Bumble Bee Habitat Assessment Surveys
Collinsville 500/230 Kilovolt Substation Project
Biologist Ivan Parr, BioMaAS
May 19 and 23, 2025

Summary of Findings: Habitat Assessment for Crotch's Bumble Bee
Collinsville 500/230 Kilovolt Substation Project

Overview

Pacific Gas & Electric (PG&E) retained Kleinfelder to conduct a pre-project survey for the Collinsville 500/230 Kilovolt (kV) Substation Project (Proposed Project). The project also includes the construction of an approximately 1.2 mile 500 kV transmission line intertie, which will connect the proposed substation to the existing Vaca Dixon-Tesla 500kV Transmission Line; and modifications to transposition structures at four locations. (Figure 1). As a result, five discreet sites (North, Maud, Bird's Landing, Collinsville Proposed Substation, and Byron)were identified for biological resource studies (Study Area) (Figure 2).

In spring of 2025, PG&E requested that Kleinfelder Inc. (Kleinfleder) and a subconsultant, BioMaAS, Inc. (BioMaAS) determine if the Study Area had potential to contain habitat for the Crotch's bumble bee (*Bombus crotchii*) [CBB], a species under review for listing as endangered under the California Endangered Species Act (CESA). The biologist conducting the habitat assessment surveys is Ivan Parr, who does not have a Memorandum of Understanding (MOU) with the California Department of Fish & Wildlife (CDFW) to capture and handle CBB, but has organized and participated in three multi-day field trainings through the Western Section of The Wildlife Society and The Xerces Society, in which he learned to survey for bumble bees, assess habitat, and handle living bumble bees under Xerces Society permits. These workshops also provided him the opportunity to handle living and preserved CBB. The biologist had also conducted habitat assessments on three other projects prior to this survey.

Desktop Review

To determine the potential for CBB within the Study Area, Kleinfelder and BioMaAS biologists reviewed several sources, including the California Natural Diversity Database (CNDDB 2025), Bumble Bee Watch (The Xerces Society et al. 2025A), and the California Bumble Bee Atlas (Xerces et al., 2025B). According to the CNDDB, seven extant occurrences occur within a 10-mile radius of the Study Area's five components: Fairfield (Occurrence 570) Lagoon Valley (Occurrence 12), Travis Air Force Base (Occurrences 116, 568, 399), and Peterson Ranch (Occurrence 571). Bumble Bee Watch identified an additional sighting as of May 20, 2025, in the Montezuma Hills, within a quarter mile of the proposed Collinsville Substation (Figure 3).

PG&E requested that biologists assess the potential for CBB habitat on the ground. Biologists identified areas within the five sites of the Study Area which could be accessed by driving and on foot, to conduct a targeted habitat assessment.

Habitat of the Crotch's Bumble Bee

The CBB occurs throughout cismontane California, preferring hotter areas than most other bumble bee species. Relatively little information on this species is available in literature, however, they are known to inhabit scrub and grassland areas. As a short-tongued species, CBB has a preference for milkweeds (*Asclepias*), dusty maidens (*Chaenactis* spp.), lupines (*Lupinus* spp.), bur clover (*Medicago* spp.), caterpillar flowers (*Phacelia* spp.), and sages (*Salvia* spp.) (Williams et al. 2014). Other documented forage plants include vetches (*Vicia* spp.), larkspur (*Delphinium* ssp.), clovers (*Trifolium* spp.), California poppy (*Eschscholzia californica*), mariposa lilies (*Calochortus* spp.), sweetclover (*Melilotus* spp.), soap-lily (*Chlorogalum pomeridianum*), yellow star-thistle (*Centaurea solstitialis*), and hedgenettle (*Stachys* spp.) (Nelson pers comm. 2024). CBB nests are found within underground burrows and are difficult to detect from the surface, being accessed through inconspicuous holes in the soil, rocky debris, rocky piles, leaf litter, or downed wood. The CBB may hide an entrance to its nest under any of these substrates, however, they may also simply utilize an existing invertebrate or mammal burrow in an open grassland (Nelson 2024, pers comm), so the presence of small burrows alone could provide nesting habitat for CBB (Williams et al. 2014).

Surveys

On May 19 and 23, 2025, Pacific Gas & Electric (PGE) biologist Ode Bernstein and BioMaAS biologist Ivan Parr conducted habitat assessment surveys by walking through portions of each of the sites and recording habitat characteristics, including nest habitat and floral resources that could be used for forage. All flowering plant species were recorded. All observed bumble bees and their behaviors were also recorded. Habitat assessment methods were based on Hatfield et al. (2012), USFWS (2019), The Xerces Society (2017), and CDFW (2023). However, a protocol-level presence/absence survey for CBB was not conducted since this survey would require multiple months of effort and the presence of habitat alone could still suggest presence of CBB, even if the bee was not seen (CDFW 2023).

Overview of Findings:

Although no Crotch's bumble bees were observed during the survey, habitat for the Crotch's bumble bee was observed within all five of the separate sites within the Study Area. Each site contained annual grassland and ruderal habitat suitable for the species. Both nesting habitat and forage habitat in the form of floral resources were recorded in all five sites. Nesting habitat was present by cracks in the soil, discarded lumber, vegetation thatch, rocky areas, leaf litter, cow patties, soil cracks, small mammal burrows, insect burrows, and other debris piles. As previously mentioned, nesting habitat could be any small hole within open grassland, so nesting habitat is present in nearly any location within the Study Area that is not currently developed or actively tilled for agriculture. Dominant floral resources within the five sites contained at least one member of the CBB's documented forage plants. All sites contained a prevalence of yellow star-thistle and clovers. In addition, the North Site, Maud Site, and Bird's Landing sites had an abundance of vetch species (*Vicia benghalensis*). Annual yellow sweetclover (*Melilotus indicus*) was present at the Bird's Landing, Collinsville, and Byron sites. Bur clover (*Medicago* sp.) was present in the form of ruderal groundcover at the North Site, Maud Site, and Bird's Landing. Given the prevalence of both nesting and foraging habitat, and the proximity of CBB records, the CBB has a high potential to occur within the Study Area as a whole. A detailed explanation of findings within each of the sites is included below.

North Site

Habitat within the North Site involved a mostly tilled filed surrounding the towers (Figure 2). The principal habitat consisted of annual grassland, specifically Italian wildrye (*Festuca perenne*), resulting in a *Festuca perenne* Herbaceous Semi-Natural Alliance surrounded by agricultural fields, as previously mapped by Insignia (2022) (Appendix A). Smaller portions of the Site are mapped as ruderal habitats, namely the *Brassica nigra* – *Centaurea* (*solstitialis*, *melitensis*, *calicitrapa*) Herbaceous Semi-Natural Alliance. Yellow star-thistle, a favored forage plant for the CBB, is one of the dominant species throughout the entire site, as is a congener, purple star thistle (*Centaurea calcitrapa*). All areas within the Site, including some of the developed portions, which contain downed wood and debris, have potential breeding habitat for the CBB. Due to sightings within a 10-mile radius of the North Site and the presence of both forage and breeding habitat, CBB has a moderate potential to occur within the North Site.

Maud Site

Habitat within the Maud Site is principally annual grassland. Surveyed portions were mapped as Avena ssp. – Bromus spp. Herbaceous Semi-Natural Alliance (Insignia 2025)(Appendix A), which was confirmed by the surveys. Ruderal vegetation was also prevalent throughout the site, along trails, ditches, and intermittent waterways. Annual grasses dominated the property; however, several blooming plants species were persistent throughout the entire site. These included the native harvest brodiaea (*Brodiaea coronaria*) and gumweed (*Grindelia camporum*), in addition to invasives such as yellow star-thistle, clovers, and vetch – these latter three being common forage plants for the CBB. All areas within the Site, including some of the developed portions, which contain downed wood and debris, could be breeding habitat for the CBB. Due to sightings within a 10-mile radius of the Maud Site and the presence of both forage and breeding habitat, CBB has a moderate potential to occur here.

Bird's Landing Site

Habitat within the Bird's Landing Site contains a developed substation and towers which lie principally within annual grassland. It is mapped as *Avena* spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance (Insignia 2025), which was confirmed by the surveys. Ruderal vegetation grows around the towers. Annual grasses dominated the property; however, several blooming plants species were persistent throughout the entire site. These included mostly Italian thistle (*Carduus pycnocephalus*), yellow star-thistle, black mustard (*Brassica nigra*), purple vetch (*Vicia benghalensis*), and Mediterranean linseed (*Bellardia trixago*). Yellow star-thistle and purple vetch are among the preferred forage plants for the CBB. All areas within the Site, which consists of grassland, could be breeding habitat for the CBB. Due to sightings within a 10-mile radius of the site and the presence of both forage and breeding habitat, CBB has a moderate potential to occur within the Bird's Landing Site.

