Appendix “I”

Crotch’s Bumble Bee Site Assessment

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Memorandum

Date:	May 20, 2025
To:	Mitch Adkinson, Adkan Engineers, 6879 Airport Drive, Riverside, California 92504
From:	Michael Tuma, PhD, Principal Biologist, FirstCarbon Solutions, 967Kendall Drive, #A-537, San Bernardino, California 92407
Subject:	Crotch's Bumble Bee Survey Report for the Highland Grove V Development Project in Unincorporated Riverside County, California

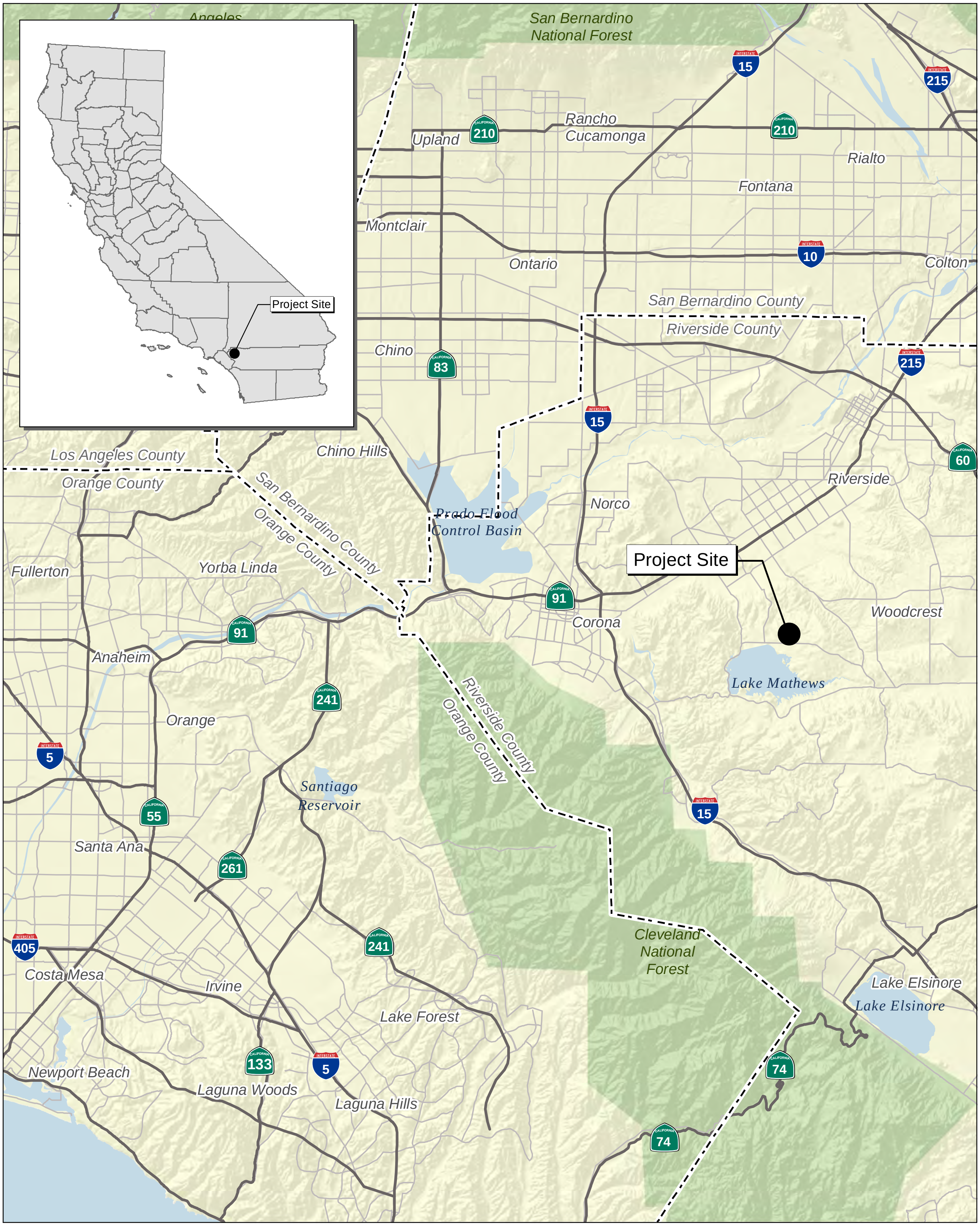
FirstCarbon Solutions (FCS) conducted protocol surveys for Crotch's bumble bee (*Bombus crotchii*) in support of the proposed Highland Grove V Development Project (proposed project) in unincorporated Riverside County, California. The following report provides details about the proposed project, its environmental setting, methods and results of the habitat assessment, and recommendations for further action.

PROJECT SITE LOCATION AND DESCRIPTION

The approximately 36.56-acre project site is located in unincorporated Riverside County (County), California (Exhibit 1). The project site is surrounded by the City of Riverside to the north, the community of Woodcrest to the east, Lake Mathews to the south, and the City of Corona to the west. Regional access to the site is provided via Interstate 15 (I-15), which bisects the project site north to south. Additional regional access to the site is provided via State Route (SR) 91, which bisects the project site east to west. Local access to the project site is provided via Cambria Court in the adjacent Citrus Heights neighborhood.

The project site is located at the southwest corner of McAllister Street and El Sobrante Road on several parcels, including Assessor's Parcel Numbers (APNs) 270-160-002, -003, -018, -020, -021, -022, -023, and -024. The site is located within the *Lake Mathews, California* United States Geological Survey (USGS) 7.5-minute Topographic Quadrangle Map.

The project site is surrounded by undeveloped lands to the north and west and agricultural operations to the east and south (Exhibit 2 and Exhibit 3). The project site is vacant and undeveloped and has been used for hay production. Undeveloped lands directly north and west of and adjacent to the project site have been previously used for agricultural production.



Source: Census 2000 Data, The California Spatial Information Library (CaSIL).

