Siting Drivers for Proposed Delta Conveyance Systems Facilities

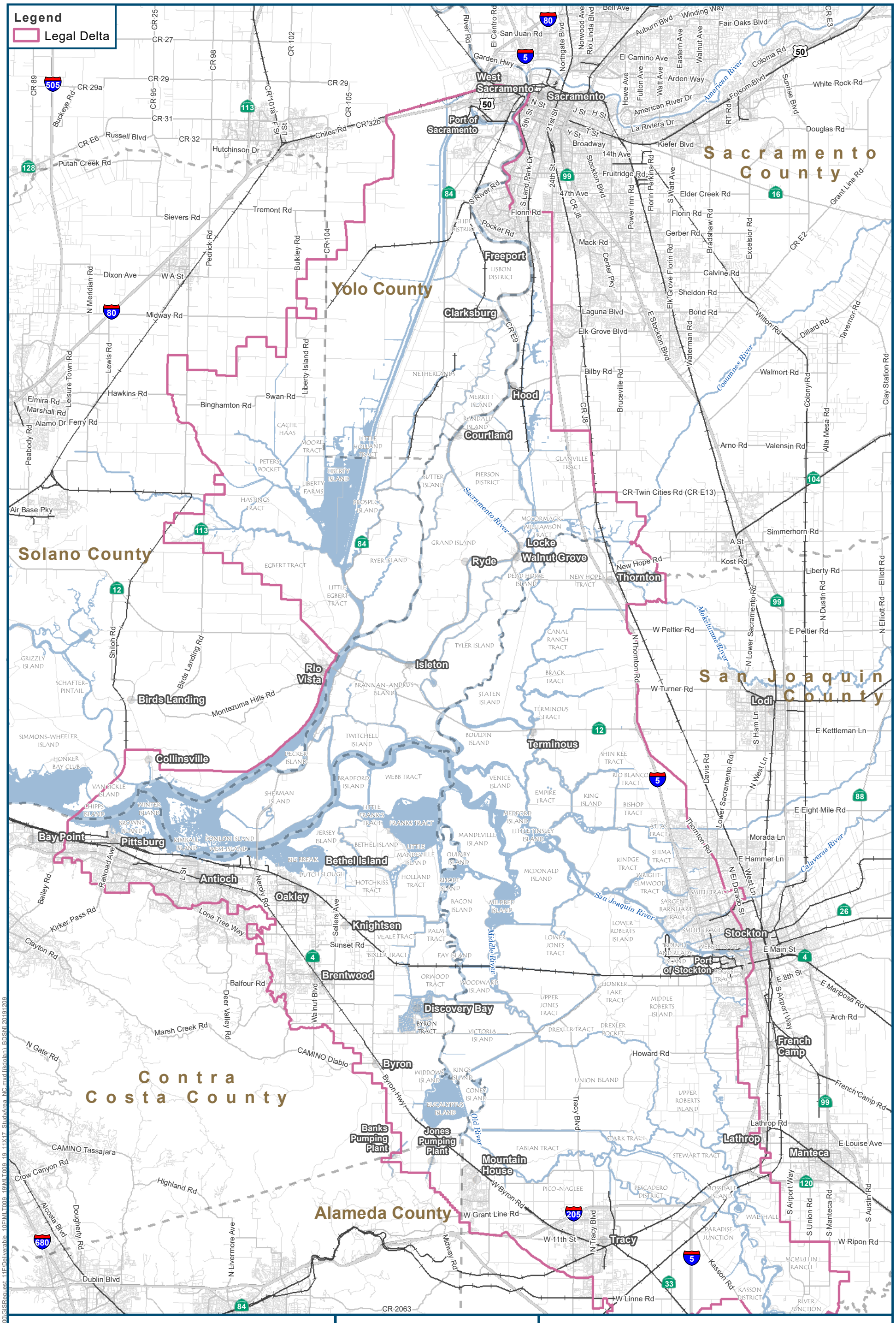
Presented at December 11, 2019
DCA Stakeholder Engagement Committee Meeting

DCA
DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

STAKEHOLDER ENGAGEMENT COMMITTEE (SEC)

12/13/2019

Map 1



Data Source: DCA, DWR

Siting Driver: Soil Compressibility

Relevant Facilities:

- [x] Intakes
- [x] Tunnel Shaft – Launch
- [ ] Tunnel
- [x] Tunnel Shaft – Retrieval
- [x] Intermediate Forebay
- [x] Southern Forebay
- [x] Pumping Plant
- [x] South Delta Interconnection Conveyance

Why is this important?

The geology of the Delta has been shaped by the landward spread of tidal environments resulting from sea level rise after the last glacial period. Approximately 15,000 years ago, relative sea level was approximately 300 feet lower, and the present-day Delta was an arid floodplain cross-cut by the Sacramento and San Joaquin rivers. Following this period, sea level rose rapidly, resulting in the landward migration of the ocean through the Carquinez Strait and into the Central Valley, resulting in deposition of organic silt and clay across the floodplain. Approximately 5,000 years ago, sea level stabilized and the Deltaic environment remained in approximately its present position, characterized by vertical marsh growth and decomposition.

Within this complex network of buried stream channels are layers of soft fine-grained soils, susceptible to compression under loading. Loose coarse-grained sediments present in the near-surface soils are likely susceptible to liquefaction during a seismic event. In these areas, additional soil strengthening may be required if a surface facility is constructed above. Soil strengthening is a process that would involve mixing cement with soft soils to increase their strength.

How does soil compressibility affect facility siting and design?

Siting facilities in areas of highly compressible soils could reduce the long-term structural integrity of facilities founded on or within the affected soils. This may also be true of the risk of differential settlement due to the highly variable nature of the Delta soils. Similarly, siting facilities in areas with highly liquefiable soils would increase the risk of damage during a seismic event. Reduction of these risks could be achieved through soil strengthening. Any potential tunneling is anticipated to be deeper and in more competent soils, and therefore impacts to the tunnels are considered minimal.

Facility	Effect of Driver on the Siting of Facilities
Intakes	Facility configuration; soil strengthening
Tunnel Shaft-Launch	Facility configuration; soil strengthening
Tunnel	No direct effect
Tunnel Shaft- Retrieval	Facility configuration; soil strengthening
Intermediate Forebay	Facility configuration; soil strengthening; embankment geometry
Southern Forebay	Facility configuration; soil strengthening; embankment geometry
Pumping Plant	Facility configuration; soil strengthening
South Delta Interconnection Conveyance to Existing PP	Facility configuration; soil strengthening

