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WILLOW ROCK ENERGY STORAGE CENTER PROJECT
RESULTS OF CROTCH'S BUMBLE BEE SURVEYS

2024 Addendum

UNINCORPORATED COMMUNITY OF ANSEL, KERN COUNTY, CALIFORNIA

Prepared for:

GEM A-CAES LLC
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Riverside, CA 92505

August 2024

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

WSP USA Environment & Infrastructure Inc. (WSP) was contracted by GEM A-CAES LLC, a subsidiary of Hydrostor Inc. (Hydrostor), to conduct biological resources surveys at the site of the proposed Willow Rock Energy Storage Center (WRESC) in the unincorporated community of Ansel, Kern County, California. The purposes of the surveys are to support the preparation of the California Energy Commission's Application for Certification. As part of the 2023 biological surveys, WSP was retained to conduct focused protocol-level surveys of the Crotch's bumble bee (*Bombus crotchii*) in the WRESC project area (WSP 2024), which includes an energy storage facility, a gen-tie transmission line, and additional workspace.

Hydrostor updated the WRESC project design to include additional project features following the 2023 field survey season. This addendum report presents the methods, results, and discussion of the focused Crotch's bumble bee surveys conducted in 2024 within accessible additional project areas (described below) that were not included in the 2023 surveys. All figures referenced in this report are provided in Appendix A.

1.1 Project Description

As part of the on-going data collection, additional focused surveys are required to document the potential presence of Crotch's bumble bee and their associated habitat in accessible areas of the additional workspace areas and alternative gen-tie transmission line right-of-way alignments (gen-tie alignments). These areas are described as P2 North (47 acres) and P2 South (10 acres), as well as approximately 3.69 miles of additional gen-tie alignments (Figure 1, Regional Location). In the context of this report, "project site" specifically refers to the project footprint, including all linear transmission lines and other supporting ancillary features while "project area" refers to just the additional project areas that were added for the additional 2024 addendum. Accessible portions were identified are areas within public road rights-of-way, parcels owned by the applicant, or parcels with right-of-entry agreements.

1.2 Project Location and Topography

The survey area is located on private property in and around the rural community of Ansel within the 7.5-minute Soledad Mountain and Rosamond, California, U.S. Geological Survey topographic quadrangle (topo quad). P2 North and P2 South are located east of State Route 14 and the additional gen-tie alignments are located west of State Route 14 (Figure 1, Regional Location). The project site is located within portions of Sections 31, 32, and 33 of Township 10 North and Range 12 West; portions of Section 4 of Township 9 North and Range 12 West; and portions of Sections 14, 15, of Township 9 North and Range 13 West (Figure 2, Historic USGS Topographic Map).

Topography in the project site slopes from northwest to southeast with flat areas in the southern portions and gently rolling hills in the central portion of the project site. Elevations range from approximately 2,400 feet (732 meters) to 2,720 feet (830 meters) along Dawn Road (Figure 3, Local Vicinity).

2.0 BACKGROUND ON CROTCH'S BUMBLE BEE

Crotch's bumble bee, a member of the Apidae family (the typical bees' family), is a social bee. It can be distinguished by its square-shaped face and rounded ankle on the midleg. Queens and workers (females) have a black head, face, mid and bottom thorax, and are black between their wing bases. Drones (males) have yellow hair on their faces, a black stripe mid-thorax, and yellow on the front of their abdomen, while the rest of their abdomen is typically black and red (Los Padres Forest Watch 2023).

Crotch's bumble bee primarily occurs in California's pacific coast, western desert, and adjacent foothills throughout most of the state's southwestern region, where it inhabits grasslands and shrublands and requires a hotter and drier environment than other bumble bee species. Overwintering occurs in soil or under leaf litter/debris. The bees nest in various cavities and forage on a number of annual flowers, including plants in the following floristic families: Fabaceae, Apocynaceae, Asteraceae, Lamiaceae, Boraginaceae, and Hydrophyllaceae. Genera include *Antirrhinum, Asclepias, Chaenactis, Clarkia, Dendromecon, Eschscholzia, Eriogonum, Lupinus, Medicago, Phacelia,* and *Salvia* (Hatfield et al. 2018).

Workers are typically active from April to August and queens are generally active for only two months, from February through March. Once the queen selects the hive location, the active colony is detectable between April and August. These bees require flowering plants for the entire activity period to be considered suitable for an active hive.

