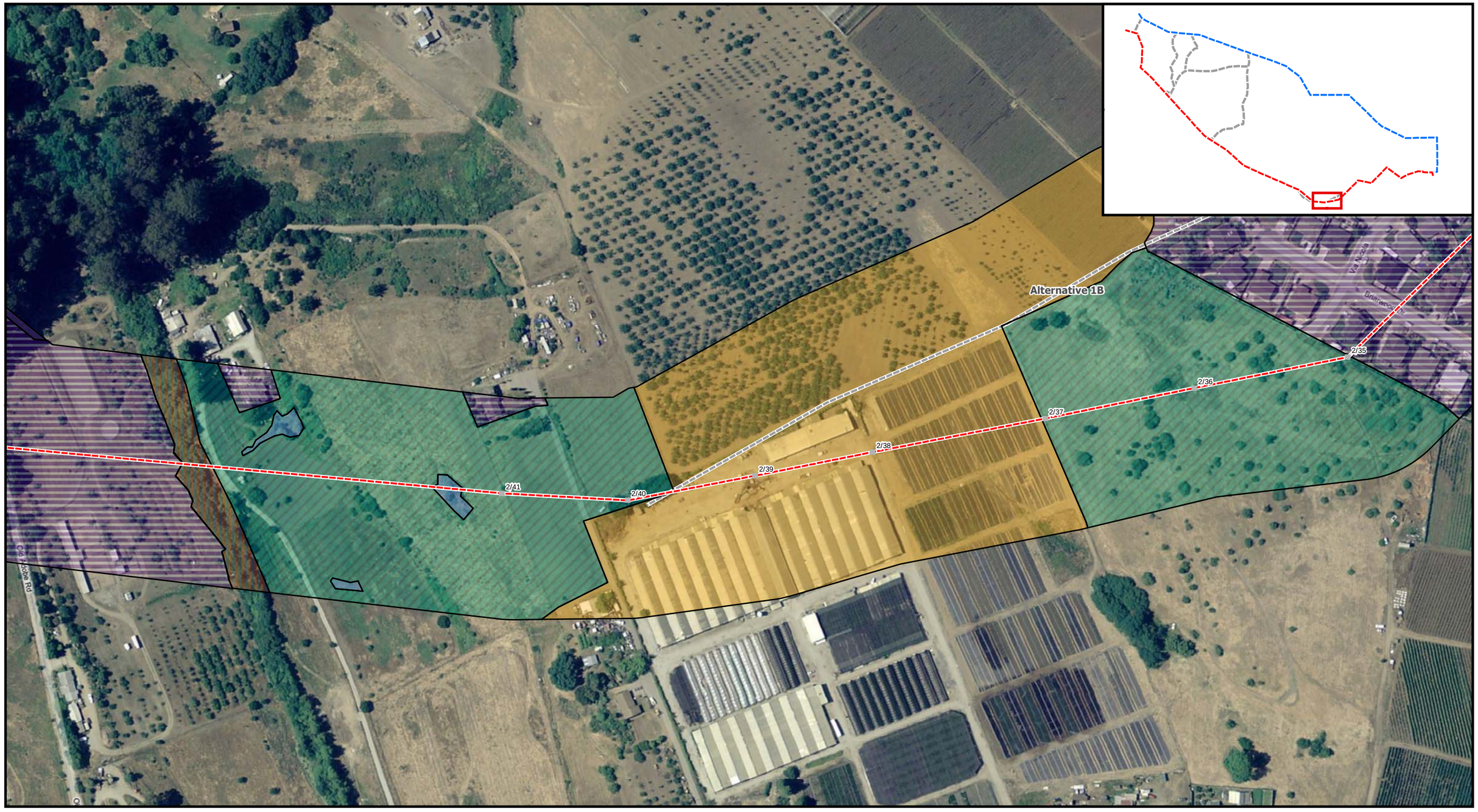

Southern Alignment Vegetation Communities Map 6 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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INSIGNIA ENVIRONMENTAL

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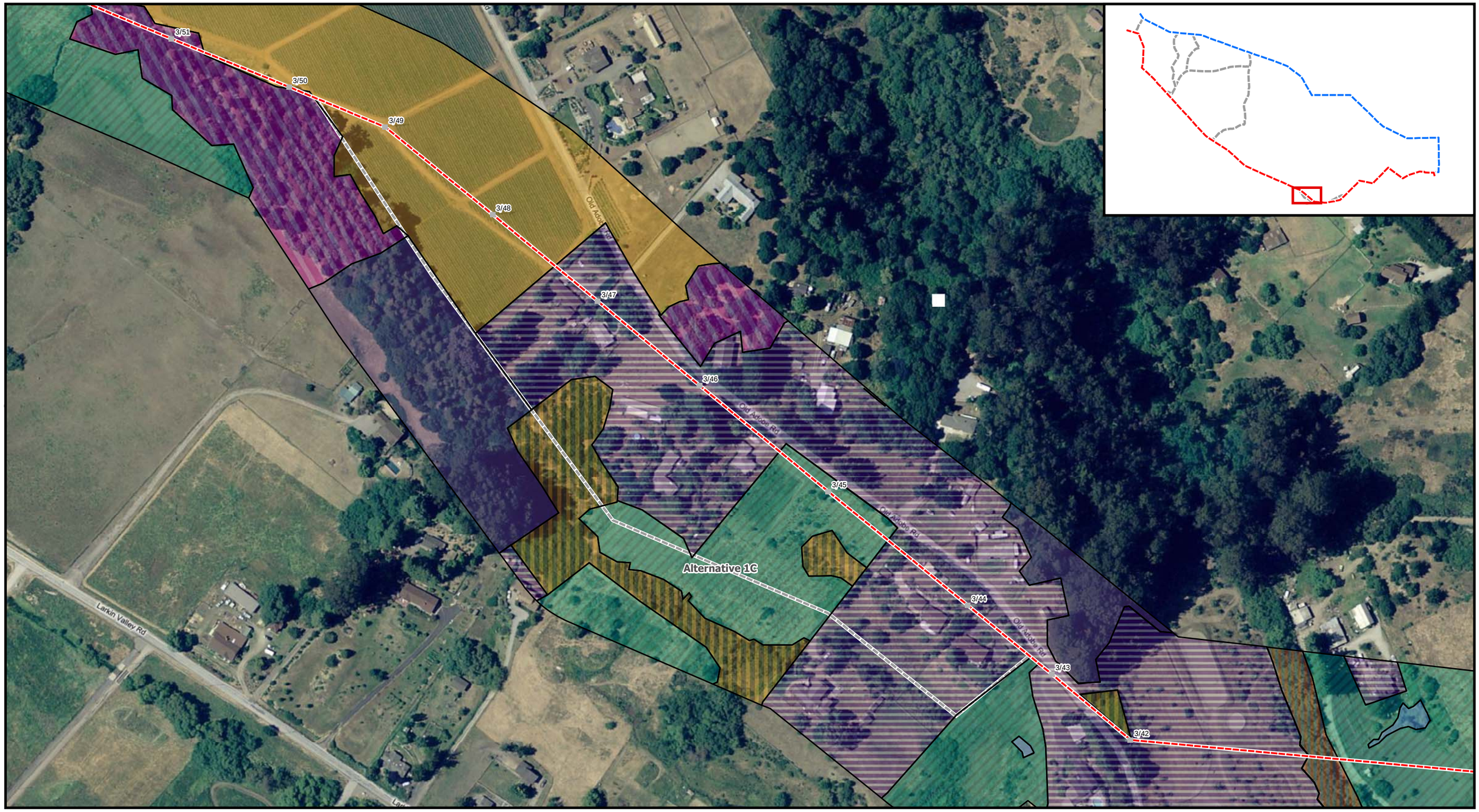

Southern Alignment Vegetation Communities Map 7 of 19

Santa Cruz Reinforcement Project

Existing Pole
New Alignment
Northern Alignment
Southern Alignment
Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

Pacific Gas and Electric Company®

INSIGNIA ENVIRONMENTAL

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Southern Alignment Vegetation Communities Map 8 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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INSIGNIA ENVIRONMENTAL

