Appendix H3. SCADA/Communications Routing and Basic Design Approach (Final Draft)

1. Introduction and Purpose

This technical memorandum (TM) describes the communications criteria and physical characteristics to establish planning level communication routes for the supervisory control and data acquisition (SCADA) system serving the Delta Conveyance Project (Project). The communications network connects major operations centers, intakes, and remote data sites that require high speed, reliable data communications throughout construction and long-term operations. This TM defines communications design criteria, describes physical characteristics of communications media, and provides planning level installation notes. It then identifies potential routes for each fiberoptic connection, using existing telecommunications routes and planned road modifications as much as possible. Finally, network route design approaches are analyzed. The purpose of this TM is to evaluate physical media options, recommend the most viable media, and identify potential media routes with the minimum environmental footprint for the Project.

1.1 Document Organization

This TM contains the following sections:

- Introduction and Purpose
- Network Sites
- Network Route Design
- Alternatives Analysis
- Recommendations
- Attachment 1 – Communications Diagrams
- Attachment 2 – Antenna Installation Details
- Attachment 3 – Delta Conveyance Project Route Maps

2. Network Sites

The data communications network connects three operations centers, as shown in the Communications Diagram in Attachment 1. The operations centers are the Project Operations Center (POC), Delta Field Division Area Control Center (DACC), and the Bethany Reservoir Pumping Plant (BRPP). In addition, the communications network monitors and controls the intakes, and monitors up to four remote data sites with instrumentation for level, flow, or intrusion indicators.

- **POC:** The POC is the central operations control for the State Water Project, located in the suburban Sacramento area. It remotely monitors water conveyance both north and south of the Project. It would be the remote operations control for the Project as well, and it would require reliable and responsive access to the Project SCADA system.
- **DACC:** This operations center is located in the administration building located at the site of the Harvey O. Banks Pumping Plant (Banks). The DACC operates the pumping plants and California Aqueduct system south of the Delta. Its operations would be closely coordinated with those of the BRPP. It would also require reliable and responsive access to the Project SCADA system.

- **Bethany Reservoir Pumping Plant:** This operations center would operate the entire Project facilities, including the intakes, tunnel shafts, BRPP, and Bethany Reservoir Discharge Structure. The Project SCADA system servers and master programmable logic controller (PLC) would be located here, which would require reliable and responsive SCADA data to be directly and independently accessible. All pumping plant PLCs, individual pump PLCs, and individual control structure PLCs would communicate directly to the Master PLC through a separate and independent network. SCADA data from the Intakes and other remote data points would communicate directly through the backbone links described here.
- **Intakes:** These facility-level network sites would control and monitor the intakes associated with the Project. They would include a PLC at each intake that monitors and controls intake features and communicates to the main operations centers (POC, DACC, and BRPP) through the backbone network. Internet access would be required during construction.
- **Remote data sites:** The remote monitoring of level, flow, or intrusion data points at three tunnel shaft locations (Twin Cities Complex, Lower Roberts Island, and Terminous Tract), plus monitoring and control at the Bethany Reservoir Discharge Structure would be anticipated. Internet access would be required at launch shafts during construction.

3. Network Route Design

Each operations center, intake, control structure, and selected remote data site requires data communications for the SCADA system, information technology (IT)/Internet access, and video security cameras. The data communication requirements dictate design criteria, such as segregation, redundancy, and bandwidth. All network and communications transport topology and equipment would be specified by the DWR Operations and Management (O&M) Communications Branch.

3.1 Network Design Criteria

The basis of design for the data communication network includes the following criteria:

- **Mission-critical Segregated Networks**
  - **SCADA:** The SCADA system, a mission-critical component, continuously monitors process and equipment performance, collects these data for historical trending and analysis, displays performance in real time, and enables automatic operations where necessary or desired. This criticality requires high reliability achieved by using redundancy and recovery strategies. SCADA data typically requires relatively low bandwidth even with thousands of inputs and outputs at a SCADA-connected site. SCADA networks would be based on 1-gigabyte (GB) links.
  - **Business:** Access to business applications and the Internet at some sites is also mission-critical. Employees access maintenance and financial systems for more efficient and effective maintenance work practices. They access the Internet for documentation and diagnostic assistance. IT and Internet access typically requires a low to high range of bandwidth, depending on the data requested at any specific time period. Business networks would be based on 1-GB links, upgradeable to 10 GB.
  - **Security (Video cameras):** Video security is mission-neutral. Video security cannot prevent malicious intervention; it can only record interventions to be used as forensic evidence. Video cameras require high bandwidth capacity. Security networks would be based on 10GB links.
  - **SCADA Segregation:** Due to the mission critical nature of the SCADA system, DWR requires network segregation. Network segregation prevents high data traffic events from overwhelming

SCADA specific data communications that could cause operational issues in a 24/7 environment. The Project SCADA network will be segregated from the Business and Security networks and will integrate with the existing State Water Project SCADA network.

- **Mission-critical Redundant Backbone Links**
  - The backbone links described here would achieve redundancy by establishing two independent paths from each operations center to every other operations center:
    - **Link 1:** The link between the POC and the DACC is already established through leased lines, and consists of redundant fiberoptic lines leased from a telecommunications provider. Redundancy is achieved by two independent paths between the data centers over approximately 59 miles.
    - **Link 2:** The link between the DACC and the BRPP operations centers would be a fiberoptic cable installed in dedicated conduits along future and existing road rights-of-way. Some redundancy would be achieved by using multiple fiberoptic pairs or multiple cables, but the path remains singular over approximately 4 miles.
    - **Link 3:** The link between the BRPP operations center and the intakes would require leased communication links for all segregated networks. Installation options are overhead (OH) or buried along Project access and public roads (underground [UG]). The path would have a length of approximately 11 miles between the intakes (assume Intake C-E-3) and the leased router (CTX) at Eschinger Road and a length of approximately 4 miles between the BRPP and the leased router in Mountain House.
    - **Link 4:** The link between the intakes and the POC would use leased lines and new fiberoptic cable installed along existing telecommunications or road rights-of-way. Installation options are overhead (OH) or buried along Project access and public roads (underground [UG]). The path would have a length of approximately 11 miles between the intakes (assume Intake C-E-3) and the leased router in Freeport.
- **Mission-supportive Remote Data Sites**
  - **SCADA Data:** Remote data points with surface water elevations, flows, or intrusion sensors would require a network connection with minimal bandwidth. These do not require redundancy because the remote data points are noncritical to the process.
  - **Internet Access:** Internet access could be provided to remote data points during construction.
  - **Security Cameras:** Video cameras would need a network connection with high bandwidth but would not require redundancy.

3.2 Physical Media Options

Data communications over long distances (further than 300 m) use fiberoptic cables, satellite radio, or microwave radio signals. All communication media have inherent characteristics that must be considered when selecting the physical media for a given communication application. These characteristics are described here and summarized in Table 1.

