DOCKETED	
Docket Number:	23-OPT-02
Project Title:	Darden Clean Energy Project
TN #:	253060-3
Document Title:	Appendix U Incidental Take Permit Form_Volume 3_Darden Clean Energy
Description:	California Endangered Species Act Incidental Take Permit Application
Filer:	Evelyn Langsdale
Organization:	Rincon Consultants
Submitter Role:	Applicant Consultant
Submission Date:	11/9/2023 1:10:08 PM
Docketed Date:	11/9/2023

Appendix U - Volume 3

Incidental Take Permit Form

Attachment U.2 - Volume 3

Biological Resources Assessment

Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Solar Facility

0 100 200 Feet N

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Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Solar Facility

0 100 200
Feet
N

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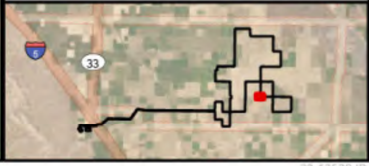

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Darden Clean Energy Project

Fresno County, California

- Jurisdictional Study Area (250-Foot Buffer)
- CDFW - Streambed
- RWQCB - Non-Wetland Waters of the State

Project Components

- Utility Switchyard
- Utility Switchyard Parcel
- Gen-Tie Line ROW

0 100 200 Feet N

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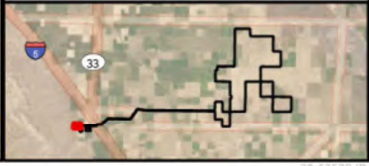

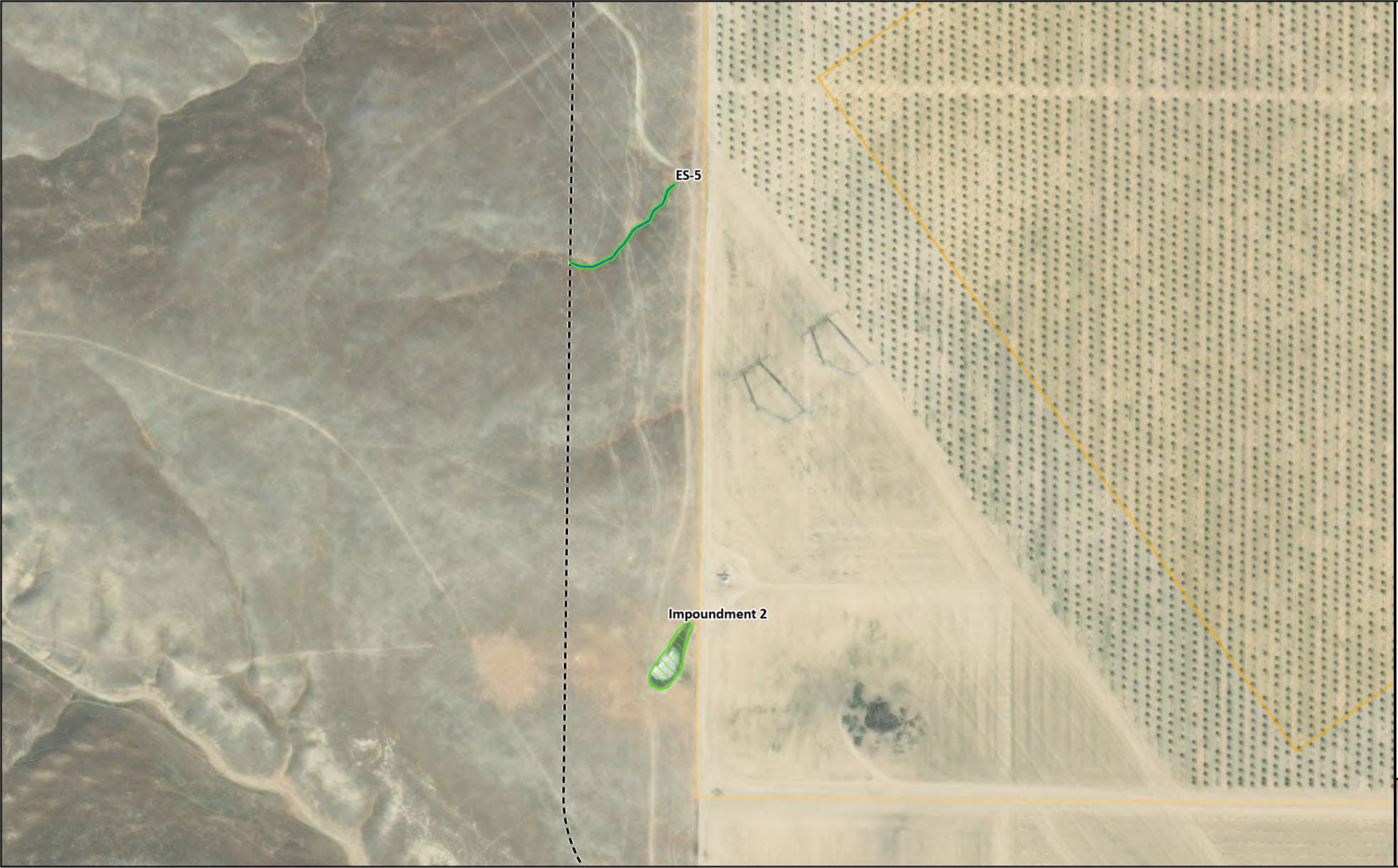

Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

CDFW - Streambed

RWQCB - Non-Wetland Waters of the State

Project Components

Utility Switchyard

Utility Switchyard Parcel

0 100 200

Feet

N

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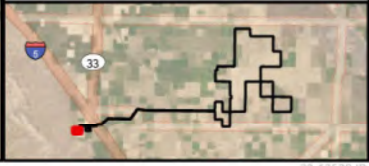

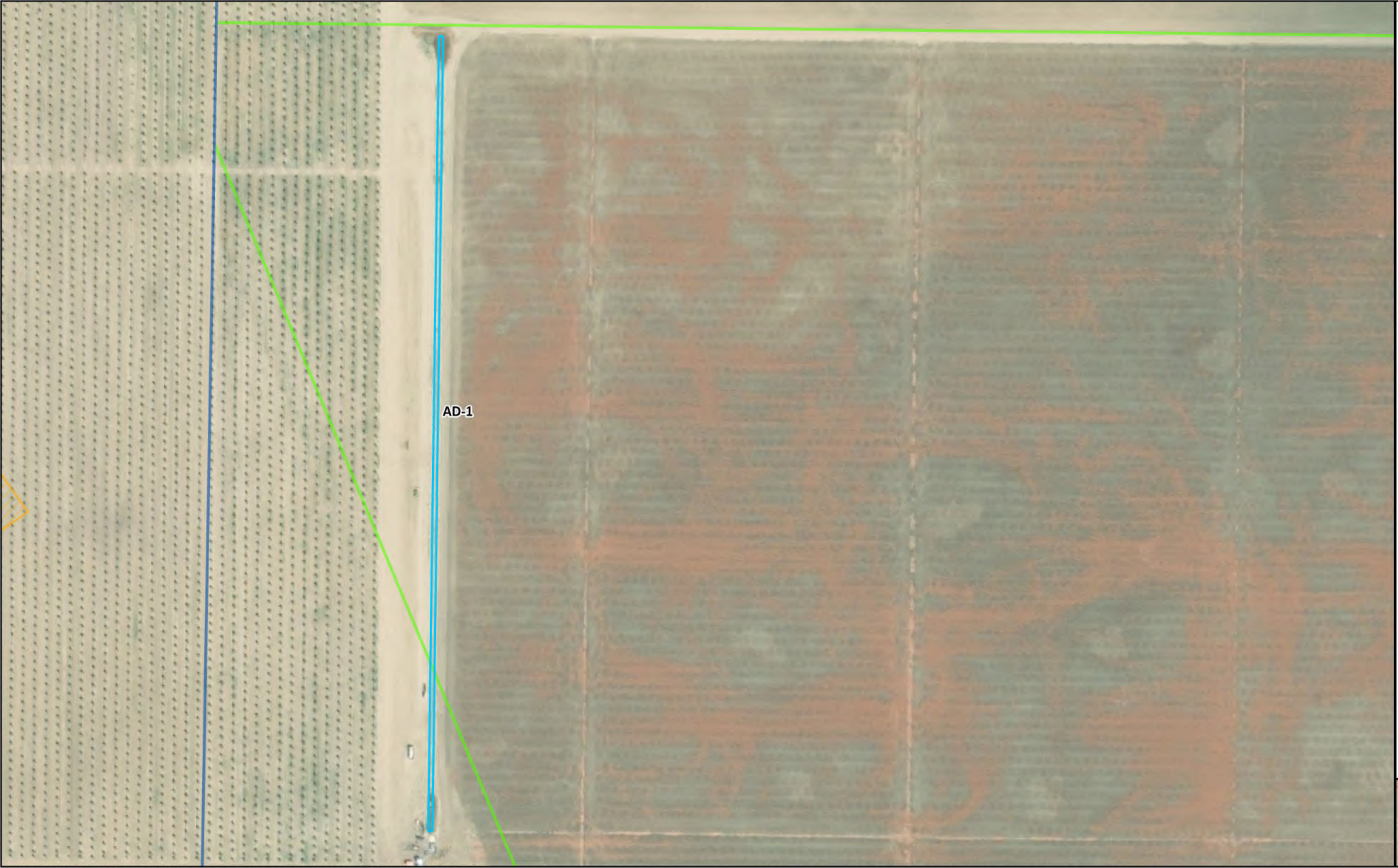

Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Utility Switchyard

Utility Switchyard Parcel

Alternate Green Hydrogen Site

Green Hydrogen Facility

Green Hydrogen Parcels

0 100 200 Feet N

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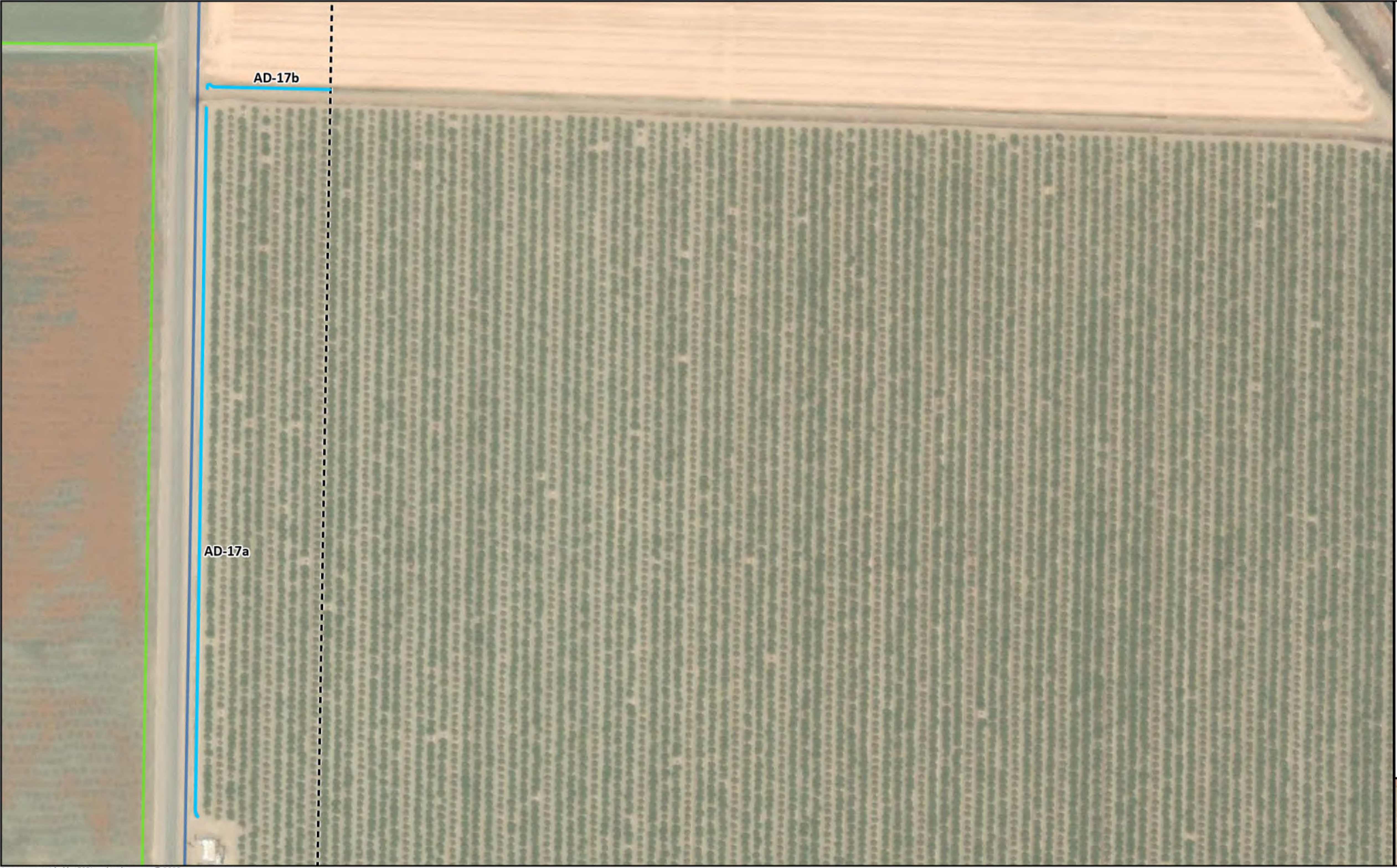

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Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Alternate Green Hydrogen Site

Green Hydrogen Facility

Green Hydrogen Parcels

0 100 200
Feet
N

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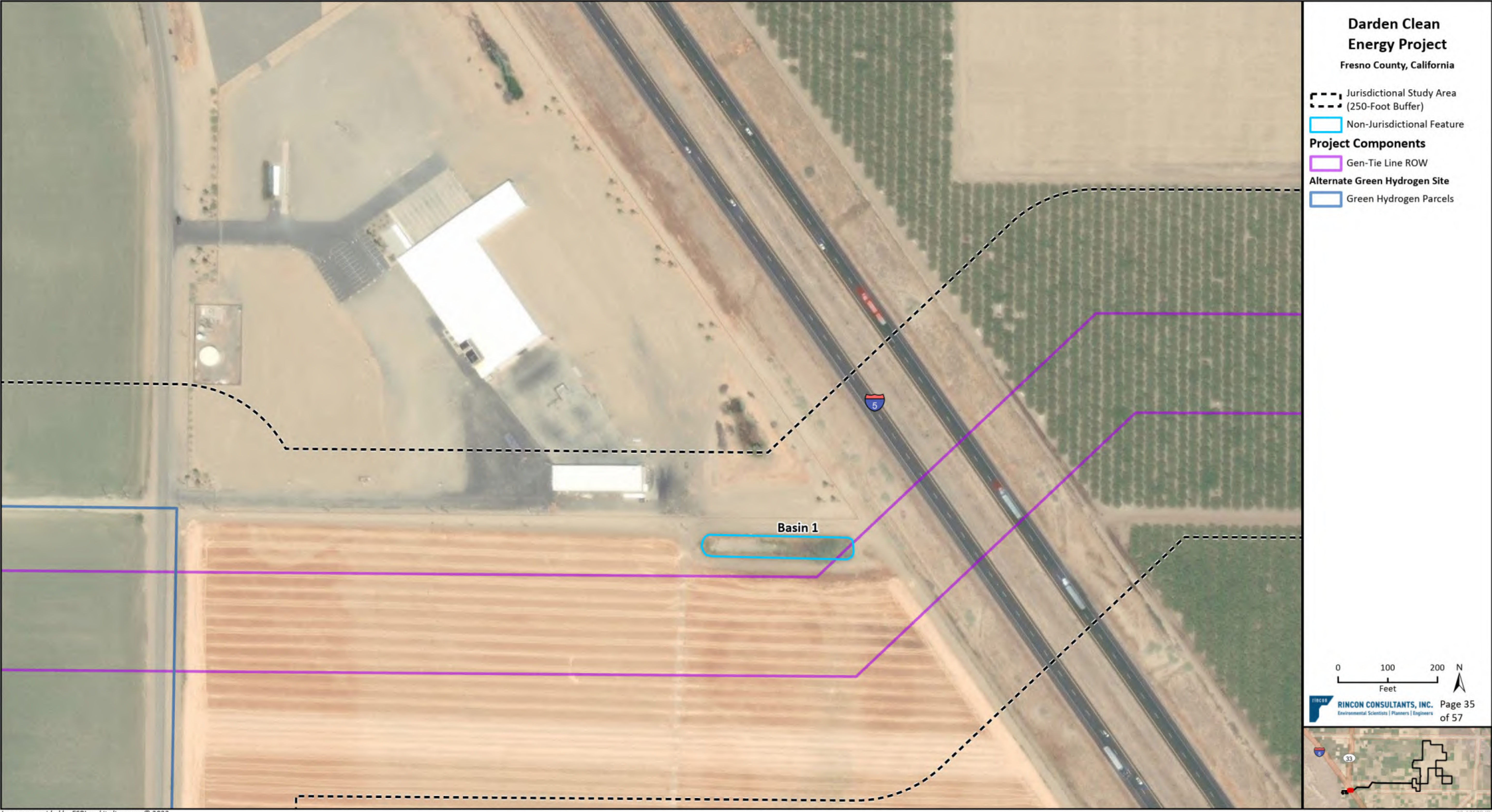

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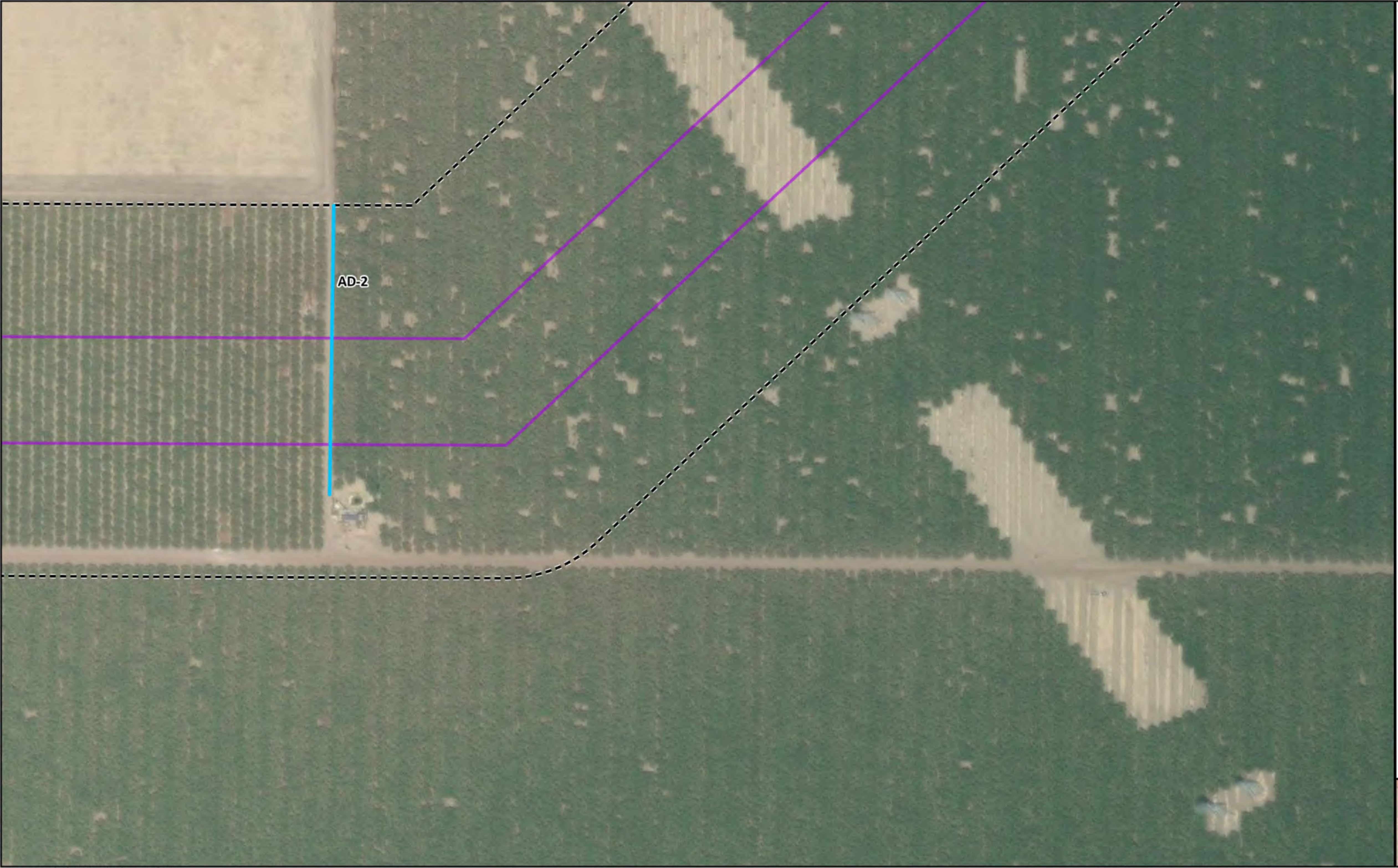

Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Gen-Tie Line ROW

0 100 200 Feet N

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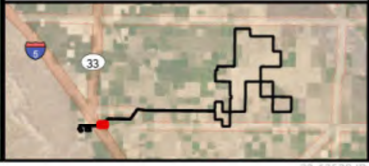

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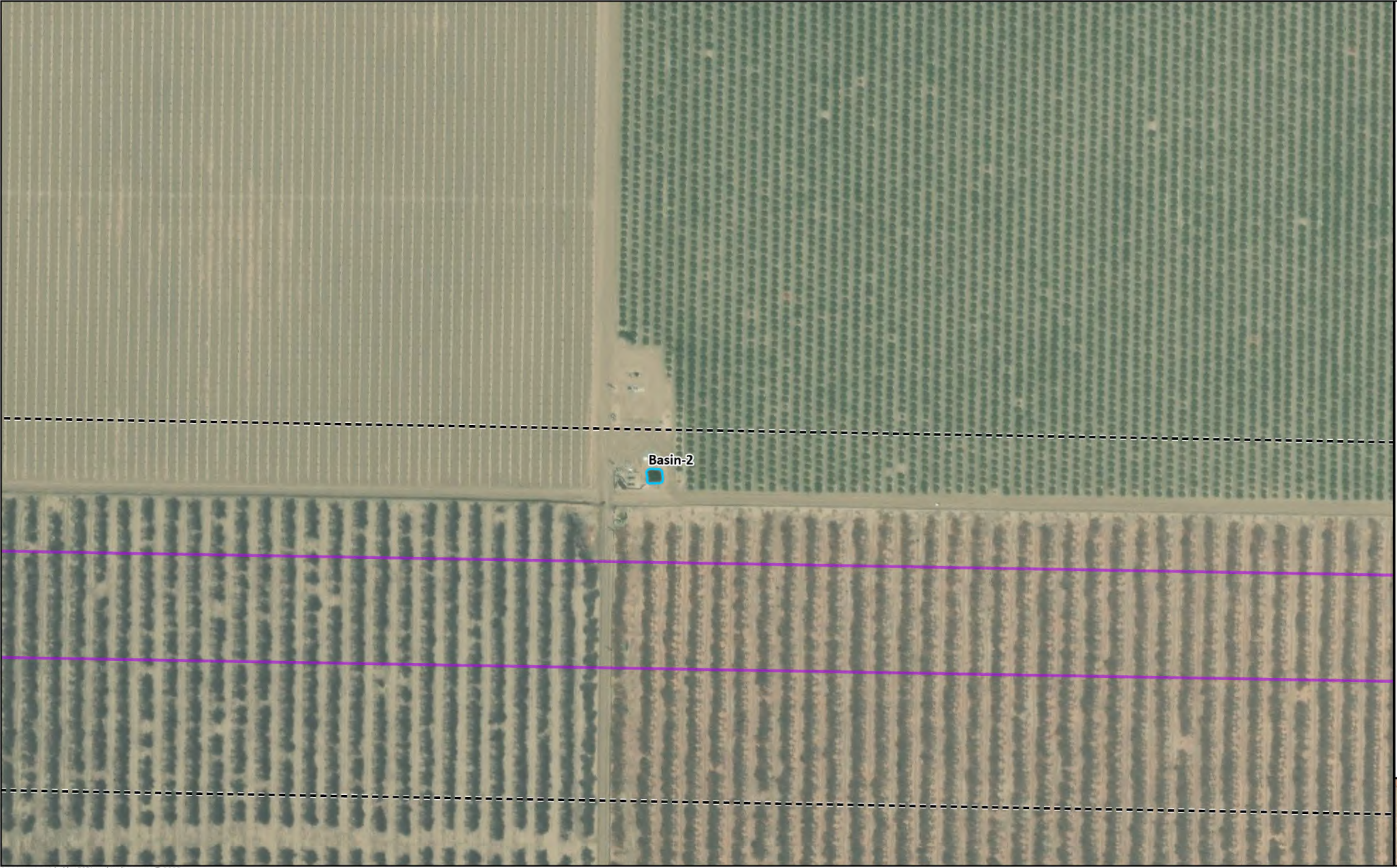

Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Gen-Tie Line ROW

0 100 200
Feet
N

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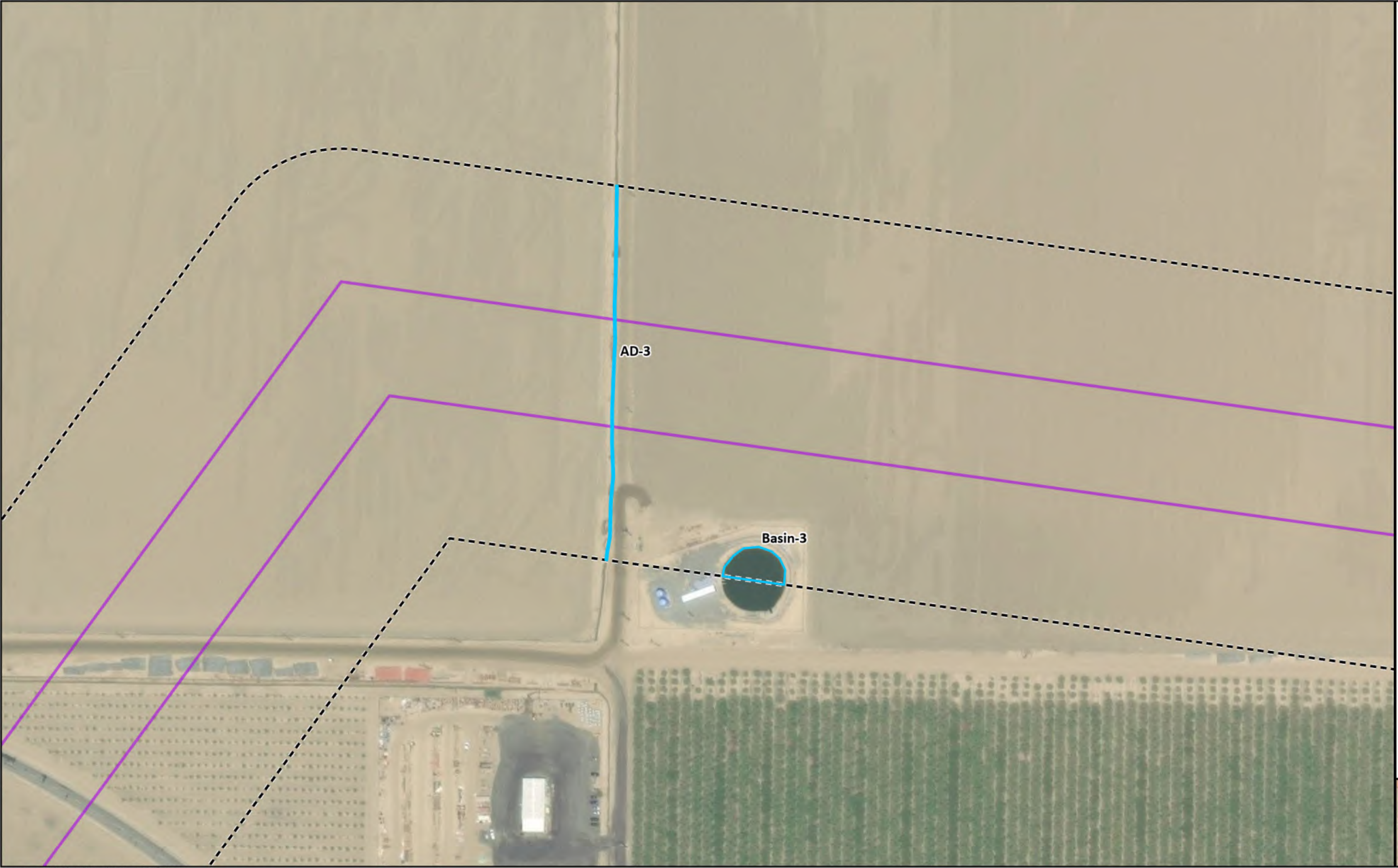

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Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Gen-Tie Line ROW

0 100 200
Feet
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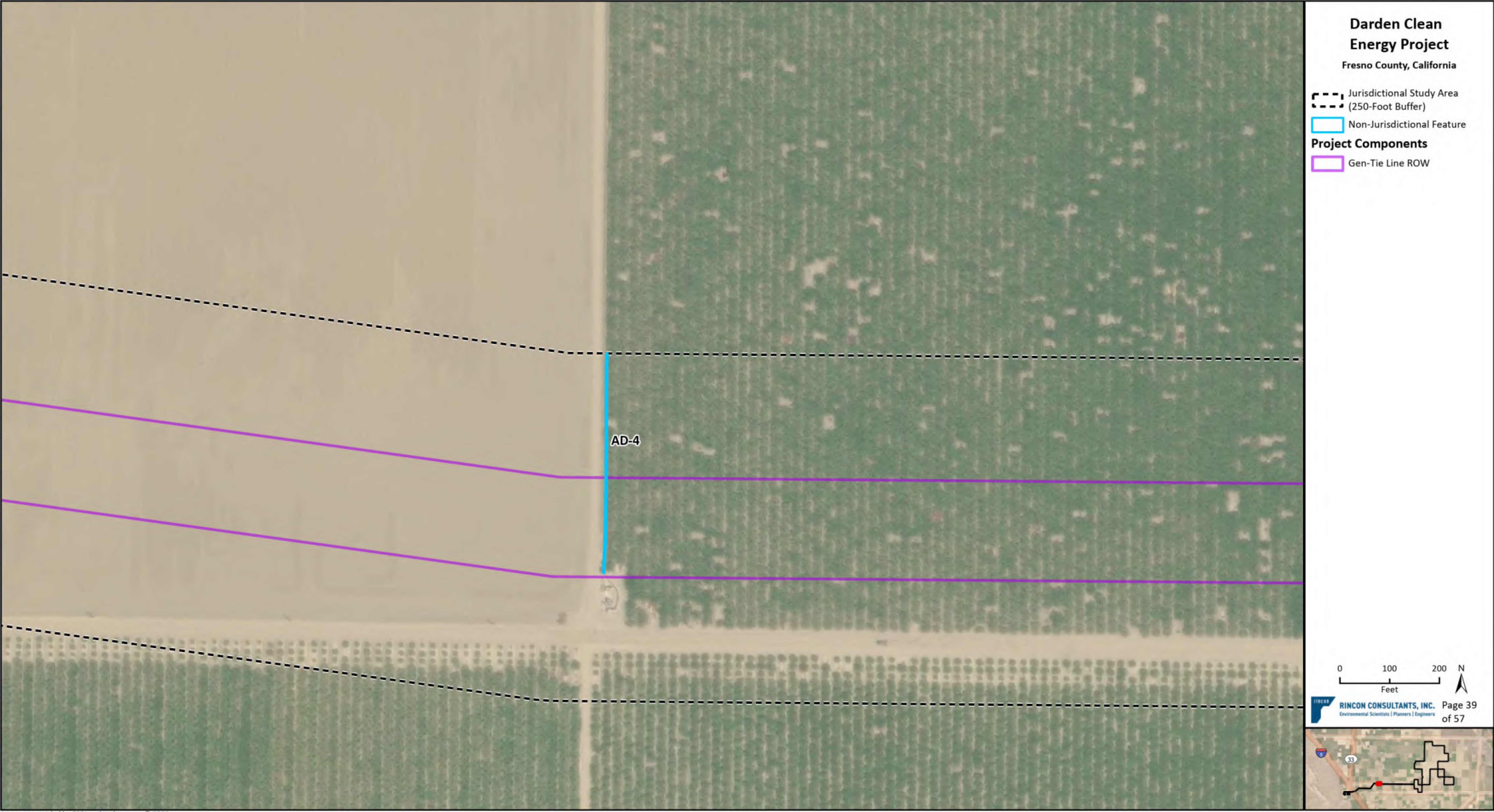

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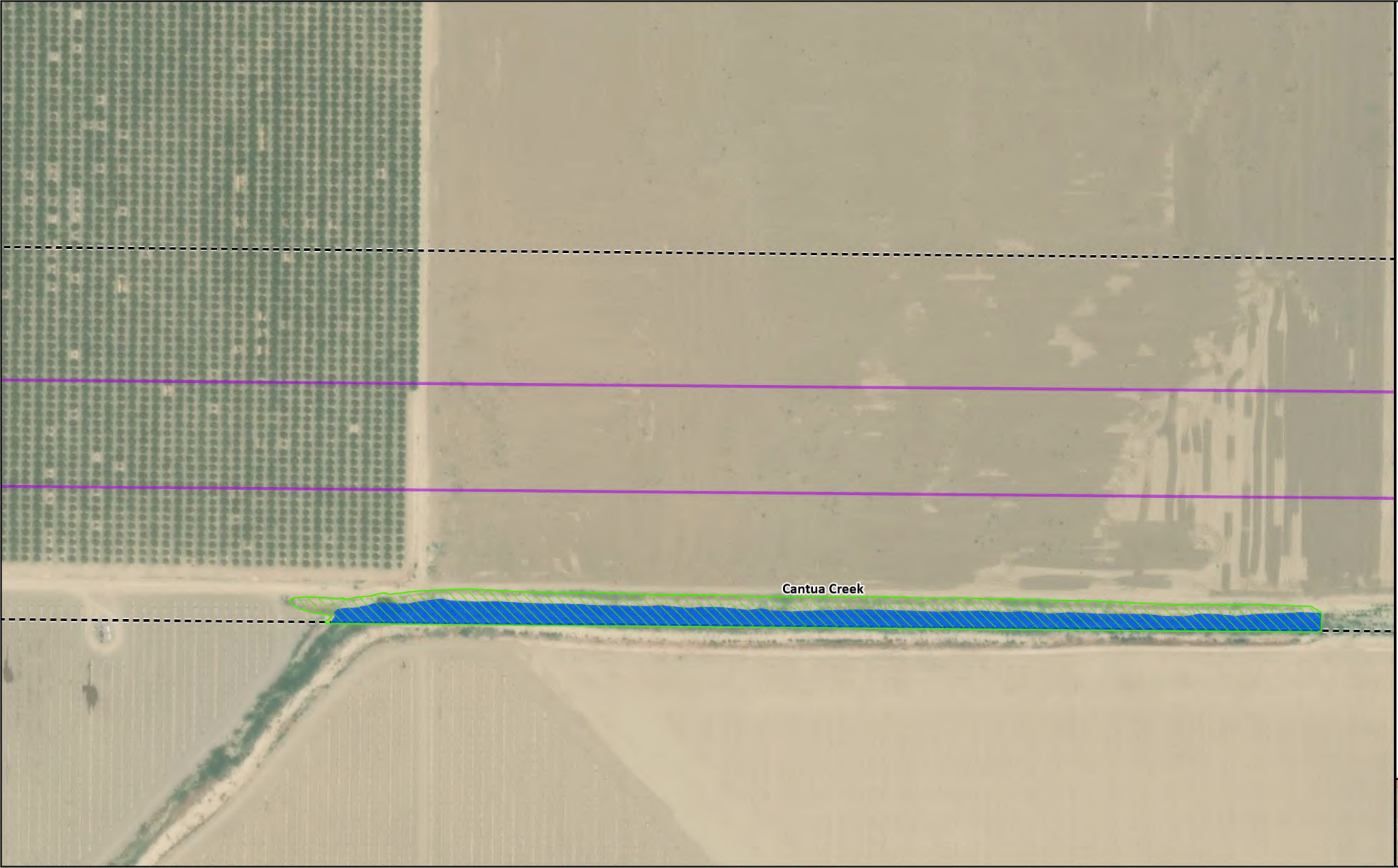

Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

CDFW - Streambed

RWQCB - Non-Wetland Waters of the State

Project Components

Gen-Tie Line ROW

0 100 200 Feet

N

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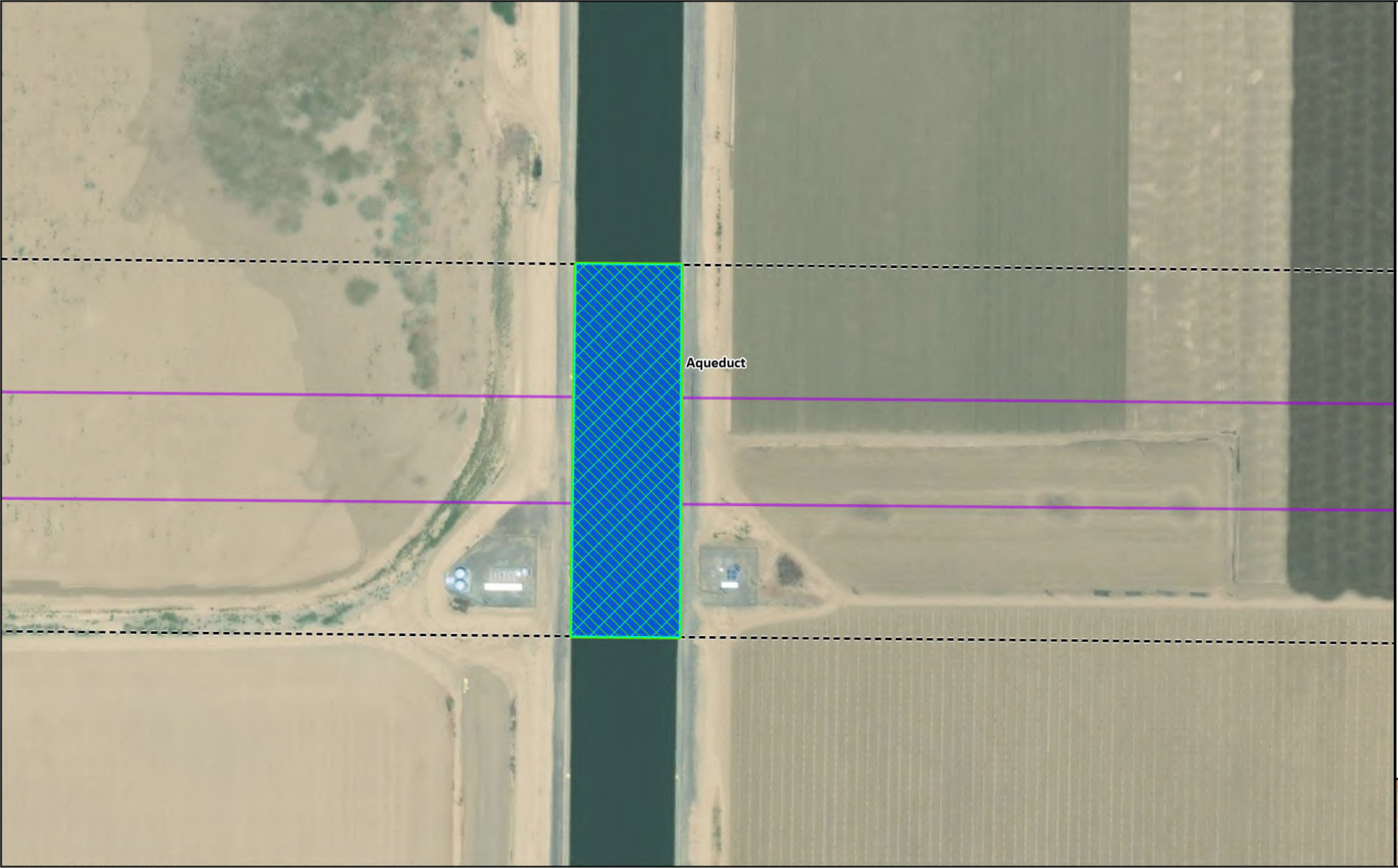

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Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

USACE - Non-Wetland Waters of the U.S.

