Subject:	**Electrical Power Load and Routing Study – Bethany Reservoir Alternative (Final Draft)**
Project feature:	Site Development / Logistics
Prepared for:	California Department of Water Resources (DWR) / Delta Conveyance Office (DCO)
Prepared by:	Delta Conveyance Design and Construction Authority (DCA)
Copies to:	File
Date:	May 27, 2022
Reference no.:	EDM_SD_CE_TMO_Elect-Power-Trans-Bethany_001091

1. Introduction

The California DWR issued a Notice of Preparation (NOP) pursuant to the California Environmental Quality Act (CEQA) on January 15, 2020 (DWR 2020a). The NOP identified a proposed Delta Conveyance Project (project) to include new intake facilities located along the Sacramento River between Freeport and the confluence of the Sacramento River with Sutter Slough. The new project conveyance facilities would also include a tunnel to convey water from the new intakes to the existing State Water Project (SWP) Harvey O. Banks (Banks) Pumping Plant and related pumping and conveyance facilities in the south Delta.

The NOP described Central and Eastern corridor options to convey water from intakes in the north Delta to the SWP and potentially the Central Valley Project (CVP) pumping plants in the south Delta. Each corridor would use the same intakes and the same Southern Forebay, Pumping Plant, and South Delta Conveyance Facilities, and project alternatives would be sized to convey a range of project design flow rates from 3,000 cubic feet per second (cfs) to 7,500 cfs.

The NOP was circulated to the public, interest groups, and agencies to receive comments. The comments were summarized in a Scoping Report released by DWR in July 2020 (DWR 2020b). Some of the comments were related to concerns about the construction of facilities near roadways and communities near the Clifton Court Forebay. DWR considered the scoping comments and methods to reduce environmental disturbances at the proposed new Southern Forebay and identified the Bethany Alternative that would extend from the intakes along the Eastern Corridor to Lower Roberts Island; and then, continue along a tunnel alignment to a new Bethany Reservoir Pumping Plant to be located south of the Clifton Court Forebay. The new pumping plant and associated aqueducts would convey the water to a Bethany Reservoir Discharge Structure along the rim of the existing SWP Bethany Reservoir.

To construct and operate the project, various power supplies would be needed. The existing power grid as well as new lines would be required to provide the power necessary infrastructure for this project. The purpose of this technical memorandum (TM) is to:

- Describe the existing power supply network in the project area
- Define the project power needs, including load and specific facilities required
- Identify potential power supply sources
- Describe networks that could be used to bring that power to the point of use, including new transmission, defined here as being 60 kilovolt (kV) or higher, and distribution, less than 60 kV, lines

The location of new power facilities described in this TM were sited based on collaboration efforts between potential utility providers and DWR which have occurred during the planning of this project and/or previous project iterations. The basis of these efforts were to minimize the area disturbed by the

new power facilities. However, the information described below and presented in Attachment 1 is preliminary, based on assumptions explicitly noted. It is intended to be used to support the development of the estimated footprint of disturbed areas associated with the power facilities and to identify potential construction effects. This information also would serve as a conceptual basis for ongoing and future collaboration with utility providers. Assumptions and proposed alignments will need to be verified and approved by expected utility providers, and detailed design information will be developed in future design phases, in close coordination with those service providers.

The TM includes the following sections:

- Conceptual Development Criteria
- Existing Electrical Supplies in the Project Area
- Estimated Power Loads
- Proposed Electrical Facilities
- Circuit Breakers
- References
- Document History and Quality Assurance

The *Environmental Impact Report* (EIR) and subsequent documentation will describe existing conditions for these power networks and anticipated project benefits and impacts.

2. Conceptual Development Criteria

Conceptual development criteria related to power supplies for the Bethany Reservoir Alternative are identical to those described for power supplies in the *Electrical Power Load and Routing Study* for the Central and Eastern corridor options (DCA 2021).

3. Existing Electrical Supplies in the Project Area

Existing power suppliers in the Bethany Reservoir Alternative project area are identical to those described for power suppliers in the *Electrical Power Load and Routing Study* for the Central and Eastern corridor options (DCA 2021). High-voltage transmission lines in the Project area that are anticipated to be utilized by the Project during construction and/or operation are owned and maintained by SMUD, PG&E, and WAPA, as shown in Figure 3-1.

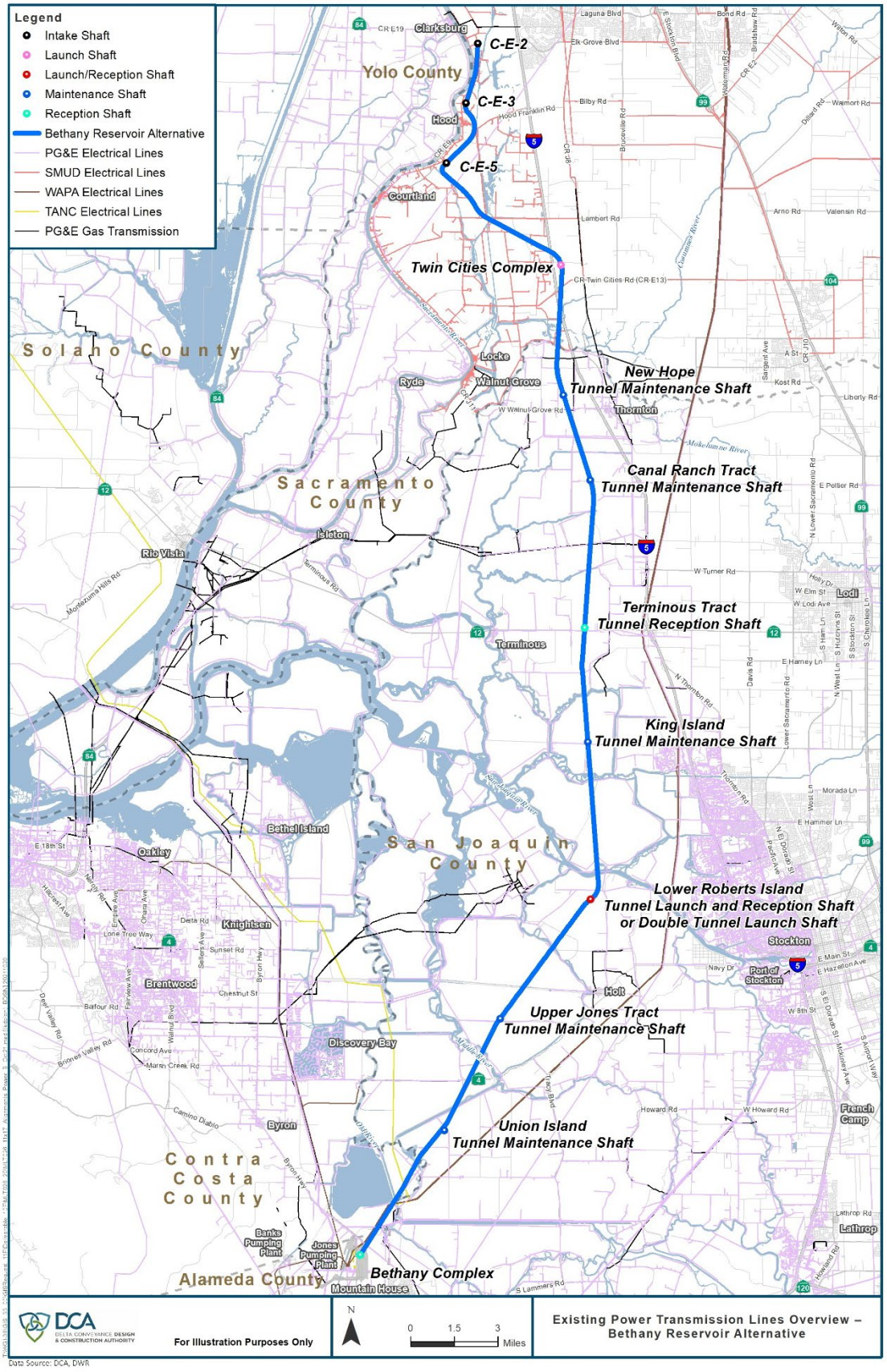


Figure 3-1. Existing Electrical Power Infrastructure in Project Area

4. Estimated Power Loads

Power demand during construction would include support for large equipment, such as cranes and ground improvement machines, tunnel boring machines and associated equipment including conveyors and pumps, small tools, and construction-support facilities. Support facilities would include, but not be limited to, construction trailers, temporary lighting, and electric vehicle charging stations. Some of this equipment could be powered by onsite generators or internal combustion engines; however, electrical grid service to the sites, if available, would be more efficient, use less diesel fuels, and produce fewer emissions.

Power demand during operations would include power for mechanical equipment (such as operable gates, screen cleaners, pumps), sensors and supervisory control and data acquisition (SCADA) systems, and power for onsite buildings and lights. Operations loads would vary slightly, depending on the type of fish screen installed at the intake(s) to protect aquatic species. The project would include either vertical flat plat screens or cylindrical tee screens.

Table 4.1 summarizes the power demand assumptions for construction of the key feature facilities for the Bethany Reservoir Alternative, and Table 4.2 presents the power demand assumptions for operations.