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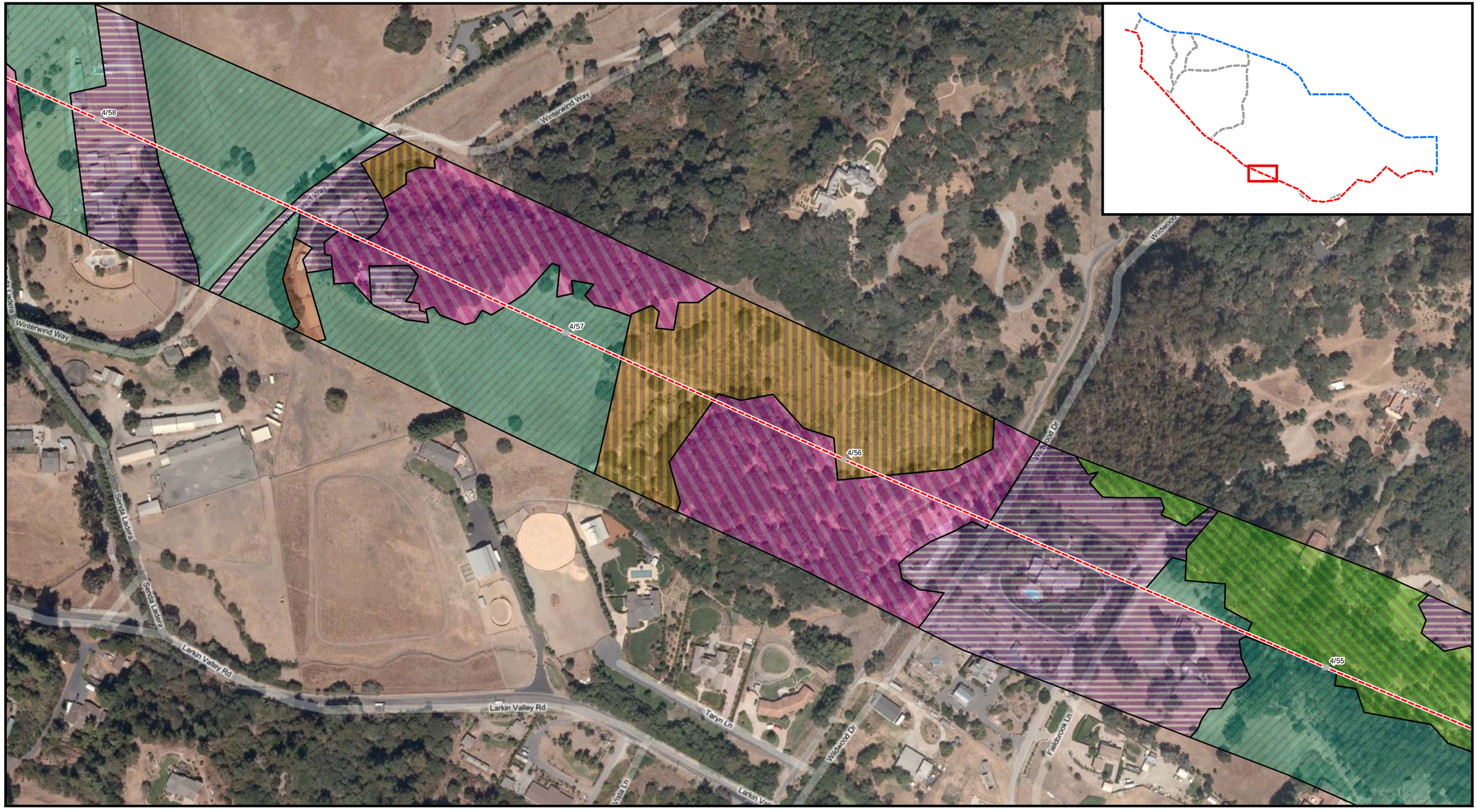

Southern Alignment Vegetation Communities Map 9 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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INSIGNIA ENVIRONMENTAL

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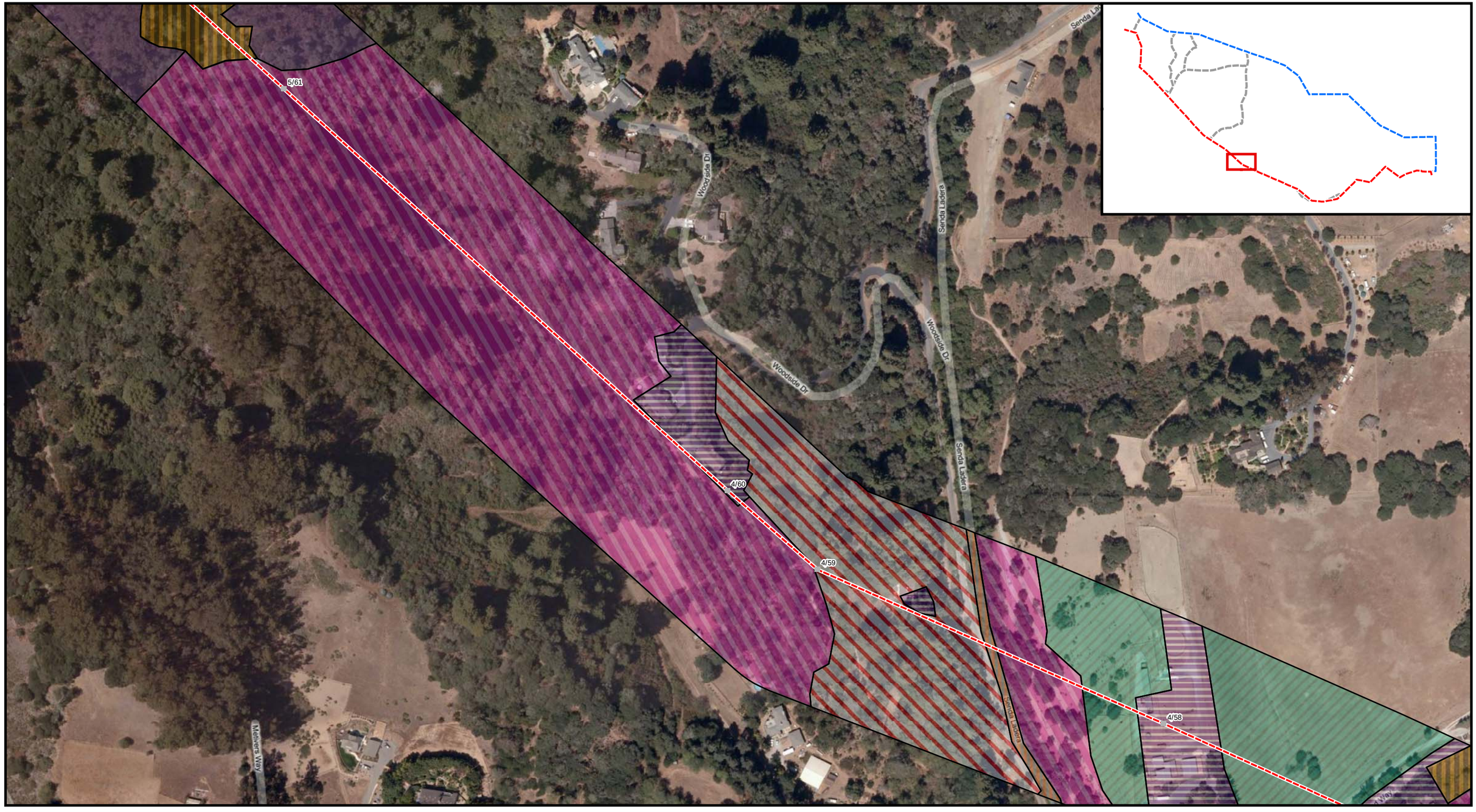

Southern Alignment Vegetation Communities Map 10 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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INSIGNIA ENVIRONMENTAL

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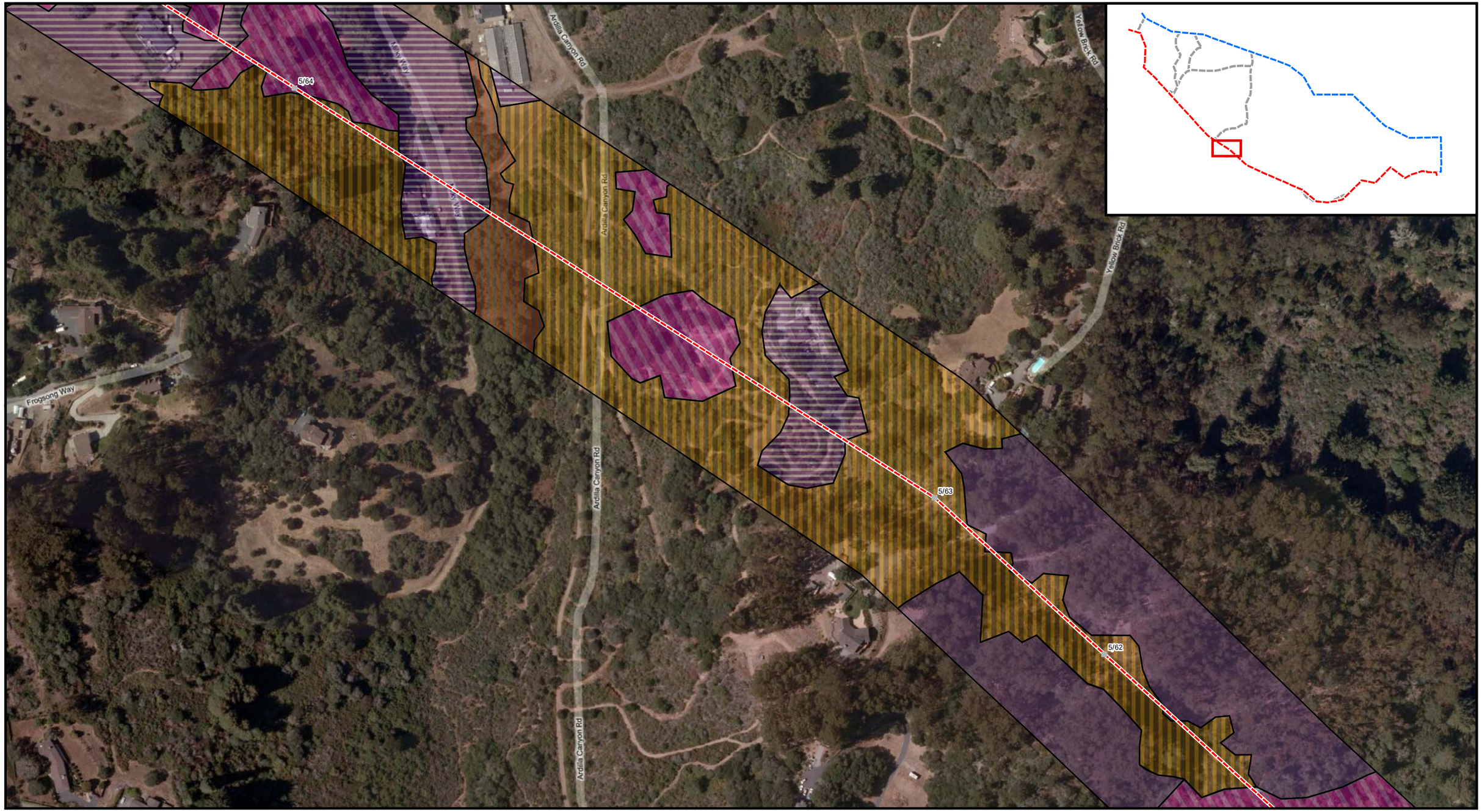