CDFW - Streambed

RWQCB - Non-Wetland Waters of the State

Project Components

Gen-Tie Line ROW

0 100 200 Feet

N

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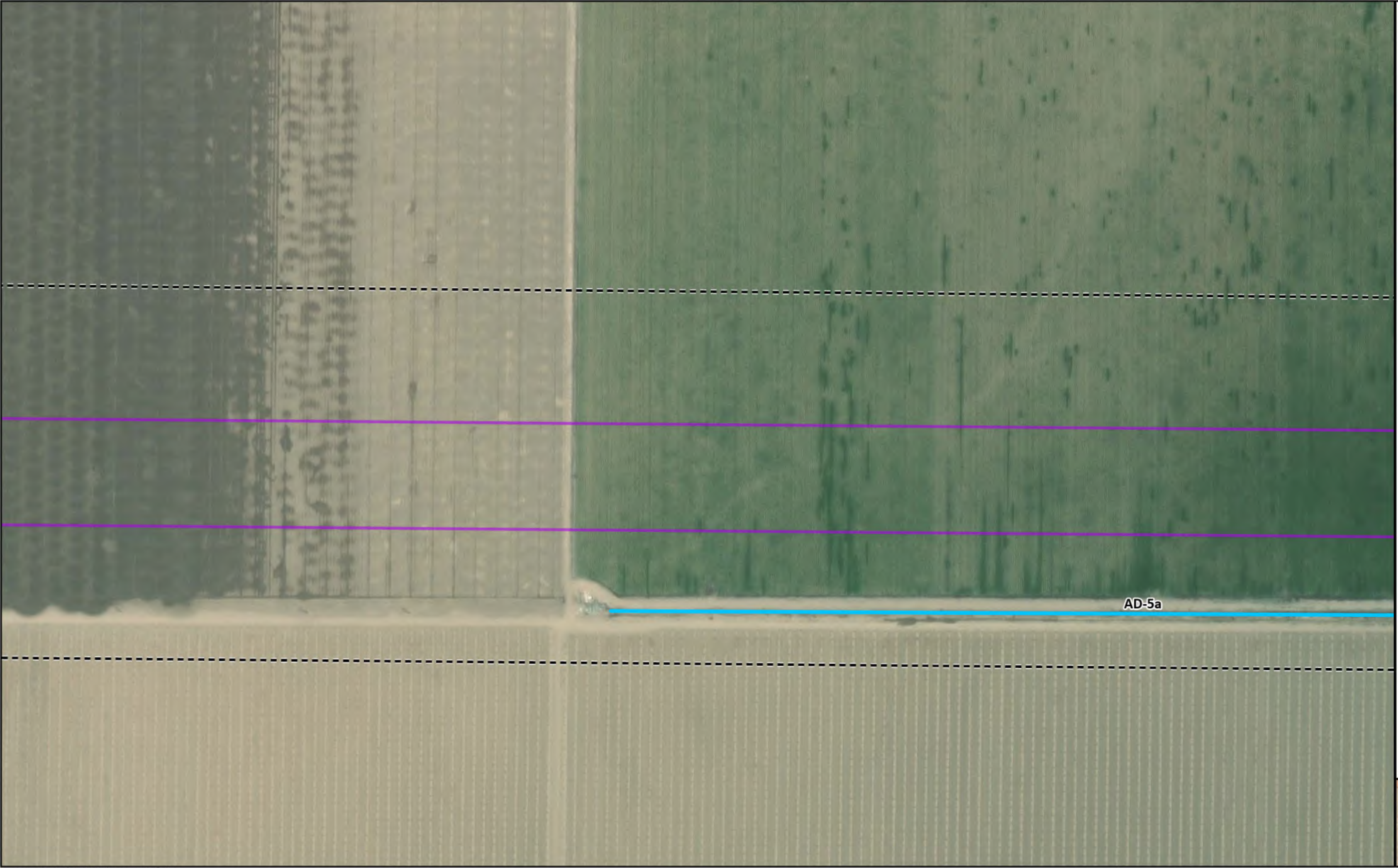

Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Gen-Tie Line ROW

0 100 200
Feet
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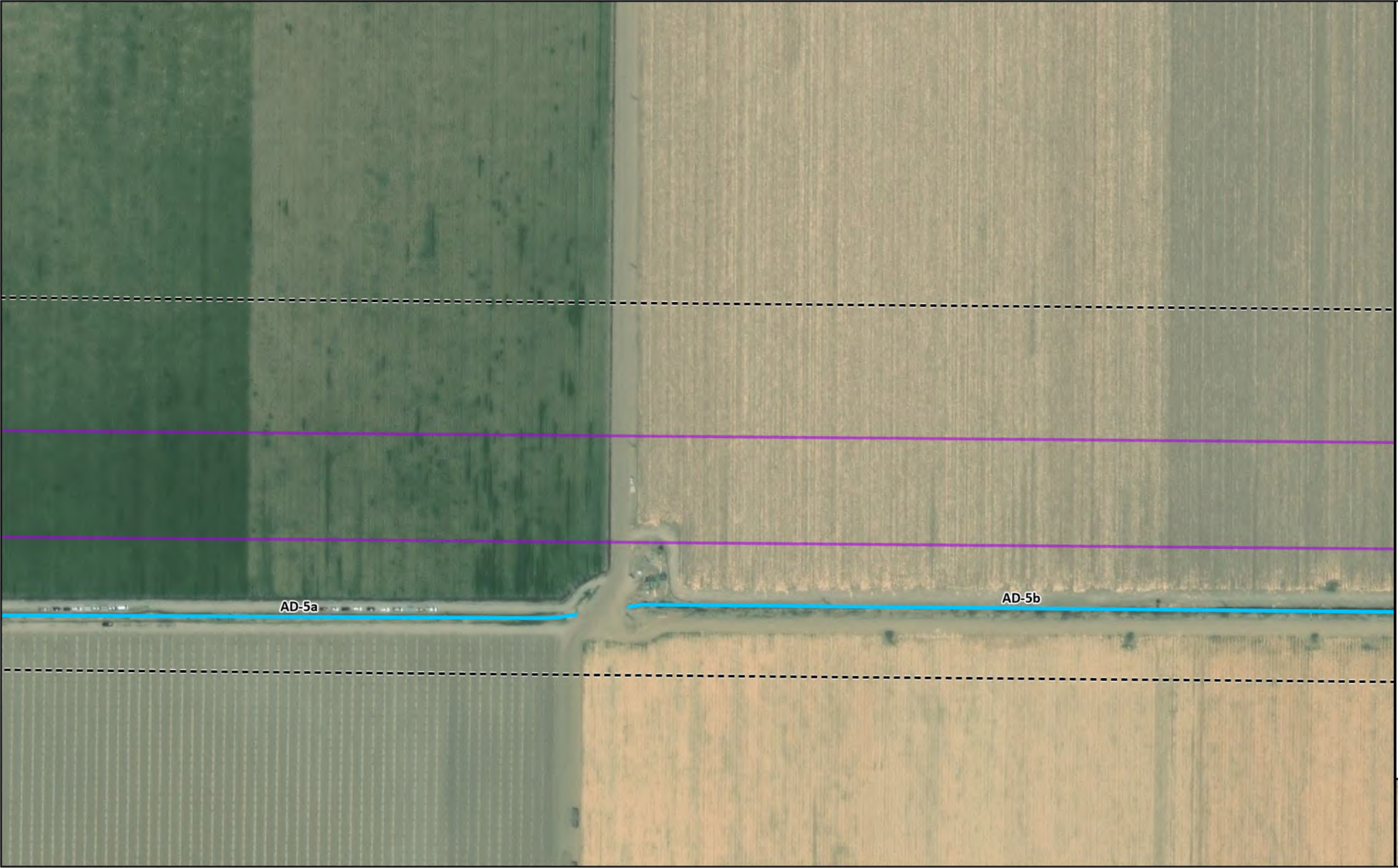

Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Gen-Tie Line ROW

0 100 200 Feet N

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Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Gen-Tie Line ROW

0 100 200 Feet

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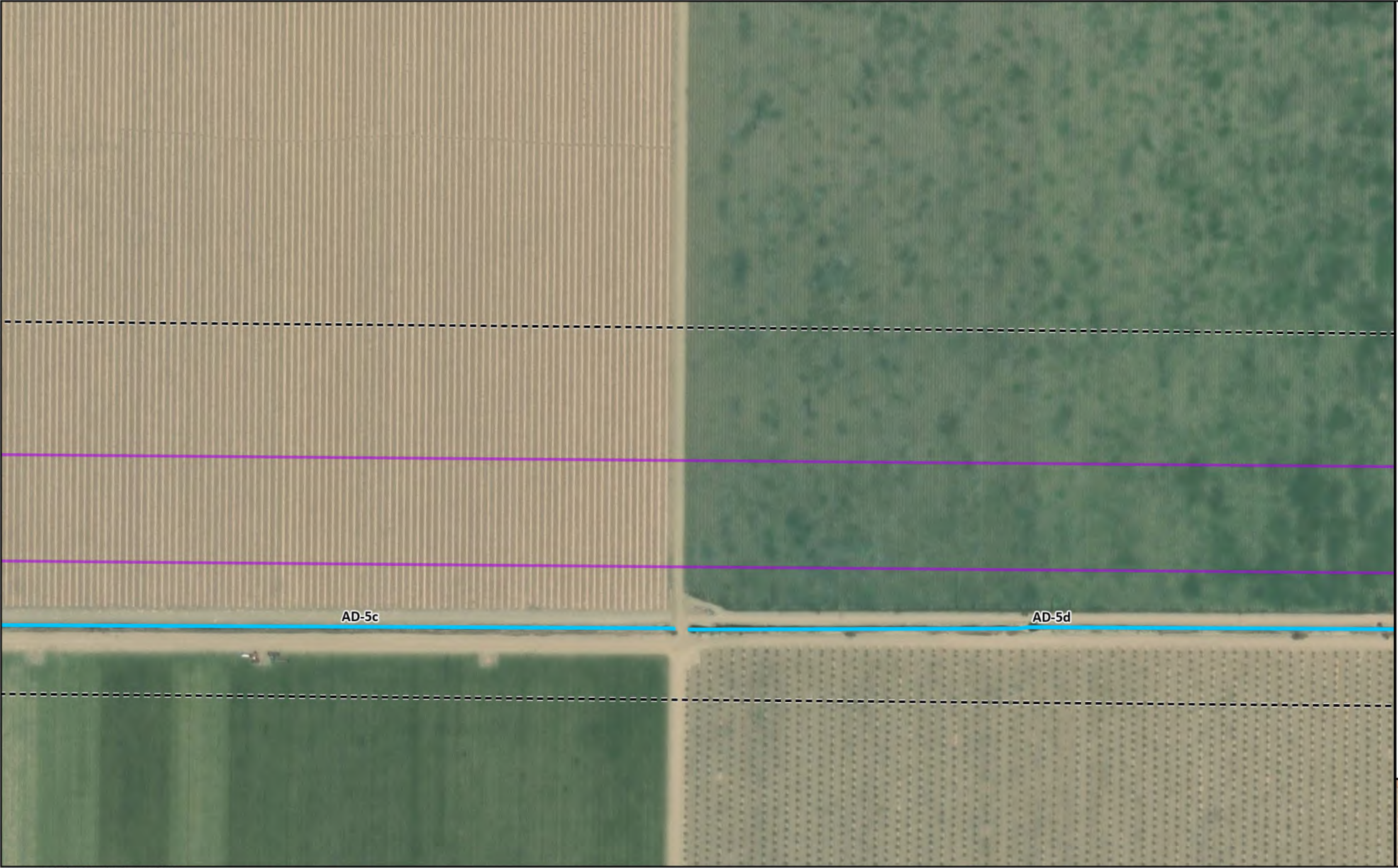

Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)
Non-Jurisdictional Feature

Project Components

Gen-Tie Line ROW

0 100 200 Feet N

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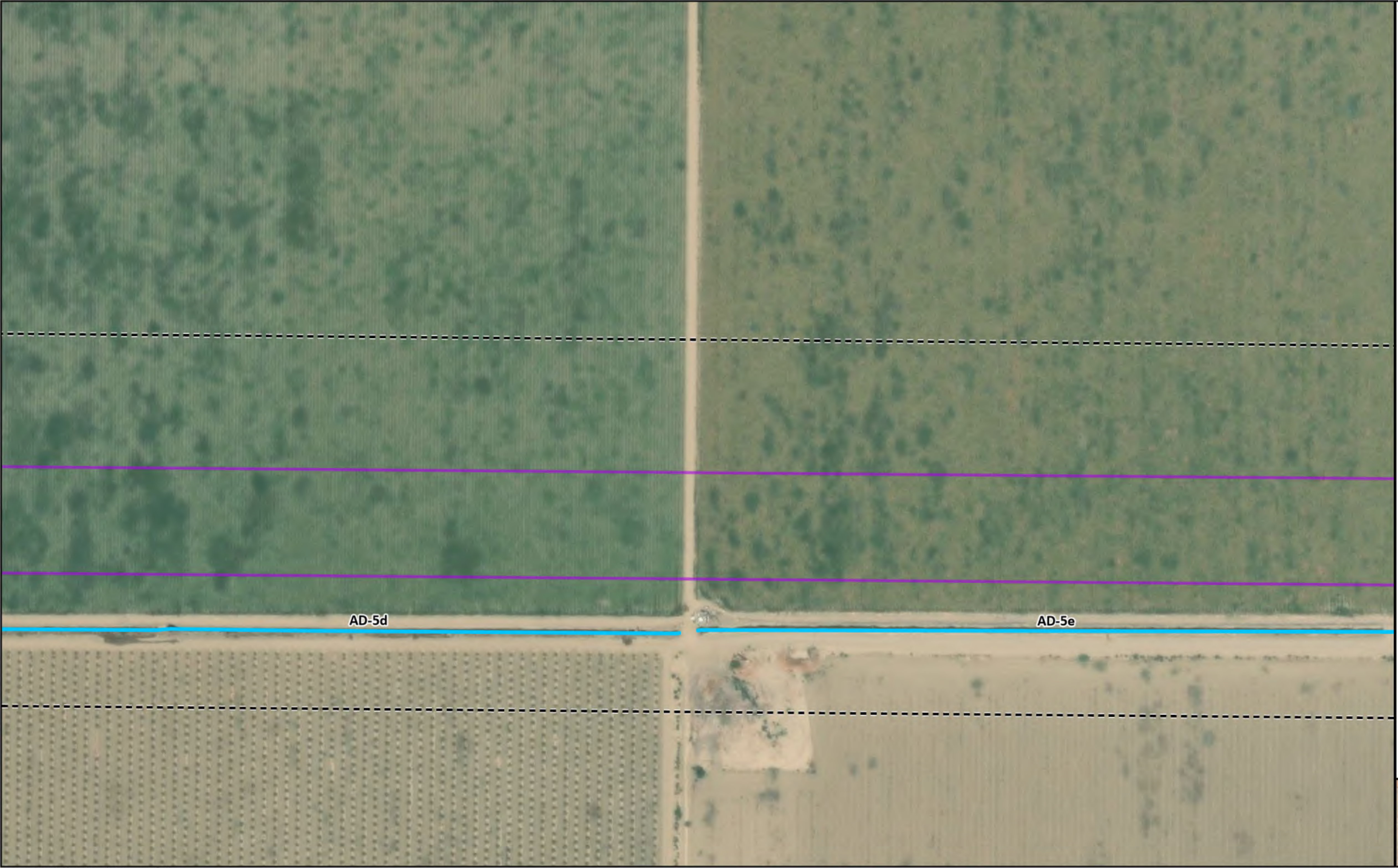

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Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Gen-Tie Line ROW

0 100 200 Feet

N

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Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

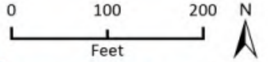
Non-Jurisdictional Feature

Project Components

Solar Facility

Option 2

BESS



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Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Solar Facility

Option 2

Green Hydrogen Facility

0 100 200 Feet

N

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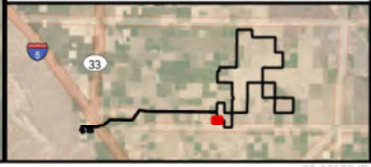

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Darden Clean Energy Project

Fresno County, California

- Jurisdictional Study Area (250-Foot Buffer)
- Non-Jurisdictional Feature

Project Components

- Solar Facility

Option 2

- Green Hydrogen Facility

0 100 200 Feet

N

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Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Solar Facility

0 100 200
Feet
N

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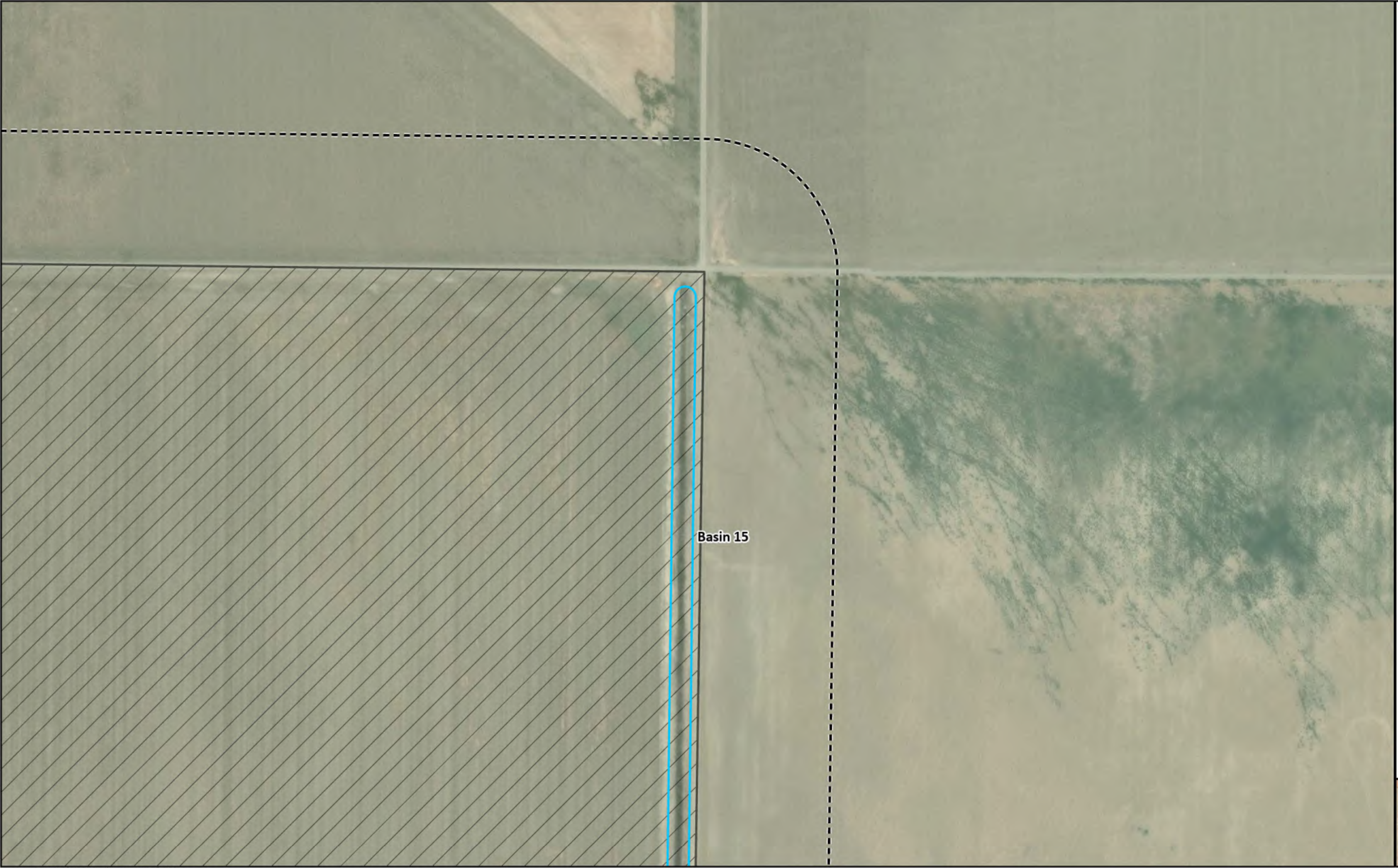

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Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Solar Facility

0 100 200 Feet

N

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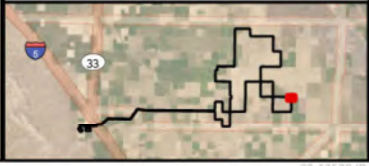

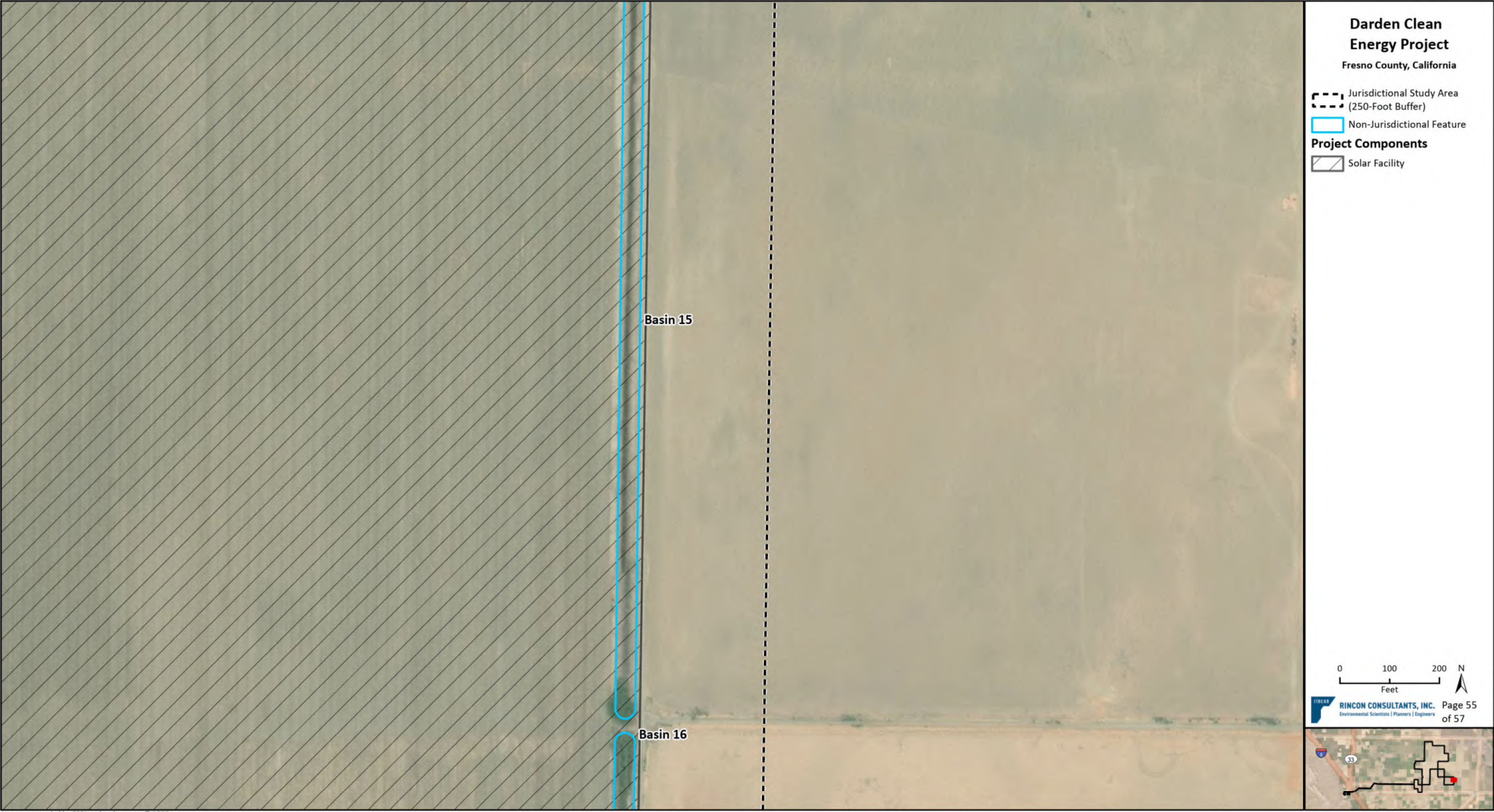

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Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Solar Facility

0 100 200 Feet N

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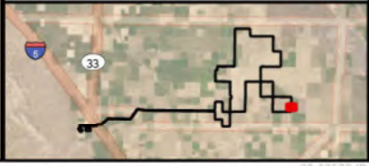

Darden Clean Energy Project

Fresno County, California

Jurisdictional Study Area (250-Foot Buffer)

Non-Jurisdictional Feature

Project Components

Solar Facility

0 100 200 Feet N

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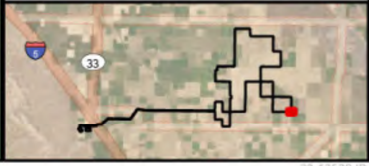

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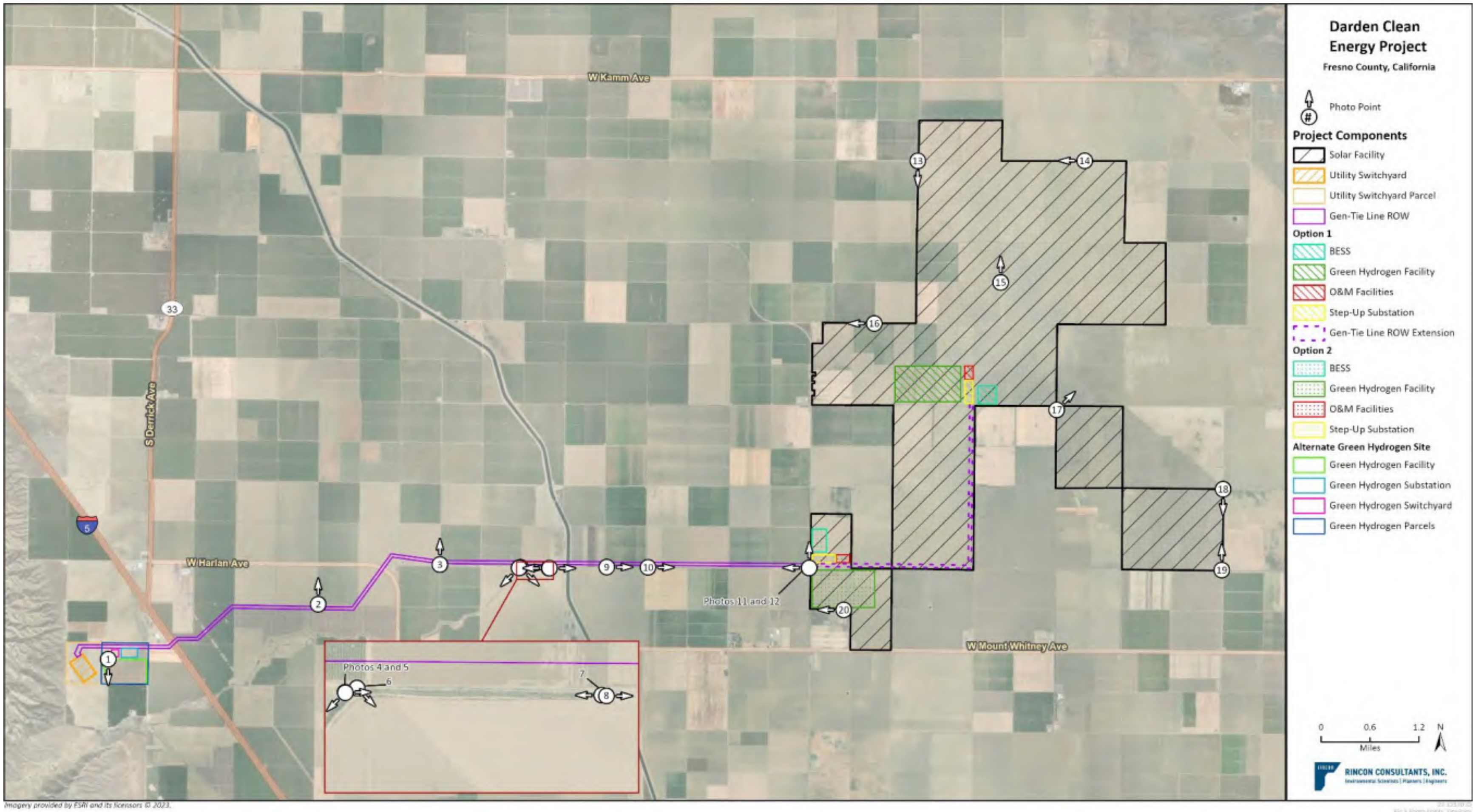
Appendix Q-10

Aquatic Resources Representative Photographs

Figure I-1 Photo Point Locations



Photograph 1. View southwest, Cantua Creek, Photo Point 6. The creek here is channelized between levees as it enters the gen-tie line ROW buffer area. Dominant hydrophytic vegetation in the channel is sandbar willow (*Salix exigua*) (FACW). Other vegetation on the banks includes annual sunflower (*Helianthus annuus*) (FACU), big saltbush (*Atriplex lentiformis*) (FACU), Russian thistle (*Salsola tragus*) (FACU), and tree tobacco (*Nicotiana glauca*) (FAC).

Photograph 2. View east of Cantua Creek, on the south edge of the gen-tie line ROW buffer, Photo Point 4. The tree is a Fremont cottonwood (*Populus fremontii subsp*. *fremontii*) (FAC). An OHWM data sheet was prepared for Cantua Creek in the approximate location of this photograph and is attached in Appendix J.

Photograph 3. View south, Cantua Creek, Photo Point 5. Evidence of shelving indicating the OHWM. Other indicators include break in slope, scour, and sediment sorting.

Photograph 4. View west near the terminus of Cantua Creek, Photo Point 7. Here the creek bed meets the level of both adjacent fields, flow sinks into the ground, and the levees abruptly end.

Photograph 5. View east near the terminus of Cantua Creek, Photo Point 8. The line of vegetation in the center is primarily annual sunflower and Russian thistle and indicators of an OHWM as seen in Photos 1-3 are absent. The levee of the California Aqueduct is visible in the distance.

Photograph 6. View northeast, Basin 12, Photo Point 17. This basin is dominated by tule and cattails, with Goodding's willow (*Salix gooddingii*) (FACW) on the banks. Paired Wetland Sample Point Data Sheets SP1 (wetland) and SP2 (upland) were completed to characterize the vegetation at this basin and are attached in Appendix J. Soil pits were not dug due to inaccessible steep slopes; standing water and an abrupt change from hydrophytic to non-hydrophytic vegetation was observed. Adjacent to the west and connected via an under-road culvert is Basin 13, with a long and narrow L-shape and containing much the same vegetation. Both basins meet the three-parameter definition of a wetland with hydrophytic vegetation, presumed hydric soils, and hydrology. However, the basins are excavated in uplands and used and maintained for agricultural operations. Therefore, these basins are considered non-jurisdictional as isolated, manmade excavated features used for agriculture.

Photograph 7. View south, from north end of Basin 15, Photo Point 18. At this end, the basin was dry during the August survey and contained evidence of non-hydrophytic vegetation, though progressing south there appears to be a gradient of decreasing elevation where water remains longer, with evidence of dried hydrophytic vegetation such as curly dock (*Rumex crispus*) (FAC), small areas that were still saturated or had standing water with live curly dock and (Polygonum sp.), and a pool of standing water at the far end with several large Goodding's willows, seen in the distance in the photo. Evidence of a culvert connecting to Basin 16 to the south was not detectable and the basins show no evidence of flow. The NWI shows this basin, Basin 16, and Basin 17 (at the south end of Basin 16 and running east-west) as part of an extensive system to the east of the JSA and has these features mapped as R4SBc. However, there is no evidence these are channelized historically natural streams, no evidence they are connected, and no evidence of flow. While fallow at the time of the delineation site visit in August 2023, at the time of the reconnaissance site visit in December of 2022, the ditch and field seen on the right in the photo were barren dirt, with the exception of the Goodding’s willows. As part of agricultural operations, these basins are considered non-jurisdictional.

Photograph 8. View north, from south end of Basin 16, Photo Point 19. Water was still present over a greater distance of this basin than Basin 16 with standing water in much of the south end. There is a small group of Goodding's willow near the center. This basin is in line with Basin 15 in Photograph 7; however, no culvert was detected and no connection could be established. As noted above, these basins were barren of vegetation in December of 2022, with the exception of the Goodding's willows. Basins 15, 16, and 17 are considered non-jurisdictional as they are for agricultural purposes.

Photograph 9. View south, AD-1, Photo Point 1. Typical of larger, primarily u-shape agricultural ditches with natural line on bank and slight erosion creating slope break where water enters the ditch. Average OHWM width is 8 feet. Ditch is non-jurisdictional as it is for agricultural purposes. An OHWM data sheet was prepared for this feature in the approximate location of center of this photograph and is attached in Appendix J.

Photograph 10. View North, AD-4, Photo Point 3. Top left of photo shows typical of v-ditch created to hold irrigation pipes. Average width at top is 3 feet. Many additional ditches of this type were not mapped as they are not intended to convey or hold water directly. They are frequently created and destroyed, do not meet the definition of waters, and would be non-jurisdictional as they are used for agricultural purposes.

Photograph 11. View east, AD-5, Photo Point 9. AD-5 is typical of trapezoidal ditches throughout the Project site. The average OHWM width is 3 feet, often widening somewhat at culverted crossings. By design the ditch has a bed and banks, other indicators include break in slope and natural line on bank. In some reaches the ditch is vegetated, here with Russian thistle and further west includes bearded sprangletop (*Leptochloa fusca* subsp. *fascicularis*) (NL) and other non-hydrophytic vegetation. This ditch was being actively maintained during the survey by a crew removing vegetation further to the east.

Photograph 12. View east, AD-5, Photo Point 10. AD-5 is on the left in the photo, parallel on the right is a pipe v-ditch with Russian thistle that has been removed to lay the pipe.

Photograph 13. View west, AD-5, Photo Point 12. View of typical culvert crossing of ditch AD-5. Average size of culverts is 30-inches.

Photograph 14. View north, AD-6, Photo Point 11. View at the intersection of West Harlan Avenue and South Sonoma Avenue. AD-6 has an average width of 5 feet and is connected to AD-5 through the culvert seen on the left. This section is also generally trapezoidal in shape, and a slope break can be seen on the bank near the center of the photo. Vegetation is Russian thistle and bearded sprangletop. AD-6 continues north along South Sonoma Avenue, within the 250 foot buffer of the Project site. AD-6 flows through a culvert into canal AC-1 approximately 0.5 miles north. AC-1 averages 40 feet in width and is connected on the north to AC-2, averaging 65 feet in width, which runs offsite. While supporting vegetation occasionally, these ditches and canals are maintained regularly and generally kept free of vegetation. An OHWM data sheet was prepared for this feature in the approximate location of the upper right of this photograph and is attached in Appendix J.

Photograph 15. View west, AD-8, Photo Point 16. Typical of small u-shaped ditches throughout the site. Average OHWM width is 2 feet. Non-jurisdictional as it is used for agricultural purposes.

Photograph 16. View east, AD-17, Photo Point 20. Ditch not currently in use for agriculture. The average width is 5 feet, approximately 80% vegetated though much of it is dead; All vegetation present is upland, primarily telegraph weed (*Heterotheca grandiflora*) (NL), annual sunflower, prickly lettuce (*Lactuca seriola*) (FACU), and big saltbush. No current hydrology and does not meet the definition of a wetland; non-jurisdictional. An OHWM data sheet was prepared for this feature in the approximate location of the upper center of this photograph and is attached in Appendix J.

Photograph 17. View north, AD-10, Photo Point 15. Large ditch not currently in use. Average width is 15 feet, dominated by annual sunflower and prickly lettuce. No current hydrology and does not meet the definition of a wetland; non-jurisdictional.

Photograph 18. View northwest, Basin 2, Photo Point 2. Typical small basin for agriculture, non-jurisdictional. Vegetation surrounding the basin is nonnative annual grass.

Photograph 19. View south, Basin 8, Photo Point 13. Typical larger basin in active use, average OHWM width is 45 feet, generally unvegetated.

Photograph 20. View south, Basin 9, Photo Point 14. Typical large basin not currently in use for agriculture. Average width is 30 ft, covered by nonnative annual grasses; this basin was unvegetated during the December 2022 reconnaissance survey. Other vegetation in similar basins include prickly lettuce and annual sunflower. No current hydrology and does not meet the definition of a wetland; non-jurisdictional.

Appendix Q-11

Delineation Data Sheet

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Darden Solar **Project Number:** 22-12530 **Stream:** Cantua Creek **Investigator(s):** K. Asmus O. Rout	**Date:** 8/21/23 **Time:** **Town:** **State:** **Photo begin file#:** **Photo end file#:**
Y ☒ / N ☐ Do normal circumstances exist on the site?	**Location Details:**
Y ☒ / N ☐ Is the site significantly disturbed?	**Projection:** **Datum:** **Coordinates:**

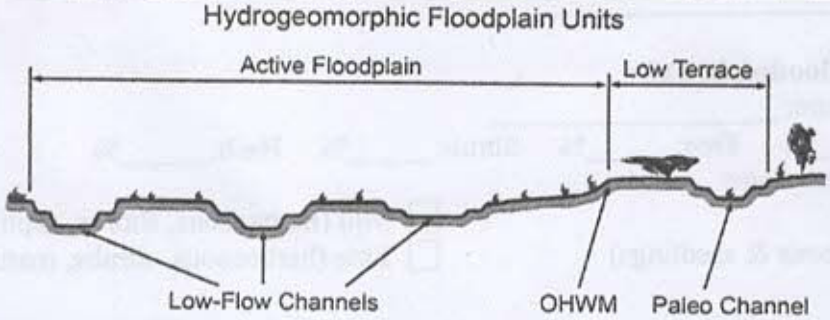
Potential anthropogenic influences on the channel system:
Farming, berms

Brief site description:
Channel runs southwest to northeast, then east across orchard and row crop fields, eventually dissapating at the California Aqueduct

Checklist of resources (if available):

- ☒ Aerial photography
  Dates:
- ☒ Topographic maps
- ☒ Geologic maps
- ☒ Vegetation maps
- ☒ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☒ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

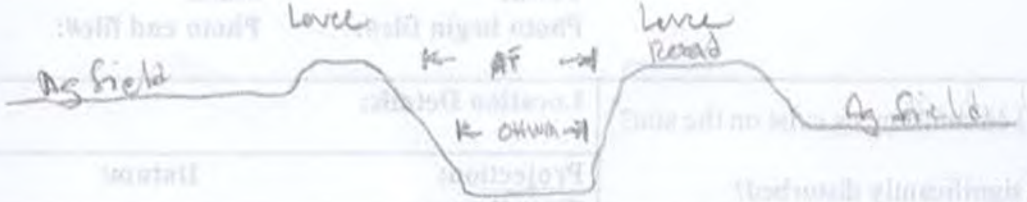


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☒ Mapping on aerial photograph ☒ GPS
   - ☒ Digitized on computer ☐ Other:

Project ID: **Cross section ID:** 1 **Date:** **Time:**

Cross section drawing:



OHWM

GPS point: ______________________

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☒ Change in vegetation cover
- ☒ Break in bank slope
- ☒ Other: Shelving
- ☐ Other: ______________

Comments:

Floodplain unit: ☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ______________________

Characteristics of the floodplain unit:

Average sediment texture: Silt and sand

Total veg cover: 5 % Tree: 0 % Shrub: 11 % Herb: 5 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☒ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☒ Surface relief
- ☒ Other: Sediment sorting
- ☐ Other:
- ☐ Other:

Comments:

Project ID: **Cross section ID:** 1 **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: ______

Characteristics of the floodplain unit:

Average sediment texture: silt and sand — occasional cobble, Some concrete slabs near top of bank/levee

Total veg cover: 58 % Tree: 8 % Shrub: 15 % Herb: 25 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☒ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☒ Surface relief
- ☒ Other: Erosion & scour
- ☒ Other: Bank slough/undercut
- ☒ Other: Bank cut

Comments:

Cantra Creek is mapped in NWI as intermittent. Here on the site it is channelized between levees. Natural course appears to have been north into what is now an ag field. Sink is indicated in NHD and it does disappear into valley floor at east end of levees

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ______

Characteristics of the floodplain unit:

Average sediment texture: ______

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ______
- ☐ Other: ______
- ☐ Other: ______

Comments:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Darden Solar City/County: Fresno County Sampling Date: 08/22/2023

Applicant/Owner: Intersect Power State: CA Sampling Point: SP1

Investigator(s): Kristin Asmus and Owen Routt Section, Township, Range: S12, T16S, R16E

Landform (hillslope, terrace, etc.): Valley floor Local relief (concave, convex, none): Flat Slope (%): 0

Subregion (LRR): C Lat: 36.472507° Long: -120.192999° Datum: WGS 1984

Soil Map Unit Name: Tranquility, clay, saline-sodic, wet, 0 to 1 percent slopes NWI classification: PUBFx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔ No ____	**Is the Sampled Area within a Wetland?**	**Yes ✔ No ____**
Hydric Soil Present?	Yes ✔ No ____		
Wetland Hydrology Present?	Yes ✔ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 10x10ft)			
1. Typha lattifolia	65	Y	OBL
2. Schoenoplectus actus	15	N	OBL
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover	80		

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

✔ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No ____

Remarks:

Feature is an approx. 2 acre agricultural basin with well-developed freshwater marsh with a narrow fringe of upland vegetation. Edge of wetland is visible by abrupt change in vegetation from OBL to UPL species.

SOIL

Sampling Point: SP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ✔ No ______

Remarks:

No soil pit was dug, basin sides were steep with dense growth of vegetation. Hydric soils are assumed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✔ No ______ Depth (inches): ______________

Water Table Present? Yes ______ No ______ Depth (inches): ______________

Saturation Present? (includes capillary fringe) Yes ______ No ______ Depth (inches): ______________

Wetland Hydrology Present? Yes ✔ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Basin was full of water at the time of the survey in August.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Darden Solar City/County: Fresno County Sampling Date: 08/22/2023

Applicant/Owner: Intersect Power State: CA Sampling Point: SP2

Investigator(s): Kristin Asmus and Owen Routt Section, Township, Range: S12, T16S, R16E

Landform (hillslope, terrace, etc.): Valley floor Local relief (concave, convex, none): Flat Slope (%): 0

Subregion (LRR): C Lat: 36.472512° Long: -120.192899° Datum: WGS 1984

Soil Map Unit Name: Tranquility, clay, saline-sodic, wet, 0 to 1 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No ✔

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No ✔
Hydric Soil Present?	Yes ___	No ✔
Wetland Hydrology Present?	Yes ___	No ✔

Is the Sampled Area within a Wetland? Yes ___ No ✔

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 10x10 ft)			
1. Tamarix parviflora	5	Y	FAC
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 10x10ft)			
1. Atriplex lentiformis	30	Y	FACU
2. Helianthus annuus	35	Y	FACU
3. Salsola tragus	25	Y	FACU
4. Lactuca seriola	15	N	FACU
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover	105		

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ___	x 1 = ___
FACW species ___	x 2 = ___
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✔

Remarks:

Upland paired point with SP1. Feature is an approx. 2 acre agricultural basin with well-developed freshwater marsh with a narrow fringe of upland vegetation. Edge of wetland is visible by abrupt change in vegetation from OBL to FACU species.

SOIL

Sampling Point: SP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ____ No ✔

Remarks:

No soil pit was dug, basin sides were steep with dense growth of vegetation and vegetation break was very distinct.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✔ Depth (inches): ____

Water Table Present? Yes ____ No ✔ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ✔ Depth (inches): ____

Wetland Hydrology Present? Yes ____ No ✔

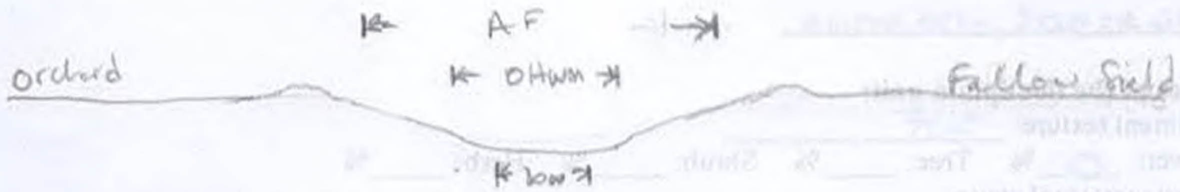
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Data point is paired upland to SP1, near top of basin sides.

Project ID: **Cross section ID:** 3 **Date:** **Time:**

Cross section drawing:



OHWM

GPS point: 36.425018, -120.402135

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☒ Break in bank slope
- ☒ Other: Natural line on bank
- ☐ Other:

Comments:

Active agricultural ditch, wide U-shape, unvegetated

Floodplain unit: ☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: 36.425019, -120.402127

Characteristics of the floodplain unit:

Average sediment texture: silt

Total veg cover: 0 % Tree: % Shrub: % Herb: %

Community successional stage:

- ☒ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☒ Surface relief
- ☐ Other:
- ☐ Other:
- ☐ Other:

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Darden Solar
Project Number: 22-12530
Stream: N/A
Investigator(s): K. Asmus

Date: 8/21/2023
Time:
Town: N/A Fresno County
State: CA
Photo begin file#:
Photo end file#:

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☒ / N ☐ Is the site significantly disturbed?