Table 4.1 Summary of Electrical Power Load Assumptions for Construction of Key Features

Project Capacity Option (cfs)	3,000	4,500	6,000	7,500
Facility	**Load (kVA)**			
Intake C-E-2	-	-	-	6,000
Intake C-E-3	-	8,000	8,000	8,000
Intake C-E-5	8,000	6,000	8,000	8,000
Lambert Batch Plants	8,000	8,000	8,000	8,000
Twin Cities Complex Double Tunnel Launch Shaft[a]	38,000	38,000	58,000	58,000
Lower Roberts Double Launch Shaft[a]	37,000	37,000	59,000	59,000
New Hope Tract Maintenance Shaft	1,000	1,000	1,000	1,000
Canal Ranch Maintenance Shaft	1,000	1,000	1,000	1,000
Terminus Tract Reception Shaft	1,000	1,000	1,000	1,000
Upper Jones Tract Maintenance Shaft	1,000	1,000	1,000	1,000
Union Island Maintenance Shaft	1,000	1,000	1,000	1,000
Bethany Reservoir Pumping Plant and Surge Basin (including Batch Plants)	12,750	12,750	12,750	12,750
Bethany Aqueduct and Bethany Reservoir Discharge Structure	11,200	15,200	15,200	17,200
Hood-Franklin Park and Ride	358	358	358	358
Charter Way Park and Ride	355	355	355	355
TOTAL	**120,663**	**130,663**	**174,663**	**182,663**

Table 4.1 Summary of Electrical Power Load Assumptions for Construction of Key Features

Project Capacity Option (cfs)	3,000	4,500	6,000	7,500
Facility	**Load (kVA)**			

[a] Includes power for two tunnel boring machines (TBMs)

Notes:

- = not applicable

cfs = cubic feet per second

kVA = kilovolt ampere(s)

Table 4.2 Summary of Electrical Power Load Assumptions for Operation of Key Features

Intake Type	Tee Screen				Vertical Flat Plate			
Project Capacity Option (cfs)	**3,000**	**4,500**	**6,000**	**7,500**	**3,000**	**4,500**	**6,000**	**7,500**
Facility	**Load (kVA)**				**Load (kVA)**			
Intake C-E-2	-	-	-	3,500	-	-	-	2,500
Intake C-E-3	-	4,000	4,000	4,000	-	3,000	3,000	3,000
Intake C-E-5	4,000	3,500	4,000	4,000	3,000	2,500	3,000	3,000
Lambert Batch Plants	-	-	-	-	-	-	-	-
Twin Cities Complex Double Tunnel Launch Shaft	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]
Lower Roberts Launch and Reception Shaft	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]
New Hope Tract Maintenance Shaft	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]
Canal Ranch Maintenance Shaft	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]
Terminus Tract Reception Shaft	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]
Upper Jones Maintenance Shaft	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]
Union Island Maintenance Shaft	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]	1,000[a]
Bethany Reservoir Pumping Plant and Surge Basin (including Batch Plants)	97,516	147,524	193,532	203,032	97,516	147,524	193,532	203,032
Bethany Aqueduct and Bethany Reservoir Discharge Structure	300	400	500	1,000	300	400	500	1,000
Hood-Franklin Park and Ride	-	-	-	-	-	-	-	-
Charter Way Park and Ride	-	-	-	-	-	-	-	-
TOTAL	**108,816**	**162,424**	**209,032**	**222,532**	**107,816**	**160,424**	**207,032**	**219,532**

[a] Normal maintenance and reception shaft post-construction load would be less than 50 kVA; however, maximum load expected during infrequent maintenance activities (occurring approximately every10 years) shown to provide maximum operational loads.

5. Proposed Electrical Facilities

Due to the power load required for many of the project facilities, as well as the need to step-down existing power to lower voltage levels required for facilities and equipment, several sites would require onsite electrical facilities, including substations, switchyards, and switching stations for high-voltage lines, and metering areas for lower voltage lines. Table 5-1 presents the assumed sizes for these facilities' permanent footprints.

Table 5-1. Electrical Facility Types and Sizes

Substations		Switching Stations		Metering Areas	
Type	**Footprint**	**Type**	**Footprint**	**Type**	**Footprint**
69-kV	135 feet by 62 feet	Single downstream load circuit	30 feet by 70 feet	Onsite	25 feet by 25 feet
230-kV	344 feet by 186 feet	Double downstream load circuits	60 feet by 70 feet	At connection to existing overhead	25 feet by 25 feet
		Triple downstream load circuits	90 feet by 70 feet		

Notes:

- = not applicable

kV = kilovolt

Table 5-2 presents the location of each type of facility.

Table 5-2. Proposed Electrical Facilities

Facility	Type and Description of Electrical Facility			
	Substation	**Switchyard**	**Metering Area**	**Other**
Intake C-E-2 (7,500 cfs Option only)	69-kV onsite substation—Intake C-E-2	-	-	Onsite transformers, ≤69 kV, quantity TBD
Intake C-E-3	69-kV onsite substation—Intake C-E-3	Double downstream load circuits, low-profile switching station—intake haul road (7,500 cfs Option only, feeds Intakes C-E-2 and C-E-3)	-	Onsite transformers, ≤69 kV, quantity TBD

Table 5-2. Proposed Electrical Facilities

Facility	Type and Description of Electrical Facility			
	Substation	**Switchyard**	**Metering Area**	**Other**
Intake C-E-5	69-kV onsite substation—Intake C-E-5	Double downstream load circuits, low-profile switching station—intake haul road (not required for 3,000 cfs option, feeds Intake C-E-5 and line to Intakes C-E-2 and C-E-3)	-	Onsite transformers, ≤69 kV, quantity TBD
Lambert Road Batch Plants	69-kV onsite substation—Lambert Batch Plant	Triple downstream load circuits, low-profile switching station (feeds batch plants, Twin Cities site, and intakes)	-	Onsite transformers, ≤69 kV, quantity TBD
				Improvements to existing utility substation
Twin Cities Double Tunnel Launch Shaft	69-kV onsite main distribution substation	-	-	Onsite transformers, ≤69 kV, quantity TBD
	Two 69-kV onsite substations—tunnel launch shafts (north and south)	-	-	-
	Two 69-kV onsite substations—RTM storage and management (north and south)	-	-	-
New Hope Tract Tunnel Maintenance Shaft	-	-	Onsite	Onsite transformer
Canal Ranch Tract Tunnel Maintenance Shaft	-	-	At connection to existing overhead	Onsite transformer
Terminous Tract Tunnel Reception Shaft	-	-	Onsite	Onsite transformer
King Island Tunnel Maintenance Shaft	-	-	At connection to existing overhead	Onsite transformer

Table 5-2. Proposed Electrical Facilities

Facility	Type and Description of Electrical Facility			
	Substation	**Switchyard**	**Metering Area**	**Other**
Lower Roberts Island Double Tunnel Launch Shaft	230-kV substation—House Road	-	-	Onsite transformers, ≤69 kV, three SF_6 circuit breakers
	69-kV onsite substation—tunnel launch shaft	-	-	-
Upper Jones Tract Tunnel Maintenance Shaft	-	-	Onsite	Onsite transformer
Union Island Reception Shaft	-	-	Onsite	Onsite transformer
Bethany Reservoir Pumping Plant and Surge Basin	230-kV onsite substation and switchyard	-	-	Seven permanent SF_6 circuit breakers, one construction-phase, temporary SF_6 circuit breaker
	Three 69-kV onsite, temporary substations—contractor staging (2), batch plant (1)			
Bethany Reservoir Discharge Structure	-	-	West of Mountain House Road	Onsite transformers, ≤69 kV, quantity TBD
DMC Control Structure (7,500 cfs Option only)	-	-	At connection to existing overhead	Onsite electrical building and transformers, ≤69 kV, quantity TBD
Hood-Franklin Park & Ride	-	-	Onsite	Onsite transformer
Charter Way Park & Ride	-	-	Onsite	Onsite transformer

Notes:
- = not applicable
< = less than
PG&E = Pacific Gas and Electric Company
SMUD = Sacramento Municipal Utility District
TBD = to be determined
WAPA = Western Area Power Administration

6. Circuit Breakers

In addition to new electrical facilities, many of the sites would require the installation of new circuit breakers to protect new electrical circuits. For all power lines with a capacity lower than 230 kV, vacuum circuit breakers would be used. These types of circuit breakers use air to cool the arc. Because vacuum circuit breakers do not contain greenhouse gas (GHG)-emitting materials, and they will be entirely contained within the permanent disturbance areas for proposed Project facilities, the total number required and location of each would be defined during a future design phase. At this time, vacuum circuit breakers are not available for 230 kV circuit breakers, so for all proposed power lines with a voltage capacity of 230 kV, it is assumed that sulfur hexafluoride (SF_6) gas circuit breakers would be used. As the name suggests, this type of circuit breaker uses SF_6 to cool the arc in the circuit. These would be installed within the permanent disturbance areas for proposed Project facilities. However, if new technology, i.e. a non-GHG emitting high-voltage circuit breaker, is commercially available at the time of construction, the project would utilize the best available technology.

Because the majority of new power lines required for the project have a capacity of 69 kV or less, as presented in Table 5.2, the number of SF_6 circuit breakers required for construction and operation of the Project would be limited to ten during the operating phase, four during construction. Three would be located at the 230-kV substation at the main PG&E/WAPA transmission line that is the power source for the Lower Roberts Island Double Tunnel Launch Shaft; these would be active during both construction and operation. During the operating phase, seven SF_6 circuit breakers would be located at the 230-kV onsite main distribution substation and switchyard at the Bethany Reservoir Pumping Plant, and. During construction, one SF_6 circuit breaker would be operated at the Bethany Complex but would be decommissioned before the operating phase.

7. Power Supply Alignments

This section summarizes the preliminary, proposed alignments to provide power to facilities for the Bethany Reservoir Alternative. These approaches have not been discussed with the power companies, and are, therefore, subject to change. DWR is leading the discussions with SMUD, PG&E, and WAPA.

The power alignment for all facilities north of the Lower Roberts Island Double-tunnel Launch Shaft, two park and ride lots—Hood-Franklin and Charter Way, and the DMC Control Structure would be the same as described for the Eastern corridor in the *Electrical Power Load and Routing Study* for the Central and Eastern corridor options (DCA 2021). This section does not include the power supply alignments proposed under the Bethany Reservoir Alternative that are described in the Central and Eastern corridor TM; however, Attachment 1 presents them, along with the new Bethany Reservoir power supply alignments.

The following subsections describe the power connections and alignments which differ from those proposed for the Eastern Corridor in the *Electrical Power Load and Routing Study* for the Central and Eastern corridor options (DCA 2021).

7.1 Lower Roberts Island Tunnel Double Launch Shaft

Table 7-1 lists approximate power demands at the Lower Roberts Double Tunnel Launch Shaft site and all other launch shaft locations.