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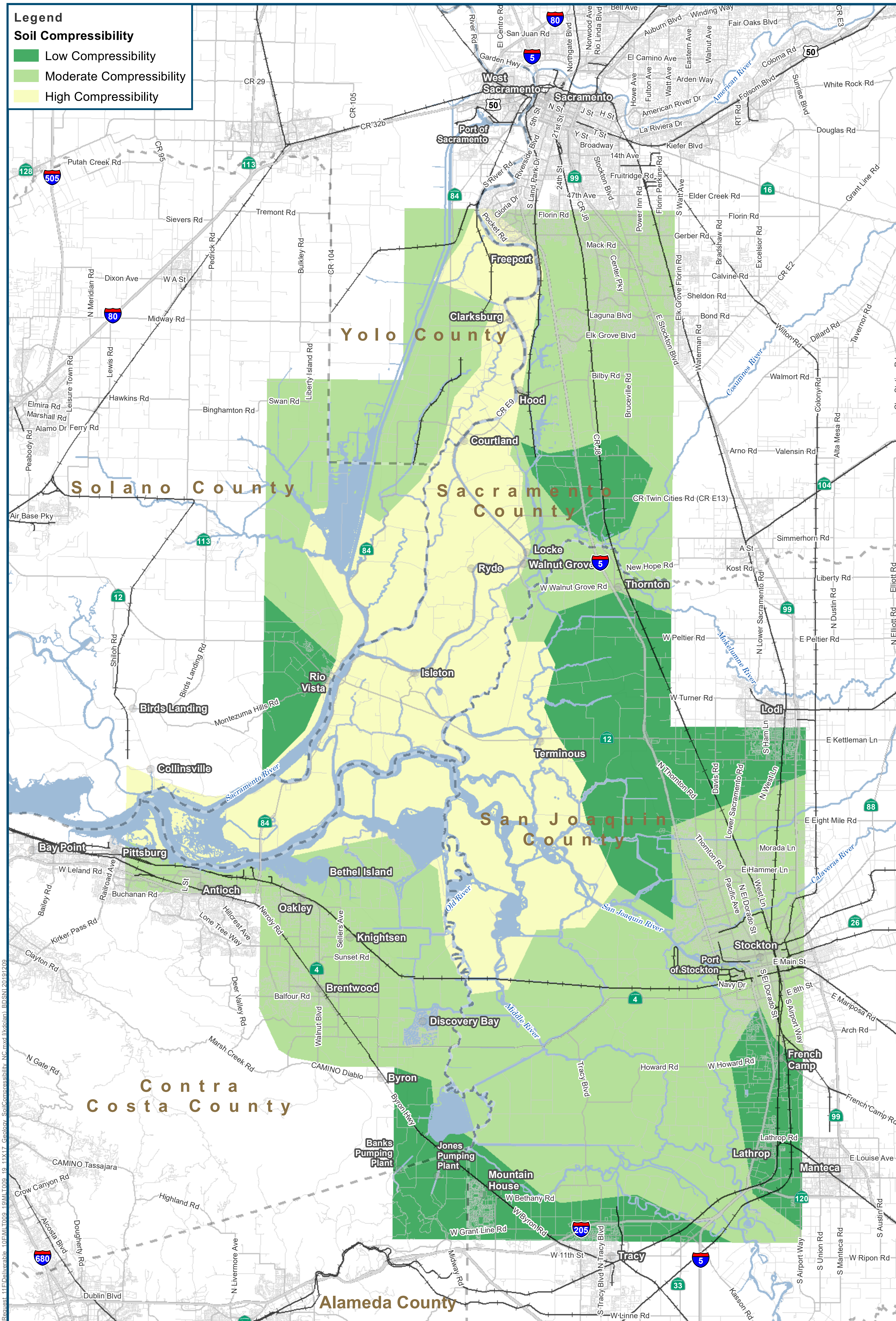
Map 2



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N

0 2.25 4.5 Miles

Geology: Soil Compressibility

T:\WGI-36\GIS_33_00\GISRequest_11F\Deliverable_10F\MLT009_19\MLT009_19_11X17_Geology_SoilCompressibility_NC.mxd (lkitolin) BDSN 20191209

Data Source: DCA, DWR

Siting Driver: Oil and Gas Wells

Relevant Facilities:

- [ ] Intakes
- [ ] Tunnel Shaft-Launch
- [x] Tunnel
- [ ] Tunnel Shaft- Retrieval
- [ ] Intermediate Forebay
- [ ] Southern Forebay
- [ ] Pumping Plant
- [ ] South Delta Interconnection Conveyance

Why is this important?

Portions of the Delta are underlain by extensive oil and gas deposits and numerous wells have been installed since the fields were first developed. Additionally, portions of the Delta are also home to underground natural gas storage. Many of the current and historic wells have been documented by the State of California, however, potential to encounter previously unidentified abandoned cased or uncased wells is possible.

How do oil and gas wells affect facility siting and design?

Primary risks associated with the presence of oil and gas wells are related to the potentially explosive nature of the atmosphere within the wells and the potential presence of steel well casing as an underground obstruction. Gas and steel well casings present the highest risk to any potential tunneling operations. It is critical that all existing wells and underground facilities be accurately located prior to construction. This can be done with records research of existing oil and gas wells and performing aerial and ground-based surveys to confirm all locations. All construction operations must consider the possibility of the presence of gas and be designed to meet all relevant safety requirements and codes.

Facility	Effect of Driver on the Siting of Facilities
Intakes	Minimal effect
Tunnel Shaft-Launch	Minimal effect
Tunnel	Potentially significant affect
Tunnel Shaft- Retrieval	Minimal effect
Intermediate Forebay	Minimal effect
Southern Forebay	Minimal effect
Pumping Plant	Minimal effect
South Delta Interconnection Conveyance to Existing PP	Minimal effect

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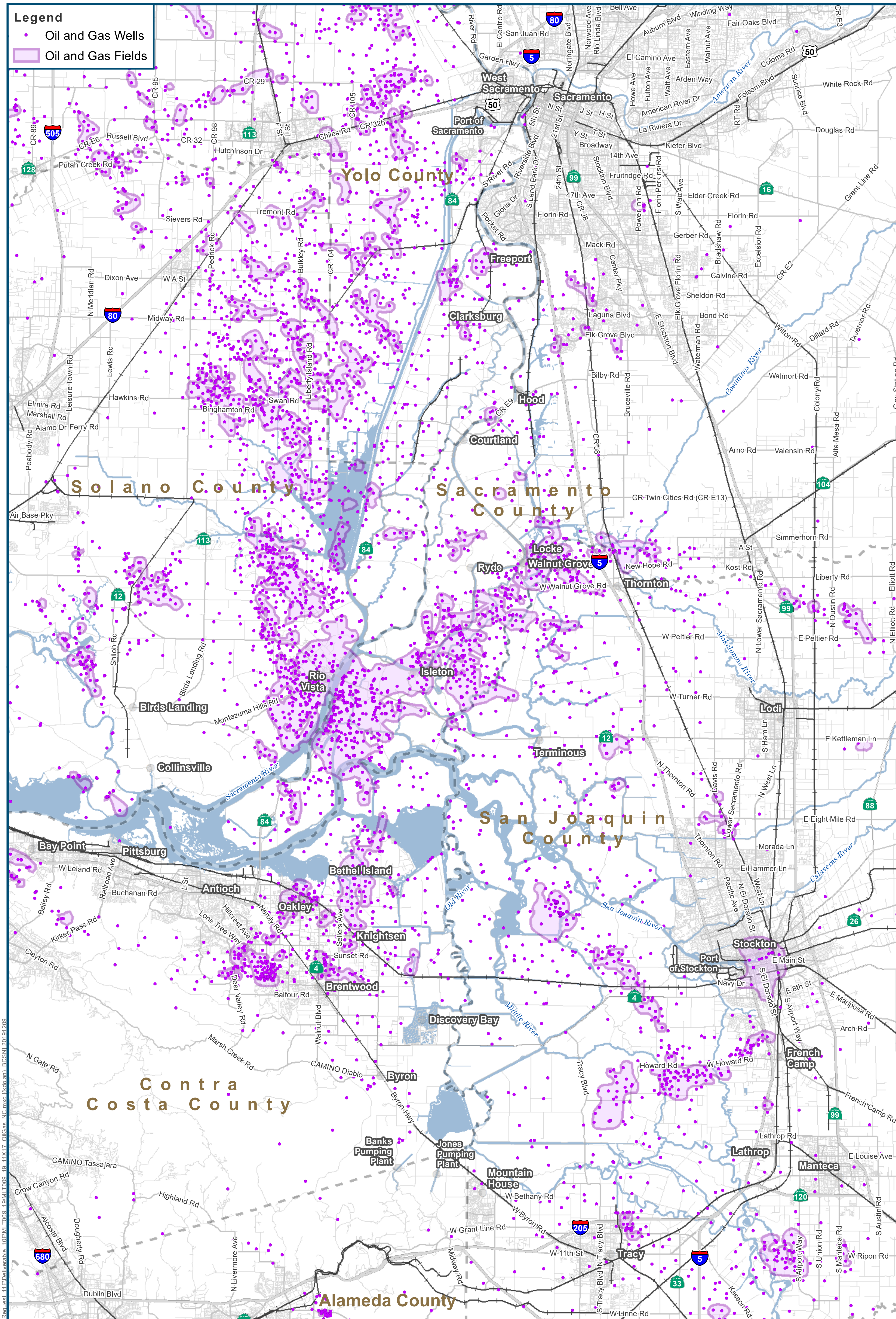
Map 3



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N

0 2.25 4.5 Miles

Oil and Gas Wells

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Data Source: DCA, DWR
California Department of Conservation: Division of Oil, Gas and Geothermal Resources

Siting Driver: Access Routes

Relevant Facilities:

- [x] Intakes
- [x] Tunnel Shaft-Launch
- [ ] Tunnel
- [x] Tunnel Shaft- Retrieval
- [x] Intermediate Forebay
- [x] Southern Forebay
- [x] Pumping Plant
- [x] South Delta Interconnection Conveyance

Why is this important?