Location Details:

Projection: WGS
Datum: 1984
Coordinates:

Potential anthropogenic influences on the channel system:

Active agriculture

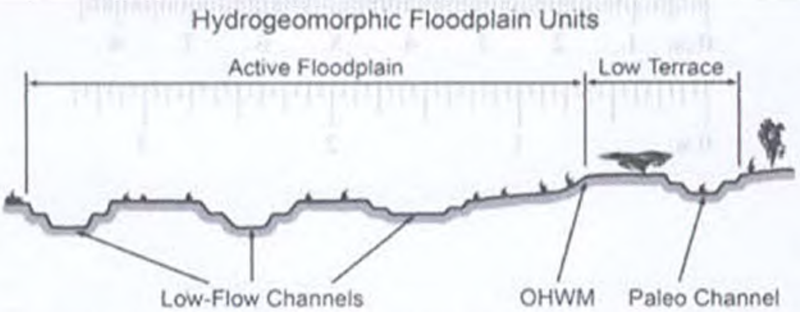
Brief site description:

Active agriculture, orchard to west, fallow field to east

Checklist of resources (if available):

- ☒ Aerial photography
  Dates: many, Google Earth
- ☒ Topographic maps
- ☒ Geologic maps
- ☒ Vegetation maps
- ☒ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☒ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

- ☐ Mapping on aerial photograph
- ☒ Digitized on computer
- ☐ GPS
- ☐ Other:

Project ID: **Cross section ID:** 3 **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: 36.425028, -120.402146

Characteristics of the floodplain unit:

Average sediment texture: Silt

Total veg cover: 0 % Tree: ___ % Shrub: ___ % Herb: ___ %

Community successional stage:

☒ NA

☐ Early (herbaceous & seedlings)

☐ Mid (herbaceous, shrubs, saplings)

☐ Late (herbaceous, shrubs, mature trees)

Indicators:

☐ Mudcracks

☐ Ripples

☐ Drift and/or debris

☐ Presence of bed and bank

☐ Benches

☐ Soil development

☐ Surface relief

☒ Other: top of small berm

☐ Other: ___

☐ Other: ___

Comments:

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ___

Characteristics of the floodplain unit:

Average sediment texture: ___

Total veg cover: ___ % Tree: ___ % Shrub: ___ % Herb: ___ %

Community successional stage:

☐ NA

☐ Early (herbaceous & seedlings)

☐ Mid (herbaceous, shrubs, saplings)

☐ Late (herbaceous, shrubs, mature trees)

Indicators:

☐ Mudcracks

☐ Ripples

☐ Drift and/or debris

☐ Presence of bed and bank

☐ Benches

☐ Soil development

☐ Surface relief

☐ Other: ___

☐ Other: ___

☐ Other: ___

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Darden Solar **Project Number:** 22-12530 **Stream:** N/A **Investigator(s):** K. Asnus	**Date:** 8/22/23 **Town:** N/A **Photo begin file#:**	**Time:** **State:** CA **Photo end file#:**
Y ☒ / N ☐ Do normal circumstances exist on the site?	**Location Details:**	
Y ☒ / N ☐ Is the site significantly disturbed?	**Projection:** WGS **Coordinates:**	**Datum:** 1984

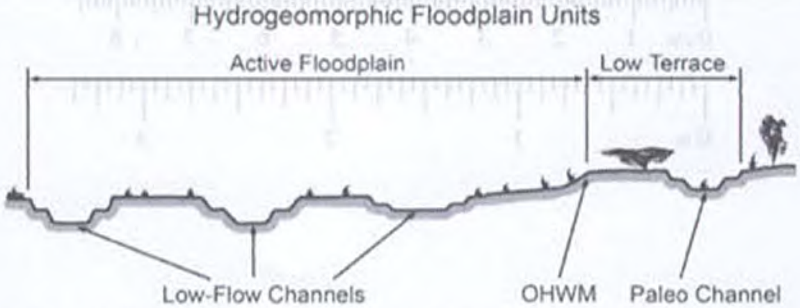
Potential anthropogenic influences on the channel system:
Active agriculture

Brief site description:
Active agricultural fields and dirt roads adjacent, paved road on other side (S. Sonoma Blvd)

Checklist of resources (if available):

- ☒ Aerial photography
  Dates: various Google Earth
- ☒ Topographic maps
- ☒ Geologic maps
- ☒ Vegetation maps
- ☒ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☒ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☒ Digitized on computer
   - ☒ GPS
   - ☐ Other:

Project ID: Darden **Cross section ID:** 2 **Date:** 8/22/23 **Time:**

Cross section drawing:

OHWM

GPS point: 36.443649, -120.248021

Indicators:

- [ ] Change in average sediment texture
- [ ] Change in vegetation species
- [ ] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: ____
- [ ] Other: ____

Comments:

sediment texture is silt. Active ag ditch w/ some veg, trapezoidal shape
veg is Leptochloa fusca below, salsola tragus above OHWM
30% cover 40% cover

Floodplain unit: [x] Low-Flow Channel [ ] Active Floodplain [ ] Low Terrace

GPS point: 36.443649, -120.248011

Characteristics of the floodplain unit:

Average sediment texture: silt

Total veg cover: 50 % Tree: 0 % Shrub: 0 % Herb: 50 %

Community successional stage:

- [ ] NA
- [x] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [x] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [x] Other: wetted channel, flowing water
- [ ] Other: ____
- [ ] Other: ____

Comments:

Project ID: **Cross section ID:** 2 **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: 36.44852, -120.24831

Characteristics of the floodplain unit:

Average sediment texture: Silt

Total veg cover: 50 % Tree: 0 % Shrub: 0 % Herb: 50 %

Community successional stage:

- ☒ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☒ Other: Ditch TOB in active agriculture
- ☐ Other: ____
- ☐ Other: ____

Comments:

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ____

Characteristics of the floodplain unit:

Average sediment texture: ____

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ____
- ☐ Other: ____
- ☐ Other: ____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Darden solar
Project Number: 22-12530
Stream:
Investigator(s): K. Asmus

Date: 8/22/2023
Town: Fresno County
Photo begin file#:

Time:
State: CA
Photo end file#:

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☒ / N ☐ Is the site significantly disturbed?

Location Details:

Projection: WGS
Datum: 1984
Coordinates:

Potential anthropogenic influences on the channel system:

Active agriculture

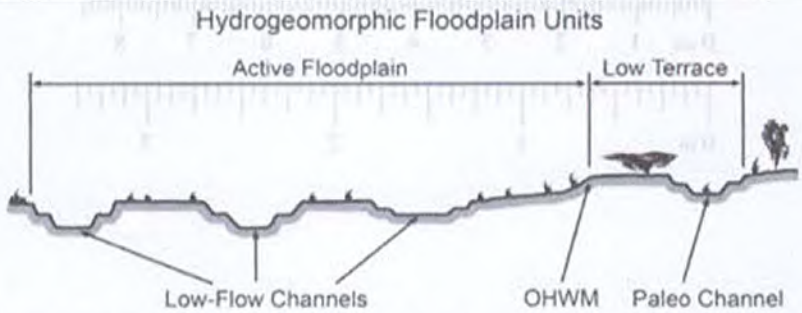
Brief site description:

Overgrown ditch in fallow fields, dirt road to north

Checklist of resources (if available):

- ☒ Aerial photography
  Dates:
- ☒ Topographic maps
- ☒ Geologic maps
- ☒ Vegetation maps
- ☒ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event



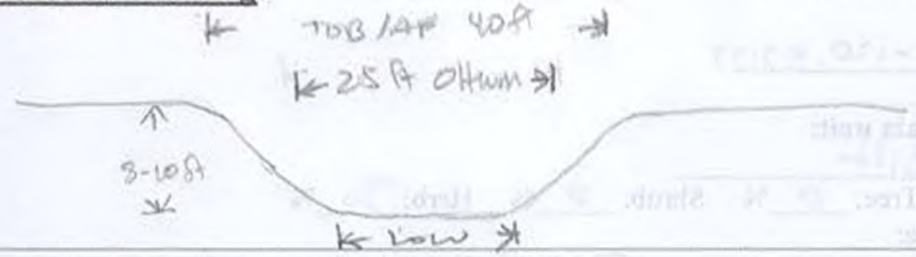
Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

☐ Mapping on aerial photograph ☐ GPS
☒ Digitized on computer ☐ Other:

Project ID: 22-12530 **Cross section ID:** 4 **Date:** 08/22/23 **Time:**

Cross section drawing:



OHWM

GPS point: 36.458333, -120.157145

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☒ Break in bank slope
- ☐ Other: ______
- ☐ Other: ______

Comments:

Basin covered in non native annual grasses, same as adjacent field to west. Grapes in field on east

Floodplain unit: ☑ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: 36.458352, -120.157114

Characteristics of the floodplain unit:

Average sediment texture: Silt

Total veg cover: 90 % Tree: 0 % Shrub: 0 % Herb: 80 %

Community successional stage:

- ☐ NA
- ☑ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☒ Surface relief
- ☐ Other: ______
- ☐ Other: ______
- ☐ Other: ______

Comments:

Project ID: 22-12530 **Cross section ID:** 4 **Date:** 08/22/23 **Time:**

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: 36.458339, -120.152127

Characteristics of the floodplain unit:

Average sediment texture: Silt

Total veg cover: 70 % Tree: 0 % Shrub: 0 % Herb: 70 %

Community successional stage:

- ☐ NA
- ☒ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☒ Other: Top of bank of basin
- ☐ Other: ______
- ☐ Other: ______

Comments:

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ______

Characteristics of the floodplain unit:

Average sediment texture: ______

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ______
- ☐ Other: ______
- ☐ Other: ______

Comments:

Attachment U.3

Swainson's Hawk Conservation Strategy

Darden Clean Energy Project

Swainson's Hawk Conservation Strategy

prepared for

IP Darden I, LLC and Affiliates
wholly owned subsidiaries of Intersect Power, LLC
9450 SW Gemini Drive PMB #68743
Beaverton, Oregon 97008

prepared by

Rincon Consultants, Inc.
7080 North Whitney Avenue, Suite 101
Fresno, California 93720

October 2023

Darden Clean Energy Project

Swainson's Hawk Conservation Strategy

prepared for

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Fresno, California 93720

October 2023

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
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1 Introduction

1.1 Overview of Conservation Strategy

The goal of this conservation strategy is to address potential effects to Swainson's hawk nesting and foraging habitat at the proposed Darden Clean Energy Project (Project) located in Fresno County, California, and in the adjacent regions of the southern San Joaquin Valley. Specifically, this conservation strategy outlines the current status of Swainson's hawk at the Project site, assesses potential impacts, and proposes strategies for avoiding and mitigating potential impacts from construction, operation, and eventual repowering or decommissioning of the Project. Additionally, this plan proposes a research approach to assess the outcome of mitigation and conservation actions based on Swainson's hawk behavior (foraging and nesting success) during the operations phase of the Project, which will allow identification of beneficial practices to manage Swainson's hawk populations to be applied broadly to future renewable energy development on Westlands Water District lands in the southern San Joaquin Valley that have been retired from agricultural practices[1].

The overall intent is to conserve the existing regional Swainson's hawk population while allowing for the State to achieve its goals of confronting climate change and protecting groundwater resources. This conservation strategy aims to achieve the following objectives:

- Provide substantial evidence to the California Department of Fish and Wildlife (CDFW) that the activities undertaken herein will fully mitigate temporary and permanent impacts to the state-listed Swainson's hawk sufficient to issue a 35-year incidental take permit under Section 2081(b) of the California Fish and Game Code for construction and long-term operation of the Project;
- Ensure no net loss in nesting activity on the Project site by: retention of existing nest trees, installation of temporary artificial perch structures, maintenance of effective no-activity buffers around active nests during construction and long-term operation, and planting and maintenance of high-quality nest trees within portions of the Project site.
- Ensure no net reduction in long-term foraging conditions on the Project site by: restoration, management, and maintenance of moderate-to-high quality grassland that supports small mammal and insect prey at levels greater than or equal to baseline conditions.
- Implementation of a research program to validate the success of this conservation strategy, evaluate potential habitat uplift relative to baseline conditions, and contribute scientific evidence regarding the relative benefit of various treatments (e.g., different seed mixes, different perch structure designs, etc.) that may be applied to other retired agricultural lands slated for solar energy development.

This conservation strategy focuses on Swainson's hawk population status and conservation approaches that are relevant to conditions in the southern San Joaquin Valley portion of the Central Valley, California.

[1] Renewable energy development is increasingly concentrated on Westlands Water District lands under settlements, which require a non-irrigation covenant upon transfer of ownership

2 Relevant Legislation

2.1 California Renewable Portfolio Standard and Green House Gas Reduction Goals

California leads the nation in addressing climate change through strong renewable portfolio standard (RPS) goals and greenhouse gas (GHG) emission reduction goals. California's RPS program was established in 2002 with the intent of increasing the amount of renewable energy purchased in the state to 20%; it has been modified multiple times since with more aggressive RPS goals.

California's Greenhouse Gas (GHG) emission reduction goals were established in 2006 with the initial requirement of a reduction of GHG emissions to 1990 levels by 2020, a reduction of 15% below the emissions expected under a "business as usual" scenario. These goals were further accelerated in 2016 and 2022. California is now seeking to achieve statewide carbon neutrality as soon as possible, and no later than 2045, with an 85% emissions reduction target.

Most recently in 2022, the state legislature enacted California's most aggressive climate targets to date, including the following:

- **Senate Bill 1020 (Laird)** - Revised zero-carbon energy goals originally set in SB 100, with a more aggressive targets: 90% by 2035; 95% by 2040; 100% by 2045.
- **Assembly Bill 1279 (Muratsuchi**) - Codified the economy-wide 2045 carbon neutrality goal and requires that at least 85% of the reductions come from emission reductions.

To advance these statewide goals, the California Energy Commission (CEC) and California Public Utilities Commission (CPUC) are tasked with electric system planning to enable the 70+ GW of new solar generators that will be required to meet these aggressive 2045 zero carbon electricity and GHG reduction goals. Construction of renewable energy is central to these goals and the state is working to add nearly 70 GW of new solar generation in California by 2045. This Project would contribute over 1 GW to this goal. In summary, the Project site was selected because it:

- Contributes to California's RPS and GHG reduction goals.
- Is consistent with the CEC and CPUC screening criteria for lands suitable for renewable development.
- Minimizes environmental impacts and land disturbance associated with solar energy development by siting the facility on relatively flat, contiguous lands with high solar insolation in close proximity to existing roads and established utility corridors.
- Is centrally located in an area near one of the state's largest transmission lines and would construct a new, high-voltage transmission interconnection substation to enable delivery into the statewide grid.
- Makes use of land with poor soil qualities that will be retired from agricultural practices to meet local groundwater management goals under the Sustainable Groundwater Management Act (SGMA) and the local groundwater sustainability plan (GSP).

2.2 Renewable Energy Land Use Planning

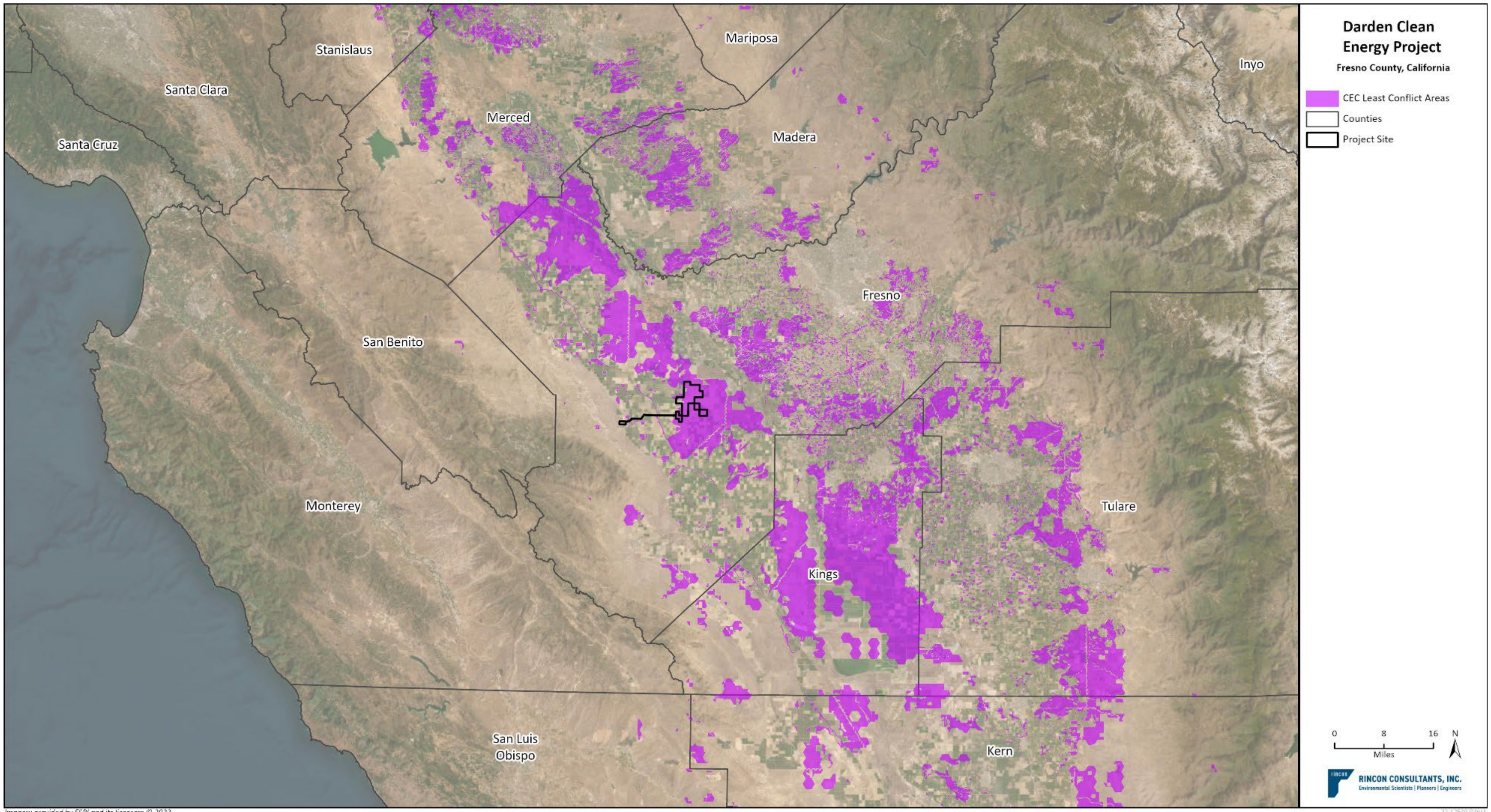
The CPUC is responsible for annual Integrated Resource Planning to ensure that the statewide transmission grid is sufficient to accommodate changes to electricity demand and electric system decarbonization policy mandates. To enable successful transmission system planning, the California Energy Commission is tasked with modeling the geographic locations where new renewable energy generators are anticipated to be located. The latter analysis is known as “land use screening”, which is a geospatial analysis which takes into account development constraints, biodiversity impacts, cropland impacts, drought-driven cropland retirements, landscape intactness, and terrestrial climate resiliency. What results is a geospatial estimate of where the lowest-cost, lowest-impact, highest capacity factor solar energy generators are likely to be developed across the State, which then drives the State’s transmission system upgrades to facilitate this low-cost, low-impact outcome.

Since 2008, the CEC, CPUC, and California Independent System Operator (California ISO) have used spatial environmental and land-use data to inform electric system planning and help system planners focus on areas that have a greater potential for successful deployment of new utility-scale renewable energy capacity and electric transmission. Over time, the methods and data used have evolved, reflecting the availability of new information and new planning initiatives related to biodiversity conservation, agricultural resource protection, and renewable resource development. In parallel, California’s climate and clean energy mandates have increased.

In 2022, the CEC updated land use screens to assist multiple state agencies, including the CPUC with future renewable planning. The Land-Use Screens for Electric System Planning: Using Geographic Information Systems to Model Opportunities and Constraints for Renewable Resource Technical Potential in California report (CEC Land-Use Screens Report) (Hossainzadeh et al, 2023) describes updates to land-use screens for electric system planning. Land-use screens are map-based footprints delineating important environmental and physical characteristics of the land. The screens are assembled from an integration of raw data into modeled results at the statewide scale and can show land access limitations or competing land-use priorities. The report provides technical updates to the method for using environmental and land-use datasets (such as biodiversity, habitat, and cropland) to assess renewable resource technical potential for onshore wind, solar photovoltaic, and geothermal technologies for electric system planning. The renewable resource technical potential of a technology is its achievable energy generation capacity given technoeconomic, topographic, environmental, and land-use constraints.

CEC’s most recent 2023 land use screens indicate that there are approximately 1.6 million acres of low-conflict solar development areas in the San Joaquin Valley. These areas were identified as having the highest renewable energy resource development potential and avoiding areas with high biodiversity conservation and agricultural resource protection goals. Within Fresno County, there are approximately 70,800 acres of these recommended development areas, with the caveat that site-specific evaluation is needed. Based on the CEC land use screens, most of the gen-tie line and the Project itself are located in CEC “least conflict” areas suitable for renewable energy development near a regional transmission line (Figure 1). Site specific surveys have confirmed the suitability of the site as well, except for the challenge of nesting Swainson’s hawks.

Figure 1 Least Conflict Areas



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2.3 Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA) of 2014 requires over drafted groundwater basins to be restored and brought into sustainable conditions of withdrawal and recharge by 2040. To accomplish this, groundwater basins are required to be managed by Department of Water Resources (DWR)-approved Groundwater Sustainability Agencies (GSAs), which are then required to develop and implement a Groundwater Sustainability Plan (GSP) for each of their respective basins. Achieving groundwater basin sustainability in California will necessarily remove an estimated 500,000 to 1 million acres of agricultural land from irrigated production over the next two decades (Ayres et al. 2022).

The Project site is underlain by the Westside Subbasin of the San Joaquin Valley Groundwater Basin which is managed by Westland's Water District GSA. The surface area of the Westside Subbasin is 622,215 acres. In 1998, Westland's Water District began purchasing drainage impaired land through various land acquisition programs removing the purchased lands' water allocation and reallocating the water to nonimpaired lands. As of August 2018, the District has retired approximately 90,259 acres from irrigation and sold 5,037 acres for solar development. Westland's Water District actively intends to retire 100,000 acres of land within its boundaries under the District's Land Purchase Program and record a non-irrigation covenant on the title of all such retired lands (Westlands Water District GSA and County of Fresno GSA-Westside 2022). The Project is located in an area planned for retirement and solar energy development.

3 Swainson's Hawk Background

3.1 Life History

3.1.1 Overview and Range California

The Swainson's hawk (*Buteo swainsoni*), also known as a "grasshopper hawk," for their atypical behavior of foraging on grasshoppers, is a medium-sized Buteo that breeds from southwestern Canada to northern Mexico (Woffinden 1986, Woodbride et al. 1995, CDFG 1994, Sarasola and Negro 2005). Swainson's hawks are breeding season residents of California, currently found primarily in the Central Valley but also in the southern desert regions and the northeast portion of the state. Individuals migrate to western Mexico, Central America, and central South America in the fall (Airola et al. 2019), although some small groups may remain in California year-round (Herzog 1996). Swainson's hawks return to California in March and begin establishing nesting territories, generally showing a high level of territoriality and high level of nest/mate fidelity (CDFG 1994, Estep 1989).

3.1.2 Nesting and Reproduction

Swainson's hawks typically return to nest sites in early March to April (later in more northern regions), immediately form pairs, and begin the nesting cycle. Nest building typically begins seven to fifteen days after arrival and lasts for about one week (Fitzner 1980). Nest construction continues through April and eggs are usually laid between early April and early May. Incubation lasts 34-35 days, and the young fledge 42-44 days after hatching. Clutch size ranges from 1-4 eggs with an average size of about 2.5 eggs (Bechard 1983). In the Central Valley of California fledging occurs between July 1st and mid-August (Estep 1989).

3.1.3 Habitat Use

Swainson's hawks generally nest in isolated trees, small stands of trees, or in scattered riparian trees or forests surrounded by open, high-quality foraging habitat (Bloom 1980). Preferred nesting trees in California include valley oaks (*Quercus lobata*), Fremont's cottonwood (*Populus fremontiiI)*, willows (*Salix* spp.), walnut (*Juglans* spp.), sycamore (*Platanus* sp.), eucalyptus (*Eucalyptus* spp.), and in urban areas, ornamental redwoods (*Sequoia sempervivens*) and conifers (Bloom 1980, England et al. 1995, Estep 2007, Estep 2008). The fact that Swainson's hawks use, sometime preferentially, trees not native to their range suggests that the hawks will readily nest in ornamental trees. Nests have been documented in planted windbreaks, and in eucalyptus trees and ornamental pines and redwoods (England et. Al 1995, Woodbridge 1998). In Argentina, the non-native *Eucalyptus viminalis*, planted extensively throughout the pampas of Swainson's hawks' wintering range in the late 1800s, was present in all roosts surveyed, and in 59% of those roosts, was the only tree species in the roost. The study concluded that not only had the tree planting expanded habitat for the hawks into an area where they hadn't occurred previously, it had also resulted in an increase in the communal roost sizes (Hernan Sarasola and Negro 2006).

3.1.4 Diet

Swainson's hawks prey on a variety of mammals, birds, lizards, snakes, amphibians, and insects. The specific prey species taken vary from location to location, but are generally dominated by ground squirrels, jackrabbits, cottontails, small rodents, and birds. In northeastern California, the biomass of the diet was dominated by voles (*Microtus* sp.) and Belding's ground squirrel (*Spermophilus beldingi*), but also included numerous grasshoppers (Bloom 1980; Woodbridge 1991). Outside the breeding season, Swainson's hawks are primarily insectivores consuming grasshoppers, crickets, and dragonflies (Woffienden 1986, Woodbridge et al. 1995). This pattern includes post-breeding birds, migratory birds, nonbreeding or pre-breeding birds arriving on the breeding grounds, and birds wintering in South America.

3.1.5 Foraging

Suitability for Swainson's hawk foraging is driven by the prey base, and accessibility of prey from the air (Estep 1989). Because Swainson's hawks generally search for prey by circling aerially, prey accessibility is determined by vegetation structure, which can be more important than prey density (Bechard 1982). In dense cover of vegetation over approximately 12 inches, prey is mostly inaccessible, reducing foraging opportunities (Estep 1989, 2009). While Swainson's hawks historically foraged in grassland valley bottoms and low hills in the Central Valley, as that habitat was replaced by agricultural development, Swainson's hawks adapted to use of those areas as their primary foraging habitat. Studies of foraging habitat use have found that that Swainson's hawks favor foraging in alfalfa and harvested fields (Estep 1989, Babcock 1995, Smallwood 1995, Swolgaard et al. 2008, Estep and Dinsdale 2012, Estep 2013, Fleishman et al. 2016), likely because these habitats have abundant prey and maintain, through frequent harvesting, a suitably low vegetation structure. While Swainson's hawks do forage in vineyards, that use is often less frequent than would be expected based on the proportion of vineyard acreage in the study areas (Swolgaard et al. 2008, Estep 2013), and Swainson's hawks rarely attempted to capture prey between rows of vines (Estep 2013). Likewise, orchards are considered unsuitable habitat since their structure inhibits Swainson's hawk access to prey (Estep 2021).

The availability of nesting habitat may influence Swainson's hawk numbers more than availability of foraging habitat. In the Natomas Basin in the Sacramento Valley, reproductive success and population-level recruitment of Swainson's hawks was associated equally or more closely with nest site availability than with land cover type distribution, which included high-quality grassland and alfalfa foraging habitat, in that study area (Fleishman et al. 2016).

3.1.6 San Joaquin Valley Swainson's Hawks

In the southern San Joaquin Valley, where there are fewer trees in general than the northern Central Valley, Swainson's hawks primarily establish nests in riparian/remnant riparian forest, eucalyptus wind breaks, and trees associated with rural residences (Schlorff and Bloom 1984, Estep and Dinsdale 2012). Swainson's hawks have also been shown to nest at lower densities and have relatively low nest success compared to other raptors in the northern San Joaquin Valley (Sousa 2010, Estep 2011, Estep and Dinsdale 2012). Estep and Dinsdale suggested the fluctuations in high-quality foraging habitat availability based on crop rotations may explain this pattern.

Nesting habitat is not necessarily associated with distribution of suitable foraging habitat (Estep 2011). Estep and Dinsdale (2012) found that nesting Swainson's hawks in the central San Joaquin Valley were concentrated along the Kings River/Fresno Slough riparian corridor and to the east. Nest tree availability and high-value foraging habitat was higher in these areas; foraging habitat included irrigated pasture and alfalfa. Where nest trees were scarcer west of the Kings River, and agriculture was lower-value wheat, cotton, and row crops, Swainson's hawk nesting was reduced. However, despite the presence of less suitable foraging habitat, Swainson's hawks east of the Kings River would still forage on the west side when harvest activities in those crops exposed prey.

3.1.7 Artificial Structure Use

Swainson's hawks are known to use structures other than trees for nesting. In the San Joaquin Valley, hawks have been observed nesting on lattice transmission towers within orchards, on wooden utility poles, and in the Sacramento Valley, on a wooden utility pole and in the crossarm of a metal transmission tower adjacent to a solar array, row and hay crops, orchards, vineyards, and grazed pasturelands (Howard et al. 2022). The use of these structures may have been due to lack of nest trees or population density limiting access to more suitable trees.

It has been suggested that artificial nest platforms may allow Swainson's hawk expansion into new areas in the San Joaquin Valley, where there are fewer trees, as was observed with osprey (Airola and Estep 2022). Swainson's hawk use of artificial nest structures has not been well-documented in California; however, such use has been documented in Alberta, Canada (Schmutz et al. 1984), and in Minden, Nevada (Sierra Pacific Power Company 1999). In the Alberta study, the increase in Swainson's hawk nest density was similar to overall fluctuations in nest density in the general area, indicating that Swainson's hawks used artificial nests at rates comparable to nests in trees. In Nevada, a Sierra Pacific biologist successfully moved an active Swainson's hawk nest with nestlings from a transmission tower planned to be re-energized to a dummy power pole 100 feet away. After flushing for approximately two hours, an adult Swainson's hawk returned to the new nest and continued feeding the chicks.

3.2 Population Status

3.2.1 Historical Population Status

Historically, the Swainson's hawk was considered widespread in high numbers across California, including the Great Basin, the Sacramento and San Joaquin Valleys, along the coast in Marin, Monterey, Ventura, Los Angeles, and San Diego counties, and a few scattered sites in the Colorado and Mojave deserts (Bloom 1980). Estimates based on historically available habitat and population density estimated historic populations at between 4,284 and 17,136 breeding pairs (Bloom 1980) prior to European settlement of North America. However, Grinnell and Miller (1944) observed widespread declines in breeding populations by the early 1940s.

3.2.2 Population Decline

In 1980, Bloom conducted a survey of Swainson's hawks statewide that confirmed 110 active pairs and estimated total population of approximately 375 breeding pairs. These survey results reflected a 91% decline in numbers since prior to European settlement (Bloom 1980). However, some recent studies have concluded that the historical estimates generated by Bloom may have underestimated the population size at the time of that study, noting an absence of statistically-based conclusions (Battisone et al. 2019, Furnas et al. 2022). Bloom (1980) also noted that historical accounts and museum records indicated a similar contraction of the Swainson's hawk range across the state. His data identified that remaining population centers were in the northeastern Great Basin in Modoc

County and within the Central Valley; elsewhere, the hawk was virtually extirpated in significant parts of its previous range. The once abundant population in coastal southern California had declined the most. A subsequent statewide survey conducted in 1988 showed 320 active territories with approximately 241 in the Central Valley and 78 in the Great Basin in northeastern California but considered Swainson's hawk extirpated from southern California and the coastal valleys (Schlorff 1988). There are numerous potential causes for these early Swainson's hawk declines that have been observed in California, and also areas of Oregon, Nevada, and Canada, including urban encroachment, foraging habitat conversion to unsuitable agricultural types such as orchards and vineyards (Battisone et al. 2016, Battisone et al. 2019), tree removal, destruction of riparian habitats (Risebrough et al. 1989), insecticide use in Argentina (Woodbridge et al. 1995), and potentially impacts from DDT/DDE use in southern California (Bloom 1980, Risebrough et al. 1989).

CDFW's 2016 Status Review of Swainson's Hawk in California stated that Swainson's hawk dependence on specific agricultural land uses rendered a large proportion of the population vulnerable to declines as a result of expanding crop conversions from suitable types (irrigated row crops) to unsuitable types (orchard and vineyards) (Battisone et al. 2016). Estep (2016) noted that the nesting population in western Fresno County is sparse due to this increasing conversion of suitable foraging habitat as well as a lack of nest trees. In Swainson's hawk studies conducted in 2011 and 2016 in Fresno County, Estep documented the increasing conversion of suitable irrigated row crop foraging habitat to unsuitable orchards and vineyards (Estep 2011, 2016). Expansion of orchards were the primary factor in an annual 10% decline in rotated irrigated cropland during that time period (Fresno 2015). The foraging study conducted for the Project (SBC 2023) documented the loss of eight previously active nest trees due to tree removal within 10 miles of the Project site – three of these removed trees were in orchards developed after the active nests had been originally documented.

3.2.3 Current Population Status

Several recent studies have indicated Swainson's hawk populations are recovering, at least in some parts of the state (Gifford et al. 2012; Kane et al. 2012; Battistone et al. 2019; Furnas et al. 2022). This increase in numbers has been reported in the Central Valley in 2003 to 2009 (Gifford et al. 2012) and in Butte Valley in northeastern California, where population size quadrupled over a period of 40 years (Kane et al. 2020). Battistone et al. (2019) estimated 3,218 breeding pairs in 2005-2006 in California's Great Valley. Most recently, an analysis of Swainson's hawk breeding populations using data from 1,038 locations recorded in 2005, 2006, 2016, or 2018 throughout California concluded the Swainson's hawk summering population in California grew at a rate of 13.9% per year between 2005 and 2018 in the Central Valley and northern regions with an estimated 18,810 breeding pairs as of 2018 (Furnas et al. 2022), an estimate similar to estimates of pre-European settlement population size of 4,284 to 17,136 breeding pairs made by Bloom (1980).

Reasons for the increase in Swainson's hawk population size are uncertain, but several potential factors have been suggested. Bechard (1982) suggested riparian restoration and behavioral adaptation to the use of agricultural landscapes with low vegetative cover may be key factors in recovery. Smallwood (1995) noted that irrigated alfalfa may have been particularly important because of increased crop yields since 1980. Diversity in wintering range and migratory pathways may also be factors in recovery if they confer survival and reproductive benefits due to the shorter distance and earlier arrival times (Airola et al 2019). While there is no disagreement that Swainson's hawk populations experienced substantial declines in the 20th century, the extent of those declines was likely overestimated, and the species has recently (and possibly during the later part of the 20th century) experienced a notable recovery in population size, particularly in the Central Valley.

3.3 Regulatory Background

3.3.1 Regulatory Response to Declining Populations

The Swainson's hawk was listed as a state-threatened species under the California Endangered Species Act (CESA) by the California Fish and Game Commission in 1983 based on results of Bloom's 1980 statewide assessment. CESA grants protections to Swainson's hawk by prohibiting take[2], as authorized by CDFW. Listing under CESA includes a requirement to review listed species every five years to identify any changes to the conditions that led to the original listing, pending availability of funds (FGC Section 2007). The most recent 5-year review was completed in 2016 (CDFW 2016), and it recommended retaining the listing status of Threatened based on (1) ongoing cumulative loss of foraging habitats, (2) significantly reduced abundance relative to historic estimates, and (3) an overall reduction in breeding range. Removal of species from CESA can be initiated by the public or by CDFW as a petition to the Fish and Game Commission under Fish and Game Code (FGC) Sections 2071; the Commission will base any delisting decision on whether the best available scientific information warrants it (FGC Section 2070).

3.3.2 Current Regulatory Implementation

Take of Swainson's hawk may be authorized by CDFW through the issuance of an Incidental Take Permit (ITP) under FGC Section 2081(b).An ITP would be issued for such activities that may result in conducting construction activities in the vicinity of nests within an agency-determined avoidance buffer or disturbance resulting in nest abandonment or forced fledging.

Chapter 6.2 of Division 15 of the Public Resources Code establishes a new, opt-in certification process allowing renewable energy projects that meet certain specific conditions to seek project approval through California Energy Commission (CEC) oversight. An MOU between the CEC and CDFW recognizes that the CEC's licensing authority for opt-in facilities pursuant to Public Resources Code section 25545.1, subdivision (a) shall be in lieu of any permit, certificate, or similar document required by any state, local, or regional agency, or federal agency to the extent permitted by federal law, for the use of the site and related facilities, and shall supersede any applicable statute, ordinance, or regulation of any state, local, or regional agency, or federal agency to the extent permitted by federal law. The CEC therefore effectively issues "take" authorization through their certification process, and a Memorandum of understanding (MOU) between CDFW and CEC outlines the procedures for agency-to-agency consultation on CEC opt-in projects.

[2] "Take" is defined in the California Fish and Game Code (FGC) Section 2080, as to "hunt, pursue, capture, or kill, or to attempt to hunt, pursue, capture, or kill" species determined to be threatened or endangered by the Fish and Game and Commission.

4 Darden Clean Energy Project

4.1 Project Overview

The Darden Clean Energy Project (Project) consists of the construction, operation, and eventual repowering or decommissioning of a 1,150 megawatt (MW) solar photovoltaic (PV) facility, an up to 4,600 megawatt-hour (MWh) battery energy storage system (BESS), an up-to 1,150 MW green hydrogen facility, a 34.5-500 kilovolt (kV) grid step-up substation, a 10 to 15-mile 500 kV generation intertie (gen-tie) line, a 500 kV utility switching station along the Pacific Gas and Electric Company (PG&E) Los Banos-Midway #2 500 kV transmission line, and appurtenances.

4.1.1 Project Description

Construction of the Project is anticipated to take between 18 and 36 months to complete. The Project would include the following major components:

- **Solar Facility, Step-Up Substation, and Gen-tie**
  - Construct a 1,150 MW solar PV facility, consisting of approximately 3,100,000 solar panels, inverter-transformer stations, and an electrical collection system. The collection cables would be buried underground in a trench about 4 feet deep, with segments installed overhead on wood poles to connect all of the solar facility development areas to the onsite step-up substation.
  - Construct a new step-up substation to step up the medium voltage of the PV collector system from 34.5 kV to 500 kV, located on approximately 20 acres. Two locations (Options 1 and 2 sites) are being considered for the step-up substation.
  - Construct an operations and maintenance (O&M) building.
  - Construct an approximately 10 to 15-mile 500 kV gen-tie line, consisting of either monopole tubular steel poles or steel H-frame structures and dead-end structures, to interconnect the step-up substation to the new utility switchyard. The gen-tie line would be located within an up to 275-foot wide corridor.
- **BESS Facility**
  - Construct a battery storage system capable of storing up to 1,150 MW of electricity for four hours (4,600 MWh), located on approximately 35 acres. Two locations (Options 1 and 2 sites) are being considered for the battery storage system.
- **Green Hydrogen Facility**
  - Construct an up-to 1,150 MW green hydrogen facility, consisting of an electrolyzer and water treatment plant with reverse osmosis and Electrodeionization and ancillary equipment such as filters, storage tanks, backwash systems and chemical dosing systems. Three locations are being considered for the green hydrogen facility. Option 1 or Option 2 sites would be approximately 225 acres in size and would be located within the solar facility. In addition, an approximately 100-acre alternate site located west of Interstate 5 is being considered. If the alternate site is selected,-it would generate 800 to 1,000 MW and include the construction of an 8,000 square foot O&M building within the facility boundaries, as well as a substation and switchyard on approximately 20 additional acres.

- **Utility Switching Station**
  - Construct a PG&E-owned switchyard, consisting of high-voltage circuit breakers, switches, and series capacitor line compensation equipment in a breaker-and-half configuration, to electrically connect the Project's generation onto PG&E's 500 kV transmission network. The utility switchyard would be located on approximately 40 acres.

The Project would operate for approximately 35 years, at which time Project facilities would be either repowered or decommissioned. Repowering would include replacing panels, inverters, and wiring with upgraded equipment. Upon decommissioning, the Project site would be reclaimed in accordance with a Decommissioning Plan approved by the CEQA lead agency. A non-irrigation covenant will continue to legally bind, and the site will not return to agricultural production. The Decommissioning Plan will require removal of all equipment to 4 feet below ground surface.

4.1.2 Darden Site Setting

The Project site is located in unincorporated Fresno County south of the community of Cantua Creek in the San Joaquin Valley (Figure 2). The proposed solar facility, BESS, step-up substation, and green hydrogen facility (Options 1 and 2) would be located on approximately 9,100 acres of land primarily owned by Westlands Water District, between South Sonoma Avenue to the west and South Butte Avenue to the east. The proposed approximately 10 to 15-mile line would span west from the intersection of South Sonoma Avenue and West Harlan Avenue to immediately west of Interstate 5 (I-5), where it would connect to the proposed utility switchyard along the Pacific Gas and Electric Company (PG&E) Los Banos-Midway #2 500 kV transmission line (Figure 3). The alternate green hydrogen facility site being considered is located adjacent to the proposed utility switchyard site.

The Project site is relatively flat, with elevations ranging from approximately 186 to 644 feet above mean sea level, increasing elevation from the east to the west and southwest towards the Diablo Range. Soils are predominantly saline-sodic clay loams and clay, including Tranquility clay, Calflax and Posochanet clay loams, and Ciervo clay/wet Ciervo complex. Tranquility series soils, which are mapped most extensively in the Project site, are poorly drained soils on alluvial fan skirts with high runoff and slow permeability. Tranquility series soils are most used for irrigated crops such as cotton or wheat, and are also used as wildlife habitat supporting timothy (*Phleum pratense*), watergrass (*Echinochloa* spp.), and saltbush (*Atriplex* sp.). Other soils on the site are used for cotton, alfalfa, sugar beets, wheat, onions and tomatoes; native vegetation is annual grasses, forbs and saltbush.

The land cover types in the Project parcels include fallow lands, tilled and disked fields containing ruderal vegetation, and some active farming. The Project site has historically been used for irrigated farming, dry-farming, and/or left fallow over the past four years. From 2017 to 2020, the Project site was used to grow winter wheat, barley, cotton, onions, tomatoes, pistachios, and garlic. However, during this period, approximately half of the Project site was left fallow each year. During the same period, the gen-tie parcels were primarily used to grow almonds, as well as garlic, chickpeas, cotton, dry beans, corn, tomatoes, pistachios, winter wheat, herbs, onions, cantaloupe, oranges, and alfalfa. On average, approximately one quarter of the parcels were left fallow each year. Fallow fields are typically tilled annually in the early spring to suppress weeds. The entirety of the Project site has been rated as moderate quality SWHA foraging habitat (Stringer 2023).

Properties surrounding the Project site include other fallow and active agricultural lands. The Project's gen-tie line spans privately-owned land on the western portion of the Project site with land cover types including active agriculture and fallow fields. The California Aqueduct and I-5 bisect the gen-tie parcels, running generally north-south. Compacted dirt roads and paved roads border and separate quarter-sections of land in various uses, primarily agriculture.

The Project site provides suitable habitat for numerous grassland species including burrowing owl, American badger, several raptors, and other bird species. Red-tailed hawk (*Buteo jamaicensis*), great horned owl (*Bubo virginianus*), western kingbird (*Tyrannus verticalis*), and northern harrier (*Circus hudsonius*) were all documented to be nesting within or adjacent to the Project site during field visits between February and July, 2023. Other common species such as black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans)*, common raven (*Corvus corax*), and California ground squirrel (*Otospermophilus beecheyi*) also occur on the Project site.

