



Adelanto Gateway Logistic Center Project **Crotch's Bumble Bee Survey Report**

City of Adelanto, San Bernardino County, California

PROJECT APPLICANT:

Mileski Living Trust C/O Synergy Consulting

1971 190th Street
Torrance, CA 90504

Contact: Michael Mileski

PREPARED BY:

FirstCarbon Solutions

967 Kendall Drive, #A-537
San Bernardino, CA 92407
714.508.4100

Contact: Jason Brandman, Project Director
Michael W. Tuma, PhD, Principal Biologist

March 14, 2025

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

1 - Introduction	1
1.1 - Project Site Location and Description	1
2 - Requirement for Crotch's Bumble Bee Survey	7
2.1 - Crotch's Bumble Bee Description	7
3 - Existing Site Conditions	9
3.1 - Topography and Hydrology	9
3.2 - Vegetation Communities and Land Cover	9
3.3 - Soils	13
4 - Methods	17
4.1 - Background Review	17
4.2 - Habitat Assessment	17
4.3 - Crotch's Bumble Bee Surveys	17
5 - Results and Discussion	19
5.1 - Background Review	19
5.2 - Habitat Assessment	19
5.3 - Crotch's Bumble Bee Surveys	23
6 - Conclusions and Recommendations	25
 Appendix A: Site Photographs	
 Appendix B: Habitat Assessment Scoring	
 Tables	
Table 1: Soil Types Present within Project Site	13
Table 2: Dates, Surveyors, and Conditions During the Crotch's Bumble Bee Surveys Conducted on the Project Site in 2024	23
 Exhibits	
Exhibit 1: Regional Location Map	3
Exhibit 2: Local Vicinity Map, Aerial Base	5
Exhibit 3: Vegetation Communities Map	11
Exhibit 4: Crotch's Bumble Bee Occurrence Map	15
Exhibit 5: Crotch's Bumble Bee Occurrence Map	21

THIS PAGE INTENTIONALLY LEFT BLANK

1 - INTRODUCTION

FirstCarbon Solutions (FCS) conducted protocol surveys for Crotch's bumble bee (*Bombus crotchii*) in support of the proposed Adelanto Gateway Logistic Center Project (proposed project) in the City of Adelanto, in San Bernardino County, California. The following report provides details about the proposed project, its environmental setting, methods, and results of the surveys, and recommendations for further action.

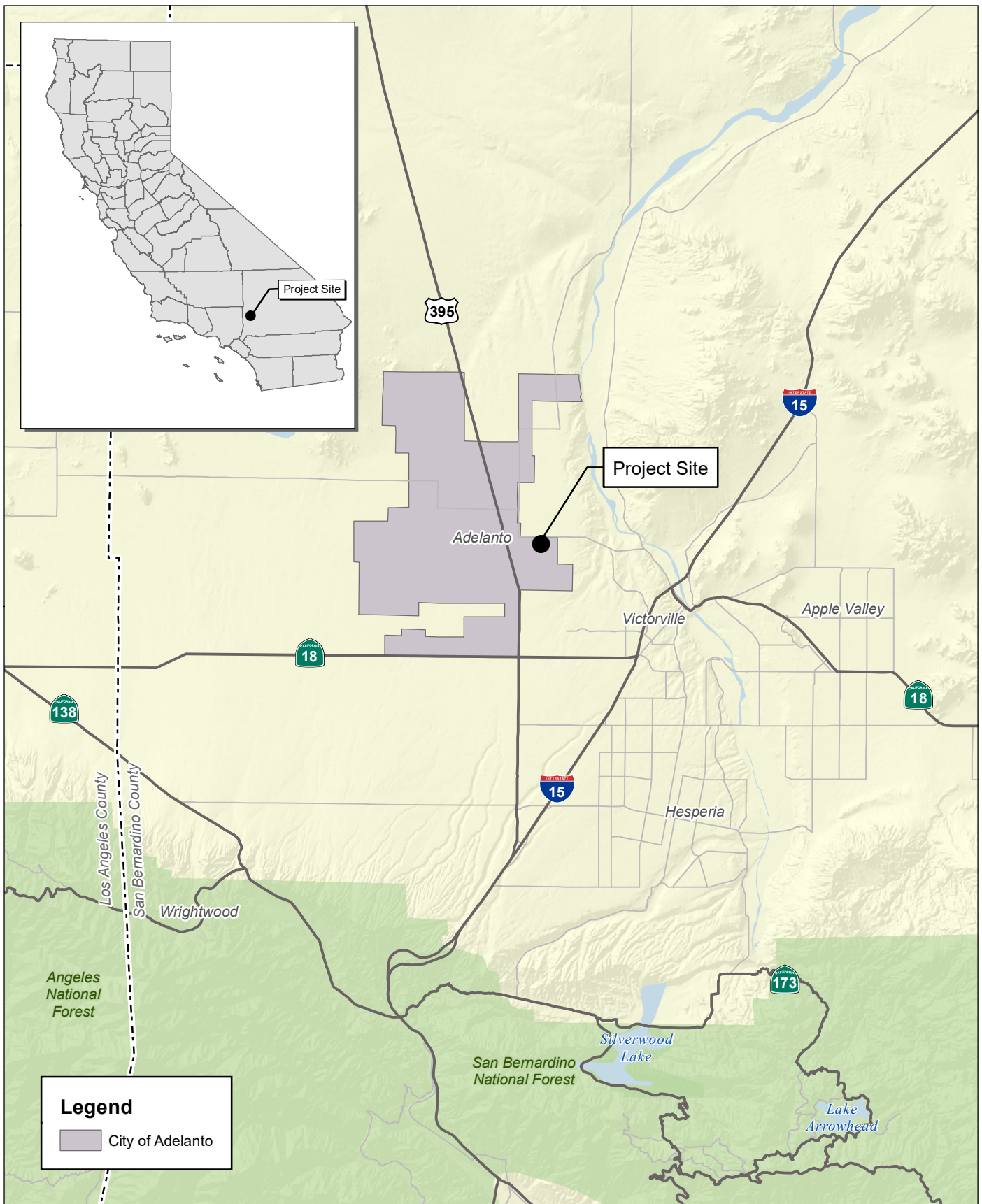
1.1 - Project Site Location and Description