Crotch's bumble bee is absent from much of its historic range in the Central Valley, with a relative species abundance decline of approximately 98% over the last decade. There are several factors that are attributed to the extreme decline of the species. Habitat loss and degradation, including agricultural intensification in the northern Central Valley and rapid urbanization in the southern Central Valley, are primary contributors. Another major threat factor affecting this bumble bee species is climate change. The species is adapted to a narrow range of climatic conditions compared to other bumble bees. In addition, native bumble bees in general are threatened by other factors including pesticides, non-native competition, and a reduction in genetic diversity.

Crotch's bumble bee has not been listed as threatened or endangered by either the U.S. Fish and Wildlife Service or the California Department of Fish and Wildlife (CDFW). The species had been designated as an endangered species under the International Union for the Conservation of Nature Red List since 2014 (IUCN 2024) and has been a candidate endangered species under the California Endangered Species Act since 2019 (CDFW 2021; Hatfield and Jepsen 2021).

3.0 METHODS

Information on Crotch's bumble bee presence and habitat was obtained from a background literature review and field surveys.

3.1 Literature Review and Records Search

A literature review and record search were conducted to identify Crotch's bumble bee occurrences at the project site and within a 5-mile buffer. The review included the following:

- A report from the CDFW California Natural Diversity Data Base for a 10-mile radius of the project site (CDFW 2024)
- Aerial photographs
- Pertinent documents from the WSP library and project files (e.g., other biological surveys from the WRESC project and general vicinity)
- iNaturalist (2024)

3.2 Focused Surveys

The methods applied for the Crotch's bumble bee protocol survey were based on the Survey Considerations for California Endangered Species Act Candidate Bumble Bee Species (CDFW 2023). This protocol recommends surveys be conducted during the Colony Active Period (April to August) and that a habitat assessment is conducted to document, delineate, and evaluate suitable bumble bee habitat followed by foraging bumble bee and nesting surveys (CDFW 2023).

The preliminary habitat assessment survey, also identified as the "Queen Survey," was completed on March 26 and 27, 2024, by WSP senior staff and field assistants. The assessment was completed by walking straight line transects spaced 10 meters apart across the project area to achieve full coverage. Data collected during the assessment surveys included visually inspecting the project site for components of Crotch's bumble bee habitat and encountered nectar sources. Suitable habitats were mapped using a global positioning system. Points were taken at each individual nectar source and polygons mapped at larger areas of nectar sources. These data were used to refine the spatial scope of the focused protocol surveys. Where access was not possible (e.g., private property), binoculars were used to scan for bumble bees and their habitat.

Foraging bumble bee and nesting surveys were completed during the peak nectar blooming period (April through June 30). Surveys were initiated at the beginning of the blooming season, based on periodic site visits in early March. A total of three surveys were spaced at least two to three weeks apart (weather dependent) between April, May, and June (Table 1).

Surveys were conducted during the day on sunny days and not during wet conditions (foggy, raining, or drizzling). Surveys were completed between 1 hour after sunrise and 2 hours before sunset (0730 to 1530). The surveys targeted optimal weather conditions that are sunny with low wind speeds (less than 8 miles per hour). Partly cloudy days or overcast conditions are permissible if shadows are still visible. Survey pace consisted of no more than 1 person-hour per 3 acres of highest quality habitat in the survey area or continue to sample until at least 150 bumble bees are sighted, whichever came first. Survey personnel, dates, times, and weather conditions are presented in Table 1.

Table 1. Crotch's Bumble Bee Survey Data

Date (2024)	Surveyor(s)	Time	% Cloud Cover, Wind (mph)	Temperature (°F)	Crotch's Bumble Bee Observed?
Habitat Assessment Queen Survey 26-27 March	NM, TC, MB, SW, EU	0730-1500	Clear (0%), winds .4-7.2 mph	50-75°F	No
Foraging Survey 1 8-9 April	SC, MW, MP, TC, MEB, MAB, MW, MP, TC, CS	0730-1500	Clear (0%), winds 0-4.3 mph	42-76°F	Yes
Nesting Survey 2 7-8 May	NM, MW, EU, MAB	0730-1500	Clear (0%), winds 2.5-7.8 mph	59-79°F	Yes
Nesting Survey 3 5-6 June	NM, TC, EU, MEB, MAB, TC, PC	0730-1500	Clear (0%), winds .2-4.3 mph	83-90°F	Yes

Key: CS = Ciara Shirey; EU = Emily Urquidi; °F = degrees Fahrenheit; MAB = Melissa Bukovac; MEB = Melanie Bukovac; mph = miles per hour; MP = Marshall Paymard; MW = Michael Wilcox; NM = Nathan Moorhatch; PC = Phil Clevinger; TC = Tim Chumley

Crotch's bumble bee surveys were completed in suitable habitat areas (identified as areas with suitable nectar sources, primarily Phacelia sp.) documented during the habitat assessment in the project site (Figure 4, Nectar Sources). Nectar sources consisted of individual Phacelia patches growing almost exclusively at the base of creosote bush, with a few scattered Phacelia in open areas. Once all individual nectar source plants were mapped, a GIS polygon was created along the outer edges. These polygons were considered substantial nectar sources, as each area was greater than 1 acre and were used as the survey area for the remaining protocol surveys. Biologists surveyed suitable habitat areas for bumble bee activity by conducting meander transects between flower patches. Biologist searched for bee activity, such as traveling from flower patch to flower patch.