Table 7-1. Preliminary Estimate of Power Required for Lower Roberts Island Double Launch Shaft Site

Capacity (cfs)	3,000 and 4,500	6,000 and 7,500
Equipment Description	**Load (kVA)**	**Load (kVA)**
TBM and Trailing Gear (EPB) [a]	20,000	40,000
Tunnel Ventilation Fans	7,400	7,400
Water Cooling Plant	500	500
Foam Plant	500	500
Conveyor (Tunnel)	3,615	4,820
Conveyor (Surface)	810	1,080
Tunnel Lighting	300	300
Shaft Pumps	200	200
Compressed Air Plant	1,600	1,600
Main Hoist and Shaft Elevator	70	70
Shaft Gantry Crane	400	400
Shop Facilities	300	300
RTM Dryers	-	-
Water Treatment	200	200
Change House	40	40
Office Trailers	140	140
Yard Lighting	80	80
Miscellaneous	500	500
Recommendation	**37,000 kVA**	**59,000 kVA**

Notes:

[a] Includes power for two tunnel boring machines (TBMs)

EPB = earth-pressure balance

kVA = kilovolt ampere(s)

RTM = reusable tunnel material

TBM = tunnel boring machine

Two existing PG&E-owned overhead lines transect the Lower Roberts Island Double Tunnel Launch Shaft site. The line that runs north-south is 21 kV, and the one that runs east-west has two voltages: it is 11 kV west of the north-south line, and 21 kV east of the line. DCA assumes these lines would not provide adequate power to the site. There are two 230-kV transmission lines owned by WAPA and one 230-kV line owned by PG&E to the east of the Lower Roberts Island Double Tunnel Launch Shaft site.

The Lower Roberts Island Double-tunnel Launch Shaft would be in the same location as described for the Eastern corridor in the *Electrical Power Load and Routing Study* for the Central and Eastern corridor options (DCA 2021) and would require the installation of a new substation near West House Road. This substation would connect to one of the existing, western 230-kV overhead transmission line running generally northeast-southwest, either WAPA's or PG&E's, as described for the Eastern corridor (DCA 2021). This substation would also be 230 kV to 69 kV, matching the supply-side power voltage and stepping down the voltage onsite to provide 69 kV power to the project facilities. However, changes in the site layout would result in the need for the substation to be constructed south of House Road, rather than north of the road. The new substation location would be approximately 0.3 mile south of the substation location described for the Eastern corridor. From the substation, approximately 0.25 mile of new underground power would be joint trenched into the substation access road running north from the site before reaching West House Road. Once the underground power reaches West House Road, all power facilities extending into the launch shaft and RTM management area site would remain the same as described for the Eastern corridor. Attachment 1 provides this layout. As noted in Section 6, the new PG&E or WAPA 230 kV substation would contain two SF_6 circuit breakers.

7.2 Upper Jones Tract Tunnel Maintenance Shaft

An existing overhead 11-kV line owned by PG&E spans Upper Jones Tract on West Bacon Island Road, along the southern perimeter of the site disturbance boundary.

DCA assumes the existing power line could provide adequate capacity for the construction and operational loads at the tunnel shaft. Because of the proximity to an existing power pole, no offsite disturbance would be required. A short section of the existing overhead power line would be relocated underground to avoid overhead clearance issues at the entrance to the site. The work would be conducted within the disturbance area already identified for the site, and the 25-foot-by-25-foot metering area for this site would also be contained onsite. Attachment 1 provides this alignment.

7.3 Union Island Tunnel Reception Shaft

An existing overhead 11-kV line owned by PG&E is located along Bonetti Road along the eastern boundary of the Union Island Tunnel Reception Shaft site. DCA assumes the existing power lines could provide adequate capacity for the construction and operation loads at the tunnel shaft. Because of the proximity to an existing power pole, no offsite disturbance would be required. A short section of the existing overhead power line would be relocated underground to avoid overhead clearance issues at the entrance to the site. The work would be conducted within the disturbance area already identified for the site, and the 25-foot-by-25-foot metering area for this site would also be contained onsite. Attachment 1 shows this alignment.

7.4 Bethany Reservoir Pumping Plant and Surge Basin

There are several existing high-voltage overhead power lines located near the Bethany Complex, including two 230-kV overhead transmission lines owned by WAPA and a 500-kV transmission line owned by the Transmission Agency of Northern California (TANC) located just outside the northwest Bethany Reservoir Pumping Plant site boundary and paralleling its western boundary, approximately 500 feet west of Mountain House Road. These transmission lines originate at the Tracy Substation, which is owned and

operated by WAPA and is on the corner of Mountain House and Kelso Roads. PG&E also has a high-voltage substation in Brentwood along Sellers Avenue.

Due to the high load required at the Bethany Reservoir Pumping Plant, the facility cannot receive power through a connection to existing overhead transmission lines like many other sites; rather, it must connect directly to a substation. Although it is possible that PG&E could be the ultimate utility provider, at this time, it is assumed WAPA would be the provider, and the Bethany Complex would connect to WAPA's Tracy substation adjacent to the site. Attachment 1 provides the proposed alignment, which is discussed here.

To connect to WAPA's Tracy Substation, new 230-kV switching equipment would be installed in a new switchyard on the Bethany Complex, adjacent to Mountain House Road. This facility would span approximately 8.5 acres but is included in the permanent site footprint for the Bethany Reservoir Pumping Plant and surge basin area. The new switchyard would connect to the existing Tracy Substation with a new, approximately 300-foot, overhead line across Mountain House Road and onto the site. A new overhead line would connect from the switchyard to a temporary main substation for the Bethany Reservoir Pumping Plant site and to the permanent Bethany Reservoir Pumping Plant substation. New temporary overhead power lines would be installed from the temporary substation north to the Bethany Reservoir Pumping Plant and the Surge Basin contractor's yards near the Bethany Reservoir Pumping Plant and Surge Basin sites, southeast to the Bethany Complex batch plants, and south to the Aqueduct contractor's yard. All of these alignments would be contained within the site disturbance boundary and would be removed after construction.

As noted in Section 6, the 230-kV main distribution substation at the Bethany Reservoir Pumping Plant would contain two SF_6 circuit breakers, and the new switchyard near the Tracy Substation would include four SF_6 circuit breakers.

An additional power connection for the aqueducts work would be required at the controlled low-strength material (CLSM) Processing Area and for the mined tunnel portal area, located off Kelso Road, west of the Tracy Substation. Rather than connecting to the Bethany Complex onsite substation, this site would connect to an existing overhead line along Kelso Road, across the street from the site entrance. A 25-foot-by-25-foot metering area would be installed on the southern side of Kelso Road, and from there, new overhead line would be installed along the site access road, for a total distance of approximately 1,200 linear feet, all of which would be contained within the site disturbance area and roadway improvements.

7.5 Bethany Reservoir Discharge Structure

New low-voltage power supply would be required at the Discharge Structure on Bethany Reservoir. A new line would be dropped from PG&E's existing 69-kV overhead power line along Christensen Road. A 25-foot-by-25-foot metering area would be installed adjacent to the existing tower, and, from there, new overhead power would be installed along the existing access road, around the parking lot, and adjacent to the California Aqueduct Bikeway along the perimeter of Bethany Reservoir until reaching the site. In total, this alignment spans approximately 1.1 mile; including the metering area and the 25-foot corridor, this would permanently impact approximately 3.4 acres. Attachment 1 shows this alignment.

8. References

California Department of Water Resources (DWR). 2020a. *Notice of Preparation of the Environmental Impact Report for the Delta Conveyance Project*.

California Department of Water Resources (DWR). 2020b. *Delta Conveyance Project Scoping Summary Report*.

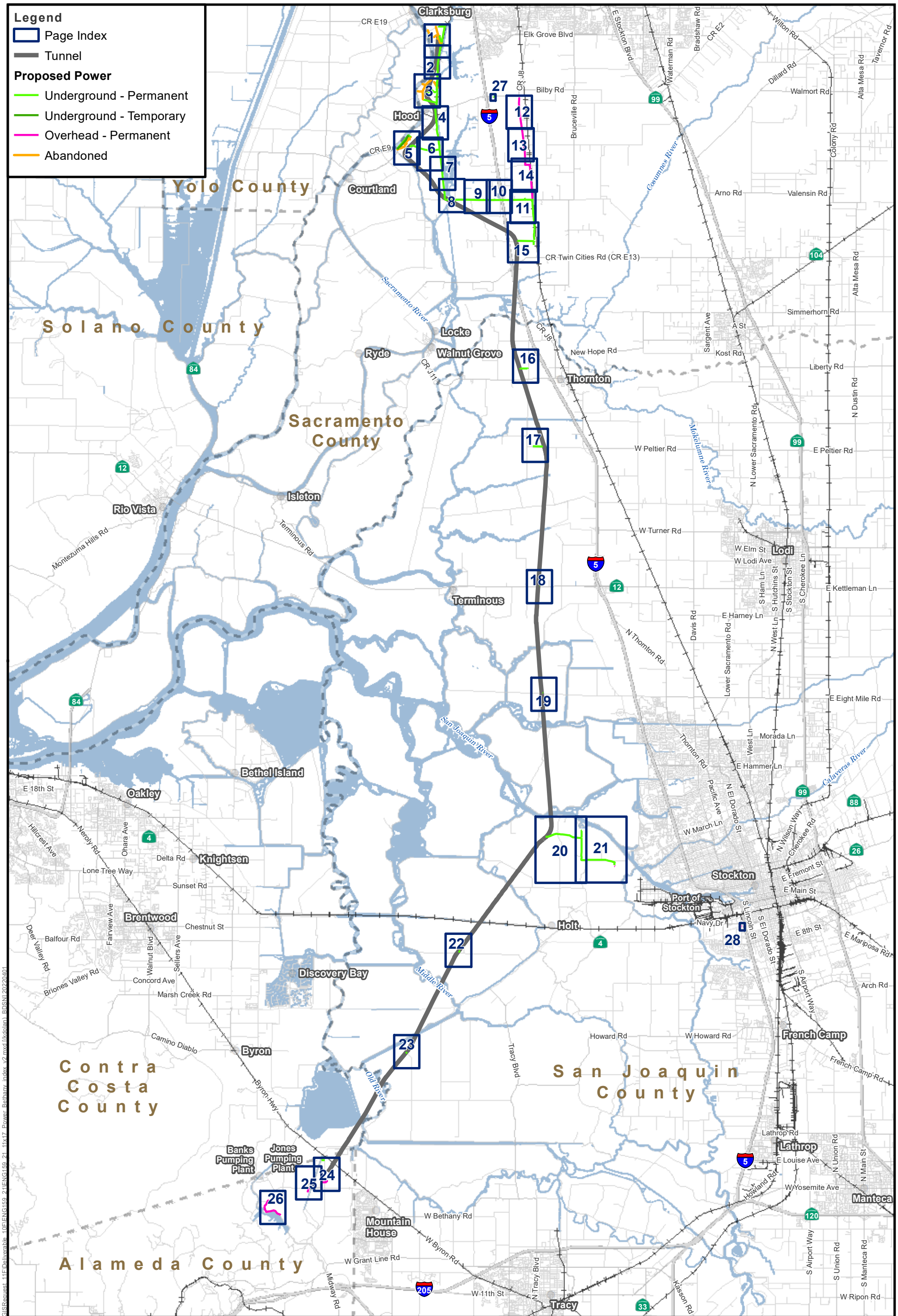
Delta Conveyance Design and Construction Authority (DCA). 2021. *Electrical Power Load and Routing Study.* Final Draft.