Southern Alignment Vegetation Communities Map 11 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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Southern Alignment Vegetation Communities Map 12 of 19

Santa Cruz Reinforcement Project

Existing Pole
New Alignment
Northern Alignment
Southern Alignment
Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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INSIGNIA ENVIRONMENTAL

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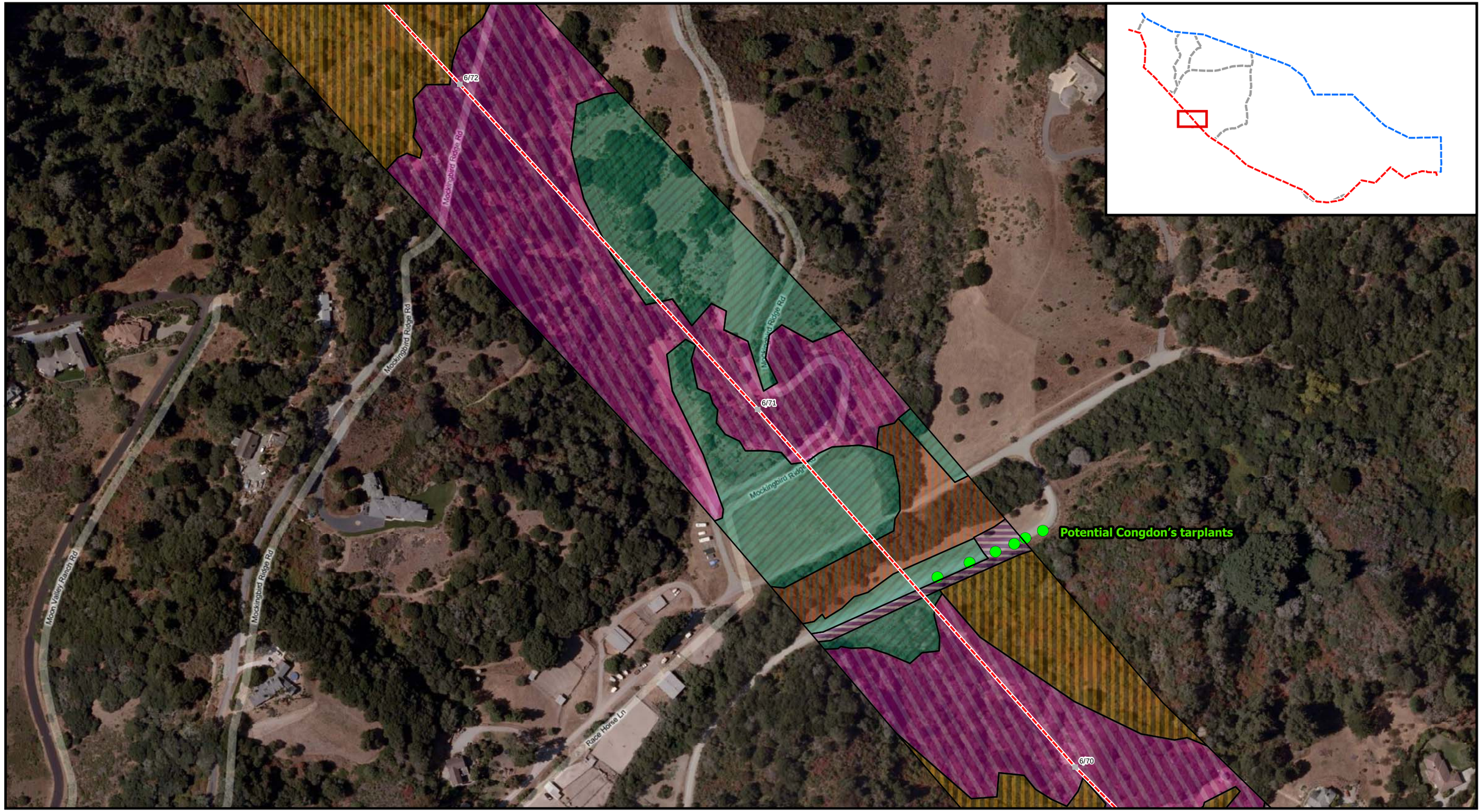

Southern Alignment Vegetation Communities Map 13 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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INSIGNIA ENVIRONMENTAL

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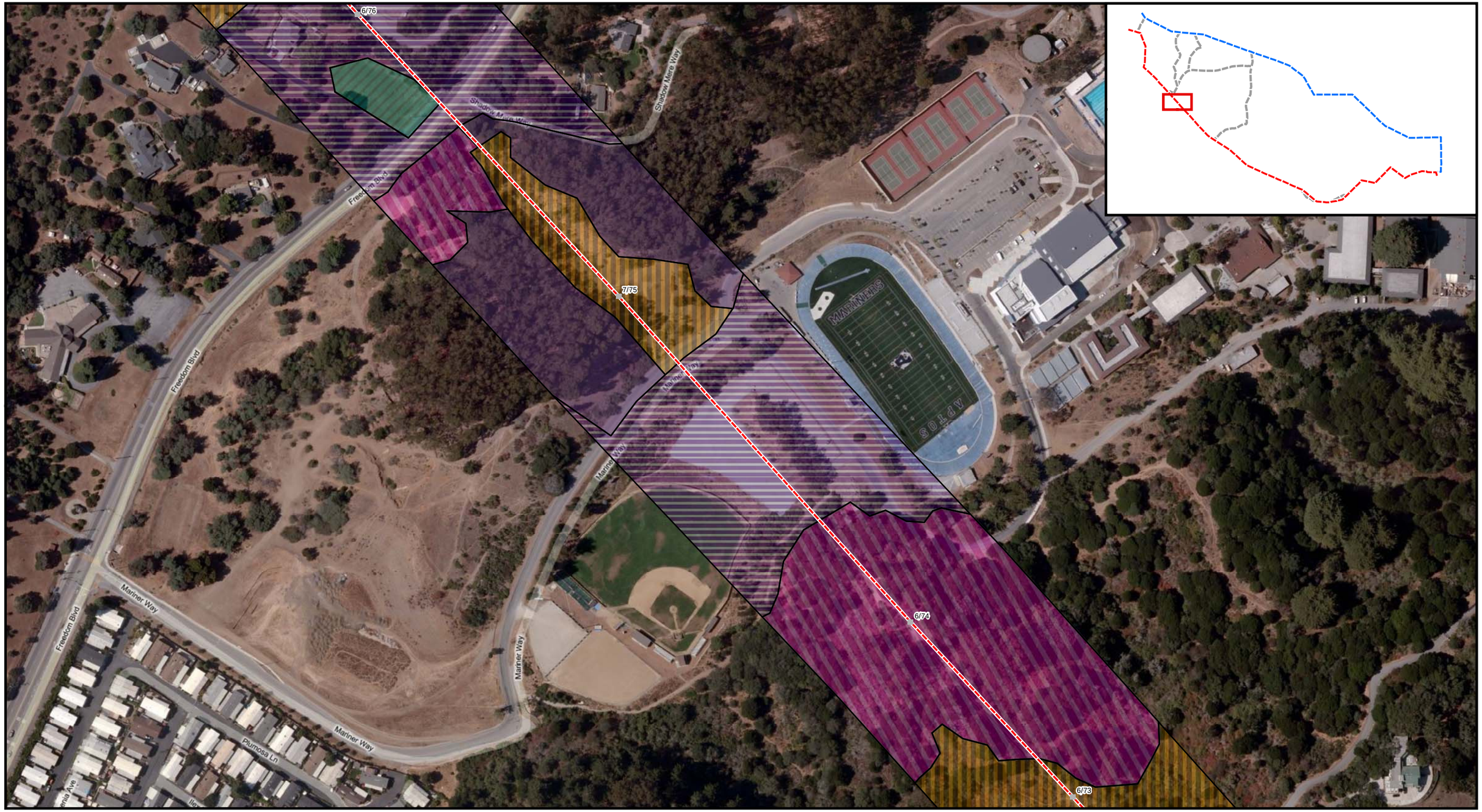