Any potential Delta conveyance system would be primarily located within the legal Delta boundary and within Sacramento, San Joaquin, and Contra Costa counties. In order to carry on construction, materials, goods, and workers would need to be transported to work sites. An efficient network of access routes would reduce disturbance to other land uses. Typically, potential means to move people, products and machines to work areas could include:

Roads – The road system throughout the Delta consists of a network including interstates, state highways, county and city roads and private roads.

Railroads – Two major railroads, Union Pacific Railroad and BNSF Railway Company, have tracks through or adjacent to the Delta.

Barge – There are numerous barge routes through the Delta, including ship channels, rivers and sloughs.

Each type of transportation system and any necessary improvements would be considered for access to various work locations.

How do available access options affect facility siting and design?

Considering available access options when siting and designing facilities could reduce effects from construction and worker traffic on communities and agricultural areas.

Facility	Effect of Driver on the Siting of Facilities
Intakes	Heavy transportation node – concrete, materials, workers
Tunnel Shaft-Launch	Heavy transportation node – concrete liners, RTM storage
Tunnel	No transportation required
Tunnel Shaft- Retrieval	Light transportation node
Intermediate Forebay	Heavy transportation node – imported levee material, workers
Southern Forebay	Heavy transportation node – imported levee material, workers
Pumping Plant	Heavy transportation node – concrete, materials, workers
South Delta Interconnection Conveyance to Existing PP	Heavy transportation node – imported levee material, concrete, workers

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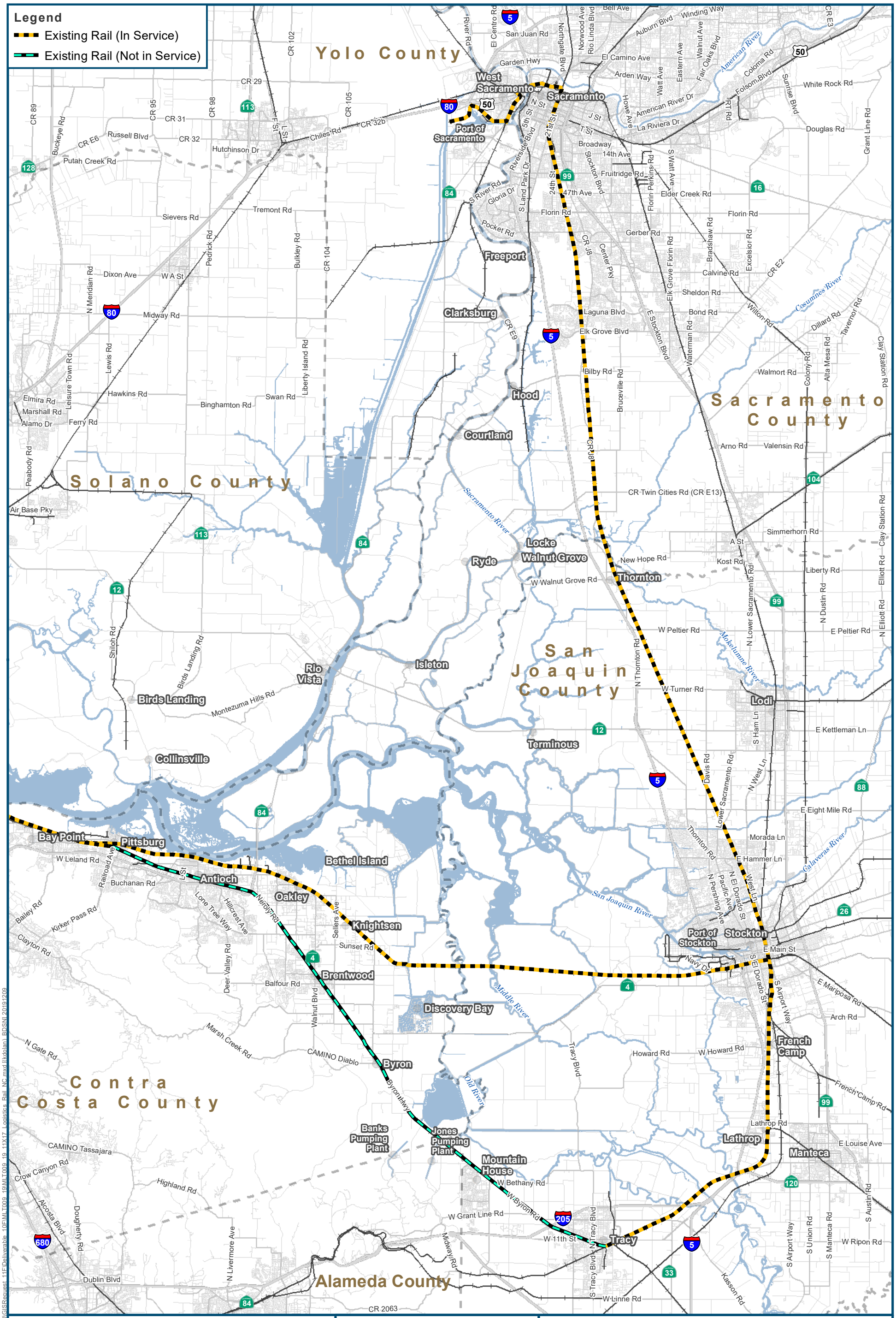
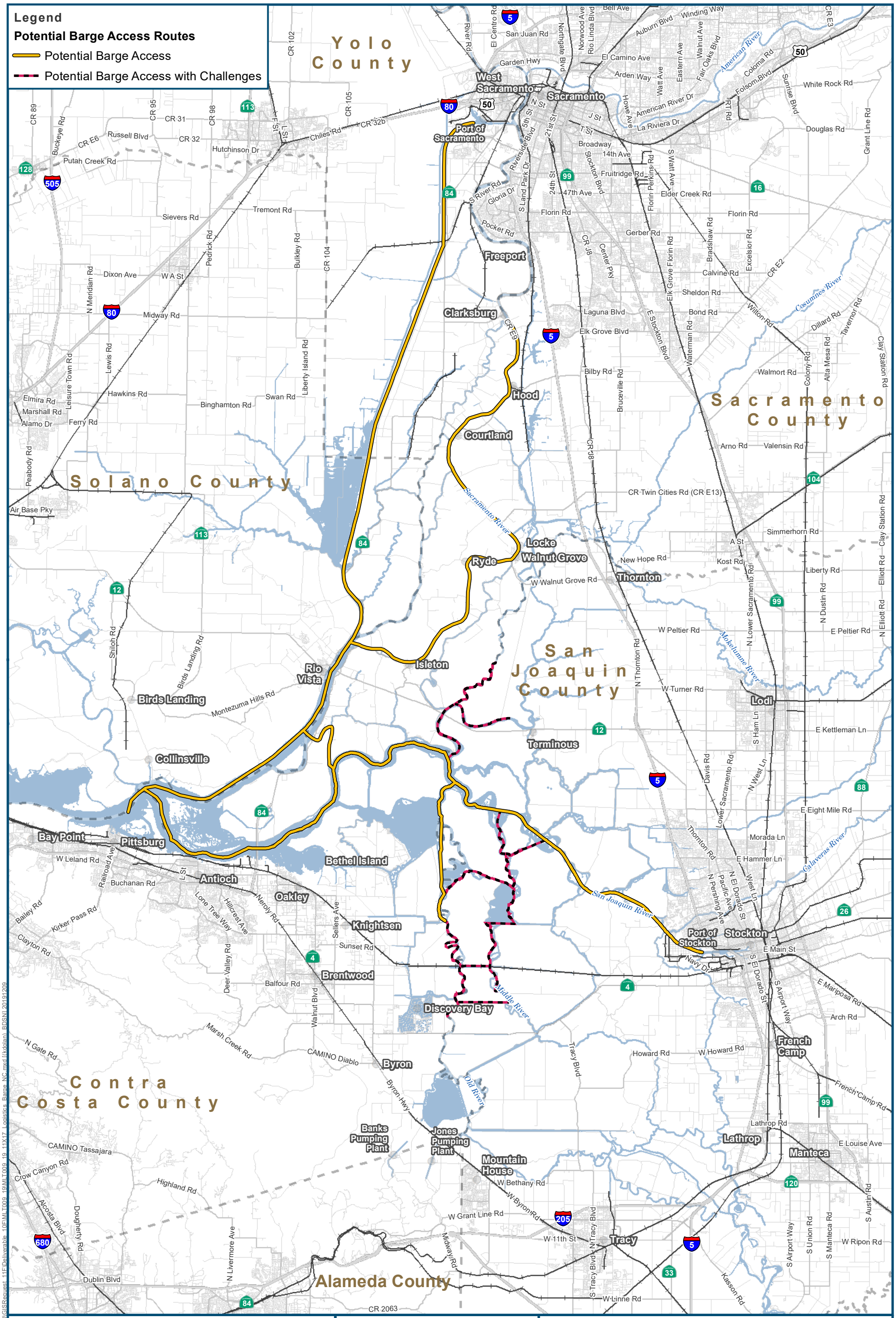
Map 4