9. Document History and Quality Assurance

Reviewers listed have completed an internal quality review check and approval process for deliverable documents that is consistent with procedures and directives identified by the Engineering Design Manager (EDM) and the DCA.

Approval Names and Roles			
Prepared by	**Internal QC review by**	**Consistency review by**	**Approved for submission by**
Jacqueline Todak / EDM Deputy Project Manager	Phil Ryan / EDM Design Manager	Gwen Buchholz / DCA Environmental Consultant	Terry Krause / EDM Project Manager
This interim document is considered preliminary and was prepared under the responsible charge of Philip K. Ryan, California Professional Engineering License C41087.			

Attachment 1
Bethany Reservoir Alternative Power Supply



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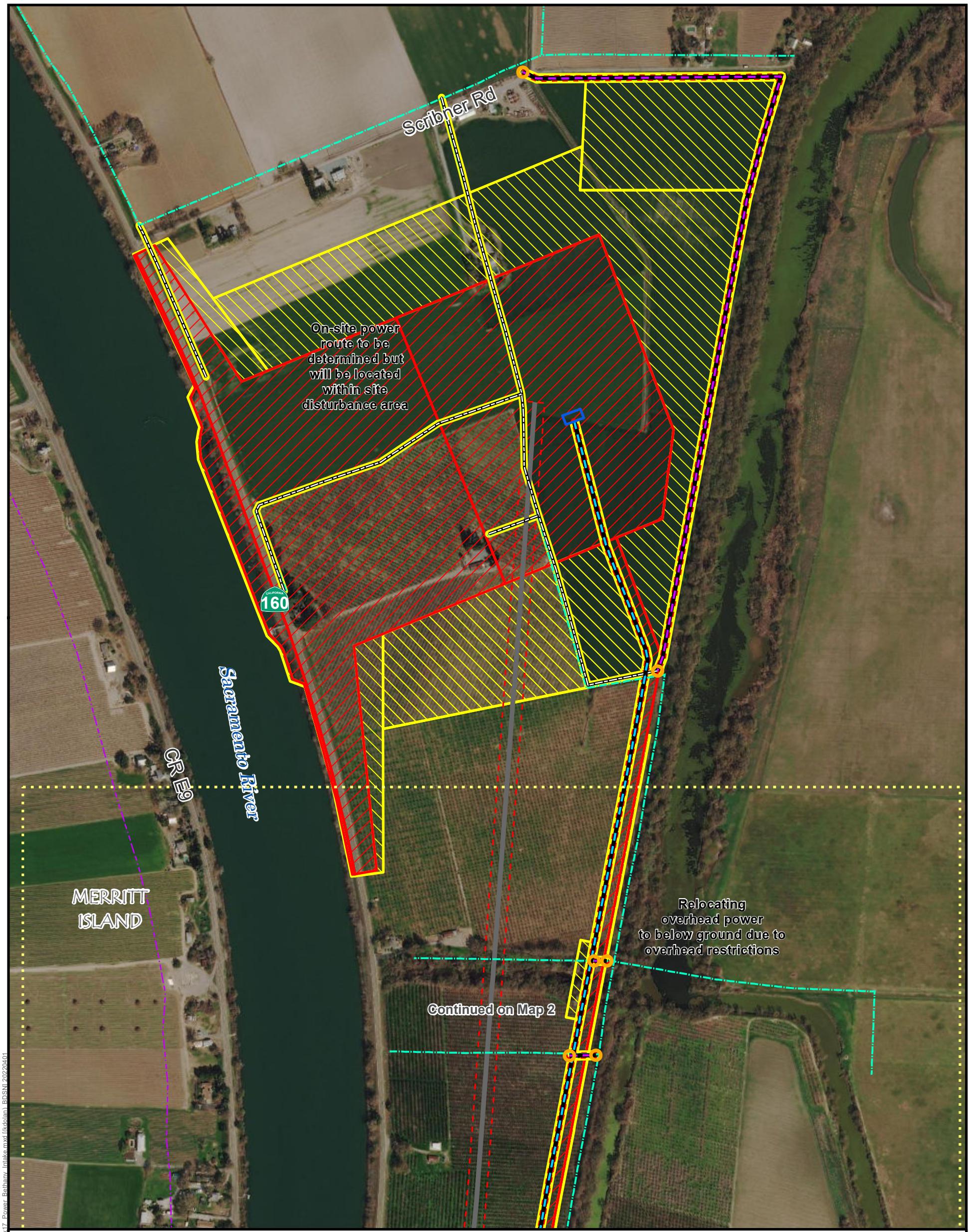

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Proposed Substation
Abandoned Existing Power

Proposed Underground Power
Outside Roadway
Relocated Non-Project Power

Existing Power

PG&E Low Voltage
21-22 kV

SMUD Low Voltage
12 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

CONFIDENTIAL ATTORNEY-CLIENT PRIVILEGE DISCUSSION DRAFT

DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

For Illustration Purposes Only

N

0 500 Feet

Map 1
Bethany Reservoir Alternative Power Supply
Intake 2
04/01/2022

Data Source: DCA, DWR

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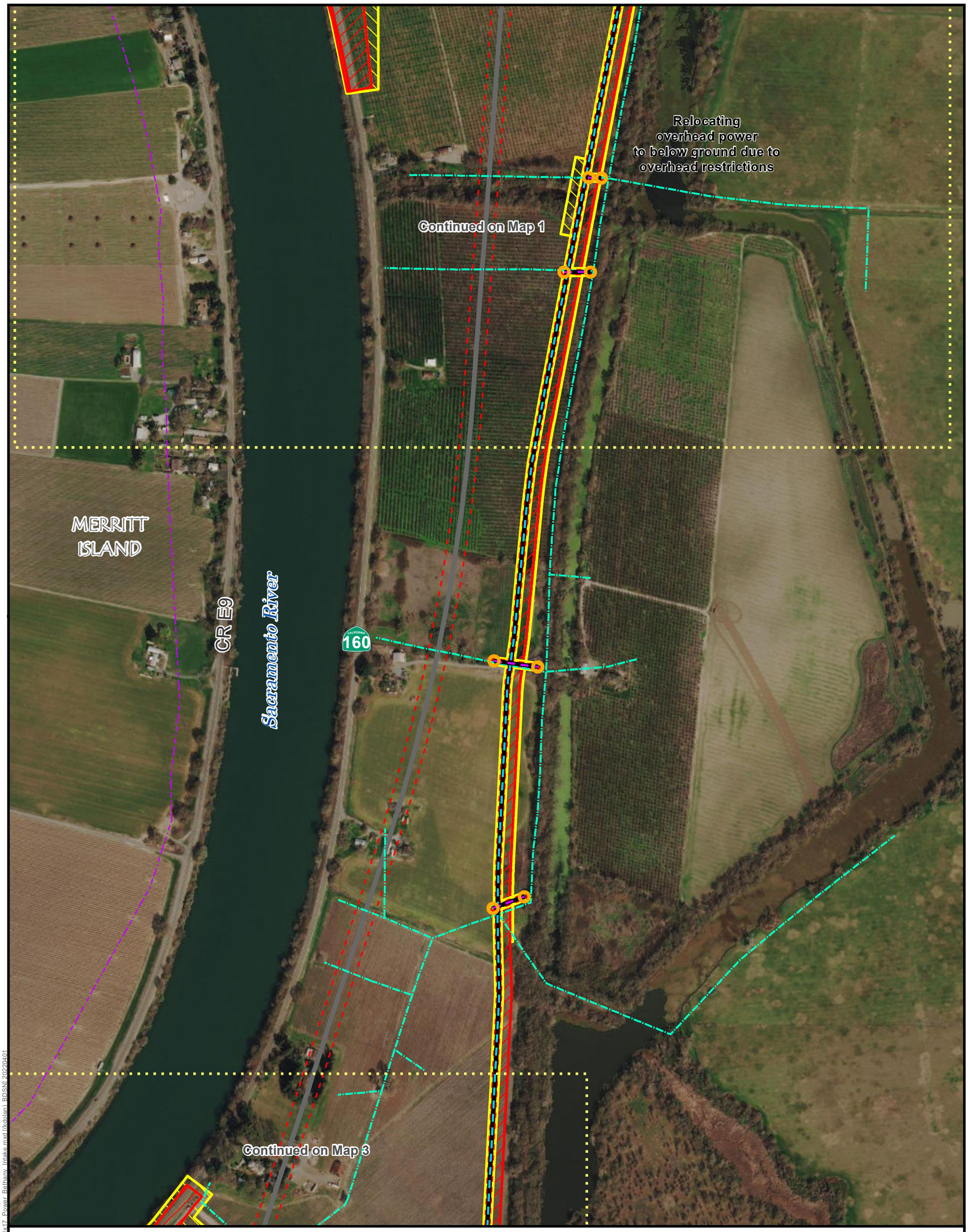

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Proposed Underground Power
Outside Roadway
Relocated Non-Project Power