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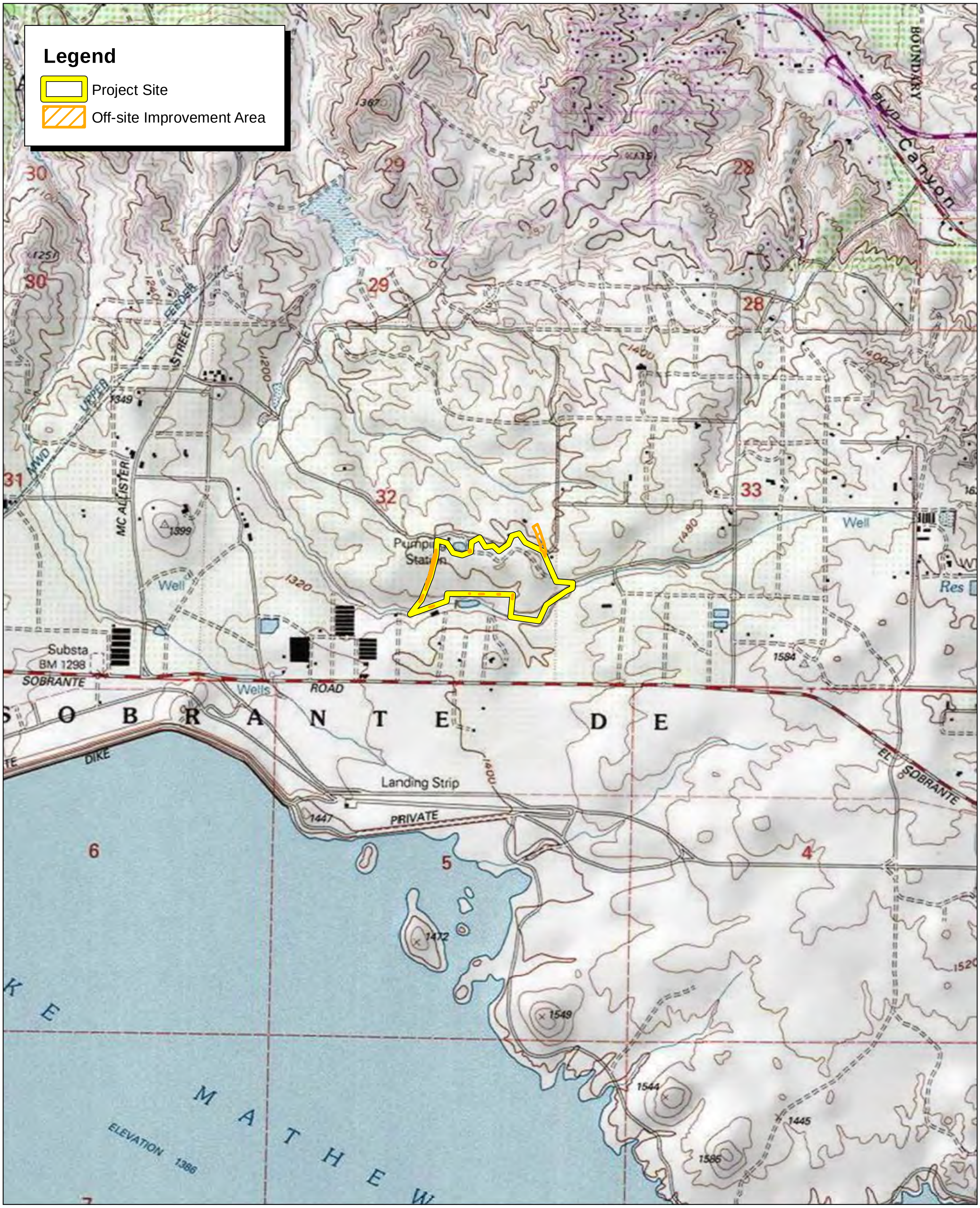
5 2.5 0 5
Miles

Exhibit 1
Regional Location Map



Source: adkan Engineers, October 2024. USGS Lake Mathews 7.5' Quadrangles / T03S,R05W,sec32,33.

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2,000 1,000 0 2,000
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Exhibit 2
Local Vicinity Map
Topographic Base

Source: ESRI Aerial Imagery. adkan Engineers, October 2024.

1,000 500 0 1,000
Feet

Exhibit 3
Local Vicinity Map Aerial Base

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ADKAN ENGINEERS
HIGHLAND GROVE V DEVELOPMENT PROJECT
CROTCH'S BUMBLE BEE SURVEY REPORT

The project site and adjacent undeveloped areas functioned as a citrus operation until the early 2000s. Evidence of operational site disturbance includes compacted soils, erosional areas, debris piles, and dirt roads. There is a drainage feature along the southern boundary of the project site. Adkan Engineers (project applicant) proposes a residential subdivision on the 36.56-acre project site, located north of El Sobrante Road, east of McAllister Street, and southeast of Sweet Avenue in the Lake Mathews/Woodcrest community of unincorporated Riverside County (Exhibit 3). The proposed project consists of subdividing the 36.56-acre property to accommodate a total of 68 single-family detached lots having a minimum pad size of 8,000 square feet and lot size of 10,000 square feet. The proposed project would include a basin for water quality purposes and an open space area for a community park. The proposed project is contingent upon the development of Tract 38605 for access and utilities.

Crotch's Bumble Bee Description

Crotch's bumble bee is a bee in the family Apidae that occurs largely in California and primarily in southwestern California, including the Pacific Coast, the western Mojave Desert, and the southern San Joaquin Valley.[1] The species also ranges into southwest Nevada and Baja California, Mexico, though occurrences are rare. This species inhabits scrublands, grasslands, chaparral, and semi-urban settings in foothills and desert margins.[2] Crotch's bumble bee appears to tolerate a narrow range of climatic conditions in comparison to other bumble bee species and requires hotter, drier environments to survive.[3] This species nests underground, often in abandoned rodent dens, or aboveground in tufts of grass, rock piles, old bird nests, or cavities in dead trees.[4] Favored food (nectar) sources for the Crotch's bumble bee include milkweeds (*Asclepias* spp.), pincushions (*Chaenactis* spp.), lupines (*Lupinus* spp.), clovers (*Medicago* spp.), phacelias (*Phacelia* spp.), and sages (*Salvia* spp.).[5] Crotch's bumble bees are generalist foragers and have been commonly associated with plants from the Fabaceae, Apocynaceae, Asteraceae, Lamiaceae, Hydrophyllaceae, Asclepidaeceae, and Boraginaceae families.[6]

Like most bumble bees (except cuckoo bumble bees), Crotch's bumble bees are social insects that live in colonies composed of a queen, workers, and reproductives (males and new queens). The colonies have an annual cycle that begins with the emergence of a queen female from her hibernacula and her

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1. Los Padres Forest Watch. 2013. Crotch's Bumblebee. Website: https://lpfw.org/our-region/wildlife/crotchs-bumblebee/. Accessed April 30, 2025.
2. California Department of Fish and Wildlife (CDFW). 2022. CDFW Seeks Public Comment Related to Crotch's Bumble Bee, Franklin's Bumble Bee, Suckley's Cuckoo Bumble Bee and Western Bumble Bee. Website: https://wildlife.ca.gov/News/Archive/cdfw-seeks-public-comment-related-to-crotchs-bumble-bee-franklins-bumble-bee-suckleys-cuckoo-bumble-bee-and-western-bumble-bee#gsc.tab=0. Accessed April 30, 2025.
3. NatureServe Explorer. 2025. *Bombus crotchii*. Website: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.834085/Bombus_crotchii. Accessed April 30, 2025.
4. Hatfield, R., S. Jepsen, R. Thorp, L. Richardson, and S. Colla. 2015. Crotch's bumble bee. IUCN Red List of Threatened Species. 2015: e.T44937582A46440211. Website: https://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T44937582A46440211.en. Accessed April 30, 2025.
5. Hatfield, R., S. Jepsen, R. Thorp, L. Richardson, and S. Colla. 2015. Crotch's bumble bee. IUCN Red List of Threatened Species. 2015: e.T44937582A46440211. Website: https://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T44937582A46440211.en. Accessed April 30, 2025.
6. California Department of Fish and Wildlife (CDFW). 2018. A Petition to the State of California Fish and Game Commission. Website: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=161902&inline. Accessed April 30, 2025.

establishment of a nest where she collects pollen and nectar and lays eggs. The reproductive queen conducts all the foraging and care for the colony in early spring until the first workers emerge and take on these duties while the queen continues to lay eggs and rear young.[7] Male Crotch's bumble bees emerge after the worker bees and are generally active from May to September, with peak activity in July. This species' workers are active from April to August and queen bees from March until May. The peak of worker activity is between May and June, whereas queens are most active in April.[8] The annual colony cycle ends with the deaths of workers and males and entry to hibernation sites by the new queens. Crotch's bumble bees are not migratory, and only mated queens overwinter.[9,10]

Crotch's bumble bee populations have experienced sharp declines over the last 10 years, particularly in northern and southern portions of the Central Valley of California.[11] Declines have been attributed to conversion of habitat for agricultural practices and urbanization.[12] Additionally, climate change and increased aridity have lowered suitable habitat for this species due to its narrow climatic specialization.[13] Pollution and competition with non-native bees have also impacted Crotch's bumble bee populations.[14,15] Because of population declines and subsequent inbreeding, genetic diversity in Crotch's bumble bee populations has also declined.[16,17,18]

2024 Habitat Assessment

FCS Biologists conducted a field visit and habitat assessment of the project site in 2024 to assess habitat for Crotch's bumble bee and characterize the biological conditions on-site. During the habitat assessment, FCS Biologists mapped vegetation communities and land cover, compiled a list of flowering plants, and recorded observations of threats to Crotch's bumble bees. The information collected during the field visit was used to evaluate Crotch's bumble bee habitat and potential for occurrence using protocol presented

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7 Koch, J., J. Strange, and P. William. 2012. Bumble Bees of the Western United States (PDF). Website: https://archive.org/details/CAT31104683. Accessed April 30, 2025.