The approximately 487.20-acre project site is located in the City of Adelanto, in San Bernardino County, California (Exhibit 1). The project site is centered around 34.568588° latitude and -117.387749° longitude. The location of the project site within the Mojave Desert region is shown on Exhibit 1, and the project site boundaries on a recent high-resolution aerial image are shown on Exhibit 2. The project site is located on the *Adelanto, California* United States Geological Survey (USGS) 7.5-minute Topographic Quadrangle Map, Township 6 North, Range 5 West, Section 34.

The project site is situated in an area characterized by urban development, including the Federal Correctional Complex to the east of the site and several corporate businesses including a trucking company, concrete company, and a diesel engine repair shop to the south. Additionally, a cannabis store, open land, and Adelanto Road is located to the west of the site and Air Expressway, the DHL Supply Chain, and the Southern California Logistics Airport located to the north. However, undeveloped land is also present to the west, north, and east of the project site. Significant landmarks in the project vicinity include U.S Route 395 located approximately 0.45 mile west and the Southern California Logistics Airport located approximately 0.34 mile north of the project site.

The proposed project would consist of an industrial distribution facility comprised of industrial warehouses and office space.

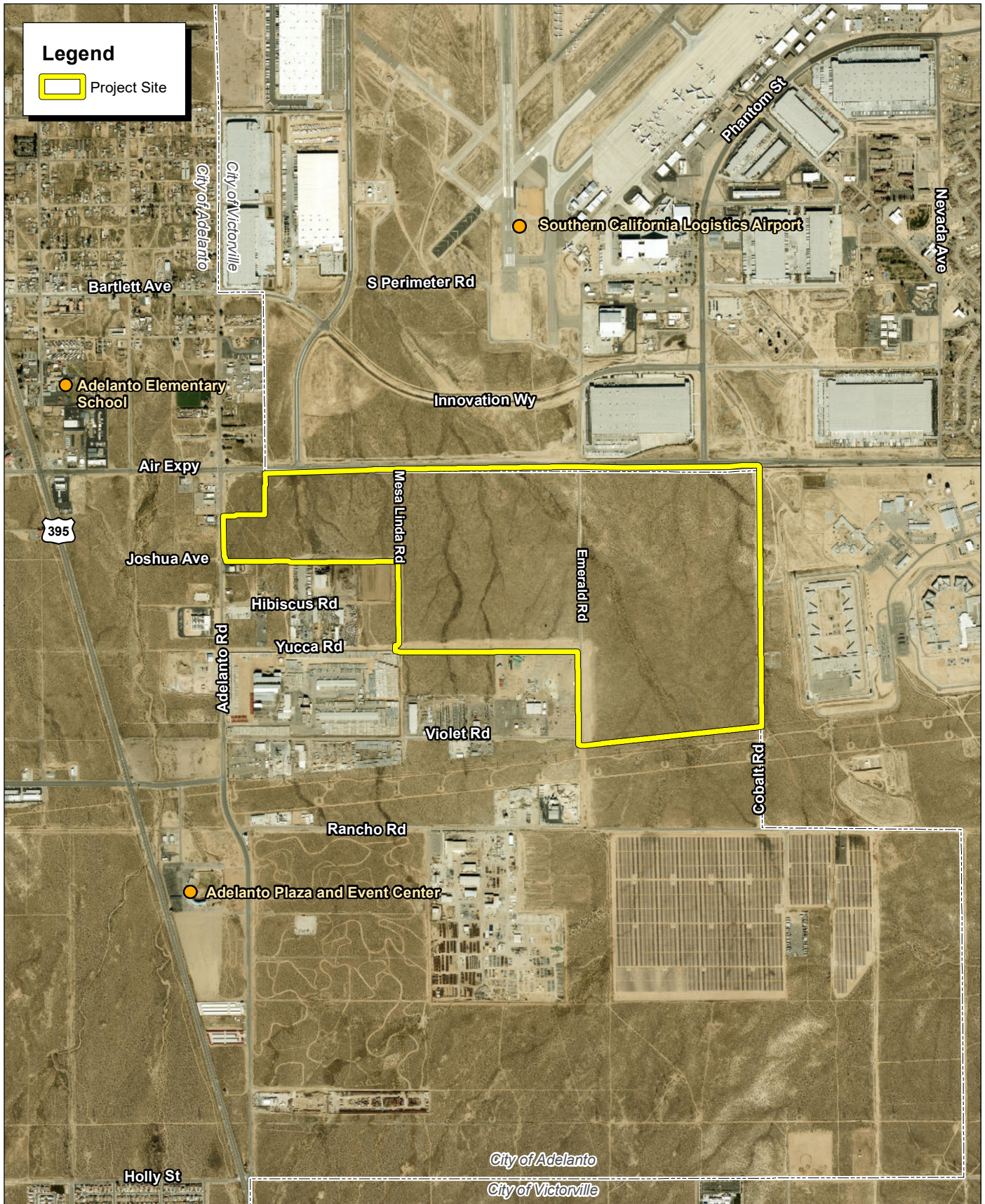
THIS PAGE INTENTIONALLY LEFT BLANK



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



THIS PAGE INTENTIONALLY LEFT BLANK



Source: ESRI Aerial Imagery. BLUE Engineering & Consulting, Inc.



THIS PAGE INTENTIONALLY LEFT BLANK

2 - REQUIREMENT FOR CROTCH'S BUMBLE BEE SURVEY

The Crotch's bumble bee (*Bombus crotchii*) is a candidate for listing under the California Endangered Species Act (CESA). CESA prohibits take, which is defined under CESA as to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" a listed species, and directs agencies to consult with the California Department of Fish and Wildlife (CDFW) on projects or actions that could affect listed species. To assess potential project impacts to this species, the project applicant would need to retain a qualified biologist to conduct presence/absence surveys for the species according to the CDFW Survey Considerations for CESA Candidate Bumble Bee Species.¹

2.1 - 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.² 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.³ Crotch's bumble bee appears to tolerate a narrow range in climatic conditions in comparison to other bumble bee species and requires hotter, drier environments to survive.⁴ 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.⁵ 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.).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