Southern Alignment Vegetation Communities Map 14 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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INSIGNIA ENVIRONMENTAL

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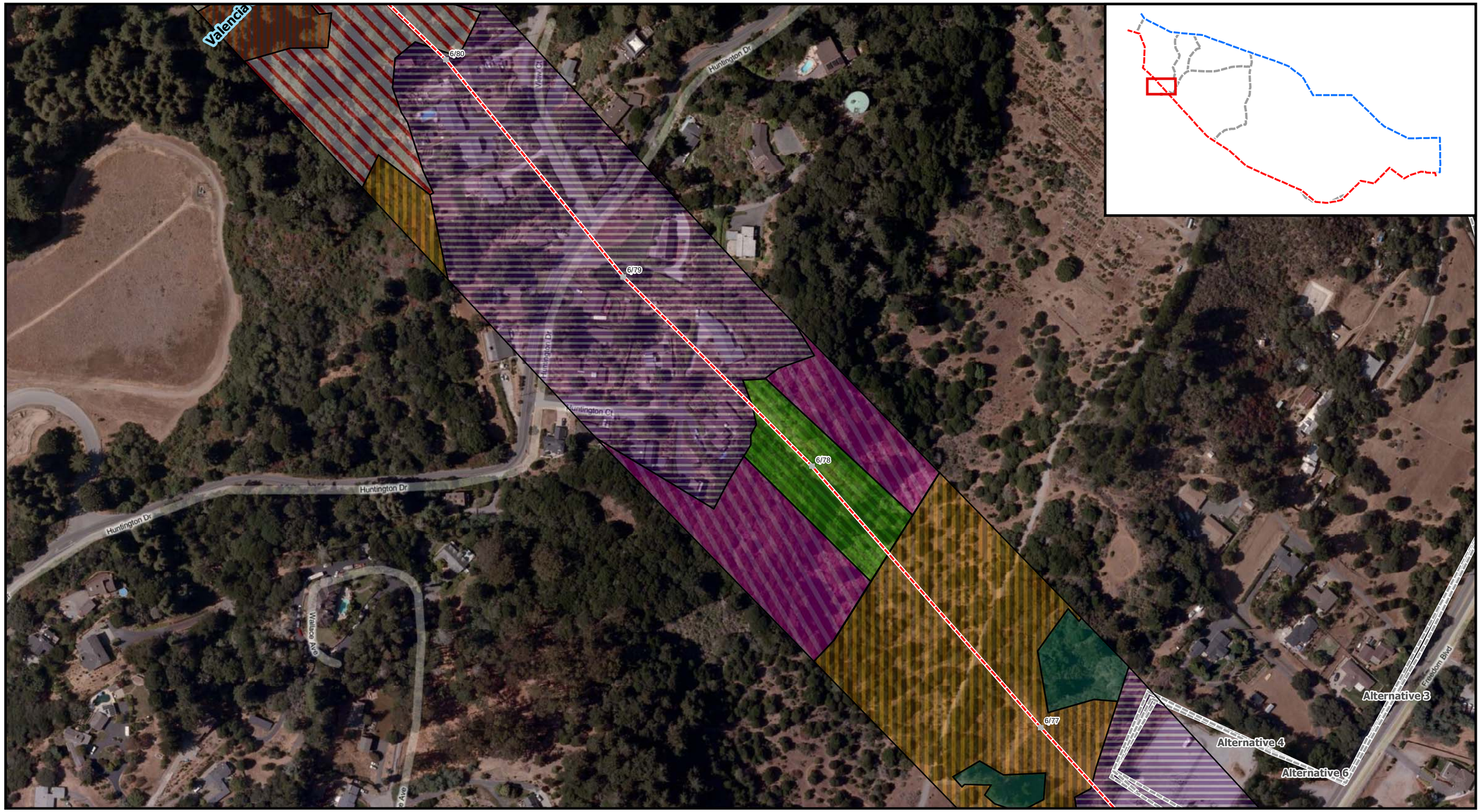

Southern Alignment Vegetation Communities Map 15 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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INSIGNIA ENVIRONMENTAL

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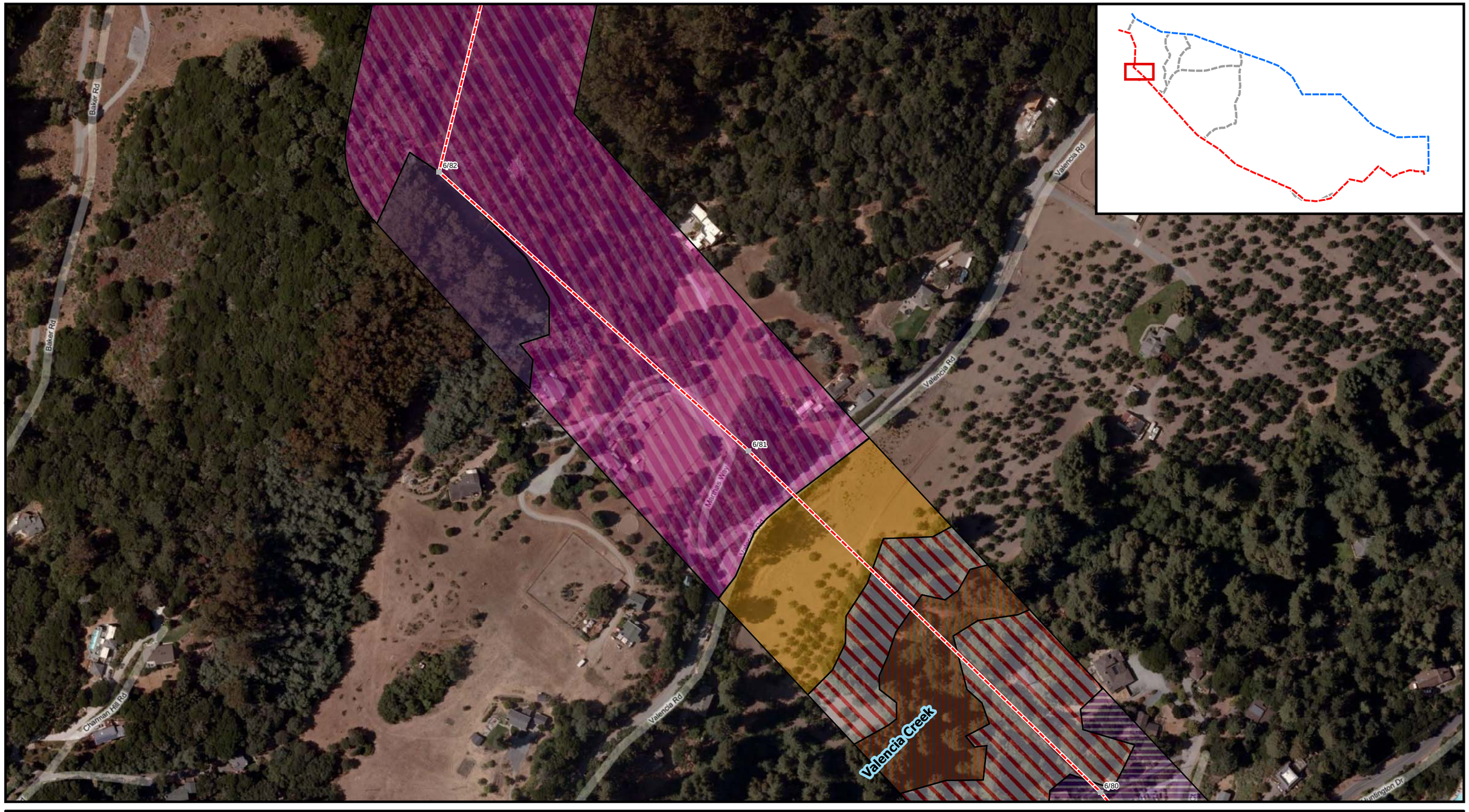

Southern Alignment Vegetation Communities Map 16 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