8 Koch, J., J. Strange, and P. William. 2012. Bumble Bees of the Western United States (PDF). Website: https://archive.org/details/CAT31104683. Accessed April 30, 2025.

9 NatureServe Explorer. 2025. *Bombus crotchii*. Website: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.834085/Bombus_crotchii. Accessed April 30, 2025.

10 Hatfield, R., S. Jepsen, R. Thorp, L. Richardson, and S. Colla. 2015. Crotch's bumble bee. IUCN Red List of Threatened Species. 2015: e.T44937582A46440211. Website: https://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T44937582A46440211.en. Accessed April 30, 2025.

11 Ibid.

12 Ibid.

13 NatureServe Explorer. 2025. *Bombus crotchii*. Website: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.834085/Bombus_crotchii. Accessed April 30, 2025.

14 Williams, P.H., S.R. Colla, and Z. Xie. 2009. Bumblebee vulnerability: Common correlates of winners and losers across three continents. Conservation Biology 23: 931–940.

15 Williams, P.H. and J.L. Osborne. 2009. Bumble bee vulnerability and conservation worldwide. Apidologie 40: 367–387.

16 Goulson, D. 2010. Bumblebees: Behaviour, Ecology, and Conservation. Oxford, UK: Oxford University Press.

17 Cameron, S.A., J.D. Lozier, J.P. Strange, J.B. Koch, N. Cordes, L.F. Solter, and T.L. Griswold. 2011. Patterns of widespread decline in North American bumble bees. Proceedings of the National Academy of Science (USA) 108(2): 662–667.

18 Lozier, J.D., J.P. Strange, I.J. Steward, and S.A. Cameron. 2011. Patterns of range-wide genetic variation in six North American bumble bee (Apidae: *Bombus*) species. Molecular Ecology 20: 4870–4888.

in the Rusty Patched Bumble Bee Habitat Assessment Form and Guide published by the Xerces Society for Invertebrate Conservation.[19] The habitat assessment is a scoring system based on regional landscape features, site features, foraging habitat, nesting and overwintering habitat, pesticide practices, and management practices. FCS Biologists developed a score for the project site and compared it to the maximum possible score to evaluate the potential for occurrence of the species on-site. The guide recommends that sites managed for rusty patched bumble bees should have a minimum score of 100. FCS Biologists determined that with a score of 107, the project site appears to support habitat that is at least marginally suitable for Crotch's bumble bee. Accordingly, FCS recommended that focused Crotch's bumble bee surveys be performed in suitable habitat on-site to assess presence or absence of the species.

Methods

Background Review

FCS reviewed existing environmental documentation pertaining to the habitat requirements of Crotch's bumble bee and survey protocols and species occurrence data provided by the United States Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW). An FCS Biologist compiled Crotch's bumble bee occurrences previously recorded within the project vicinity maintained in the California Natural Diversity Database (CNDDB).[20] The CNDDB Biogeographic Information and Observation System (BIOS 6) was used to determine the distance between the known occurrences of Crotch's bumble bee and the project site.[21] FCS Biologists also reviewed Crotch's bumble bee mapping and occurrence data provided by iNaturalist[22] and Bumble Bee Watch.[23] An FCS Biologist also reviewed aerial photographs to gain perspective of the current land uses, plant community distributions, and locations of potential bumble bee habitat in the project vicinity and reviewed United States Department of Agriculture (USDA) soil surveys[24] to establish if soil conditions on the project site are suitable for excavation of burrows by burrowing wildlife.

Focused Field Surveys

Per the CDFW Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species,[26] FCS Biologists conducted three surveys for Crotch's bumble bee on the project site during the colony active period for the species, which generally occurs from April through August.

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[19] Xerces Society for Invertebrate Conservation. 2017. Rusty Patched Bumble Bee Habitat Assessment Form and Guide. Website: https://xerces.org/publications/hags/rusty-patched-bumble-bee-habitat-assessment-form-guide. Accessed April 30, 2025.

[20] California Department of Fish and Wildlife (CDFW). 2024. CNDDB RareFind 5 California Natural Diversity Database Query for Special-Status Species. Website: https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data. Accessed April 30, 2025.

[21] California Department of Fish and Wildlife (CDFW). 2024. Biogeographic Information and Observation System (BIOS 6). Website: https://wildlife.ca.gov/Data/BIOS. Accessed April 30, 2025.

[22] iNaturalist. 2024. Website: https://www.inaturalist.org. Accessed April 30, 2025.

[23] Bumble Bee Watch. 2024. Website: https://www.bumblebeewatch.org/. Accessed April 30, 2025.

[24] United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). 2024. Web Soil Survey (WSS). Website: https://websoilsurvey.nrcs.usda.gov/app/. Accessed April 30, 2025.

During the surveys, FCS Biologists walked through suitable Crotch's bumble bee habitat, recorded floral resources available within the survey area, recorded habitat conditions in field notes and with photography, searched for bees, and noted the presence of other pollinating insects. The searches for foraging bumble bees were conducted slowly; each Biologist surveyed at a rate of approximately 3 acres per hour. When a Biologist detected a bumble bee, the Biologist would carefully follow the bee as it foraged, photographing it while it visited flowers. The Biologist would follow each observed bee to collect a sufficient number of photographs from different angles to ensure that key morphological characteristics (e.g., face, cheeks, corbicula, thorax, terga) were visible in the photographs. The Biologists also attempted to follow bees from foraging areas to nest sites. No bumble bees were captured, handled, or harmed during the survey.

Common plant species observed during the field visit were identified by visual characteristics and morphology in the field and recorded in a field notebook and on field maps. Uncommon and unfamiliar plants were identified with the use of taxonomical guides, including Jepson eFlora and Calflora.[25,26] Taxonomic nomenclature used in this study follows The Jepson Manual: Vascular Plants of California.[27] Common plant names, when not available from The Jepson Manual, were taken from other regionally specific references. Vegetation community types and boundaries were noted on aerial photos, verified through field observation, and digitized using Esri ArcGIS® Field Maps. Vegetation community and land cover types used to help classify habitat types are based on the California Native Plant Society (CNPS) Manual of California Vegetation (MCV) and cross-referenced with the CDFW Natural Communities List.[28,29,30]

2025 Habitat Assessment

The information collected during the field visit was used to evaluate Crotch's bumble bee habitat and potential for occurrence using protocol presented in the Rusty Patched Bumble Bee Habitat Assessment Form and Guide published by the Xerces Society for Invertebrate Conservation.[31] The habitat assessment is a scoring system based on regional landscape features, site features, foraging habitat, nesting and overwintering habitat, pesticide practices, and management practices. FCS Biologists developed a score for the project site and compared it to the maximum possible score to evaluate the potential for occurrence of the species on-site. This evaluation was compared to the habitat assessment performed in 2024.

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[25] Jepson Flora Project (eds.) 2023. Jepson eFlora. Website: https://ucjeps.berkeley.edu/eflora/. Accessed April 30, 2025.