¹ California Department of Fish and Wildlife (CDFW). 2023. Survey Conditions for CESA Candidate Bumble Bee Species. Website: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=213150&inline>. Accessed June 28, 2024.

² Los Padres Forest Watch. 2019. Crotch's Bumblebee. Website: <https://lpfw.org/our-region/wildlife/crotch-s-bumblebee/>. Accessed March 4, 2025.

³ 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-crotch-s-bumble-bee-franklin-s-bumble-bee-suckley-s-cuckoo-bumble-bee-and-western-bumble-bee#gsc.tab=0>. Accessed March 4, 2025.

⁴ *Bombus crotchii*. NatureServe Explorer. 2023-06-30.

⁵ Hatfield, R.; Jepsen, S.; Thorp, R.; Richardson, L. and Colla, S. 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 March 4, 2025.

⁶ NatureServe Conservation Status Factors Edition Authors: Schweitzer, D.F. (2010); Richardson, L.L. (2018)

hibernacula and her establishment of a nest where she collects pollen and nectar and lays eggs. The reproductive queens conduct 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. Workers of this species are active from April to August and queen bees are active 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}

⁷ Koch, J; Strange, J; William, P. 2012. Bumble Bees of the Western United States (PDF).

⁸ Ibid.

⁹ *Bombus crotchii*. NatureServe Explorer. 2023-06-30.

¹⁰ Hatfield, R.; Jepsen, S.; Thorp, R.; Richardson, L. and Colla, S. 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 March 4, 2025.

¹¹ Ibid.

¹² Ibid.

¹³ NatureServe. 2014. NatureServe Explorer: An Online Encyclopedia of Life. Arlington, Virginia. Website: <http://explorer.natureserve.org>. Accessed March 4, 2025.

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

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

¹⁶ Goulson, D. 2010. Bumblebees: behaviour, ecology, and conservation. Oxford University Press, Oxford.

¹⁷ Cameron, S.A., Lozier, J.D., Strange, J.P., Koch, J.B., Cordes, N., Solter, L.F. and Griswold, T.L. 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., Strange, J.P., Steward, I.J. and Cameron, S.A. 2011. Patterns of range-wide genetic variation in six North American bumble bee (*Apidae: Bombus*) species. *Molecular Ecology* 20: 4870-4888.

3 - EXISTING SITE CONDITIONS

The project site lies within Victor Valley, which comprises the south-central portion of the Mojave Desert. The valley spans approximately 20,105 square miles and consists of a largely desert scrub ecosystem, primarily dominated by creosote bushes and Joshua trees. The valley lies north of the San Bernardino Mountains, northeast of the San Gabriel Mountains, north of the Cajon Pass, and east of Antelope Valley. The Mojave River runs through Victor Valley and is located to the south and east of the project site.