Legend
Existing Rail (In Service)
Existing Rail (Not in Service)
Yolo County
Solano County
Sacramento County
San Joaquin County
Contra Costa County
Alameda County
West Sacramento
Sacramento
Port of Sacramento
Freeport
Clarksburg
Hood
Courtland
Locke
Walnut Grove
Ryde
Thornton
Isleton
Rio Vista
Birds Landing
Collinsville
Terminous
Lodi
Bay Point
Pittsburg
Antioch
Oakley
Knightsen
Bethel Island
Brentwood
Discovery Bay
Byron
Banks Pumping Plant
Jones Pumping Plant
Mountain House
Tracy
Lathrop
Manteca
French Camp
Stockton
Port of Stockton
Sacramento River
San Joaquin River
Middle River
Old River
Mokelumne River
Calaveras River
American River
Cosumnes River
Delta Conveyance Design & Construction Authority
For Illustration Purposes Only
N
0 2.25 4.5 Miles
Potential Railroad Access Routes
Data Source: DCA

Map 5



Data Source: DCA

Siting Driver: Power Supply

Relevant Facilities:

- [x] Intakes
- [x] Tunnel Shaft – Launch
- [ ] Tunnel
- [x] Tunnel Shaft – Retrieval
- [x] Intermediate Forebay
- [x] Southern Forebay
- [x] Pumping Plant
- [x] South Delta Interconnection Conveyance

Why is this important?

Electrical power is required at all major construction nodes where major electrical equipment must operate. Power draws are too large for alternative sources such as renewables or natural gas powered generators. At sites where power requirements are minimal, alternative power sources other than connection to the electrical grid could be considered. Temporary power required for construction could become part of a permanent on-site power supply where warranted.

Depending on proximity to facilities and capacity requirements, power supplies could be provided by Western Area Power Administration (WAPA), Pacific Gas and Electric Company (PG&E) and Sacramento Municipal Utility District (SMUD).

Facilities requiring significant power draws such as a tunnel launch shaft should be located in close proximity to existing power lines or located in an area where new transmission lines could be routed.

How do available power options affect facility siting and design?

To the extent possible, facility siting should consider available power supplies. Power is needed at most construction sites on either a temporary or permanent basis.

Facility	Effect of Driver on the Siting of Facilities
Intakes	Needs temporary and permanent power supply
Tunnel Shaft-Launch	Needs significant temporary and minimal permanent power
Tunnel	No power required
Tunnel Shaft- Retrieval	Minimal power requirements for construction
Intermediate Forebay	Requires temporary and permanent power supply
Southern Forebay	Requires temporary and permanent power supply
Pumping Plant	Requires temporary and significant permanent power supply
South Delta Interconnection Conveyance to Existing PP	Requires temporary and permanent power supply (at flow control facilities)

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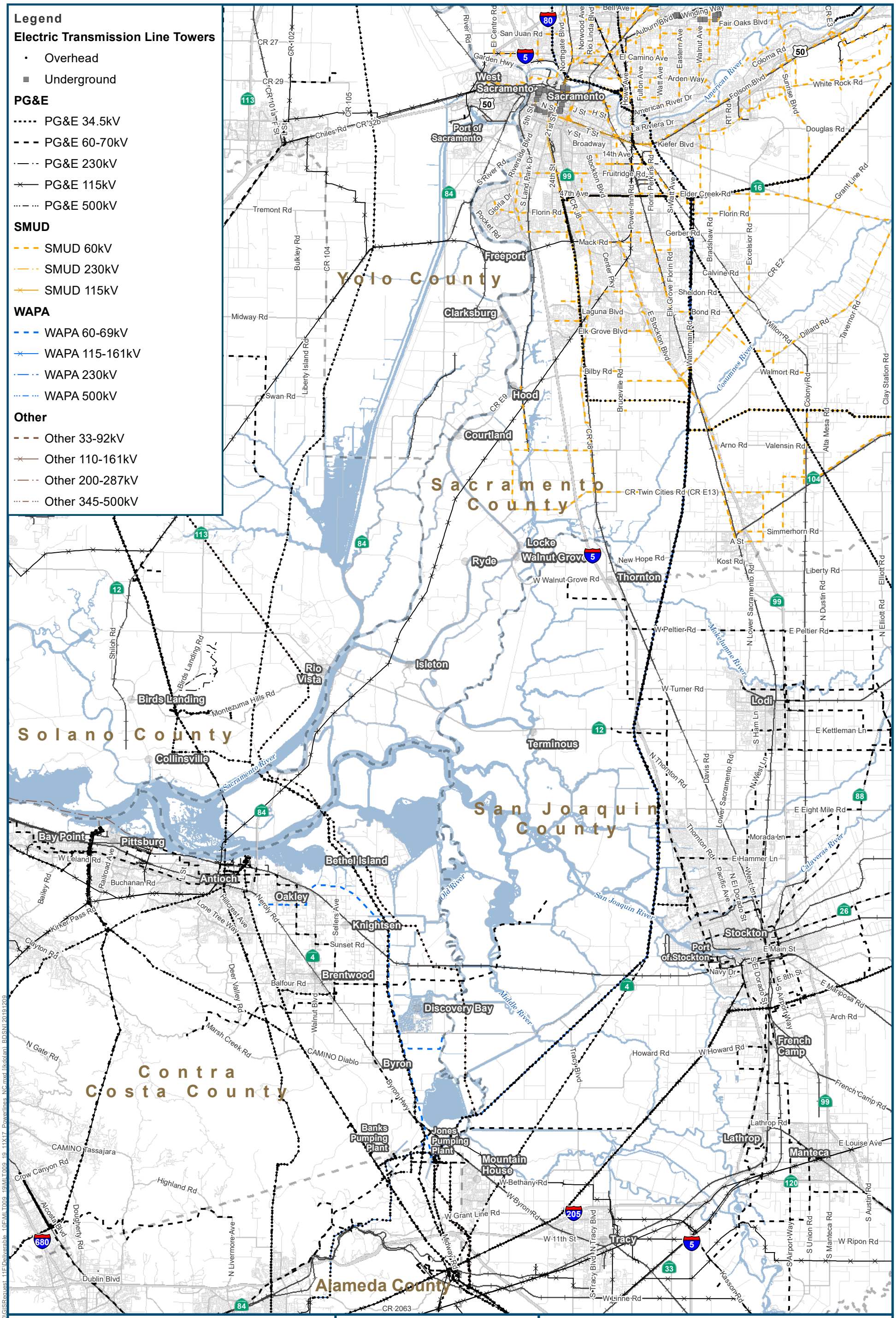
Map 6



Data Source: DCA, DWR
Transmission Lines: CEC GIS Unit, REAT, Caliso, PG&E, SCE, SDG&E, LADWP, WAPA, IID, SMUD, MID, MWD,
GE, Platts, ANZA Electric Cooperative, Bear Valley, City of Anaheim PUD, City of Colton, City of Vernon, Plumas Sierram PUC, Riverside Public Utilities, and Silicon Valley Power.

Siting Driver: Land Use

Relevant Facilities:

- [x] Intakes
- [x] Tunnel Shaft – Launch
- [ ] Tunnel
- [x] Tunnel Shaft – Retrieval
- [x] Intermediate Forebay
- [x] Southern Forebay
- [x] Pumping Plant
- [x] South Delta Interconnection Conveyance

Why is this important?

Source: California Department of Water Resources

Any potential Delta conveyance system would be primarily located within the legal Delta boundary and within Sacramento, San Joaquin, and Contra Costa counties. The Delta consists of approximately 750,000 acres of land including approximately 430,000 acres of agricultural land, 119,000 acres of riparian and native vegetation, 84,000 acres of urban land uses, and 64,000 acres of open water (DWR, 2015).