[26] Calflora. 2020. Calflora: Information on California plants for education, research, and conservation. Website: http://www.calflora.org/. Accessed April 30, 2025.

[27] Baldwin, B.G., D. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D. Wilken (Editors). 2012. The Jepson Manual: Vascular Plants of California. Berkeley, CA: University of California Press.

[28] Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. A Manual of California Vegetation, Second Edition. Sacramento, CA: California Native Plant Society.

[29] California Department of Fish and Wildlife (CDFW). 2022. Natural Communities List. Website: https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities#sensitive%20natural%20communities. Accessed April 30, 2025.

[30] California Native Plant Society (CNPS). 2024. A Manual of California Vegetation Online. Website: https://vegetation.cnps.org/. Accessed April 30, 2025.

[31] Xerces Society for Invertebrate Conservation. 2017. Rusty Patched Bumble Bee Habitat Assessment Form and Guide. Website: https://xerces.org/publications/hags/rusty-patched-bumble-bee-habitat-assessment-form-guide. Accessed April 30, 2025.

Results and Discussion

Topography and Hydrology

The project site has an elevation that ranges from approximately 1,380 feet above mean sea level (AMSL) near the south-central portion of the project site to 1,429 feet AMSL near the north central portion of the project site. The project includes one drainage feature, designated herein as Drainage A. Drainage A is an incised drainage that conveys intermittent flows in a westward direction prior to exiting the site at the western boundary of the project site. Flows that enter the project site originate from agricultural runoff from the surrounding orchards and seeps within the drainage.

Soils

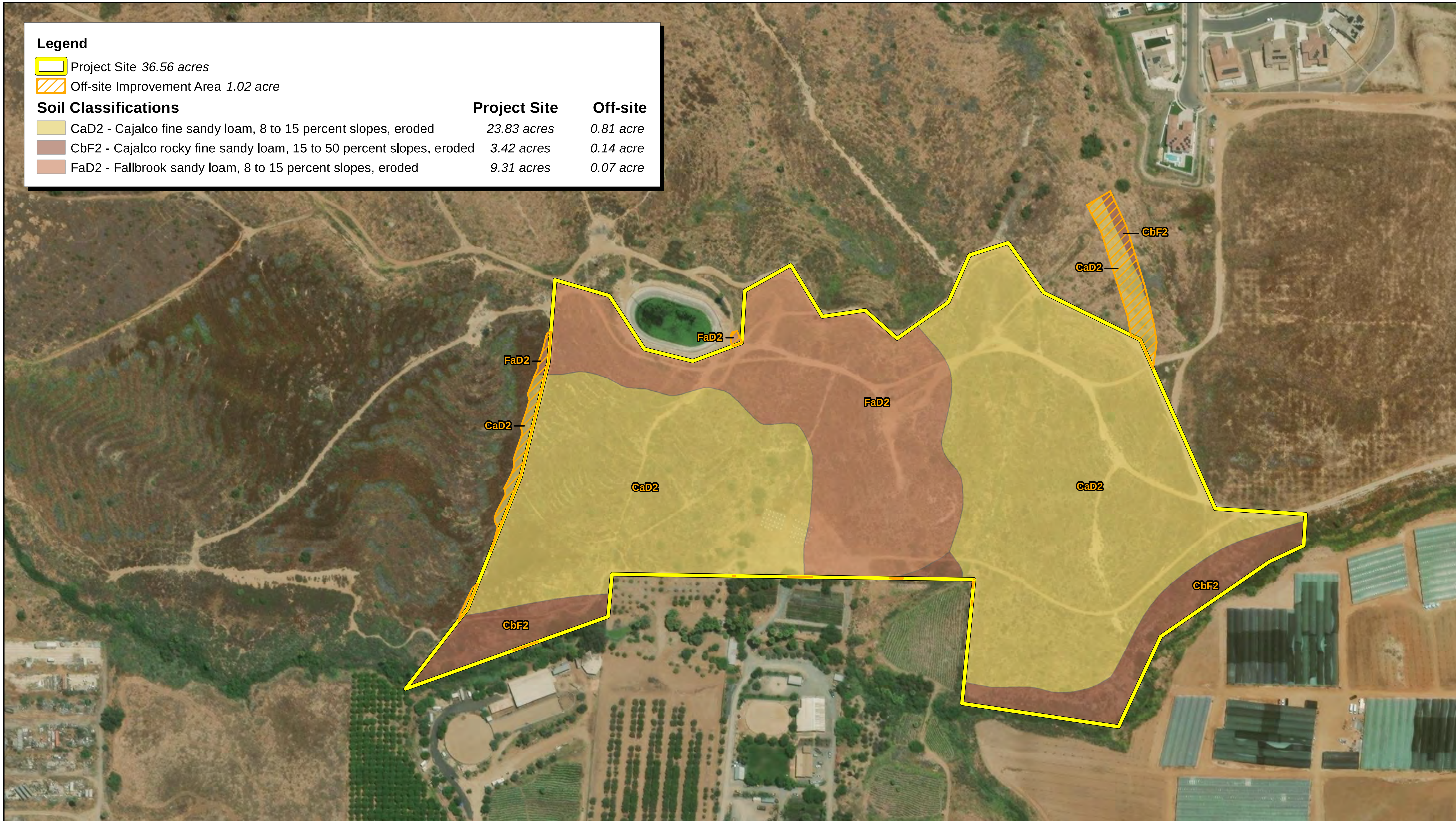
The Natural Resource Conservation Service (NRCS) Web Soil Survey (WSS) mapped three soil types on the project site, including two Cajalco soils and Fallbrook sandy loam. (See Table 1, below, and Exhibit 4).

Table 1: Soil Types Present on the Project Site

Soil Name	Symbol	Slope	Description
Cajalco find sandy loam, eroded	CaF2	15–35%	Well drained residuum weathered from gabbro on side slopes and backslope. Elevation from 900 to 3,500 feet.
Cajalco rocky fine sandy loam, eroded	CbF2	15–50%	Well drained residuum weathered from gabbro on side slopes and backslope. Elevation from 900 to 3,500 feet.
Fallbrook sandy loam, eroded	FaD2	8–15%	Well drained residuum weathered from granodiorite and/or tonalite. On hills, side slopes, and backslope. Elevation from 300 to 2,000 feet.

Vegetation Communities/Land Cover Types

The vegetation communities and land cover types recorded on the project site are described below. A map showing vegetation communities and land cover types is presented in Exhibit 5. A complete list of flowering plants found on the project site is presented in Appendix A. Photographs are presented in Appendix B.



Source: ESRI Aerial Imagery. adkan Engineers, October 2024. USDA Soils Data Mart, Riverside County.