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INSIGNIA ENVIRONMENTAL

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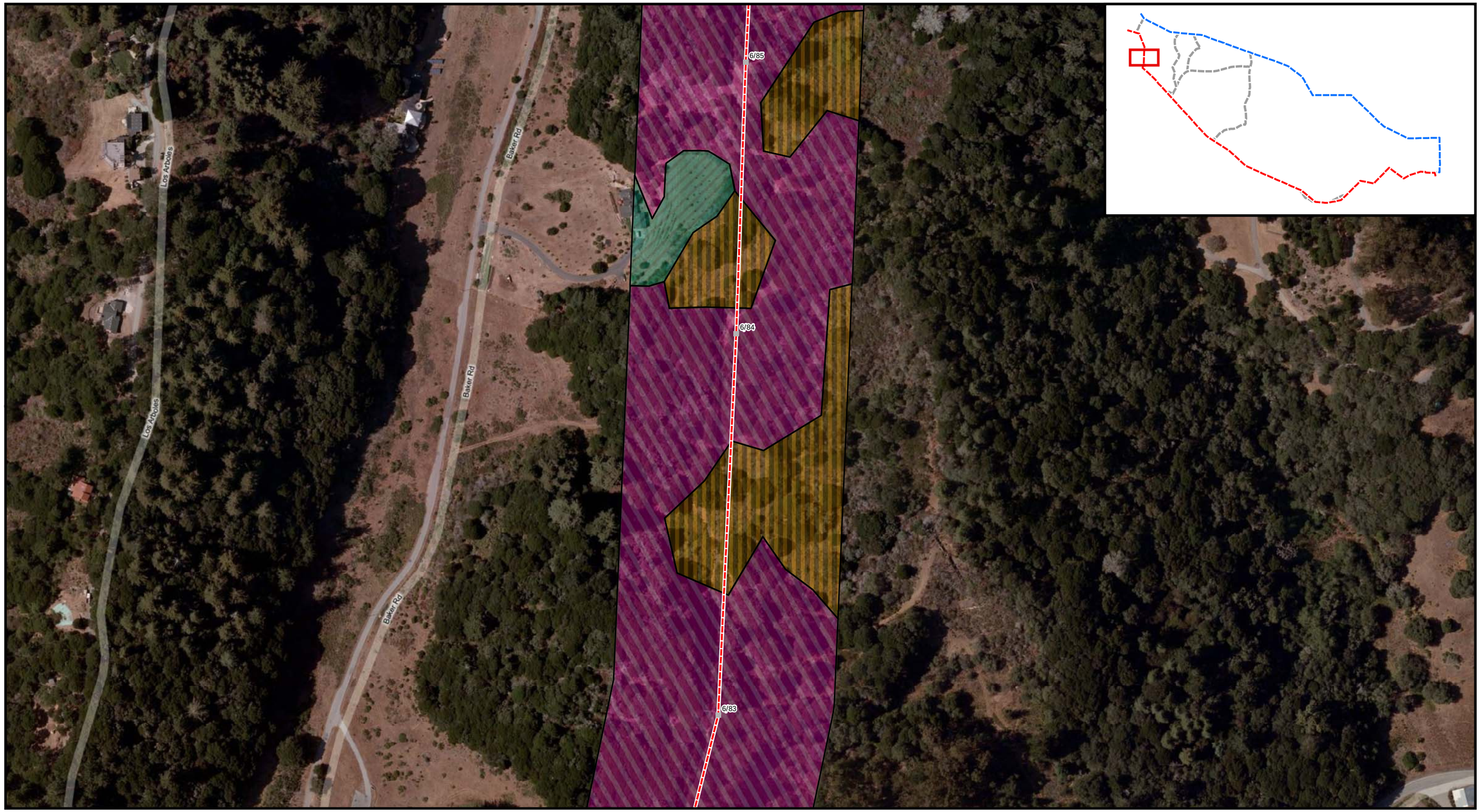

Southern Alignment Vegetation Communities Map 17 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

Pacific Gas and Electric Company®

INSIGNIA ENVIRONMENTAL

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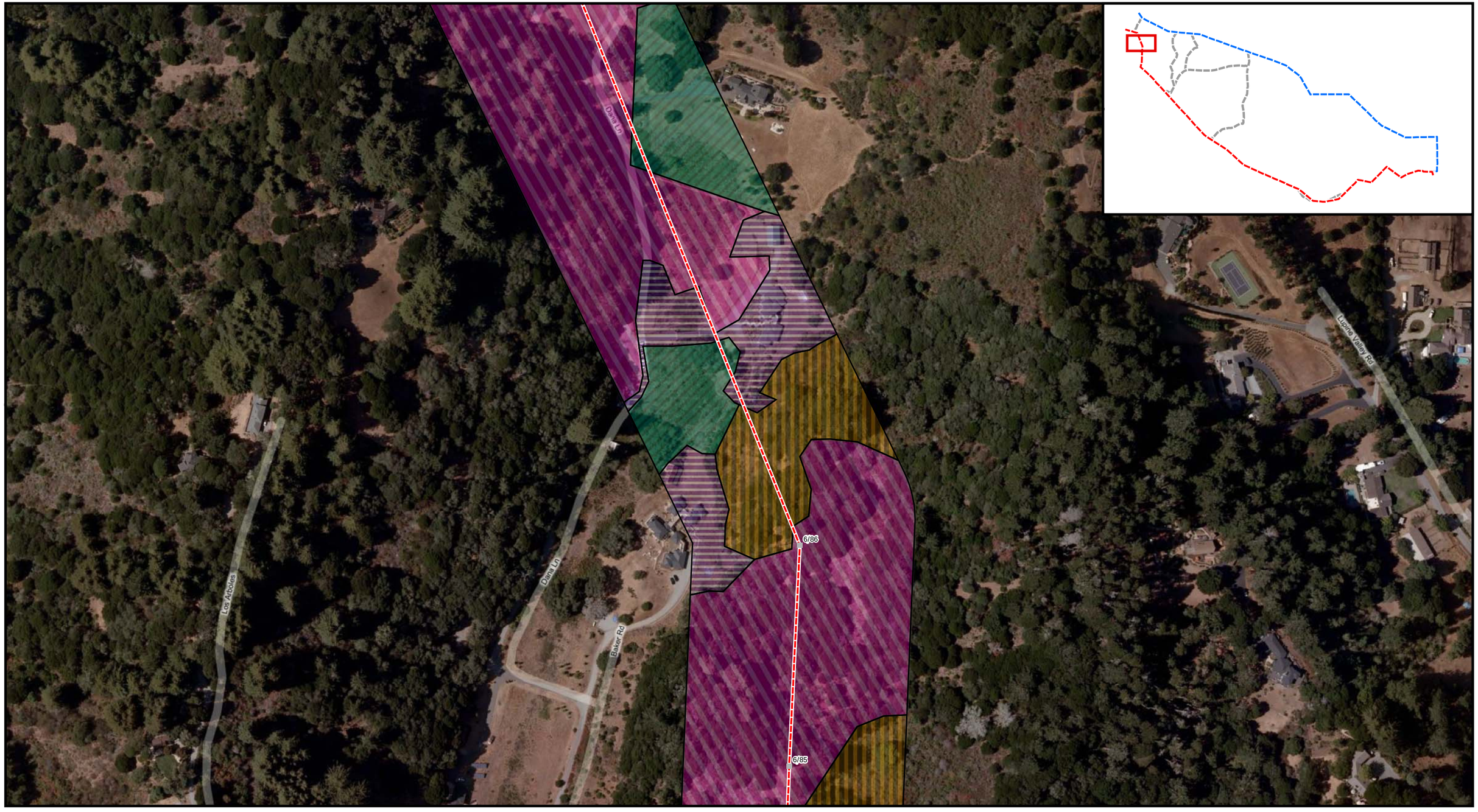

Southern Alignment Vegetation Communities Map 18 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