As the largest land use type in the Delta, agriculture is an important part of the Delta economy and cultural identity. Agricultural lands within the Delta are highly productive and typical crops include grains, fruits, field crops, nuts, seeds, pasture and alfalfa, wine grapes, vegetables, olives and blueberries (Delta Protection Commission, 2010).

Ideally, new facilities should be sited on land zoned for its intended purpose. Where this is not possible, siting should attempt to minimize the amount of disturbed land for new facilities.

How does existing land use affect facility siting and design?

Any potential Delta conveyance system could result in effects related to land use, specifically through construction of new access roads and facilities on land zoned for agricultural use.

Facility	Effect of Driver on the Siting of Facilities
Intakes	Facility configuration; access routes
Tunnel Shaft-Launch	Location of Reusable Tunnel Material storage sites; access routes
Tunnel	No direct effect – facility underground
Tunnel Shaft- Retrieval	Access routes
Intermediate Forebay	Facility configuration; access routes
Southern Forebay	Facility configuration; access routes
Pumping Plant	Access routes
South Delta Interconnection Conveyance to Existing PP	Facility configuration; access routes

References

California Department of Water Resources (DWR). 2015. Delta Land Use GIS Data.

Delta Protection Commission. 2010. Land Use and Resource Management Plan for the Primary Zone of the Delta. Available at http://delta.ca.gov/wp-content/uploads/2016/10/Land-Use-and-Resource-Management-Plan-2.25.10_.pdf.

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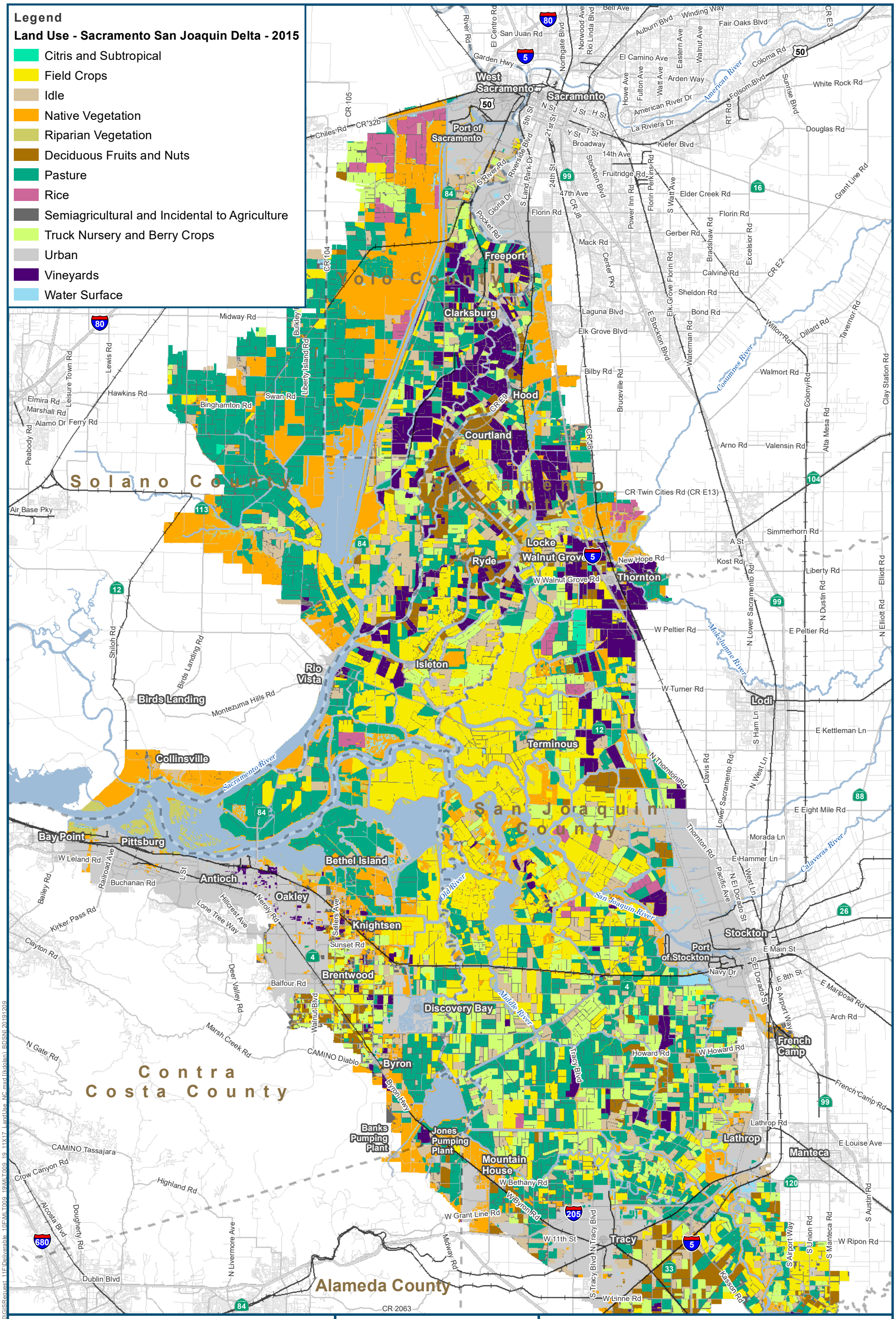
Map 7

Legend

Land Use - Sacramento San Joaquin Delta - 2015

- Citris and Subtropical
- Field Crops
- Idle
- Native Vegetation
- Riparian Vegetation
- Deciduous Fruits and Nuts
- Pasture
- Rice
- Semiagricultural and Incidental to Agriculture
- Truck Nursery and Berry Crops
- Urban
- Vineyards
- Water Surface



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N

0 2.25 4.5 Miles

Land Use

Data Source: DCA, DWR

Siting Driver: Sensitive Receptors

Facilities Effected:

- [x] Intakes
- [x] Tunnel Shaft – Launch
- [ ] Tunnel
- [x] Tunnel Shaft – Retrieval
- [x] Intermediate Forebay
- [x] Southern Forebay
- [x] Pumping Plant
- [x] South Delta Interconnection Conveyance

Why is this important?

Source: California Department of Water Resources

Sensitive receptors are areas with people that are more susceptible to effects such as noise, dust, and air pollutants. Sensitive respectors in the Delta include locations where people, especially children, seniors, and sick persons, are located and where there is a reasonable expectation of continuous human exposure for a period of time that could have an effect. Typical sensitive receptors include residences, hospitals, and schools.

How does proximity to sensitive receptors affect facility siting and design?

The most prevalent community sensitive receptors would be schools and recreational sites located in communities near construction sites of any facilities related to a potential Delta conveyance system.

Facility	Effect of Driver on the Siting of Facilities
Intakes	Facility configuration; access routes
Tunnel Shaft-Launch	Facility configuration; access routes
Tunnel	No direct effect – facility underground
Tunnel Shaft- Retrieval	Access routes
Intermediate Forebay	Facility configuration; access routes
Southern Forebay	Facility configuration; access routes
Pumping Plant	Access routes
South Delta Interconnection Conveyance to Existing PP	Access routes