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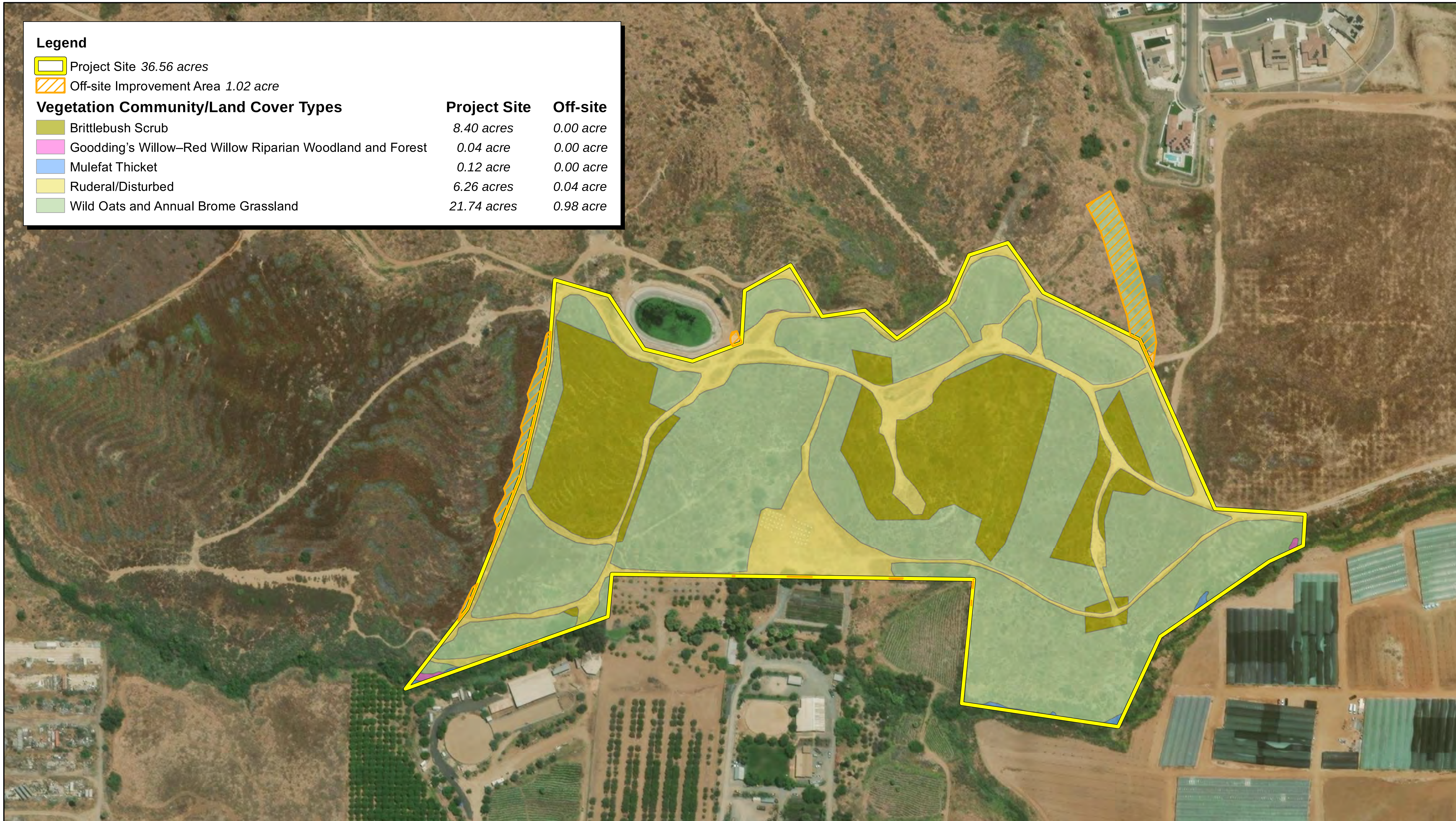
250 125 0 250
Feet

Exhibit 4
Soils Map



Source: ESRI Aerial Imagery. adkan Engineers, October 2024.

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250 125 0 250 Feet

Exhibit 5
Vegetation Community/Land Cover Map

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CROTCH'S BUMBLE BEE HABITAT ASSESSMENT REPORT

Wild Oats and Annual Brome Grassland

The site contains non-native annual grassland that best matches wild oats and annual brome grassland as described in the CNPS MCV.[28] This community encompasses 21.74 acres of the project site and was evaluated as being poor habitat for Crotch's bumble bee. Species observed within this community include red brome (*Bromus rubens*), ripgut brome (*Bromus diandrus*), farmer's foxtail barley (*Hordeum murinum*), black nightshade (*Solanum nigrum*), common fiddleneck (*Amsinckia intermedia*), white horehound (*Marrubium vulgare*), shortpod mustard (*Hirschfeldia incana*), black mustard (*Brassica nigra*), and Italian thistle (*Carduus pycnocephalus*). Other less abundant species present in this community include brittlebush (*Encelia farinosa*), California brittlebush (*Encelia californica*), London rocket (*Sisymbrium irio*), Bermuda buttercup (*Oxalis pes-caprae*), Coastal heron's bill (*Erodium cicutarium*), castor bean (*Ricinus communis*), and Common fiddleneck (*Amsinckia intermedia*).

Mulefat Thickets

The drainage along the southern border of the project site supports riparian vegetation best described as mulefat thickets or *Baccharis salicifolia* Shrubland Alliance as described in the CNPS MCV.[29] This community encompasses 0.12 acre of the project site and provides a small amount of Crotch's bumble bee foraging habitat. This community includes mulefat (*Baccharis salicifolia*), blue elderberry (*Sambucus mexicana*), arroyo willow (*Salix lasiolepis*), and red willow *(Salix laevigata*). Several emergent trees occur in scattered locations within this community, including Mexican fan palm (*Washingtonia robusta*), Canary Island date palm (*Phoenix canariensis*), and blue gum (*Eucalyptus globulus*).

Goodding's Willow–Red Willow Riparian Woodland and Forest

A portion of the drainage along the southern border of the project site supports a riparian vegetation community best described as Goodding's willow—red willow riparian woodland and forest. This community encompasses 0.04 acre of the project site and is poor habitat for Crotch's bumble bee. This community is characterized by a relatively dense canopy dominated by Goodding's black willow (*Salix gooddingii*) and red willow trees. Other species in this community include arroyo willow, mulefat, and blue elderberry.

Brittlebush Scrub

The project site includes some scrub habitat best described as brittlebush scrub or *Encelia farinosa* Shrubland Alliance as described in the CNPS MCV.[30] This community encompasses 8.40 acres of the project site and provides the best opportunities for foraging pollinators, including Crotch's bumble bee. This community is dominated by brittlebush (*Encelia farinosa*) with an understory of non-native grasses and herbaceous plants such as red brome, farmer's foxtail barley, common fiddleneck, Coastal heron's bill, California sagebrush (*Artemisia californica*), California cholla (*Cylindropuntia californica*), and California buckwheat (*Eriogonum fasciculatum*).

Ruderal/Disturbed

Ruderal/disturbed habitat is present throughout the project site. This land cover type is characterized by disturbed, cleared, grubbed and/or bare ground. This land cover type encompasses 6.26 acres of the project site and provides poor habitat for Crotch's bumble bee. Plants in ruderal areas are composed of native and non-native species. Ruderal/disturbed lands are found along a bare dirt road that traverses the site.

Database Records for Crotch's Bumble Bee

According to the CNDDB, there is one historical record (1951) for Crotch's bumble bee within 5 miles of the project site. There are seven CNDDB records within 10 miles of the project site, and six of the recorded occurrences range from 1933 to 2020 (Exhibit 6). The most recent record is from June 2024 and is approximately 9.5 miles northwest of the project site. A review of occurrence data for Crotch's bumble bee on the iNaturalist website determined that 13 recent observations were recorded within approximately 10 miles of the project site, including two observations approximately 9 miles northeast of the project site in March and April 2025 (Exhibit 7); one observation approximately 6 miles northwest of project site recorded in 2023; one observation approximately 9 miles northeast of project site recorded in 2021; two observations approximately 8 miles northeast of project site, in the Riverside East area, recorded in 2020 and 2024; one observation approximately 9 miles southwest; and five observations approximately 9 miles east of the project site recorded between 2017 and 2025. A review of the Bumble Bee Watch website found one record from 2024 for a Crotch's bumble bee approximately 3 miles northeast of the project site.[32]