Collinsville Site

Habitat within the Collinsville Site includes the proposed substation, which is on a tilled field surrounded by black mustard (*Brassica nigra*) and yellow star-thistle, forming the *Brassica nigra* – *Centaurea* (*solstitialis*, *melitensis*) Herbaceous Semi-Natural Alliance (Appendix A). The remaining undeveloped portion of the site is covered in various semi-natural annual grassland alliances. Despite the persistence of invasive species, there is a recent (May 20, 2025) sighing of a CBB within a quarter mile of the proposed substation (The Xerces Society et al., 2025A). In addition to black mustard and yellow star-thistle, blooming plants within the site are dominated by Italian thistle, purple vetch, Mediterranean

linseed, and mallows (*Malva*, *Malvella* spp.). The footprint of the substation lies on tilled earth, which could potentially impact the presence of a CBB nest, but there are still many acres of open grassland where a CBB nest could build survive underground. Due to sightings within a quarter-mile radius of the Collinsville Site and the presence of both forage and breeding habitat, CBB has a high potential to occur within the Collinsville Site.

Byron Site

The Byron Site is the one area within the Study Area that occurs within Contra Costa County. The majority of this site falls within agricultural fields. However, canals and a levee run through the site, and these are bordered by alkali vegetation such as iodine bush (*Allenrolfea occidentalis*) and alkali heath (*Frankenia salina*), making an *Allenrolfea occidentalis* Shrubland Alliance and *Distichlis spicata* – (*Juncus cooperi – Frankenia salina*) Interior Herbaceous Alliance (in this case salt grass [*Distichlis spicata*] co-dominates with alkali-heath [*Frankenia salina*]. In addition to native habitats, invasive grasslands such as the *Festuca perenne* Herbaceous Semi-Natural Alliance dominate. Although the majority of the project construction would take place within tilled agricultural fields, flowering plants are present within the fields and t–e potential for foraging CBB is present anywhere within the site. Suitable nest habitat for CBB exists along the levee and anywhere that fields have been left to go fallow. There are no recorded sightings of CBB within a 10-mile radius of the Byron site, but occurrences 13 miles west (Occurrence 585, Marsh Creek State Park) and 13 miles south (Occurrence 19 and Occurrence 587, Tracy) demonstrate that the site is within the current range of the CBB, and CBB may persist in the area undetected (Figure 3). Due to the presence of both forage and breeding habitat, CBB has a moderate potential to occur within the Byron Site.

The Tables below summarize the findings within the individual sites.

Site Name: North Site			
Temperature range: 69-75	Weather: Sunny, clear	Time of Start: 6:45	Wind (mph): 2
Habitat: Ruderal, annual grassland, agricultural fields	Surrounding Habitats: annual grassland, ruderal, agricultural fields		
Notes: area surrounding culvert dominated by blackberries.			
Floral Resources within study area (*asterisk indicates observed visitation) • Achyrachaena mollis / Blow wives / ACMO2 • Amsinckia menziesii / Fiddleneck, Common fiddleneck, Small-flowered fiddleneck / AMME • Anthemis cotula / Dog fennel, Mayweed / ANCO2 • Bellardia trixago / Mediterranean lineseed, Mediterranean linseed / BETR • Brodiaea terrestris / Ground brodiaea / BRTER • Carduus pycnocephalus / Italian thistle / CAPY2 • Centaurea calcitrapa / Purple star thistle, Purple star-thistle / CECA2 • Centaurea melitensis / Tocalote / CEME2 • Centaurea solstitialis / Yellow starthistle, Yellow star-thistle / CESO3 • Convolvulus arvensis / Field bindweed, Bindweed, Orchard morning-glory / COAR4 • Croton setigerus / Dove weed / CRSE11 • Cynara scolymus / Globe artichoke / CYSC2 • Deinandra sp. / Tarweed / DEINA2 • Erodium cicutarium / Coastal heron's bill, Redstem filaree / ERCI6 • Eryngium aristulatum / Jepson's button celery / ERAR11			

- Grindelia camporum / Gumweed / GRCA
- Hypochaeris glabra / Smooth cats ear, Smooth cat's-ear / HYGL2
- Matricaria discoidea / Pineapple weed, Pineapple weed, Rayless chamomile / MADI6
- Medicago arabica / Spotted burclover, Burclover, Spotted burclover / MEAR
- Navarretia sp. / Pincushionplant / NAVAR
- Plagiobothrys bracteatus var. aculeolatus / Bracted popcornflower / PLBRA
- Silybum marianum/Blessed milk thistle/SILMA*
- Trifolium albopurpureum / Indian clover / TRAL5
- Trifolium depauperatum / Dwarf sack clover / TRDE
- Trifolium fragiferum / Strawberry clover / TRFR2
- Vicia benghalensis / Purple vetch / VIBE
- Xanthium spinosum / Spiny cocklebur / XASP2

Bumble Bee Observations (asterisk indicates observed within work area)

Species (Queen, Worker, Drone)	Behavior	Species Visited	Photographs
Bombus vosnesenskii (Worker)	Foraging	Silybum marianum	NA

Bee Notes: NA

Nest Observations

Nest observed?	Species	Location	Habitat Present
None			Burrows, Debris piles, Downed wood, Leaf litter, Rock piles

Overview of the North Site, showing ruderal and annual grassland habitat.

Fallow fields overgrown with flowering forbs, including purple star-thistle, yellow star-thistle, bindweed (*Convolvulus arvensis*), and harvest brodiaea (*Brodiaea coronaria*).

The base of the towers provides small amounts of shade and protection from blading, making vegetation diversity higher around the towers.

Irrigation canals provide a water source within an otherwise arid landscape.

Soil cracks, burrows, and vegetation debris provide habitat for nesting bumble bees.

Site Name: Maud Site

Temperature range: 69-75	Weather: Sunny, clear	Time of Start: 8:51	Wind (mph): 2
Habitat: Ruderal, annual grassland, agricultural fields	Surrounding Habitats: annual grassland, ruderal, agricultural fields		

Notes: area surrounding culvert dominated by blackberries.

Floral Resources within study area (*asterisk indicates observed visitation)

- Achyrachaena mollis / Blow wives / ACMO2
- Amsinckia menziesii / Fiddleneck, Common fiddleneck, Small-flowered fiddleneck / AMME
- Anthemis cotula / Dog fennel, Mayweed / ANCO2
- Bellardia trixago / Mediterranean lineseed, Mediterranean linseed / BETR
- Brodiaea coronaria / Harvest brodiaea, Garland brodiaea / BRCO3
- Carduus pycnocephalus / Italian thistle / CAPY2
- Centaurea calcitrapa / Purple star thistle, Purple star-thistle / CECA2
- Centaurea melitensis / Tocalote / CEME2
- Centaurea solstitialis / Yellow starthistle, Yellow star-thistle / CESO3
- Convolvulus arvensis / Field bindweed, Bindweed, Orchard morning-glory / COAR4
- Croton setigerus / Dove weed / CRSE11
- Cynara scolymus / Globe artichoke / CYSC2
- Deinandra sp. / Tarweed / DEINA2

- Erodium cicutarium / Coastal heron's bill, Redstem filaree / ERCI6
- Eryngium aristulatum / Jepson's button celery / ERAR11
- Grindelia camporum / Gumweed / GRCA
- Hypochaeris glabra / Smooth cats ear, Smooth cat's-ear / HYGL2
- Matricaria discoidea / Pineapple weed, Pineapple weed, Rayless chamomile / MADI6
- Medicago arabica / Spotted burclover, Burclover, Spotted burclover / MEAR
- Navarretia sp. / Pincushionplant / NAVAR
- Plagiobothrys bracteatus var. aculeolatus / Bracted popcornflower / PLBRA
- Trifolium albopurpureum / Indian clover / TRAL5
- Trifolium depauperatum / Dwarf sack clover / TRDE
- Trifolium fragiferum / Strawberry clover / TRFR2
- Vicia benghalensis / Purple vetch / VIBE
- Xanthium spinosum / Spiny cocklebur / XASP2

Bumble Bee Observations (asterisk indicates observed within work area)

Species (Queen, Worker, Drone)	Behavior	Species Visited	Photographs
None			

Bee Notes: NA

Nest Observations

Nest observed?	Species	Location	Habitat Present
None			Burrows, Debris piles, Downed wood, Leaf litter, Rock piles

Annual grassland dominates the habitat within the Maud Site.

Showing towers within the Maud Site, including surrounding ruderal and annual grassland.

Ephemeral ponded areas and cow wallows provide late-season moisture which promote blooming plants.

Harvest brodiaea, a native plant, is abundant throughout the Maud Site.

Burrows and soil cracks provide abundant opportunities for bumble bee nests.

Site Name: Bird's Landing Site

Temperature range: 78-80	Weather: Sunny, clear	Time of Start: 10:45 AM	Wind (mph): 3
Habitat: Ruderal, annual grassland	Surrounding Habitats: annual grassland, ruderal, agricultural fields		

Notes: area surrounding culvert dominated by blackberries.