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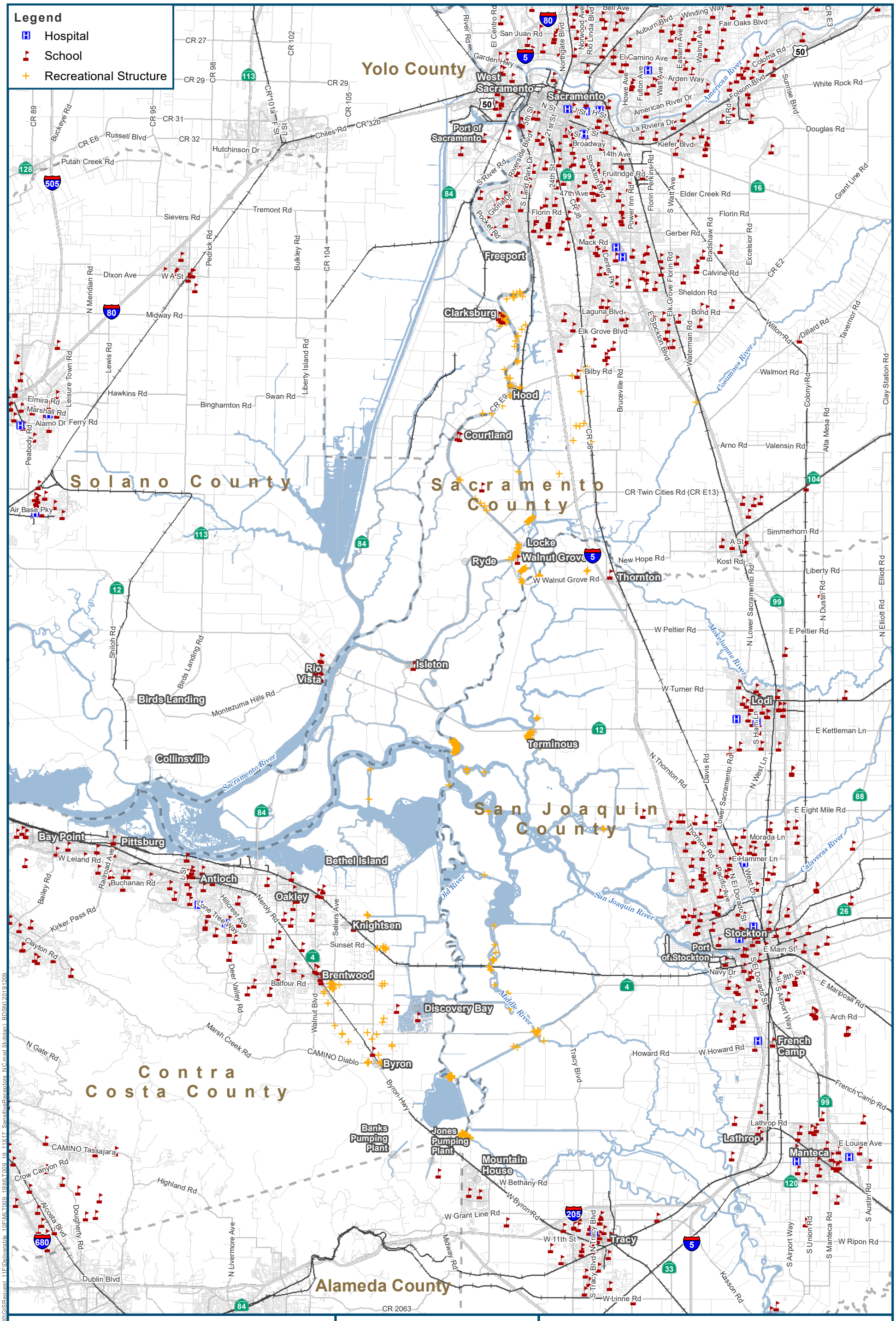
Map 8



Data Source: DCA, DWR
Alameda County, Contra Costa County, Sacramento County, San Joaquin County, Solano County

Siting Driver: Greater Sandhill Cranes

Relevant Facilities:

- [x] Intakes
- [x] Tunnel Shaft – Launch
- [ ] Tunnel
- [x] Tunnel Shaft – Retrieval
- [x] Intermediate Forebay
- [ ] Southern Forebay
- [ ] Pumping Plant
- [ ] South Delta Interconnection Conveyance

Why is this important?

Source: California Department of Water Resources

Greater sandhill cranes are listed as threatened under the California Endangered Species Act (CESA) and are a fully protected species under the California Fish and Game Code. Under CESA, a threatened species cannot be imported, exported, or taken, possessed, purchased or sold. With the approval of conservation measures, such as collection and relocation of protected species, an Incidental Take Permit may be issued. However, a fully protected species may not be taken or possessed at any time and no permits may be granted for take (i.e. hunt, kill, catch, capture or pursue, or intend to hunt, kill, catch, capture or pursue).

Greater sandhill cranes overwinter in the Delta, arriving in late September and remaining until late February or early March when they begin their northward migration back to their breeding grounds (Pogson 1990; Tacha et al. 1992). During this period, cranes use roosting and foraging habitat identified within the Delta.

How does greater sandhill crane roosting habitat affect facility siting and design?

Greater sandhill crane wintering habitat in the project vicinity is primarily located north of State Route 4. Siting of facilities as part of any potential Delta conveyance system would have to consider any potential effects to greater sandhill crane habitats.

Facility	Effect of Driver on the Siting of Facilities
Intakes	Facility configuration
Tunnel Shaft-Launch	Facility configuration
Tunnel	No direct effect – facility underground
Tunnel Shaft- Retrieval	Facility configuration
Intermediate Forebay	Facility configuration
Southern Forebay	Likely no direct effect – would be sited near existing state and federal pumping plants
Pumping Plant	Likely no direct effect – would be sited near existing state and federal pumping plants
South Delta Interconnection Conveyance to Existing PP	Likely no direct effect – would be sited near existing state and federal pumping plants

References

Pogson, T. H. 1990. Distribution, Abundance and Behavior of Greater Sandhill Cranes (Grus canadensis tabida) Wintering in California's Central Valley. MA thesis. University of Alaska.

Tacha, T. C., S. A. Nesbit, and P. A. Vohs. 1992. Sandhill Crane (Grus canadensis). In: A. Poole, F. Gill (eds.). The Birds of North America 31. Philadelphia, PA: The Academy of Natural Sciences; Washington, DC: The American Ornithologist's Union.

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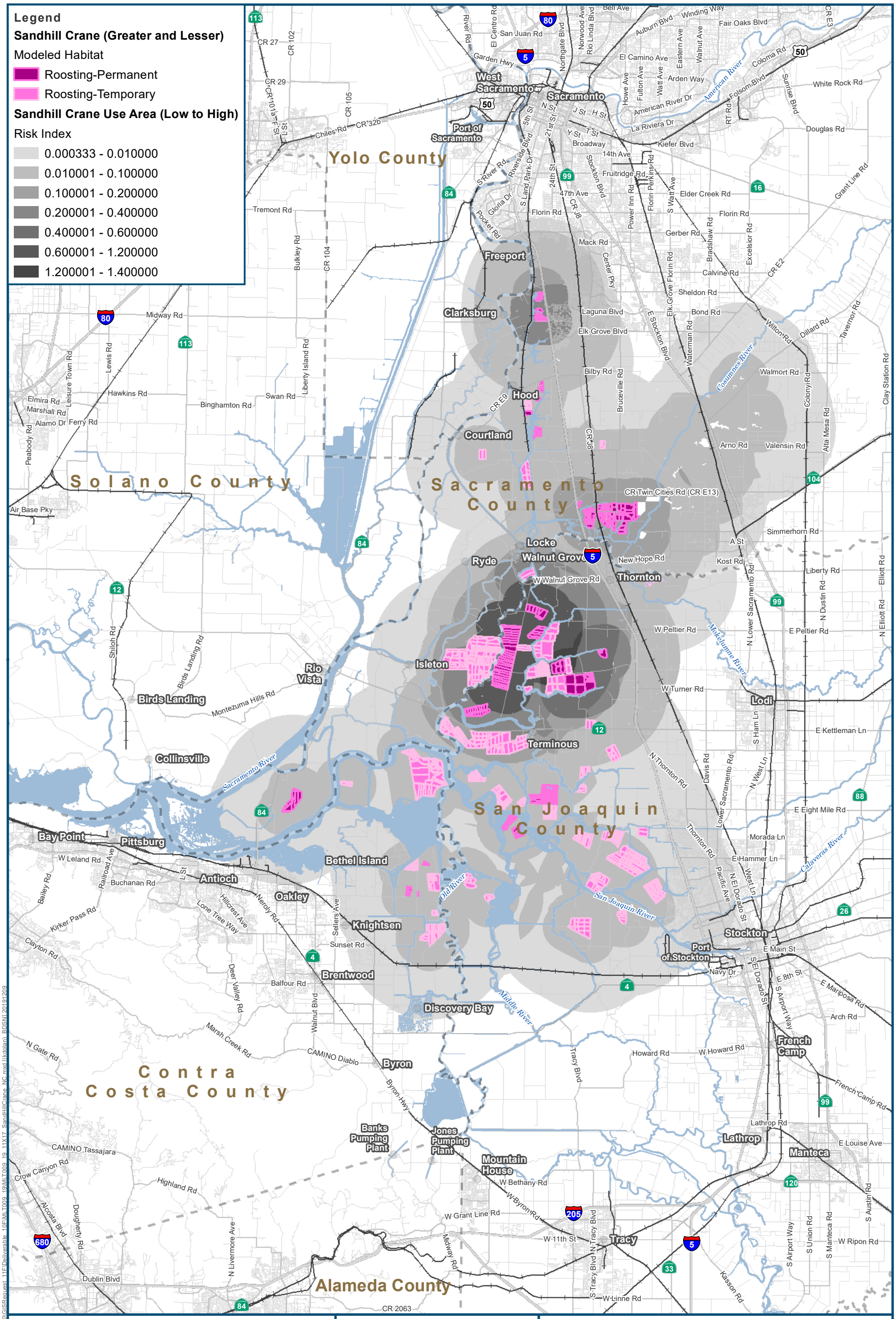
Map 9