Figure 2 Regional Location

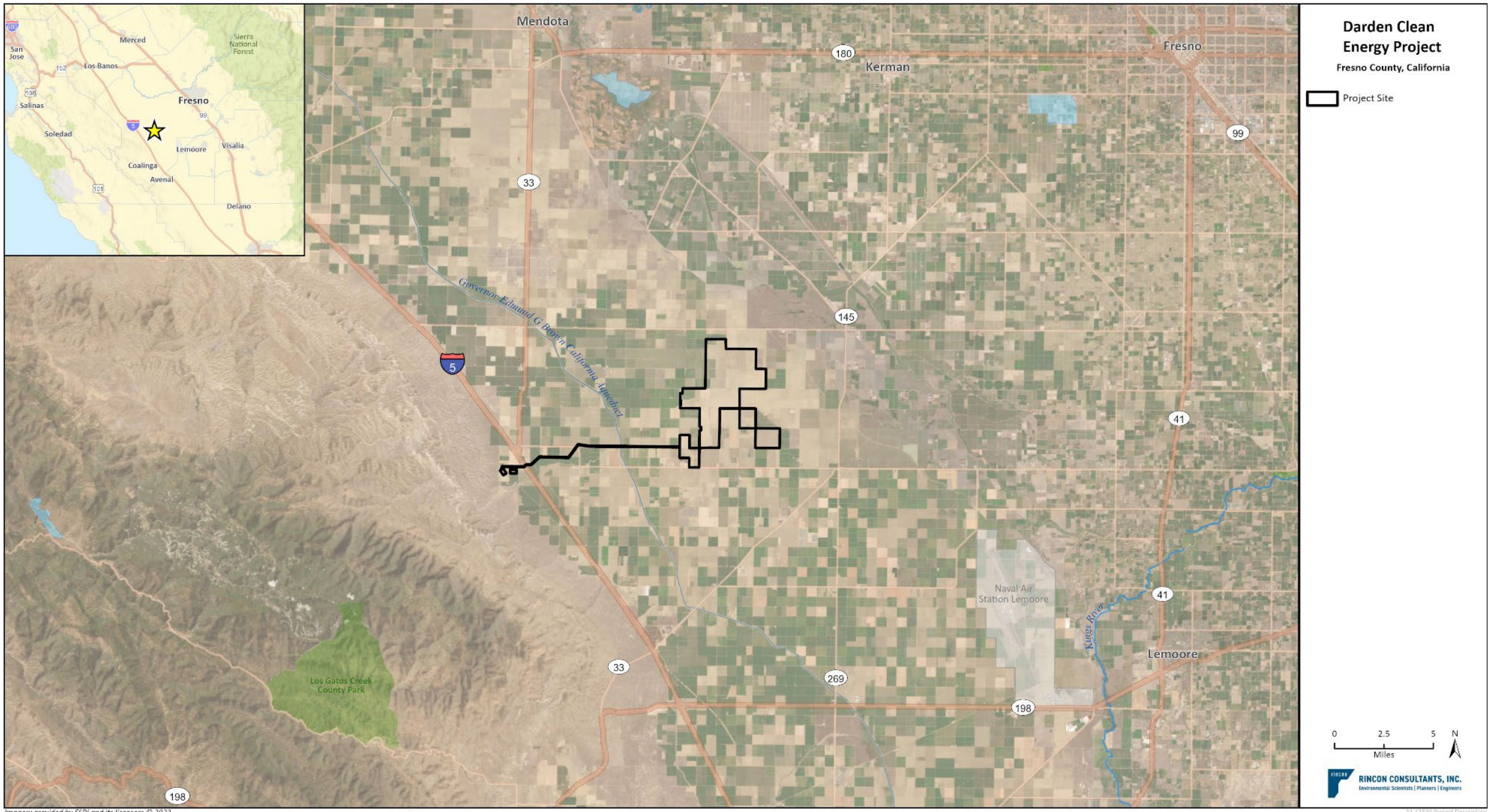
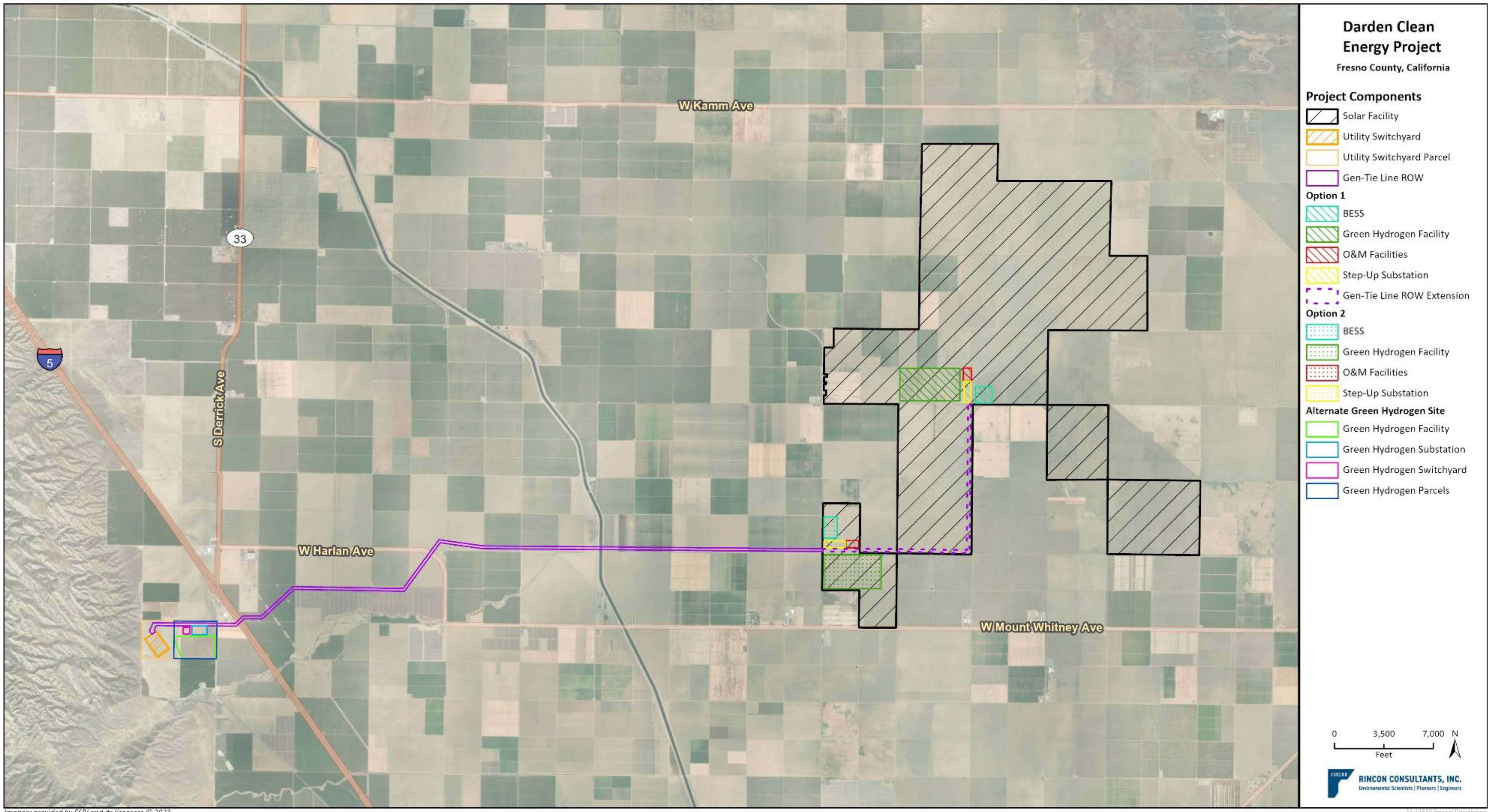


Figure 3 Project Site



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22-12530 Project Description
Fig X Project Site

5 Swainson's Hawks and the Darden Project

5.1 Nesting at the Project Site

Potential nesting habitat within the Project site is mostly limited to the solar PV portion of the site and is comprised of individual trees, tree clusters, and two rows of eucalyptus trees (Figure 4). The gen-tie right-of-way, utility switchyard, and alternate hydrogen facility locations present minimal potential nesting habitat due to the lack of suitable nesting trees and the presence of orchards. Rincon estimated there are approximately 30 potentially suitable nesting trees within the Project site. Additional nesting habitat is located in some areas adjacent to the Project site and scattered throughout the Project vicinity.

Protocol Swainson's hawk surveys were completed in 2023 under a joint study completed by Stringer Biological Consulting, Inc (SBC) and Rincon Consultants (SBC and Rincon 2023; Appendix C). Surveys were conducted in accordance with the guidelines prepared by the Swainson's hawk Technical Advisory Committee (TAC) in *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (TAC 2000). Six rounds of surveys were conducted, and were completed during survey Periods II, III, IV, and V. Surveys conducted during Period IV consisted of visiting all previously identified Swainson's hawk nests to document nest status at that time. A total of five (5) active nests were documented within the Project site, and one (1) additional active nest was documented within the 0.5-mile buffer outside the Project site and immediately adjacent to the western boundary. Nesting trees included eucalyptus, cottonwood, and elm.

Because not all nests showed activity during all nest surveys, it is possible that fewer than six pairs are nesting on or immediately adjacent to the site. Figure 5 shows the location of all active nests. Refer to Appendix C for additional information regarding the focused Swainson's hawk nesting surveys.

5.2 Regional Foraging Habitat

A Swainson's hawk foraging habitat analysis was conducted by SBC to evaluate the extent of foraging habitat for the regional Swainson's hawk population in and around the Darden Clean Energy Project site (see Appendix B). The study included field documentation of active Swainson's hawk nests and suitable foraging habitat acreage within the Project site plus a 10-mile buffer (study area) during the breeding season in May 2023. The amount of foraging habitat required for each nesting pair was calculated based on average Swainson's hawk foraging ranges, using a correction factor to account for overlap in foraging habitat to generate the total acreage of foraging habitat required for the active Swainson's hawks nesting in the study area. The study documented 41 nesting pairs within the 372,082-acre study area (Figure 6) and documented 205,133 acres of suitable foraging habitat. Of that, 106,848 acres would be required to sustain the regionally-nesting population, resulting in 98,285 surplus acres of suitable foraging habitat (SBC 2023).

Figure 4 Suitable Swainson's Hawk Nesting Trees within the Project Site

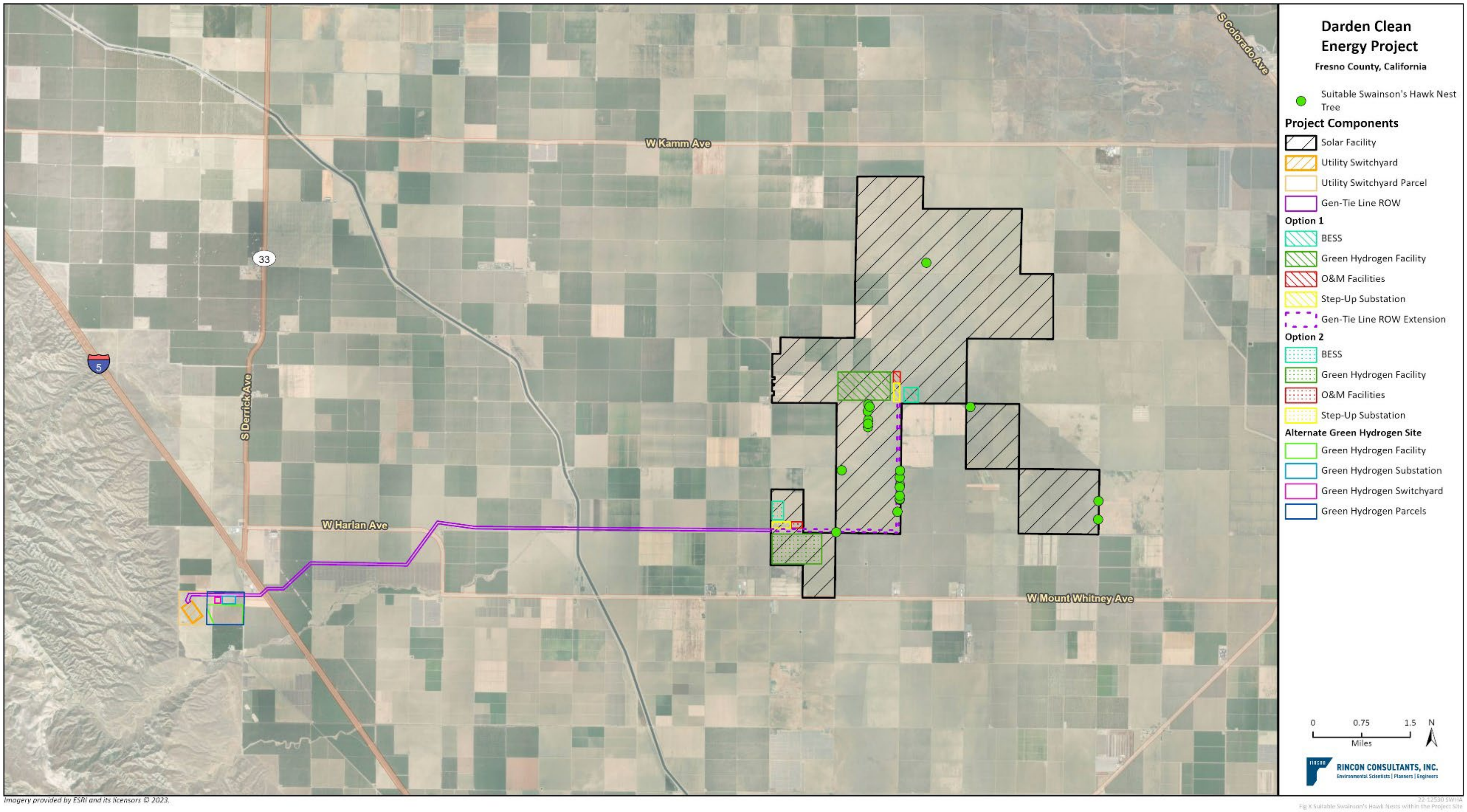

Figure 5 Active Swainson's Hawk Nests within 0.5 mile of the Project Site, 2023

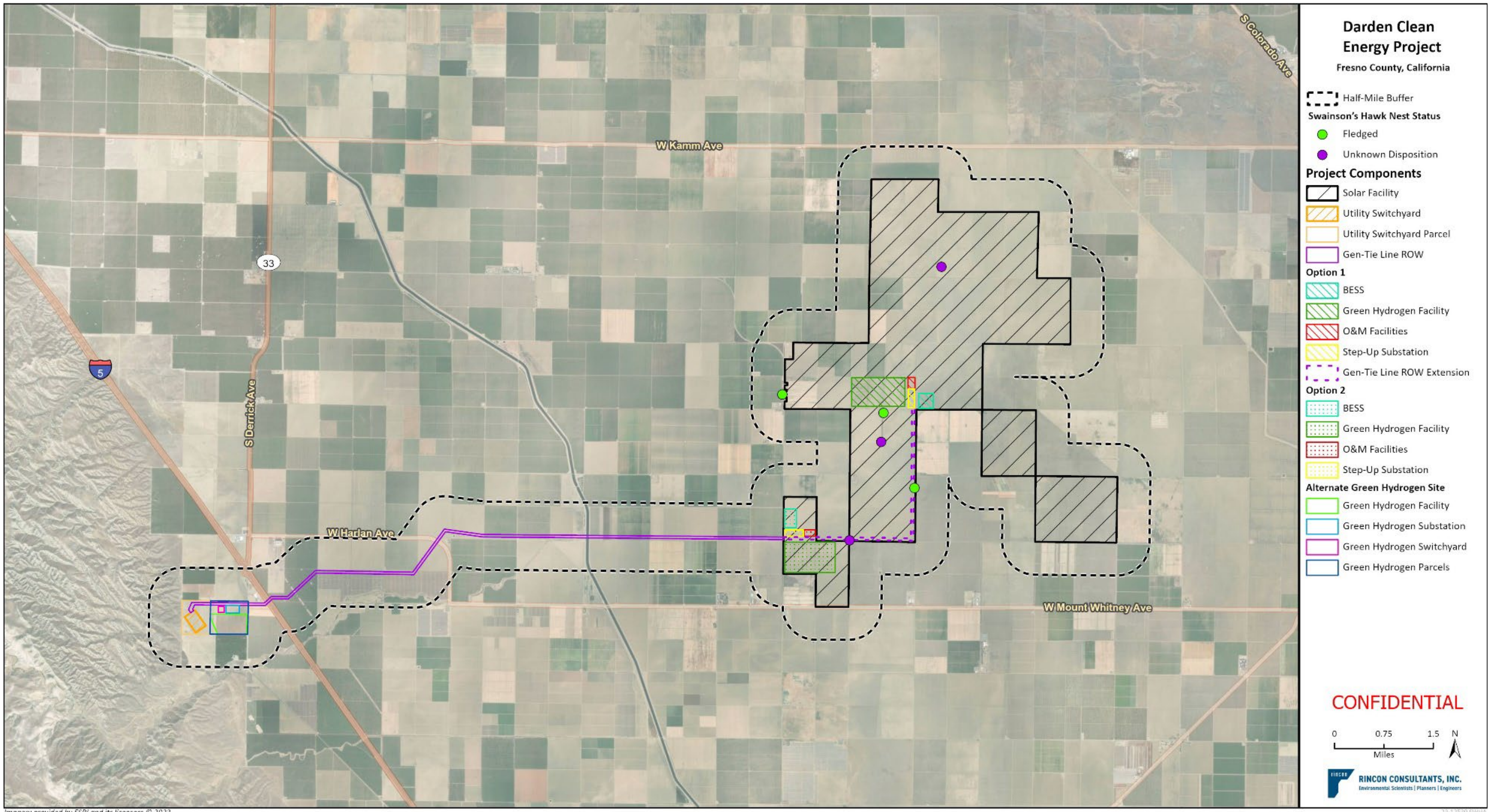

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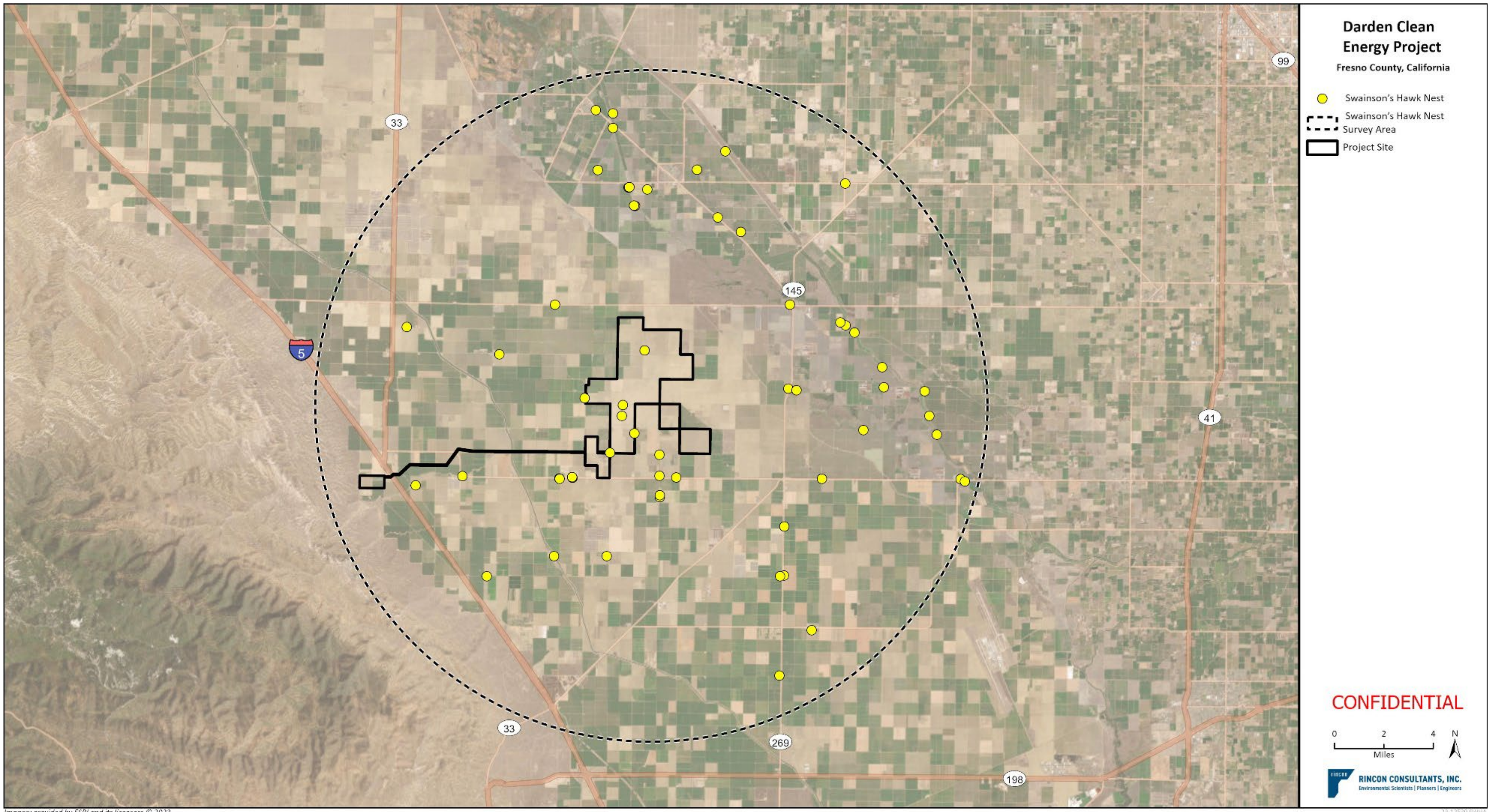
Figure 6 Active Swainson's Hawk Nests within 10 miles of the Project Site, 2023



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5.3 Foraging within Solar Development Areas

It is well-documented that agricultural landscapes throughout the southern San Joaquin Valley provide suitable foraging habitat for Swainson's hawk, and that recent increases in Swainson's hawk population size may be, in part, a result of improved foraging opportunities in the Central Valley (Bechard 1982; Smallwood 1995). Consequently, it would be reasonable to expect that conversion of low-growing agricultural row-crop landscapes to solar energy development would result in a net removal of foraging opportunities for Swainson's hawks. However, recent studies have demonstrated that well-managed solar facilities can provide foraging habitat value for Swainson's hawk, documenting successful Swainson hawk foraging within solar development areas.

A foraging analysis conducted in south Sacramento County (Estep 2013) encompassed an area that included three solar array fields and found that Swainson's hawks foraged in solar facilities 1.8 times as frequently as would be expected based on the proportion of solar facility acreage to the total study area; 12.8% of Swainson's hawk habitat use occurred in the solar array field despite it comprising only 7% of the study area. In the same study, other raptor species, including American kestrels (*Falco sparverius*), northern harrier (*Circus hudsonius*) and red-tailed hawks also used solar arrays as foraging habitat; American kestrels also appeared to selectively forage within the solar array. Additionally, these raptors were able to use the panels as perches for hunting, including Swainson's hawk, which typically hunts from the air (Estep 2013).

A 2021 follow-up to the 2013 study included two additional solar array fields to the same study area, and again Swainson's hawks demonstrated a similar level of usage relative to the proportion of the solar array in the study area. In the 2021 study, Swainson's hawks foraged in the solar facilities 2.8 times as frequently as would be expected, i.e., 11% of their habitat use, even though the solar array comprised only 3.7% of the study area. Although both studies documented perching, only the 2021 study included perching as a component of habitat use while the 2013 study did not, which could have affected calculation of use frequency, and therefore comparability, between the studies. Observations of Swainson's hawks perching on the solar panels to hunt did increase in 2021 compared to those in the 2013 study. The proportion of perching occurrences in 2021 was almost four times as observed in 2013, 7.7% compared to 2.1%, respectively (Estep 2021). Overall, both studies show more frequent use of solar arrays than expected in relation to their availability within the study area, as well as continued and increasing use of the panels themselves during foraging.

In a study conducted in 2017 in the central San Joaquin Valley in Kings County, one pair of Swainson's hawks was observed foraging within an approximately 1,100-acre solar facility near Lemoore Naval Air Station near the city of Lemoore, California. The pair spent approximately one hour within the facility site between late May and late June, 2017. This level of use was compared to use of adjacent active and inactive agricultural fields with non-native forb and grass cover, wheat fields, disked fields, orchards, and cotton crops. Although the Swainson's hawks spent nearly the same amount of time in both areas, the adjacent fields comprised an area 4.4 times larger than the solar facility, suggesting the hawks were preferentially using the solar facility. Additionally, the Swainson's hawk pair continued to use the site despite being harassed, and often chased off the site by red-tailed hawks, blackbirds, and kingbirds. The authors suggested that solar facilities could potentially enhance foraging habitat if maintained with low vegetation cover, which in this case, was more suitable than the dense and tall (greater than 12 inches) vegetation in the adjacent areas (Helix 2018).

In the study areas that comprised the 2013 and 2021 studies, vegetation management within the solar arrays could have affected Swainson's hawk and other raptor species' use of those areas. The implementation of a management plan for the solar facilities included establishing and maintaining a grass substrate between the solar panels to establish rodent abundance to encourage raptor use of the sites. Estep (2021) suggested that with this vegetation management regime, depending on the configuration of the panels and their spacing, the entirety of the solar array can remain as habitat for small mammals and potentially 60% of the land within in a solar array can remain available to foraging Swainson's hawks and other raptors.

5.4 Potential Impacts to Swainson's Hawk Habitat

5.4.1 Nesting Habitat

The Project layout has been designed to conserve all existing trees within the Project site. No trees are proposed for removal; however, if any trees are identified as hazardous during construction or operations, tree trimming or tree removal may be required to ensure public safety. Hazardous tree removal, if required, would not reduce the overall nesting potential within the Project site and vicinity, and can be offset with new tree plantings.

Project construction activity may directly impact nesting Swainson's hawks by disturbing nesting activities as a result of increased vehicle traffic, noise at work sites, and human presence. Such disturbance may lead to nest abandonment or otherwise reduce nesting success. Loss of foraging habitat during construction, particularly within the proposed solar PV array, utility switchyard, BESS, and green hydrogen facility locations could also directly impact Swainson's hawk reproductive success and/or lead to abandonment of the Project area for nesting habitat with more available foraging habitat elsewhere. The introduction or spread of invasive plants could indirectly impact foraging habitat by degrading habitat for its prey species, which could also negatively impact reproductive success of nesting hawks.

To avoid potential line strikes or electrocution to Swainson's hawks (and other birds), the Project transmission facilities would be designed consistent with the Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006 (Avian Power Line Interaction Committee [APLIC] 2006) where feasible. Transmission facilities would also be evaluated for potential collision reduction devices in accordance with Reducing Avian Collisions with Power Lines: The State of Art in 2012 (Avian Power Line Interaction Committee 2012). Design consistency with APLIC would reduce any collision or electrocution impacts to a less than significant level.

5.4.2 Foraging Habitat

The foraging study conducted for the Project calculated the amount of foraging habitat potentially impacted by the Project (Stringer 2023). The analysis considered that impacts to 70% of the surplus foraging habitat would constitute a significant impact under CEQA, consistent with previous studies (Estep 2011, 2016; Helix 2018a, 2020). The foraging analysis determined there are 41 known pairs of nesting Swainson's hawks within 10 miles of the Project that require a total of 106,848 acres of foraging habitat, and that there are approximately 205,133 acres of suitable foraging habitat available to those 41 pairs of Swainson's hawks within 10 miles of the Project. At a CEQA threshold of 70%, that allows for a loss of 29,485 acres of foraging habitat before impacts would exceed the CEQA threshold and be considered significant. The analysis estimated that approximately 4,818 acres of foraging habitat would be lost from development of infrastructure and panels on the 9,500-

acre Project site. This loss represents an approximately 16% reduction in the 29,485 acres of surplus foraging habitat, a reduction that would not constitute a significant impact under CEQA (Stringer, 2023).

Project development could potentially contribute to the cumulative impacts resulting from the broader expansion of renewable energy throughout the southern San Joaquin Valley to meet California’s renewable energy goals. However, based on an estimated additional 4,448 acres of proposed and foreseeable solar energy generation development under consideration for cumulative impacts to the Darden Clean Energy Project, the cumulative impacts would represent an approximately 32% reduction of the 29,485 acres of surplus Swainson’s hawk foraging habitat. Cumulative impacts as defined under CEQA and based on the current list of reasonably foreseeable projects would not be considered a significant impact.

6 Proposed Conservation Strategy

This Conservation Strategy seeks to ensure that the direct and indirect impacts of the Project are temporary, less than significant under CEQA, and fully mitigated to allow for issuance of an ITP. It also seeks to demonstrate that the Project's contribution to cumulative impacts to Swainson's hawk nesting and foraging habitat are less than significant, and to generate valuable scientific evidence on the efficacy of various methods to manage solar landscapes to maximize Swainson's hawk use. To achieve this, the actions included in in the proposed conservation strategy are aimed at:

- Maintaining or improving the current level of Swainson's hawk use of the Project site post-construction, and
- Demonstrating success of the conservation strategy as a model for Swainson's hawk conservation for future renewable projects throughout the southern San Joaquin Valley.

This conservation strategy will be largely tied to the procedures and specifications outlined in the Draft Vegetation Management Plan (VMP; Appendix D). The VMP outlines the goals and framework of revegetation, invasive weed maintenance, and habitat management. Specifically, the VMP provides a preliminary conceptual, programmatic revegetation and vegetation management framework. This preliminary framework is intended to be fully developed based on the results of site-specific research and studies that will be conducted to identify site-specific procedures that are likely to result in successful site restoration and habitat management. The overall intent of the VMP is to guide successful revegetation of the Project site to facilitate effective weed control, increase nesting habitat for Swainson's hawk (*Buteo swainsoni*), improve the quality of Swainson's hawk foraging habitat, and create pollinator habitat while allowing for safe and efficient operations and maintenance of the Project site. Limited information is available on the successful conversion of non-irrigable agricultural lands of California's Central Valley to suitable and high-quality Swainson's hawk foraging habitat. Specifically, there is little or no information regarding the most effective procedures for successful restoration of appropriate vegetative cover and sufficient prey diversity and abundance for Swainson's hawk. This is further compounded by the high salinity and potential selenium concentration within Westlands Water District lands, and what is likely a substantial invasive plant seedbank. The Project will implement an independent research program to be conducted by Cornell University, under Dr. Grodsky as Principal Investigator, funded directly by Intersect Power. The intent of the research program will be to confirm efficacy of the proposed conservation strategy and vegetation management plan to ensure no net loss of Swainson's hawk foraging and nesting habitat, inform any adaptive management procedures, and to establish standard procedures for habitat management on renewable energy projects in the Central valley that would be based on peer-reviewed and published results. Funding is intended to support two (2) years of preconstruction research and up to 10 years of post-construction research. Additional funding sources are currently being investigated that would expand the research so that the results would be more broadly applicable to the conversion of agricultural lands to solar environments across the U.S. Specifically, the research program will evaluate the restoration and management practices that provide the best results towards meeting success criteria for development of Swainson's hawk foraging habitat, including soil and land preparation, seed mix, and management regimes (e.g., mechanical vs grazing). The research design is currently under development and this outline is intended to function as a preliminary conceptual outline to establish goals and success criteria.

6.1 Overview of Strategy and Implementation

Intersect Power is proposing strategies to address the Project's potential impacts to Swainson's hawk:

- Temporary impacts to nesting
- Temporary impacts to foraging
- Long-term impacts to nesting
- Long-term impacts to foraging
- The Project's contribution to potential cumulative impacts on nesting and foraging

Short term conservation measures, including artificial nest structures and on-site habitat restoration, are intended to address potential impacts to nesting and temporary loss of foraging habitat during the Project's construction phase. Long-term conservation measures, including new nest tree plantings and long-term rangeland management on-site are intended to address potential cumulative impacts and promote Swainson's hawk population stability and growth, as well as address potential impacts to nesting Swainson's hawks during some O&M phase activities. To assess conservation success criteria and to promote the implementation of best management practices with proven outcomes, Intersect Power is also proposing a post-construction research program to assess Swainson's hawk use of the Project site and temporary nest structures, evaluate foraging within restored habitat areas and develop recommendations for long-term population management of Swainson's hawk within renewable energy development areas.

The Swainson's hawk foraging analysis (Stringer 2023; Appendix B) completed for this Project determined that sufficient residual foraging habitat would remain regionally after Project development, and thus, the loss of foraging habitat on the Project site would not represent a significant impact under CEQA on a project or cumulative level. However, Intersect Power is proposing to implement a habitat restoration and vegetation management approach designed to create high quality foraging habitat within the solar development areas of the Project to promote the long-term stability of Swainson's hawk populations in the context of future renewable energy projects that are anticipated for California's southern San Joaquin Valley, and will be required to meet California's clean energy goals. Short-term goals are intended to ensure minimum disruption to Swainson's hawk activity during the constructions phase; long-term goals are intended to promote an environment wherein Swainson's hawk populations can thrive and expand within a San Joaquin Valley comprised of increasingly mixed agricultural and renewable energy land use.

6.2 Short-Term Conservation Strategies

6.2.1 Nesting Habitat

Estep and Dinsdale (2012) noted relatively high numbers of Swainson's hawks occupying the agricultural fields between Interstate 5 and the Fresno Slough/Kings River, which includes the Project location and suggested that the area could support additional nesting pairs were it not for the lack of nesting habitat. These observations, coupled with the fact that nests constructed by Swainson's hawks can be relatively unstructured and often fail to last through the winter (Woodbridge 1998), highlights the importance of focusing conservation actions on providing nesting habitat for Swainson's hawk in the Project area.

Preservation of Existing Nest Trees

All nest trees documented within the Project site during the 2023 Swainson's hawk surveys will be preserved in place throughout the duration of the Project (Figure 5). These include trees where Swainson's hawks were documented nesting and/or nest-building, regardless of whether the nests were successful, i.e., produced fledglings.

In addition, all suitable nest trees, including those that were documented as active in previous years but were not used by Swainson's hawks in 2023, will also be preserved in-place (Figure 4). Solar panels will be setback from preserved trees by a distance of approximately twice the height of the preserved tree. Preservation of existing trees would result in a nest tree density of approximately 0.2 nests per square kilometer within the PV array portion of the Project site.

Temporary Construction Buffers

During construction and some O&M activities, temporary disturbance buffers will be established to minimize disruption to nesting Swainson's hawk. Smaller disturbance buffers are proposed for those activities that are substantially similar to agricultural activity that has been occurring at the Project site (e.g., site prep work that would be similar to harvesting and disking). Alternatively, larger disturbance buffers are proposed for activity that differs substantially from that of agricultural activity (e.g., pile driving and other high-decibel construction activity). We have further categorized construction activity by the duration of time spent within proximity (as defined by the associated buffer) to a nest and assigned an intensity level (low, moderate, heavy) to each definable construction activity The following outlines proposed disturbance buffers for each **intensity** at each **duration** for construction-related and O&M-related activity. Work completed outside the 0.25-mile buffer of an active nest would require no monitoring. All work conducted outside of reduced buffers, but within 0.25 miles of an active nest would be monitored by a qualified biologist to ensure work activity was not causing a disruption to Swainson's hawk normal behavior. Biological monitoring for any given activity can be reduced or discontinued once it can be demonstrated that the hawks are not disturbed by the activity.

Categories of Construction Activity Duration:

- Short: Less than 2 hours
- Medium: Less than 1 day
- Long: 2 days to 2 weeks
- Extended: More than 2 weeks

Categories of Construction Activity Intensity:

Heavy	Moderate	Low
Aerial lift	Excavation (backhoe)	Geotech
Crane work	Grading (grader)	Hand work (shovel, rake, etc.)
Helicopter	Boring/drilling	Surveying
Pile driving	Clearing (mower/roller)	Staking
	Hauling (tractors, loaders, forklift)	Water truck
	Loaders (piles)	General travel (Trucks, trailers, UTV)
	Welding	
	Trenching	

Table 1 Temporary Construction Buffers (feet)

		Construction Activity Intensity		
		Low	Moderate	Heavy
Construction Activity Duration	Short	50’	100’	150’
	Medium	100’	250’	600’
	Long	150’	500’	1,000’
	Extended	250’	750’	1,320’

Temporary Nest Structure Establishment

When nests fail or are removed, Swainson’s hawks have been documented to move to nearby trees (SBC and Rincon 2023) and in at least one case, a utility pole (Howard et al. 2022). Artificial nests will be constructed in the vicinity of existing nest sites to provide enhanced short-term nesting opportunities for Swainson’s hawks. Structure installation and/or availability will be timed with the arrival of migrating Swainson’s hawks, around mid-March, to reduce competition with red-tailed hawks, which establish nests several weeks earlier (Sousa 2010, J. Estep, pers. comm.). Nest structures will be designed similar to those which Swainson’s hawks have been documented to use in other locations, including 48-inch by 24-inch wire mesh baskets approximately 8 inches deep lined with nesting material and shade provided by an approximately 1.5-foot fence, or board, attached to the south side of the platform (Schmutz et al. 1984).

Nesting platforms will be installed on posts at a height of approximately 15 feet in suitable locations adjacent to newly planted trees, as further described below. The platforms will be designed according to the specifications above and/or other recommended practices, such as structures with two vertical poles supporting four paired sets of cross arms (Brubaker and Brubaker 2003). Posts supporting nest structures would be buried at a depth of at least 3 feet to prevent collapse during storms.

Establishment of New Nest Trees

Considering that the lack of nesting trees within the San Joaquin Valley/Central Valley may be a limiting factor for nesting Swainson’s hawks, Intersect Power proposes to plant new trees to provide increased suitable nesting habitat, which would potentially support the continued increase and expansion of the Swainson’s hawk’s breeding range.

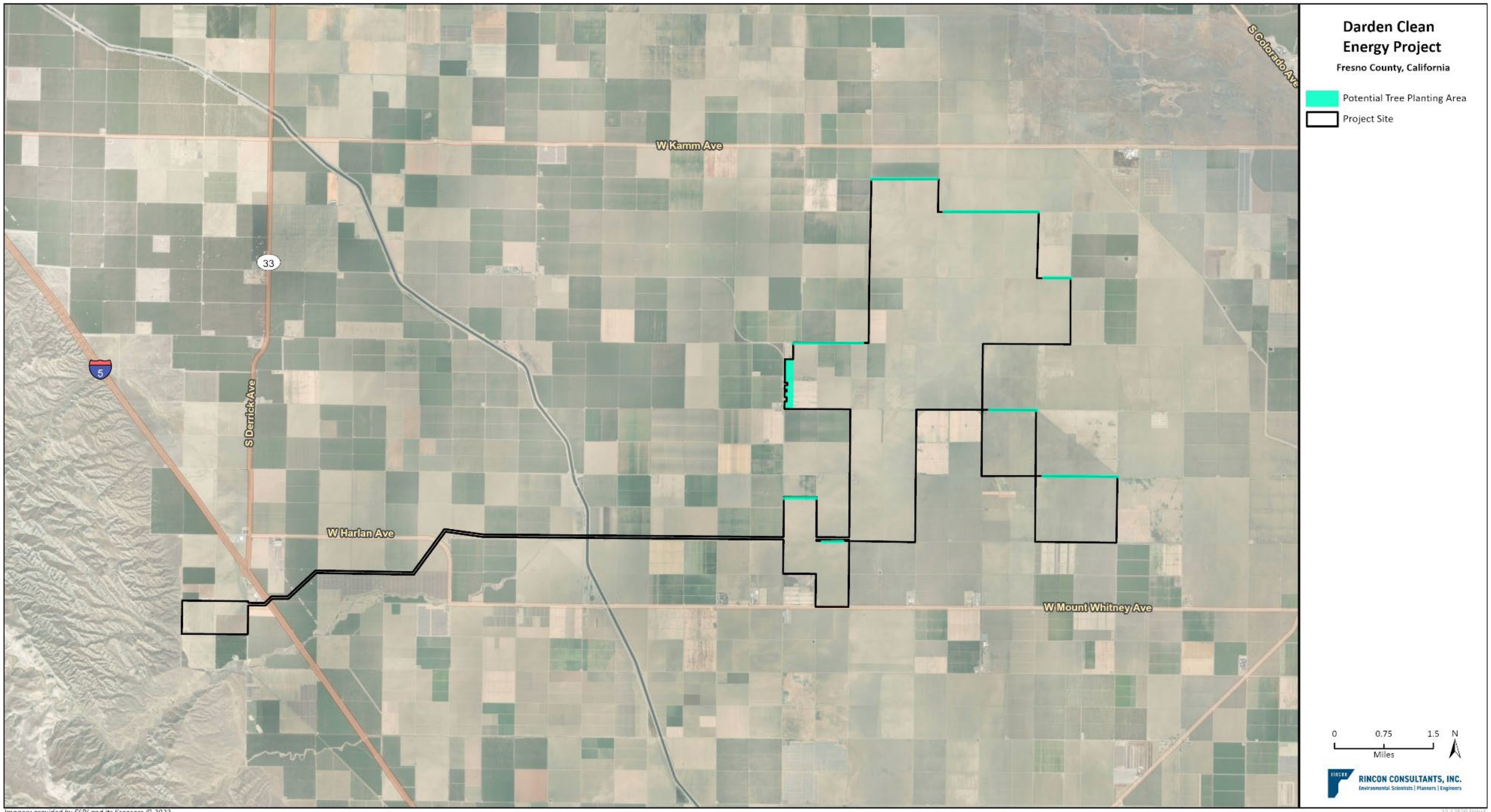
The intent is to improve and expand Swainson’s hawk nesting opportunities in the region. Given the challenges of irrigation in the Central Valley, and with the understanding the goal of tree planting is not to recreate a natural landscape but to expand long-term nesting opportunities as quickly as possible, eucalyptus is probably the best option for planting, especially considering they are among the fasting-growing trees. The most commonly used nest trees for Swainson’s hawk were eucalyptus, cottonwood, and willow trees (Estep, pers. comm. 2023). While cottonwood and willow trees are also fast-growing, they have much higher water demands, and are unlikely to be successful in the Westlands Water District landscape of the Project site.

Fast-growing, non-invasive trees with capacity for tall heights mixed with slower-growing native tree species suitable for nesting Swainson’s hawks will be selected for planting, providing a mixed stand to accommodate other nesting raptor species and reduce nest site competition, as suggested by Sousa (2010). Selection of trees within the Project site would meet constraints of their planting locations; including species with low water needs and tolerance for the salt and selenium content and poor drainage of Project site soils. Additionally, trees suitable for nesting Swainson's hawks and other raptors may be planted outside the Project site as part of Intersect Power's community investment plan, which could include adding green infrastructure and shade trees for the local community. The current potential locations proposed for nest tree establishment are in Figure 7.

Nest trees will be planted and managed during the first growing year using species-specific methods known to ensure highest survival rates, including:

- Periodic irrigation per tree species requirements.
- Weed clearing and control: Weeds and grasses will be cleared in an up to 3-foot radius to minimize competition with saplings. Vegetation clearing will also reduce the potential for sapling herbivory by voles (*Microtus* sp.).
- Herbivory protection: Tree shelters, including tubes or shelters as appropriate will be installed to protect saplings from rodents and birds.
- Activities to manage plantings will occur approximately once every two months.

Figure 7 Potential Locations for Nest Tree Establishment



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6.2.2 Foraging Habitat

Habitat Restoration

The vegetation establishment component of this conservation strategy, as related to Swainson's hawk, is focused on promoting habitat for their prey within the solar PV array. As recommended in previous Swainson's hawk foraging studies and described in the Vegetation Management Plan prepared for the Project (Rincon Consultants 2023x, Appendix D), areas within the solar PV array will be seeded with a mix of native and naturalized grassland and forb species. The seed mix species will be selected based on their compatibility with site soil characteristics and ability to maintain coverage without irrigation. It is anticipated that revegetation of the solar PV area with an intentional seed mix suitable for the existing landscape will provide comparable foraging habitat to existing conditions and may provide a habitat uplift for Swainson's hawk foraging habitat, and this will be evaluated through the scientific research study.

Vegetation will be maintained throughout the life of the Project via an adaptive management strategy that would include:

- Management of vegetation at a height that facilitates both prey abundance and Swainson's hawk access to prey by mechanical or rangeland management means.
- Reseeding with a native and naturalized seed mix to prevent invasive and noxious weeds such as yellow starthistle (*Centaurea solstitialis*), rush skeletonweed (*Chondrilla juncea*), and others.
- Weed management via grazing, mechanical, and/or chemical control, as approved by CDFW and the CEQA lead agency.