- Anthemis cotula / Dog fennel, Mayweed / ANCO2
- Bellardia trixago / Mediterranean lineseed, Mediterranean linseed / BETR
- Brassica nigra / Black mustard / BRNI
- Carduus pycnocephalus / Italian thistle / CAPY2
- Castilleja densiflora / Dense flower owl's clover / CADE29
- Centaurea calcitrapa / Purple star thistle, Purple star-thistle / CECA2
- Centaurea melitensis / Tocalote / CEME2
- Centaurea solstitialis / Yellow starthistle, Yellow star-thistle / CESO3
- Cichorium intybus / Chicory / CIIN
- Conium maculatum / Poison hemlock / COMA2
- Convolvulus arvensis / Field bindweed, Bindweed, Orchard morning-glory / COAR4
- Conyza canadensis / Canadian horseweed / COCA5
- Cynara scolymus / Globe artichoke / CYSC2
- Erodium cicutarium / Coastal heron's bill, Redstem filaree / ERCI6

- Foeniculum vulgare / Fennel / FOVU
- Helminthotheca echioides / Bristly ox-tongue
- Hirschfeldia incana / Mustard / HIIN3
- Malva neglecta / Dwarf mallow, Common mallow / MANE
- Malva nicaeensis / Bull mallow / MANI2
- Marah fabaceus / California manroot / MAFA3
- Medicago polymorpha / California burclover / MEPO3
- Melilotus indicus / Annual yellow sweetclover, Sourclover / MEIN2
- Silybum marianum / Milk thistle / SIMA3
- Sonchus asper / Spiny sowthistle / SOAS
- Sonchus oleraceus / Sow thistle, Common sow thistle / SOOL
- Stephanomeria exigua / Small wirelettuce / STEX
- Torilis arvensis / Field hedge parsley, Tall sock-destroyer / TOAR
- Tragopogon porrifolius / Salsify, Salsify, Oyster plant / TRPO
- Trifolium repens / White clover / TRREP
- Triteleia laxa / Ithuriel's spear, Ithuriel's spear, Common triteleia / TRLA16
- Vicia benghalensis / Purple vetch / VIBE

Bumble Bee Observations (asterisk indicates observed within work area)

Species (Queen, Drone, Male)	Behavior	Species Visited	Photographs
None	NA	NA	NA

Bee Notes: NA

Nest Observations

Nest observed?	Species	Location	Habitat Present
None			Burrows, Debris piles, Downed wood, Leaf litter, Rock piles

Overview of the Bird's Landing Site, showing annual grassland habitat.

Flowering milk thistle, yellow star-thistle, Italian thistle, and black mustard provide potential forage plants throughout the Bird's Landing Site.

The Bird's Landing Substation is dominated by ruderal and grassland species, including black mustard and purple star thistle.

Invertebrate burrows and vegetation thatch provide refugia and potential habitat for CBB nests.

Purple owl's clover (*Castilleja densiflora*), a native wildflower present within the Site.

Site Name: Collinsville Site

Temperature range: 78-80	Weather: Sunny, clear	Time of Start: 12:13 PM	Wind (mph): 4
Habitat: Ruderal, annual grassland	Surrounding Habitats: annual grassland, ruderal, agricultural fields		
Notes: area surrounding culvert dominated by blackberries.			

Floral resources within work area (*asterisk indicates observed visitation):

- Anthemis cotula / Dog fennel, Mayweed / ANCO2
- Brassica nigra / Black mustard / BRNI
- Brassica rapa / Common mustard, Turnip, Field mustard / BRRA
- Carduus pycnocephalus / Italian thistle / CAPY2
- Centaurea calcitrapa / Purple star thistle, Purple star-thistle / CECA2
- Centaurea melitensis / Tocalote / CEME2
- Centaurea solstitialis / Yellow starthistle, Yellow star-thistle / CESO3
- Chenopodium berlandieri / Pit seed goosefoot, Pitseed goosefoot / CHBE4
- Conium maculatum / Poison hemlock / COMA2
- Convolvulus arvensis / Field bindweed, Bindweed, Orchard morning-glory / COAR4
- Croton setigerus / Dove weed / CRSE11
- Cynara scolymus / Globe artichoke / CYSC2

- Helminthotheca echioides / Bristly ox-tongue
- Hirschfeldia incana / Mustard / HIIN3
- Lepidium latifolium / Perennial pepperweed / LELA2
- Malva neglecta / Dwarf mallow, Common mallow / MANE
- Marrubium vulgare / White horehound / MAVU
- Melilotus indicus / Annual yellow sweetclover, Sourclover / MEIN2
- Melissa officinalis / Lemon balm / MEOF2
- Silybum marianum / Milk thistle / SIMA3
- Sonchus asper / Spiny sowthistle / SOAS
- Sonchus oleraceus / Sow thistle, Common sow thistle / SOOL
- Trifolium repens / White clover / TRREP
- Xanthium spinosum / Spiny cocklebur / XASP2

Bumble Bee Observations (asterisk indicates observed within work area)

Species (Queen, Drone, Male)	Behavior	Species Visited	Photographs
None			

Bee Notes: NA

Nest Observations

Nest observed?	Species	Location	Habitat Present
None			Burrows, Debris piles, Downed wood, Leaf litter, Rock piles

The majority of the site is within ruderal and annual grassland habitats harboring flowering plants.

Looking west at the proposed footprint of the Collinsville Substation. A CBB was observed within a quarter mile of this location.

Grass debris, soil cracks, and even dried cow patties may provide habitat for bumble bee nests.

Looking west towards San Francisco Bay, showing the tilled footprint of the proposed substation, where it is being overgrown by flowering plants.

Site Name: Byron Site

Temperature range: 72-76 F	Weather: Sunny, clear	Time of Start: 09:15 AM	Wind (mph): 3
Habitat: Ruderal, annual grassland	Surrounding Habitats: annual grassland, ruderal, agricultural fields		
Notes: area surrounding culvert dominated by blackberries.			

Floral resources within work area (*asterisk indicates observed visitation):

- Amsinckia menziesii / Fiddleneck, Common fiddleneck, Small-flowered fiddleneck / AMME
- Brassica nigra / Black mustard / BRNI
- Carduus pycnocephalus / Italian thistle / CAPY2
- Centaurea babylonica / Syrian knapweed / CEBA4
- Centaurea calcitrapa / Purple star thistle, Purple star-thistle / CECA2
- Centaurea melitensis / Tocalote / CEME2
- Centaurea solstitialis / Yellow starthistle, Yellow star-thistle / CESO3
- Centromadia pungens / Common tarweed / CEPU14
- Conium maculatum / Poison hemlock / COMA2
- Convolvulus arvensis / Field bindweed, Bindweed, Orchard morning-glory / COAR4
- Cressa truxillensis / Alkali weed / CRTR5

- Distichlis spicata / Salt grass / DISP
- Epilobium brachycarpum / Willow herb / EPBR3
- Frankenia salina / Yerba reuma, Alkali heath / FRSA
- Grindelia camporum / Gumweed / GRCA
- Heliotropium curassavicum / Chinese parsley / HECU3
- Iris pseudacorus / Horticultural iris / IRPS
- Lepidium latifolium / Perennial pepperweed / LELA2
- Malva neglecta / Dwarf mallow, Common mallow / MANE
- Malva nicaeensis / Bull mallow / MANI2
- Malvella leprosa / Alkali mallow, Alkali-mallow, White-weed / MALE3
- Melilotus indicus / Annual yellow sweetclover, Sourclover / MEIN2
- Nerium oleander / Oleander, Common oleander / NEOL
- Pseudocydonia sinensis / Chinese-quince / PSSI4
- Rhaponticum repens / Russian knapweed / ACRE3
- Rubus armeniacus / Himalayan blackberry / RUAR9
- Silybum marianum / Milk thistle / SIMA3
- Sonchus asper / Spiny sowthistle / SOAS
- Sonchus oleraceus / Sow thistle, Common sow thistle / SOOL
- Trifolium fragiferum / Strawberry clover / TRFR2

Bumble Bee Observations (asterisk indicates observed within work area)

Species (Queen, Drone, Male)	Behavior	Species Visited	Photographs
None			

Bee Notes: NA

Nest Observations

Nest observed?	Species	Location	Habitat Present
None			Burrows, Debris piles, Downed wood, Leaf litter, Rock piles

Looking east towards the towers at the Byron Site. Much of the landscape is tilled, but vegetation persists around the base of the towers.

Alkali sinks dominated by saltgrass and alkali-heath harbor potential nesting areas and floral resources.

Saltgrass and alkali heath grows along a levee within the site footprint.

Centromadia, a native tarweed provides summer blossoms. Small mammal burrows may be utilized in developing nests.