- Capacity (bandwidth based on the frequency range of the underlying electro-magnetic waveform)
- Vulnerability (based on sensitivity to electro-magnetic interference [EMI])
- Constructability (based on installation and construction requirements)
- Maintenance (based on accessibility, frequency of routine maintenance, and replaceability)

Table 1. Characteristics of Communication Media

Installation/ Media Option	Capacity (Hz)	Vulnerability (to EMI)	Constructability	Maintenance
Overhead/ Fiberoptic	500 THz	Not applicable	Use existing or new power poles along existing ROW	Splices every 3-5 miles; repeaters every 20 miles
Underground/ Fiberoptic	500 THz	Not applicable	Use dedicated conduit along Project or public ROW	Splices every 3-5 miles; repeaters every 20 miles
Inside Tunnel/ Fiberoptic	500 THz	Not applicable	Design and construction issues for installation in Project tunnels	Splices every 3-5 miles; repeaters every 20 miles; difficult access
Leased/ Satellite Radio	3 GHz	High	Building or pole mounted dish antennas	Covered by lease agreement
Leased/ Cellular	900 MHz	Medium	Building or pole mounted Yagi antennas, signals may be unavailable	Covered by lease agreement
Unlicensed/ Microwave	900 MHz	Medium	Building or pole mounted Yagi antennas, Omni antenna on TV tower	Antenna replacement
Licensed/ Microwave	450 MHz	Low	Building or pole mounted Yagi antennas, Omni antenna on TV tower	Antenna replacement

Notes:
GHz = gigahertz
MHz = megahertz
THz = terahertz
TV = television

3.3 Installation Notes

When possible, the construction of fiberoptic-based communications systems for the Project would use existing telecommunications infrastructure, dedicated conduits within public roads and planned Project-specific road modifications, and termination panels installed inside or on the buildings or structures.

The constructability of radio-based communications systems, whether satellite or microwave, relies on clear lines of sight to provide reliable signal strength. Leased systems (satellite and cellular) depend on the availability and power of existing radio transmitters to provide signal strength within the vicinity of potential Eastern or Central corridors. Satellite signals are assumed to be available, while cellular signals are known to be generally unavailable within these corridors.

The signal strength of microwave systems (licensed and unlicensed) depends on elevation to clear most obstacles in the lines of sight. Assuming a master radio transmitter could be placed at sufficient elevation on one of the TV towers (which are up to 1,000 feet tall) near Walnut Grove, it is likely that most receiving antennas would need to be only 20 to 30 feet high to clear undergrowth and most trees. Geological topology and buildings are unlikely to be significant obstacles within the boundary of potential corridors. A microwave radio system would require an omni-directional antenna on the TV tower, and directional antennas (also known as Yagi) antennas pointed toward the TV tower at each remote site.

Attachment 2 includes installation details for microwave antenna mounts. Figure A2-1 shows installation details of a Yagi antenna for both building and pole mounts. Figure A2-2 shows installation details of an Omni antenna for both building and pole mounts. Table 2 summarizes the general specifications for both antennas.

Table 2. Microwave Antenna Specifications

Antenna Type	Dimensions Length by Width	Structural Height (feet)	Color	Footprint
Yagi (directional) (pole mount)	36" by 8"	20 to 30	Bronze or Aluminum (pole can be painted)	3 feet by 3 feet concrete base
Yagi (directional) (building mount)	36" by 8"	20 to 30	Bronze or Aluminum	Not applicable
Omni-directional (existing TV Tower)	36" by 3"	1,000	Bronze or Aluminum	Not applicable

3.4 Fiberoptic Routes

For high-speed, reliable and secure data communications, fiberoptic is the preferred media for this Project. Installation methods include OH on existing power poles and UG in accessible locations. The preferred installation method is UG. UG includes four underground installation approaches: (1) adjacent to roadway (UGA), (2) in existing roadway (UGE), (3) in proposed roadway (UGN), and (4) trenchless or in a common trench (UGT). Attachments 3 include GIS-based maps that show the proposed fiberoptic routes using each installation approach, including:

- **Delta Conveyance Project SCADA Maps:** This set of one key map and 10 detailed maps includes four backbone routes, three facility routes, and three remote site routes to individual shafts. Proposed route segments are color-coded by installation method.

The maps in Attachment 3 show potential fiberoptic routes to establish the network backbone and SCADA connections to all applicable facilities, including certain remote sites.

4. Alternatives Analysis

Connecting the operations centers and all remote data sites with a fiberoptic system requires point-to-point routes. One point is defined by the facility site locations. The other point is defined by router locations in an existing fiberoptic network, typically owned by a telecommunication provider. Surface connections will require OH or UG installations. Each design assumes no spare fiber pairs in existing fiber cables and therefore, new fiberoptic cable must be installed from the nearest router to each operations center and to each remote data site. Each cable includes at least six fiber pairs, to include three segregated networks (SCADA, Business, and Security) with three spare pairs.

4.1 Network Route Groups

For identification purposes, the physical network fiber routes are organized into two groups (Table 3).

Table 3. Physical Fiber Route Groups

Group	ID	Start Point	End Point
Backbone	B01	Bethany Reservoir Pumping Plant (Link 2)	DACC
	B02	Bethany Reservoir Pumping Plant (Link 3)	Mountain House Router
	B03	C-E-3 (Link 3)[a]	Eschinger Road Router
	B04	C-E-3 (Link 4)[a]	Freeport Router
Facilities	F02	C-E-5	B03, Access Road
	F03	Bethany Reservoir Pumping Plant	Bethany Reservoir Discharge Structure[b]
Remote Sites	E01	B03, Lambert Road	Twin Cities Complex
	E04	Lodi Router	Terminous Tract Shaft
	E06	Rough and Ready Island Router	Lower Roberts Island

Notes:
[a] No maintenance shafts require long-term SCADA connectivity, so they are not included in the Network Route Groups Shown in Table 3.
[b] The Bethany Reservoir Discharge Structure would have a supplemental connection to the DACC since an existing fiberoptics cable originating at the DACC traverses the site of the structure and data from that structure would also be communicated into the system via a connection to the existing cable.

4.1.1 Backbone Group

The Backbone Group of network routes would connect the intakes and BRPP operations centers to each other, and the POC and DACC operations centers through leased lines. Link 2 (BRPP to DACC) would be established by a direct fiber route. Links 3 and 4 would be established by installing new fiber cables from the operations centers to the nearest router for the leased line network. The Backbone Group assumes 24 fiber pairs for all routes.

Conceptual Routes were developed as follows:

- B01: The route follows west from the BRPP to Mountain Road to Kelso Road, then west along Kelso Road to the DACC on the campus of DWR’s existing Harvey O. Banks Pumping Plant. No other reasonable route choices are available because it follows the shortest and most direct public roads to the DACC.
- B02: The route follows Project roads to Kelso Road, then east along Kelso Road to Great Valley Parkway on the west side of the Mountain House development. The it goes south on Great Valley to West Hargrove Avenue, east on West Hargrove, and south on S Jacobs Driver to its termination point at the Mountain House Router. No other reasonable route choices are available because it follows the shortest and most direct public roads to the router location.
- B03: The route follows Project roads south to Lambert Road, then east along Project-improved Lambert Road to Franklin Blvd, then follows existing public roads on the shortest path to the Eschinger Road Router, which is one of the two closest routers to the intakes area. No other reasonable route choices are available since the route would be in roads already disturbed by other Project needs, and follows the shortest and most direct public roads to the connection point.

- B04: The route follows existing rural roads on the shortest path to an existing overhead line along Scribner Road, then utilize the existing overhead line north to SR 160, then follows existing SR 160 on the shortest path to an existing overhead line that leads the rest of the way to the Freeport Router. No other reasonable route choices are available since the route would connect to the other one of the two closest routers to the intakes area (see B03) and follows the shortest and most direct existing roads; plus, it would maximize the use of existing overhead lines.

Table 4 summaries the Backbone Group fiber routes.