6.3 Long-Term Conservation Strategy

Implementation of Vegetation Management Plan

The objectives of the VMP design are to:

- Establish permanent, regenerative vegetative cover that is highly compatible with a lack of irrigation, saline soils, and poor drainage conditions at the Project site;
- Provide for optimum foraging conditions for Swainson's hawks while accounting for constraints;
- Facilitate a Before-After Control-Impact (BACI) research design to test the efficacy of multiple vegetation management regimes; and
- Prevent and control noxious weed infestations.

Monitoring and Management of Nest Tree Plantings and Artificial Nest Structures

A qualified botanist, arborist, or restoration professional will monitor nest tree plantings for five (5) years following planting, and artificial nest structures annually for 5 years following installation.

For both nest trees and artificial nest structures:

- Photographs will be taken from documentation points established during planting. Additional points may be established at the first monitoring event.
- A monitoring report summarizing monitoring data, success criteria, and recommendations will be prepared and provided to CDFW at the end of each year of monitoring.

- A final monitoring report will confirm attainment of restoration success criteria.

For nest trees:

- Invasive weed/grass encroachment that may compromise success will be documented.
- Restoration planting mortality or loss of vigor will be noted.
- Results of remedial measures or invasive weed/grass control will be documented.

For artificial nest structures:

- Use of the nest structure by Swainson's hawk or other species will be documented in April to May and again in June to July annually.
- Required repairs will be noted, and activities to repair structures, if implemented, will be documented.

Implementation of Swainson's Hawk Management Research Program

A research program with be established to analyze the effect of the Swainson's hawk conservation strategy actions on Swainson's hawk.

7 Success Criteria

The conservation actions will be considered successful and complete when the criteria outlined in this section have been met. However, all conservation strategies contain inherent uncertainty, and adaptive management may be required if aspects of any given strategy are shown to be infeasible. Alternative approaches may be developed through consultation with CDFW, and alternative success criteria may ultimately supersede those outlined herein.

7.1 Short-Term Conservation Strategy Success Criteria

Year 1 -2 after construction and prior to Swainson's hawk breeding season of March 15 – August 31:

- All nest trees and suitable nest trees are documented.
- All suitable nest trees on site will be preserved unless hazard conditions require removal to ensure public safety. Any removed hazard trees will be mitigated for by installation of a temporary nest platform in the vicinity of the removed tree or in the potential tree planting areas (Figure 7).
- Plant and manage a sufficient number of trees so that up to 30 additional trees have survived and do not require supplemental irrigation at 5 years. The goal shall be to double the number of existing eucalyptus nest trees on the Project site, or alternatively, substantially increase the number of nesting trees including native species such as valley oak at a lower overall number (see Table 2). Plantings will be situated in the potential tree planting areas as depicted on Figure 7. Trees will preferentially include fast-growing species (24-36 inches/year) with low water requirements, such as eucalyptus, cypress, and faster-growing oak species, but may also include slower growing oak species to create a mixed canopy. Trees will be planted at the following ratios to double the existing nest tree quality (Table 2).
- Seed mixes applied within the entire area of the solar PV array in different treatment plots, per the experimental design of the research study.

Table 2 Tree Planting

Species	Planting Ratio (# of new trees planted: # of current trees on site)
Eucalyptus, Cypress	1:1
Cottonwood	1:2
Oak	1:3

7.2 Long-Term Conservation Strategy Success Criteria

Years 3-5 after construction:

- Maintain 67% survival of planted trees in Years 1 and 2, and replant as necessary to achieve total tree commitment as determined by selected species.
- Install replacement trees as needed to meet survival rates. If substantial replanting is necessary the maintenance and monitoring period may be extended to ensure survival of replacement trees for 5 years.

- Vegetative cover within the solar array is at least 60% absolute cover of seed mix species post-rain events during non-drought years.
- Cover of invasive weed species maintained at 5% cover or less.
- Swainson's hawks observed foraging within the Project size and a 0.5-mile buffer.
- Swainson's hawks nesting in at least 10% of the preserved nest trees and/or nest platforms, or at rates comparable to those of other known nest trees within a 10-mile buffer around the Project site (as documented previously in 2023 Swainson's hawk surveys [SBC and Rincon 2023, SBC 2023]).

7.3 Success Criteria Evaluation

7.3.1 Study Outline [Preliminary]

Study design

- BACI study design
- Replicated restoration treatments (e.g., site prep, seed mixes, field borders/hedgerows) and design elements (if possible, spacing between array rows and/or spacing between array units) across the facility
- Controls in adjacent marginalized agricultural lands
- Repeated visits within and among years during breeding season for Swainson's hawk and avian community, peak growing season for vegetation, and high insect activity

Wildlife sampling

- Swainson's hawk
  - Abundance of breeding pairs (N-mixture models for abundance/density with detection)
  - Displacement and recovery through time; long-term dataset required
  - Fitness (i.e., nesting success)
  - Behavioral observations
  - Sweep-netting for Orthopterans, other insects for prey abundance
  - Small mammal sampling (e.g., Sherman traps) for prey abundance
  - Insects and small mammal response also will be analyzed independently
- Avian community
  - Point counts and acoustic recording units in treatments and controls

Vegetation sampling

- Plant community metrics for avian habitat covariates
- Plant community response to treatments through time (e.g., changes in composition, diversity, richness, cover, and structure)
- Efficacy of restoration treatments to inform adaptive management

Soils/Phytoremediation

- In tandem with plant data, test for effects of phytoremediation, an ecosystem service, of marginalized soils for ecosystem health and regenerative agriculture

- Chemical analysis of soils for contaminants and nutrients
- Chemical content of selected plant species

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Appendix A

Site Photographs

Photograph 1. Fields on the Project site are disked following the growing season, December 15, 2022.

Photograph 2. Mustard covering previously disked field, April 4, 2023.

Photograph 3. Irrigation channel filled with trash and dried plants, December 15, 2022.

Photograph 4. Irrigation channel in spring covered in grasses and forbes, April 4, 2023.

Photograph 5. Orchard within future utility switching station, December 14, 2022.

Photograph 6. Eucalyptus stand within the Project site, December 15, 2022. Previous evidence of burning present in understory.

Photograph 7. Eucalyptus stand within Project site, June 12, 2023. Recent evidence of burning understory.

Photograph 8. SWHA nest tree (cottonwood), June 12, 2023.

Photograph 9. SWHA nest (not visible) in eucalyptus tree, May 2, 2023.

Appendix B

Swainson's Hawk Foraging Study

Darden Clean Energy Project

SWHA Foraging Study

prepared for

IP Darden I, LLC and Affiliates
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October 2023

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Tables

Attachments

1 EXECUTIVE SUMMARY

Stringer Biological Consulting, Inc. (SBC) in coordination with Rincon Consultants, Inc. (Rincon) conducted an analysis of the potential impacts of the proposed Darden Clean Energy Project (project) on foraging habitat for Swainson's hawk (SWHA; *Buteo swainsoni*) on behalf of IP Darden I LLC. The purpose of this report is to provide the Lead Agency with information necessary to make findings pursuant to the requirements of the California Environmental Quality Act (CEQA). This report evaluates potential project impacts to SWHA resulting from a temporary loss of foraging habitat during the construction phase of the project and prior to site restoration.

Based on the results of the analysis presented herein, the proposed Darden Clean Energy Project would not result in a significant impact to the regional population of SWHA through loss of suitable foraging habitat at the project level, nor would it contribute to a significant cumulative impact in concert with other planned or reasonably foreseeable solar projects within the 10-mile radius study area. The loss of 4,818 acres of agricultural land will not affect the distribution or abundance of nesting SWHAs in the study area. Because it represents only 2.3% of the available foraging habitat within the study area, its conversion is negligible relative to availability, and particularly with regard to the relatively small number of SWHAs that nest in the study area. The loss of 4,818 acres of agricultural land would not represent a significant loss of foraging habitat for SWHAs and does not represent a significant CEQA impact. At the cumulative level considering other solar projects in the study area in addition to the Darden Clean Energy Project, all planned, or reasonably foreseeable solar projects represent approximately 4.5% of the total available foraging habitat within the study area which leaves significantly more foraging habitat than is needed by the regional population.

In conclusion, the proposed project would not result in a significant reduction (based on the significance threshold and assessment methods used in this report) of available SWHA foraging habitat at either the project or cumulative level, and that as a result of this analysis no mitigation should be required as per CEQA guidance.

2 INTRODUCTION

Stringer Biological Consulting, Inc. (SBC) in coordination with Rincon Consultants, Inc. (Rincon) has prepared this letter report on behalf of IP Darden I LLC, to present an analysis of the potential impacts of the proposed Darden Clean Energy Project (project) on foraging habitat for Swainson's hawk (SWHA; *Buteo swainsoni*). SWHA is listed as threatened under the California Endangered Species Act (CESA). The purpose of this report is to provide the Lead Agency with information necessary to make findings pursuant to the requirements of the California Environmental Quality Act (CEQA).

The analysis provided in this letter report was undertaken to evaluate potential project impacts to SWHA resulting from a temporary loss of foraging habitat during the construction phase of the project and prior to site restoration. The study design is based on an approach that has previously been used in Fresno and Kings Counties (Estep 2011, 2016; HELIX 2018a; HELIX 2020) to support CEQA determinations. The methodological approach combines field observations, public and proprietary data, and a desktop spatial analysis to estimate the acreage of suitable foraging habitat required to sustain the regional population of SWHA, as well as the amount of suitable foraging habitat available. Impacts to foraging habitat are assessed at both the project and cumulative levels to determine whether the reduction in foraging habitat as a result of the project and other planned or reasonably foreseeable projects would result in a significant impact to SWHA and necessitate off-site or on-site mitigation to reduce impacts.

Project Location and Description

The project site is located in the vicinity of the Interstate 5/State Route 33/State Route 145 intersection, northwest of the City of Huron in unincorporated Fresno County. The project site is located within the "San Joaquin, CA" and "Westside, CA" U.S. Geological Survey 7.5-minute topographic quadrangles. The project site centroid is located at approximately latitude 36°29'10.54"N, and longitude 120°12'32.00"W. Figure 1 in Attachment A is a Regional Location and Vicinity Map. All report figures are in Attachment A.

The project includes approximately 9,120 acres for development of photovoltaic (PV) solar arrays located on Westlands Water District lands. As part of the land transfer to the Applicant, Westlands Water District would subject this land to a non-irrigation covenant, meaning the land would be restricted from current and future irrigated agricultural use. The project's associated infrastructure includes battery storage, generation tie lines and a substation, and may include a green hydrogen component. The project's step up substation and battery energy storage system (BESS) will be located within the PV solar development area. The green hydrogen facility may be co-located with the substation and or located at an alternative site west of Interstate 5. The gen-tie line will be approximately 10-15 miles.

Solar PV generating facilities consist of individual solar panels (modules) which are arranged in rows to form solar arrays. The arrays are combined to form larger units called solar blocks or array blocks. For large-scale utility applications, hundreds of array blocks are interconnected as part of the solar power generation facility. Each array block is served by an electrical inverter, which can be located centrally within the array block or distributed within the array footprint. The inverters convert the direct current (DC) output from the array to alternating current (AC) which is then conveyed to the substation and switchyard which steps up the voltage to match the collection system.

Site History

The proposed project is located primarily on lands owned by Westlands Water District (Westlands). Westlands acquired this property as part of the September 3, 2002, settlement agreement reached among the United States, Westlands, and others in the Sumner Peck Ranch et al. v. Bureau of Reclamation et al. lawsuit. The project site is located in an area of agricultural land use and has historically been used for dry-farmed (non-irrigated) agriculture, such as low-yield production of winter wheat and oats, and has been used for this purpose for the last 10 years. Currently, some portions of the project site lie fallow while the majority of the area is used to grow non-native grasses and forbs, such as mustard and alfalfa. The project parcels fall within portions of Westlands' lands that are under various and intensive constraints to irrigation resulting from multiple lawsuits and settlements over the past two decades. As a result, and for all intents and purposes, these lands can no longer support crop-agriculture activity.

Summary of the Proposed Project

Impact Area

For the purposes of this analysis, the entire project site is considered suitable foraging habitat for SWHA. Historically these lands have functioned as moderate to high-quality foraging habitat for the species because they have been under agricultural crop use for many decades. However, the current status of Westlands Water District lands, as described above, indicate the suitability for foraging would be potentially degraded in coming decades, as, without a rigorous management regime, they would remain either barren disked fields or be heavily impacted by invasive weeds such as mustard and Russian thistle. We suggest the cessation of agricultural activity should be a contributing factor in any assessment of potential impacts to foraging habitat.

The solar array blocks (PV modules), in combination with the BESS, substation and green hydrogen facility, would cover an estimated maximum of 4,818 acres. This is based on the specific panel size and layout of the PV development areas wherein, for each 7.5-foot-wide panel rack (when panels are in their horizonal position) there is a corresponding open row between racks that measures 10.5 feet wide. This amounts to a panel coverage of approximately 42% within PV development footprints. Preliminary engineering assessments have determined percent cover could be as high as 48% at horizontal, and therefore, calculations have assumed 48% as the worst-case scenario. When calculated against a total of 9,120 acres of PV development area, this amounts to 4,378 acres of panel cover at horizontal (peak cover) position. Combined with other project infrastructure, we estimate a total impact of 4,818 acres of SWHA foraging habitat (Table 1). While an estimated maximum of 4,818 acres out of the total project area of approximately 9,510 acres would be covered at a maximum (when PV modules are fully horizontal) during operations, we have also assessed impacts to foraging habitat in the context of the temporary, construction-phase impacts of all 9,510 acres, assuming the worst-case scenario that it would all be unavailable for foraging during the construction period.

Table 1. Project Impacts (acres)

Project Feature	Temporary Construction Impacts (acres)	Permanent Forage Cover (C)/Loss (L) (acres)
Total PV Development Footprint	9,120	-
PV panel cover at horizontal	-	4,378 (C)
O&M structures (Option 1:Option 2)*	11:10	11 (L)
Green Hydrogen Facility and Step-Up Substation (Options 1 and Options 2)*	242	242 (L)
Alt Green Hydrogen Switchyard and Substation (if required)	120	120 (L)
Utility Substation	35	35 (L)
Battery Storage (BESS) (Option 1 and Option 2)*	32	32 (L)
Gen-tie Corridor (gen-tie extension*)	235 (96)	0
Maximum Total Impacts	9,510	4,818

*Means the component overlaps the PV Development Footprint

Swainson's Hawk Use of the Project Site

Surveys for nesting SWHA were conducted at the proposed project site by SBC and Rincon biologists between April and July 2023. SWHA surveys were conducted within the entire project site as well as a 0.5-mile buffer around the project site. The surveys were conducted in accordance with the guidelines prepared by the SWHA Technical Advisory Committee (SHTAC) in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (SHTAC 2000). The project site was surveyed a total of six times during survey Periods II, III, IV, and V. The SWHA surveys consisted of three surveys in Period II/III on April 3-5, April 11-13, and April 17-18; one survey in Period IV on May 1-3; and two surveys in Period V on June 12-14 and July 11-12. Surveys were only conducted during Period IV because three prior surveys had been conducted and all known SWHA nests sites had been documented. Surveys in Period IV generally consisted of checking known SWHA nests to document status (active or inactive) and searching for nests of other raptors. A total of five active SWHA nests were documented within the project site during the surveys and one additional active SWHA nest was documented just outside of the project site within the 0.5-mile buffer (See Figures 2 and 3).

3 METHODS

Swainson's Hawk

SWHA was state listed as a California threatened species on April 17, 1983, and has no federal listing status. The species is a breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and the Mojave Desert. There has been very limited SWHA breeding reported from Lanfair Valley, Owens Valley, Fish Lake Valley, Antelope Valley, and in eastern San Luis Obispo County. SWHA breeds in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah in the Central Valley and forages in adjacent grasslands or suitable grain or alfalfa fields, or livestock pastures. SWHAs breed in California and winter in Argentina, Mexico, and South America. SWHAs usually arrive in the Central Valley between March 1 and April 1 and migrate south between September and October. SWHAs typically nest in trees adjacent to suitable foraging habitat, with nest trees generally located near the edges of riparian stands, and adjacent to, or among agricultural fields, as well as in mature roadside trees. Central Valley SWHAs typically build or reuse nests in large trees, such as valley oak (*Quercus lobata*), Fremont's cottonwood (*Populus fremontii*), willow (*Salix* spp.), walnut (*Juglans hindsii* x *regia*), western sycamore (*Platanus racemosa*), Eucalyptus (*Eucalyptus* spp.), and ornamental redwoods (*Sequoia sempervirens*) and pines (*Pinus* spp.) (Clark Jr. and Biddy et. al. 2022). Suitable foraging areas for SWHA include native grasslands or lightly grazed pastures, alfalfa and other hay crops, idle land, certain grain and row croplands, and ruderal lands. SWHAs primarily feed on voles; however, they will feed on a variety of prey including other small mammals, birds, snakes and insects.

Regulatory Guidance

The California Department of Fish and Wildlife (CDFW) has developed regional strategies to address land use issues related to SWHA conservation pursuant to both the California Endangered Species Act (CESA) and the CEQA process. The CDFW Region 2 guidelines (CDFW 1994) are often used during CEQA review of proposed projects in the Central Valley. Amongst other recommendations, the guidelines recommend acquisition of replacement lands (i.e., compensatory mitigation) for projects that would result in the loss of foraging habitat acreage sufficient to be considered a significant impact to the SWHA population pursuant to CEQA definitions. The guidelines state that the determining criteria for CEQA significance is removal of any suitable foraging habitat within 10 miles of an active SWHA nest, which is defined as a nest active at any time in the previous 5 years. The recommendations contained in the guidelines do not account for the size of the affected population, the amount and quality of existing foraging habitat, or the size of the project relative to the amount of available foraging habitat; however, the guidelines do allow for independent assessment of impacts and development of a conservation strategy as an alternative to the guidelines.

To specifically assess the potential impacts of the proposed project to SWHA, this study quantified the effects of the proposed project on the regional population of SWHA by analyzing data on land use, nest distribution and SWHA abundance within 10 miles of the project. The results of this study are designed to inform a CEQA significance determination based on project-specific information regarding SWHA population data and regionally available foraging habitat.

Methodology

Impacts to SWHA Foraging

This analysis follows methods used for several other utility-scale solar projects approved in the region (reviewed in Estep 2017), including similar projects in Fresno County (Estep 2011, 2016, HELIX 2020). In order to provide a more robust assessment of CEQA impacts, the scale of the analysis goes beyond the project site and the nearest active SWHA nest, and in this way differs from the standard CDFW Guidelines. The analysis considers the size and distribution of the regional population of SWHA, the availability of suitable foraging habitat, and the effect of project development on the availability of SWHA forage resources to the regional population (i.e., suitable foraging habitat).

Regional Population and Study Area

For purposes of this analysis, the regional population of SWHA was defined as the number of nesting territories documented within 10 miles of the project site. The 10-mile radius standard was chosen based on telemetry studies that indicate SWHA will fly up to 10 miles from the nest to forage (Babcock 1995, Estep 1989). Consequently, the regional population for the study is equivalent to the SWHA that may potentially forage on the project site and thus be directly affected by the project through loss of foraging habitat. The 10-mile radius around the project site boundary (smoothed to account for the uneven shape of the project site) defines the study area for the analysis (depicted on Figure 2). The gen-tie route provides limited foraging habitat for SWHA and impacts along the gen-tie route (i.e., power poles) would be negligible as they relate to any loss of SWHA foraging habitat. While the gen-tie route is encompassed within the 10-mile radius study area, it was not included in project limits that were used to define the study area.

Foraging Habitat Availability

The amount, distribution, and quality of foraging habitat available to the regional population is a function of surrounding land use patterns. Historically, SWHA hunted in the grasslands of the Central Valley and coastal valleys, and the desert scrub and shrub lands of high desert regions. With the conversion of the Central Valley to agriculture, SWHA foraging has shifted to managed cultivated lands and the availability of foraging habitat has become largely dependent on agricultural practices (Babcock 1995, Woodbridge 1991, Estep 1989). The suitability of individual land cover types is largely a function of two factors: 1) prey abundance; and 2) prey accessibility; the latter of which is influenced by vegetation structure (Estep 2009, Bechard 1982). Land uses considered suitable for SWHA foraging include alfalfa hay; irrigated cropland typically cultivated in a rotation of cotton, wheat, and tomatoes, but also including silage crops such as triticale, sorghum, and corn; irrigated pasture; and uncultivated land that has retained some natural soil and vegetation (Estep 2017). Agricultural land uses historically considered unsuitable for SWHA foraging include orchards and vineyards (Estep 2017).

The results of a two-year study of four to five (second year only) solar array fields in Sacramento County demonstrated that SWHA do forage in moderately-sized solar array fields following conversion from cultivated uses. SWHA use of solar array fields exceeded expected use based on availability within the agricultural landscape (Estep 2021). The study evaluated solar arrays that were managed to function as suitable SWHA foraging habitat (i.e., low cover of grasses maintained at 4 to 12 inches in height) and were located within a matrix of agricultural land that included irrigated pasture, dry pasture, and irrigated cropland. The study suggests that properly managed solar array fields within an agricultural landscape are not avoided by SWHA and may be selected at a greater frequency than many cultivated land cover types (Estep 2021). Other studies have also shown that SWHA will forage in utility-scale solar generating facilities that are located within an overall matrix of agricultural land (HELIX 2018a).

Suitable foraging habitat varies in quality based on agricultural management of various crop types. Crop types that support large numbers of rodent prey and consistently have a low, open vegetation structure provide the highest quality habitat, whereas crop types that support low numbers of prey or are characterized by tall and dense vegetation provide the lowest quality foraging habitat. Foraging studies indicate that SWHA preferentially forage in alfalfa, tomato, wheat, oat, and other annually rotated crops that maintain a relatively low vegetation profile and that are harvested during the breeding season. Alfalfa has been shown to provide particularly high value habitat due to its consistently low vegetation height and high frequency of mowing and is used by SWHA at a significantly higher rate relative to its availability in the landscape (Estep 2013, 2009, 1989; Swolgaard et al. 2008; Babcock 1995; Bechard 1982). Other grain crops (e.g., wheat, barley, sorghum), along with row crops (e.g., tomatoes, sugar beets) and irrigated pasture provide moderate value habitat, as they are harvested during the breeding season. Crops such as corn, cotton, safflower, melons, and vegetables provide low value foraging habitat (Estep 2015). Based on the documented parameters of SWHA forage preference, we have categorized available landscape-scale data on land use for foraging suitability as follows: suitable or unsuitable for SWHA foraging, and where suitable, as Low, Moderate, or High quality foraging habitat.

Foraging Habitat Requirements

SWHA forage widely over large areas (Estep 2015). Data from two telemetry studies conducted in the Sacramento Valley indicate that SWHA home ranges vary from 830 acres to 21,543 acres (Estep 1989, Babcock 1995). The average home range size from Babcock (1995) was 9,978 acres (N=5) and from Estep (1989) was 6,820 acres (N=12). Smaller home ranges generally correlate with high percentages of alfalfa, fallow fields, and dry pastures within the range (Babcock 1995, Woodbridge 1991, Estep 1989). In the immediate vicinity of high value foraging habitat, home range sizes are as low as 830 acres (Estep 2015). The analyses in this study were based on an average home range size of 6,820 acres (Estep 1989), as it represents a reasonable estimate of home range size given the land use and crops in the region, as supported by field research.

Home range and foraging territory are not synonymous. The 6,820-acre home range is the average area that an individual hawk will occupy during the course of the breeding season; however, within this area, foraging occurs opportunistically where conditions provide accessible prey (Estep 2015). Furthermore, this area is not defended and SWHA often forage communally (Estep 1989, personal observations by the author). Although average home range size may not be an accurate indicator of realized foraging habitat acreage, it is not feasible to precisely quantify the foraging area used by individuals of wide-ranging, opportunistic species such as SWHA; therefore, the average home range size is a useful baseline that can be adjusted to account for factors that affect the amount of the home range that provides the essential resource base for the SWHA nesting territory and thus determines the amount of habitat required to sustain a nesting pair (Estep 2015).

Factors that affect the amount of the home range that provides the essential resource base for the SWHA nesting territory include 1) Home range overlap; 2) Habitat suitability; and 3) Foraging outside a study area. Each of these factors is described in detail below.

Factor One – Home range overlap. Home ranges within a population overlap, as SWHA forage opportunistically over a shared landscape and often gather in large numbers to forage during agricultural activities that expose prey such as harvest, disking, burning, or flooding. Estep (1989) found that average overlap among home ranges within a population was 40 percent. Adjusting the average home range size downward by the average amount of overlap partially accounts for the extent to which SWHA in a population share the available foraging habitat in the region.

Factor Two – Habitat suitability. While SWHA utilize a large home range, actual foraging takes place in a subset of the total home range, and most prey capture attempts are in moderate- or high-quality habitat areas (Estep 2015). Most SWHA home ranges are likely to contain some unsuitable and low-quality suitable land uses that do not contribute appreciably to the resource base available in the home range. In order to account for this, the average home range can be adjusted downward to reflect only the proportion of the suitable foraging habitat in the study area that is of Moderate or High quality (Estep 2015).

Factor Three – Foraging outside the study area. Because SWHA utilize land up to 10 miles from the nest for foraging, some portion of the calculated potential foraging habitat available to a nesting pair in the regional population will be outside the study area, unless the nest is inside the project site boundary. Comparing only the habitat available inside the study area to the total habitat requirements of the regional population would substantially underestimate the amount of habitat available to the regional population. The amount of overlap between the study area and the potential foraging territory of a nest will decrease with distance from the project site. This relationship can be represented in a simplified manner with Equation 1, which is a trigonometric formula for the overlap (A) between two circles of unit radius (radius=1):

$$A = 2\, cos^{-1}\left(\frac{d}{2}\right) - \frac{d}{2}\sqrt{4 - d^2}$$

where d=distance between the centers of the circles expressed as a proportion of the radius, and r=1. This is a suitable approximation of the amount of a given nest's potential foraging area within the Study Area as a function of its distance from the project site, as the study area is approximately a circle of radius 10 miles centered on the project site, and the potential foraging area available to a nesting pair of SWHA is approximately a circle of radius 10 miles centered on the nest. The measure of overlap (A) for each pair of nests is used to calculate the weighted average overlap between the study area and the potential foraging area available to the regional population (r).

After applying this equation to each nest location in the regional population and calculating the weighted average overlap of all nests, the total amount of foraging habitat required by the regional population can be adjusted to reflect the average proportion of all home ranges that is outside the study area. For this analysis, nest distances from the project site were binned in increments of 1 mile, and the value of d for each bin was the mid-point of the distance increment (e.g., all nests between 2 and 3 miles from the project site boundary were given a value of 2.5). As an example of the process, for a nest that is between 2 and 3 miles from the center of the project site, the quantity d is calculated as 2.5 miles divided by the 10-mile radius of the circle and equals 0.25.

Using all of the information discussed above, the acreage of suitable foraging habitat required in the study area to support the regional population of SWHA (Y) can be calculated using Equation 2:

$$Y = n \cdot 6{,}820 \cdot p \cdot q \cdot r$$

where n is the number of SWHA nesting pairs in the regional population; 6,820 is the baseline average home range size; p is the adjustment for average home range overlap (1-average overlap); q is the proportion of the suitable habitat in the study area that is moderate- or high-quality habitat; and r is the weighted average overlap between the study area and the potential foraging area available to the regional population. The quantity Y can be subtracted from the total existing acreage of suitable foraging habitat in the study area; a positive result would indicate that there is a surplus of foraging habitat available to SWHA in the study area; a negative result would indicate that there is a deficit of foraging habitat in the study area.

Thresholds of Significance

CEQA defines the significance of an impact on a state-listed species based on the following relevant thresholds of significance:

- Appendix G of the State CEQA guidelines states that a biological resource impact is considered significant (before considering offsetting mitigation measures) if the lead agency determines that project implementation would result in "substantial adverse effects, either directly or through habitat modifications, on any species identified as being a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or USFWS"; and
- CEQA Section 15065 (Mandatory Findings of Significance) states that a biological resource impact is considered significant if the project has the potential to "substantially reduce the number or restrict the range of an endangered, rare or threatened species".
- Both these thresholds are understood to mean something other than "take" of a single member of a species.

Impacts to SWHA Foraging

Based on the above-referenced definitions, the proposed project could be considered to have a potentially significant impact to SWHA if it resulted in a reduction of available foraging habitat below the amount required to sustain the regional population. If the proposed project would not result in a deficit of suitable foraging habitat in the study area, the project's impact on foraging habitat could be considered less than significant under CEQA.

Because SWHA home ranges are different each year due to seasonal and annual changes in the crop matrix, it is difficult to predict or model the extent of the area likely to be used by a given pair of SWHA over a period of years (Estep 2015). The method herein used to estimate the acreage of available and required foraging habitat in the study area is robust and scientifically defensible; however, the approach is dependent on several generalizations and assumptions, and the resulting estimates for some of the model's inputs are best approximations. To account for variation in the estimated inputs (due to such factors as interannual variation in the regional population caused by mortality and recruitment), to allow for resilience in the population to environmental factors outside the scope of this analysis, and to account for other potential sources of error, the CEQA significance threshold has been set substantially higher than the minimum amount of foraging habitat required in the study area to sustain the regional population. For this analysis, the CEQA significance threshold was conservatively set at 70 percent of the existing surplus habitat. If the project would result in the surplus of suitable foraging habitat in the study area being reduced to less than 70 percent of the existing surplus, the project would be considered to have a significant impact on the regional population of SWHA under CEQA. This 70% threshold was established by Estep (2015) as being adequate to provide a buffer of foraging habitat above the minimum number of acres needed and has been accepted by numerous CEQA lead agencies.

Data Acquisition and Processing

Data used in the analysis came from publicly available datasets, the results of other SWHA nest surveys conducted in the region, and data obtained during surveys performed by SBC and Rincon in 2023.

Land Use Data

Land use data were taken from the California Department of Water Resources (DWR) 2019 Crop Mapping dataset: https://data.cnra.ca.gov/dataset/statewide-crop-mapping. The data are based on the 2019 Statewide Agricultural Survey conducted by DWR and were downloaded on December 5, 2022. This dataset contains agricultural land cover vector data covering the entire Study Area, which is derived from land cover data collected by DWR personnel based on aerial imagery and ground surveys. The data were clipped to the Study Area boundary and cross-checked for accuracy by SBC staff using aerial imagery available in desktop Google Earth Pro applications as well as 2021 land cover raster data obtained from the U.S. Department of Agriculture (USDA) Crop Layer available online at https://www.nass.usda.gov/Research_and_Science/Cropland/Release/index.php. Where conflicts arose between agricultural land cover classifications in the DWR 2019 vector data and more recent aerial imagery available in Google Earth Pro or the USDA 2021 raster dataset, the land cover type was modified to reflect the more recent aerial imagery/data. Land cover for non-agricultural areas was classified using desktop Google Earth Pro applications and the USDA 2021 raster data, which classifies all land cover in the Study Area including undeveloped and urban areas, and acreages were obtained using ArcMap 10.7.1® applications. Once all land in the Study Area was assigned a land cover classification, each land cover type was characterized as suitable or unsuitable for SWHA foraging, and as High, Moderate, Low, or Unsuitable quality foraging habitat, according to a crosswalk derived from previous studies (Estep 2015, 2017). The crosswalk is provided in Attachment B.

Swainson's Hawk Nest Data

Spatially explicit data on SWHA sightings and previously documented SWHA nest locations in the study area were obtained from the following sources: iNaturalist (https://www.inaturalist.org), a comprehensive ground survey performed in 2011 for the Tranquillity Solar project (located in the northwest corner of the study area) for all SWHA nesting pairs within a 10-mile radius of the Tranquillity Solar project site (Estep 2011), a comprehensive ground survey of SWHA nests in the central San Joaquin Valley that includes the study area (Estep and Dinsdale 2012), a comprehensive ground survey performed in 2016 for the Scarlet Solar project (located in the northwest corner of the study area) that included a survey for all SWHA nesting pairs within a 10-mile radius of the Scarlet Solar project site (Estep 2016a), California Natural Diversity Database (CNDDB) records, and data from other unpublished SWHA surveys conducted in the Study Area over the last 6-7 years by SBC staff.

Based on a review of the available historic nest data described above, a predicted 40 (with a margin of error of ± 2 or 3) SWHA nests/nest territories would be expected to be present in the study area. The exact number of SWHA nest territories previously documented is impossible to determine as it is derived from a compilation of data from multiple studies conducted over several years and likely contains duplicative nest accounts. Some trees with previously documented nests have been removed or have experienced branch or trunk failure causing the pair to relocate, potentially resulting in double counting of a nesting pair in the desktop review. Some of the historic nest records appear to be duplicates because they are from different studies conducted in different years and some of the pairs would be expected to have moved nest territories over the life span of the various studies. All of these factors could potentially affect the estimate of the actual SWHA nest territories present in the study area based on historic data.

SWHA Nest Surveys

Prior to initiating ground surveys, a desktop review was conducted to compile data on all previously documented SWHA nests in the study area (described above in *Swainson's Hawk Nest Data*) as well as identify potentially suitable nesting locations for SWHA within the study area. To identify suitable nest trees, the entire Study Area was divided into grids using ArcMap 10.7.1®, which were exported into the Google Earth Pro desktop application. Using the grid system exported into Google Earth Pro, SBC staff systematically reviewed the most recent available aerial imagery and street view photography (where available) and created a kmz file of all potentially suitable nest trees in the Study Area as a general guidance to inform the field surveys. Trees were generally classified as suitable or unsuitable based on size, crown density and location (e.g., horticultural trees in the interior of urban areas such as the communities of San Joaquin or Tranquillity and very small dense trees were generally considered unsuitable). In cases where the potential suitability of the tree was questionable (e.g., it appeared to be small with a dense crown on aerial imagery but was located adjacent to medium to high quality foraging habitat), it was designated as a potentially suitable nest tree. Regardless of the desktop identification and classification of suitable nest trees, any potentially suitable nest tree identified during field surveys was searched for SWHA nests.

The entire study area, including the project site and 10-mile radius, was surveyed twice in spring/summer of 2023 during the SWHA nesting season. The surveys were designed to be a complete census of nesting SWHA in the study area. Following methodology designed by Estep (reviewed in Estep 2017), surveys were conducted in two main phases, during the late brooding/early nestling phase (April 20 to May 31) and during the late nestling – to late fledging phase (June 1 to July 15). The first round of SWHA nest surveys for this study was conducted May 1 – 5 and the second round of SWHA nest surveys was conducted June 12-16.

Each set of surveys was conducted by a team of four biologists. All biologists conducting surveys were equipped with tablets or smartphones running ArcGIS Field Maps depicting the project site and 10-mile buffer as well as all previously documented SWHA nests (described above in the section *Swainson's Hawk Nest Data*) and the locations of any potential nest trees that were identified via desktop review of aerial imagery. During each survey, all portions of the study area with suitable nest trees were surveyed for nesting SWHA using a combination of windshield and pedestrian surveys. All SWHA observations were noted, as well as stick nests with the potential to be used by raptors and nests of other raptor species. During each survey, a note was made in ArcGIS Field Maps for each previously documented nest location and potential nest tree whether any nests or raptors were observed as well as any other pertinent notes such as nest stage, nest disposition, number of raptors observed, life stage (nestling, fledgling, sub-adult, adult etc.), or raptor behavior (e.g., perching, flying overhead, courtship, nesting). If SWHA were observed using a nest or nest tree, subsequent surveys consisted of a follow-up visit to document nesting activity as described above. Surveyors took care not to disturb nesting SWHA to the extent possible while allowing for nest detection and determining nest stage.

In addition to the nest census conducted within the project site and 10-mile radius, four additional surveys for nesting SWHA were conducted by SBC and Rincon biologists within the project site and 0.5-mile radius in order to complete protocol-level surveys for nesting SWHA in support of CEQA documentation and consultation with CDFW as described above in *Swainson's Hawk Use of the Project Site*. Protocol level SWHA nesting surveys were conducted according to guidelines prepared by the SHTAC in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (SHTAC 2000). The methodology for the protocol-level surveys was similar to that described in the SWHA Nest Surveys section of this report. Nests documented during protocol-level surveys are included in the results of this report.

Cumulative Projects

Review of the Fresno County Planning Commission's Open Applications and Planning Commission Log webpage, and the Fresno County Division of Public Works and Planning's Photovoltaic Facilities Processing webpage provided four past, present, or probable future solar energy projects located within the study area that would potentially be constructed within one year before or after the Project. A list of projects meeting these criteria is shown in Table 2 along with a brief description, location, distance from the project site, and status. The Valley Clean Infrastructure Plan (VCIP) is included in the table for informational purposes but cannot be evaluated as a cumulative project because it is in the early stages of planning and no specific locations have been determined (it does not qualify as a cumulative project under CEQA). Projects could be implemented anywhere throughout Westlands Water District lands as part of this Plan. However, it is unknown at this time whether any projects would be implemented within the Darden Clean Energy Project study area as part of the VCIP.

Comparison of SWHA Nest Density and Foraging Habitat Suitability to Other SWHA Studies in the Project Region

Since the validity of studies like the one conducted for this report are predicated on the quality of the data obtained on the numbers of SWHA nest territories in the study area and the determination of suitable foraging habitat in the study area, a comparison was conducted between the results of this study for the Darden Clean Energy Project and other similar sized studies in the southern San Joaquin Valley. The purpose of the comparison was to see if the results of this current study related to SWHA nest density, and the percentage of suitable foraging habitat are consistent with other such studies.

A comprehensive SWHA nest census conducted in 2011 that covered approximately 900,000 acres in Fresno and Kings counties found a SWHA nest density of 0.07 nesting territories per square mile (mi^2)(Estep 2011). Another SWHA nest census that covered approximately 1,029,785 acres in Fresno and Kings counties and overlapped the prior mentioned study (as well as the Darden Clean Energy Project study area), found a SWHA nest density of 0.06 per mi^2 (Estep and Dinsdale 2012).

A survey of five similar regional SWHA studies conducted in Fresno and Kings counties with study areas ranging in size from roughly 240,000 to 300,000 acres found the proportion of suitable foraging habitat to range from 58.4% (Fresno County; lowest of the five studies) to a high of 81.3% (Kings County; highest of the five studies), with an average of 69% suitable foraging habitat (Estep 2011; Estep 2016a,b; HELIX 2018b, HELIX 2020).

Table 2. Cumulative Solar Projects Within a 10-Mile Radius of the Project Site

Project Name	Description	Location	Distance to Project Site	Status
Scarlet Solar	CUP 3555: 400 Megawatt (MW) PV solar facility with 400 MW energy storage system on 4,089 acres	3.5 miles west-southwest of the community of Tranquility and approximately 6.5 miles east of I-5 along State Route 33 at W South Avenue in unincorporated Fresno County	10.4 miles northwest	Project is currently under construction.[1, 4]
Sonrisa Solar	CUP 3677: 200 MW PV solar facility with battery storage capacity of 100 megawatts on approximately 2,000 acres	Approximately 1.9 miles east of State Route 33 at West Adams Avenue	10.4 miles northwest of the solar facility	Under Fresno County Planning Commission Review.[1]
Tranquility Solar	CUP 3451-58: 200 MW solar facility on 3,732 acres	Intersection of West Floral Avenue and State Route 33	10.1 miles north of the utility switchyard	Under construction, not completed.[2]
Luna Valley Solar	CUP 3671: 200 MW solar facility and energy storage on 1,252 acres	0.90-mile northwest of the intersection of Manning Avenue and South Derrick Avenue	12.7 miles north of the utility switchyard	Approved; Construction permits not yet obtained.[2, 3]
WWD: Valley Clean Infrastructure Plan (VCIP)	A plan that would allow for the construction of solar facilities and electric transmission infrastructure with the potential to provide 20,000 MWs of solar energy and energy storage	Throughout Westlands Water District; specific location undetermined	Specific location undetermined	Project is currently soliciting input from landowners in Westlands Water District.5

Sources: [1]County of Fresno 2023a; [2]County of Fresno 2023b; [3]County of Fresno 2023c; [4]WWD 2023; [5]Golden State Clean Energy

CUP – conditional use permit; WWD – Westlands Water District

4 RESULTS

Raptor Nests Documented in the Study Area

A total of 106 active raptor nests were documented in the study area including 41 active SWHA nests, 28 active red-tailed hawk nests, 35 great-horned owl nests, and 2 red-shouldered hawk nests (Figure 2).

Table 3. Summary of Raptor Nests Documented in the Study Area

Species	Number of Active Nests
Swainson's Hawk	41
Red-tailed Hawk	28
Great-horned owl	35
Red-shouldered hawk	2
Total	**106**

Distribution of SWHA Nests and Habitat in the Study Area

The distribution of SWHA nest territories is fairly even throughout the study area, although there is a noticeable concentration of SWHA nests in the center of the study area in and adjacent to the project site as well as in the northeastern half of the study area. The majority of the suitable foraging habitat is in the central portion of the study area in and adjacent to the project site as well as in a band that extends from southeast of Levis through the project site to southeast of Calflax. It is not surprising that the highest concentration of nests is in the central portion of the study area where suitable foraging habitat is abundant. What may seem counterintuitive is the concentration of nests in the northeastern quadrant of the study area where much of the land is considered unsuitable foraging (orchards and vineyards). However, that area has some of the best nesting habitat in tall ornamental trees (e.g., *Eucalpytus* spp., *Pinus* spp.), in and around rural residences/farmhouses and in riparian trees along Fresno Slough and James Bypass. Interestingly, SWHA individuals were routinely seen in areas dominated by orchards during the surveys. SWHA were observed flying into and out of orchards as well as perching in orchard trees (almond trees primarily) during the surveys. SWHA were also observed on several occasions sitting on the ground and in downed almond trees within almond orchards that had been ripped out and were being prepared for chipping/composting. Based on these observations, it appeared that SWHA may be using almond orchards at least for foraging, although the extent that SWHA are using almond orchards is unclear.

Distribution of Habitat and Impacts in the Study Area (Sub-area Analysis)

In cases where SWHA nests are concentrated in certain areas within the study area, rendering a signification portion of the study area unusable by all but a few nest territories, an additional "sub-area analysis" is done to more accurately reflect the impacts on the regional population (Estep 2017, 2011). The sub-area analysis typically removes a large portion of the study area where nests are at very low density and repeats the analysis of required and available foraging habitat with a greatly reduced acreage of available habitat compared to the remaining regional population. The project site is always retained in the sub-area if such an analysis is done. For the Darden Clean Energy Project, the sub area analysis was not considered to be appropriate because SWHA nests are fairly evenly distributed throughout the study area (Figure 3) and the highest concentration of nests (11 out of 41) is in the project site and within a one-mile radius. Logically, since the highest concentration of SWHA nests is in and adjacent to the project site, the entire study area is assumed to be important to the regional population of SWHA. Therefore, a sub-area analysis was not done for this study.