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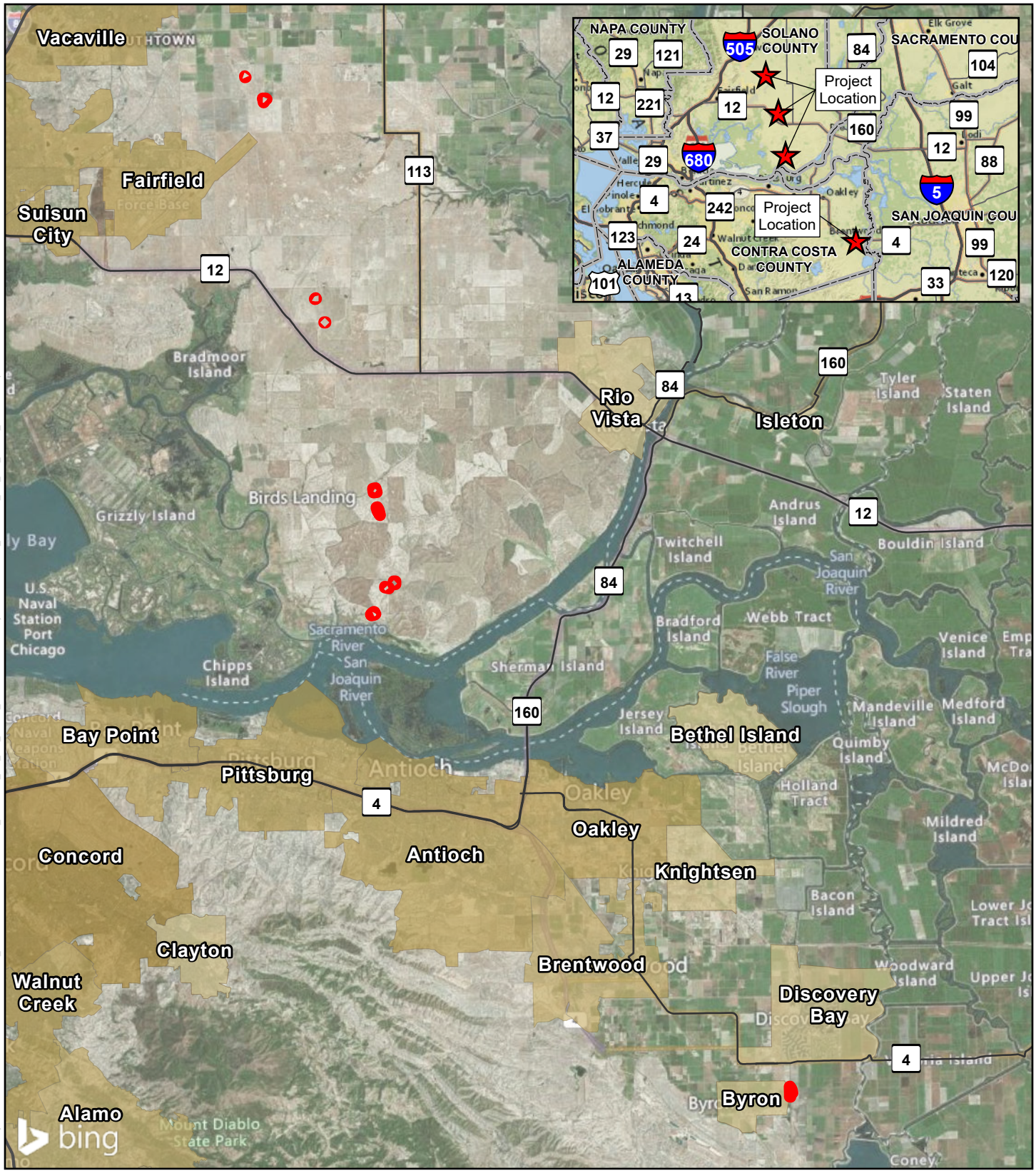
Figures



Source: Bing Maps

0 2 4 Miles

0 3.2 6.4 Kilometers

N

Scale 1:253,440

1 inch = 4 miles

Figure 1: Regional Vicinity
Collinsville 500/230 Kilovolt Substation Project
Solano and Contra Costa County
California

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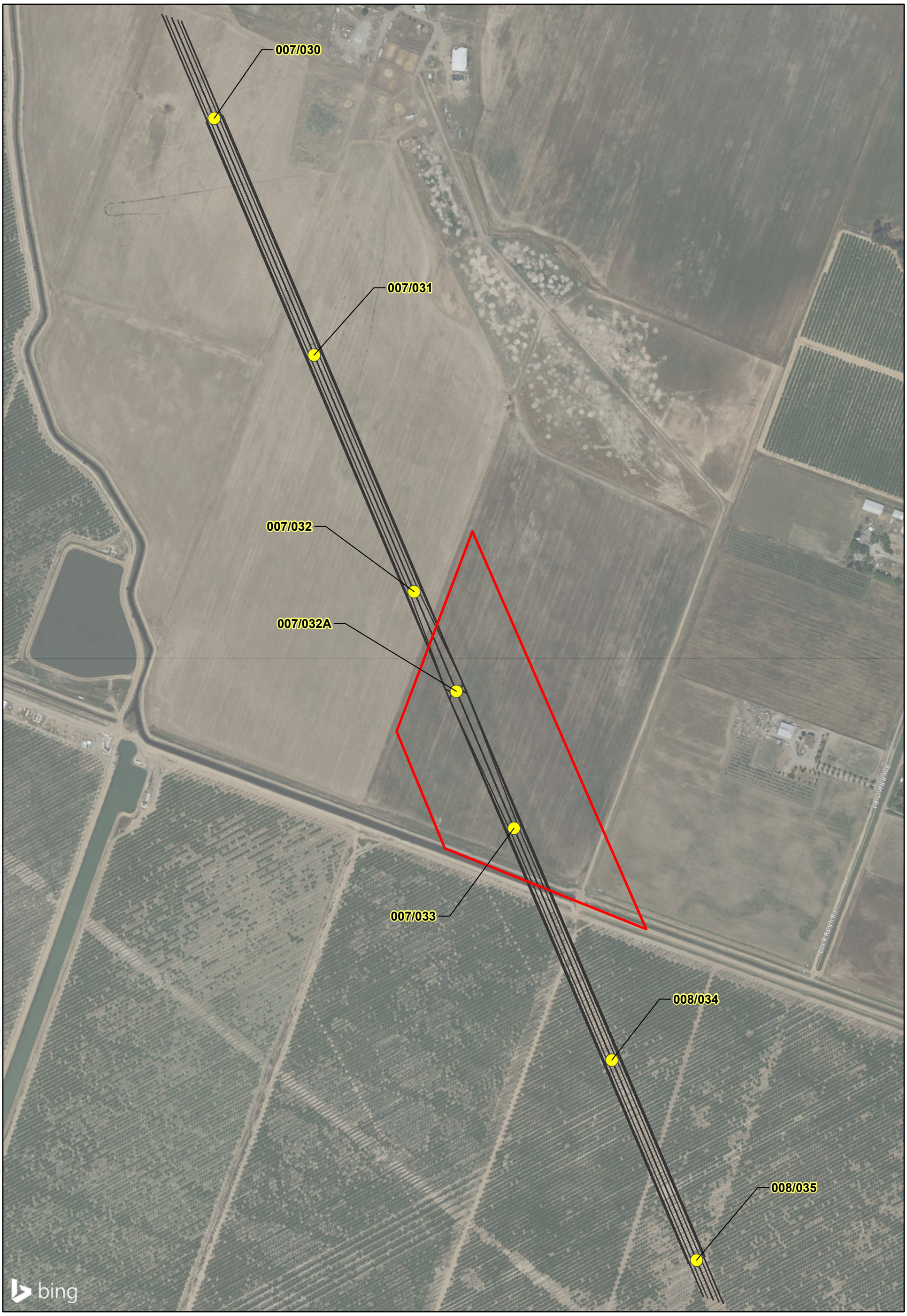
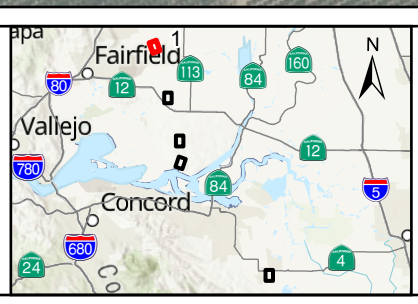


Survey Area

Tower Site

Study Line



Scale 1:6,000
1 inch = 500 feet

0 250 500 Feet

0 75 150 Meters

Figure 2: Study and Survey Areas
Page 1 of 5
North Study Site
Collinsville 500/230 Kilovolt
Substation Project
Solano and Contra Costa County
California