Table 4. Backbone Group Fiber Routes

Route ID	OH Miles	UGA Miles	UGE Miles	UGN Miles	UGT Miles	Total Miles
B01	0	.12	2.69	0	0	2.81
B02	0	.29	3.60	1.58	0	3.89
B03	0	3.43	0	7.7	.17	11.3
B04	5.02	3.1	.87	2.30	.12	11.41
Total						**29.41**

All four Backbone Group surface routes are included in the design for the Delta Conveyance Project SCADA configuration. Attachment 3 shows the Backbone Group OH and UG segments.

4.1.2 Facilities Group

The Facilities Group of network routes would connect the intakes and Bethany Complex to the Backbone Group routes adjacent to each facility. Each connection would be established by a direct fiber route. F02 assumes two parallel routes separated by the access road width, each with six fiber pairs, and each connecting at a patch panel at the Backbone cable route junction. F03 would be a single six fiber pair cable. It would be backed up by connecting the system to an existing DWR fiberoptic cable in the roadway crossing the Bethany Reservoir Discharge Structure.

F02 route is short direct connections to the Backbone routes passing the respective sites, therefore they are all the only reasonable routes. F03 follows the Project's Bethany Reservoir Aqueduct and would be installed as part of that effort, therefore it is the only reasonable route.

Table 5 summarizes the Facilities Group fiber routes.

Table 5. Facilities Group Fiber Routes

Route ID	OH Miles	UGA Miles	UGE Miles	UGN Miles	UGT Miles	Total Miles
F02	0	0	0	2.56	0	2.56
F03	0	0	0	0	2.82	2.82
Total						5.38

Attachment 3 shows the Facilities Group OH and UG segments.

4.1.3 Bethany Reservoir Alignment Tunnel Group

The Bethany Reservoir Alignment tunnel group of network routes would connect the Twin Cities Shaft (E01), the Terminous Shaft (E04), and Lower Roberts Island Shaft (E06) to the BRPP operations center via leased lines. The analysis assumes six fiber pairs are needed for each remote data point. Each route would require new fiberoptic cables from the shafts to the nearest leased line router. Dual cables and associated connections are not required because, unlike the intakes, these sites will not be long-term mission-critical connections to the system.

- Twin Cities Complex (E01) directly to the Backbone Group extending from the intakes to the Eschinger Road Router (B03) at Lambert Road
- Terminous Reception (E04) Shaft directly to the Lodi Router; this reception shaft is included for long-term water level monitoring midway along the Eastern Corridor
- Lower Roberts Island Shaft (E06) shaft directly to the Rough and Ready Island Router

Conceptual routes were developed as follows:

- E01: The route would follow Franklin Blvd to Lambert Road, then connect to B03. No other reasonable route choices are available since the route would be the shortest direct route and would be adjacent to an existing public road; part of which would be improved as part of the Project.
- E04: The route would follow SR 12 east of the Terminous Tract Shaft to the Lodi Router at Lower Sacramento Road in Lodi. No other reasonable route choices are available since the route would be the shortest direct route to the closest router and about half of the distance would be in the portion of SR 12 that would already be disturbed by other Project needs.
- E06: The route would follow on-site roads and Project-improved House Road east from the shaft over the new bridge over Burns Cut, then follow the new Project access road south along the west side of the Port of Stockton on Rough and Ready Island to Davis Avenue where it would turn east and be routed on existing overhead lines to the Rough and Ready Island Router at Hooper Street. No other reasonable route choices are available since the route would be in the only disturbed roadway path to Davis Avenue and the remainder would be overhead.

Table 6 summarizes the Bethany Reservoir Alignment Tunnel Group.

Table 6. Eastern Corridor Group

Route ID	OH Miles	UGA Miles	UGE Miles	UGN Miles	UGT Miles	Total Miles
E01	not applicable	1.11	not applicable	1.11	not applicable	2.22
E04	3.53	1.33	not applicable	2.02	0.33	7.21
E06	1.29	0.00	0.00	5.50	0.00	6.79
Total						16.22

Attachment 3 shows the Bethany Alignment tunnel shaft Group OH and UG segments.

4.1.4 Delta Conveyance Project Fiberoptic Route Summary

The potential media routes with the minimum environmental footprint for the Delta Conveyance Project establishes the network backbone and SCADA connections to all operations centers, facilities, and selected remote sites. This includes 51.01 miles of new fiberoptic cable.

5. Recommendations

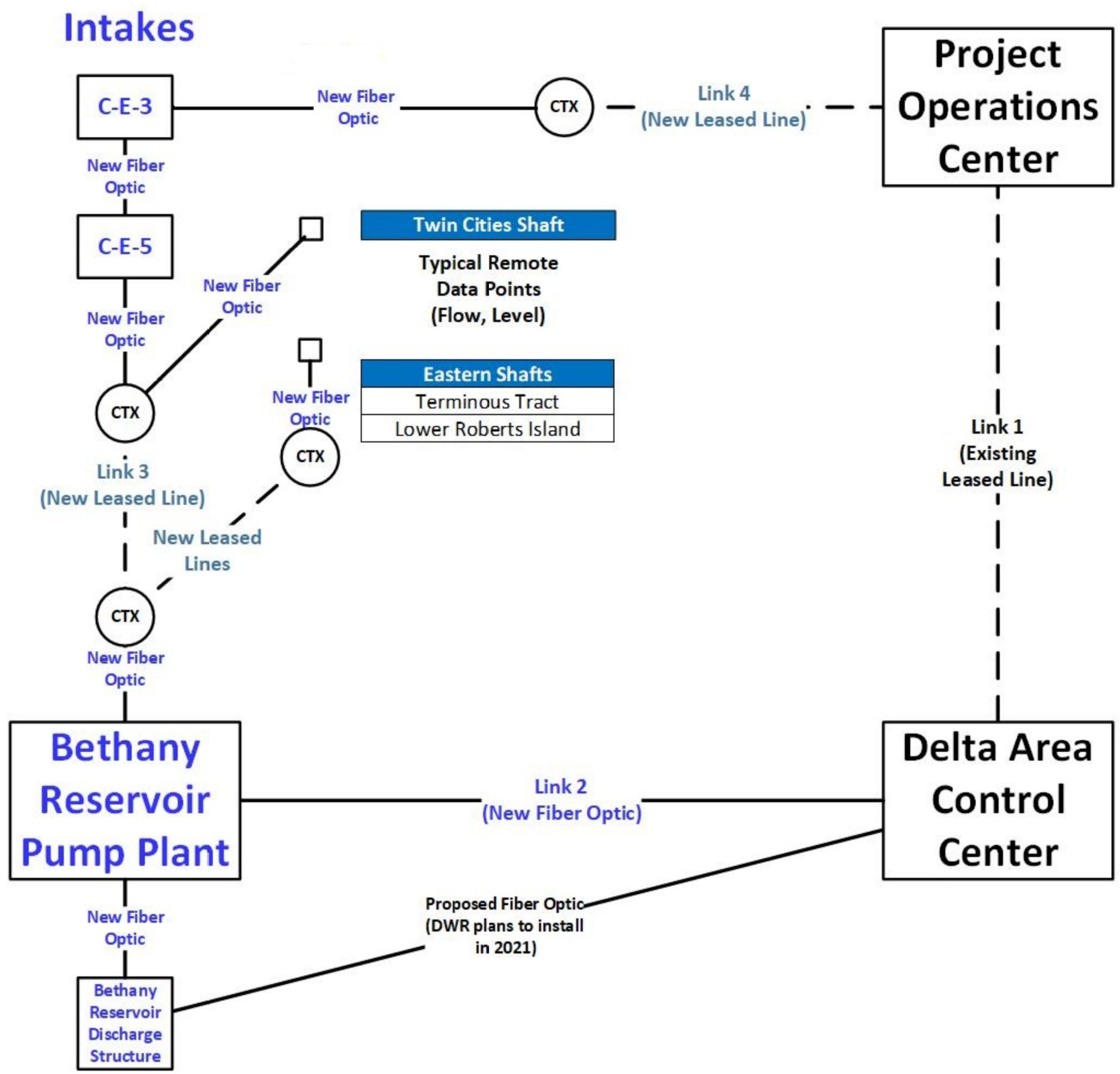
The selection of the Surface Installation design approach is recommended.