Regional Population of SWHA and Habitat Requirements

The regional population of SWHA that would potentially be affected by the Darden Clean Energy Project is 41 nesting pairs in a 372,082-acre (roughly 581 mi^2) study area (Figure 3), which equates to a density of 0.071 nesting territories per mi^2. Attachment C is a summary of SWHA nests observed in the study area and Attachment D contains representative photos. The nest locations are distributed fairly evenly throughout the study area, with the exception of the northwestern quadrant and the far southcentral portion of the study area, where nests are absent or in notably lower abundance. The lack of SWHA nests in the northwestern quadrant is likely due to the general scarcity of suitable nest trees in that region. A total of 205,133 acres of suitable foraging habitat were identified in the study area; the remaining 166,949 acres contained unsuitable land uses for foraging (Figure 4). Of the suitable foraging habitat in the study area, 8,012 acres were High quality (alfalfa), 167,614 acres were Moderate quality, and 29,507 acres were Low quality (Figure 5). Overall, 85.6 percent of the suitable foraging habitat was Moderate- or High-quality habitat. Land uses in the study area are summarized in Table 4.

Table 4. SWHA Foraging Habitat in the Study Area

Habitat Type	Area (ac)	% of Total
Grand Total	**372,082**	**100.0**
Suitable Habitat	*205,133*	*55.1*
High Quality (alfalfa)	8,012	2.2
Moderate Quality	167,614	45.0
Low Quality	29,507	7.9
Unsuitable Habitat	*166,949*	*44.9*

Of the 41 SWHA nests observed, 11 nests were either on the project site or within a one-mile radius (Figure 6). The next highest concentration of SWHA nests was between four and six miles from the project site and nearly 75% of the nests were within a six-mile radius of the project site. The approximate overlap of the potential foraging area and the study area was calculated for each nest using Equation 1. The weighted average overlap of all nests (r) within the study area was 0.744 (Table 5), meaning that roughly 75% of the foraging habitat required for the regional population is within the study area.

Table 5. Proportion of Potential Foraging Area Inside the Study Area

Distance Increment (mi)	Number of Nests	Overlap
0-1	11	0.968
1-2	2	0.905
2-3	3	0.841
3-4	2	0.778
4-5	6	0.716
5-6	6	0.654
6-7	4	0.594
7-8	2	0.534
8-9	4	0.476
9-10	1	0.419
	Weighted Average	**0.744**

Using the results discussed above, the total acreage of foraging habitat required in the study area to sustain the regional population of SWHA was calculated using Equation 2:

$$Y = 41 \cdot 6{,}820 \cdot 0.6 \cdot 0.856 \cdot 0.744 = 106{,}848$$

Where 41 is the size of the regional population (n); 6,820 is the baseline average home range size; 0.6 is the correction for 40 percent overlap among home ranges (p); 0.856 is the proportion of the suitable foraging habitat in the study area that is Moderate- or High-quality (q); and 0.744 is the weighted average proportion of potential foraging area for all nest territories in the regional population that is inside the study area (r).

The total amount of foraging habitat in the study area required by the regional SWHA population was calculated to be 106,848 acres. The total amount of suitable foraging habitat in the study area is 205,133 acres. Accounting for the total required acreage of foraging habitat for all 41 pairs of SWHA, the study area contains approximately 98,285 acres of surplus suitable foraging habitat. For purposes of this study, the CEQA significance threshold is 70 percent of the existing surplus, or 68,800 acres (Table 6).

Table 6. Project Impacts and CEQA Significance Threshold

	Existing (acres)	Project 4,818 acres	% of Existing	Cum.[1] 4,448 acres	% of Existing
Foraging Habitat Required	106,848	--	--	--	--
Suitable Foraging Habitat	205,133	200,315	97.6	195,867	95.5
Surplus	98,285	93,467	95.1	89,019	90.6
CEQA Significance Threshold	68,800		--		--
Less than Significant Impact[2]/ Surplus Remaining After Project Development	29,485	24,667	83.7	20,219	68.6

[1] Acreage of all planned or reasonably foreseeable solar projects within the study area used for the cumulative analysis that provide suitable foraging habitat for SWHA (see discussion in *Cumulative Impacts*).

[2] Impact acreage that would be below the CEQA threshold of significance, or 98,285-68,800=98,285·0.3=29,485.

Project Impacts to SWHA foraging Habitat

Project-Level Impacts

The proposed project would result in the conversion of approximately 9,510 acres of active agricultural land in the study area into a solar PV generating facility. Based on panel dimensions, preliminary site design and engineering feedback, 48% of the study area was conservatively assumed to be rendered unsuitable foraging for SWHA (i.e., permanently impacted by panel cover at peak horizontal orientation and other permanent project infrastructure). As discussed in *Project Location and Description*, an estimated maximum of 48 percent of the area within a typical solar array block consists of solar PV panel surface and other structures when viewed from above as well as other structures such as substations, BESS, and inverters, and the other 52 percent remains open ground surface and is available to SWHA for foraging. Removal of an estimated maximum of 4,818 acres of habitat (9,120 x 0.48) (see Table 1) would reduce the surplus SWHA foraging habitat in the study area to 93,467 acres, which is 95.1 percent of the existing surplus, and well above the 70-percent CEQA significance threshold (Table 6). The project-level impact to the regional population of SWHA through foraging habitat loss would be less than significant, and no compensatory mitigation for impacts to foraging habitat would be required at the project level.

Cumulative Impacts

In addition to a project-specific assessment, CEQA also requires that a cumulative assessment be conducted to determine whether the project's incremental impacts are cumulatively considerable when added to other past, present, and reasonably foreseeable future actions. In order to do this, the study area is used as the cumulative impact assessment area. For purposes of this assessment, the cumulative impact is defined as all planned and proposed solar energy projects within the roughly 10-mile radius study area. It does not include other types of projects or other land use changes that would potentially remove or modify Swainson's hawk foraging habitat (Estep 2016). When considering total project acreage, solar energy projects comprise the majority of planned and proposed non-agricultural projects in the Study Area that could impact SWHA foraging habitat. Additionally, the 70% significance threshold is conservatively set to accommodate land use changes, resulting in the CEQA significance threshold being set substantially higher than the minimum amount of foraging habitat required in the study area to sustain the regional population.

In addition to the proposed Darden Clean Energy Project, there are four planned or reasonably foreseeable solar projects that are considered in the cumulative analysis (Table 2). Cumulative projects are depicted in Figure 7, along with the acreage of each project that overlaps the study area. It is worth noting that solar projects in the study area that have already been constructed and are evident on aerial imagery were classified as developed land during the quantification of suitable SWHA foraging habitat. Therefore, existing solar projects are already depicted as unsuitable habitat (Figure 4) and are not discussed separately in this report. The total area of the four cumulative projects that falls within the study area is 6,946 acres. Of the 6,946 acres of cumulative projects, 2,498 acres have already developed (Tranquillity Solar) and are already identified as unsuitable foraging habitat (See Figure 4). Therefore, an additional 4,448 acres of suitable SWHA foraging habitat would be impacted by the cumulative solar projects evaluated in this analysis (Figure 8).

When considering development of the cumulative projects, the surplus SWHA foraging habitat in the study area would be reduced to 89,019 acres (conservatively assuming 100% impact for these projects), which is 90.6 percent of the existing surplus and above the 70-percent CEQA significance threshold (Table 6). Therefore, the project would contribute to a less than significant cumulative impact to the regional population of SWHA through foraging habitat loss, and no compensatory mitigation would be required for cumulative impacts.

5 CONCLUSIONS

The proposed Darden Clean Energy Project would not result in a significant impact to the regional population of SWHA through loss of suitable foraging habitat at the project level, nor would it contribute to a significant cumulative impact in concert with other planned or reasonably foreseeable solar projects. After project development, the amount of surplus suitable foraging habitat for SWHA in the study area would remain greater than 70 percent of the existing surplus at both the project and cumulative level, and therefore provide sufficient surplus foraging habitat to allow for population growth and resiliency to disturbance, as well as to changes to the foraging landscape through changes in agricultural land uses.

The loss of 4,818 acres of agricultural land will not affect the distribution or abundance of nesting SWHAs in the study area. Because it represents only 2.3% of the available foraging habitat within the study area, its conversion is negligible relative to availability, and particularly with regard to the relatively small number of SWHAs that nest in the study area. The loss of 4,818 acres of agricultural land would not represent a significant loss of foraging habitat for SWHAs and does not represent a significant CEQA impact. At the cumulative level considering other solar projects in the study area in addition to the Darden Clean Energy Project, all planned, or reasonably foreseeable solar projects represent approximately 4.5% of the total available foraging habitat within the study area which leaves significantly more foraging habitat than is needed by the regional population.

The analysis performed for this study is based on previously accepted methods (Estep 2017, 2015, 2011) and makes use of the best available data. The analysis considers impacts to SWHA at a more biologically realistic scale than the method employed in the 1994 CDFW guidelines while remaining logistically feasible as well as generalizable to a wide range of projects and locations.

In conclusion, the proposed project would not result in a significant reduction (based on the significance threshold and assessment methods used here) of available SWHA foraging habitat at either the project or cumulative level, and that as a result of this analysis no mitigation should be required as per CEQA guidance.

6 DISCUSSION

The results of this SWHA foraging habitat analysis conducted for the Darden Clean Energy Project identified a regional population of 41 SWHA nesting pairs/nest territories within the roughly 10-mile radius study area (nest density of 0.071 per mi^2). This finding is consistent with or slightly higher than nest densities previously documented in the southern San Joaquin Valley (Estep 2011; Estep and Dinsdale 2012) and also is consistent with prior studies that indicate that the nest density in the southern San Joaquin Valley is significantly lower than the SWHA nest density documented in Sacramento County (0.37 per sq. mi^2) and Yolo County (0.38 per mi^2) as discussed in Estep (2016). Because the 41 SWHA nest territories that were identified in the study area during the census for the Darden Clean Energy Project is consistent both with prior large-scale SWHA nest surveys in the southern San Joaquin Valley and historic nest data available for the study area (discussed in *Swainson's Hawk Nest Data* section), it is assumed to be a reliable estimate of the number of SWHA nesting pairs/nesting territories in the study area.

The approximately 372,082-acre Darden Clean Energy Project study area currently provides an estimated 205,133 acres of suitable foraging habitat, which equates to 55% of the total land cover. The estimated percentage of suitable foraging habitat is lower than what has been reported in other similar regional SWHA studies conducted in Fresno and Kings counties, which reported an average of 69% suitable foraging habitat with a range of 58.4% to 81.3% (Estep 2011; Estep 2016a, b; HELIX 2018b, HELIX 2020). Of the suitable foraging habitat in the study area, approximately 86% is considered moderate or high quality. The regional population of SWHA requires an estimated 106,848 acres of foraging habitat to sustain itself. Therefore, there is an estimated surplus of 98,285 acres of suitable foraging habitat in the study area. Surplus foraging habitat is needed to sustain the regional SWHA population to allow for interannual variation in the regional population caused by mortality and recruitment, allow for resilience in the population to environmental factors outside the scope of this analysis, and to account for other potential sources of error. For the purposes of this study, the CEQA significance threshold is set at 70 percent of the existing surplus, or 68,800 acres, meaning that a reduction in surplus foraging habitat below 68,800 acres would result in a significant impact on SWHA.

Removal of an estimated maximum of 4,818 acres of habitat as a result of the Darden Clean Energy Project would reduce the surplus SWHA foraging habitat in the study area to 93,467 acres, which is 95.1 percent of the existing surplus, and well above the 70-percent CEQA significance threshold. Even if the entire roughly 9,510-acre project site was considered to be a complete loss of SWHA foraging habitat, the Darden Clean Energy Project would reduce the available surplus to 88,775 acres, or 90.3% of the available surplus. Therefore, the project's impact to the regional population of SWHA through foraging habitat loss would be less than significant, and no compensatory mitigation for impacts to foraging habitat would be required at the project level.

Removal of an additional 4,448 acres of suitable SWHA foraging habitat as a result of all planned or reasonably foreseeable solar energy projects would reduce the available surplus to 89,019 acres (assuming project impacts of 4,818 acres), which is 90.6 percent of the existing surplus, and well above the 70-percent CEQA significance threshold. Alternatively, assuming project impacts of 9,510 acres, removal of an additional 4,448 acres of suitable SWHA foraging habitat as a result of all planned or reasonably foreseeable solar energy projects would reduce the available surplus to 84,327 acres, which is 85.8 percent of the existing surplus. Therefore, under either scenario, the cumulative impact to the regional population of SWHA through foraging habitat loss would be less than significant, and no compensatory mitigation for impacts to foraging habitat would be required at the cumulative level.

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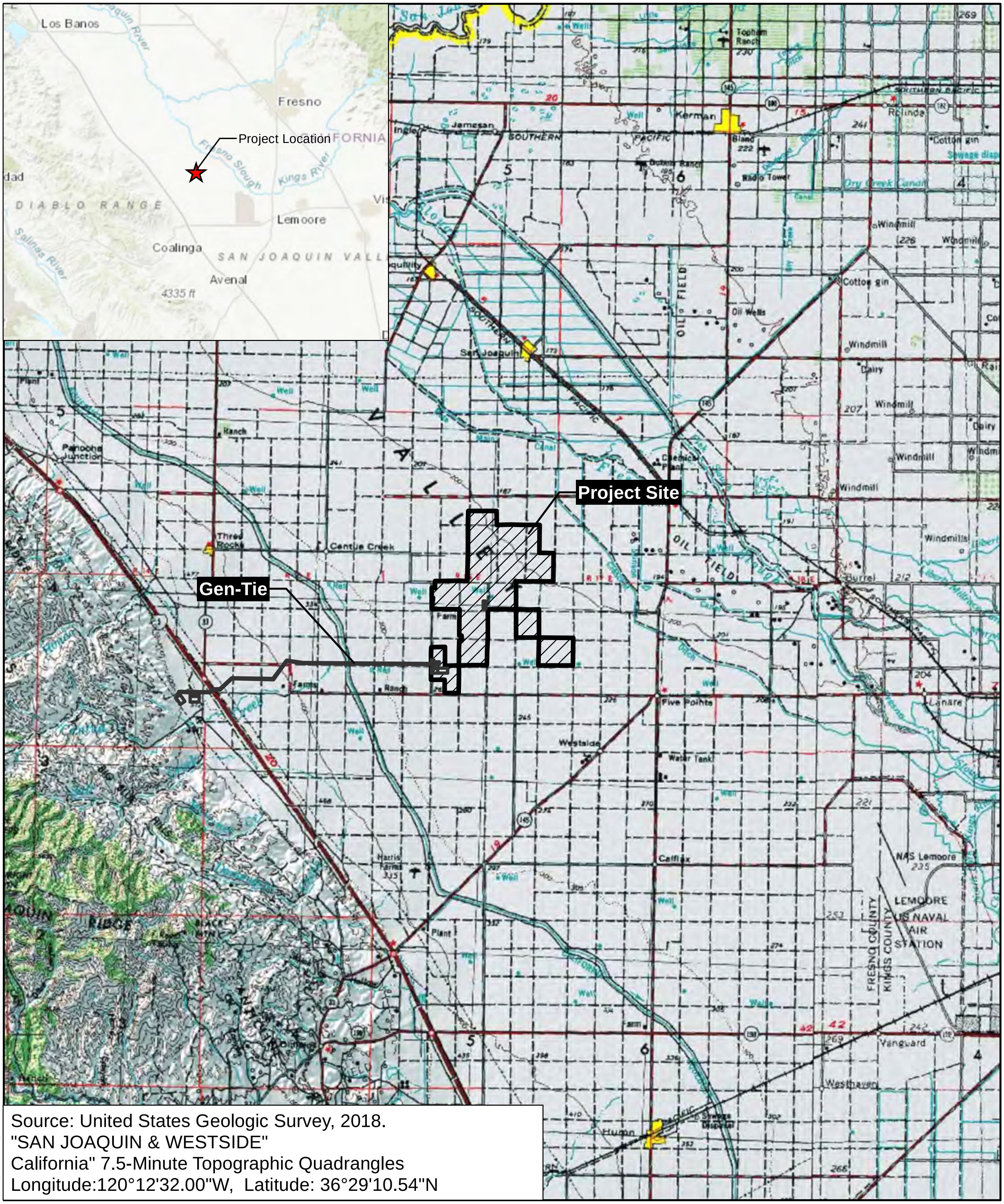
Attachment A

Figures



Source: United States Geologic Survey, 2018.
"SAN JOAQUIN & WESTSIDE"
California" 7.5-Minute Topographic Quadrangles
Longitude:120°12'32.00"W, Latitude: 36°29'10.54"N

Figure 1

Regional Location and Vicinity

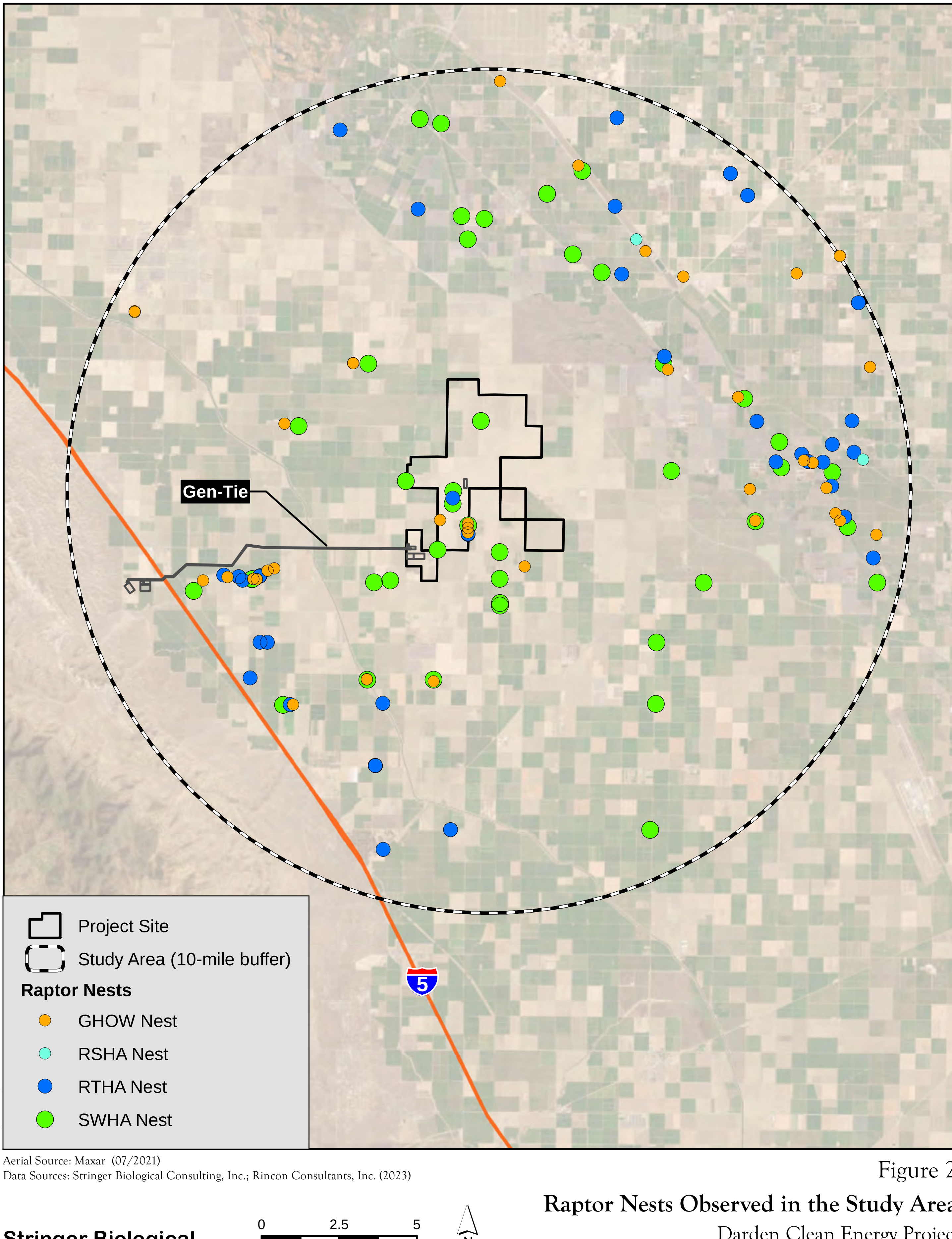
DardenClean Energy Project

Fresno County, CA

N

0 2.5 5
Miles

Stringer Biological Consulting



Aerial Source: Maxar (07/2021)
Data Sources: Stringer Biological Consulting, Inc.; Rincon Consultants, Inc. (2023)

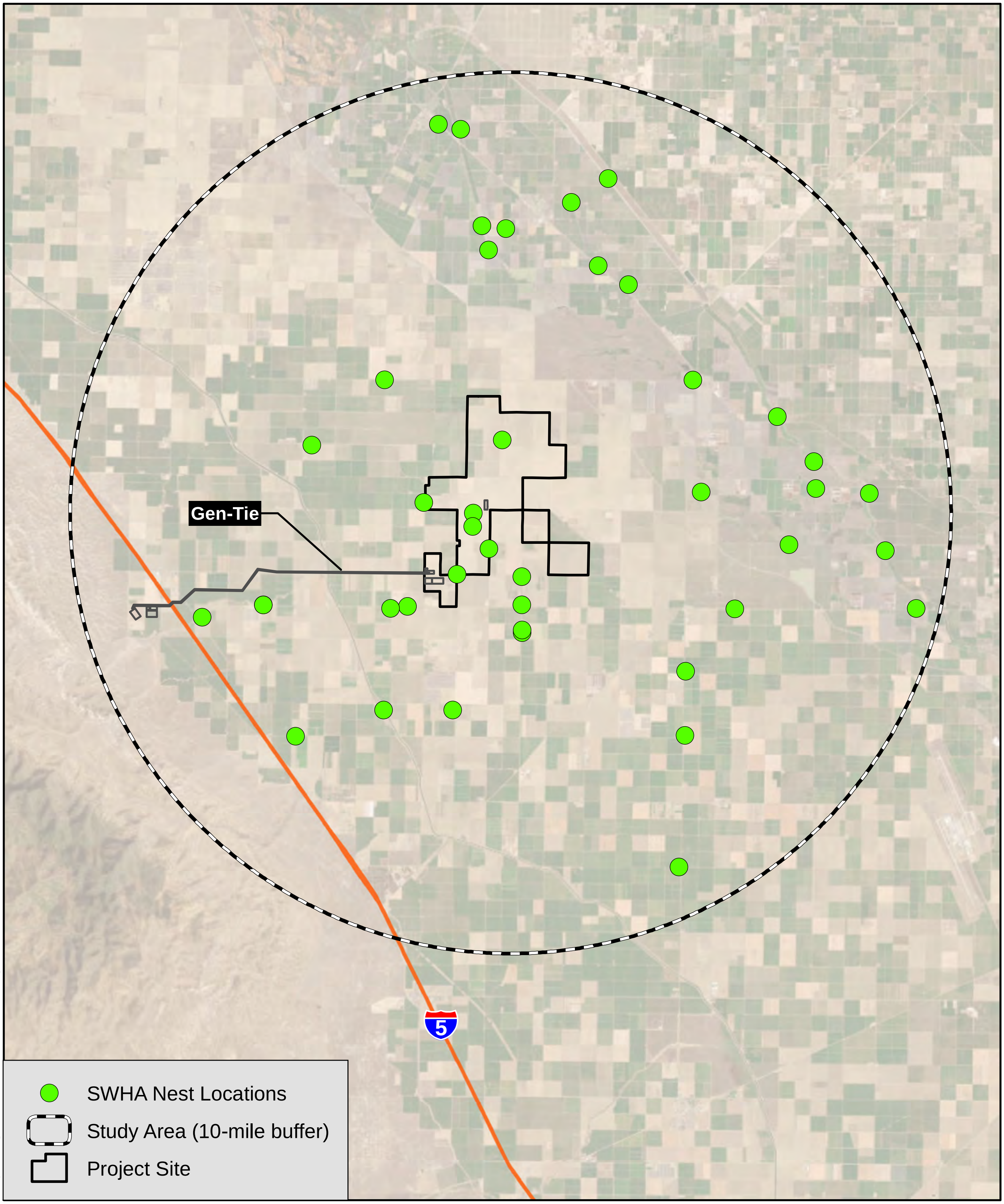
Figure 2

Raptor Nests Observed in the Study Area

Darden Clean Energy Project

Fresno County, CA

Stringer Biological Consulting



Aerial Source: Maxar (07/2021)
Data Sources: Stringer Biological Consulting, Inc.; Rincon Consultants, Inc. (2023)

Figure 3

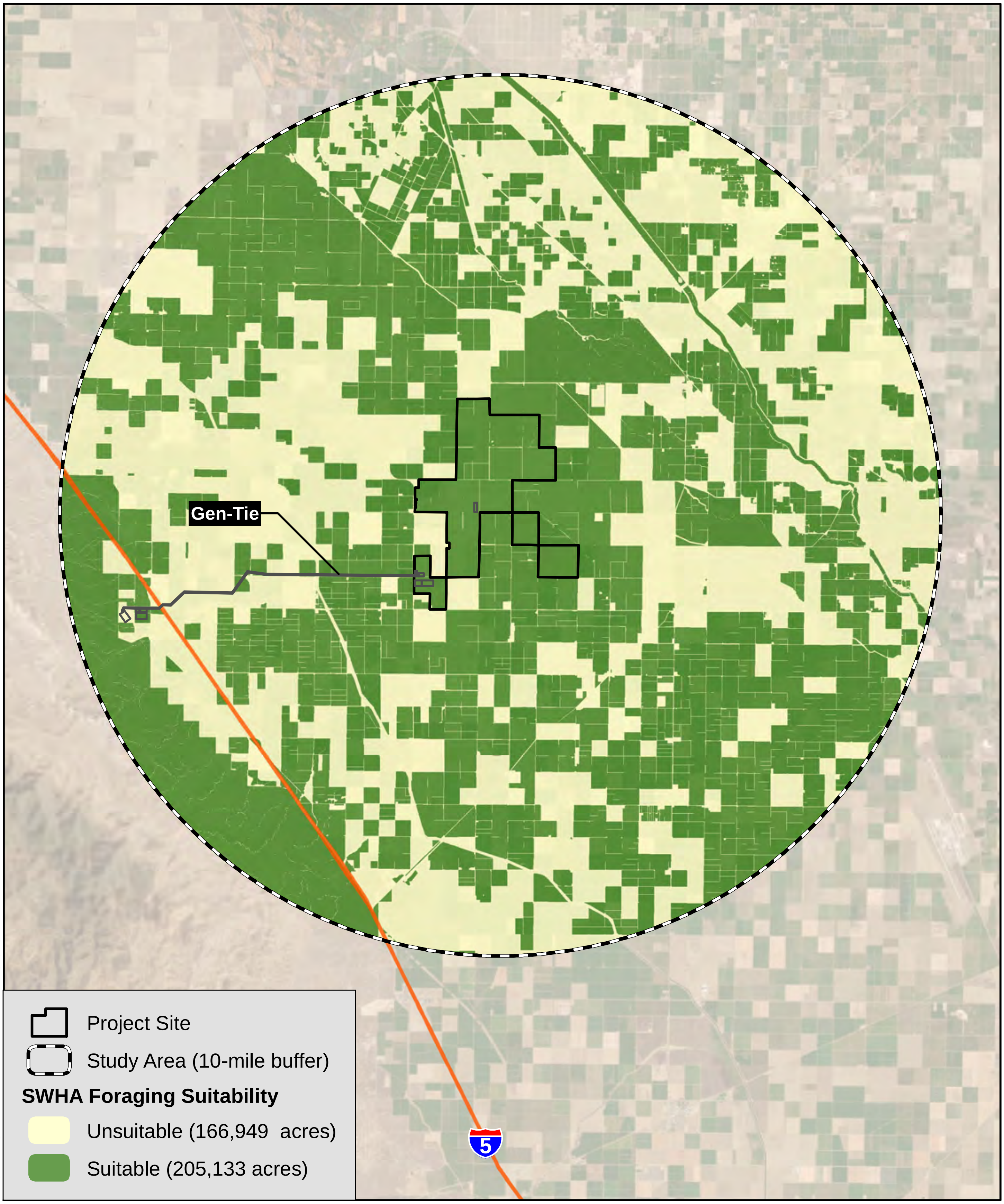
Swainson's Hawk Nest Locations

Darden Clean Energy Project

Fresno County, CA

0 2.5 5
Miles
N

Stringer Biological Consulting



Aerial Source: Maxar (07/2021)
Data Sources: Department of Water Resources (2023)

Figure 4

Swainson's Hawk Suitable Foraging Habitat

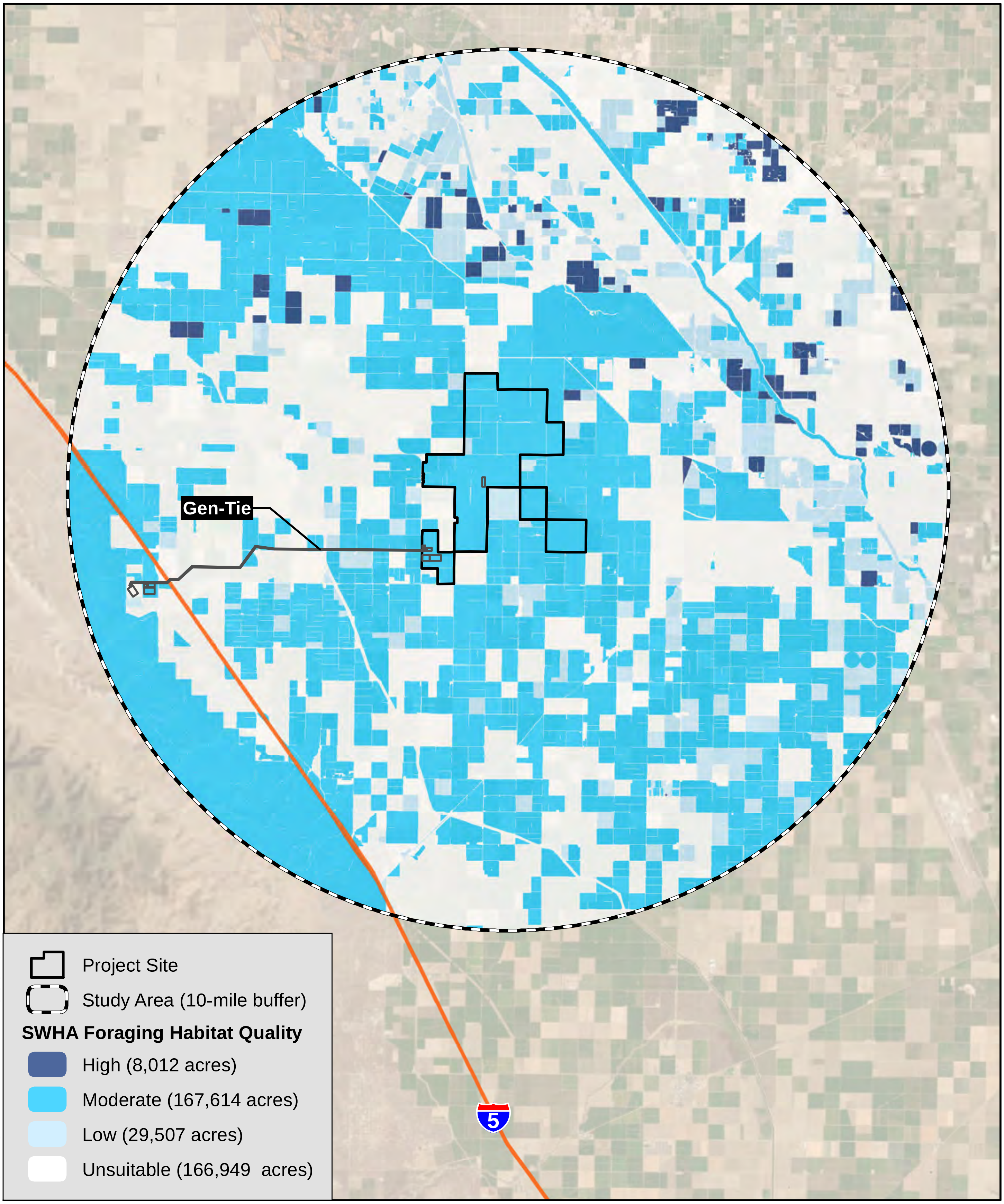
Darden Clean Energy Project

Fresno County, CA

Stringer Biological Consulting

0 2.5 5
Miles

N



Aerial Source: Maxar (07/2021)
Data Sources: Department of Water Resources (2023)

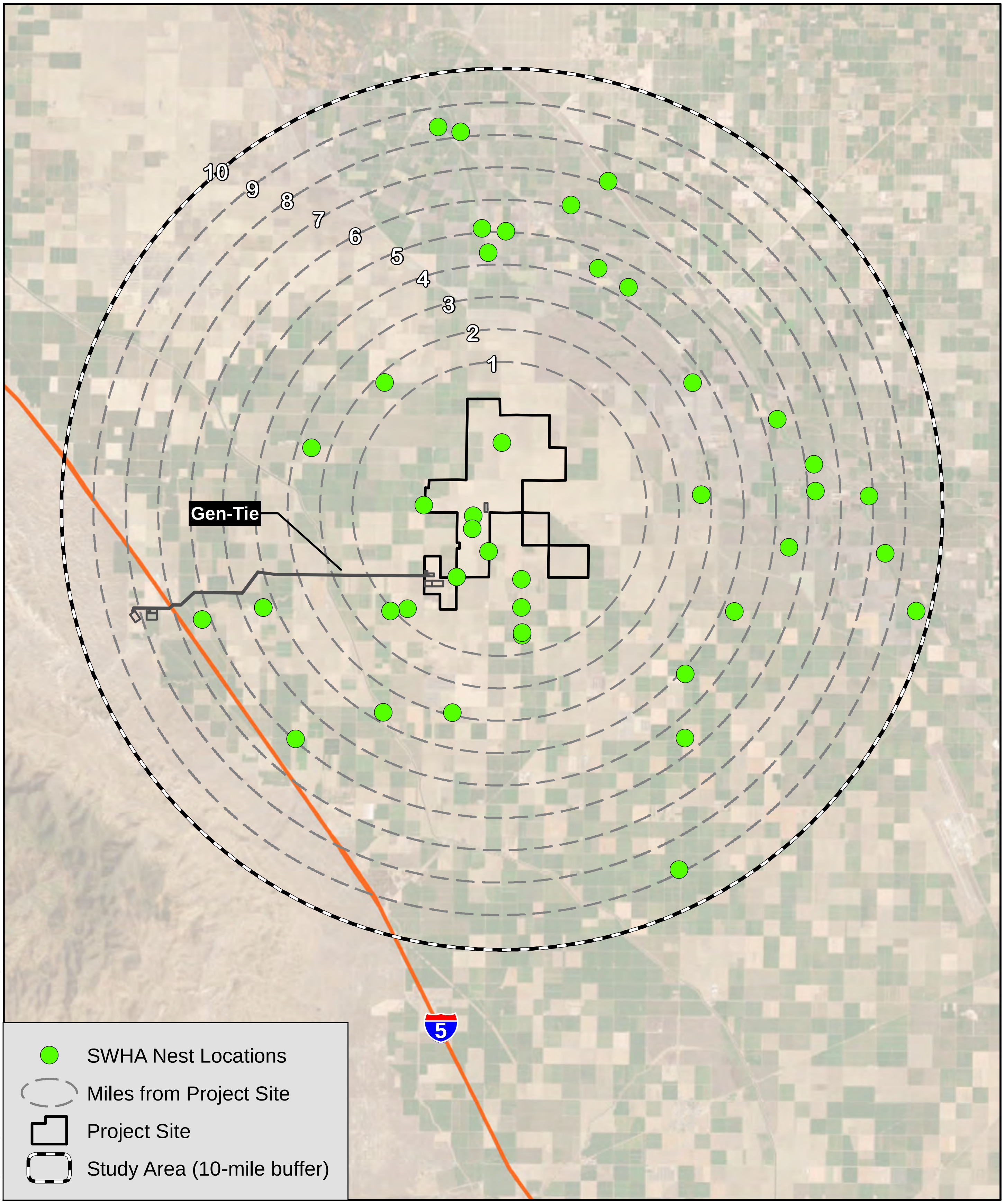
Figure 5

Swainson's Hawk Foraging Habitat Quality

Darden Clean Energy Project

Fresno County, CA

Stringer Biological Consulting



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Aerial Source: Maxar (07/2021)
Data Sources: Stringer Biological Consulting, Inc.; Rincon Consultants, Inc. (2023)

Figure 6

Swainson's Hawk Nest Distances from Project Site

Darden Clean Energy Project

Fresno County, CA

Stringer Biological Consulting

0 2.5 5
Miles

N

Attachment B

Land Use Crosswalk

Crop Type/Land Cover	Land_Type	Foraging (Y=1; N=0)	Quality (0, 1=low; 2=mod, or 3=high)
Tomatoes (Processing)	irrigated cropland	1	2
Almonds	orchard/vineyard	0	0
Cotton	irrigated cropland	1	1
Grain and Hay - Misc.	alfalfa/ hay crop	1	2
field Misc.	orchard/vineyard	0	0
Bush berries	orchard/vineyard	0	0
Beans (dry)	irrigated cropland	1	1
Onions and Garlic	irrigated cropland	1	2
Young Perennial	orchard/vineyard	0	0
Melons, Squash, and Cucumbers	irrigated cropland	1	1
Lettuce or Leafy Greens	irrigated cropland	1	2
Corn, Sorghum or Sudan	irrigated cropland	1	1
Vineyards	orchard/vineyard	0	0
Wheat	irrigated cropland	1	2
Alfalfa and alfalfa mixtures	alfalfa/ hay crop	1	3
Peaches and Nectarines	orchard/vineyard	0	0
Truck Crops - Misc.	orchard/vineyard	1	1
Olives	orchard/vineyard	0	0
Pomegranates	orchard/vineyard	0	0
Apples	orchard/vineyard	0	0
Pasture - Mixed	irrigated pasture	1	2
Carrots	irrigated cropland	1	1
Cole crops	irrigated cropland	1	1
Walnuts	orchard/vineyard	0	0
Deciduous - Misc.	orchard/vineyard	0	0
Citrus and Subtropical	orchard/vineyard	0	0
Field Misc.	irrigated cropland	1	1
Cherries	orchard/vineyard	0	0
Peppers (Chili, Bell, etc.)	irrigated cropland	1	2
Pasture - Miscellaneous Grasses	irrigated pasture	1	2
Potato or Sweet potato	irrigated cropland	1	2
Urban Development	Developed	0	0
Annual grassland/pasture	Uncultivated Land	1	2
Idle field/cropland	Uncultivated Land	1	2
Dairy/Chicken farm/Other	Developed	0	0
Residential/Urban	Developed	0	0
Commercial/Retail/Institution	Developed	0	0
Solar facilities	Developed	0	0
Industrial	Developed	0	0
agricultural pond	Developed	0	0
Ruderal	Uncultivated Land	1	1
irrigated cropland (unk)	irrigated cropland	1	1
Cattle Pens (beef cows)	Developed	0	0
perennial wetlands	Wetlands/Waters	0	0
winter wheat/cotton	irrigated cropland	1	2

Attachment C

Summary of SWHA Nests in the Study Area

Attachment C. Summary of Swainson's Hawk Nests Observed in the Study Area

Site #	USGS Quad	Location	Lat./Long.	Nesting Habitat	Nest Tree	Nest Status Notes
SH1	Jamesan	Railroad tracks near junction of Colorado Road and S. Sonoma Ave	36.645118°N/ -120.243258°S	Tree line adjacent to railroad tracks	Eucalyptus	Active nest territory; undetermined reproductive status.
SH2	Jamesan	S Denver Ave between W Lincoln Ave and W Clayton Ave	36.643241°N/ -120.230769°S	Tree in backyard of rural residence	Eucalyptus	Active nest territory; undetermined reproductive status.
SH3	San Joaquin	S Levee Road 900 feet south of Manning Ave.	36.599982°N/ -120.218276°S	Riparian tree	Cottonwood	Active nest territory; undetermined reproductive status.
SH4	San Joaquin	W Cherry Lane 500 feet east of S El Dorado Ave	36.598773°N/ -120.204928°S	Tree in backyard of rural residence	Eucalyptus	Active nest territory; undetermined reproductive status.
SH5	San Joaquin	S Levee Road 500 feet north of W Dinuba Ave	36.589282°N/ -120.214516°S	Riparian tree	Willow	Active nest territory; undetermined reproductive status.
SH6	San Joaquin	Southeast side of W Parlier Ave and South Yuba Ave	36.610905°N/ -120.168903°S	Roadside tree	Eucalyptus	Female incubating eggs when last observed.
SH7	San Joaquin	James Bypass levee between W Sumner Ave and W South Ave	36.62184°N/ -120.148421°S	Riparian tree	Willow	Successful; 2 young fledged
SH8	San Joaquin	S Colorado Ave 350 feet north of W Huntsman	36.582866°N/ -120.15342°S	Roadside tree	Willow	Active nest territory; undetermined reproductive status.
SH9	San Joaquin	W Floral Ave 1500 feet east of S Colorado Ave	36.574494°N/ -120.136561°S	Roadside tree	Eucalyptus	Active nest territory; undetermined reproductive status.

Site #	USGS Quad	Location	Lat./Long.	Nesting Habitat	Nest Tree	Nest Status Notes
SH10	Helm	Southwest side of Helm Elementary School	36.532186°N/ -120.100188°S	Tree row at elementary school	Eucalyptus	Female brooding when last observed
SH11	Helm	James Bypass 350 feet south of W Conejo Ave	36.516214°N/ -120.053072°S	Willow	Isolated tree	Active nest territory; undetermined reproductive status.
SH12	Five Points	Along Fresno Slough 2,300 feet southeast of intersection of Lassen Ave and W Elkhorn Ave	36.482029°N/ -120.094852°S	Willow	Riparian tree	Active nest territory; undetermined reproductive status. Private Property.
SH13	Five Points	Fresno Slough 1.6 miles northwest of Elkhorn Bridge	36.496101°N/ -120.032586°S	Cottonwood	Isolated tree	Active nest territory; undetermined reproductive status.
SH14	Five Points	W Elkhorn Ave and S Howard Ave	36.484228°N/ -120.031376°S	Eucalyptus	Roadside tree row	Active nest territory; undetermined reproductive status.
SH15	Five Points	Fresno Slough 1,500 feet south of Elkhorn Bridge	36.48224°N/ -120.001677°S	Cottonwood	Levee tree row	Active nest territory; undetermined reproductive status.
SH16	Five Points	W Cerini Ave 0.8 mi west of S Howard Ave	36.458995°N/ -120.045824°S	Eucalyptus	Rural residential	Female incubating eggs when last observed
SH17	Burrel	Fresno Slough approximately 800 feet south of W Cerini Ave extension	36.456823°N/ -119.992408°S	Willow	Levee tree row	Active nest territory; undetermined reproductive status.
SH18	Burrel	McKean Farms, W Mt. Whitney Ave	36.430828°N/ -119.974901°S	Eucalyptus	Horticultural tree, industrial property	Active nest territory; undetermined reproductive status. Private Property.