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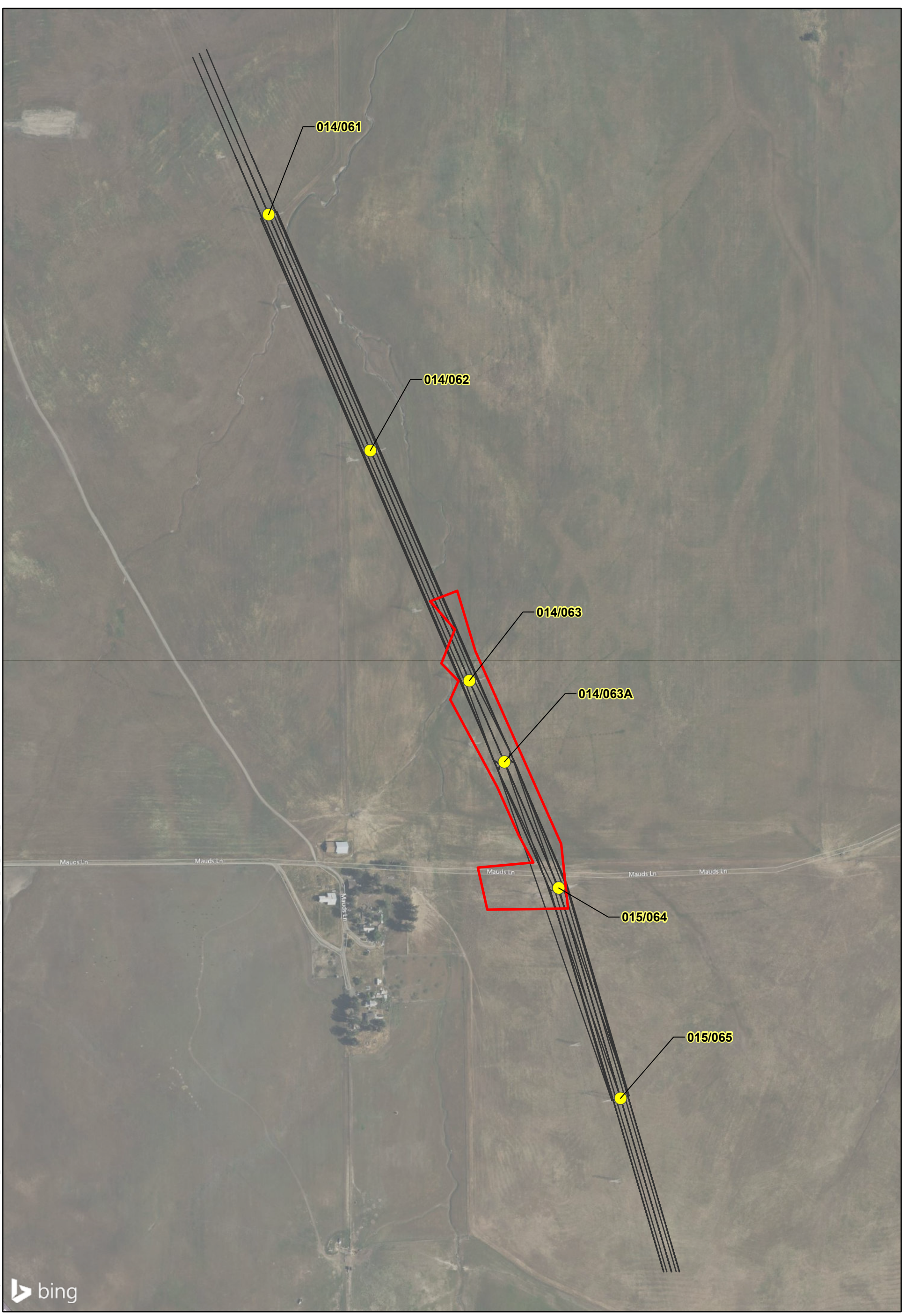
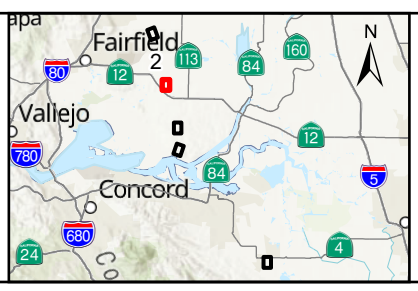


Survey Area
Tower Site
Study Line



Scale 1:6,000
1 inch = 500 feet

N

0 250 500 Feet

0 75 150 Meters

Figure 2: Study and Survey Areas
Page 2 of 5
Maud Study Site
Collinsville 500/230 Kilovolt
Substation Project
Solano and Contra Costa County
California

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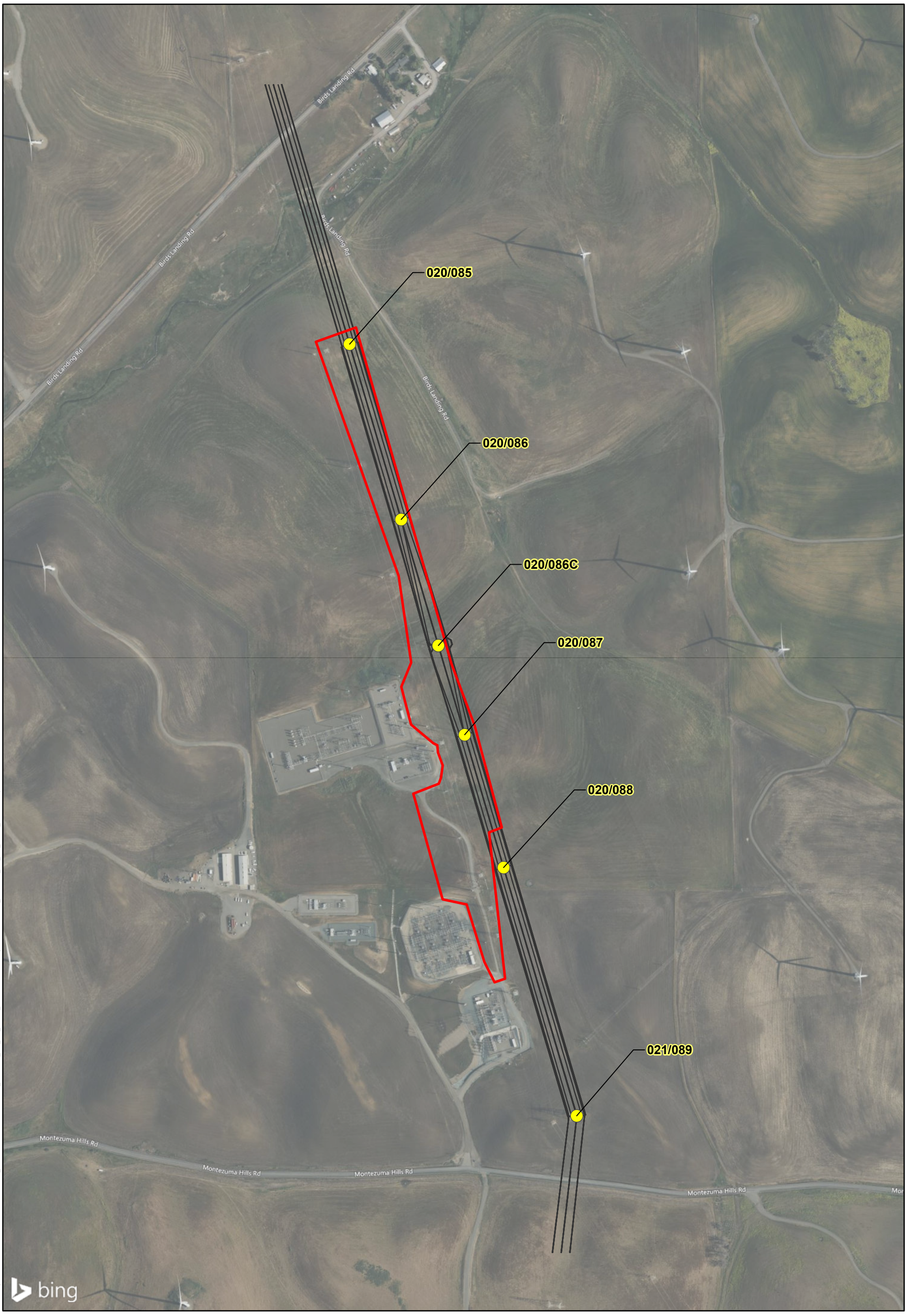
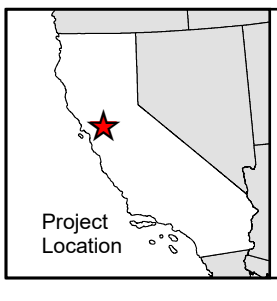
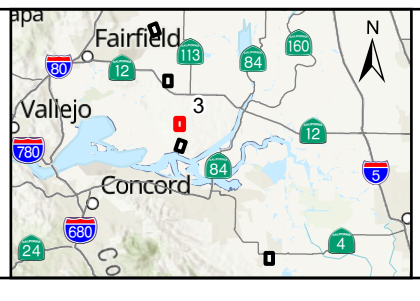




Survey Area
Tower Site
Study Line



Scale 1:6,000
1 inch = 500 feet

N

0 250 500 Feet

0 75 150 Meters

Figure 2: Study and Survey Areas
Page 3 of 5
Bird's Landing Study Site
Collinsville 500/230 Kilovolt
Substation Project
Solano and Contra Costa County
California