It is also recommended overhead fiber installation be minimized in favor of installing fiberoptic cables underground along existing or proposed road rights-of-way. Given the ability to minimize impacts, overhead installation would still appear to be the best option for the B02 (BRPP to Brentwood Router) and portions of the B04 (C-E-3 to Freeport Router) Backbone segments.

Attachment 1
Communications Diagram

Delta Conveyance Communications Diagram

Legend		
Symbol	Description	Count
□	Remote Data Point	2
C-E-3	Local Control Point	4
CTX	Leased Line Point (Router)	4



GENERAL

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

REV	DATE	DESCRIPTION	SUB.	APPD
	SEP 2024	DELTA CONVEYANCE PROJECT CONCEPT ENGINEERING REPORT DRAWINGS		

DESIGNED: M JOHNSON
DRAWN: J OYE
CHECKED: A MURDOCK
APPROVAL RECOMMENDED:
APPROVAL BY: A MURDOCK

CONCEPT PLANNING DOCUMENT
NOT FOR CONSTRUCTION

DCA
DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

DELTA CONVEYANCE PROJECT
CONCEPT ENGINEERING REPORT

COMMUNICATION DIAGRAM

PROJECT NO. W8X97000
SHEET NO. PPE-E-0030GN
REV
SEQUENCE NO.