3.1 - Topography and Hydrology

The project site lies between 2,900 and 2,925 above sea level in elevation. The project site and vicinity are generally flat and slope gently toward the north. The site contains an unvegetated ephemeral drainage that flows in a south to north direction through the site and ranges from two to three feet in width. The drainage originates off-site to the south and flows north before dissipating on-site. The site also contains several non-jurisdictional drainage swales.¹⁹

3.2 - Vegetation Communities and Land Cover

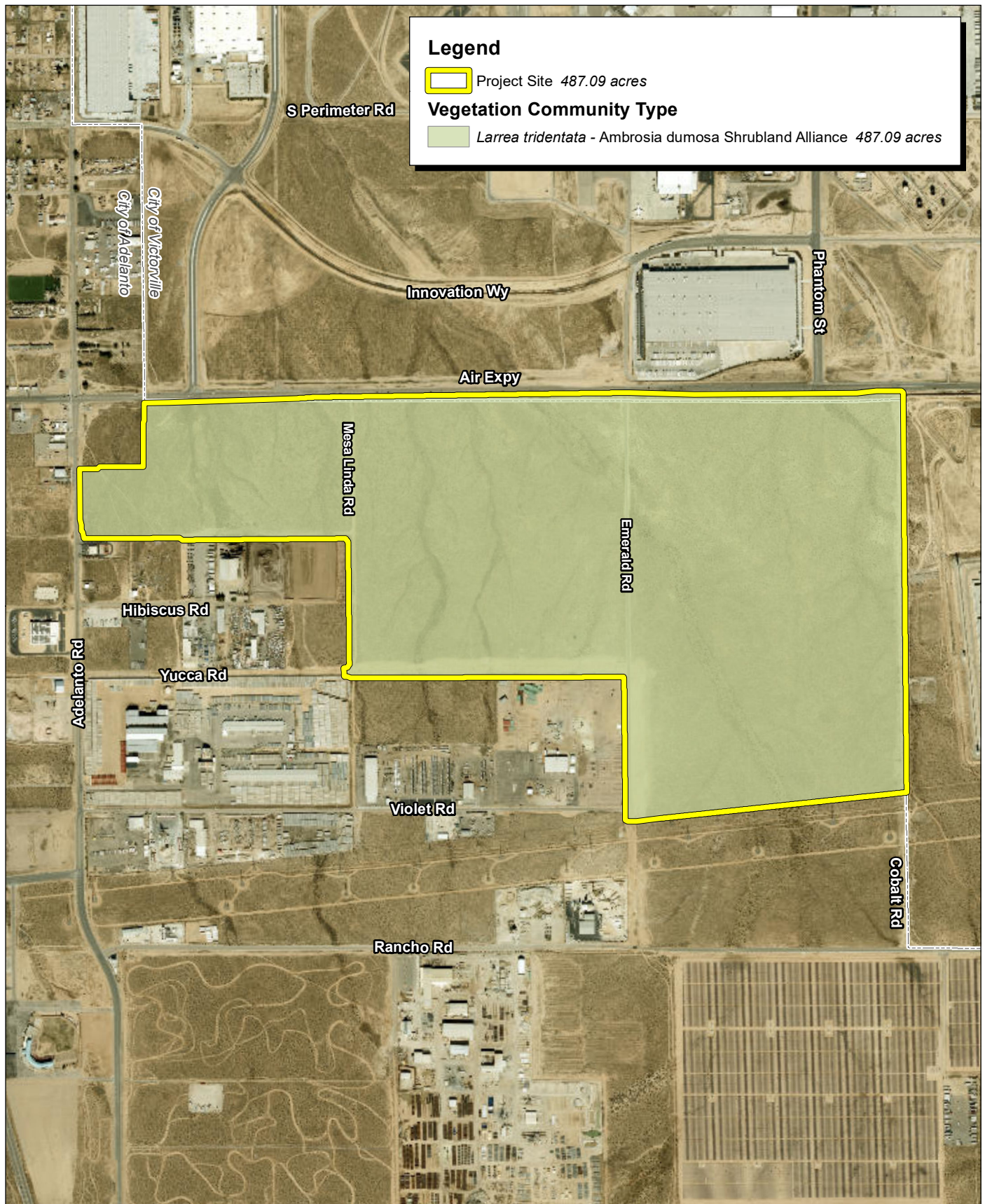
FCS Biologists recorded one vegetation community on the project site, creosote bush–white bursage scrub, described below.

3.2.1 - *Larrea tridentata*–*Ambrosia dumosa* Shrubland Alliance

The entirety of the project site consists of creosote bush–white bursage scrub (*Larrea tridentata*–*Ambrosia dumosa* Shrubland Alliance) (Exhibit 3). This community is dominated by creosote bush (*Larrea tridentata*) with white bursage (*Ambrosia dumosa*) as the subdominant shrub. Other species observed in this community consist of athel tamarisk (*Tamarix aphylla*), silver cholla (*Cylindropuntia echinocarpa*), cotton thorn (*Tetradymia comosa*), desert globe mallow (*Sphaeralcea ambigua*), Mojave lupine (*Lupinus odoratus*), Nevada ephedra (*Ephedra nevadensis*), box-thorn (*Lycium* spp.), desert mariposa lily (*Calochortus kennedyi*), Jerusalem thorn (*Parkinsonia aculeata*), western Joshua tree (*Yucca brevifolia*), desert woollystar (*Eriastrum eremicum*), horsetweed (*Erigeron canadensis*), shortpod mustard (*Hirschfeldia incana*), rubber rabbitbrush (*Ericameria nauseosa*), dove weed (*Croton setigerus*), common tarweed (*Madia elegans*), and red brome (*Bromus rubens*). This vegetation alliance is commonly found on alluvial fans, bajadas, valleys, basins, upland slopes, and mesas. It thrives in areas with well-drained soils and minimal water retention. This natural vegetation community has a state rarity of S5 under the Manual of California Vegetation (MCV), which considers it secure within California.