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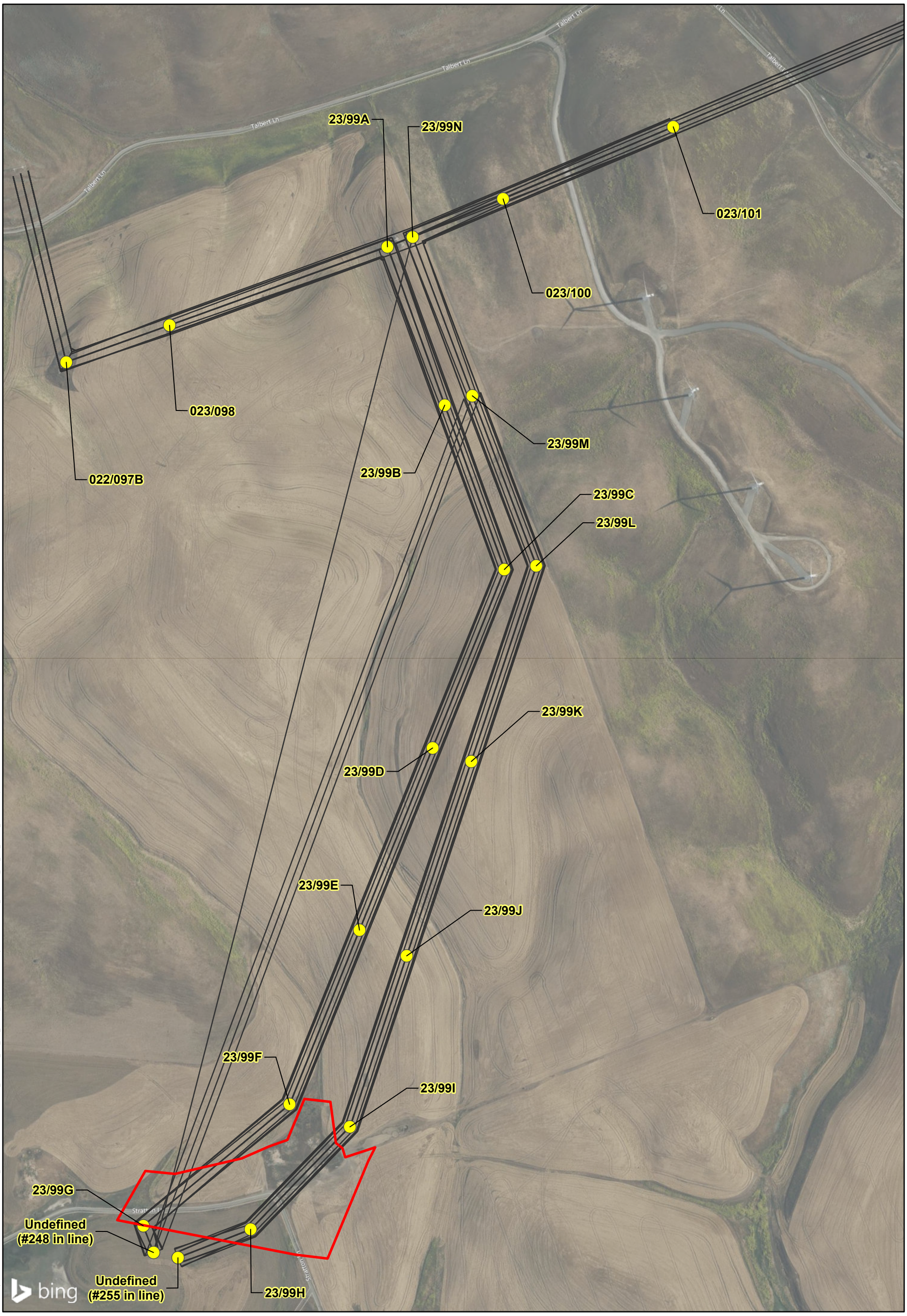
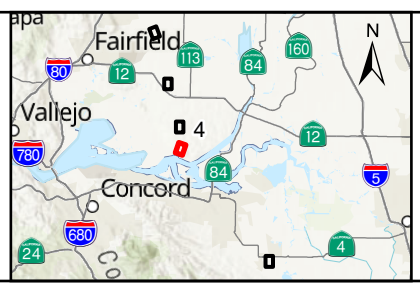


Survey Area

Tower Site

Study Line



Scale 1:6,000
1 inch = 500 feet

0 250 500 Feet

0 75 150 Meters

Figure 2: Study and Survey Areas
Page 4 of 5
Collinsville Study Site
Collinsville 500/230 Kilovolt
Substation Project
Solano and Contra Costa County
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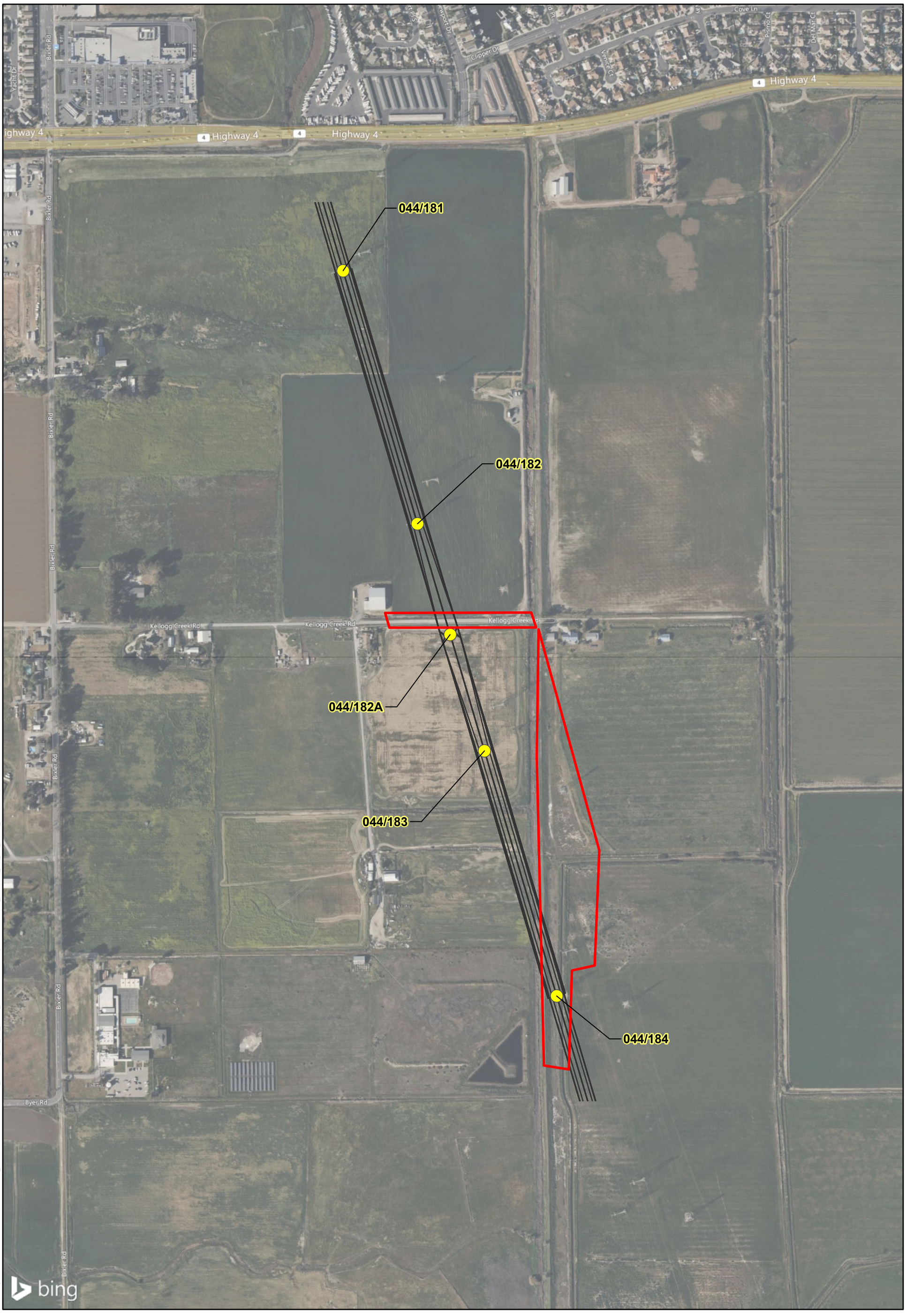
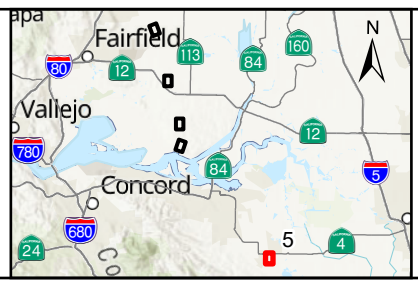


Survey Area
Tower Site
Study Line



Scale 1:6,000
1 inch = 500 feet

N

0 250 500 Feet

0 75 150 Meters

Figure 2: Study and Survey Areas
Page 5 of 5
Byron Site
Collinsville 500/230 Kilovolt
Substation Project
Solano and Contra Costa County
California