Bumble bees were photographed directly from flowers, if present, and no bumble bees were collected or handled during the surveys. Surveys were conducted at a minimum of 1 person-hour of surveys per 3 acres of suitable habitat. This survey effort did not include time to photograph, identify, and/or document bee behavior. At no time did the biologists observe more than 150 bumble bees during the surveys. Potential nest sites were flagged and resurveyed during subsequent site visits, as nests may not be associated with nectar sources.

Data on species and number of all identified bumble bees were recorded in field notebooks and recorded on the Field Map global positioning system application at each observation location. The Field Map application has an area to approximate the numbers of each species observed for each data point taken. If a Crotch's bumble bee was identified, the species identification was verified by a second crew member. All other biologists were also called over to verify and observe bee behavior while the bee was being photographed. Representative photographs taken during the survey are presented in Appendix B.

4.0 RESULTS

4.1 Literature Review and Records Search

The closest known active Crotch's bumble beehive was recorded on Edward's Airforce Base over 7 miles to the east (CDFW 2024). Other known hive locations are in the foothills surrounding the Antelope Valley, 10 miles to the north and west. The nearest known record of Crotch's bumble bee is approximately 6.2 miles south-southeast of the project site at the Antelope Valley California Poppy Preserve State Natural Reserve. The occurrence was from 2019 (CDFW 2024). There are other known recorded occurrences in all directions of the project site, which puts the project site within the current known range for this species. A single Crotch's bumble bee observation was recorded by WSP within the P2 North additional workspace area in 2023 (WSP 2024).

4.2 Habitat Assessment

Based on the findings of a floristic inventory completed as part of the early spring sensitive plant protocol survey, nectar sources for Crotch's bumble bee such as species in the genera *Antirrhinum, Asclepias, Chaenactis, Clarkia, Dendromecon, Eschscholzia, Eriogonum, Lupinus, Medicago, Phacelia,* and *Salvia* were mapped as individual points. The primary nectar source in the project site were stands of tansy-leafed phacelia (*Phacelia tanacetifolia*). Less than 10 *Eschscholzia, Chaenactis,* and *Eriogonum* individuals were identified, and as such were not considered to occur in sufficient numbers to be mapped as a substantial nectar source (greater than 0.10 acre in size) and were generally within the immediate vicinity (within 5 meters) of the recorded Phacelia stands. Host plant locations are identified in Figure 4, Nectar Sources. Ground conditions for potential hives consisted of undisturbed decomposed granite soils with scattered bare ground patches and small mammal burrows. There was no evidence of leaf litter or woody forest edge that could provide overwintering habitat.

4.3 Focused Surveys

No Crotch's bumble bee queens were identified during the March Queen Surveys. Three Queen Crotch's bumble bees and five Crotch's bumble bee workers were identified during the 2024 flight season. Two Queen Crotch's bumble bees were identified on April 9, 2024 (**Figure 4-4 and Figure 4-5**) and one worker was identified on May 7, 2024 (**Figure 4-2)** during the Crotch's bumble bee protocol surveys. A single queen was incidentally identified during a burrowing owl survey conducted on April 3 (**Figure 4-1**) and four Crotch's bumble bee workers were also incidentally identified on April 24, 2024 during an additional burrowing owl survey (**Figure 4-3**). All three Crotch's bumble bee queens were detected foraging on tansy-leafed phacelia (*Phacelia tanacetifolia*) and slowly moving from one clump of flowers to the next during the protocol surveys. Figure 4 includes point data for all mapped locations of tansy-leafed phacelia.

The Queen Crotch's bumble bees were only observed in the Phacelia patches and only foraging behavior was observed. No hives were identified.