Pacific Gas and Electric Company®

INSIGNIA ENVIRONMENTAL

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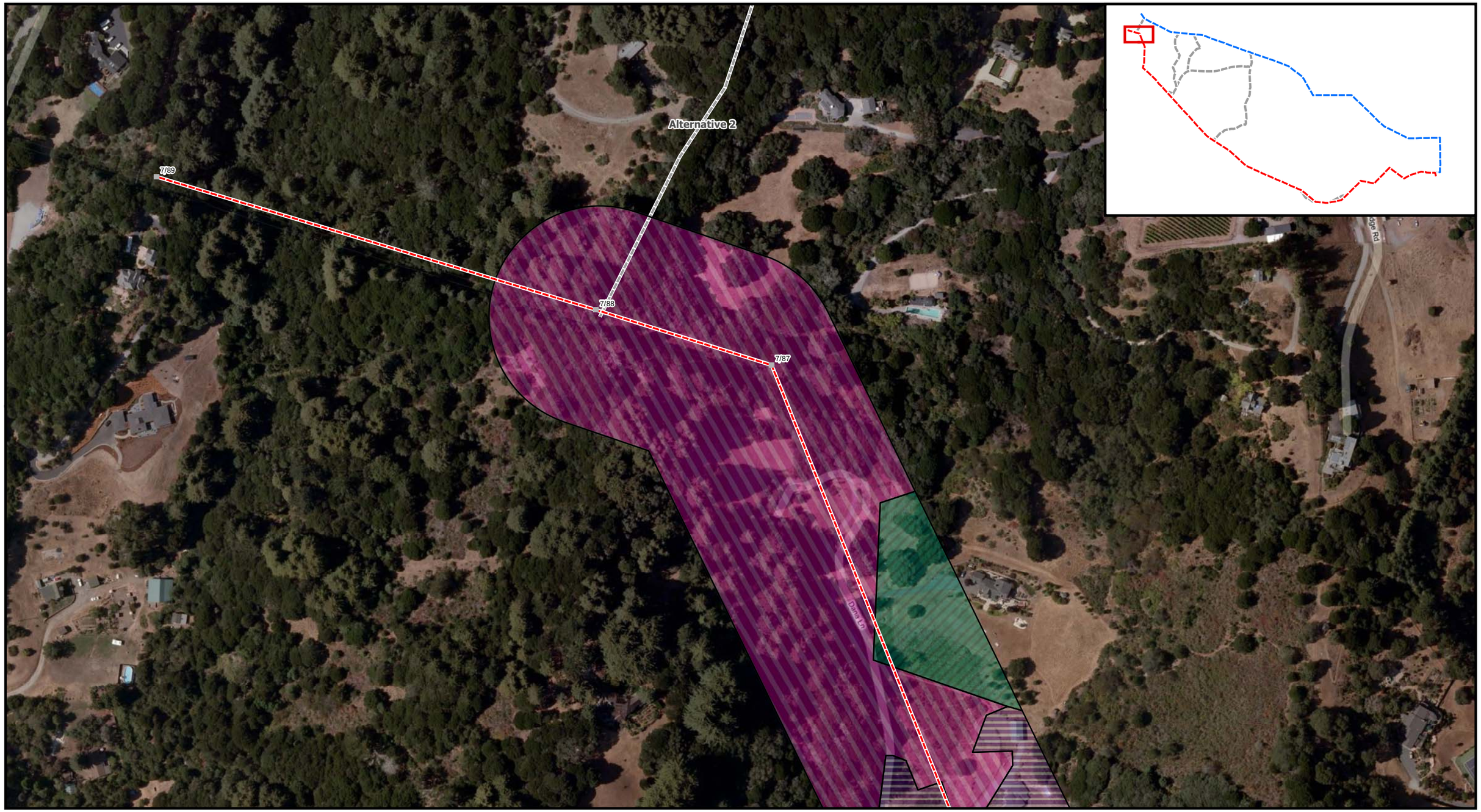

Southern Alignment Vegetation Communities Map 19 of 19

Santa Cruz Reinforcement Project

- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Potential Rare Plant

Vegetation Classification

- Agricultural
- Annual Grassland
- Coastal Oak Woodland
- Coastal Riparian
- Closed-Cone Pine Cypress Woodland
- Coastal Scrub
- Disturbed/Developed
- Fresh Emergent Wetland
- Lacustrine
- Mixed Chaparral
- Non-Native Woodland
- Perennial Grassland
- Upland Redwood Forest

Pacific Gas and Electric Company®

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ATTACHMENT B: CNDDB AND CRITICAL HABITAT MAP

steelhead - south/central California coast ESU

1/29 1/28 1/27 1/26 1/25 1/24 1/23 1/22 1/21 1/20 1/19 1/18 1/17 1/16 0/15 0/14 0/13 0/12 0/11 0/10 0/9 0/8 0/7 0/6 0/5 0/4 0/3 0/2 0/1

western pond turtle

1/15 1/16 1/17 1/18 1/19 1/20 1/21 1/14 1/13 1/12 0/11 0/10 0/9 0/8 0/7 0/6 0/5 0/4 0/3 0/2 0/0 0/1D

Green Valley Substation

Congdon's tarplant

steelhead - south/central California coast ESU

Santa Cruz tarplant

CNDDB and Critical Habitat Map 1 of 8

Santa Cruz Reinforcement Project

- Existing Substation
- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Study Area (1 Mile)

CNDDB Occurrence
- Plant Occurrence
- Animal Occurrence

USFWS and NOAA Designated Critical Habitat
- Plant
- Animal

INSIGNIA ENVIRONMENTAL

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12/09/2010

steelhead - south/central California coast ESU

4/55 4/54 4/53 3/52 3/51 3/50 3/49 3/48 3/47 2/46 2/45 2/44 2/43 2/42 2/41A 2/41 2/39 2/38 2/37 2/36 2/35 2/34 2/33 2/32 2/31 2/30 1/29 1/28 1/27 1/26 1/25 1/24 1/15 1/16 1/17 1/18 1/14

Santa Cruz long-toed salamander

Santa Cruz tarplant

Hooker's manzanita

CNDDB and Critical Habitat Map 2 of 8

Santa Cruz Reinforcement Project

- Existing Substation
- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Study Area (1 Mile)

CNDDB Occurrence
- Plant Occurrence
- Animal Occurrence

USFWS and NOAA Designated Critical Habitat
- Plant
- Animal

INSIGNIA ENVIRONMENTAL

Pacific Gas and Electric Company

N W E S

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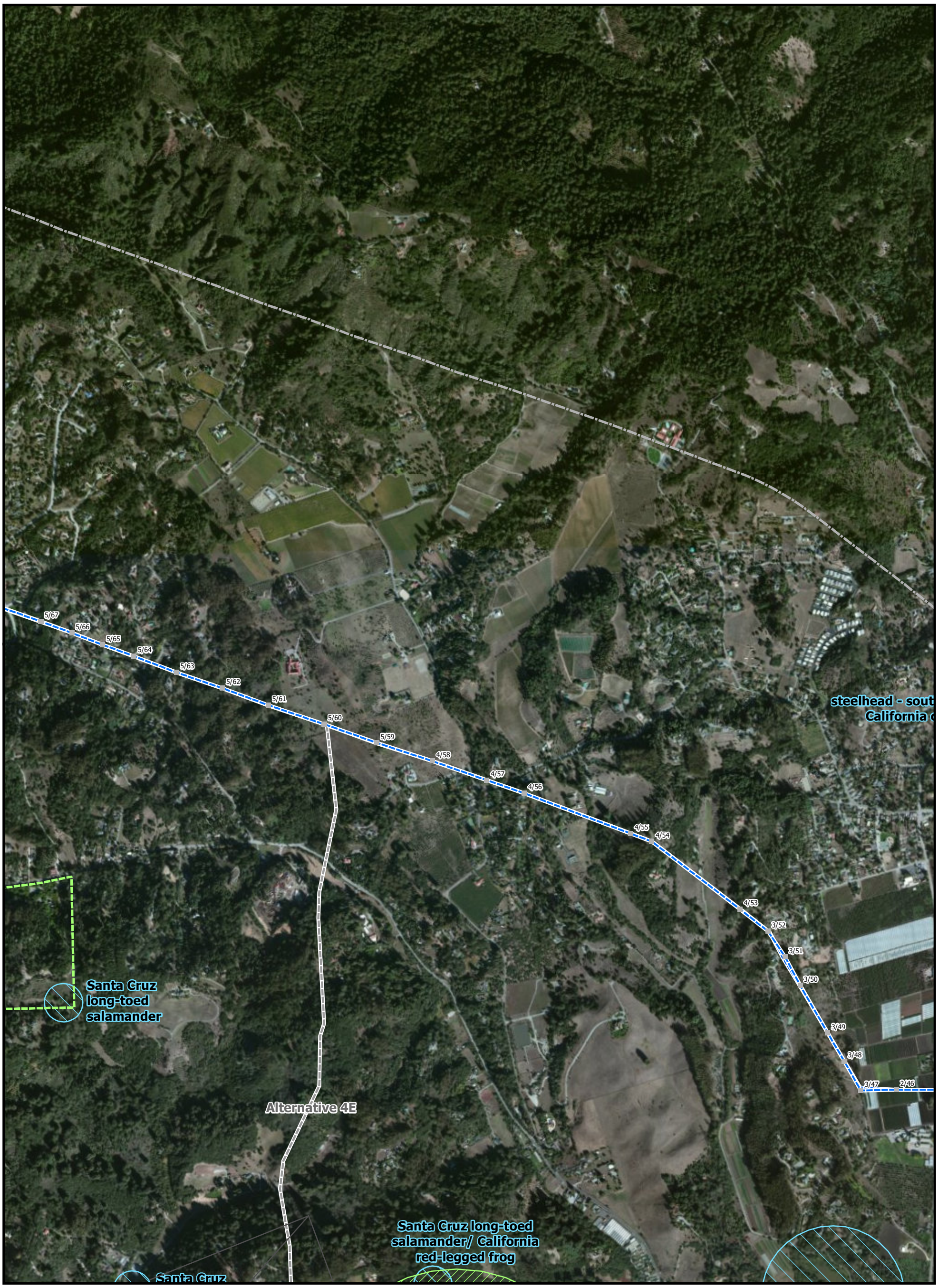

CNDDB and Critical Habitat Map 3 of 8

Santa Cruz Reinforcement Project

- Existing Substation
- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Study Area (1 Mile)