Existing Power

PG&E Low Voltage
21-22 kV

SMUD Low Voltage
12 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

CONFIDENTIAL ATTORNEY-CLIENT PRIVILEGE DISCUSSION DRAFT

DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

For Illustration Purposes Only

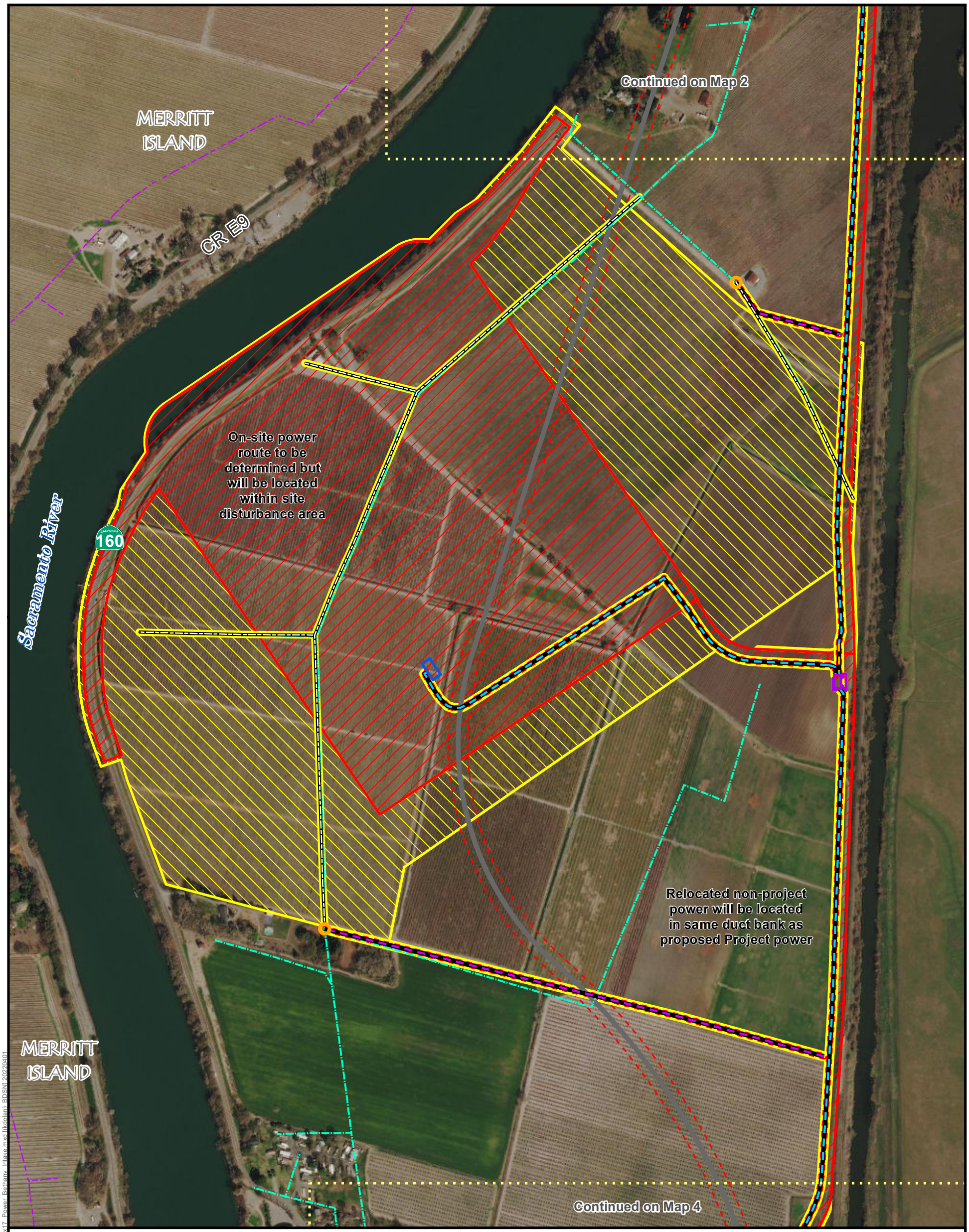
N

0 500 Feet

Map 2
Bethany Reservoir Alternative Power Supply
Intake Haul Road North
04/01/2022

Data Source: DCA, DWR

TWGL38\GIS_33_00\GISRequest_11E\Deliverable_10E\ENG159_21\ENG159_21_11x17_Power_Bethany_Intake.mxd (kkolan) BDSNI 20220401



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Connection to Existing Overhead
Proposed Substation
Proposed Switching Station
Abandoned Existing Power

Proposed Underground Power
Within Proposed Roadway
Outside Roadway
Relocated Non-Project Power

Existing Power

PG&E Low Voltage
21-22 kV

SMUD Low Voltage
12 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

For Illustration Purposes Only

N

0 500 Feet

Map 3
Bethany Reservoir Alternative Power Supply
Intake 3
04/01/2022

Data Source: DCA, DWR

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Continued on Map 3

Hood

3rd St

4th St

5th St

Hood Franklin Rd

Continued on Map 6

Page Index

Existing Substation

Connection to Existing Overhead

Proposed Underground Power

Outside Roadway

Existing Power

PG&E High Voltage

115 kV

SMUD Low Voltage

12 kV

SMUD High Voltage

60-70 kV

Tunnel

Permanent Subsurface Impact

Permanent Surface Impact

Temporary Surface Impact

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DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

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N

0 500 Feet

Map 4
Bethany Reservoir Alternative Power Supply
Intake Haul Road North
04/01/2022

Data Source: DCA, DWR

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MERRITT ISLAND

CR E9

Sacramento River

TEMPORARY

160

On-site power route to be determined but will be located within site disturbance area

RANDALL ISLAND

Continued on Map 6

Page Index
Connection to Existing Overhead
Proposed Substation
Abandoned Existing Power

Proposed Underground Power
Outside Roadway
Relocated Non-Project Power

Existing Power

PG&E Low Voltage
21-22 kV

PG&E High Voltage
115 kV

SMUD Low Voltage
12 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

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N

0 500 Feet

Map 5
Bethany Reservoir Alternative Power Supply
Intake 5
04/01/2022

Data Source: DCA, DWR

Page Index
Proposed Switching Station
Proposed Underground Power
Within Proposed Roadway
Outside Roadway

Existing Power
PG&E High Voltage
115 kV
SMUD Low Voltage
12 kV
SMUD High Voltage
60-70 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

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N

0 500 Feet

Map 6
Bethany Reservoir Alternative Power Supply
Intake Haul Road South and Intake 5
04/01/2022

Data Source: DCA, DWR

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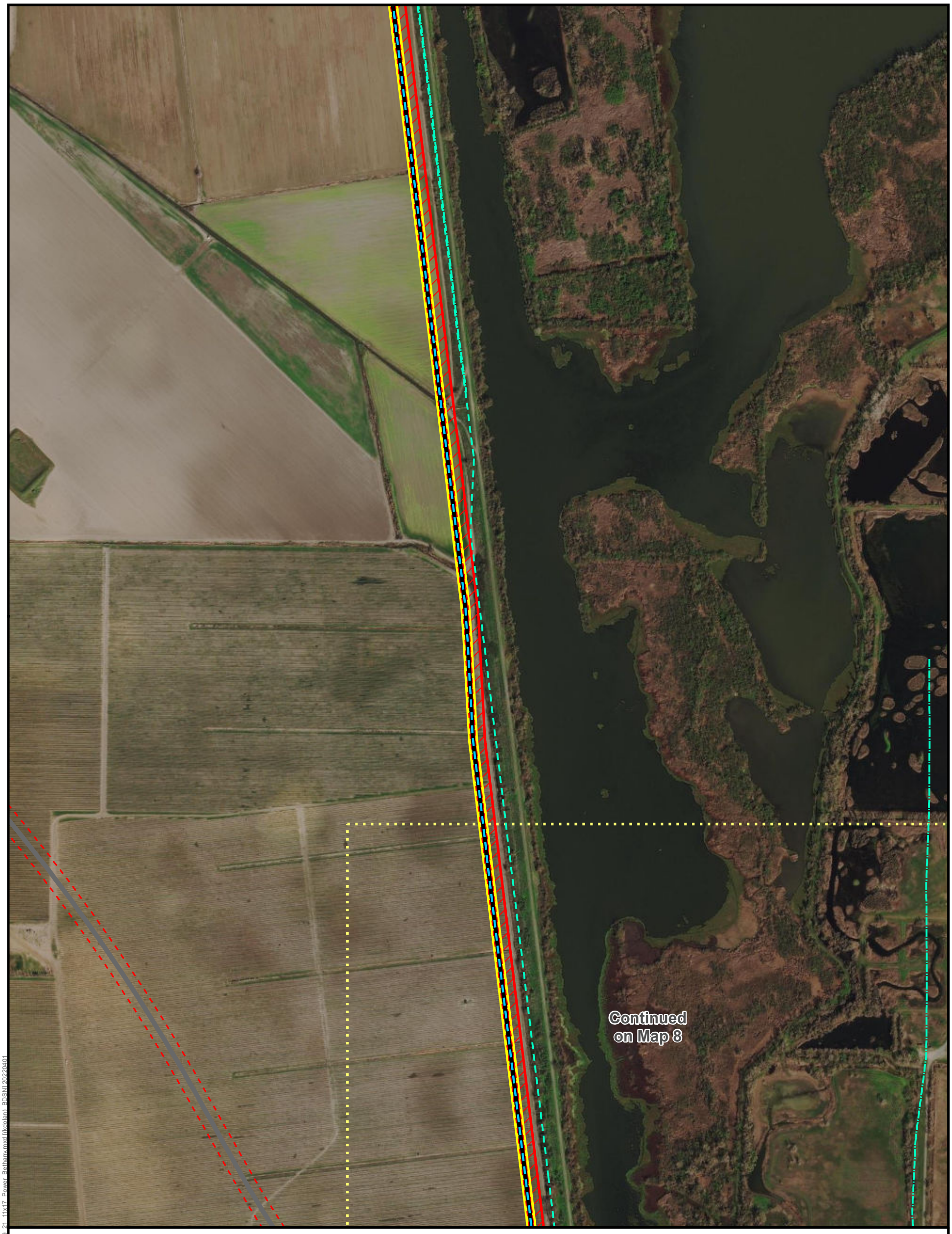

Page Index
Proposed Underground Power
Outside Roadway

Existing Power
SMUD Low Voltage
12 kV
SMUD High Voltage
60-70 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

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N

0 500 Feet

Map 7
Bethany Reservoir Alternative Power Supply
Intake Haul Road South
04/01/2022

Data Source: DCA, DWR

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Page Index

Proposed Underground Power
- Within Proposed Roadway
- Outside Roadway
- Trenchless Installation

Existing Power

SMUD Low Voltage
- 12 kV

SMUD High Voltage
- 60-70 kV

Tunnel

- Permanent Subsurface Impact
- Permanent Surface Impact
- Temporary Surface Impact

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N

0 500 Feet

Map 8
Bethany Reservoir Alternative Power Supply
Intake Haul Road South and Lambert Road
04/01/2022

Data Source: DCA, DWR

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Continued on Map 8

Lambert Rd

Continued on Map 10

GLANVILLE TRACT

Page Index

Proposed Underground Power
Outside Roadway

Existing Power
SMUD Low Voltage
12 kV
SMUD High Voltage
60-70 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