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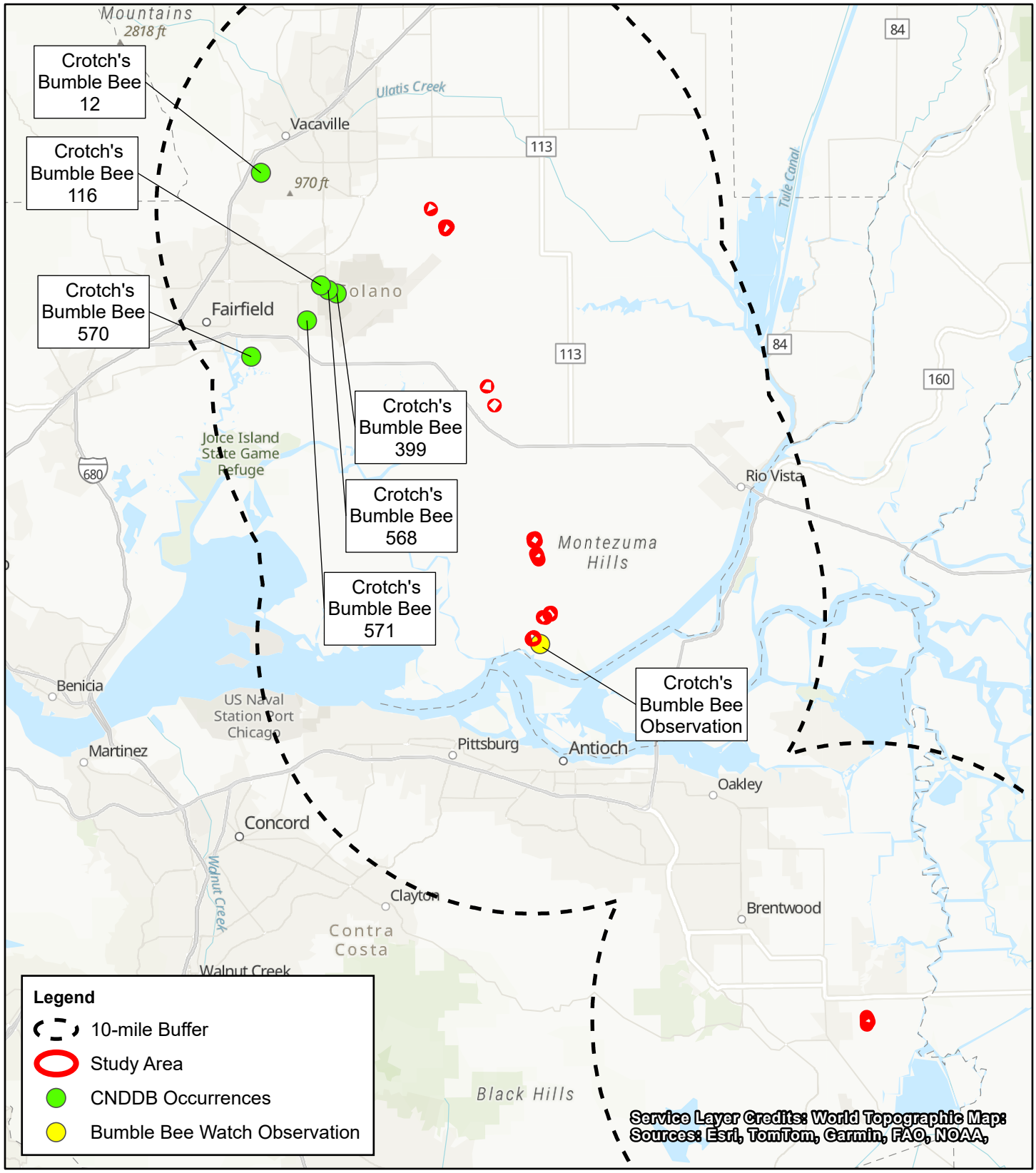

0 2.5 5 Miles

0 4 8 Kilometers

N

Scale: 1:316,800
1 inch = 5 miles

Figure 3: Crotch's Bumble Bee CNDDB and Bumble Bee Watch Occurrences Collinsville 500/230 Kilovolt Substation Project
Solano and Contra Costa County
California

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Appendix

Attachment A: Bio Resources Map Tower A

Collinsville 500/230 Kilovolt Substation Project

Vegetation Community

- Agriculture
- *Brassica nigra - Centaurea (solstitialis, melitensis)* Herbaceous Semi-Natural Alliance
- Developed
- Disturbed
- *Lolium perenne* Herbaceous Semi-Natural Alliance
- Open Water
- Ornamental Vegetation
- Stick Nest
- Drainage
- Wetland
- Limited Access Area
- Survey Area

1:10,000

0 400 800 Feet

LS POWER GRID CALIFORNIA

INSIGNIA ENVIRONMENTAL

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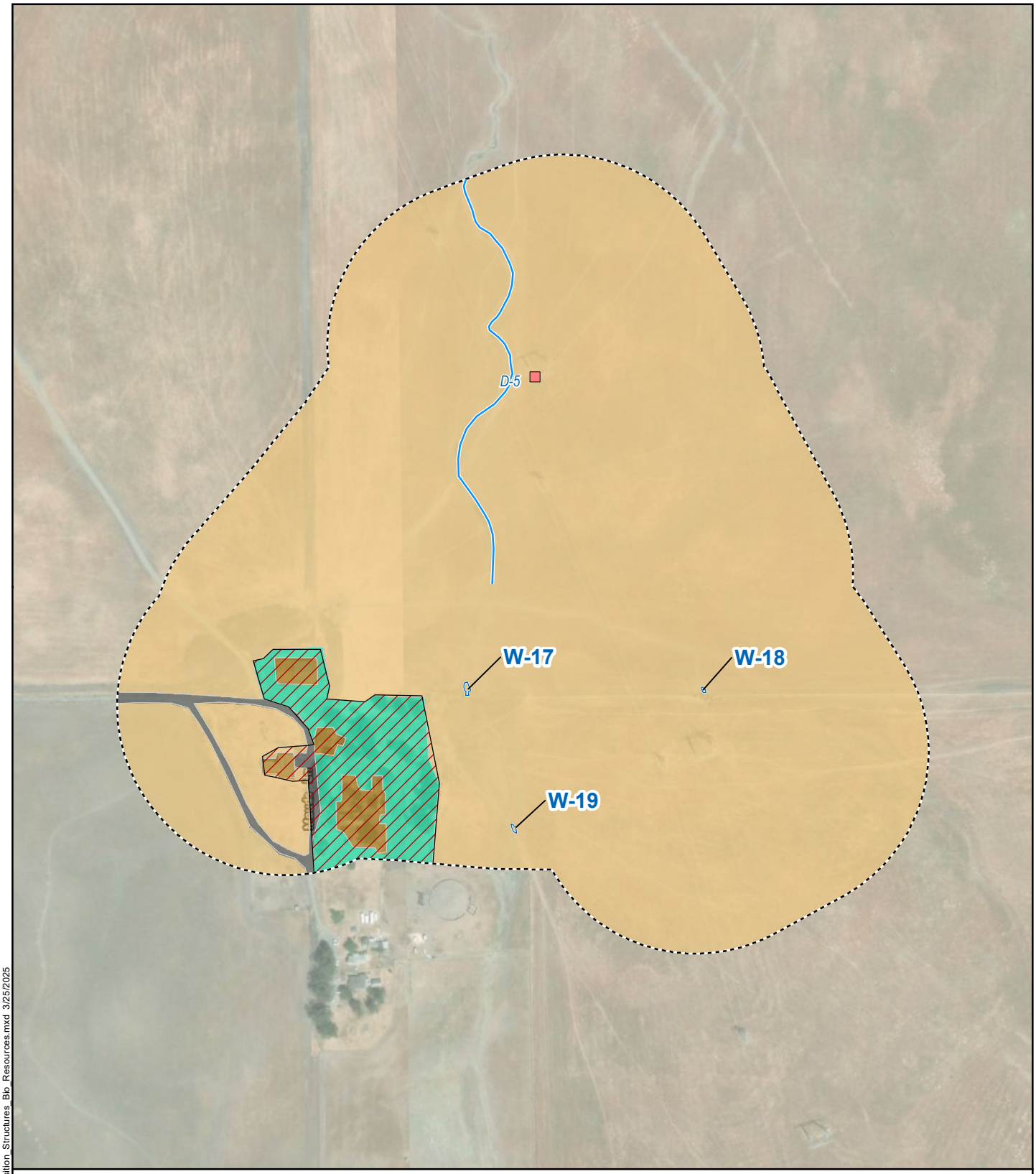

Attachment A: Bio Resources Map Tower B **Collinsville 500/230 Kilovolt Substation Project**

Vegetation Community

- *Avena spp.* - *Bromus* spp. Herbaceous Semi-Natural Alliance
- Developed
- Disturbed
- Ornamental Vegetation