CNDDB Occurrence
- Plant Occurrence
- Animal Occurrence

USFWS and NOAA Designated Critical Habitat
- Plant
- Animal

INSIGNIA ENVIRONMENTAL

Pacific Gas and Electric Company

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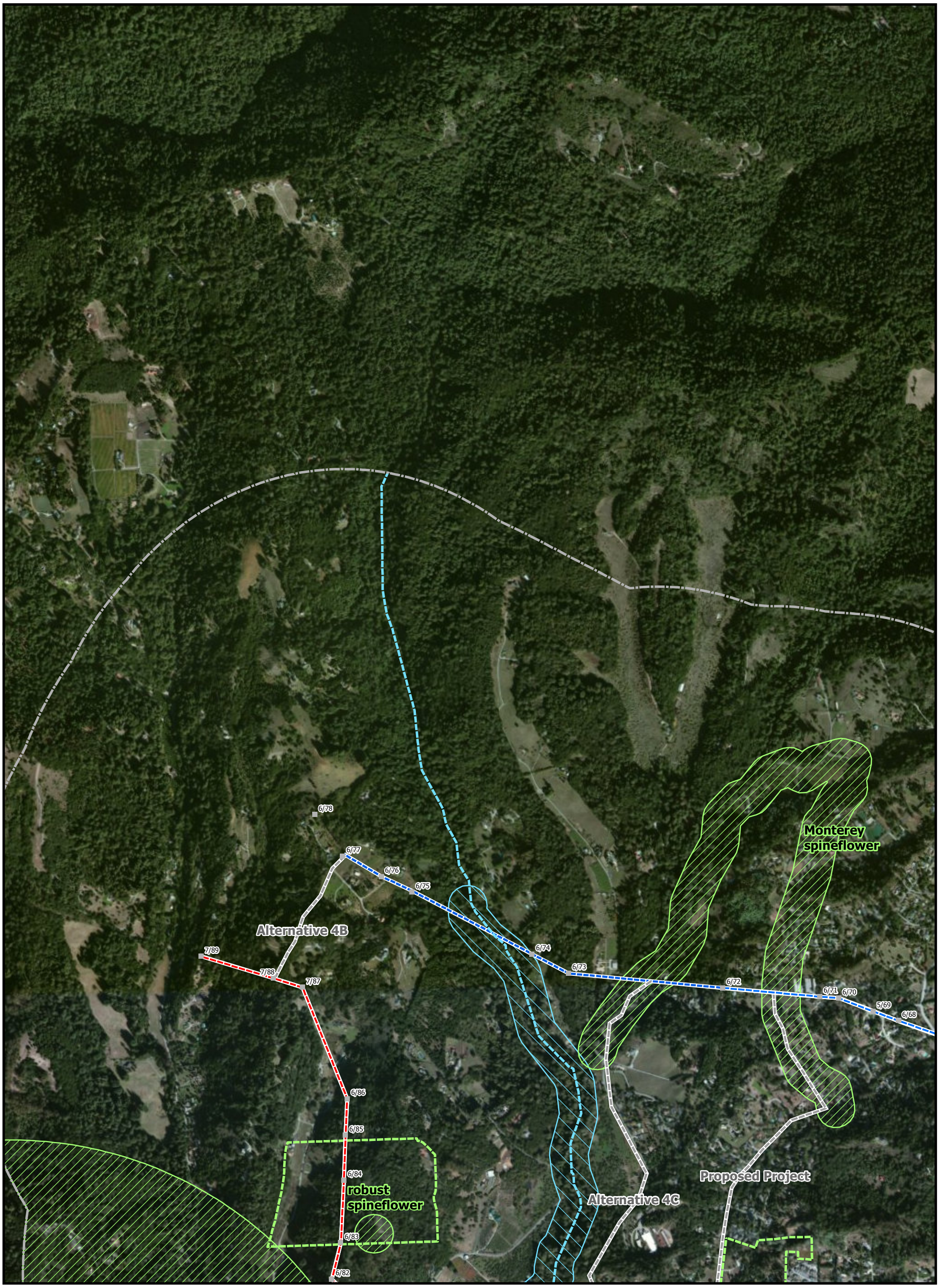

CNDDB and Critical Habitat Map 4 of 8

Santa Cruz Reinforcement Project

- Existing Substation
- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Study Area (1 Mile)

CNDDB Occurrence
- Plant Occurrence
- Animal Occurrence

USFWS and NOAA Designated Critical Habitat
- Plant
- Animal

INSIGNIA ENVIRONMENTAL

Pacific Gas and Electric Company

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CNDDB and Critical Habitat Map 5 of 8

Santa Cruz Reinforcement Project

Existing Substation
Existing Pole
New Alignment
Northern Alignment
Southern Alignment
Study Area (1 Mile)

CNDDB Occurrence
Plant Occurrence
Animal Occurrence

USFWS and NOAA Designated Critical Habitat
Plant
Animal

INSIGNIA ENVIRONMENTAL

Pacific Gas and Electric Company

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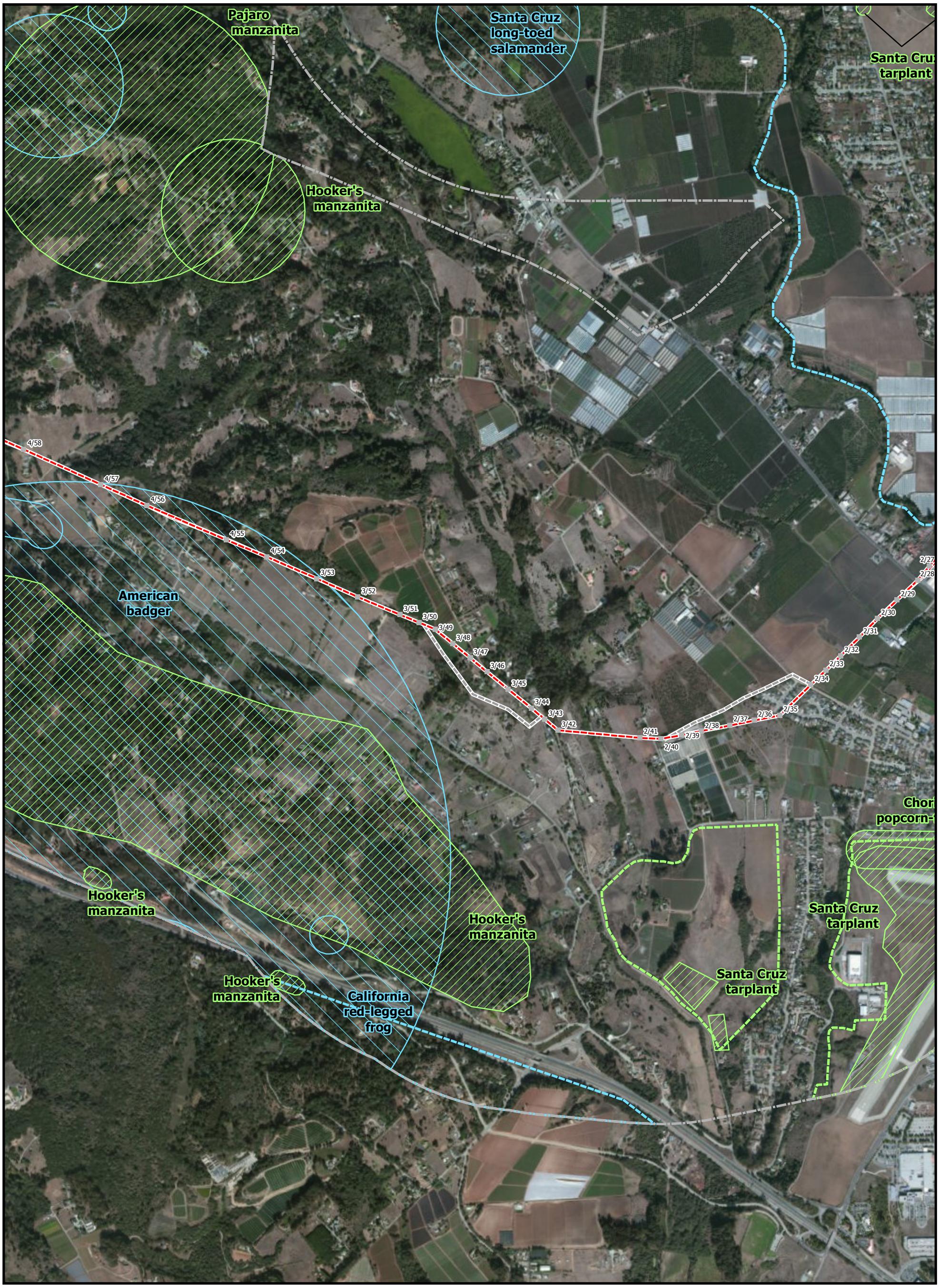

CNDDB and Critical Habitat Map 6 of 8

Santa Cruz Reinforcement Project

- Existing Substation
- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Study Area (1 Mile)