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N

0 500 Feet

Map 9
Bethany Reservoir Alternative Power Supply
Lambert Road
04/01/2022

Data Source: DCA, DWR

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Proposed Underground Power
Outside Roadway
Trenchless Installation

Existing Power
SMUD Low Voltage
12 kV
SMUD High Voltage
60-70 kV

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 Feet

Map 10
Bethany Reservoir Alternative Power Supply
Lambert Road
04/01/2022

Data Source: DCA, DWR

Continued on Map 14

On-site power route to be determined but will be located within site disturbance area

Lambert Rd

Continued on Map 10

Franklin Rd

CR J8

GLANVILLE TRACT

Continued on Map 15

Page Index
Existing Substation
Connection to Proposed Overhead, Existing Pole
Proposed Switching Station

Proposed Underground Power
Within Existing Roadway
Within Proposed Roadway
Outside Roadway

Proposed Overhead Power
New Line on Existing Poles

Existing Power
SMUD High Voltage
60-70 kV

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 Feet

Map 11
Bethany Reservoir Alternative Power Supply
Lambert Road/Franklin Concrete Batch Plant
04/01/2022

Data Source: DCA, DWR

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Page Index
Improvements to Existing Substation
Proposed Overhead Power
New Line on Existing Poles

Existing Power
SMUD High Voltage
60-70 kV
230KV

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 Feet

Map 12
Bethany Reservoir Alternative Power Supply
Franklin Road
04/01/2022

Data Source: DCA, DWR

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Page Index
Proposed Overhead Power
New Line on Existing Poles

Existing Power
SMUD High Voltage
60-70 kV
230KV

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 Feet

Map 13
Bethany Reservoir Alternative Power Supply
Franklin Road
04/01/2022

Data Source: DCA, DWR

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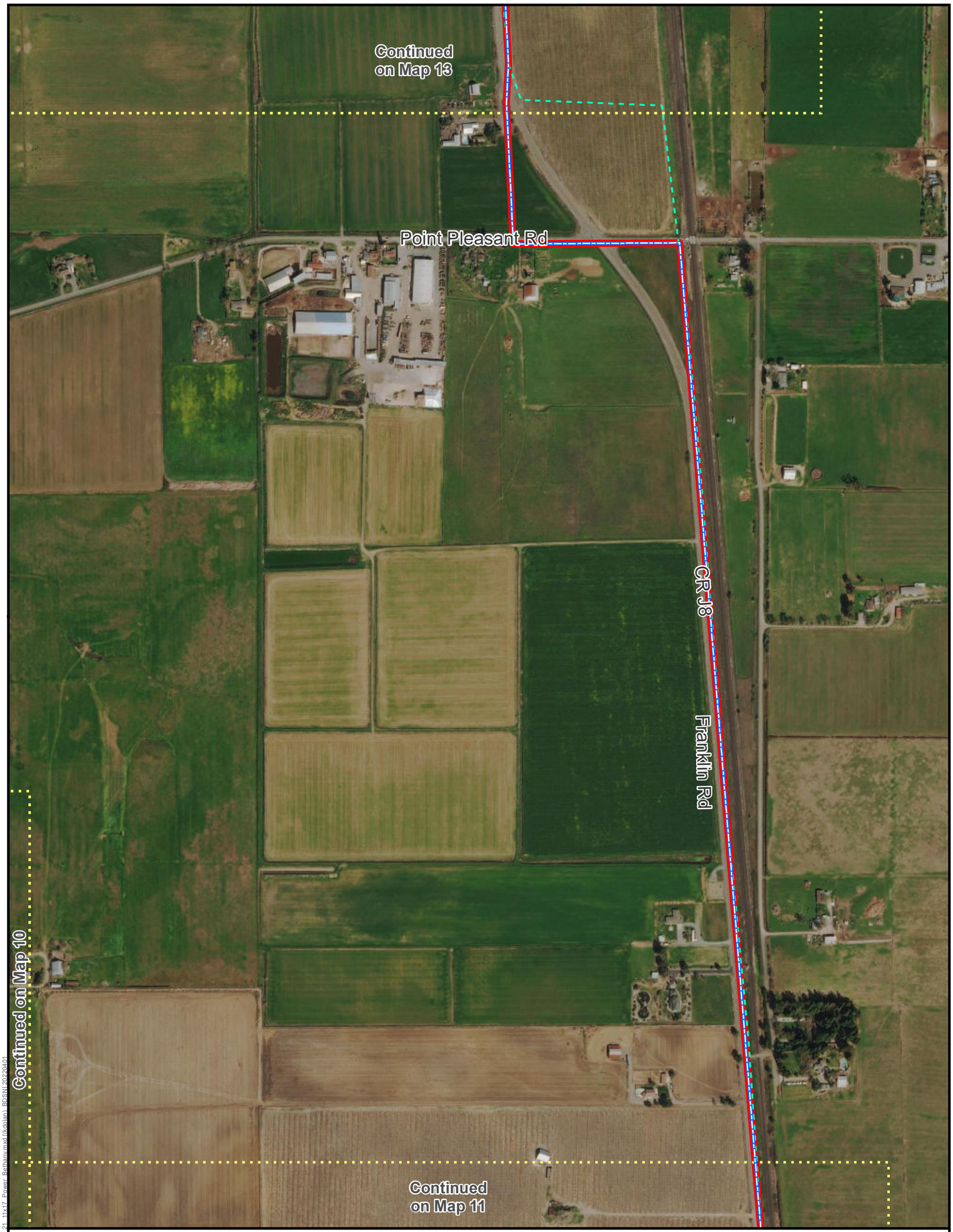

Page Index
Proposed Overhead Power
New Line on Existing Poles

Existing Power
SMUD High Voltage
60-70 kV

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 Feet

Map 14
Bethany Reservoir Alternative Power Supply
Franklin Road
04/01/2022

Data Source: DCA, DWR

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Proposed Substation
Proposed Underground Power
Within Existing Roadway
Within Proposed Roadway
Outside Roadway

Existing Power
SMUD High Voltage
60-70 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 Feet

Map 15
Bethany Reservoir Alternative Power Supply
Twin Cities Complex
04/01/2022

Data Source: DCA, DWR

TWGL38\GIS_33_00\GISRequest_14\Deliverable_10\ENG159_21\ENG159_21_11x17_Power_Bethany.mxd (lkdolan) BDSN 20220401

5

Blossom Rd

On-site power route to be determined but will be located within site disturbance area

NEW HOPE TRACT

W Walnut Grove Rd

Connection to Existing Overhead
Proposed Metering Area
Metering Area
Proposed Underground Power
Within Proposed Roadway

Existing Power
PG&E Low Voltage
11 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 Feet

Map 16
Bethany Reservoir Alternative Power Supply
New Hope Tract
04/01/2022

Data Source: DCA, DWR

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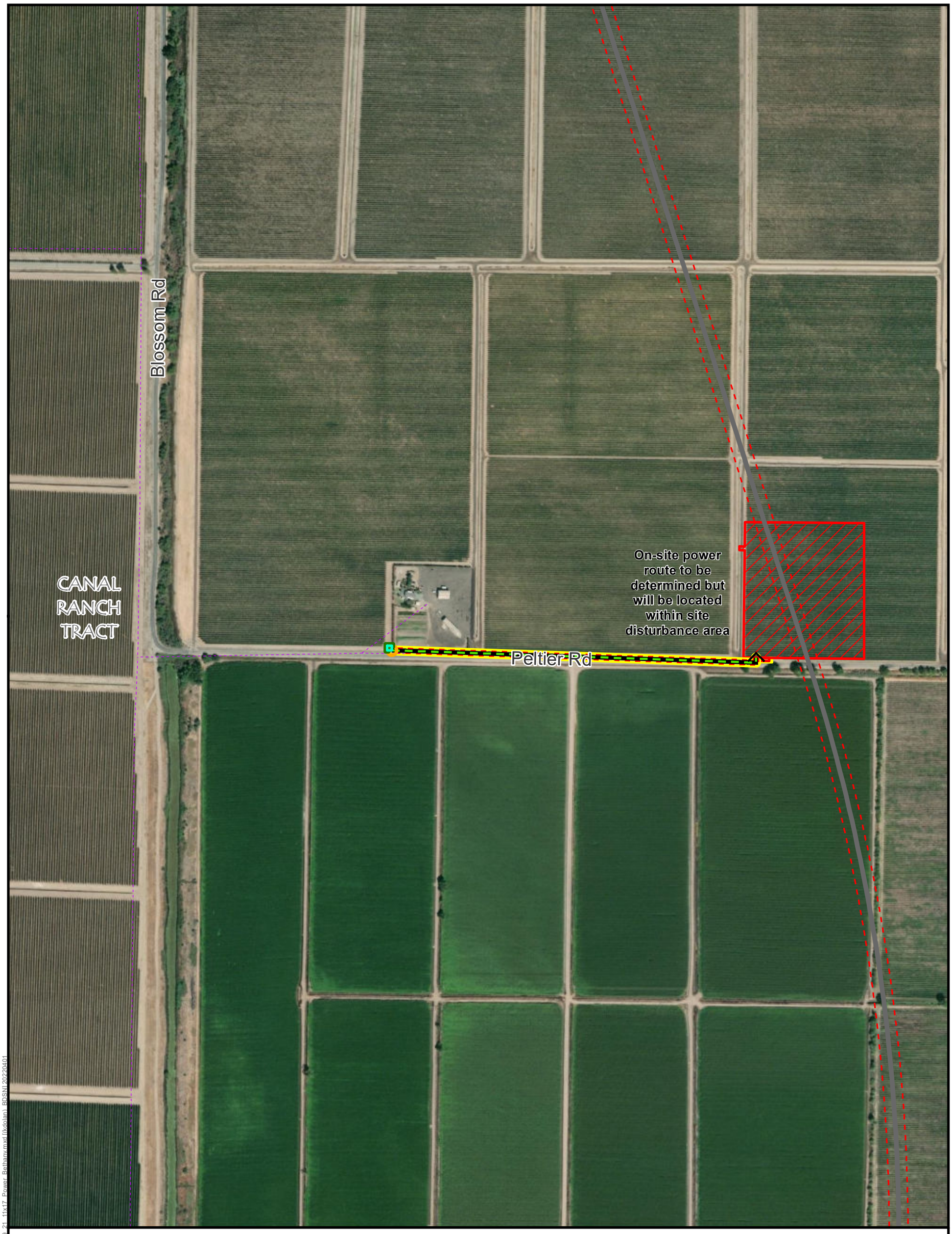