Site #	USGS Quad	Location	Lat./Long.	Nesting Habitat	Nest Tree	Nest Status Notes
SH19	Five Points	W Mt. Whitney Ave; 1.5 miles east of Five Points	36.430026°N/ -120.075596°S	Cottonwood	Rural residential	Female incubating eggs when last observed
SH20	Five Points	Lassen Ave and W Excelsior Ave	36.401796°N/ -120.102439°S	Unknown horticultural tree	Agricultural processing facility	Successful; one young fledged
SH21	Calflax	Lassen Ave and W Jeffrey Ave	36.373038°N/ -120.102242°S	Eucalyptus	Rural residential tree row	Female incubating eggs when last observed
SH22	Calflax	W Ford Ave and Hwy 269	36.314135°N/ -120.104803°S	Eucalyptus	Rural residential	One nestling in nest when last observed
SH23	Westside	Telesis Onion Company; S Colusa Ave, 1,600 feet north of W Laguna Ave	36.419333°N/ -120.193197°S	Eucalyptus	Rural residential tree row	Active nest territory; undetermined reproductive status.
SH24	Westside	Telesis Onion Company; S Colusa Ave, 1,200 feet north of W Laguna Ave	36.418203°N/ -120.193196°S	Eucalyptus	Rural residential tree row	Adult returning to nest with food; unknown number of nestlings
SH25	Westside	American Fertilizer; S Colusa Ave and W Mt. Whitney Ave	36.430637°N/ -120.19361°S	Eucalyptus	Tree row	Active nest territory; undetermined reproductive status.
SH26	Westside	W Harlan Ave and S Colusa Ave	36.443126°N/ -120.193817°S	Eucalyptus	Roadside tree row	Successful; two young fledged
SH27	Westside	Approximately 970 feet southwest of the intersection of W Paige Ave and S Napa Ave	36.383117°N/ -120.231127°S	Eucalyptus	Rural residential tree row	Active nest territory; undetermined reproductive status.
SH28	Tres Picos Farms	Canal bank 1,100 feet south of W Paige Ave	36.382776°N/ -120.269463°S	Cottonwood	Isolated tree	Active nest territory; undetermined reproductive status.

Site #	USGS Quad	Location	Lat./Long.	Nesting Habitat	Nest Tree	Nest Status Notes
SH29	Domengine Ranch	600 feet east of the intersection of W Jeffrey and S San Mateo	36.370428°N/ -120.317855°S	Tamarisk	Roadside tree row	One nestling heard crying from nest when last observed
SH30	Westside	S El Dorado Ave 900 feet south of W Cerini Ave	36.455492°N/ -120.212207°S	Eucalyptus	Tree row	Successful; one young fledged
SH31	Westside	W Harlan Ave and S Napa Ave	36.443791°N/ -120.229718°S	Cottonwood	Isolated tree	Female incubating/brooding when last observed
SH32	Tres Picos Farms	W Mt. Whitney Ave between S Amador Ave and S Sonoma Ave	36.429331°N/ -120.256861°S	Eucalyptus	Tree row	One nestling present when last observed
SH33	Tres Picos Farms	W Mt. Whitney Ave and S Amador Ave	36.428302°N/ -120.266171°S	Eucalyptus	Roadside tree row/rural residential	Active nest territory; undetermined reproductive status.
SH34	Westside	Sound edge of tree row on W Davis Ave between S Napa Ave and S El Dorado Ave	36.465565°N/ -120.221424°S	Eucalyptus	Tree row	Active nest territory; undetermined reproductive status.
SH35	Westside	North edge of tree row on W Davis Ave between S Napa Ave and S El Dorado Ave	36.471398°N/ -120.221029°S	Eucalyptus	Tree row	Successful; one young fledged
SH36	Westside	S Sonoma Ave 1,150 feet north of W Davis Ave	36.475739°N/ -120.248579°S	Eucalyptus	Tree row	Successful; one young fledged

Site #	USGS Quad	Location	Lat./Long.	Nesting Habitat	Nest Tree	Nest Status Notes
SH37	Tres Picos Farms	W Mt. Whitney Ave approximately 450 feet east of S Stanislaus Ave	36.428929°N/ -120.336767°S	Cottonwood	Riparian	Active nest territory; undetermined reproductive status.
SH38	Tres Picos Farms	Cantua Creek; 2,900 feet east of Interstate 5	36.423165°N/ -120.370561°S	Cottonwood	Riparian	Active nest territory; undetermined reproductive status.
SH39	Cantua Creek	W Clarkson Ave; East side of the community of Cantua Creek	36.500907°N/ -120.311166°S	Pine	Rural residential	Active nest territory; undetermined reproductive status.
SH40	Cantua Creek	North side of W Kamm Ave between S Calaveras Ave and S Amador Ave	36.530506°N/ -120.271166°S	Cottonwood	Isolated tree	Active nest territory; undetermined reproductive status.
SH41	San Joaquin	S El Dorado Ave approximately 850 feet north of W Clarkson Ave	36.504286°N/ -120.205599°S	Cottonwood	Isolated tree	Female incubating eggs when last observed

Attachment D

Photolog

Attachment D. Representative Site and Nest Tree Photos

Photo 1. Typical view of agricultural fields in the project site with a dense crop of mustard. Photo taken 4/4/23.

Photo 2. View of a linear grove of Eucalyptus trees in the project site. Two SWHA nests are in this tree grove. Photo taken 4/4/23.

Photo 3. SWHA Nest Tree (SH1; see table in Attachment C). Eucalyptus tree along railroad tracks near the junction of Colorado Road and S. Sonoma Ave. Photo taken 4/17/23.

Photo 4. SWHA Nest Tree (SH2; see table in Attachment C). Eucalyptus tree in backyard of residence on S Denver Ave between W Lincoln Ave and W Clayton Ave. Taken 4/17/23.

Photo 5. SWHA Nest Tree (SH32; see table in Attachment C). Eucalyptus tree in tree row along W Mt. Whitney Ave between S Amador Ave and S Sonoma Ave. Photo taken 4/17/23.

Photo 6. SWHA Nest Tree (SH5; see table in Attachment C). Willow tree along S Levee Road 500 feet north of W Dinuba Ave. Photo taken May 2023.

Photo 7. SWHA Nest Tree (SH11; see table in Attachment C). Willow tree in James Bypass 350 feet south of W Conejo Ave. Photo taken May 2023.

Photo 8. SWHA Nest Tree (SH17; see table in Attachment C). Willow tree in Fresno Slough approximately 800 feet south of W Cerini Ave extension. Photo taken May 2023.

Photo 9. SWHA Nest Tree (SH18; see table in Attachment C). Eucalyptus tree in an industrial yard at McKean Farms, W Mt. Whitney Ave. Photo taken May 2023.

Photo 10. SWHA Nest Tree (SH39; see table in Attachment C). Pine tree in residential property along W Clarkson Ave; East side of Cantua Creek. Photo taken May 2023.

Appendix C

Swainson's Hawk Survey Report

Rincon Consultants, Inc.
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Fresno, California 93720
559-228-9925

Project No: 22-12530

IP Darden I, LLC and Affiliates
c/o Intersect Power, LLC
9450 SW Gemini Drive PMB #68743
Beaverton, Oregon 97008-7105

Subject: Swainson's Hawk Survey Report for the Darden Clean Energy Project, Fresno County, California

This report documents the results of focused Swainson's hawk (SWHA; *Buteo swainsoni*) nesting surveys completed in support of environmental permitting for the Darden Clean Energy Project (Project). Surveys and reporting were completed by a joint team of Rincon Consultants (Rincon) and Stringer Biological Consulting, Inc (SBC) biologists.

Project Description and Location

The Project consists of the construction, operation, and eventual repowering or decommissioning of a 1,150 megawatt (MW) solar photovoltaic (PV) facility, an up to 4,600 megawatt-hour (MWh) battery energy storage system (BESS), an up-to 1,150 MW green hydrogen generator, a 34.5-500 kilovolt (kV) grid step-up substation, a 10 to 15-mile 500 kV generation intertie (gen-tie) line, a 500 kV utility switching station along the Pacific Gas and Electric Company (PG&E) Los Banos-Midway #2 500 kV transmission line, and appurtenances.

The Project site is located in an agricultural area of unincorporated Fresno County south of the community of Cantua Creek (Figure 1). The proposed solar facility, BESS, substation, and green hydrogen facility would be located on approximately 9,100 acres of land currently owned by Westlands Water District, between South Sonoma Avenue to the west and South Butte Avenue to the east. The proposed gen-tie line would span west from the intersection of South Sonoma Avenue and West Harlan Avenue to immediately west of Interstate 5, where it would connect to the proposed utility switchyard along PG&E's Los Banos-Midway #2 500 kV transmission line (Figure 2).

Methodology

Literature Review

SBC conducted a literature review to identify the location of previously documented SWHA nests within the Project site and a 0.5-mile buffer (study area). The following resources were reviewed for information on SWHA nest locations in the Project vicinity:

- iNaturalist (iNaturalist 2023)
- The Distribution and Abundance of Nesting Swainson's Hawks in the Vicinity of the Proposed RE Tranquility LLC Solar Generation Facility (Estep 2011)
- Distribution, abundance, and habitat associations of nesting Swainson's hawks in the central San Joaquin Valley, California (Estep and Dinsdale 2012)
- The Distribution and Abundance of Nesting Swainson's Hawks in the Vicinity of the Proposed RE Scarlet Solar Generation Facility (Estep 2016)

- California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB; CDFW 2023)
- SBC knowledge of SWHA nesting within the Project vicinity

Biologists then conducted a review of aerial imagery to document the location of potential nest trees within the study area and develop a field-approach to document all nests within the study area.

Nest Survey

The SWHA nesting surveys were conducted in the study area in accordance with the survey protocol outlined in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (SWHA TAC 2000). The study area was surveyed a total of six times between April 3 and July 12, 2023 by SBC and Rincon biologists. The surveys covered Periods II, III, IV, and V as outlined in the SWHA protocol. Surveys were initiated prior to Period IV, and those surveys conducted during Period IV we're conducted to monitor known or potential nest sites that had been newly documented or confirmed within the study area during the previous two surveys. Survey dates, times, weather conditions, and names of surveyors are included in Table 1 below.

Surveys were conducted of all previously documented SWHA nests as well as any potential nest trees identified during the literature review or seen in the field. Each survey was conducted by a team of two biologists walking or driving to each potential nest tree. Surveys were conducted during the time periods prescribed in the survey protocol (SWHA TAC 2000) to allow for maximum probability of detection. Surveys were conducted between sunrise to 1000 and 1600 to sunset for Period II; sunrise to 1200 and 1630 to sunset for Period III; and sunrise to 1200 and 1600 to sunset for period V. Surveys conducted during Period IV do not have a set time outlined in the protocol but were conducted from sunrise to 1200 and 1515 to sunset.

Surveys were not conducted during periods of excessive or abnormal heat, wind, fog, rain, or other inclement weather. Surveys were conducted with binoculars and spotting scopes to aid in bird detection. The biologists slowly walked around each tree or group of trees within the survey area or, if the nest was visible from the road, the nest was documented from within the vehicle to avoid disturbing the animal. Notes were taken of each nest discovered and include nest stage (e.g., nest building, egg laying, nestling, fledgling, etc.), number of individuals, life stage (e.g., adult, sub-adult, juvenile, fledgling, nestling, etc.), and behavior (e.g., perching, flying overhead, copulation, brooding, etc.). Care was taken to avoid disturbing active nests during surveys and subsequent nest checks.

Table 1 SWHA Survey Information

Date	Start/End Time	Start/End Temp (F)	Wind Speed (mph)	Weather	Personnel
Period II (March 20 – April 5) and Period III (April 5 – April 20)					
Survey I					
April 3	16:00/20:00	58/55	15-20	Mostly sunny	Stephen Stringer*; Amy Trost
April 4	06:30/10:00 16:00/19:45	35/51 61/50	3-10 10-14	Mostly cloudy	Stephen Stringer*; Amy Trost
April 5	7:00/12:00	35/55	6-9	Mostly cloudy	Stephen Stringer*; Amy Trost
Survey II					
April 11	16:00/20:00	75/65	8-12	Mostly cloudy	Stephen Stringer*; Amy Trost
April 12	06:30/10:00 16:00/20:00	48/57 70/60	8-14 10-15	Mostly cloudy	Stephen Stringer*; Amy Trost

Date	Start/End Time	Start/End Temp (F)	Wind Speed (mph)	Weather	Personnel
April 13	06:30/10:00	50/58	12-16	Partly sunny	Stephen Stringer*; Amy Trost
Survey III					
April 17	06:30/10:00 16:00/20:00	47/61 71/58	0-7 7-10	Mostly cloudy	Stephen Stringer*; Amy Trost
April 18	06:30/10:00	45/56	0-12	Mostly cloudy	Stephen Stringer*; Amy Trost
Period IV (April 21 – June 10)					
Survey IV					
May 1	06:00/10:45 15:15/20:30	49/62 67/52	0-3 1-5	Cloudy	Stephen Stringer*; Amy Trost; Shannon Morris, Morgan Craig
May 2	05:30/10:30 15:15/20:15	51/60 65/54	3-8 1-7	Sprinkled	Stephen Stringer*; Amy Trost; Shannon Morris, Morgan Craig
May 3	06:00/10:15 15:15/19:30	48/60 65/51	1-5 0-3	Sprinkled	Stephen Stringer*; Amy Trost; Shannon Morris, Morgan Craig
May 4	06:30/11:15 13:30/16:00	51/60 62/64	0-4 0-3	Sprinkled	Stephen Stringer*; Amy Trost, Shannon Morris, Morgan Craig
May 9	07:30/16:03	57/70	5-7	Mostly cloudy	Shannon Morris
Period V (June 10 – July 30)					
Survey V					
June 12	15:30/19:30	82/81	7	Cloudy	Stephen Stringer*; Amy Trost; Shannon Morris, Cristy Rice
June 13	06:30/11:00 16:00/20:15	62/76 80/77	3-8 7-8	Cloudy/ muggy	Stephen Stringer*; Amy Trost; Shannon Morris, Cristy Rice
June 14	06:10/10:50 16:00/20:00	62/79 90/87	3-5 7	Partly cloudy	Stephen Stringer*; Amy Trost; Shannon Morris, Cristy Rice
Survey VI					
July 11	16:30/19:30	99/92	1-2	Clear, sunny	Stephen Stringer*; Morgan Craig
July 12	06:00/10:00 16:30/19:45	63/86 102/92	3-5 0-8	Clear, sunny	Stephen Stringer*; Morgan Craig

*Lead biologist

Results

A total of six SWHA nests were documented within the study area during the protocol surveys, hereafter identified as Nests A through F. Five of the nests were located within the Project site and the sixth was located within the 0.5-mile buffer immediately adjacent to the Project boundary (Figure 3). Table 2 provides details of each nest and their disposition. Four (4) of the nests were observed near the top of mature eucalyptus trees, one was observed in a mature cottonwood, and one was observed in a mature elm. Of the six nests documented during the surveys, only three had fledglings during the Period V surveys. It is unclear whether the remaining three nests produced eggs, or successfully fledged, if eggs were produced.

Table 2 SWHA Nest Information

Nest ID	Location (Lat.; Long.)	Date SWHA First Observed	Final Disposition	Notes
Nest A	36.475744°N; 120.248592°W	4/12/23	Fledgling	4/12/23 – Two adult SWHA flushed from nest tree. 5/4/23 – One adult SWHA observed in nest and one perched nearby in nest tree. 6/12/23 – Adult SWHA observed in nest, stage unknown. 7/12/23 – Fledgling SWHA observed in nest.
Nest B	36.443796°N; 120.229731°W	4/13/23	Unknown	4/13/23 - Adult SWHA observed on nest. Second adult observed foraging nearby. 6/13/23 – Adult female SWHA observed on nest, potentially brooding. Second adult believed to be the male observed nearby. 7/12/23 – Adult SWHA observed on nest, no fledglings observed. Nest stage/success unknown.
Nest C	36.471403°N; 120.221042°W	4/17/23	Fledgling	4/17/23 – Unoccupied nest observed in tree. A pair of SWHA observed in the vicinity. 5/1/23 – Adult SWHA observed at nest. 6/13/23 – Adult female on nest believed to be incubating eggs or potentially with hatchlings. 7/12/23 – Fledgling observed in nest.
Nest D	36.455497°N; 120.212220°W	5/1/2 3	Fledgling	5/1/23 – SWHA pair observed copulating in vicinity of nest, subadult observed nearby. 6/12/23 – Adult SWHA observed in nest, nest stage could not be determined. 7/12/23 – Fledgling SWHA observed in nest, two adults guarding nest.
Nest E	36.504291°N; 120.205612°W	5/9/2 3	Unknown	5/9/23 - Adult SWHA observed in nest. 6/12/23 – Adult female SWHA observed sitting low in the nest, believed to be incubating eggs. 7/12/23 – No SWHA observed during final survey, final disposition unknown.
Nest F	36.465570°N; 120.221436°W	7/12/23	Unknown	7/12/23 – SWHA pair observed guarding nest. Nest status unknown. No fledglings observed. Nest was not observed during prior surveys.

Rincon observed nests of several other raptor species within the study area during the surveys, including six (6) great horned owl (*Bubo virginianus*) nests, five (5) red-tailed hawk (*Buteo jamaicensis*) nests, and eleven (11) inactive large sticks nests. Other raptors encountered while surveying include American kestrel (*Falco sparverius*), northern harrier (*Circus hudsonius*), and barn owl (*Tyto alba*).

Discussion

A total of six surveys were conducted between April 3, 2023 and July 12, 2023 by SBC and Rincon biologists. Over the course of the surveys conducted during the six survey windows, Rincon documented a total of six active SWHA nests within the study area. Three active nests were first observed during the April surveys (Surveys II and III). Two additional active nests were first observed during the May survey (Survey IV), and the final active nest was first observed during the July survey (Survey VI). Five (5) nests (all but Nest E) were documented to have typical nesting behaviors during at least one survey, indicating breeding had potentially resulted in eggs. However, only three of the nests (Nests A, C and D) were documented with fledglings during the final survey. Nest E was first observed in the July survey window and no evidence of actual nesting behavior was observed.

Swainson's hawks have an incubation period of 34-35 days and a nestling period of 17-22 days (USFWS ECOS). Based on these breeding periods and the timing and observations of our surveys, we can conclude that Nests B and E could have successfully fledged young prior to our final survey. At the time of the June survey (Survey V) an adult was observed low in Nest E, a posture associated with incubating eggs. Twenty-nine days passed between Survey V and Survey VI, during which time the eggs being incubated could reasonably have hatched and the young fledged. Similarly, the adult in Nest B appeared to have been in a brooding posture indicating it had young chicks at the time of Survey V. At the time of Survey VI the adult was observed on the nest but no fledglings were observed nearby. The chicks could reasonably have fledged during this time period.

The final disposition of Nest F could not be determined as it was discovered during Survey VI, no chicks were observed, and the adult was not displaying any specific behaviors that would have given insight to the nest's status (i.e., incubating or brooding posture, food carry, etc.). This nest could have had young chicks that were not visible from the ground but the biologists were unable to definitively determine the nest's status.

Sincerely,
Rincon Consultants, Inc.

Amy Leigh Trost
Biologist, Rincon Consultants

Stephen Stringer, M.S.
Principal Biologist, SBC

David Daitch, Ph.D.
Vice President, Rincon Consultants

Attachments

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Figure 1 Project Vicinity

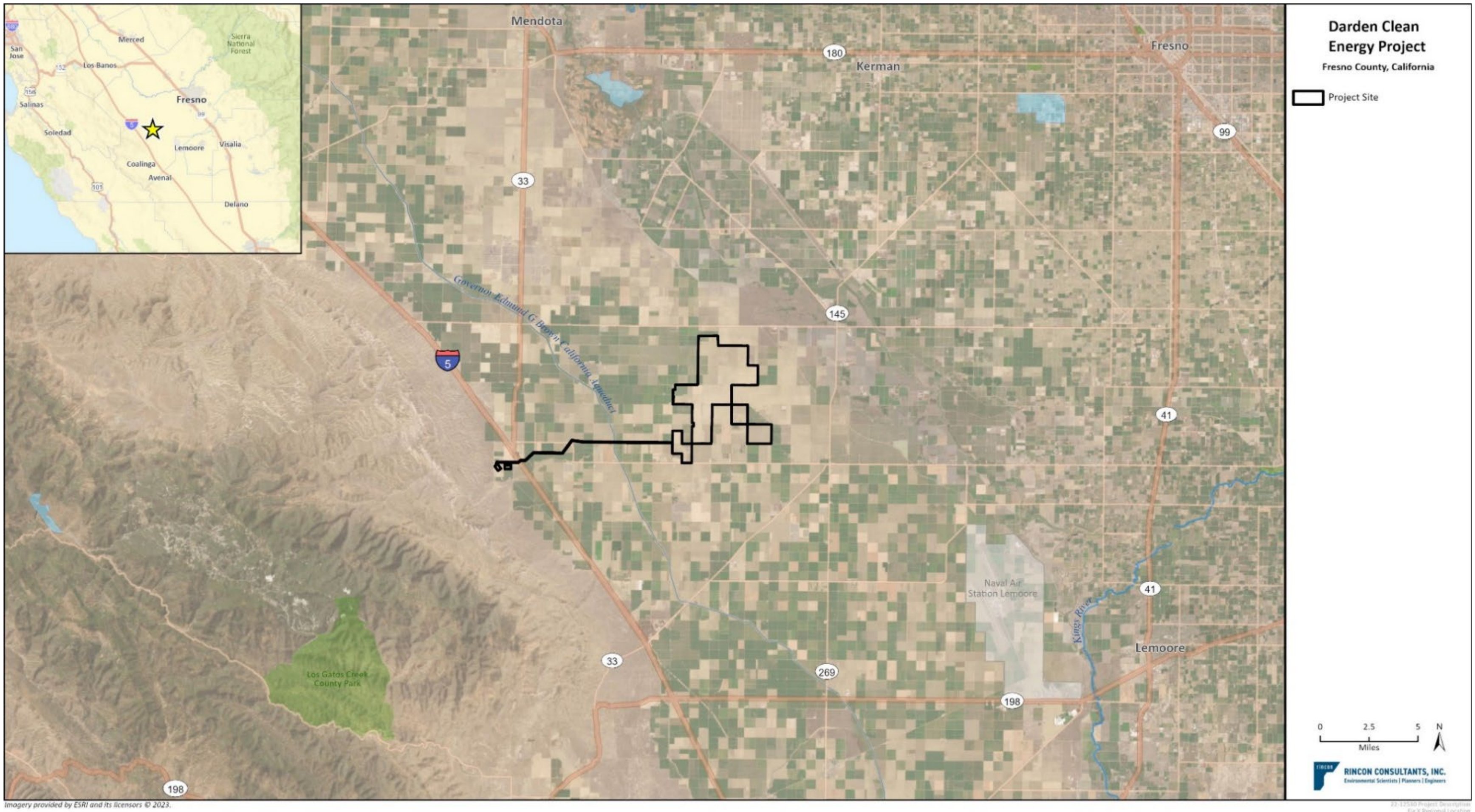

Figure 2 Project Location

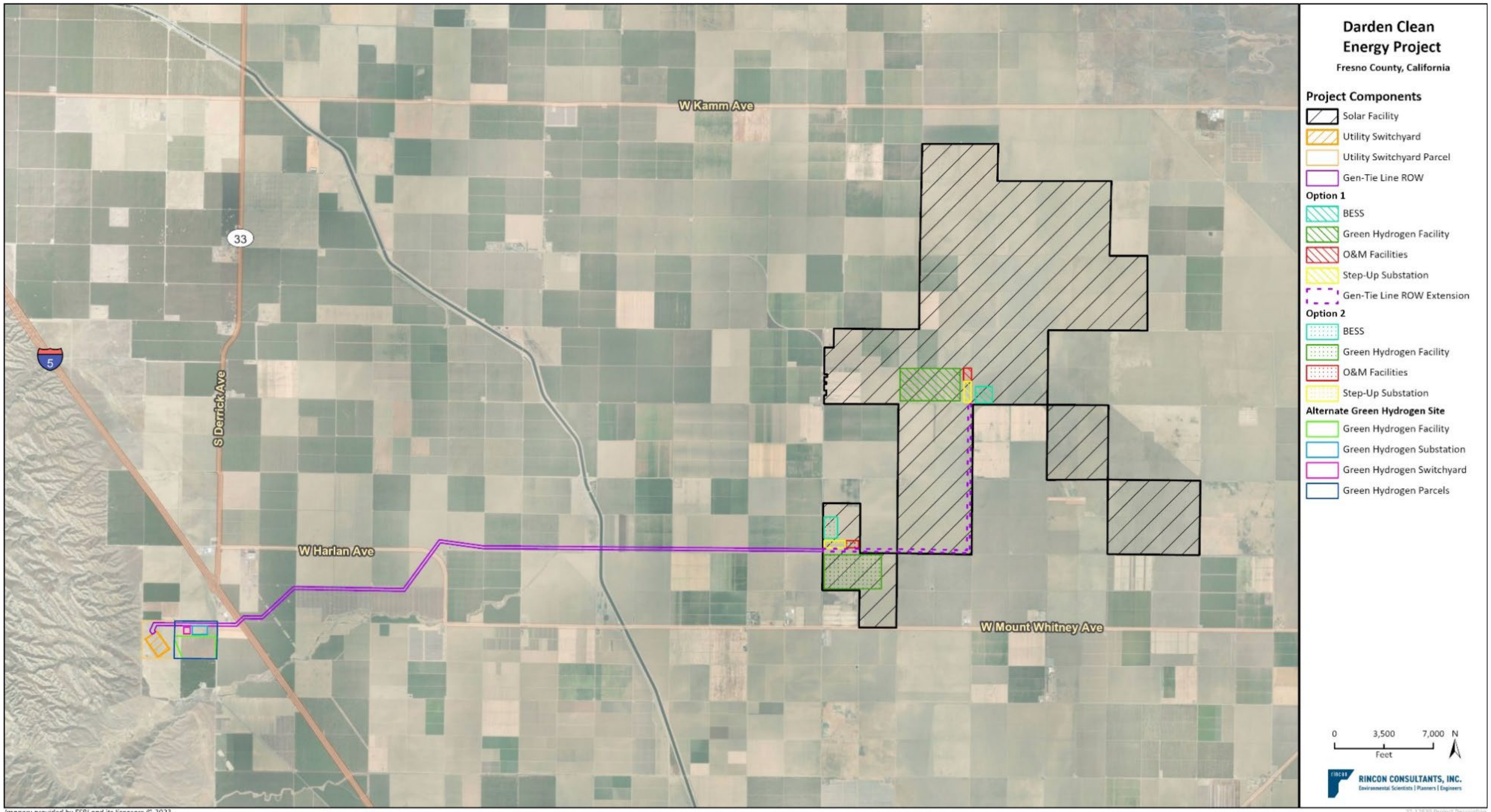

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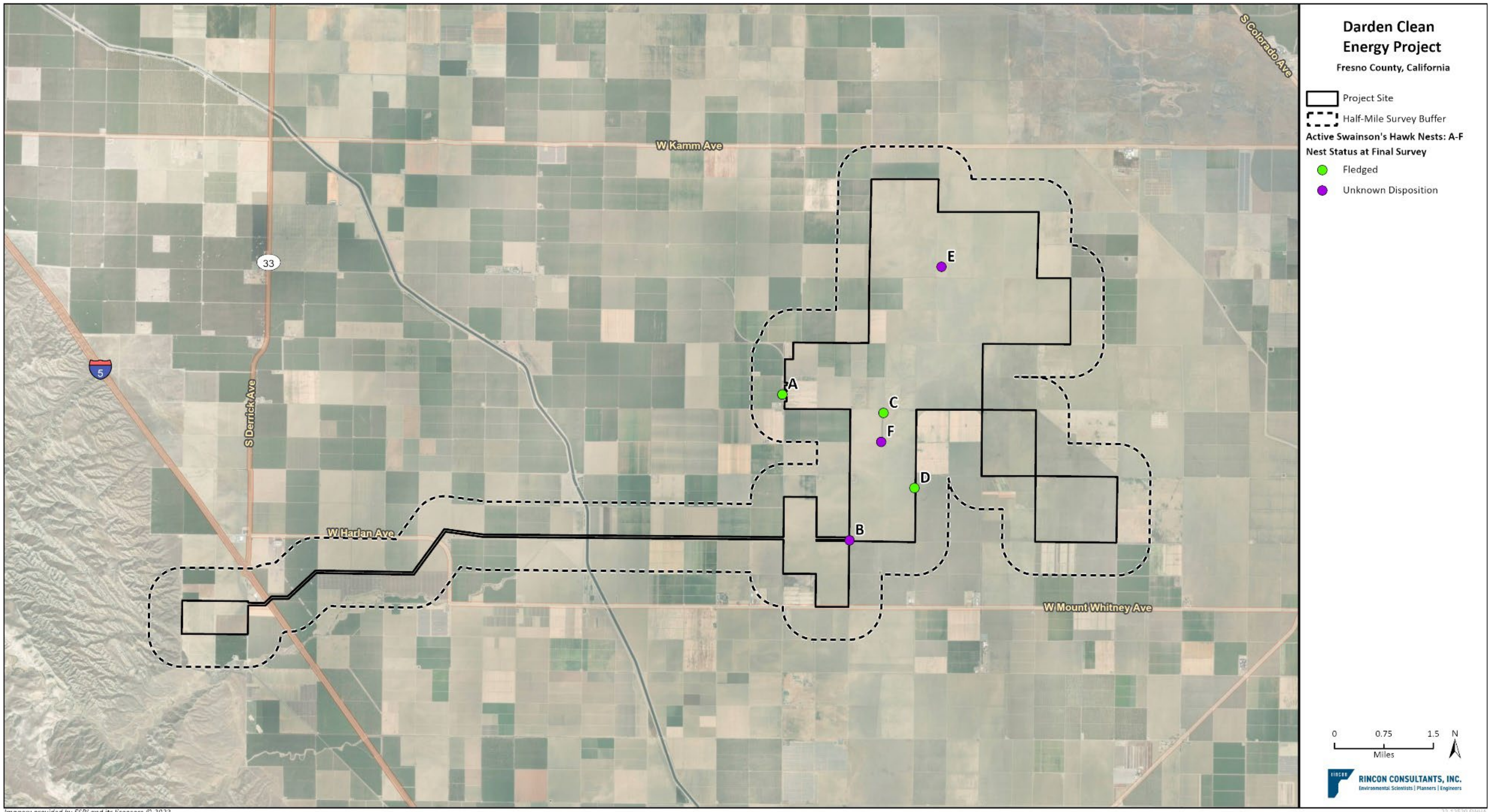
Figure 3 Swainson's Hawk Survey Area and Results



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Appendix D

Vegetation Management Plan

Darden Clean Energy Project

Vegetation Management Plan

prepared for

IP Darden I, LLC and Affiliates
wholly owned subsidiaries of Intersect Power, LLC
9450 SW Gemini Drive, PMB #68743
Beaverton, Oregon 97008-7105

prepared by

Rincon Consultants, Inc.
7080 North Whitney Avenue, Suite 101
Fresno, California 93720

October 2023

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

Darden Clean Energy Project

Vegetation Management Plan

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Table of Contents

Tables

Figures

1 Introduction

This Draft Vegetation Management Plan (Plan) has been prepared by Rincon Consultants, Inc (Rincon) to outline the goals and framework of revegetation, invasive weed maintenance, and habitat management for the Darden Clean Energy Project (Project) located in Fresno County, California. Specifically, this Plan provides a preliminary conceptual, programmatic revegetation and vegetation management framework. This preliminary framework is intended to be a document that can be updated and modified based on the results of site-specific studies. The overall intent of this Plan is to guide successful revegetation of the Project site to facilitate effective weed control, increase nesting habitat for Swainson's hawk (*Buteo swainsoni*), improve the quality of Swainson's hawk foraging habitat, and create pollinator habitat while allowing for safe and efficient operations and maintenance (O&M) of the Project site. However, limited information is available on the successful conversion of non-irrigable agricultural lands of California's Central Valley to suitable and high-quality Swainson's hawk foraging habitat. Specifically, there is little or no information regarding the most effective procedures for successful restoration of appropriate vegetative cover and sufficient prey diversity and abundance for Swainson's hawk. This is further compounded by the high salinity and potential selenium concentration within Westlands Water District lands, and what is likely a substantial invasive plant seed bank. The Project will implement an independent research program to be conducted by Cornell University, under Dr. Grodsky as Principal Investigator. The intent of the research program will be to evaluate the restoration and management practices that provide the best results towards meeting success criteria for development of Swainson's hawk foraging habitat, including soil and land preparation, seed mix, and management regimes (e.g., mechanical vs grazing). The final vegetation management plan will be developed in conjunction with the experimental design for the study and informed by the results of the study in real-time. The research design is currently under development and this Draft Vegetation Management Plan is intended to function as a preliminary strategy and conceptual outline to establish goals and success criteria.

1.1 Project Background

The Project consists of the construction, operation, and eventual repowering or decommissioning of a 1,150 megawatt (MW) solar photovoltaic (PV) facility, an up to 4,600 megawatt-hour (MWh) battery energy storage system (BESS), an up-to 1,150 MW green hydrogen generator, a 34.5-500 kilovolt (kV) grid substation, a 10- to 15-mile 500 kV generation intertie (gen-tie) line, a 500 kV utility switchyard along the Pacific Gas and Electric Company (PG&E) Los Banos-Midway #2 500 kV transmission line, and appurtenances. Construction of the Project is anticipated to take between 18 and 36 months to complete.

The Project site is an irregular shape, located in an agricultural area of unincorporated Fresno County south of the community of Cantua Creek (Figure 1). The proposed solar facility, BESS, step-up substation, and green hydrogen facility site (Options 1 and 2) would be located on approximately 9,100 acres of land owned by Westlands Water District, between South Sonoma Avenue to the west and South Butte Avenue to the east. The proposed approximately 10-mile gen-tie (up to 15 miles) line would span west from the intersection of South Sonoma Avenue and West Harlan Avenue to immediately west of Interstate 5, where it would connect to the proposed utility switchyard along

PG&E's Los Banos-Midway #2 500 kV transmission line (Figure 2). The alternate green hydrogen facility site being considered is located adjacent to the proposed utility switchyard site.

Land cover types are predominantly retired agricultural lands that have been irregularly farmed over the last 10 years and seasonally or annually disked when not growing crops, and associated dirt roads, field and road shoulders, basins, ditches, and berms. This land cover type is herein referred to as "retired and managed agricultural land." Surrounding properties include retired and active agricultural lands. The gen-tie line right-of-way spans privately-owned land on the western portion of the Project site with land-cover types including active agriculture. The California Aqueduct bisects the gen-tie parcels, running generally north-south. Compacted dirt and paved roads border and separate each land-cover type.

Figure 1 Regional Location

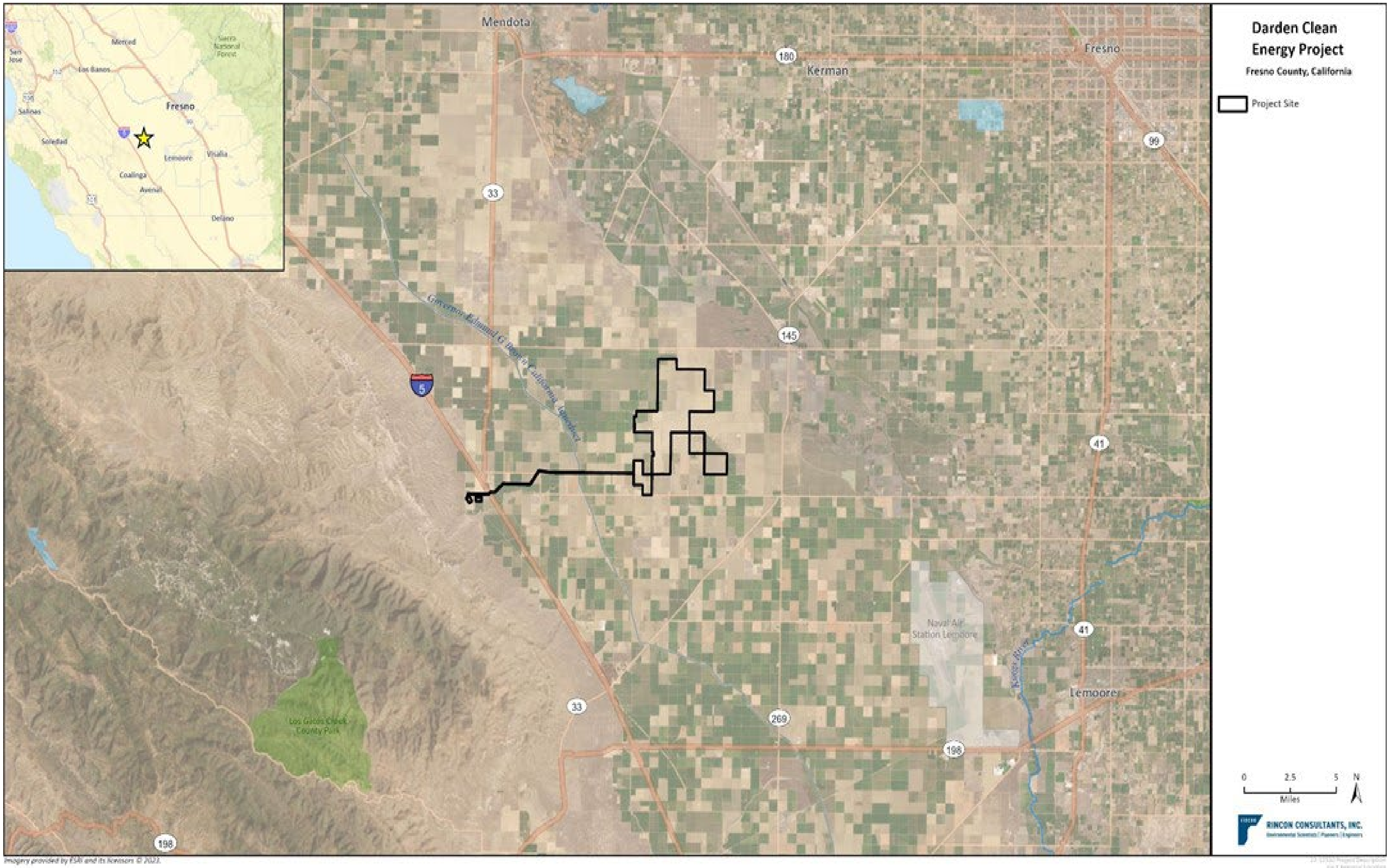
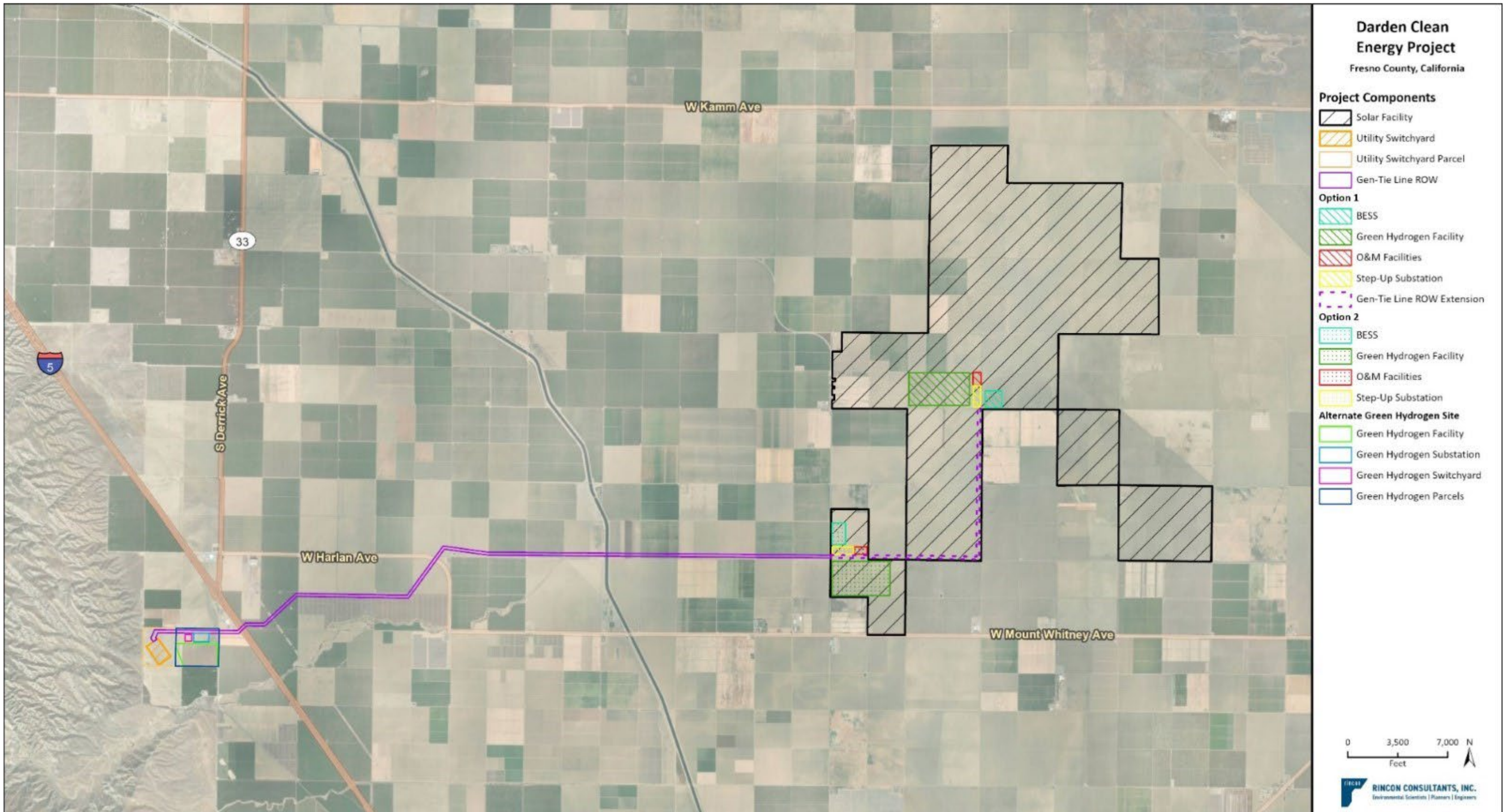


Figure 2 Project Site



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1.2 Revegetation and Vegetation Management Goals and Objectives

Revegetation and vegetation management of the Project site will occur during the Project construction and operation phases. Revegetation will account for on-site constraints including a lack of irrigation, saline soils, and poor drainage conditions. The Project will facilitate a Before-After-Control-Impact (BACI) research design to test the efficacy of multiple vegetation management regimes on the establishment of Swainson's hawk foraging habitat with the goal of achieving the following success criteria:

- Establish permanent, regenerative vegetative cover.
- The established vegetative cover represents high-quality foraging habitat for Swainson's hawks (i.e., appropriate vegetative structure that maintains a sufficient prey base).
- The established vegetative cover provides suitable floral resources for native pollinators.
- Prevent and control noxious weed infestations.
- The established vegetative cover allows for safe and efficient O&M Project activities.

Additional benefits of a vegetation management plan that achieves these primary goals would be reduced fire risk through management of fuel loads, erosion control, stormwater runoff control, and water quality control during the Project's operational phase.

2 Setting

As described in Section 1.1, the Project site is located in unincorporated Fresno County south of the community of Cantua Creek in the San Joaquin Valley (Figure 1). The Project site has historically been used for irrigated farming, dry-farming, and/or maintained as retired and managed agricultural land over the past five years. From 2017 to 2020, the Project site was used to grow winter wheat, barley, cotton, onions, tomatoes, pistachios, and garlic. However, during this period, approximately half of the Project site was left unplanted each year. During the same period, the gen-tie parcels were primarily used to grow almonds, as well as garlic, chickpeas, cotton, dry beans, corn, tomatoes, pistachios, winter wheat, herbs, onions, cantaloupe, oranges, and alfalfa. On average, approximately one quarter of the parcels were left unplanted each year. As part of active management of the land owned by Westlands Water District, unplanted fields are typically tilled annually in the early spring to suppress weeds. Tilling typically occurs in the top eight to 12 inches of the soil.