¹⁹ United States Geological Survey (USGS). 2024. National Geospatial Program. Website: https://www.usgs.gov/core-science-systems/national-geospatial-program/us-topo-maps-america?qt-science_support_page_related_con=4#qt-science_support_page_related_con. Accessed November 26, 2024.

THIS PAGE INTENTIONALLY LEFT BLANK



Source: ESRI Aerial Imagery. BLUE Engineering & Consulting, Inc.



THIS PAGE INTENTIONALLY LEFT BLANK

3.3 - Soils

The Natural Resource Conservation Service (NRCS) Web Soil Survey (WSS) depicts one soil type on the project site.²⁰ These soil types and their primary characteristics are summarized in Table 1.

Table 1: Soil Types Present within Project Site

Soil Name	Symbol	Slope	Description	Acreage On-site
Bryman Loamy Fine Sand	105	0–2%	The Bryman series consists of alluvium derived from granite sources. This soil is well draining and is nonsaline to very slight saline. It is typically found on terraces and older alluvial fans with slopes ranging.	487.09
Source: Natural Resources Conservation Service. 2024. Official Soil Series Descriptions. United States Department of Agriculture (USDA). Website: http://www.nrcs.usda.gov/ . Accessed November 26, 2024.				

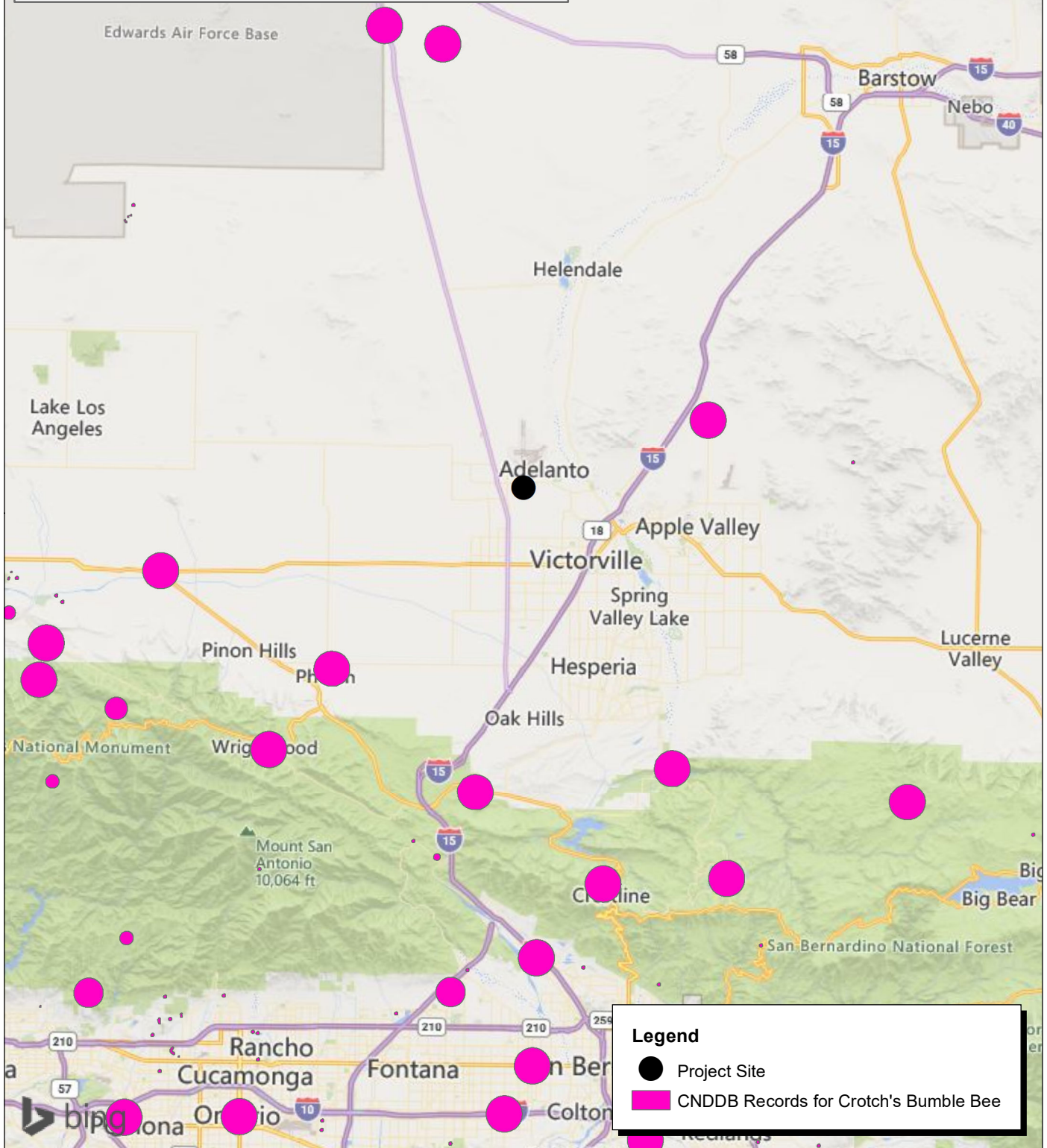
Bryman loamy fine sand is the only soil type on-site, covering 487.09 acres (Exhibit 4). These soils are well-drained and friable and provide excellent burrowing opportunities.