5.0 DISCUSSION AND CONCLUSIONS

Focused surveys detected Crotch's bumble bee individuals in the P2 South additional workspace area, in the 5,000-foot buffer north of the P2 North additional workspace area, and in separate location within the get-tie transmission line alternatives of the project area; therefore, this species is considered present. This species was observed foraging in suitable habitat areas identified by patches of tansy-leafed phacelia, but a few incidents of foraging on creosote bush and Eriastrum were also observed. Phacelia is the most available nectar source preferred by this species on the project site. Other nectar sources identified in limited numbers include Palmer's milkvetch (*Astragalus palmeri*), thistle sage (*Salvia carduacea*), chia (*Salvia columbariae*), California poppy (*Eschscholzia eschscholzia*), pygmy poppy (*Eschscholzia minutiflora*), desert pincushion (*Chaenactis fremontii*), and California buckwheat (*Eriogonum fasciculatum*), although Crotch's bumble bee were not observed using these other nectar sources.

This species of bee generally requires more nectar from March to July. Most of the species recorded in the project area that are considered appropriate source of Crotch's bumble bee nectar completed their flowering stage by the end of May. Phacelia was starting to die off during surveys conducted in May and was finished flowering by early June, as observed during sensitive plant protocol surveys. All recorded nectar sources in the project area completed their flowering stage by the end of May. Typically, Crotch's bumble bee require nectar sources throughout their flight season to establish a hive, which extends to the end of July, suggesting that while the project site contains suitable foraging habitat, it is unlikely to provide sufficient nectar sources to support a hive.

This species is considered present in the project site, as such, project-specific measures are required to reduce potential take of this species. Measures will include pre-construction surveys. If survey results indicate, additional measures may include avoiding or minimizing selected vegetation removal or limiting soil disturbance activities in affected areas. If survey results indicate, a biological monitor would sweep any potential habitat and clear the area before vegetation is removed during the Crotch's bumble bee flight season. If survey results so indicate, patches of Phacelia located in the additional workspace areas may need to be avoided or minimized. A biological monitor would be present during the removal of the individual Phacelia plants identified in the project area.

A Worker Environmental Awareness Program (WEAP) will be required for all construction workers prior to or at project kick-off. The WEAP is a mandatory training for all employees, contractors, and other project-related personnel used to educate personnel on project-related environmental concerns and shall be implemented prior to working on the WRESC project.

It is also recommended that an additional protocol-level survey be completed prior to vegetation removal in the project area. If impacts to Crotch's bumble bees during construction activities cannot be avoided, such as if a Crotch's bumble beehive is identified on site, the Applicant will consult with the CDFW and the CEC Compliance Project Manager.

6.0 REFERENCES

California Department of Fish and Wildlife (CDFW). 2021. Legal Status of Bumble Bees In California. Accessed online at: https://wildlife.ca.gov/Data/CNDDB/News/legal-status-of-bumble-bees-in-california#gsc.tab=0.

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WSP USA Environment & Infrastructure Inc. (WSP). 2024. Willow Rock Energy Storage Center Project Draft Results of Crotch's Bumble Bee Surveys. January 2024.

7.0 LIMITATIONS

This document has been prepared for the exclusive use of Hydrostor and its Construction Contract(s) in support of the preparation of the California Energy Commission's Application for Certification for the Willow Rock Energy Storage Center Project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report was prepared, based in part, on information obtained from historic information sources. In evaluating the subject site, WSP has relied in good faith on information provided. We accept no responsibility for any deficiency or inaccuracy contained in this report as a result of our reliance on the aforementioned information.

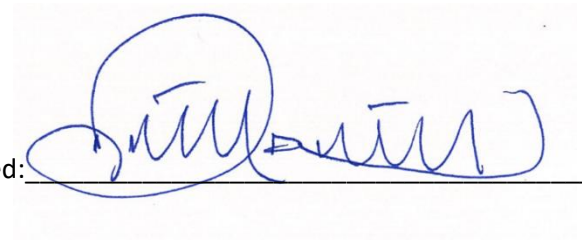
The findings and conclusions documented in this report have been prepared for the specific application to this project and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practicing under similar conditions in the jurisdiction.

With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, and should be reviewed.

If new information is discovered during future work, the conclusions of this report should be re-evaluated and the report amended as required prior to any reliance upon the information presented herein.

8.0 REPORT CERTIFICATION STATEMENT

We certify that the information in the survey report and attached exhibits fully and accurately represents our work.