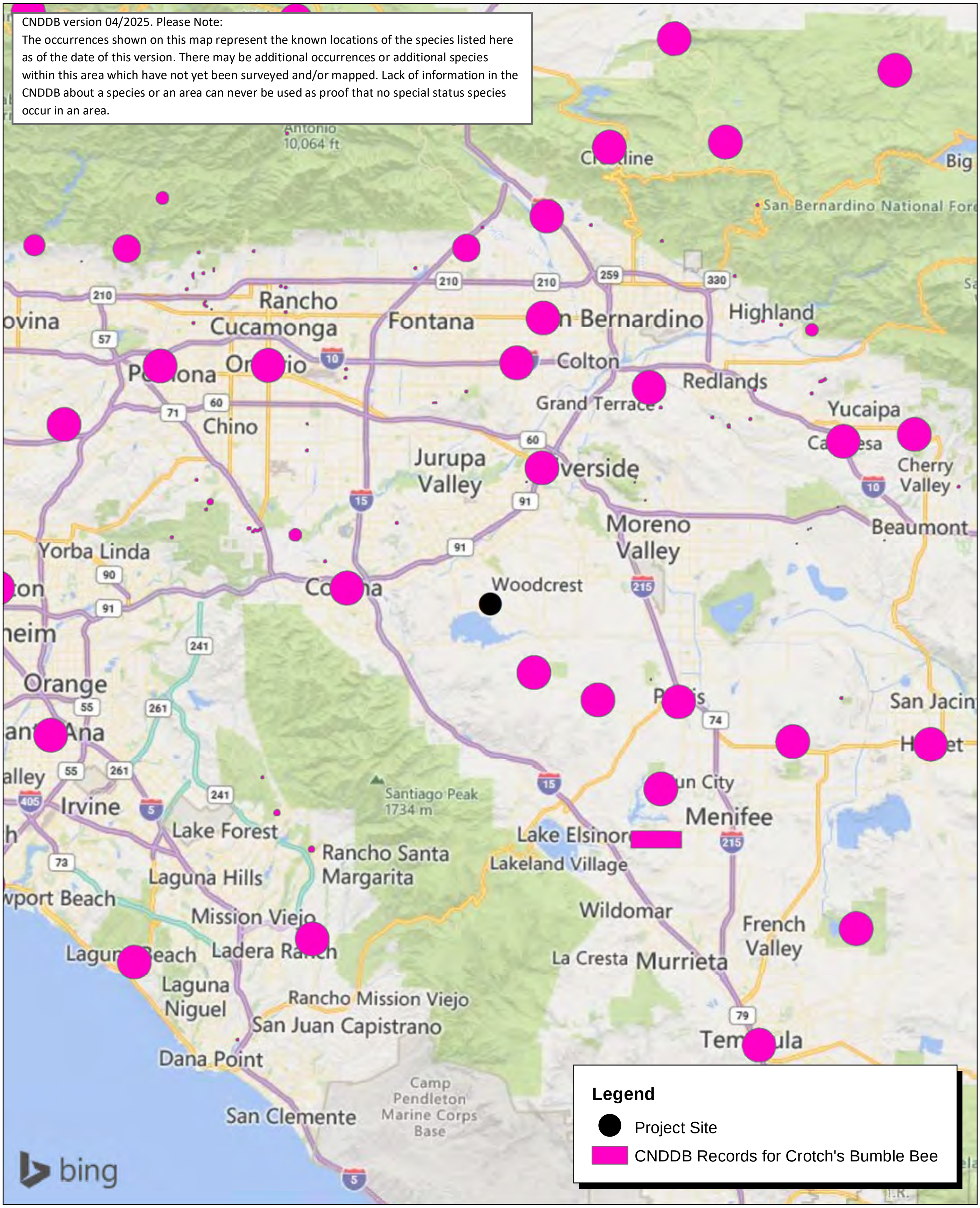
Crotch's Bumble Bee Surveys

FCS Biologists performed searches for Crotch's bumble bees on the project site on April 1, April 23, and May 9, 2025. Table 2 provides a summary of the survey dates, personnel, times, and weather conditions during the surveys.

Table 2: Dates, Surveyors, and Conditions During the Crotch's Bumble Bee Surveys Conducted on the Project Site in 2024

Date	Survey Type	Surveyor(s)	Time	Weather Conditions
04/01/2025	Crotch's bumble bee survey	Kayla Belanger, Gina Culver	9:15 a.m.–12:30 p.m.	Partly cloudy Temp: 52–58ºF Wind: 7–13 mph
4/23/2025	Crotch's bumble bee survey	Kayla Belanger, Gina Culver	12:00 p.m.–2:30 p.m.	Mostly cloudy Temp: 65–72ºF Wind: 5–7 mph
5/09/2025	Crotch's bumble bee survey	Kayla Belanger, Gina Culver	9:30 a.m.–12:00 p.m.	Clear, sunny Temp: 80–90ºF Wind: 2–7 mph
Notes: °F = degrees Fahrenheit				

[32] Bumble Bee Watch. 2025. Website: https://www.bumblebeewatch.org/. Accessed April 30, 2025.



Source: Bing Maps Road Web Mapping. California Natural Diversity Database (CNDDB), April 2025.

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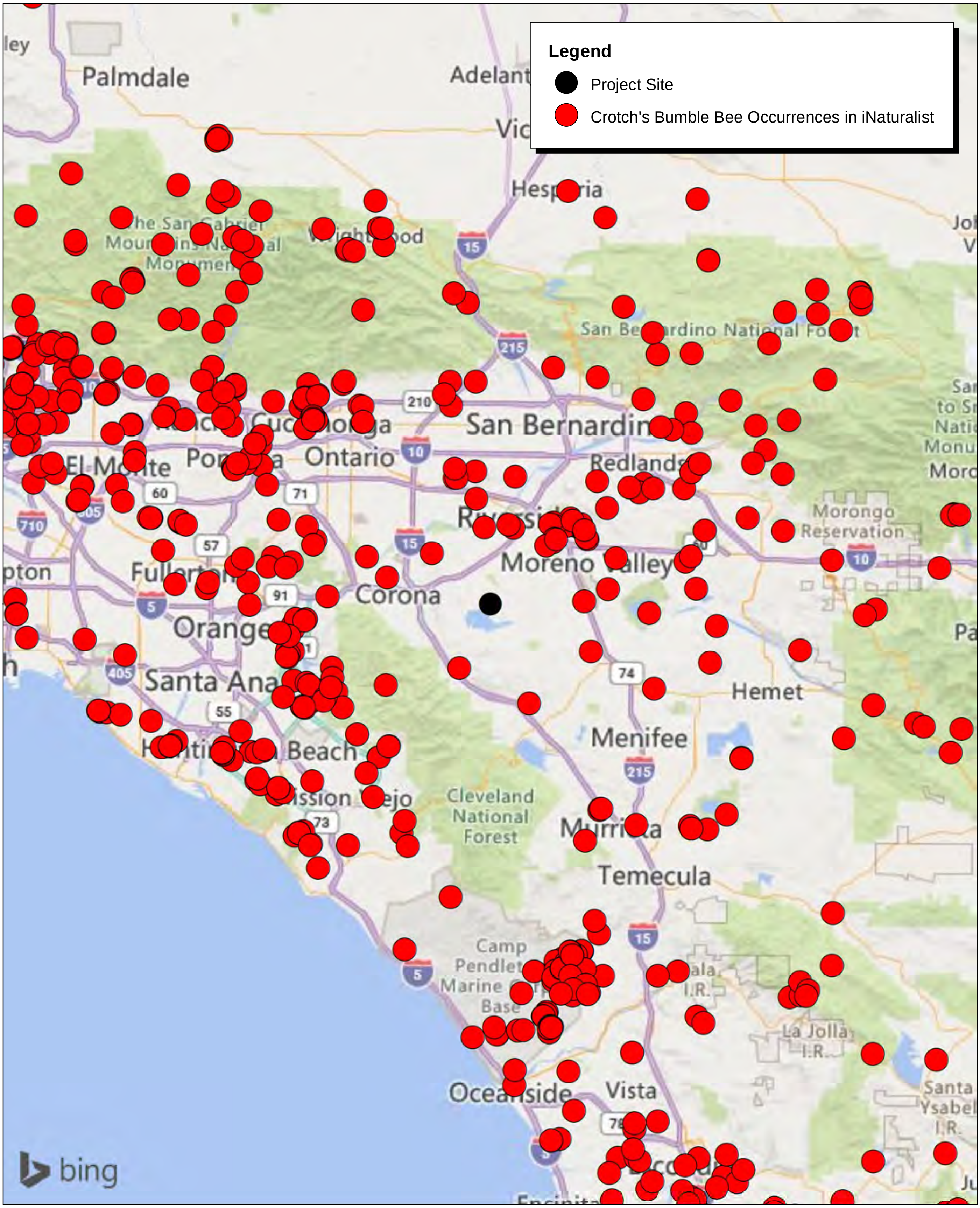
6.5 3.25 0 6.5 Miles