PPE-E-0030GN_W8X97000.dgn

PLOT DATE:10/1/2024 PLOT TIME:9:03:46 AM

Attachment 2
Antenna Installation Details

Attachment 2. Antenna Installation Details

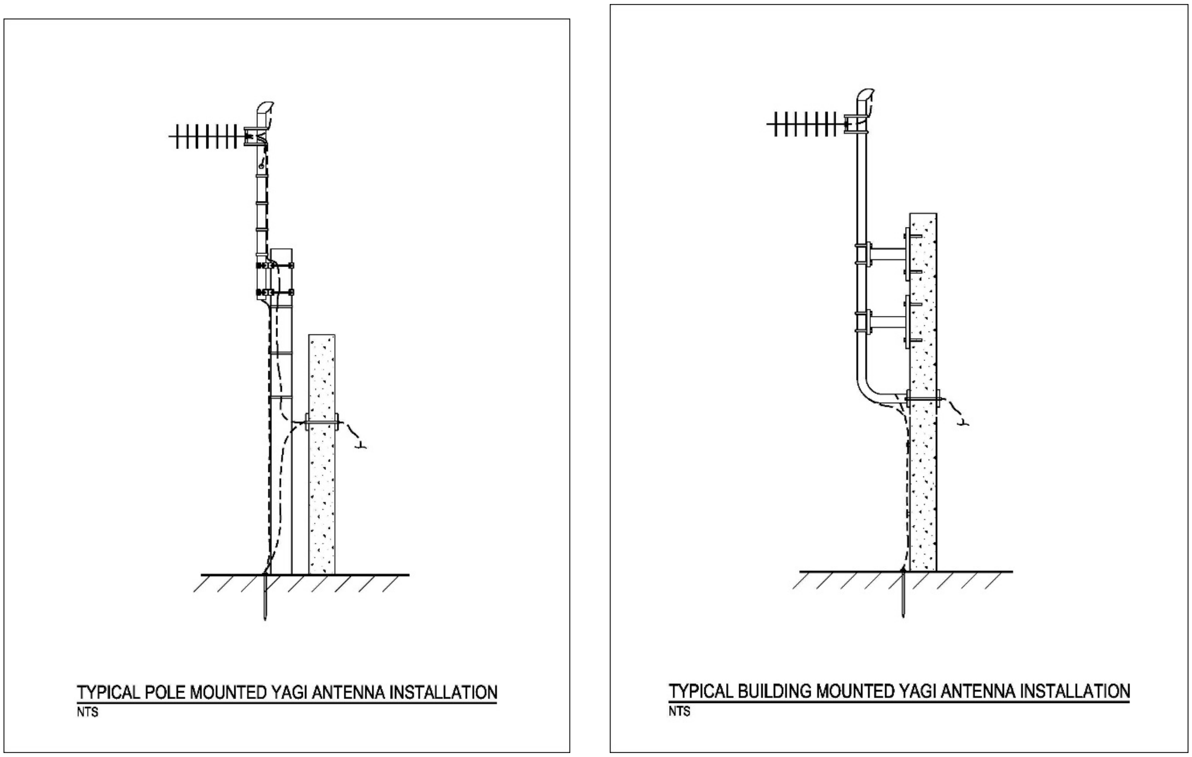


Figure A2-1. Typical Yagi Antenna Installations

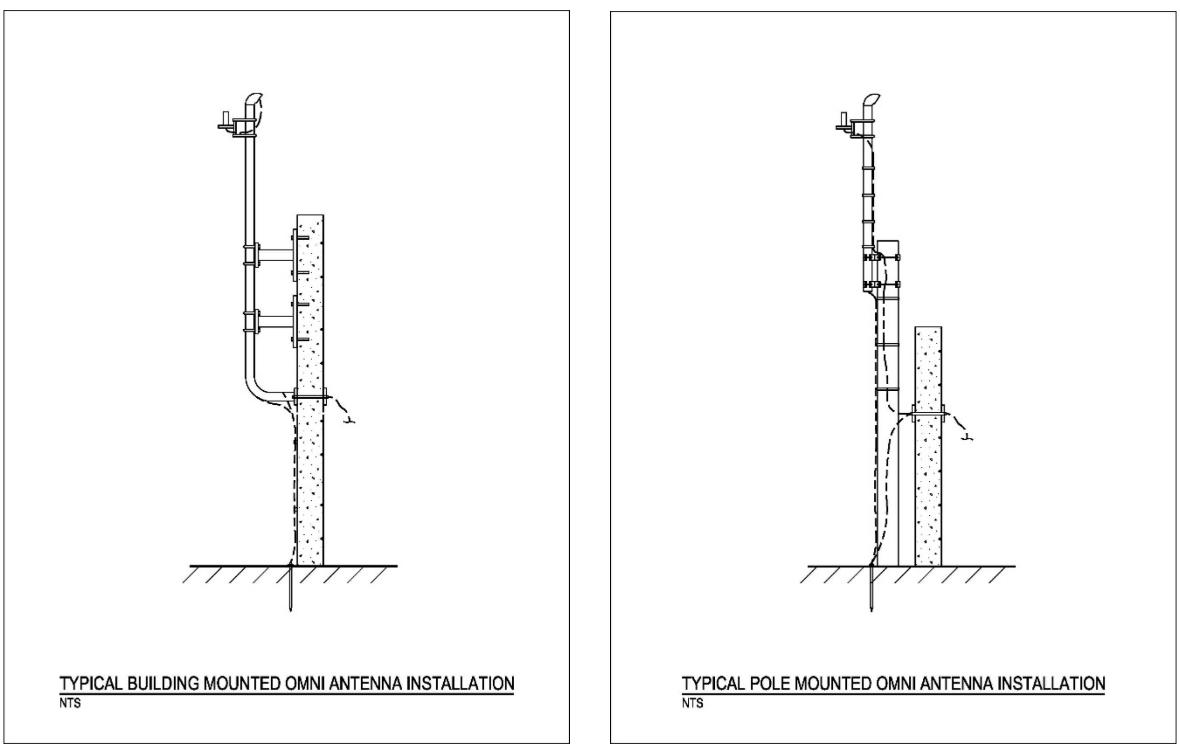
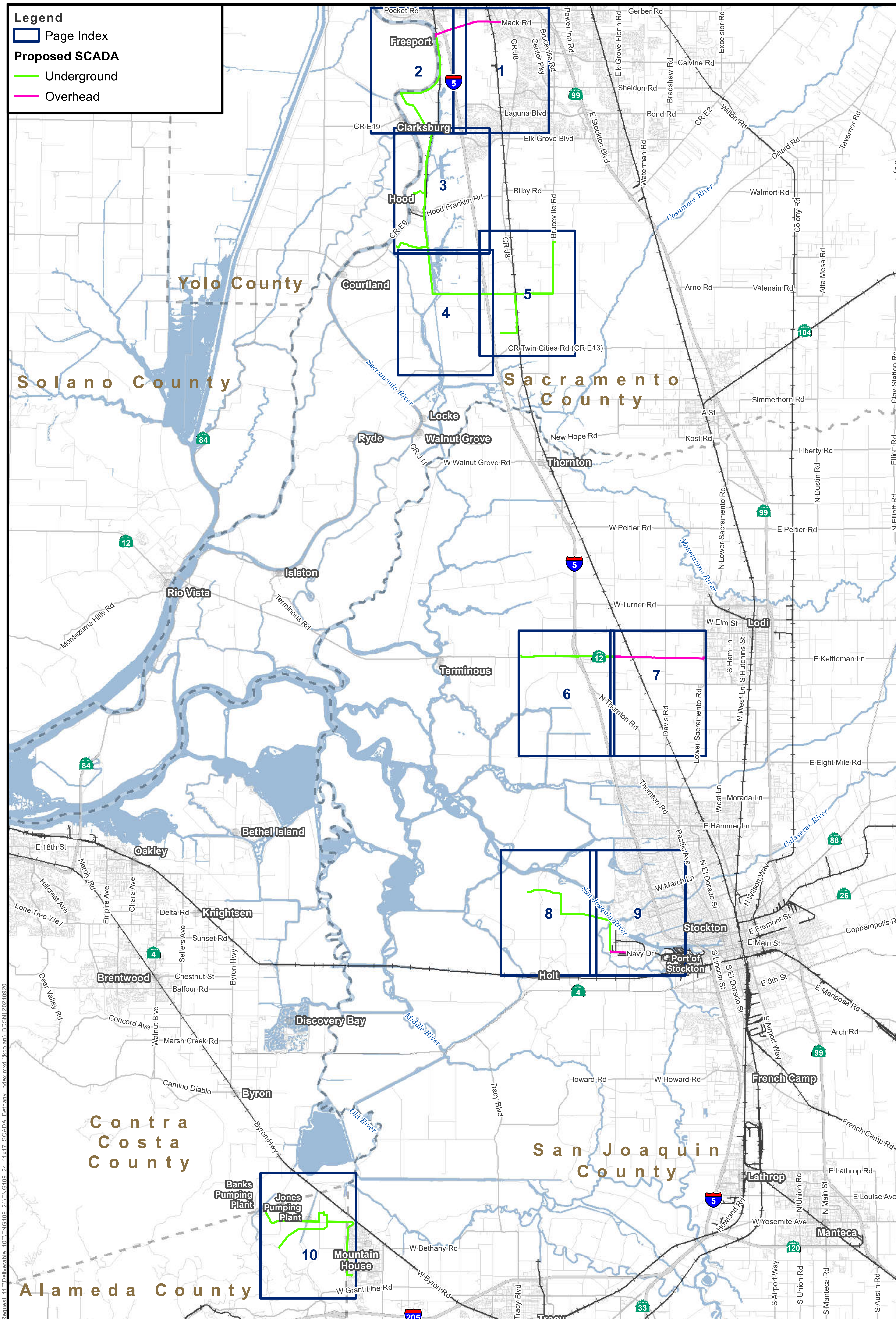


Figure A2-2. Typical Omni Antenna Installations

Attachment 3
Delta Conveyance Project Route Maps



Draft example mapbook for discussion purposes only. This mapbook is a scaled representation of the GIS data and only shows major facilities.