Legend
Sandhill Crane (Greater and Lesser)
Modeled Habitat
Roosting-Permanent
Roosting-Temporary
Sandhill Crane Use Area (Low to High)
Risk Index
0.000333 - 0.010000
0.010001 - 0.100000
0.100001 - 0.200000
0.200001 - 0.400000
0.400001 - 0.600000
0.600001 - 1.200000
1.200001 - 1.400000
Yolo County
Solano County
Sacramento County
San Joaquin County
Contra Costa County
Alameda County
West Sacramento
Sacramento
Port of Sacramento
Freeport
Clarksburg
Hood
Courtland
Locke
Walnut Grove
Ryde
Thornton
Isleton
Rio Vista
Birds Landing
Collinsville
Terminous
Bay Point
Pittsburg
Antioch
Bethel Island
Oakley
Knightsen
Brentwood
Discovery Bay
Byron
Banks Pumping Plant
Jones Pumping Plant
Mountain House
Tracy
Lodi
Stockton
Port of Stockton
Manteca
Lathrop
French Camp
Arno Rd
Valensin Rd
Walmort Rd
Bilby Rd
Elk Grove Blvd
Laguna Blvd
Bond Rd
Sheldon Rd
Calvine Rd
Florin Rd
Elder Creek Rd
Fruitridge Rd
14th Ave
Broadway
Kiefer Blvd
La Riviera Dr
American River Dr
Arden Way
El Camino Ave
Fair Oaks Blvd
Auburn Blvd
Winding Way
Bell Ave
Garden Hwy
San Juan Rd
Chiles Rd
CR 32b
Tremont Rd
Midway Rd
Hawkins Rd
Swan Rd
Binghamton Rd
Elmira Rd
Marshall Rd
Alamo Dr
Ferry Rd
Peabody Rd
Air Base Pky
Buchanan Rd
Kirker Pass Rd
Clayton Rd
Deer Valley Rd
Balfour Rd
Marsh Creek Rd
CAMINO Diablo
N Gate Rd
CAMINO Tassajara
Crow Canyon Rd
Highland Rd
Dublin Blvd
Sunset Rd
Byron Hwy
Tracy Blvd
Howard Rd
W Howard Rd
W Peltier Rd
E Peltier Rd
W Turner Rd
E Kettleman Ln
W Bethany Rd
W Grant Line Rd
W 11th St
W Byron Rd
W Linne Rd
CR 2063
Montezuma Hills Rd
Shiloh Rd
Birds Landing Rd
Bailey Rd
Railroad Ave
Alcosta Blvd
Dougherty Rd
N Livermore Ave
Sellers Ave
Neroly Rd
Hillcrest Ave
Lone Tree Way
Walnut Blvd
Liberty Island Rd
Lewis Rd
Leisure Town Rd
Bulkley Rd
CR 104
CR 105
CR 102
CR 27
CR 29
CR 101a
F St
L St
River Rd
El Centro Rd
Northgate Blvd
Norwood Ave
Rio Linda Blvd
Howe Ave
Fulton Ave
Watt Ave
Eastern Ave
Walnut Ave
Coloma Rd
Folsom Blvd
Sunrise Blvd
White Rock Rd
Douglas Rd
Grant Line Rd
RT Rd
CR E3
American River
Sacramento River
Mokelumne River
Cosumnes River
Old River
San Joaquin River
Middle River
Calaveras River
Pocket Rd
Gloria Dr
S River Rd
Riverside Blvd
S Land Park Dr
5th St
N St
J St
H St
Y St
T St
21st St
24th St
47th Ave
Florin Perkins Rd
Stockton Blvd
Power Inn Rd
S Watt Ave
Florin Rd
Gerber Rd
Mack Rd
Bradshaw Rd
Excelsior Rd
CR J8
CR E2
Center Pky
Elk Grove Florin Rd
E Stockton Blvd
Waterman Rd
Wilton Rd
Dillard Rd
Tavernor Rd
Clay Station Rd
Colony Rd
Alta Mesa Rd
CR E9
CR J6
Bruceville Rd
Pacific Ave
West Ln
N El Dorado St
S El Dorado St
E Main St
E 8th St
S Airport Way
E Mariposa Rd
Arch Rd
Navy Dr
Port
Kost Rd
New Hope Rd
A St
Simmerhorn Rd
Liberty Rd
Elliott Rd
N Elliott Rd
N Dustin Rd
N Lower Sacramento Rd
S Ham Ln
N West Ln
Davis Rd
Lower Sacramento Rd
N Thornton Rd
Thornton Rd
E Eight Mile Rd
Morada Ln
E Hammer Ln
S Austin Rd
S Union Rd
S Manteca Rd
W Ripon Rd
Kasson Rd
French Camp Rd
Lathrop Rd
E Louise Ave
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W Walnut Grove Rd
Tracy Blvd
S Tracy Blvd
N Tracy Blvd
Midway Rd
Byron Rd
Alcosta Blvd
Railroad Ave
Buchanan Rd
W Leland Rd
L St
Bailey Rd
Kirker Pass Rd
Clayton Rd
Deer Valley Rd
Balfour Rd
Walnut Blvd
Marsh Creek Rd
N Gate Rd
CAMINO Diablo
CAMINO Tassajara
Crow Canyon Rd
Highland Rd
Dublin Blvd
Sunset Rd
Byron Hwy
Tracy Blvd
Howard Rd
W Howard Rd
W Peltier Rd
E Peltier Rd
W Turner Rd
E Kettleman Ln
W Bethany Rd
W Grant Line Rd
W 11th St
W Byron Rd
W Linne Rd
CR 2063
Montezuma Hills Rd
Shiloh Rd
Birds Landing Rd
Bailey Rd
Railroad Ave
Alcosta Blvd
Dougherty Rd
N Livermore Ave
Sellers Ave
Neroly Rd
Hillcrest Ave
Lone Tree Way
Walnut Blvd
Liberty Island Rd
Lewis Rd
Leisure Town Rd
Bulkley Rd
CR 104
CR 105
CR 102
CR 27
CR 29
CR 101a
F St
L St
River Rd
El Centro Rd
Northgate Blvd
Norwood Ave
Rio Linda Blvd
Howe Ave
Fulton Ave
Watt Ave
Eastern Ave
Walnut Ave
Coloma Rd
Folsom Blvd
Sunrise Blvd
White Rock Rd
Douglas Rd
Grant Line Rd
RT Rd
CR E3
American River
Sacramento River
Mokelumne River
Cosumnes River
Old River
San Joaquin River
Middle River
Calaveras River
Pocket Rd
Gloria Dr
S River Rd
Riverside Blvd
S Land Park Dr
5th St
N St
J St
H St
Y St
T St
21st St
24th St
47th Ave
Florin Perkins Rd
Stockton Blvd
Power Inn Rd
S Watt Ave
Florin Rd
Gerber Rd
Mack Rd
Bradshaw Rd
Excelsior Rd
CR J8
CR E2
Center Pky
Elk Grove Florin Rd
E Stockton Blvd
Waterman Rd
Wilton Rd
Dillard Rd
Tavernor Rd
Clay Station Rd
Colony Rd
Alta Mesa Rd
CR E9
CR J6
Bruceville Rd
Pacific Ave
West Ln
N El Dorado St
S El Dorado St
E Main St
E 8th St
S Airport Way
E Mariposa Rd
Arch Rd
Navy Dr
Port
Kost Rd
New Hope Rd
A St
Simmerhorn Rd
Liberty Rd
Elliott Rd
N Elliott Rd
N Dustin Rd
N Lower Sacramento Rd
S Ham Ln
N West Ln
Davis Rd
Lower Sacramento Rd
N Thornton Rd
Thornton Rd
E Eight Mile Rd
Morada Ln
E Hammer Ln
S Austin Rd
S Union Rd
S Manteca Rd
W Ripon Rd
Kasson Rd
French Camp Rd
Lathrop Rd
E Louise Ave
CR Twin Cities Rd (CR E13)
W Walnut Grove Rd
Tracy Blvd
S Tracy Blvd
N Tracy Blvd
Midway Rd
Byron Rd
DCA
DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY
For Illustration Purposes Only
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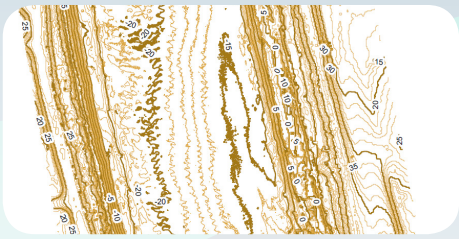
0
2.25
4.5
Miles
Sandhill Crane Habitat
Data Source: DCA, DWR
TWGI-38\GIS_33_00\GISRequest_11E\Deliverable_10E\MLT009_19MLT009_19_11X17_SandhillCrane_NC.mxd (lkddan) BDSN1 20191209