Exhibit 6

Crotch's Bumble Bee Occurrence Map (CNDDB Data)



Source: Bing Maps Road Web Mapping. iNaturalist, April 2025.

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10 5 0 10 Miles

Exhibit 7
Crotch's Bumble Bee Occurrence Map
(iNaturalist Data)

No Crotch's bumble bees were observed during the surveys conducted on the project site. Other bee species observed during the surveys included European honeybee (*Apis mellifera*). Other pollinator species observed included *Copestylum marginatum*, a species of syrphid fly, seven-spot ladybird (*Coccinella septempunctata*), weevil sp. (*Curculionoidea*), and common damselflies (*Enallagma cyathigerum).*

2025 Habitat Assessment

Field Assessment

Field surveys in 2025 included new habitat assessments to evaluate any changes to prior 2024 Crotch's bumble bee habitat assessments. The project site has historically been subjected to chronic disturbances and non-native, annual species (e.g., shortpod mustard, ripgut brome, and wild oats) appear to comprise the bulk (>50 percent) of the biomass on-site. Some Crotch's bumble bee forage species occur on-site, including blue elderberry, mule fat, brittlebush, and common fiddleneck. Most of these species occur in low densities and in scattered locations within the wild oats and annual brome grassland, the vegetation community that covers most (~60 percent) of the project site. Brittlebush is present in higher densities (>30 percent) throughout the annual brome grassland. Moreover, the wild oats and annual brome grassland exhibits low species diversity and dense stands of non-native species, rendering this community unsuitable as Crotch's bumble bee foraging habitat. The brittlebush scrub community on-site is somewhat less disturbed and supports greater diversity of annual plant species, providing foraging habitat that is marginally suitable for Crotch's bumble bees. This vegetation community occurs over 8.4 acres (~23 percent) of the project site.

Soils on the project site are friable and provide good burrowing opportunities for wildlife and potential nest sites for Crotch's bumble bees. Rodent burrows were recorded in scattered locations across the project site that could provide potential overwintering and nesting sites.

Anthropogenic threats recorded on-site include dirt roads with compacted soils that provide human access for recreational activities, agricultural grubbing, and debris and trash piles associated with illegal dumping.

Xerces Society Habitat Assessment Form and Guide

According to the Xerces Society for Invertebrate Conservation Rusty Patched Bumble Bee Habitat Assessment Form and Guide,[33] the project site scored 97, representing 45.1 percent of the maximum possible score of 215 (Appendix C). The guide recommends that sites managed for rusty patched bumble bees should have a minimum score of 100. With a score of 97, the project site does not appear to support habitat suitable for Crotch's bumble bee occurrence. The score in 2025 is down from a score of 113 in 2024. During the 2025 surveys, FCS Biologists detected a large honeybee operation adjacent to the project site as well as feral honeybee hives on the project site. The honeybees likely outcompete bumble bees and other native pollinators on the project site. FCS Biologists also collected additional data on the

[33] Xerces Society for Invertebrate Conservation. 2017. Rusty Patched Bumble Bee Habitat Assessment Form and Guide. Website: https://xerces.org/publications/hags/rusty-patched-bumble-bee-habitat-assessment-form-guide. Accessed April 30, 2025.

agricultural operations adjacent to the project site and concluded that pesticide, fungicide, and/or insecticide are likely used there. These factors combined to depress the habitat score in 2025.

Conclusions and Recommendations

The majority of the project site, approximately 60 percent, is vegetated in a wild oats and annual brome grassland community that exhibits low native species diversity and high densities of non-native annual species that are not Crotch's bumble bee forage species and, thus, is considered unsuitable habitat for Crotch's bumble bees. Approximately 23 percent of the project site is vegetated in a brittlebush scrub community that supports a greater diversity of native plant species, and this community was determined to provide marginally suitable foraging habitat for Crotch's bumble bees. Rodent burrows on-site could potentially provide nesting and overwintering opportunities. The project site has historically been subjected to chronic anthropogenic disturbances and is surrounded by disturbed lands, which likely reduces the habitat suitability of the area. In addition, the project site is directly adjacent to active agricultural operations that include honeybee farming on the property south of the project site. Also, FCS Biologists detected several feral honeybee hives in elderberry trees on the project site. Honeybees were detected in high abundance during surveys and are known to compete with native bumble bees and potentially spread disease to them. These factors led to a decrease in the habitat assessment score for the project site. Scoring the project site using the Xerces criteria for rusty patched bumble bees, a system that considers on-site conditions and its context within a wider landscape, FCS Biologists determined that the project site likely does not contain suitable habitat for Crotch's bumble bee.

Focused surveys for the species did not detect any bumble bee species. FCS concludes that Crotch's bumble bees are not present on the project site. It is likely that anthropogenic disturbances observed on-site, including active grubbing, trash from illegal dumping, density of invasive plants, dirt roads, presence of potential competition with honeybees from an adjacent farm, and likely use of pesticides, fungicides, and/or insecticides, has degraded the habitat in a manner that makes it unfavorable for Crotch's bumble bee occupancy.

If we can be of any further assistance, or if you have any questions concerning this report, please contact me at 714.508.4100.

Sincerely,

Michael W. Tuma, PhD
Principal Biologist
FirstCarbon Solutions
967 Kendall Drive, #A-537
San Bernardino, CA 92407

Enc:
Attachment A: Plants Observed On-site
Attachment B: Site Photographs
Attachment C: Habitat Assessment Scoring

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Attachment A:

Plants Observed On-site

Table 1: Plant Species Observed on the Project Site

Family	Scientific Name	Common Name	Native/ Blooming Period	Potential Crotch's Bumble Bee Forage Species?
Monocots				
Arecaceae	*Phoenix canariensis*	Canary Island date palm	Non-native/ Oct-Apr	no
Arecaceae	*Washingtonia robusta*	Mexican fan palm	Non-native/ Apr-Jun	no
Poaceae	*Bromus diandrus*	ripgut brome	Non-native Invasive/ Apr-Jun	no
Poaceae	*Bromus rubens*	red brome	Non-native/Feb-Jun	no
Poaceae	*Hordeum murinum*	farmer's foxtail barley	Non-native/ Apr-May	no
Dicots				
Anacardiaceae	*Schinus molle*	Peruvian pepper tree	Non-native/ Mar-Jun	no
Anacardiaceae	*Malosma laurina*	laurel sumac	Native/ Feb-May	yes
Asteraceae	*Artemisia californica*	California sagebrush	Native/ Apr-Oct	yes
Asteraceae	*Baccharis salicifolia*	mule fat	Native/ Jan-Dec	yes
Asteraceae	*Carduus pycnocephalus*	Italian thistle	Non-Native/ Feb-Jul	no
Asteraceae	*Centaurea melitensis*	tocalote	Non-native/ Apr-Aug	yes
Asteraceae	*Corethrogyne filaginifolia var. filaginifolia*	common sandaster	Native/ May-Aug	yes
Asteraceae	*Deinandra paniculata*	paniculate tarplant	Native/ Apr-Nov	yes
Asteraceae	*Encelia californica*	California brittlebush	Native/ Feb-Jun	yes
Asteraceae	*Encelia farinosa*	brittlebush	Native/ Jan-May	yes
Asteraceae	*Ericameria pinifolia*	pinebush	Native/ Apr-Jul	yes
Asteraceae	*Erigon canadensis*	Canada horseweed	Native/ Jun-Sep	yes