Signed:  _____ Date:__08/02/2024_____

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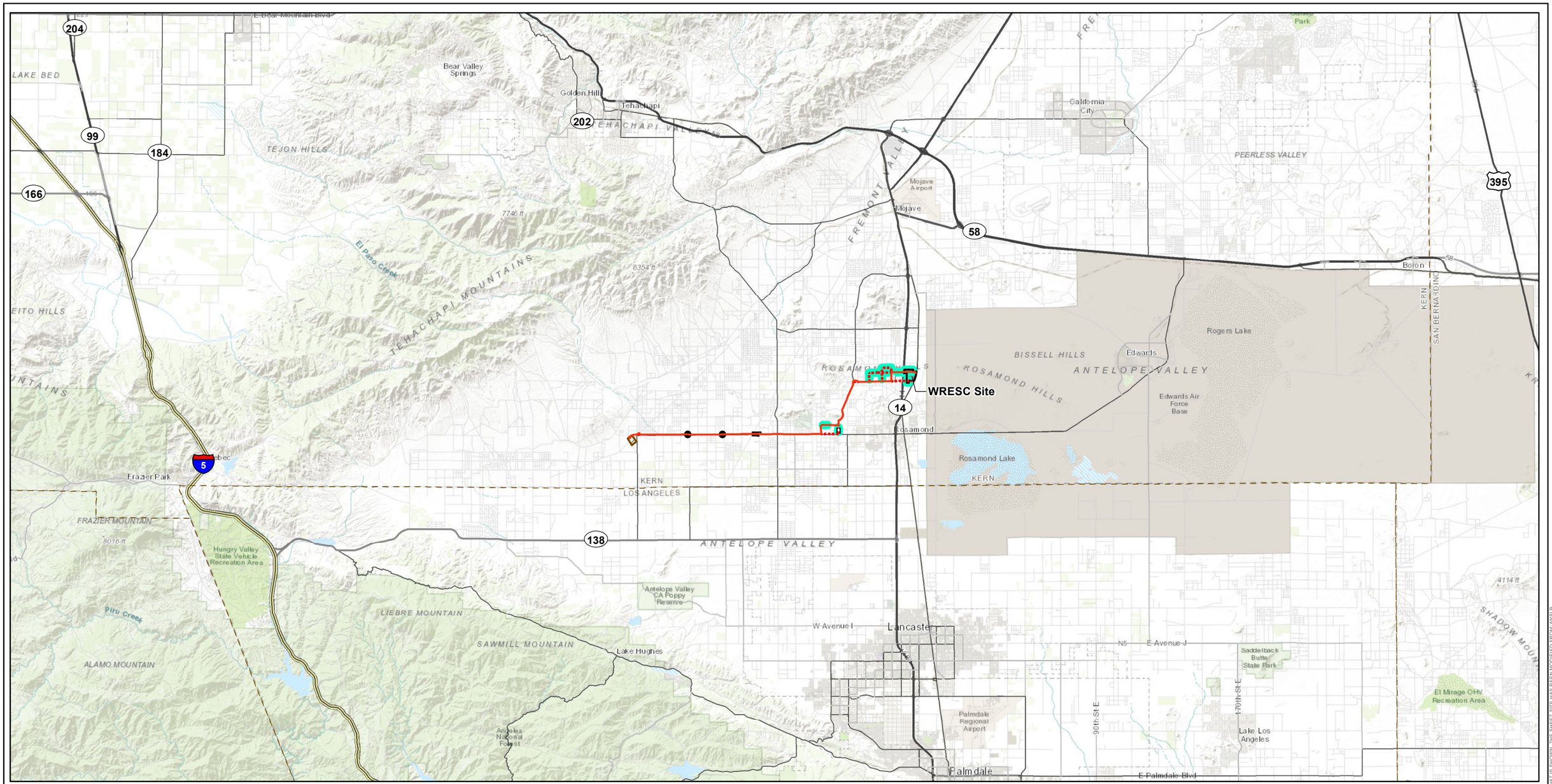
Appendix A Figures



LEGEND

- Freeway
- Major Road
- Secondary Road
- Local Connecting Road
- Important Local Road

Proposed Transmission Line

- Preferred Route, Aboveground
- Preferred Route, Underground
- Route Options 1-6, Aboveground
- Route Options 1-6, Underground

Project Components

- WRESC Site
- Other Project Parcels
- No Right of Entry Areas
- Project Boundary
- 2024 Project Area
- SCE Whirlwind Substation

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CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
CROTCH'S BUMBLE BEE FOCUSED SURVEY

CONSULTANT
wsp

YYYY-MM-DD	2024-07-29
DESIGNED	MK
PREPARED	MK
REVIEWED	SC
APPROVED	VG/LL

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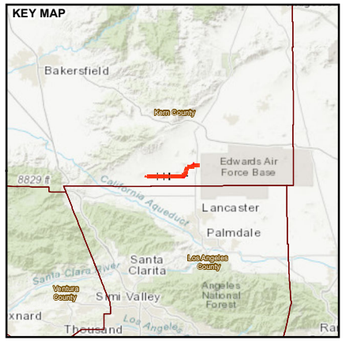
WRESC Site

LEGEND

Proposed Transmission Line
- Preferred Route, Aboveground
- Preferred Route, Underground
- Route Options 1-6, Aboveground
- Route Options 1-6, Underground