CNDDB Occurrence
- Plant Occurrence
- Animal Occurrence

USFWS and NOAA Designated Critical Habitat
- Plant
- Animal

INSIGNIA ENVIRONMENTAL

Pacific Gas and Electric Company

N W E S

1:15,000

0 500 1,000 2,000 3,000 4,000 Feet

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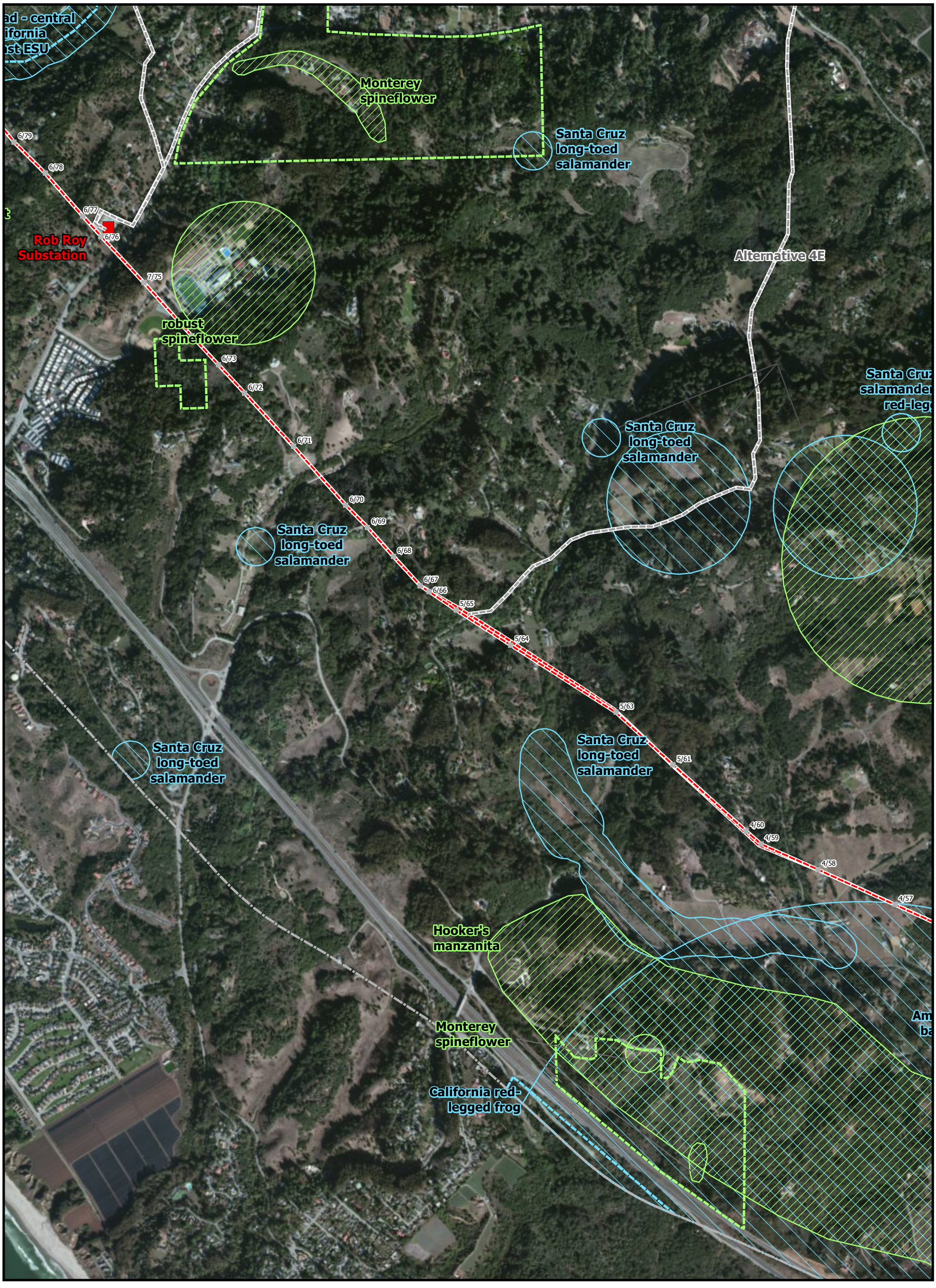
CNDDB and Critical Habitat Map 7 of 8

Santa Cruz Reinforcement Project



CNDDB Occurrence

- Plant Occurrence
- Animal Occurrence

USFWS and NOAA Designated Critical Habitat

- Plant
- Animal

- Existing Substation
- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Study Area (1 Mile)

INSIGNIA ENVIRONMENTAL

Pacific Gas and Electric Company

N W E S

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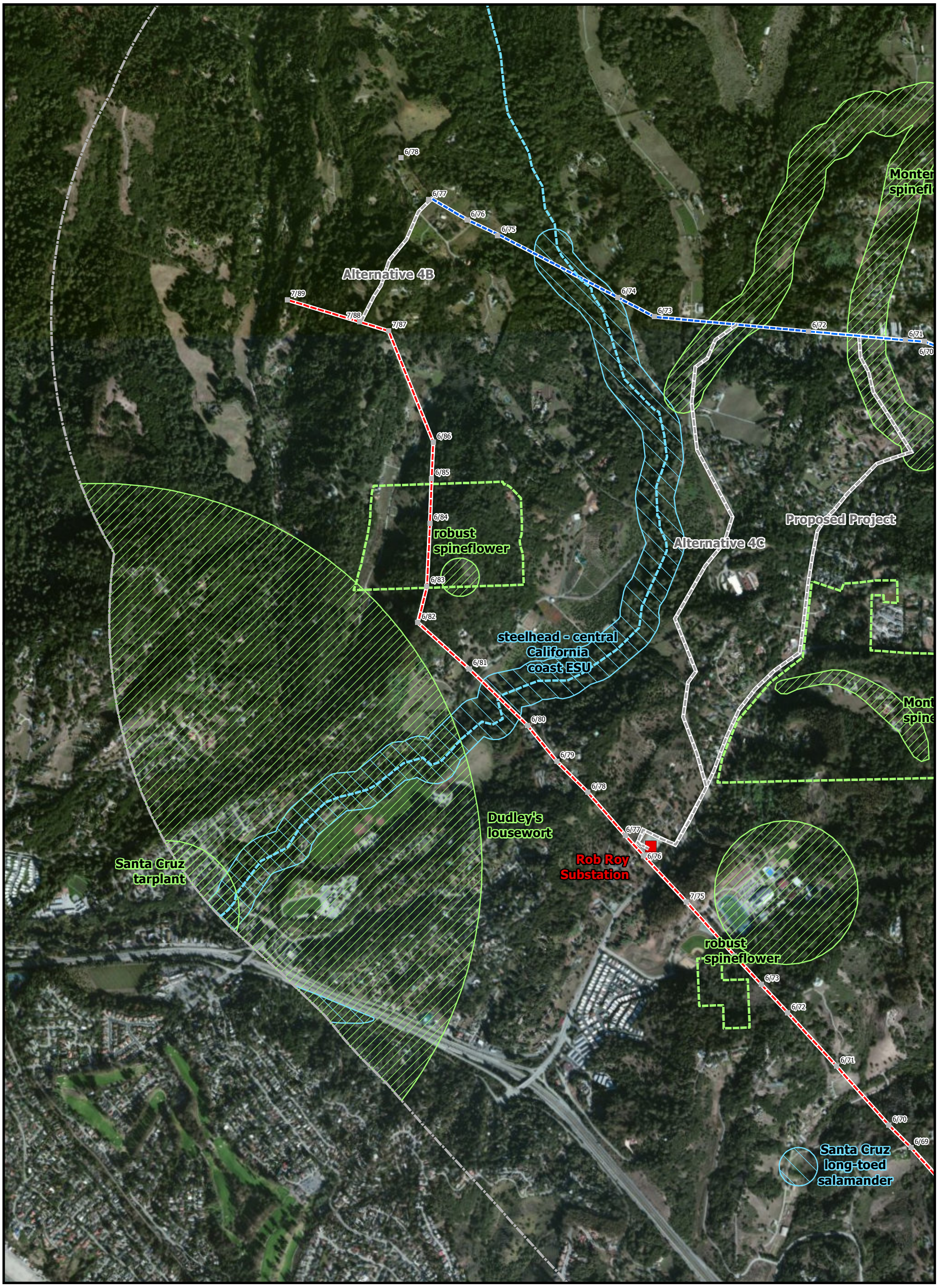

CNDDB and Critical Habitat Map 8 of 8

Santa Cruz Reinforcement Project

- Existing Substation
- Existing Pole
- New Alignment
- Northern Alignment
- Southern Alignment
- Study Area (1 Mile)

CNDDB Occurrence
- Plant Occurrence
- Animal Occurrence

USFWS and NOAA Designated Critical Habitat
- Plant
- Animal

INSIGNIA ENVIRONMENTAL

Pacific Gas and Electric Company

N W E S

1:15,000

0 500 1,000 2,000 3,000 4,000 Feet

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ATTACHMENT E: CONFIDENTIAL CULTURAL AND PALEONTOLOGICAL RESOURCES ASSESSMENT FOR ALTERNATIVES FOR THE SANTA CRUZ 115 KV REINFORCEMENT PROJECT

CONFIDENTIAL PURSUANT TO CALIFORNIA GOVERNMENT CODE 6254.10 AND PROVIDED SEPARATELY