²⁰ Natural Resources Conservation Service (NRCS). 2024. Web Soil Survey (WSS). United States Department of Agriculture (USDA). Website: <https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>. Accessed November 26, 2024.

THIS PAGE INTENTIONALLY LEFT BLANK

CNDDDB version 03/2025. Please Note:

The occurrences shown on this map represent the known locations of the species listed here as of the date of this version. There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Lack of information in the CNDDDB about a species or an area can never be used as proof that no special status species occur in an area.



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

Exhibit 4

Crotch's Bumble Bee Occurrence Map (CNDDDB Data)



THIS PAGE INTENTIONALLY LEFT BLANK

4 - METHODS

4.1 - Background Review

FCS reviewed existing environmental documentation for the project site and vicinity. This documentation included literature 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 CDFW. An FCS Biologist compiled Crotch's bumble bee occurrences previously recorded within the project vicinity based on a search of the California Natural Diversity Database (CNDDDB).²¹ The CNDDDB 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.²² FCS Biologists also reviewed Crotch's bumble bee mapping and occurrence data provided by iNaturalist and Bumble Bee Watch.^{23,24} Finally, FCS reviewed aerial photographs of the project vicinity to gain perspective of the current site conditions relative to on-site and off-site land use, plant community locations, and potential locations of wildlife movement corridors.

4.2 - Habitat Assessment

FCS Biologists evaluated 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.²⁵ 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.

4.3 - Crotch's Bumble Bee Surveys

Per the CDFW Survey Conditions for CESA Candidate Bumble Bee Species,²⁶ FCS Biologists conducted three surveys for Crotch's bumble bee on the project site. During the surveys, FCS Biologists 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. If a bumble bee was observed, the Biologists photographed it according to protocol.

²¹ California Department of Fish and Wildlife (CDFW). 2025. CNDDDB RareFind 5 California Natural Diversity Database Query for Special-Status Species. Website: <https://map.dfg.ca.gov/rarefind/view/RareFind.aspx>. Accessed March 4, 2025.

²² California Department of Fish and Wildlife (CDFW). 2025. Biogeographic Information and Observation System (BIOS 6). Website: <https://map.dfg.ca.gov/bios/>. Accessed March 4, 2025.

²³ iNaturalist. 2025. Website: <https://www.inaturalist.org/>. Accessed March 4, 2025.

²⁴ Bumble Bee Watch. 2025. Website: <https://www.bumblebeewatch.org/>. Accessed March 4, 2025.

²⁵ 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 March 4, 2025.

²⁶ California Department of Fish and Wildlife (CDFW). 2023. Survey Conditions for CESA Candidate Bumble Bee Species. Website: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=213150&inline>. Accessed June 28, 2024.

THIS PAGE INTENTIONALLY LEFT BLANK

5 - RESULTS AND DISCUSSION

5.1 - Background Review

According to the CNDDDB, there are no records for Crotch's bumble bee within 5 miles of the project site (Exhibit 4). The closest historic record of the species is approximately 9.3 miles northeast of the project site, recorded in 1944. A review of occurrence data for Crotch's bumble bee on the iNaturalist website determined that three recent observations were recorded within approximately 25 kilometers (km) of the project site, including two southeast of the project site near Hesperia and the Mojave Interpretive Walk and one southwest of the site near Piñon Hills (Exhibit 5). A review of the Bumble Bee Watch website determined that one recent observation of the species was recorded near State Route (SR) 2 about 18 miles southwest of the project site.²⁷ Species occurrences from iNaturalist and Bumble Bee Watch suggests that the immediate project vicinity in Adelanto contains sparse occurrences of Crotch's bumble bee.