Project Components
- WRESC Site
- Other Project Parcels
- No Right of Entry Areas
- Project Boundary
- 2024 Project Area
- SCE Whirlwind Substation

KEY MAP



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GEM A-CAES LLC

CONSULTANT
wsp

YYYY-MM-DD	2024-07-29
DESIGNED	MK
PREPARED	MK
REVIEWED	SC
APPROVED	VG/LL

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
CROTCH'S BUMBLE BEE FOCUSED SURVEY

TITLE
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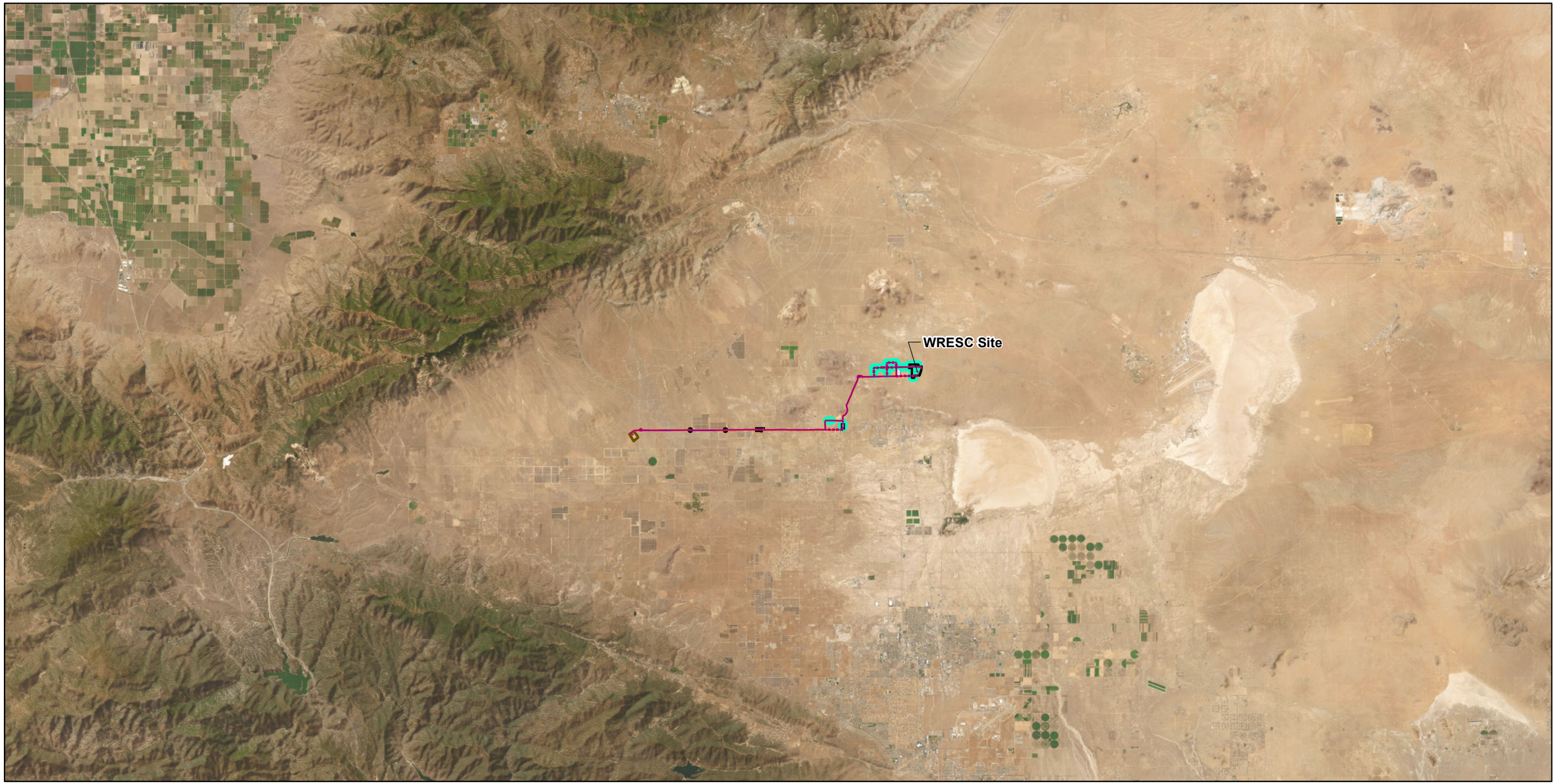
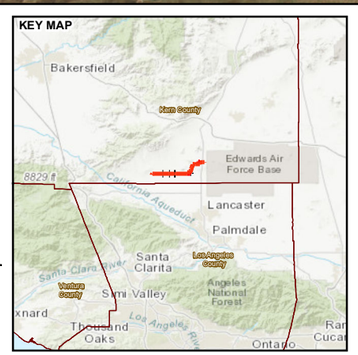