Family	Scientific Name	Common Name	Native/ Blooming Period	Potential Crotch's Bumble Bee Forage Species?
Asteraceae	*Heterotheca grandiflora*	telegraph weed	Native/ Jan-Dec	yes
Asteraceae	*Lactuca serriola*	prickly lettuce	Non-native/ May-Sep	no
Asteraceae	*Oncosiphon piluliferum*	stinknet	Non-native Invasive/ Mar-Jul	yes
Asteraceae	*Stephanomeria virgata*	twiggy wreath plant	Native/ Jul-Oct	yes
Boraginaceae	*Amsinckia intermedia*	common fiddleneck	Native/ Feb-Jun	yes*
Brassicaceae	*Brassica nigra*	black mustard	Non-native Invasive/ Apr-Jul	no
Brassicaceae	*Hirschfeldia incana*	shortpod mustard	Non-native/ Jan-Dec	no
Brassicaceae	*Sisymbrium irio*	London rocket	Non-native/ Jan-Apr	no
Cactaceae	*Cylindropuntia californica*	California cholla	Native/Apr- July	no
Cactaceae	*Opuntia littoralis*	coast prickly pear	Native/ May-Jun	no
Chenopodiaceae	*Atriplex canescens*	fourwing saltbush	Native/ May-Jun	yes
Cupressaceae	*Juniperus californicus*	California juniper	Native/ Not Applicable	no
Euphorbiaceae	*Croton setiger*	turkey-mullein	Native/ May-Oct	no
Euphorbiaceae	*Ricinus communis*	castor bean	Non-native Invasive/ Jan-Dec	no
Fabaceae	*Astralagus sp.*	milkvetch	–	–
Geraniaceae	*Erodium cicutarium*	redstem filaree	Non-native Invasive/ Feb-Jun	no
Lamiaceae	*Marrubium vulgare*	white horehound	Non-native/ May-Aug	yes
Oxalidaceae	*Oxalis pes-caprae*	Bermuda buttercup	Non-native/ Dec-Jun	no
Polygonaceae	*Eriogonum fasciculatum*	California buckwheat	Native/ Apr-Sep	yes*
Salicaceae	*Salix gooddingii*	Goodding's black willow	Native/ Feb-Mar	no
Salicaceae	*Salix laevigata*	red willow	Native/ Feb-May	no

Family	Scientific Name	Common Name	Native/ Blooming Period	Potential Crotch's Bumble Bee Forage Species?
Salicaceae	*Salix lasiolepis*	arroyo willow	Native/ Feb-May	no
Solanaceae	*Nicotiana glauca*	tree tobacco	Non-native Invasive/ Mar-Sep	no
Solanaceae	*Solanum nigrum*	black nightshade	Non-native/ Mar-Oct	no
Tamaricaceae	*Tamarix aphylla*	athel tree	Non-native/ May-Nov	no
Urticaceae	*Urtica dioica*	stinging nettle	Native/ May-Sep	no
Viburnaceae	*Sambucus mexicana*	blue elderberry	Native/ Mar-May	yes
*known preferred forage species				

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Attachment B:

Site Photographs

	
Photograph 1: View of the dried thickets of mustard that dominate the wild oats and annual brome grassland. Some brittlebush can be seen scattered throughout.	Photograph 2: View of encelia scrub, ruderal vegetation, and trash along dirt roads in the center of project site, facing west.

Photograph 3: View of the southeastern portion of project site, showing freshly grubbed area and dirt road.

Photograph 4: Representative photograph of annual brome grassland areas with newly installed silt fence.

Photograph 5: Overview photograph of the project site, facing southeast.

Photograph 6: View of a bee hive observed in an elderberry tree in the center of the project site.

Attachment C:

Habitat Assessment Scoring

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Habitat Assessment Scoring for Crotch's Bumble Bee[1]

Scoring Criteria

Section 1: Regional and Landscape Features

1a. Percentage of the grid cell that is natural habitat: >30% (score=10)
1b. Dominant vegetation/land cover within 0.5 mile of assessment area: Mix of native, naturalized, and weedy/invasive species (score=3)

Section 2: Site Features

2a. Percentage of site that is in natural or semi-natural habitat: 50-75% (score=7)
2b Additional site features that are present: permanent meadows or open areas with diverse native wildflowers allowed to bloom (score = 5), 1 point for every 20% of area that is grass (2) (total score= 7)

Section 3: Foraging Habitat

3a. Percentage of vegetative cover that is comprised of forbs, flowering shrubs, or pollinator friendly trees on site: 30-50% cover (score=7)

3b. Number of species of forbs, flowering shrubs, or pollinator-friendly trees on site that bloom in spring and support bees: 10+ species (score=10)

3c. Number of species of forbs, flowering shrubs, or pollinator-friendly trees on site that bloom in summer and support bees: 10-17 species (score=7)

3d. Number of species of forbs, flowering shrubs, or pollinator-friendly trees on site that bloom in fall and support bees: 5-9 species (score=7)

3e. Crotch's bumble bee superfoods (species most commonly used by the species): 1–4 species (score=2)

3f. Crotch's bumble bee forage species that are known to help build bumble bee immune systems: Score one point, up to 3 for each species present (score=2).

[1] Based on Xerces Invertebrate Conservation Society. 2017. Rusty Patched Bumble Bee Habitat Assessment Form and Guide. Website: https://xerces.org/publications/hags/rusty-patched-bumble-beehabitat-assessment-form-guide. Accessed April 30, 2025.

Section 4: Nesting and Overwintering Habitat

4a. Nesting and overwintering habitat: <5% bunch grasses (score=1); <5% rodent activity (score=1); ~10% unmowed, ungrazed (score=5); <5% woody, rocky cover (score=1); 0 leaf litter (score=3). (Total score = 11).

Section 5: Management and Pesticide Practices

5a. Management and pesticides practices: no herbicide use (score=5); no pesticide use on-site, but adjacent agricultural operations probably use pesticides (score=15); no fungicide use on-site, but adjacent agricultural operations probably use fungicides (score=2); no insecticide use on-site, but adjacent agricultural operations probably use insecticides (score=2); no buffers from adjacent insecticide applications (score=0); spray control (score=0). Total score=24

5b. Land management techniques: mowing (N; score=0); grazing (N; score=N/A); burning (N; score=N/A); honeybees (N; score=0)

Scoring Summary

Section 1: Regional and Landscape Features (max score 20): **13**

Section 2: Site Features (max score 35): **14**

Section 3: Foraging Habitat (max score 50): **35**

Section 4: Nesting and Overwintering Habitat (max score 30): **11**

Section 5a: Pesticide Practices (max score 40): **24**

Section 5b: Management Practices (max score 40): **0**

Total: 97 of 215 (45.1%)

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