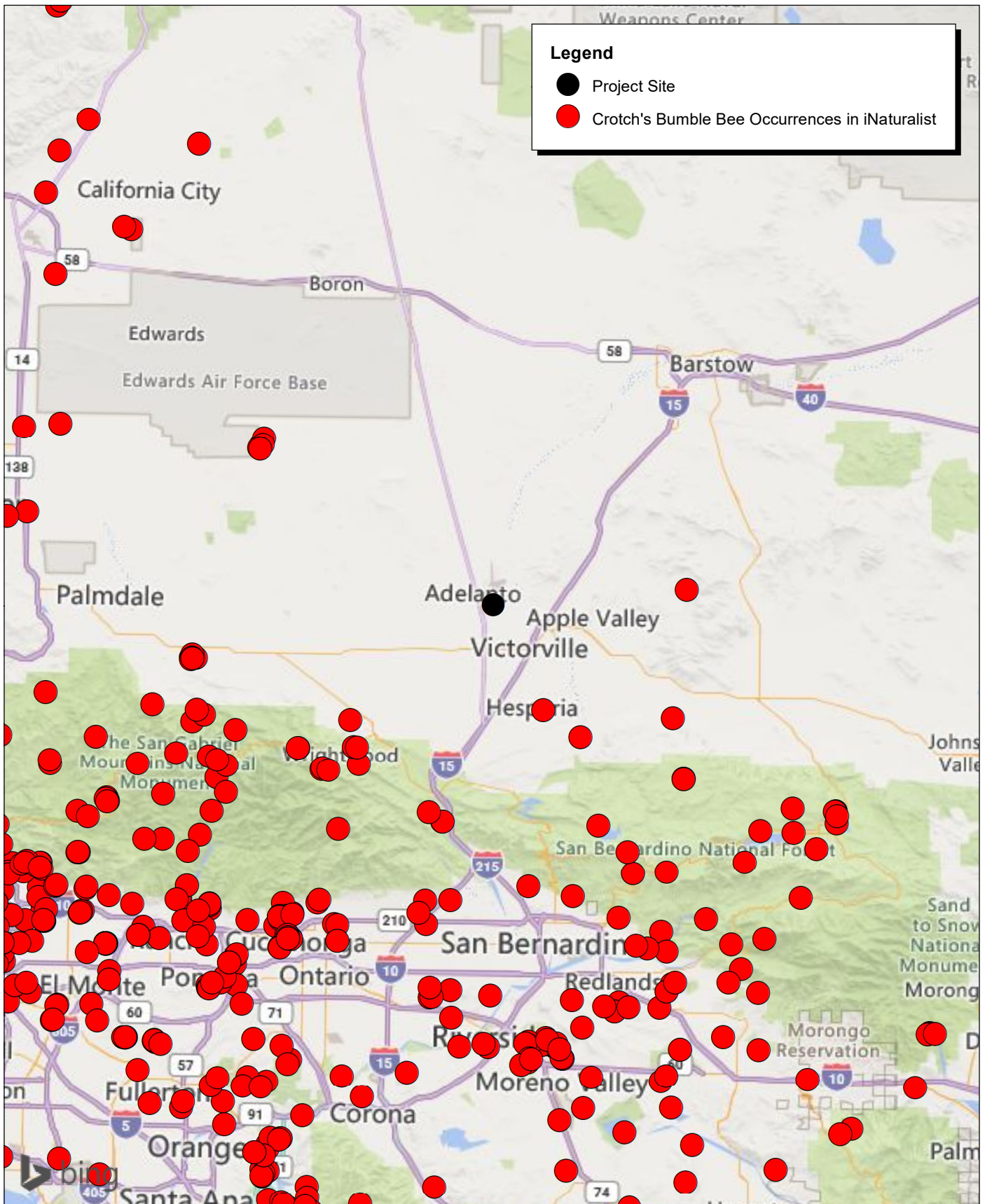
A review of aerial photography determined that the project site is located within a portion of the City of Adelanto that includes developed and undeveloped lands. The undeveloped lands within which the project site is situated are surrounded by urban development to the east, west, and south and the Southern California Logistics Airport to the north. The undeveloped lands surrounded by these developments total approximately 1.07 square miles (687 acres); all 687 acres of this area support potential Crotch's bumble bee habitat. The project site encompasses approximately 71% of this undeveloped area.

5.2 - Habitat Assessment

The project site is undeveloped and is connected to other undeveloped lands supporting native vegetation communities. There are numerous annual and perennial flowering species present on and adjacent to the project site that could provide foraging opportunities for Crotch's bumble bee, including preferred forage species such as alfalfa (*Medicago sativa*), Mojave lupine and arroyo lupine (*Lupinus succulentus*). Ruderal species, such as shortpod mustard, occur throughout the site. Other plant species on-site include desert woollystar, cotton thorn, brownplume wirelettuce (*Stephanomeria pauciflora*), and desert globe mallow. The site is occupied by California ground squirrels (*Otospermophilus beecheyi*) and their burrows could provide potential nesting and overwintering opportunities for Crotch's bumble bees. Lastly, while there are numerous anthropogenic disturbances on-site (off-road vehicle use, wind-blown trash, proliferation of invasive plants), there is no mowing or use of herbicides or pesticides on or adjacent to the project site.

²⁷ Bumble Bee Watch. 2025. Website: <https://www.bumblebeewatch.org/>. Accessed March 4, 2025.

THIS PAGE INTENTIONALLY LEFT BLANK



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

Exhibit 5

Crotch's Bumble Bee Occurrence Map (iNaturalist Data)

FCS
An ADEC Innovation



10 5 0 10
Miles

THIS PAGE INTENTIONALLY LEFT BLANK

These factors were considered in an assessment of Crotch’s bumble bee habitat on-site using the Xerces Society for Invertebrate Conservation Rusty Patched Bumble Bee Habitat Assessment Form and Guide.²⁸

According to the Rusty Patched Bumble Bee Habitat Assessment Form and Guide, the score for the project site is 110, representing 51 percent of the maximum possible score of 215 (Attachment C). The guide recommends that sites for management of rusty patched bumble bees score at least 100. Thus, the project site likely supports at least marginally suitable habitat for Crotch’s bumble bee using the Xerces criteria for rusty patched bumble bees.

5.3 - Crotch’s Bumble Bee Surveys

FCS Biologists performed searches for Crotch’s bumble bees on the project site on June 28, July 30, and August 14, 2024. 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
6/28/2024	Crotch’s bumble bee survey	Kayla Belanger	9:30 a.m.–1:30 p.m.	Sunny, clear, Temp: 71–83°F Wind: 0–5 mph
7/30/2024	Crotch’s bumble bee survey	Kayla Belanger	9:30 a.m.–1:30 p.m.	Sunny, clear, Temp: 81–94°F Wind: 5–7 mph
8/14/2024	Crotch’s bumble bee survey	Kayla Belanger	10:00 a.m.–2:00 p.m.	Hazy, Temp: 84–94°F Wind: 5–10 mph
Notes: °F = degrees Fahrenheit				

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 thread-waisted wasps (*Sphex lucae*).