LEGEND

Proposed Transmission Line
- Preferred Route, Aboveground
- Preferred Route, Underground
- Route Options 1-6, Aboveground
- Route Options 1-6, Underground

Project Components
- WRESC Site
- Other Project Parcels
- No Right of Entry Areas
- Project Boundary
- 2024 Project Area
- SCE Whirlwind Substation
- Project ROW

KEY MAP



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NOTE(S)
1. PROJECT ROW IS A 62.5 FT BUFFER ON EITHER SIDE OF THE TRANSMISSION LINE.

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CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
CROTCH'S BUMBLE BEE FOCUSED SURVEY

CONSULTANT
wsp

YYYY-MM-DD	2024-07-29
DESIGNED	MK
PREPARED	MK
REVIEWED	SC
APPROVED	VG/LL

TITLE
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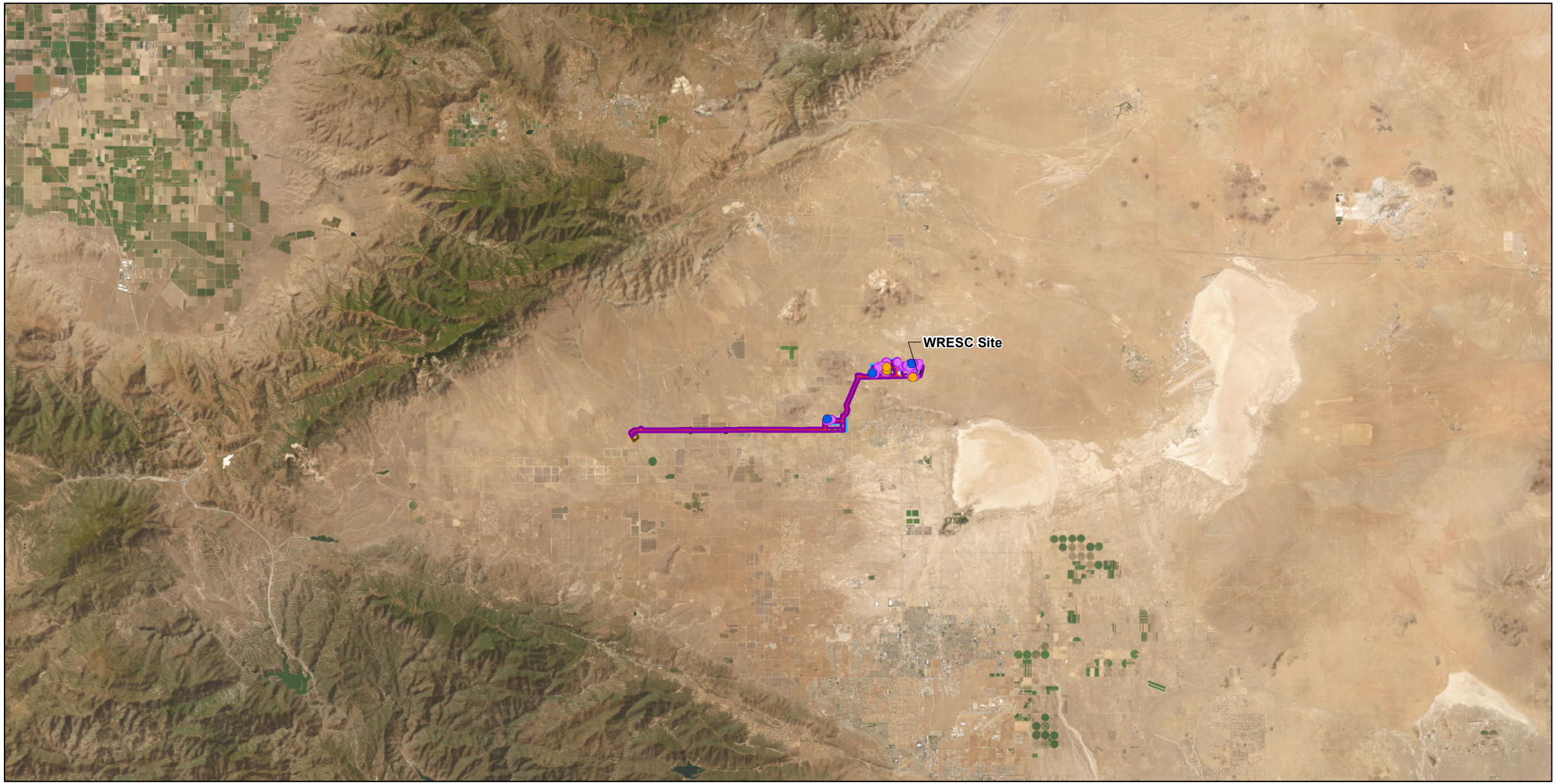