- Stick Nest
- Drainage
- Wetland
- Limited Access Area
- Survey Area

1:5,000

0 400 800 Feet

LS POWER GRID CALIFORNIA INSIGNIA ENVIRONMENTAL

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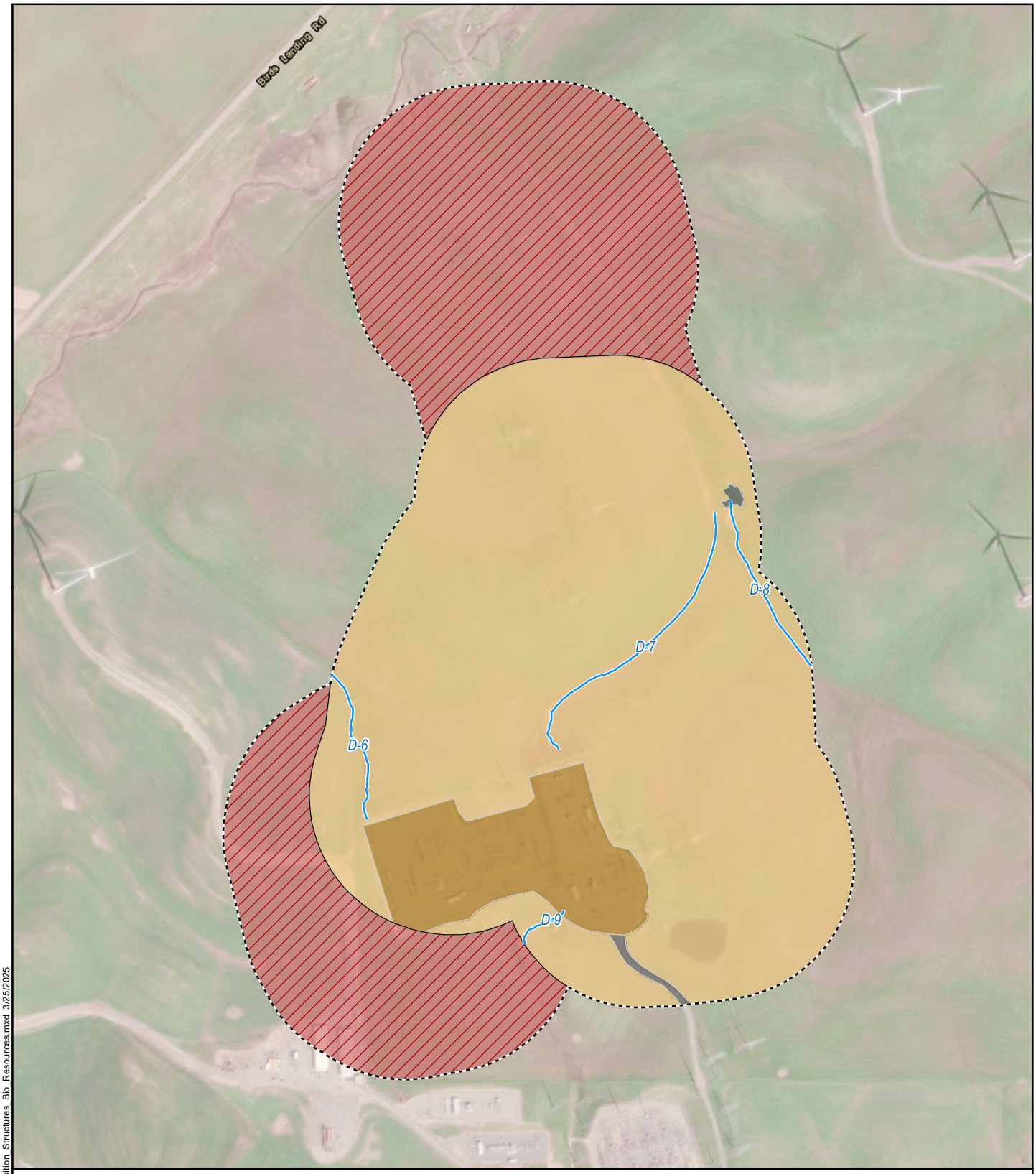

Attachment A: Bio Resources Map Tower C

Collinsville 500/230 Kilovolt Substation Project

Vegetation Community

- *Avena spp.* - *Bromus* spp. Herbaceous Semi-Natural Alliance
- Developed
- Disturbed
- Unsurveyed Area

- Drainage
- Limited Access Area
- Survey Area

1:6,000

0 400 800 Feet

LS POWER GRID CALIFORNIA

INSIGNIA ENVIRONMENTAL

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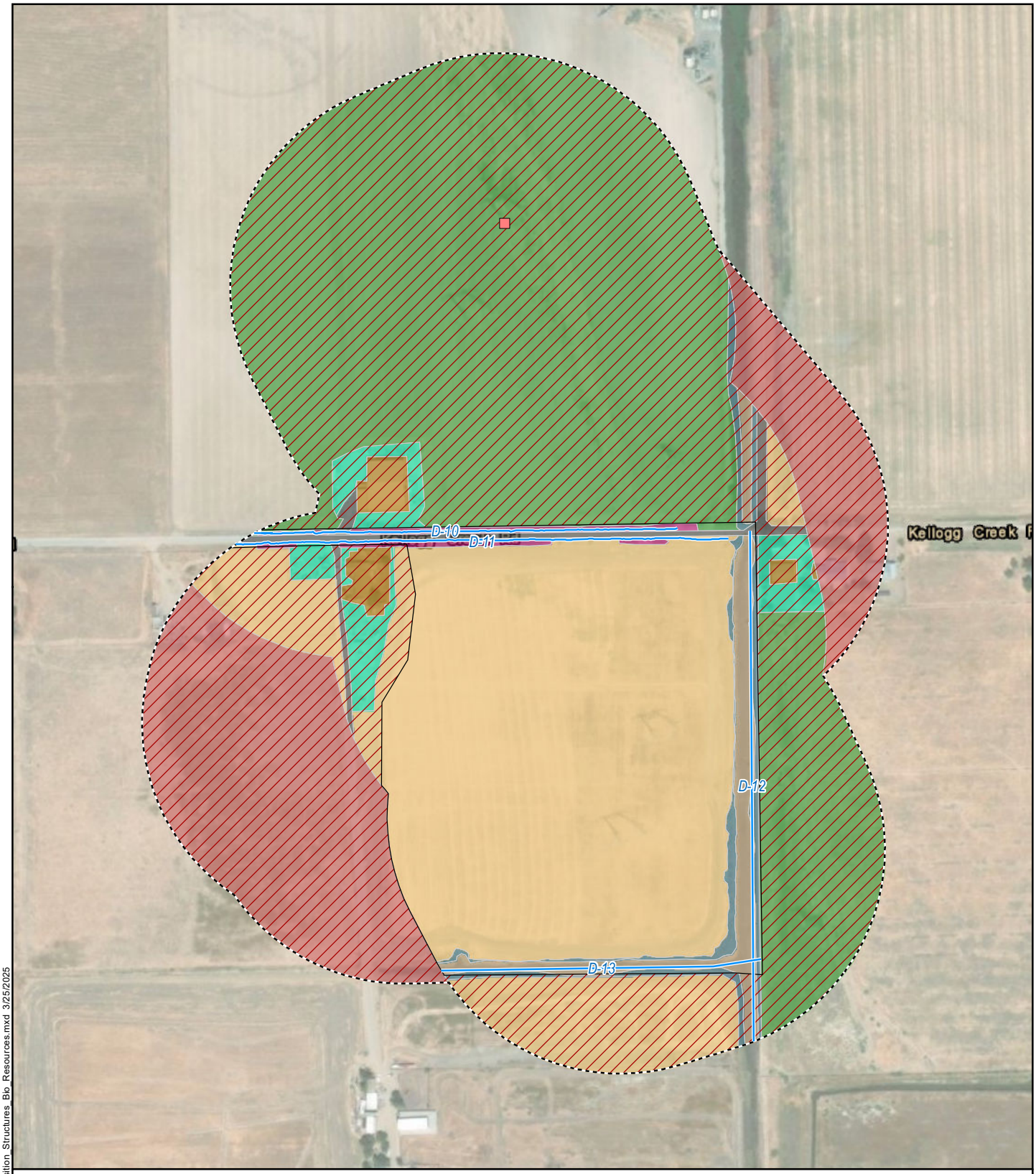

Attachment A: Bio Resources Map Tower D

Collinsville 500/230 Kilovolt Substation Project

Vegetation Community

- Agriculture
- *Allenrolfea occidentalis* Shrubland Alliance
- *Avena spp. - Bromus* spp. Herbaceous Semi-Natural Alliance
- *Brassica nigra - Centaurea (solstitialis, melitensis)* Herbaceous Semi-Natural Alliance
- Developed
- Disturbed
- Ornamental Vegetation
- *Schoenoplectus (acutus, californicus)* Herbaceous Alliance
- Unsurveyed
- Stick Nest
- Drainage
- Limited Access Area
- Survey Area

1:4,000

0 400 800 Feet

LS POWER GRID CALIFORNIA

INSIGNIA ENVIRONMENTAL

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