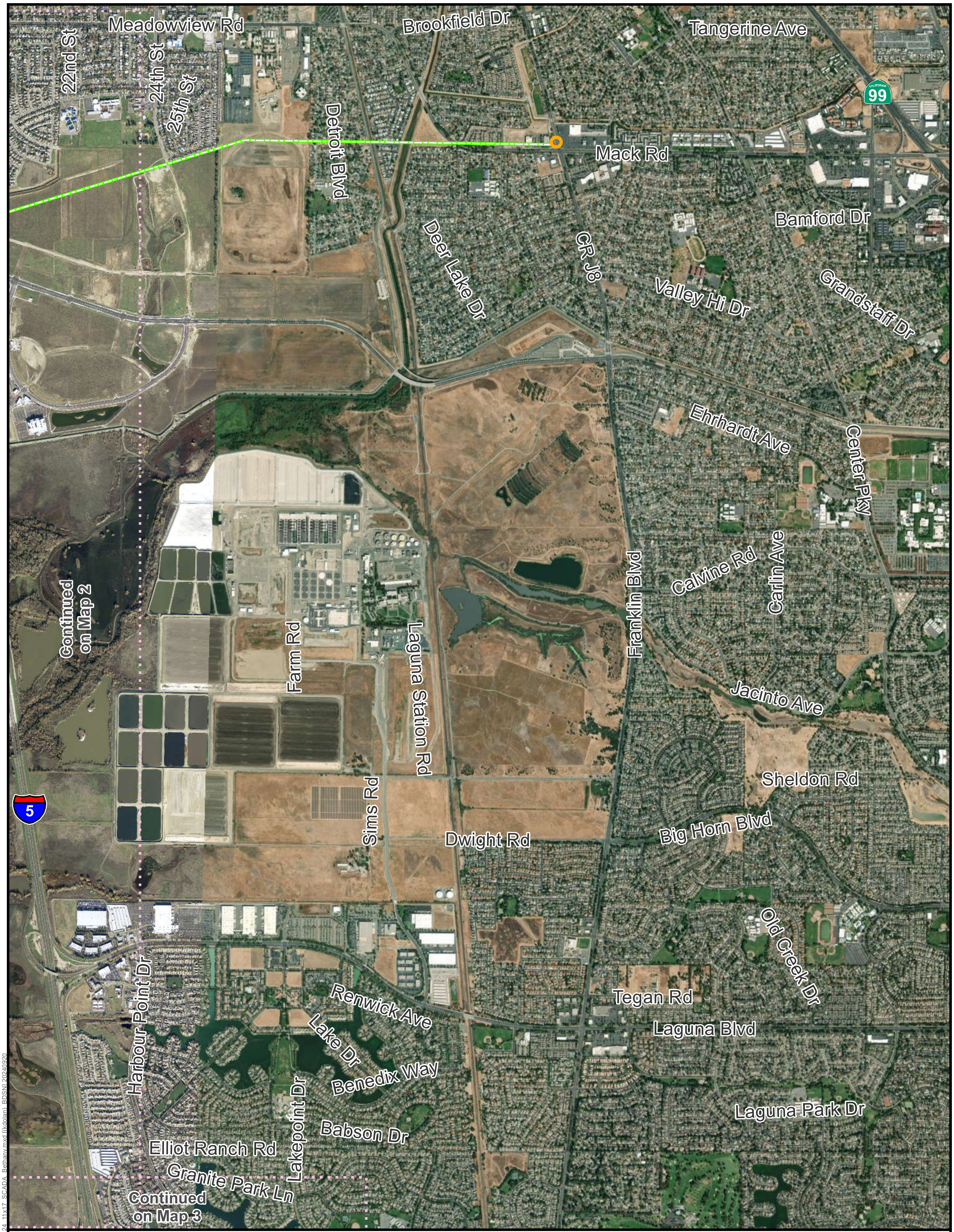
For Illustration Purposes Only

N

0 3.5 Miles

Key Map
Delta Conveyance Project – SCADA
September 2024

Data Source: DCA, DWR



Legend

Page Index
Connection to Existing Router
SCADA Proposed Fiber Routes
Proposed Overhead SCADA
New Line on Existing Poles
Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

Draft example mapbook for discussion purposes only. This mapbook is a scaled representation of the GIS data and only shows major facilities.

DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

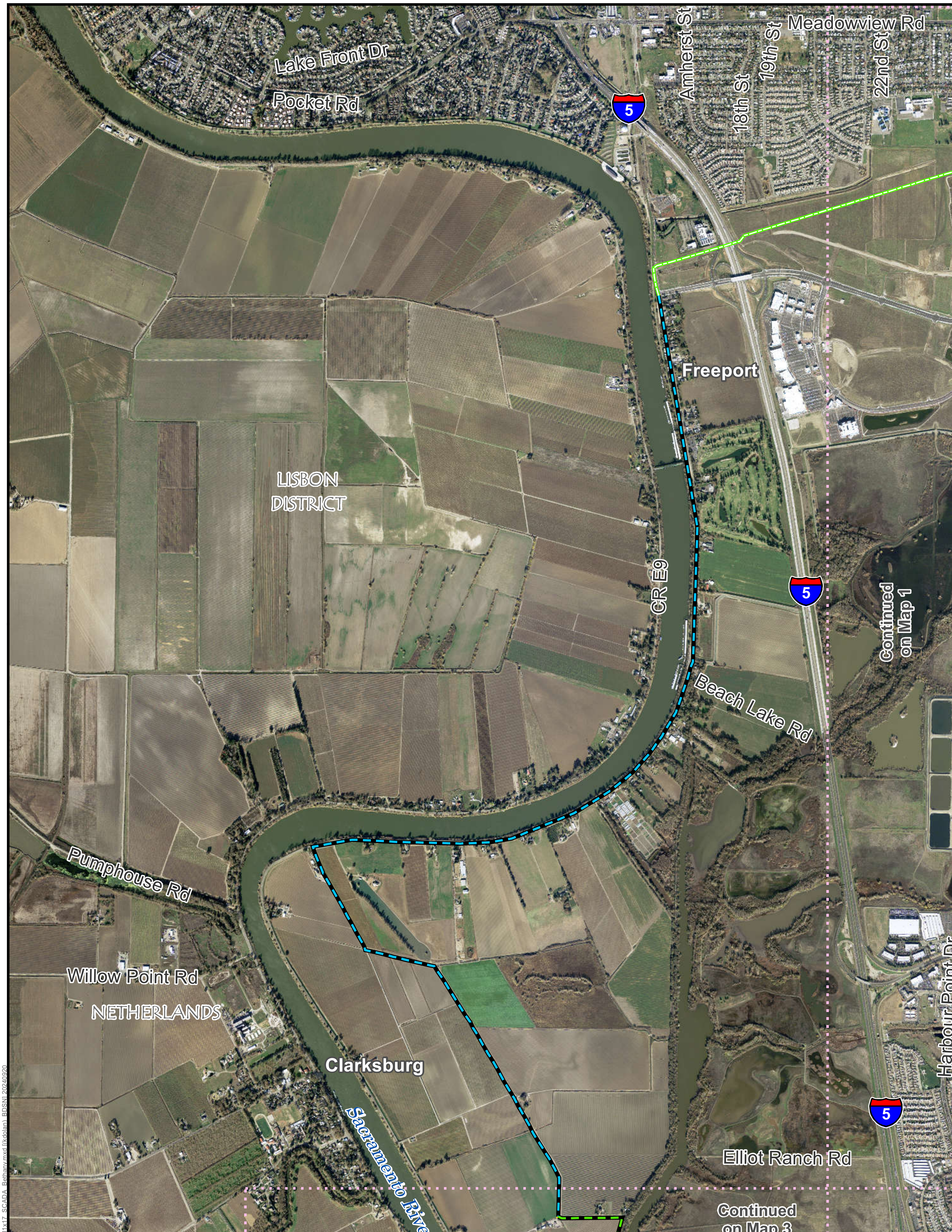
For Illustration Purposes Only

N

0 1,000 2,000 Feet

Sheet 1 of 10
Delta Conveyance Project – SCADA
September 2024

Data Source: DCA, DWR



Legend

Page Index

SCADA Proposed Fiber Routes

Proposed Underground SCADA

Within Existing Roadway

Outside Roadway

Proposed Overhead SCADA

New Line on Existing Poles

Permanent Subsurface Impact

Permanent Surface Impact

Temporary Surface Impact

Draft example mapbook for discussion purposes only. This mapbook is a scaled representation of the GIS data and only shows major facilities.

DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

For Illustration Purposes Only

N

0 1,000 2,000 Feet

Sheet 2 of 10
Delta Conveyance Project – SCADA
September 2024

Data Source: DCA, DWR

Legend

Page Index

SCADA Proposed Fiber Routes

Proposed Underground SCADA

Within Existing Roadway

Within Proposed Roadway Improvements

Outside Roadway

Permanent Subsurface Impact

Permanent Surface Impact

Temporary Surface Impact

Draft example mapbook for discussion purposes only. This mapbook is a scaled representation of the GIS data and only shows major facilities.

DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

For Illustration Purposes Only

N

0 1,000 2,000 Feet

Sheet 3 of 10
Delta Conveyance Project – SCADA
September 2024

Data Source: DCA, DWR

Legend

Page Index

SCADA Proposed Fiber Routes

Proposed Underground SCADA

Within Proposed Roadway Improvements

Permanent Subsurface Impact

Permanent Surface Impact

Temporary Surface Impact

Draft example mapbook for discussion purposes only. This mapbook is a scaled representation of the GIS data and only shows major facilities.

DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

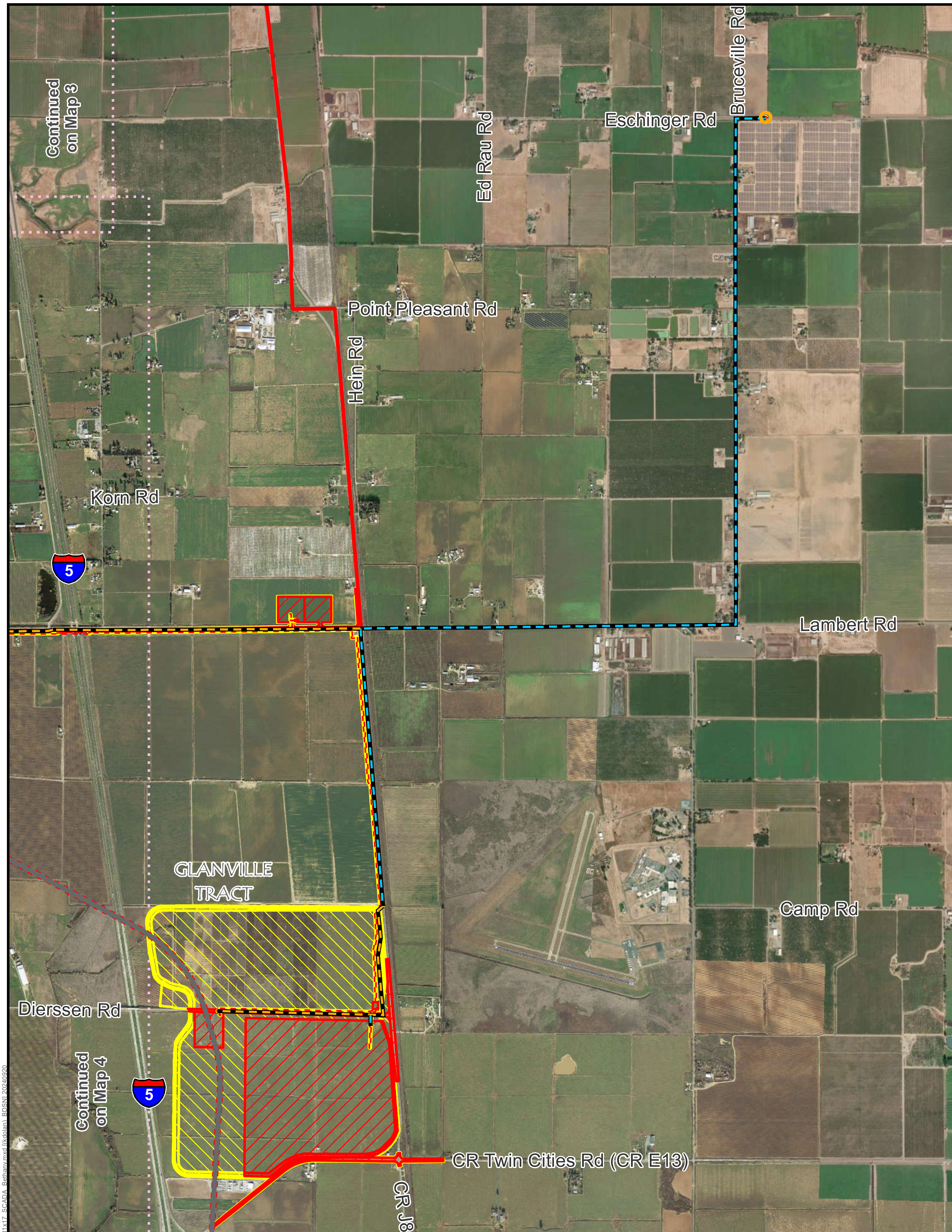
For Illustration Purposes Only

N

0 1,000 2,000 Feet

Sheet 4 of 10
Delta Conveyance Project – SCADA
September 2024

Data Source: DCA, DWR



Legend

- Page Index
- Connection to Existing Router

SCADA Proposed Fiber Routes

Proposed Underground SCADA

- Within Proposed Roadway Improvements
- Outside Roadway
- Permanent Subsurface Impact
- Permanent Surface Impact
- Temporary Surface Impact

Draft example mapbook for discussion purposes only. This mapbook is a scaled representation of the GIS data and only shows major facilities.

DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

For Illustration Purposes Only

N

0 1,000 2,000 Feet

Sheet 5 of 10
Delta Conveyance Project – SCADA
September 2024

Data Source: DCA, DWR

Legend

Page Index

SCADA Proposed Fiber Routes

Proposed Underground SCADA

Outside Roadway

Proposed Overhead SCADA

New Line on Existing Poles

Permanent Subsurface Impact

Permanent Surface Impact

Temporary Surface Impact

Draft example mapbook for discussion purposes only. This mapbook is a scaled representation of the GIS data and only shows major facilities.

DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

For Illustration Purposes Only

N

0 1,000 2,000 Feet

Sheet 6 of 10
Delta Conveyance Project – SCADA
September 2024

Data Source: DCA, DWR

Legend

Page Index
Connection to Existing Router
SCADA Proposed Fiber Routes
Proposed Underground SCADA
Outside Roadway
Proposed Overhead SCADA
New Line on Existing Poles
Permanent Subsurface Impact
Permanent Surface Impact
Temporary Surface Impact

Draft example mapbook for discussion purposes only. This mapbook is a scaled representation of the GIS data and only shows major facilities.

DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

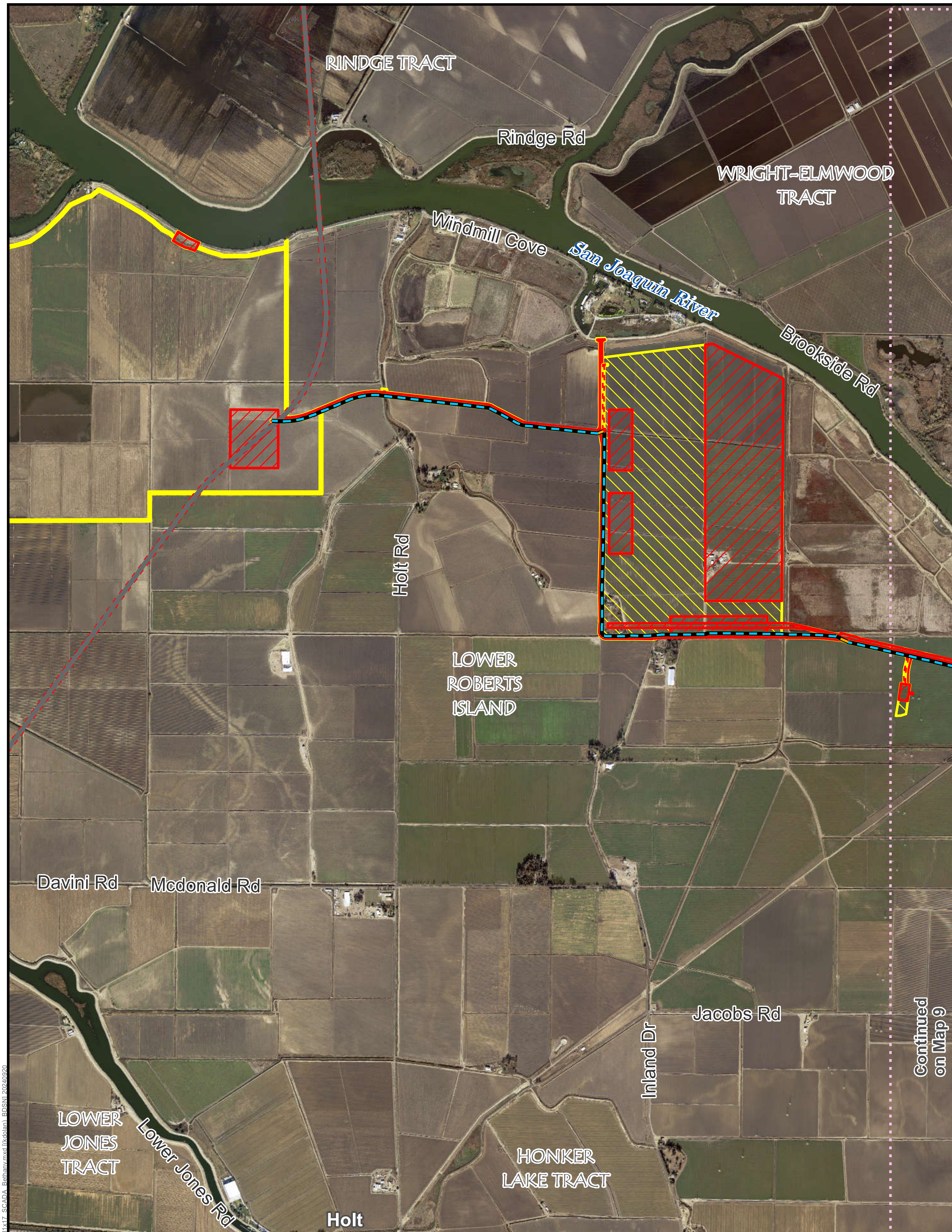
For Illustration Purposes Only

N

0 1,000 2,000 Feet

Sheet 7 of 10
Delta Conveyance Project – SCADA
September 2024

Data Source: DCA, DWR



Legend

Page Index

SCADA Proposed Fiber Routes

Proposed Underground SCADA

Within Proposed Roadway Improvements

Outside Roadway

Permanent Subsurface Impact

Permanent Surface Impact

Temporary Surface Impact

Draft example mapbook for discussion purposes only. This mapbook is a scaled representation of the GIS data and only shows major facilities.

DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

For Illustration Purposes Only

N

0 1,000 2,000 Feet

Sheet 8 of 10
Delta Conveyance Project – SCADA
September 2024

T:\WGI-38\GIS_33_00\GISRequest_11F\Deliverable_10F\ENG189_24\ENG189_24_11x17_SCADA_Bethany.mxd [(kdolan) BDSN] 20240920

Data Source: DCA, DWR

Legend

- Page Index
- Connection to Existing Router

SCADA Proposed Fiber Routes

Proposed Underground SCADA

- Within Proposed Roadway Improvements
- Outside Roadway

Proposed Overhead SCADA

- New Line on Existing Poles

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

Draft example mapbook for discussion purposes only. This mapbook is a scaled representation of the GIS data and only shows major facilities.

DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

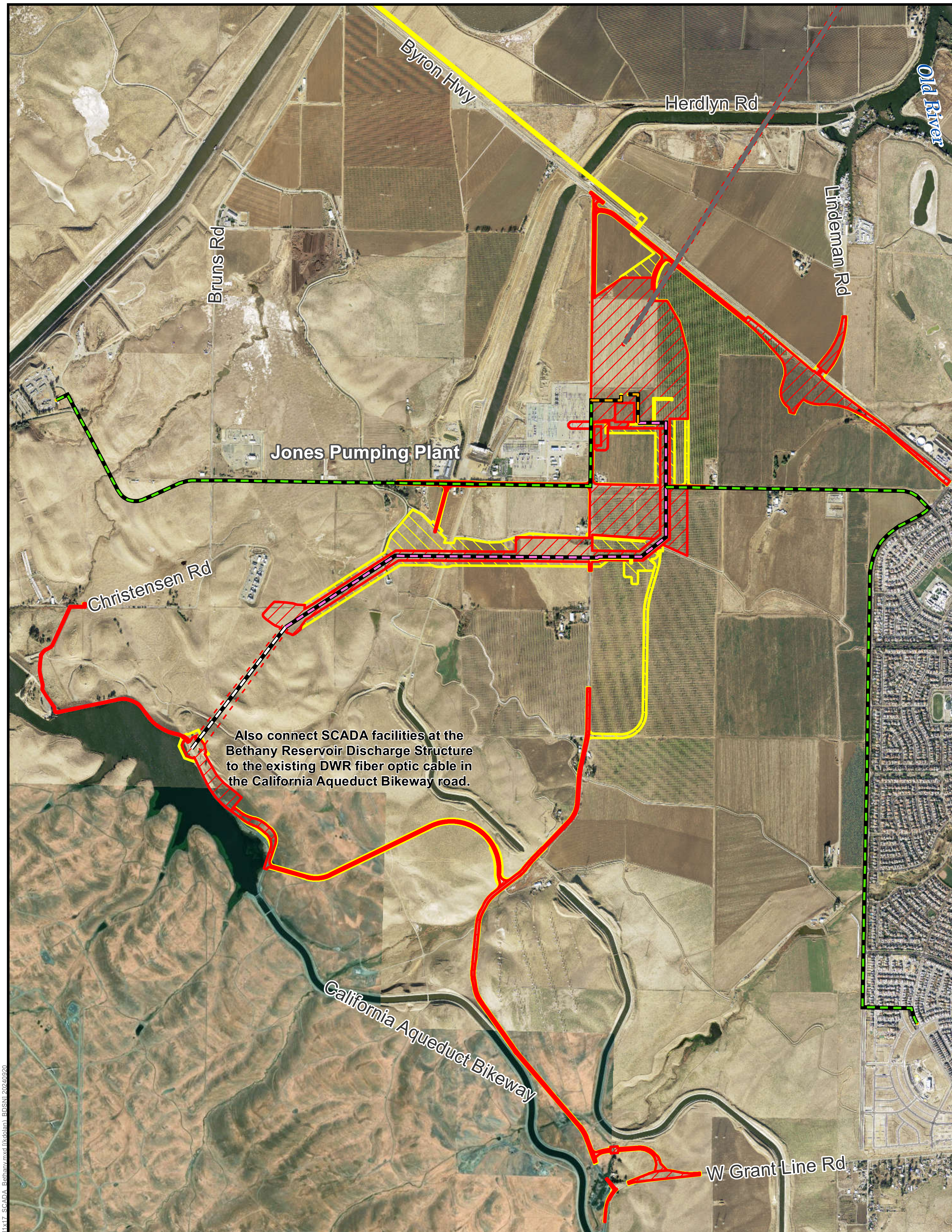
For Illustration Purposes Only

N

0 1,000 2,000 Feet

Sheet 9 of 10
Delta Conveyance Project – SCADA
September 2024

Data Source: DCA, DWR



Legend

Page Index

SCADA Proposed Fiber Routes

Proposed Underground SCADA

- Within Existing Roadway
- Within Proposed Roadway Improvements
- Common Trench with Aqueduct
- Trenchless Installation

Permanent Subsurface Impact

Permanent Surface Impact

Temporary Surface Impact

Draft example mapbook for discussion purposes only. This mapbook is a scaled representation of the GIS data and only shows major facilities.

DCA DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

For Illustration Purposes Only

N

0 1,000 2,000 Feet

Sheet 10 of 10
Delta Conveyance Project – SCADA
September 2024

Data Source: DCA, DWR