Connection to Existing Overhead
Proposed Metering Area
Metering Area
Proposed Underground Power
Within Existing Roadway

Existing Power
PG&E Low Voltage
11 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 Feet

Map 17
Bethany Reservoir Alternative Power Supply
Canal Ranch Tract
04/01/2022

Data Source: DCA, DWR

TWG\38\GIS_33_00\GISRequest_11\Deliverable_10\ENG159_21\ENG159_21_11x17_Power_Bethany.mxd (kdolan) 20220401

On-site power route to be determined but will be located within site disturbance area

Relocating overhead power to below ground due to overhead restrictions

TERMINOUS TRACT

Connection to Existing Overhead
Proposed Metering Area
Metering Area

Proposed Underground Power
Within Proposed Roadway

Existing Power
PG&E Low Voltage
11 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

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N

0 500 Feet

Map 18
Bethany Reservoir Alternative Power Supply
Terminous Tract
04/01/2022

Data Source: DCA, DWR

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On-site power route to be determined but will be located within site disturbance area

KING ISLAND

Eight Mile Rd

Connection to Existing Overhead
Proposed Metering Area
Metering Area
Proposed Underground Power
Within Proposed Roadway

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 Feet

Map 19
Bethany Reservoir Alternative Power Supply
King Island
04/01/2022

Data Source: DCA, DWR

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Neugebauer Rd

San Joaquin River

Windmill Cove

On-site power route to be determined but will be located within site disturbance area

On-site power route to be determined but will be located within site disturbance area

LOWER ROBERTS ISLAND

Holt Rd

House Rd

Continued on Map 21

Inland Dr

Page Index
Proposed Switching Station
Proposed Underground Power
Within Proposed Roadway
Outside Roadway

Existing Power
PG&E Low Voltage
11 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 1,000 Feet

Map 20
Bethany Reservoir Alternative Power Supply
Lower Roberts Island
04/01/2022

Data Source: DCA, DWR

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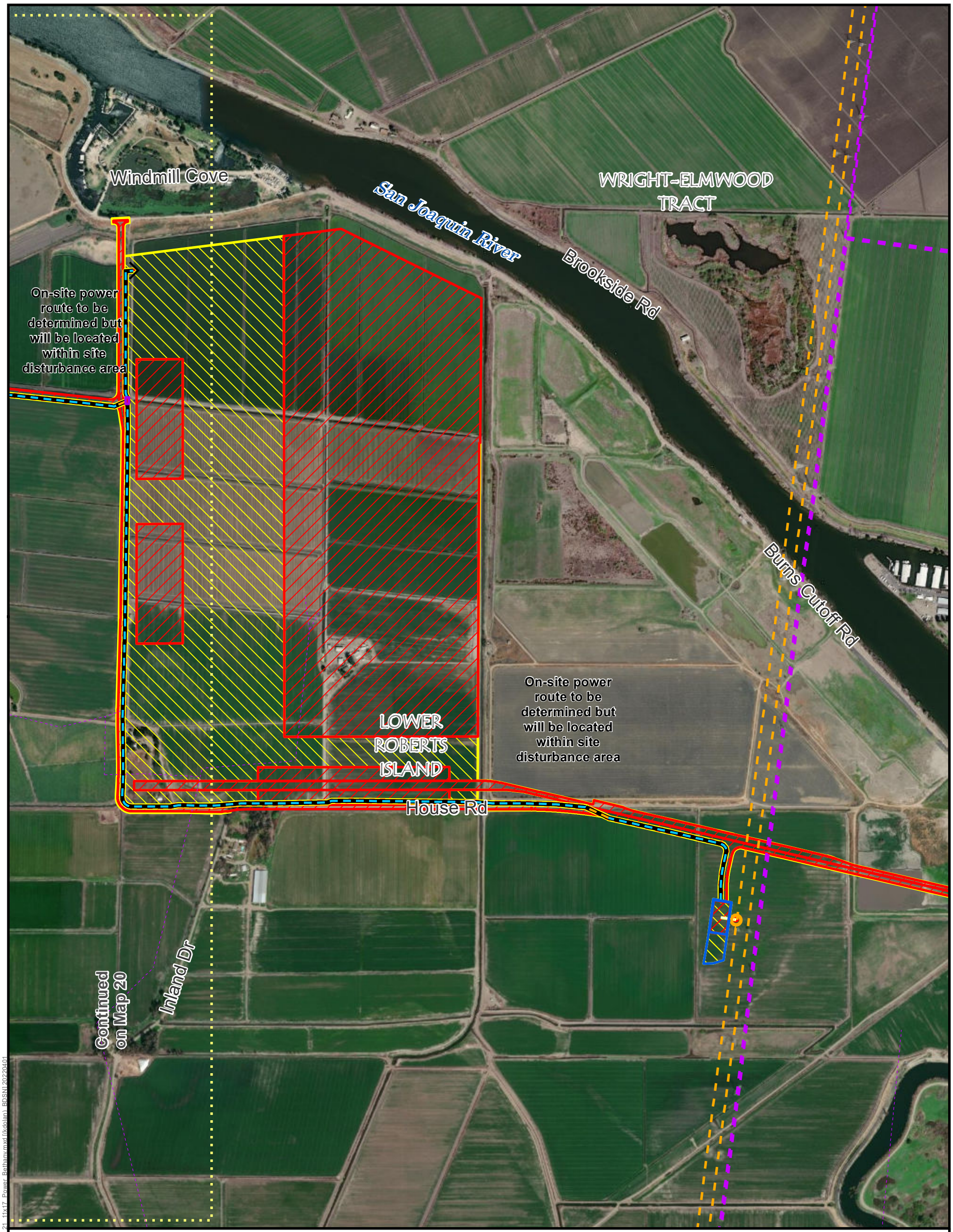

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Connection to Existing Overhead
Proposed Substation
Proposed Switching Station

Proposed Underground Power
Within Proposed Roadway
Outside Roadway

Proposed Overhead Power
New Line and Poles

Existing Power
PG&E Low Voltage
11 kV
PG&E High Voltage
230 kV
WAPA
230 kV

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 1,000 Feet

Map 21
Bethany Reservoir Alternative Power Supply
Lower Roberts Island
04/01/2022

Data Source: DCA, DWR

TWGI-38\GIS_33_00\GISRequest_16\Deliverable_10\ENG159_21_11x17_Power_Bethany.mxd (fkdolan) BDSNI 20220401

Connection to Existing Overhead Metering Area

Existing Power
PG&E Low Voltage
11 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 500 Feet

Map 22
Bethany Reservoir Alternative Power Supply
Upper Jones Tract
04/01/2022

Data Source: DCA, DWR

TWGL38\GIS_33_00\GISRequest_14\Deliverable_10\ENG159_21\ENG159_21_11x17_Power_Bethany.mxd (kdolan) BDSNI 20220401

Connection to Existing Overhead
Metering Area
Proposed Underground Power
Within Proposed Roadway

Existing Power
PG&E Low Voltage
11 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

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N

0 500 Feet

Map 23
Bethany Reservoir Alternative Power Supply
Union Island
04/01/2022

Data Source: DCA, DWR

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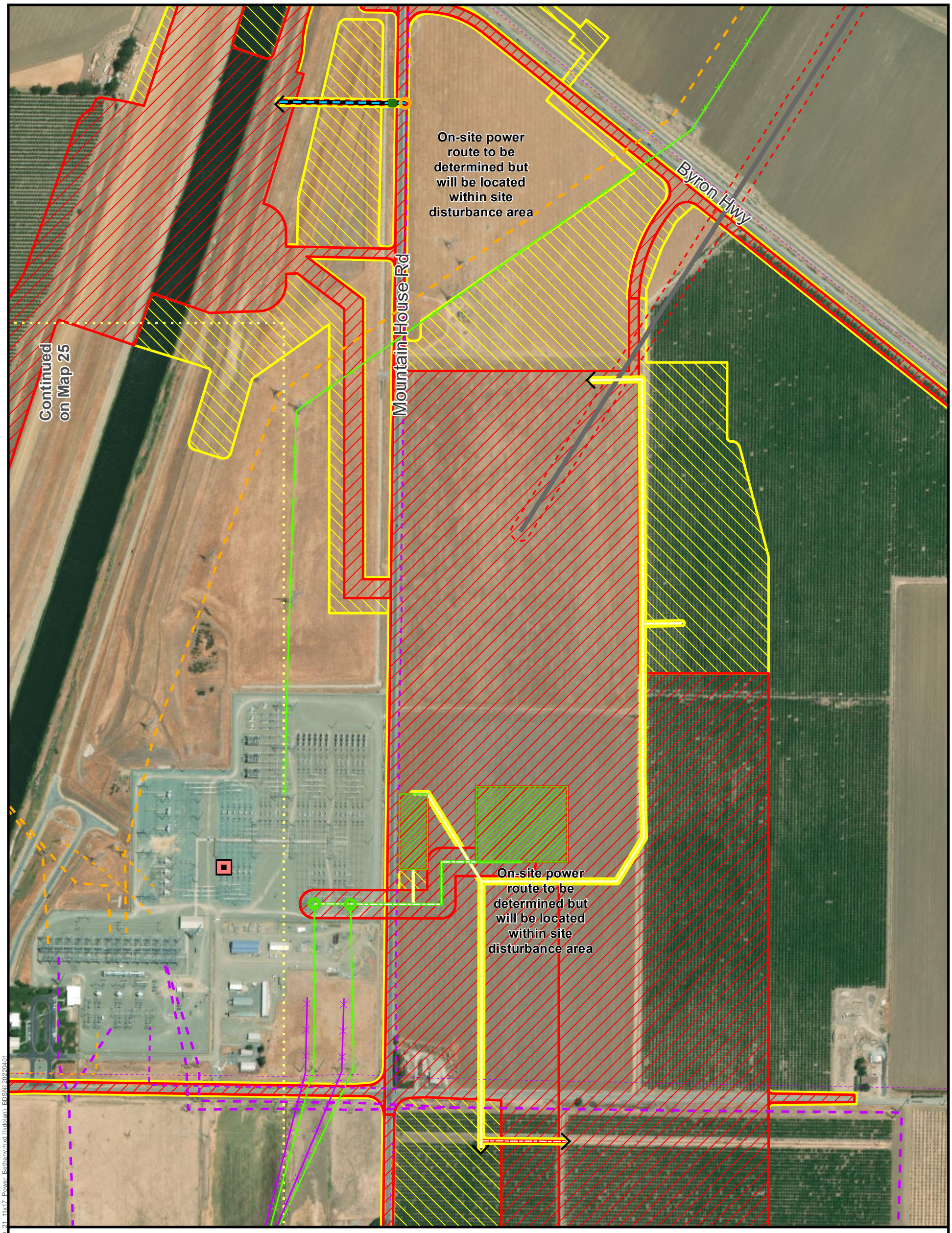