²⁸ 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 March 4, 2025.

THIS PAGE INTENTIONALLY LEFT BLANK

6 - CONCLUSIONS AND RECOMMENDATIONS

The project site is undeveloped and connected to other undeveloped lands, is not in proximity to previous Crotch's bumble bee observations, supports annual and perennial plants that provide foraging habitat for Crotch's bumble bee, supports rodent populations and numerous potential nesting and overwintering burrows for Crotch's bumble bees, and is not subjected to disturbances or management practices that would preclude Crotch's bumble bee occurrence. Thus, potentially suitable habitat for Crotch's bumble bee occurs on and adjacent to the project site, and the species could occur there. FCS Biologists conducted surveys for Crotch's bumble bees on the project site between June and August and did not detect the species. Many other surveys were also conducted on the project site between May and August 2024, including western Joshua tree inventories and assessments, desert tortoise surveys, burrowing owl surveys, Mohave ground squirrel surveys, and rare plant surveys, which provided additional opportunities to observe Crotch's bumble bees and their sign, but none were observed on-site.

FCS concludes that Crotch's bumble bees are not present on the project site. It may be possible that the anthropogenic disturbances observed on-site, including off-road vehicle use and density of invasive plants, may have degraded the habitat in a manner that makes it unfavorable for Crotch's bumble bee occupancy. FCS recommends that a pre-construction survey of the project site be implemented prior to the initiation of ground-disturbing project construction activities, and that construction monitoring by qualified Biologists be conducted during the ground-disturbing construction activities.

THIS PAGE INTENTIONALLY LEFT BLANK

Adelanto Gateway Logistic Center Project

Crotch's Bumble Bee Survey Report

Appendix A:

Site Photographs

THIS PAGE INTENTIONALLY LEFT BLANK



Photograph 1: View of the *Larrea tridentata* - *Ambrosia dumosa* Shrubland Alliance on the project site, facing northeast.



Photograph 2: View of the *Larrea tridentata* - *Ambrosia dumosa* Shrubland Alliance on the project site, facing north.



Photograph 3: View of the *Larrea tridentata* - *Ambrosia dumosa* Shrubland Alliance on the project site and development adjacent to the site, facing south.



Photograph 4: View of the *Larrea tridentata* - *Ambrosia dumosa* Shrubland Alliance and development adjacent to the project site, facing east.



Photograph 5: View of small mammal burrows located on the project site.



Photograph 6: View of the *Larrea tridentata* - *Ambrosia dumosa* Shrubland Alliance on the project site, facing west.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix B:

Habitat Assessment Scoring

THIS PAGE INTENTIONALLY LEFT BLANK

Habitat Assessment Scoring for Crotch's Bumble Bee*

Scoring Criteria

Section 1: Regional and Landscape Features

- 1a. Percentage of the grid cell that is natural habitat: 20%-30% (score=7)
- 1b. Dominant vegetation/land cover within ½ mile of assessment area including the assessment area itself: 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: >75% (score=10)
- 2b. Additional site features that are present: Buffers: 2 points for every 20% of area within 25' of water features that is flowered, 1 point for every 20% of area that is grass (score=5)

Section 3: Foraging Habitat

- 3a. Percentage of vegetative cover that is comprised of forbs, flowering shrubs, or pollinator-friendly trees on site: 10%–20% cover (score=3)
- 3b. Number of species of forbs, flowering shrubs, or pollinator-friendly trees on site that bloom in spring and support bees: 5-9 species (score=5)
- 3c. Number of species of forbs, flowering shrubs, or pollinator-friendly trees on site that bloom in summer and support bees: 1–9 species (score=3)
- 3d. Number of species of forbs, flowering shrubs, or pollinator-friendly trees on site that bloom in fall and support bees: 1–4 species (score=5)
- 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: none present (score=0)

Section 4: Nesting and Overwintering Habitat

- 4. Nesting and overwintering habitat: bunch grasses <5% (score=1); rodent activity >20% (score=5); unmowed, ungrazed (score=10); woody cover <5% (score=1); leaf litter present (score=0)

Section 5: Management and Pesticide Practices

- 5a. Management and pesticides practices: herbicide use (score=5); pesticides use (score=35); fungicides use (score=5); insecticides use (score=8); buffers from insecticide applications (score=5); spray control (score=2). Max score = 40
- 5b. Land management techniques: mowing (N/A); grazing (N/A); burning (N/A); managed honey bees not present (score=10)

Scoring Summary

Section 1: Regional and Landscape Features (max score 20): **10**

Section 2: Site Features (max score 35): **15**

Section 3: Foraging Habitat (max score 50): **18**

Section 4: Nesting and Overwintering Habitat (max score 30): **17**

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

Section 5b: Management Practices (max score 40): **10**

Total: **110 of 215 (51%)**

*based on Xerces Invertebrate Conservation Society (2017) Rusty Patched Bumble Bee Habitat Assessment Form and Guide