Siting Driver: River Geomorphology

Relevant Facilities:

- [x] Intakes
- [ ] Tunnel Shaft – Launch
- [ ] Tunnel
- [ ] Tunnel Shaft – Retrieval
- [ ] Intermediate Forebay
- [ ] Southern Forebay
- [ ] Pumping Plant
- [ ] South Delta Interconnection Conveyance

Why is this important?



Source: California Department of Water Resources

U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration National Marine Fisheries Service, and the California State Department of Fish and Wildlife all have regulatory guidelines for the size and placement of fish screens for surface water diversions. Only sections of the Sacramento River with suitable characteristics consistent with these guidelines, such as those related to underwater depth (bathymetry), would be considered for intake sites related to any potential Delta conveyance system.

The Sacramento River transports large quantities of sediment, both suspended and along the bottom of the river, through the Delta. Sediment transport quantities vary with seasonal runoff and could be significant during higher river flow events. Avoidance of areas where sediment is deposited (shoals) along the river is critical to siting any functional intake as part of a potential Delta conveyance system that would not experience sediment fouling during operations.

Stable morphological conditions of the river relative to its underwater depth and sediment shoaling characteristics over time would facilitate long-term operations and would be a primary driver to siting any potential intake structures.

How does river geomorphology affect facility siting and design?

River geomorphology affects the depth and sediment shoaling behavior of the river and therefore the siting of any potential intakes. Locations with stable river cross sections with suitable depth are required. At least 16 feet of water depth at low river flows are required to site intakes. The required depth would also need to be within about 100 feet of the top of the river bank to minimize any potential intake structure's effects on river water surface elevations at high flows. Further, sites that do not exhibit sediment shoaling are required.

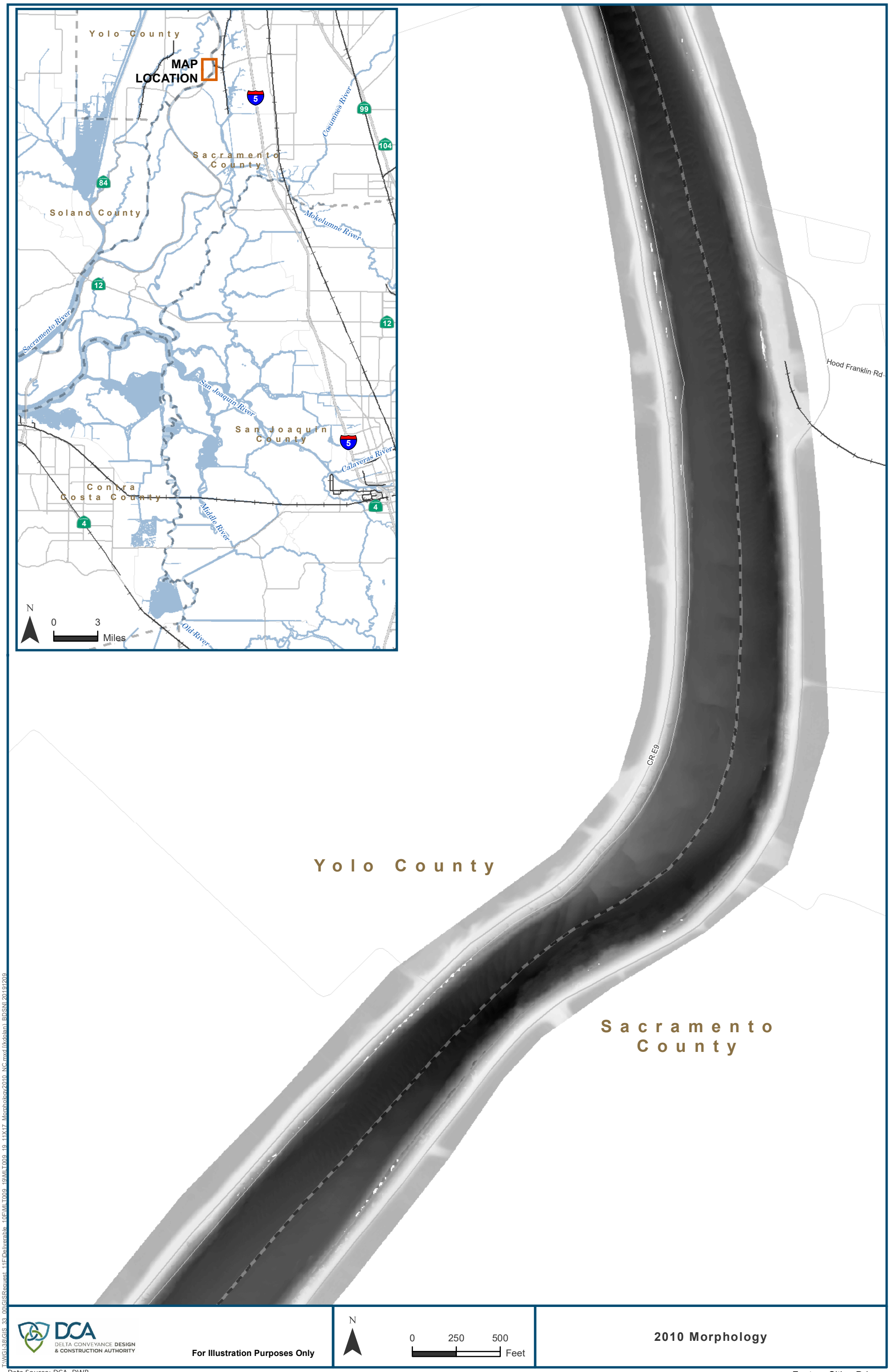
Facility	Effect of Driver on the Siting of Facilities
Intakes	Facility configuration and location
Tunnel Shaft-Launch	No direct effect
Tunnel	No direct effect
Tunnel Shaft- Retrieval	No direct effect
Intermediate Forebay	No direct effect
Southern Forebay	No direct effect
Pumping Plant	No direct effect
South Delta Interconnection Conveyance to Existing PP	No direct effect

References

California Department of Water Resources (DWR). 2019. Bathymetric survey on the Sacramento River from the confluence with the American River to Courtland. North Central Region Office, Bathymetry Data Collection Section. Survey dates: July 29 - August 19.

DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

Map 10



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For Illustration Purposes Only

2010 Morphology

Data Source: DCA, DWR,
Wood Rogers, Inc. submittal of Fugro West, Inc. – Summary Report. 2010.

Siting Drivers Summary Matrix

FACILITY	Soil Compressibility	Oil and Gas Wells	Access Routes	Power Supply	Land Use	Sensitive Receptors	Sandhill Cranes	River Geomorphology
Intakes	✓		✓	✓	✓	✓	✓	✓
Tunnel Shaft-Launch	✓		✓	✓	✓	✓	✓	
Tunnel		✓						
Tunnel Shaft- Retrieval	✓		✓	✓	✓	✓	✓	
Intermediate Forebay	✓		✓	✓	✓	✓	✓	
Southern Forebay	✓		✓	✓	✓	✓		
Pumping Plant	✓		✓	✓	✓	✓		
South Delta Interconnection Conveyance	✓		✓	✓	✓	✓		