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Existing Substation
Connection to Existing Overhead
Connection to Existing Substation
Metering Area
Substation

Proposed Underground Power
Outside Roadway

Proposed Overhead Power
New Line and Poles
New Line and Towers
Overhead New

Existing Power
PG&E Low Voltage
11 kV
PG&E High Voltage
60-70 kV
500 kV
PGE High Voltage
230 kV
WAPA
60-70 kV
230 kV
Other
TANC 500 kV

Tunnel

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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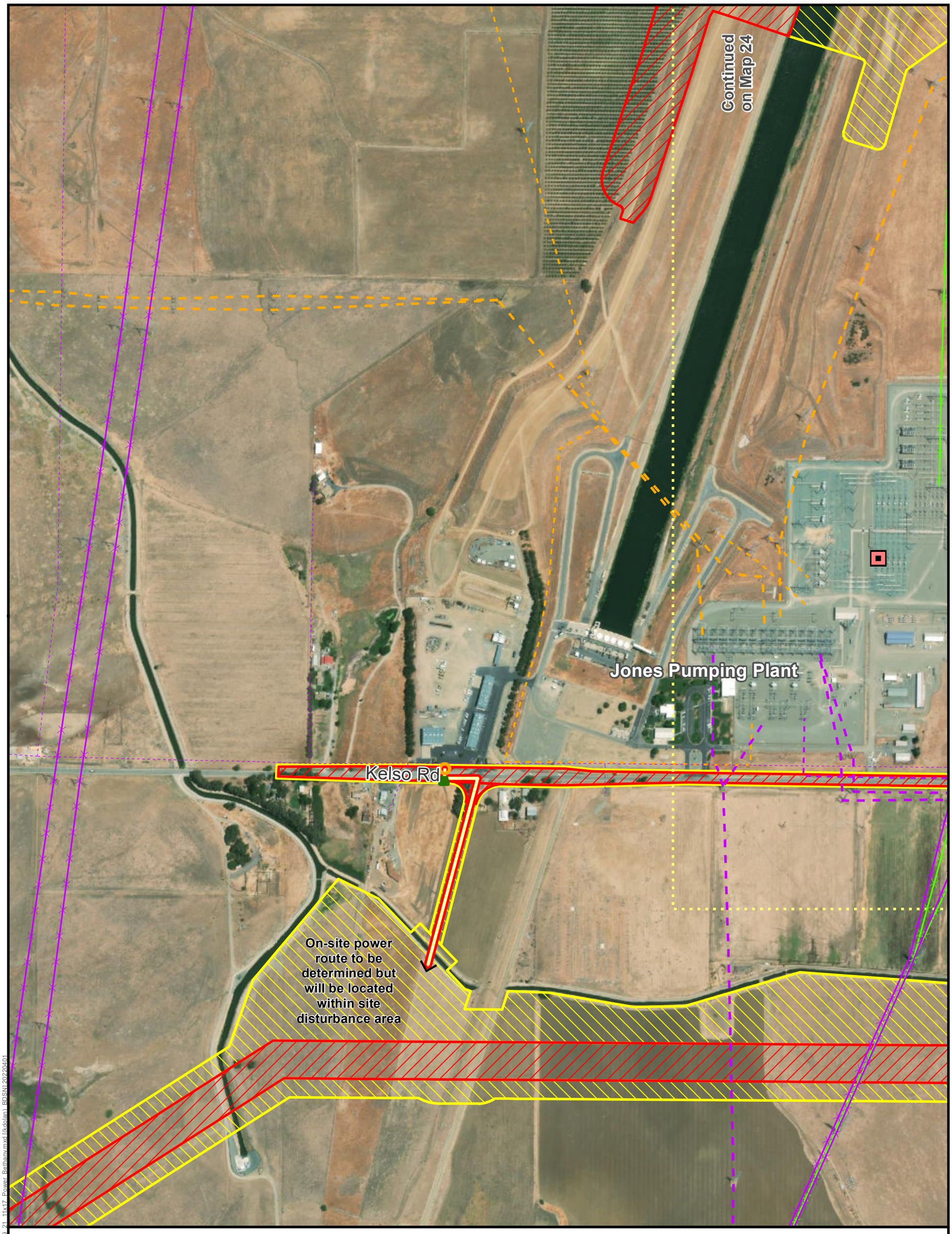
N
0 500 Feet

Map 24
Bethany Reservoir Alternative Power Supply
Bethany Complex
04/01/2022

Data Source: DCA, DWR

TWGL38\GIS_33_00\GISRequest_1\E\Deliverable_10\ENG159_21\ENG159_21_11x17_Power_Bethany.mxd (kkolan) BDSN 20220401



Page Index
Existing Substation
Connection to Existing Overhead
Metering Area

Proposed Overhead Power
New Line and Poles

Existing Power
PG&E Low Voltage
11 kV
PG&E High Voltage
60-70 kV
500 kV
PGE High Voltage
230 kV
WAPA
60-70 kV
230 kV
Other
TANC 500 kV

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

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N
0 500 Feet

Map 25
Bethany Reservoir Alternative Power Supply
Bethany Complex
04/01/2022

Data Source: DCA, DWR

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Connection to Existing Overhead
Metering Area
Proposed Overhead Power
New Line and Towers

Existing Power
PG&E Low Voltage
11 kV
PG&E High Voltage
60-70 kV
PGE High Voltage
230 kV

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

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N

0 500 Feet

Map 26
Bethany Reservoir Alternative Power Supply
Bethany Complex
04/01/2022

Data Source: DCA, DWR

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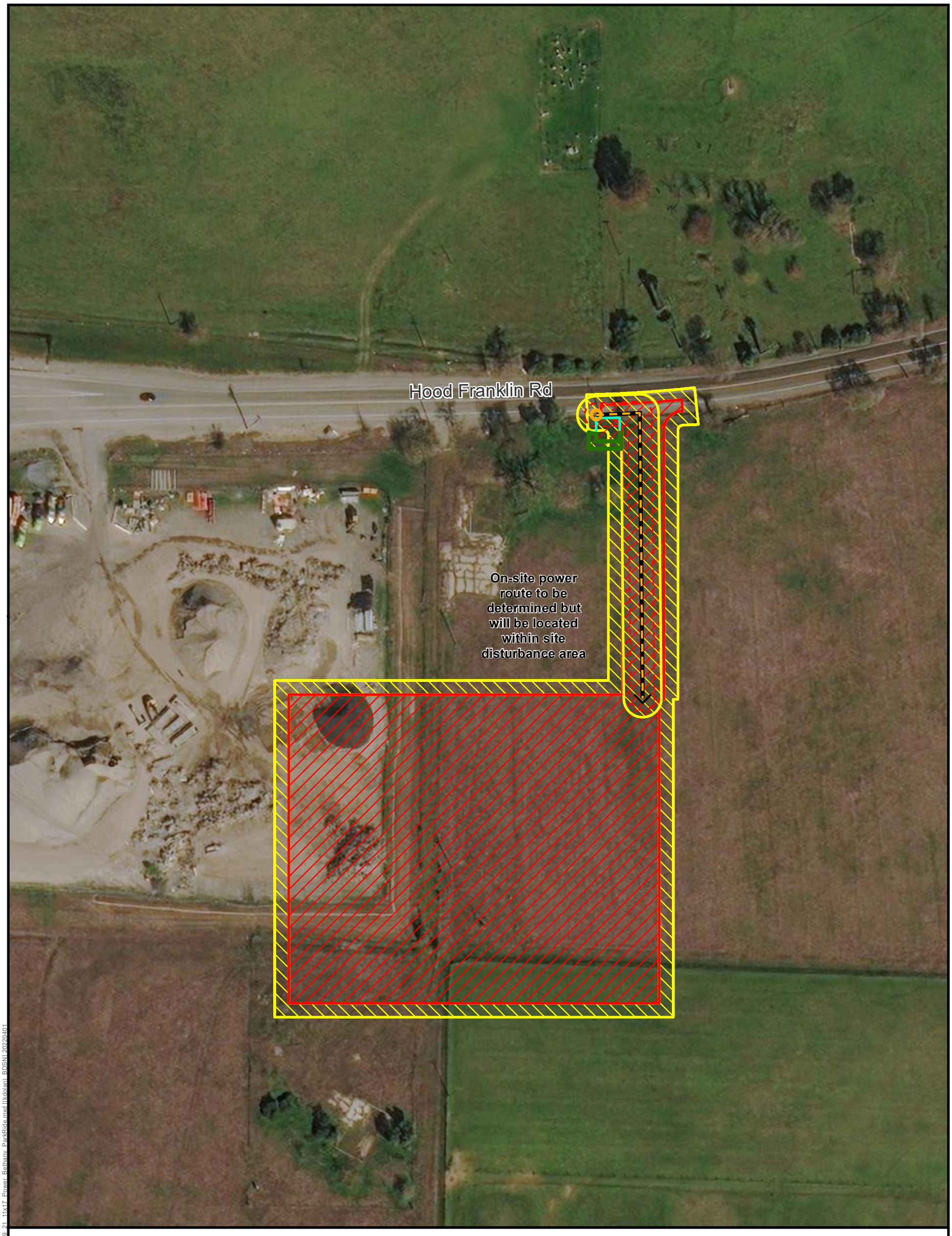

Connection to Existing Overhead
Proposed Metering Area
Metering Area
Proposed Underground Power
Within Proposed Roadway

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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N

0 100 Feet

Map 27
Bethany Reservoir Alternative Power Supply
Hood Franklin Park & Ride
04/01/2022

Data Source: DCA, DWR

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Connection to Existing Overhead
Proposed Metering Area
Proposed Overhead Power
New Line and Poles

Existing Power
PG&E Low Voltage
11 kV
PG&E High Voltage
60-70 kV
115 kV

Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

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DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

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N

0 100 Feet

Map 28
Bethany Reservoir Alternative Power Supply
Charter Way Park & Ride
04/01/2022

Data Source: DCA, DWR

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