LEGEND

- Crotch's Bumble Bee Observation (2024) - Queen
- Crotch's Bumble Bee Observation (2024) - Worker
- Phacelia Observation (2024)

Proposed Transmission Line

- Preferred Route, Aboveground
- Preferred Route, Underground
- Route Options 1-6, Aboveground
- Route Options 1-6, Underground

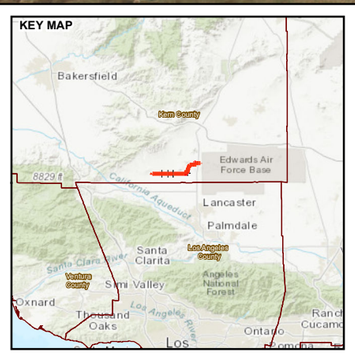
Project Components

- WRESC Site
- Other Project Parcels
- No Right of Entry Areas
- Areas with Permitted Access
- Project Boundary
- SCE Whirlwind Substation
- 500 ft Buffer Around Project Parcels and Transmission Line

2024 Project Areas

- Gen-Tie Transmission Line Variances
- P2 North
- P2 South

KEY MAP



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REFERENCE(S)

1. COORDINATE SYSTEM: NAD 1983 STATEPLANE CALIFORNIA V FIPS 0405 FEET
2. MAP SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
CROTCH'S BUMBLE BEE FOCUSED SURVEY

CONSULTANT
wsp

YYYY-MM-DD	2024-07-31
DESIGNED	MK
PREPARED	MK
REVIEWED	SC
APPROVED	VG/LL

TITLE
CROTCH'S BUMBLE BEE AND NECTAR SOURCE OBSERVATION LOCATIONS

PROJECT NO.	PHASE	REV.	FIGURE
31406639.000	01.LBR	1	4

PATH: G:\Hydrostor\Ansel\99_PROJECTS\31406639.000_Hydrostor\Ansel\BioSurvey\01.LBR_Ph1_BioSurvey\02_PRODUCTION\MXD\FIGURES\Crotchs_Bumble_Bee_Focus_Survey\Rev1\31406639-000_01_04_F08-04_Rev1_CBBeeAndNectarSources.mxd PRINTED ON: 2024-07-31 AT 10:58:17 AM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

1in
0

Appendix B Photographs

Photo 1. Looking at the top view of Crotch's bumble bee queen foraging on creosote brush *(Larrea tridentata*).

Photo 2. Looking at Crotch's bumble bee queen in flight.

Photo 3. Looking at the side view of Crotch's bumble bee queen foraging on tansy-leafed phacelia (*Phacelia tenacetifolia*).

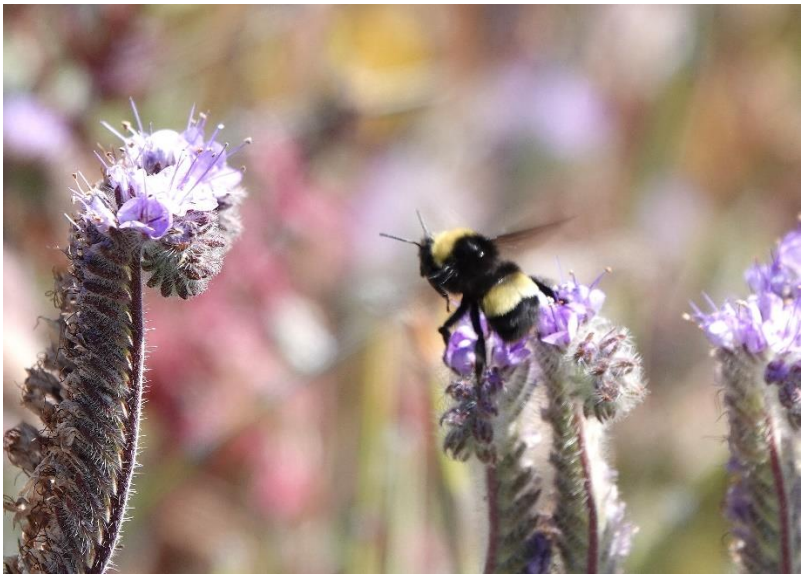

Photo 4. Looking at the rear view of Crotch's bumble bee queen.