Soils within the Project site are poorly-drained and have high salt content. Soils are predominantly saline-sodic clay loams and clay, including Tranquility clay, Calflax and Posochanet clay loams, and Ciervo clay/wet Ciervo complex. Tranquility series soils, which are mapped most extensively in the Project site, are poorly drained soils on alluvial fan skirts with high runoff and slow permeability. Tranquility series soils are primarily used for irrigated crops such as cotton or wheat, and are also used as wildlife habitat supporting timothy (*Phleum pratense*), watergrass (*Echinochloa* spp.), and saltbush (*Atriplex* spp.). Other soils on the site are used for cotton, alfalfa, sugar beets, wheat, onions and tomatoes; native vegetation is annual grasses, forbs and saltbush.

During preliminary field reconnaissance surveys performed by Rincon in 2022 and 2023, the Project site was dominated by retired and managed disked agricultural fields (Rincon 2023a). During the spring of 2022, tomatoes and garlic were grown on some of the parcels, and most of the disked parcels were grown over with black mustard (*Brassica nigra*). The mustard was mowed sometime in May of 2022 to reduce biomass accumulation of non-native plant species. Plant species observed included black mustard, bread wheat (*Triticum aestivum*), great valley phacelia (*Phacelia ciliata*) and field bindweed (*Convolvulus arvensis*). Larger trees were generally restricted to windrows or situated around structures and included red gum eucalyptus (*Eucalyptus camaldulensis*), arroyo willow (*Salix lasiolepis*), Fremont cottonwood (*Populus fremontii*) and local agricultural trees including olive, almond, and various fruit.

3 Weed Prevention and Management

Weed prevention and management will occur throughout the Project site to prevent the spread of invasive plants, control existing invasive plants, limit the introduction and spread of invasive plants potentially associated with Project related construction and operation activities, and manage impacts to Swainson's hawk foraging habitat. Weed prevention and management includes procedures to monitor and track the distribution of invasive plants and the success of weed control activities within the Project site.

Generally, invasive plants are non-native plant species that are introduced into an environment in which they did not evolve. The term "invasive plants" includes species that are classified by federal, state, or local government agencies as "noxious weeds." In this plan, the terms "invasive plants" and "weeds" are used interchangeably. Invasive plants compete with native plants and can dominate and often cause damage to natural plant communities. The control of invasive plants aids in the protection and conservation of native plant species, as well as improving wildlife habitat. During plant establishment, competition for light and nutrients from weeds can cause mortality and substantially reduce seedling growth. Invasive grass species commonly occurring in the Central Valley, such as rattail fescue (*Festuca myuros*), are also found in suitable foraging habitat for Swainson's Hawk (Estep 1989, Babcock 1995, Smallwood 1995, Swolgaard et al. 2008, Estep and Dinsdale 2012, Estep 2013, Fleishman et al. 2016). Therefore, weed prevention and management within the Project site will be primarily focused on invasive forb species and will generally exclude invasive grass species naturalized throughout the Central Valley.

Weed management may include the following control strategies, which will be based on the potential threat, location, abundance, and extent of any given weed infestation. For each weed infestation, potential control strategies include:

- **Eradication.** This control objective is to eliminate all individuals of a particular species within a specified area. This will be the goal for weed species that are new to the area (i.e., unknown threat) or known species posing (1) significant environmental concern; and (2) not already widespread in surrounding landscapes.
- **Suppression.** This objective will be selected for weed species and populations already widespread throughout the Central Valley and common on disturbed soils. The objective will be to reduce infestation density and minimize seed production and the threat of off-site spread, but not necessarily to reduce the total area or boundary of the infestation. This strategy will apply to many widely distributed, high-density weeds where eradication is not feasible.
- **Containment.** This objective will be aimed at preventing infestation expansion and spread, and may be conducted with or without any attempt to reduce infestation density. Containment focuses on halting spread until suppression or eradication can be implemented, and is practical only to the extent that the spread of seeds or vegetative propagules can be prevented.

Common weed control methods include cutting, mowing, hand pulling, biological introductions, burning, domestic animal grazing, cultivation, re-seeding, and chemical control. Mechanical control methods (i.e., mowing and hand removal), chemical control methods (i.e., herbicide), and domestic animal grazing (i.e., sheep grazing) have been identified as the primary weed management control methods for this site and are further described in Section 3.4.

3.1 Target Species

California Invasive Plant Council (Cal-IPC) ratings are provided in Table 1 below (Cal IPC 2023). All invasive forb species listed by the Cal-IPC as High, Moderate, or Alert in the Great Valley (GV) region of California are targeted for prevention and management (Table 2). Non-native grasses and aquatic species are not included as target species as they provide suitable foraging habitat for Swainson's hawk.

Table 1 Cal-IPC Ratings

Cal-IPC Ratings	
High	Species with severe ecological impact on physical processes, plant and animal communities, and vegetation structure. Most species have a widespread ecological distribution.
Moderate	Species with substantial, but not severe ecological impact on physical processes, plant and animal communities, and vegetation structure. Ecological distribution ranges from limited to widespread.
Limited	Invasive plants with low to moderate ecological impact on physical processes, plant and animal communities, and vegetation structure. Ecological distribution is generally limited, but have the capability of being persistent and problematic.
Alert	Species with high or moderate impacts, but with limited ecological distribution in California. Distribution may have the potential to spread further.
Watch	Species that have the potential of becoming high risk invasive in the future.

Table 2 Preliminary Target Non-native Invasive Plants for the Project Site

Scientific Name	Common Name	Habit	Cal-IPC Rating
Acacia dealbata	silver wattle	Shrub	Moderate
Ailanthus altissima	tree-of-heaven	Tree	Moderate
Alhagi maurorum	camelthorn	Herb	Moderate
Arctotheca calendula	fertile capeweed	Herb	Moderate, Alert
Arctotheca prostrata	capeweed	Herb	Moderate
Asparagus asparagoides	bridal creeper	Herb	Moderate, Alert
Asphodelus fistulosus	onion weed	Herb	Moderate, Alert
Atriplex semibaccata	Australian saltbush	Herb	Moderate
Brassica nigra	black mustard	Herb	Moderate
Brassica tournefortii	Sahara mustard	Herb	High
Carduus nutans	musk thistle	Herb	Moderate
Carduus pycnocephalus	Italian thistle	Herb	Moderate
Carthamus lanatus	woolly distaff thistle	Herb	High
Centaurea calcitrapa	purple starthistle	Herb	Moderate
Centaurea diffusa	diffuse knapweed	Herb	Moderate
Centaurea melitensis	tocalote	Herb	Moderate
Centaurea solstitialis	yellow starthistle	Herb	High
Centaurea stoebe ssp. *micranthos*	spotted knapweed	Herb	High
Chondrilla juncea	skeleton weed	Herb	Moderate
Cirsium arvense	Canada thistle	Herb	Moderate

Scientific Name	Common Name	Habit	Cal-IPC Rating
Cirsium vulgare	bull thistle	Herb	Moderate
Colocasia esculenta	taro root	Herb	Moderate
Conium maculatum	poison-hemlock	Herb	Moderate
Cotoneaster franchetii	orange Cotoneaster	Shrub	Moderate
Cotoneaster lacteus	milkflower Cotoneaster	Shrub	Moderate
Cotoneaster pannosus	silverleaf Cotoneaster	Shrub	Moderate
Cynara cardunculus	artichoke thistle	Herb	Moderate
Cynosurus echinatus	hedgehog dogtail	Herb	Moderate
Cytisus scoparius	Scotch broom	Shrub	High
Delairea odorata	Cape-ivy	Herb	High
Dipsacus fullonum	wild teasel	Herb	Moderate
Dittrichia graveolens	stinkwort	Herb	Moderate, Alert
Elaeagnus angustifolia	Russian olive	Tree	Moderate
Ficus carica	edible fig	Tree	Moderate
Foeniculum vulgare	fennel	Herb	Moderate
Genista monosperma	bridal veil broom	Shrub	Moderate, Alert
Genista monspessulana	French broom	Shrub	High
Hedera helix	English ivy	Herb	High
Hirschfeldia incana	short-pod mustard	Herb	Moderate
Hypochaeris radicata	rough cat's-ear	Herb	Moderate
Lepidium chalepense	lens-podded hoary cress	Herb	Moderate, Alert
Lepidium draba	heart-podded hoary cress	Herb	Moderate
Lepidium latifolium	perennial pepperweed	Herb	High
Leucanthemum vulgare	ox-eye daisy	Herb	Moderate
Limonium duriusculum	European sea lavender	Herb	Moderate
Linaria dalmatica ssp. *dalmatica*	Dalmatian toadflax	Herb	Moderate
Linaria vulgaris	yellow toadflax	Herb	Moderate
Lythrum hyssopifolia	hyssop loosestrife	Herb	Moderate
Lythrum salicaria	purple loosestrife	Herb	High
Mentha pulegium	pennyroyal	Herb	Moderate
Myoporum laetum	ngaio tree	Tree	Moderate
Nicotiana glauca	tree tobacco	Shrub	Moderate
Oncosiphon pilulifer	stinknet	Herb	High
Onopordum acanthium	Scotch thistle	Herb	High
Oxalis pes-caprae	Bermuda buttercup	Herb	Moderate
Rhaponticum repens	Russian knapweed	Herb	Moderate
Rubus armeniacus	Himalayan blackberry	Herb	High
Rumex acetosella	sheep sorrel	Herb	Moderate
Salsola soda	glasswort	Herb	Moderate

Scientific Name	Common Name	Habit	Cal-IPC Rating
Schinus terebinthifolius	Brazilian pepper tree	Tree	Moderate, Alert
Sesbania punicea	scarlet wisteria	Shrub	High
Spartium junceum	Spanish broom	Shrub	High
Tamarix chinensis	Chinese tamarisk	Tree	High
Tamarix gallica	French tamarisk	Tree	High
Tamarix parviflora	smallflower tamarisk	Tree	High
Tamarix ramosissima	saltcedar	Tree	High
Torilis arvensis	hedgeparsley	Herb	Moderate
Triadica sebifera	Chinese tallow tree	Tree	Moderate, Alert
Vinca major	periwinkle	Herb	Moderate
Washingtonia robusta	Mexican fan palm	Tree	Moderate, Alert

Source: Cal-IPC. 2023. The Cal-IPC Inventory. Invasive plant species listed in the Great Valley Region. Accessed September 2023 at: http://www.cal-ipc.org/plants/inventory/

3.2 Pre-Construction Weed Survey

Pre-construction surveys for weeds will be performed to identify and assess current weed populations within the Project site. Pre-construction surveys for weeds will take place in the spring and early summer when species are both evident and identifiable. This data would be collected as part of the research conducted by Cornell University as part of the vegetation sampling on a yet to be determined number of study plots.

The survey will be conducted by a qualified biologist, restoration ecologist, or weed scientist who has a thorough knowledge of the weed flora of the Central Valley. The scientific name, location, population extent, and general environmental characteristics (soil type, topography, vegetation community, and land use) will be recorded on a data sheet and geospatial data will be collected during the weed survey to document pre-construction populations. Cal-IPC invasive plants listed as High, Moderate, or Alert will be included in the survey. The target weed species listed in Table 2 will be refined based upon results of these surveys.

3.3 Prevention

3.3.1 Pre-Construction Control Methods

To reduce the spread of invasive plants within the Project site, invasive plants listed in Table 2 above will be removed prior to construction. Control efforts may utilize a combination of disking, mechanical blading, and hand pulling to prevent non-native plant species currently existing within the Project site from further contributing to the seed bank. Final pre-construction control efforts may be adjusted based upon the results of the pre-construction weed survey.

Disking

Disking or tilling may be used to prevent establishment of invasive plants within unvegetated or retired agricultural land within the Project site. Disking would be accomplished through the use of a heavy track vehicle or rubber-tired skidding tractor pulling an agricultural disk. Disking would occur to a depth of approximately six to eight inches below the soil surface.

Mechanical Blading

Mechanical blading would be utilized for large areas where invasive plants abundance is high. The non-native plant material bladed would be manually removed and hauled to a landfill in closed containers to prevent further contamination of the seed bank.

Hand Removal

Hand-pulling would be utilized for targeting smaller areas of invasive plants. The stems, flowers, and seeds of invasive plants would be removed and hauled to a landfill in closed containers to prevent spread. Hand removal of invasive plants may include the use of small trowels, hoes, and/or shovels.

3.3.2 Worker Environmental Training and Early Detection

Weed management will be incorporated as a part of mandatory training for all contractors, subcontractors, inspection personnel, construction managers, construction personnel, groundskeepers, maintenance personnel, and all individuals bringing vehicles or equipment onto the site during construction, operations, and decommissioning phases of the Project. Training materials will be prepared by a qualified biologist and will include an explanation of the importance of weed management for natural resource values, specific requirements for vehicle washing, and other applicable measures to prevent the introduction and spread of invasive plants. As part of this training, staff will be provided with written procedures to follow in the event of an infestation. Project workers will be required to inspect their clothing, shoes, and personal equipment before arriving on the site, and to remove and dispose of weed seed and plant parts. The material will be bagged for disposal in a landfill.

The Project site will be periodically inspected by trained staff to detect new establishment of invasive plants and to monitor the spread of existing populations on-site. Evidence of the introduction or spread of invasive plants will immediately be reported to designated site personnel, who will then determine appropriate treatment options.

3.3.3 Vehicle Inspections and Cleaning During Construction

To minimize the risk of introducing new invasive plants to the Project site and adjacent properties during construction, all equipment must be inspected and free of mud, seeds, and other vegetation debris before use in the Project site. Prior to accessing the Project site, construction equipment will be inspected and cleaned if necessary.

Specific areas will be designated for cleaning of vehicles and other equipment (e.g., tools, clothing, footwear, and other gear). If necessary, suitable receiving areas will be designated for invasive plant waste disposal prior to their transport to a certified landfill. Transport protocols will be designed to achieve 100 percent containment of invasive plant materials.

3.3.4 Weed-Free Materials

Any plant materials (such as hay bales, wattles, or other erosion control materials) brought onto the Project site will be certified weed free. Additional products such as gravel, sand bags, silt fences, and mulch may also carry invasive plants. Such products will be obtained from suppliers who can provide weed free certified materials. Deliveries will be inspected to confirm certification of all materials.

3.3.5 Preliminary Seeding

Preliminary seeding will occur immediately following completion of site grading or within the permit required timeline once a construction area becomes inactive, and prior to installation of Project infrastructure to aid in revegetation and weed prevention. Preliminary seeding methods will be outlined in a Revegetation Implementation Plan (Section 4). Preliminary seeding will occur in all areas subject to soil disturbance and grading including, but not limited to, the solar PV project area, temporary access roads, construction temporary lay-down areas, gen-tie and collection areas, and staging areas. Preliminary seeding will exclude access roads and areas that will have concrete or gravel foundations including the BESS area, green hydrogen facility, grid substation, utility switchyard, inverter pads, and associated buildings.

3.4 Weed Control

Weeds will be controlled based on abundance and extent of infestations within the Project site as well as potential threat to onsite and offsite habitat. The control strategy for weeds that are ubiquitous in the region (e.g., yellow starthistle [*Centaurea melitensis*], black mustard) will be suppression, with the objective of maintaining densities and extent at or below baseline levels. Strategies for new weed infestations will be immediate eradication if possible, and containment until eradication is complete.

Weed infestations identified during regular Project site maintenance and revegetation monitoring will be targeted for control as early as feasible to prevent weeds from going to seed, reestablishing a seed bank, and spreading further. Weed control measures will be flexible and adaptive depending on the invasive plants and intensity of the weed infestation. Specific control measures will be planned and implemented for each infestation. Weed infestations on linear Project features, in high-traffic areas such as Project staging areas, and along access routes will be high priority for control. Weeds that are common within the site and surrounding area will generally be given low priority where they occur in relatively low densities. However, these infestations will be given higher priority if abundance is high enough to create a significant new seed source that may increase weed infestation densities with the Project site or on adjacent lands.

Mechanical and Manual Control

Where weed infestations are small, or where they are adjacent to native vegetation or other sensitive biological resources (e.g., the site perimeter or in hedgerow areas), mechanical and manual control methods will be implemented. Mechanical and manual control may be appropriate for any of the three control strategies (suppress, contain, or eradicate), depending on the species and extent of the infestation. Mechanical and manual control would be scheduled and implemented to prevent further spread of weed seeds. Ideally, mechanical control will be scheduled early enough in the growing season to remove weeds before their seeds mature. If seeds have matured and begun to disperse, then control measures will be designed to prevent further spread of seeds from the infestation site, and (if feasible) recover or destroy seeds that may have already fallen from the plants. Soil solarization (covering the infestation area with plastic for several weeks during summer) may be effective in killing weed seeds.

Mechanical and manual control methods may include mowing, weed whacking, and hand pulling of weeds. Hand removal by pulling is appropriate when the infestations are small, and plants are large enough that they will not break and leave the roots in the soil.

Hand pulling is less effective for tall, widespread, and abundant species such as black mustard. Mowing is anticipated to be more effective for these infestations, as mowing allows a large area to be cleared effectively and efficiently. Additionally, mowing will allow for small annual and perennial plant species to be left undamaged by carefully avoiding any adjacent native plants. However, mowing may not be suitable for weeds that are producing seeds, unless all cut material is carefully collected and removed from the site. Even seeds that have not matured at the time of cutting can finish maturing on the cut material, and then propagate the infestation.

Chemical Control

Where weed populations are too large for effective mechanical and manual control and are not adjacent to native vegetation or other sensitive biological resources, herbicides may be applied for weed control. Herbicides may be used for any of the three control strategies (suppress, contain, or eradicate), depending on the species and extent of the infestation.

Herbicides can be characterized as pre-emergent (e.g., chlorosulfuron, hexazinone), post-emergent (e.g., picolinic acid), selective (e.g., sulfonylurea), and non-selective (e.g., glyphosate). A pre-emergent herbicide is one that generally controls un-germinated seeds by inhibiting germination. Post-emergent herbicides are generally lethal to plants after germination, but not to seeds. A few herbicides have both pre- and post-emergent activity. Herbicides can be selective or nonselective. If an herbicide is selective, it will affect some species of plants and not others, e.g., monocots (grasses) vs. dicots (broadleaf plants). A non-selective herbicide is one that is lethal to any plant species to which it is applied.

Herbicides kill plants through contact or systemic action. Contact herbicides are most effective against annual weeds and kill only the plant parts to which the chemical is applied. Systemic herbicides are absorbed either by roots or foliar parts of a plant and are then translocated within the plant. Although systemic herbicides can be effective against annual and perennial weeds, they are particularly effective against established perennial weeds. Pre-emergent herbicides inhibit germination of annuals from seed, but generally do not control perennial plants that germinate from bulbs, corms, rhizomes, stolons, or other vegetative structures.

Many of the chemical herbicides recommended for use on non-crop weeds can have devastating effects on crop plants and surrounding habitat plants such as Fremont cottonwood, which was observed within the Project site. Where chemical treatment is necessary, an appropriate chemical treatment will be selected considering all of the environmental factors of the immediate and surrounding areas. When preparing to apply chemical the following will be implemented:

- A site-specific plan will be developed in coordination with subject matter experts who have reviewed the chemical label information and considered the effects of chemical application on the immediate and surrounding areas. The plan will specify:
  - Sensitive resources and areas of avoidance
  - Season of application;
  - Environmental conditions under which the application can/cannot be carried out (temperature, wind speed, precipitation, etc.);
  - Chemical to be used, application rate(s), and estimated quantity of solution needed to cover the treatment area;
  - Application equipment;
  - Name and contact information of applicators and emergency contact information;

- Chemicals will only be applied by a California Department of Pesticide Regulations (DPR) certified applicator; and
- Chemical label instructions and information will be followed at all times.

Grazing Control

Targeted sheep grazing may also be used to control weed populations. Sheep production in the region occurs on a combination of leased and owned land. Seasonal grazing leases and contract grazing (wherein producers are paid to graze open space land) are typical. Sheep production is relatively mobile, and producers are generally equipped to move animals between properties.

Sheep would control weeds through non-selective management of vegetation heights to generally less than 12 inches from the soil surface. Light to moderate grazing intensities (i.e., occurring between March 1 and April 30 of each year) and low stock densities are recommended to be implemented, as they have been shown to promote vegetation patchiness, increase forage palatability, and promote greater plant diversity (Mosley and Brewer 2006). However, grazing intensities and stock densities would be adaptable to on-site conditions and observed effectiveness of grazing on weed control.

4 Revegetation Implementation Plan

The following section outlines industry standards for site restoration and revegetation that could be implemented at the Project site. The Project's research program will evaluate these and potential other procedures to identify the most successful procedures for meeting success criteria. As such, this section functions as a point of reference, but will be revised to outline the specific methods to be analyzed within the research program, and how those methods would be implemented if successful in the study plots. Revegetation implementation would typically occur immediately following Project site grading of the approximately 9,000-acre solar PV facility, and prior to installation of permanent Project infrastructure. Revegetation implementation typically includes site preparation, seeding, and weed control (see Section 3 for weed control). Following revegetation implementation, a monitoring plan would be implemented to verify the efficacy of vegetation management treatments . In addition to revegetation of the solar PV facility with grasses and forbs, trees will be planted within the Project site to provide additional nesting habitat for Swainson's hawks.

4.1 Site Preparation Methods

4.1.1 Soil Testing

Prior to site preparation and seeding, soil samples would be obtained throughout the Project site and tested to determine relevant soil metrics such as pH, organic matter, and nutrient levels. Soil testing would likely occur within the first 12 inches of the soil surface. Soil testing, in conjunction with the Project's research design, would inform the most appropriate soil management strategies and species composition of the seed mix within the Project site to support improved vegetative productivity.

4.1.2 Site Preparation Methods

Soil Decompaction

Soil decompaction may be utilized prior to seeding to improve soil conditions in any areas that were compacted by construction activities. Soil decompaction would be performed using a scarifier or shallow ripper tool, and should be set to not more than 12 inches depth on not less than 18-inch centers. Soil should be left in a roughened condition if grading is completed in the spring or early summer and several months remain until seeding.

Soil Amendments

Based on the results of soil testing and the Project's research design, soil amendments may be recommended to supplement soils and promote the establishment of vegetation. Soil amendments may include, but are not limited to, materials such as composted chicken manure, rock phosphate, and gypsum. Any fertilization would comply with the requirements of the Project's Stormwater Pollution Prevention Plans (SWPPP) and any other applicable regulations. The following additional industry standard guidelines would be followed for soil amendments:

- Erosion control materials would be certified as free of noxious weeds.

- All mulches, compost, and seed material would be free of noxious weeds.
- If organic soil amendments are used, compost would be obtained from a producer fully permitted as specified under the California Integrated Waste Management Board, Local Enforcement Agencies and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility must certify that it follows guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.
    - Compost must be composed of green waste source material consisting of chipped, shredded, or ground vegetation, clean processed recycled wood products, or other appropriate materials in compliance with environmental health standards. Compost will be medium coarse texture, with sieve size less than ½ inch.
    - Compost must not be derived from mixed municipal solid waste and must be reasonably free of visible contaminants. Compost must not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Other deleterious material, including plastic, glass, metal or rock, will not exceed 0.1 percent by weight or volume. Compost must not possess objectionable odors.
    - Metal concentrations in compost must not exceed the maximum metal concentrations listed under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.

Timing

Soil preparation activities (decompaction, tillage, soil amendments, and seeding) should be conducted when soil conditions are dry or only slightly moist. Soil preparation should not be undertaken if soils are so moist that vehicle traffic or tillage would lead to mold or smearing. As it is not possible to predict the exact construction schedule throughout the entire Project site, two different approaches may be used for soil preparation:

- **Dry Season Construction:** If grading is completed in fall, soil preparation activities would begin immediately to provide the best opportunity for seeding to be completed by October 15. Soil preparation activities may be conducted later in fall provided dry or only slightly moist soil conditions persist.
- **Wet Season Construction:** If grading is completed in winter when soil conditions are too wet to allow for effective soil manipulation, soil preparation activities would be postponed until the following late summer or fall, as described above under Dry Season Construction. Under this scenario, it may be necessary to apply an herbicide treatment and/or perform disking in late spring/early summer to minimize the spread of invasive plants.

4.1.3 Seed Palette

This section discusses typical seed palettes for grassland restoration in California's Central Valley. Following grading of the Project site or within the permit required timeline once a construction area becomes inactive, whichever is later, the site would be revegetated with a grassland seed mix comprised of a combination of grasses and forbs. The vegetation will be well-suited for management within the solar PV area with a preference for low-growing and low-maintenance species. Additionally, the vegetation will provide habitat for wildlife and support erosion control across the site. It is anticipated that the Project’s research program will aid in identifying a seed palette substantially consistent with that presented herein; however, the final recommended seed mix will likely be revised based on the results of the research program.

Final site-specific seeding plans will be developed based on assessment of the following factors: (1) Project site suitability (low growing as to not shade solar panels, partial shade tolerant); (2) soil conditions; (3) appropriate grassland species (including species that support Swainson's hawk prey); and (4) dietary preferences of sheep (if sheep grazing is utilized). The seed palette would be designed to be self-perpetuating; that is, the vegetation is intended to re-seed naturally without supplemental irrigation.

Arrangements for securing seed for the entire Project site would be made well in advance to ensure availability of appropriate material. If preferred species or amounts are determined to not be available, the seed mix proportions will be adjusted, or suitable alternate species will be added in.

A preliminary seed palette is included in Table 3. As sheep generally prefer to consume a mix between forbs (clovers and other broadleaf plants) and grasses, non-native, non-invasive forbs are also included in the preliminary seed palette. Some of the preferred forage plants for sheep include: crimson clover (*Trifolium incarnatum*), rose clover (*Trifolium hirtum*), soft brome brome (*Bromus hordeaceus),* California barley (*Hordeum brachyantherum* ssp. *californicum*), low barley (*Hordeum depressum*), and vernal barley (*Hordeum intercedens*). Lupines (*Lupinus* spp.) and locoweed (*Astragalus* spp.) are toxic to sheep and are not proposed in the preliminary seed palette.

In addition to providing palatable forage food for sheep, inclusion of forbs such as crimson clover, rose clover, and California poppy (*Eschscholzia californica*) will increase pollinator activity within the Project site. These low-growing forb species will provide floral nectar sources for a variety of native pollinators such as bees, beetles, flies, butterflies, and hummingbirds, and will promote the objectives outlined in Section 1.2. Final seed palettes and seeding rates will be determined based on BACI design, cost, and availability.

Table 3 Preliminary Seed Palette for Project Site

Scientific Name	Common Name	Origin and Habit	Seeding Rate (pounds/acre)
Bromus hordeaceus	soft brome	Non-native annual grass	2.50
Distichlis spicata	salt grass	Native perennial grass	1.50
Eschscholzia californica	California poppy	Native forb	0.50
Festuca myuros	rattail fescue	Non-native annual grass	2.50
Hordeum brachyantherum ssp. *californicum*	California barley	Native perennial grass	3.00
Hordeum depressum	low barley	Native annual grass	1.25
Hordeum intercedens	vernal barley	Native annual grass	1.25
Poa secunda	Sandberg bluegrass	Native perennial grass	1.25
Puccinellia distans	European alkali grass	Non-native perennial grass	1.25
Trifolium hirtum	rose clover	Non-native annual forb	2.40
Trifolium incarnatum	crimson clover	Non-native annual herb	0.60
Total Seed Rate			**18.00**

4.2 Planting Methods and Guidelines

This section outlines industry standards for planting methods that have been shown to be successful in revegetation and site restoration throughout California. This section will be refined and updated as needed based on the Project's research design and as specific methodology is shown to result in meeting success criteria.

4.2.1 Seeding

Seeding should follow directly after final grading or land preparation or within the permit required timeline once a construction area becomes inactive, whichever is later and prior to the installation of permanent infrastructure. This will allow for maximum coverage of seed throughout the Project site, and will also allow for large-scale seeding equipment to travel freely throughout the site without any movement constraints. Once permanent infrastructure (e.g., the foundation I-beams for solar panels) has been installed, large-scale seeding equipment would no longer be viable, and smaller, less efficient, and less effective seeding methods would need to be used. Therefore, installation of seed prior to permanent infrastructure will maximize potential for revegetation success. The site would likely be seeded using a seed drill, but is subject to change based upon environmental conditions during revegetation implementation. The specified seed mix would be applied to prescribed revegetation areas.

4.2.2 Tree Container Planting

Container planting of trees would occur primarily along northern boundaries of the Project site, as shown in Figure 3. Trees would be installed to improve and expand Swainson's hawk nesting opportunities in the Project site. Tree planting locations will be adjusted as needed prior to installation based on existing infrastructure and site conditions.

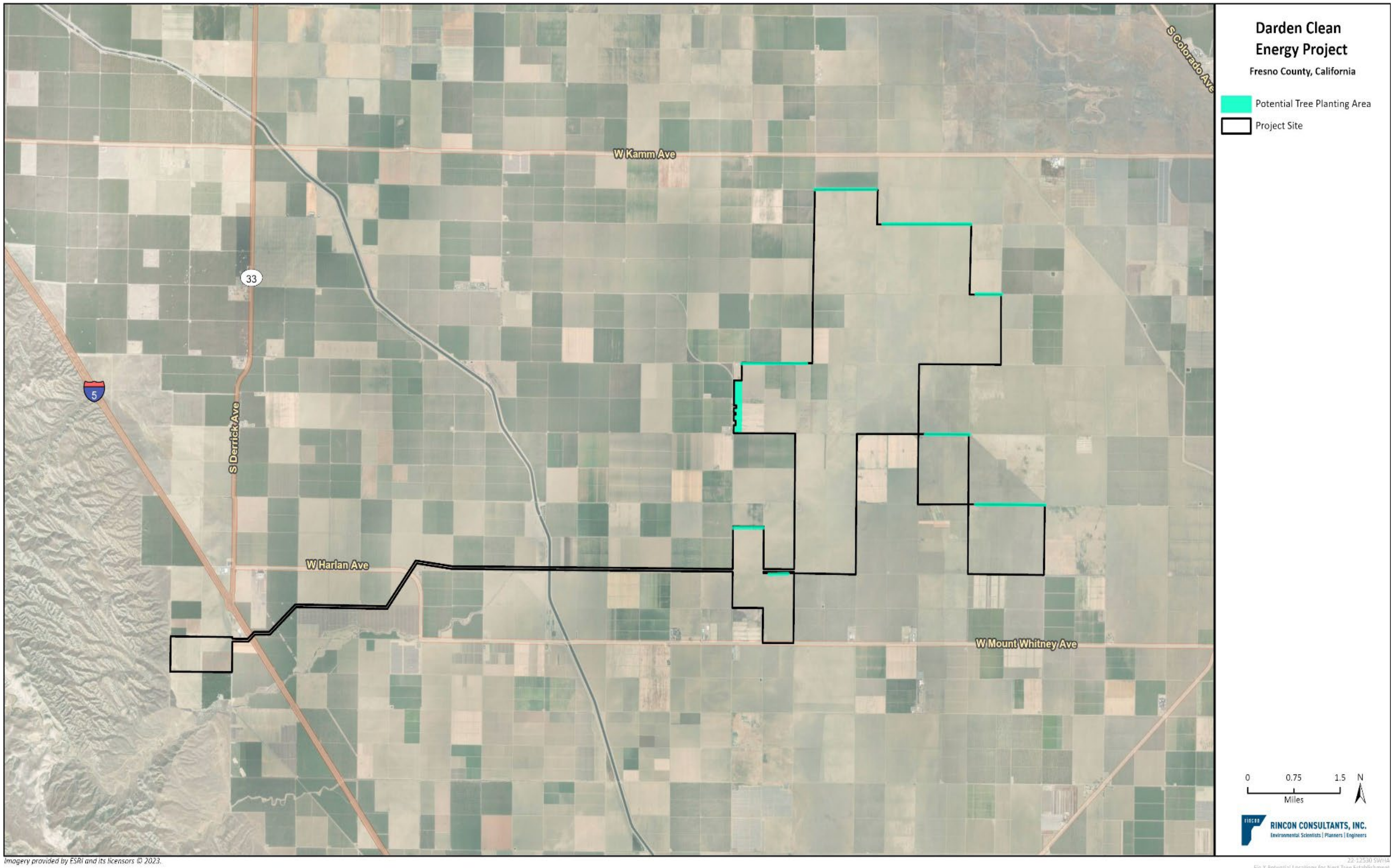
Fast-growing, non-invasive trees with capacity for tall heights mixed with slower-growing native tree species suitable for nesting Swainson's hawks will be selected for planting, providing a mixed stand to accommodate other nesting raptor species and reduce nest site competition, as described in the Swainson's Hawk Conservation Strategy prepared by Rincon (2023b). Selection of trees within the Project site would meet the constraints of their planting locations; including species with low water needs and tolerance for the high salt content and poor drainage of soils. Tree species may include, but are not limited to, eucalyptus (*Eucalyptus* spp.), cottonwoods (*Populus* spp.), willows (*Salix* spp.), and oaks (*Quercus* spp.).

The following guidelines would be followed for container plant installation:

- Planting arrangements would be initiated well in advance of planting to ensure that plant materials are available at the appropriate planting time. Sufficient time would be allocated for seed collection and contract growing, if necessary. Subject to confirmation by the plant suppliers, a minimum lead time of six months should be allocated prior to the anticipated planting dates.
- Container plants would be healthy, have well developed root systems, and would not be rootbound. A qualified biologist would inspect a representative sample of all container plants at the nursery for consistency with these requirements. The biologist would also inspect a representative sample of all plant stock at delivery and reject those plants that do not meet these requirements.

- Final planting locations would be determined by a qualified biologist based on site conditions and existing vegetation types. These locations would be mapped in advance.
- Planting holes would have vertical sides with roughened surfaces. Each planting hole would be partially backfilled with soil excavated from the planting hole and tamped to firmness without compaction. Planting holes would be filled with water, and the water would be allowed to percolate into the surrounding ground.
- Plants' roots would be adequately protected at all times from the sun and/or drying winds. After plants are removed from containers, the sides of the root ball would be lightly scarified to promote development of new roots. Any roots wrapped around the sides of the container would be pulled loose from the root ball. Plants would be planted with the roots untangled, and spread out in the planting hole to promote even root penetration.
- Plants would be set in planting holes so that the crown of the root ball is at or just above the ultimate soil surface (i.e., finished grade). Finely broken-up backfill would be tamped firmly around the root ball, making certain not to depress the crown of the plant. The top of the root collar would be exposed rather than covered with soil; however, the sides of the root ball would not be exposed.
- Each container planting would be enclosed by a wire mesh cage or similar herbivory protection. Protective devices would be maintained in place until plants are well-established.
- Immediately following installation, each plant would be deeply soaked with sufficient water to reach the lower roots. Four inches of specified mulch would be placed in a two-foot radius around the perimeter of each plant, while avoiding piling mulch around stem of plant.
- Installed container plants would be monitored and maintained for at least five years following installation to maximize survival of plants and document any planting mortality. Additional plants may need to be installed to replace dead and/or diseased container plants.

Figure 3 Potential Tree Planting Areas



4.3 Vegetation Maintenance and Long-Term Management

This section outlines industry standards for maintenance and long-term management of restored vegetation communities. However, one of the primary goals of the Project's research program is to evaluate the best management regime for the establishment and management of self-sustaining annual grasslands within the Project site. As such, this section will be revised and updated with specific procedures and guidelines that produced the best results for meeting restoration success criteria.

Vegetation maintenance would occur following seed installation, container planting, and installation of Project infrastructure, and would be used to control weed populations and promote suitable Swainson's hawk foraging habitat. Vegetation maintenance would include weed control mechanisms identified in Section 3.4, as well as any re-seeding efforts that may be warranted to promote vegetative growth.

Targeted sheep grazing, which is proposed as a weed control mechanism, would also provide a variety of additional benefits to vegetation in the Project site. Numerous researchers and practitioners have described the potential benefits of grazing and the means through which these benefits can be achieved. These benefits include:

- Nutrient cycling through deposition sheep waste;
- Removal of plant material that encourages regrowth;
- Root death through leaf removal that results in accumulation of underground organic matter and nutrient cycling;
- Increased water-holding capacity through accumulation of soil organic matter; and
- Hoof action that breaks up and compacts soil, encouraging seed germination and regeneration of vegetation (Reinhart 2006).

Sheep grazing would also promote suitable Swainson's hawk foraging habitat. Swainson's hawk foraging habitat is closely linked to vegetation structure. Vegetation that is too high or too dense (e.g., typical row crops) decreases accessibility to rodent prey by foraging hawks. Sheep grazing would allow for successful vegetation management without compromising regeneration, as vegetation would be generally kept at less than 12 inches in height through sheep grazing. This would allow for sufficiently easy access for foraging Swainson's hawks. Sheep grazing also allows for patchy vegetation heights. In some areas, especially between panels, grass would be maintained at an optimal height (generally between four and eight inches) for Swainson's hawk foraging accessibility. In other areas, vegetation would be allowed to grow taller, reducing accessibility and providing Swainson's hawk prey areas that are relatively safe from predation. Therefore, sheep grazing would allow for successful vegetation management while providing a functional uplift of Swainson's hawk foraging habitat within the Project site.

Grazing control would be managed according to the University of California's Guidelines for Residual Dry Matter (RDM) on Coastal and Foothill Rangelands in California (Bartolome et al. 2002). These guidelines are designed to provide for sustainable forage production and to protect soil resources and water quality.

5 Implementation Timing

Table 4 below provides an overview of the timing of the various revegetation and vegetation management methods to be implemented for the Project. Weed prevention and management activities that would occur prior to construction include the pre-construction weed survey, and weed control methods such as disking, mechanical blading, and hand-removal of weeds. During construction, primary weed prevention and management activities would include the worker environmental training, vehicle inspection and cleaning, and the use of weed free materials. The use of weed free materials is imperative during construction, but should also be implemented as a pre-construction and post-construction measure to reduce the chance of invasive plant introduction to the Project site. Post-construction weed prevention and management methods would primarily include weed control strategies such as mowing, herbicide application, targeted sheep grazing, and hand-removal of weeds.

Table 4 Revegetation and Vegetation Management Implementation Timing

Revegetation and Vegetation Management Method		Implementation Timing		
		Pre-Construction	During Construction	Post-Construction
Weed Prevention and Management	Pre-Construction Weed Survey	X		
	Disking	X		
	Mechanical Blading	X		
	Hand Removal of Weeds	X	X	X
	Worker Environmental Training		X	X
	Vehicle Inspection and Cleaning		X	
	Use of Weed-Free Materials	X	X	X
	Mowing			X
	Herbicide Application			X
	Targeted Sheep Grazing			X
Revegetation Implementation	Soil Testing	X		
	Soil Decompaction	X		X
	Soil Amendments	X		X
	Seed Installation	X		X
	Container Planting	X		X

Revegetation methods to be implemented pre-construction would only include soil testing, which would be used to inform any necessary soil amendments to promote revegetation success. The remainder of the revegetation methods, including soil decompaction, soil amendments, seed installation, and container planting, may be utilized prior to construction or post-construction. These revegetation methods would be initiated following site grading and before installation of Project infrastructure, and may occur in phases across the Project site based on the construction schedule and phasing. However, these methods may also be implemented as adaptive post-construction measures for any areas that were disturbed by construction activities. For example, construction activities (e.g., installation of the solar arrays) have the potential to result in soil disturbance and compaction from vehicle/equipment use, which would create sub-optimal conditions for vegetative growth. Therefore, additional soil decompaction, soil amendments, and/or re-seeding may be necessary in these areas. Additionally, container planting may be implemented as a post-construction method in response to mortality of container plants.

6 Preliminary Monitoring Plan

Monitoring of the revegetation areas in the Project site would be performed as part of a research study that is currently under development by Dr. Steven Grodsky of Cornell University. A preliminary outline of this study is provided below, and a final study design will be prepared prior to implementation of the Plan.

6.1 Monitoring Study Design

Monitoring of revegetation in the Project site would be accomplished through a BACI study design, which would incorporate the following elements:

- Vegetation management practices, including:
  - Site preparation (i.e., soil decompaction and soil amendments);
  - Seed palette (i.e., different combinations of seeds included in Table 3);
  - Field borders/hedgerows; and
  - Design elements (e.g., solar panel spacing).
- Controls in adjacent agricultural lands; and
- Repeated visits within and among years during the Swainson's hawk and general bird breeding season (generally March 15 through August 31), as well as peak growing season when vegetation and pollinators are characteristically abundant (generally March 1 through July 31).

6.1.1 Vegetation Sampling

In order to assess effectiveness of revegetation in the Project site, the following vegetation data will be collected in treatment and control plots:

- Plant community metrics for avian habitat covariates, including but not limited to:
  - Vegetation composition
  - Plant species diversity
  - Plant species richness
  - Vegetative structure
- Plant community response to treatments through time (e.g., changes in composition, diversity, richness, cover, and structure); and
- Efficacy of restoration treatments to inform adaptive management.

6.1.2 Soils/Phytoremediation

In tandem with plant data, test for effects of phytoremediation (an ecosystem service) of marginalized soils for ecosystem health and regenerative agriculture will be collected in treatment and control plots, including:

- Chemical analysis of soils for contaminants and nutrients; and
- Chemical content of selected plant species.

6.1.3 Wildlife Sampling

In order to assess effectiveness of revegetation in the Project site on Swainson's hawk, the following data will be collected on Swainson's hawk in both treatment and control plots:

- Abundance of breeding pairs (N-mixture models for abundance and density with detection);
- Displacement and recovery through time, which will require a long-term dataset;
- Fitness (i.e., nesting success);
- General behavioral observations;
- Sweep-netting for insects (e.g., *Orthoptera*) and small mammal sampling (e.g., Sherman traps) to assess prey abundance.

Additionally, data will be collected from point counts of all avian species and acoustic recording units in treatments and controls.

6.2 Success Criteria

The following success criteria have been identified to meet the revegetation and vegetation management goals detailed in Section 1.2.

- Apply seed mixes within the entire area of the solar PV array in different treatment plots immediately following completion of grading, per the experimental design of the research study.
- Maintain 67 percent survival of planted trees in Years 1 and 2, and replant as necessary to achieve total tree commitment as determined by selected species.
- Install replacement trees as needed to meet survival rates. If substantial replanting is necessary, the maintenance and monitoring period may be extended to ensure survival of replacement trees for 5 years.
- Absolute vegetative cover within the solar array is at least 60 percent of seed mix species in Years 3-5 after construction (post-rain events during non-drought years).
- Absolute cover of target invasive weed species maintained at pre-construction baseline conditions or less in Years 3-5 after construction.

7 Adaptive Management

Adaptive management will be employed in response to the results of the BACI study design, abnormal weather and precipitation conditions, the Swainson's Hawk monitoring that will be implemented as part of the Swainson's Hawk Conservation Strategy (Rincon 2023b), as well as any unforeseen circumstances during implementation of the Plan. Adaptive management would include any adjustments to the revegetation and vegetation management methods outlined in this Plan to increase the potential for revegetation success. Potential adjustments may include changes to the seed palette, weed prevention and control methods, or container planting methods to meet the success criteria identified in Section 6.2.

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