
Subject: Efforts to Minimize Delta Community Effects Supplement – Bethany Reservoir Alternative (Final Draft)

Project feature: Projectwide

Prepared for: California Department of Water Resources (DWR) / Delta Conveyance Office (DCO)

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1. Purpose

This supplementary technical memorandum (TM) has been developed to provide a summary of efforts conducted by the Delta Conveyance Design and Construction Authority (DCA), under the direction of the California Department of Water Resources (DWR), to minimize effects of the Delta Conveyance Project (project) on Delta communities, and terrestrial and aquatic habitats, based on conceptual design. In response to public comment on potential effects of the Southern Forebay associated with the Central and Eastern (C-E) corridor options, DWR directed DCA to analyze a new alternative, referred to as the Bethany Reservoir Alternative, that would eliminate the Southern Forebay and associated Southern Complex, and instead convey water to a Bethany Reservoir Discharge Structure along the rim of the existing State Water Project Bethany Reservoir. This summary document does not compare the characteristics of the Central and Eastern Options and Bethany Reservoir Alternative. The DWR Environmental Impact Report (EIR) will analyze the comparative effects of the alternatives.

This document focuses on the DCA's efforts to minimize effects of the Bethany Reservoir Alternative and is complementary to the *Efforts to Minimize Delta Community Effects* TM for the C-E Options (DCA, 2021a). Only items specific to the Bethany Reservoir Alternative are discussed in this TM. Items applicable to all corridor options, such as general construction or operation practices, or related to facilities that are the same for the Bethany Reservoir Alternative and the Central and/or Eastern Corridors are presented in the *Efforts to Minimize Delta Community Effects* TM for the C-E Options (DCA, 2021a) and are not discussed in this TM. These facilities include the following:

- Intakes
- Select features at the Twin Cities Complex
- New Hope Tract Maintenance Shaft (Eastern Corridor)
- Canal Ranch Tract Maintenance Shaft
- Terminous Tract Reception Shaft
- King Island Maintenance Shaft
- Select features at the Lower Roberts Island Launch Shaft
- Select support facilities such as park and ride lots and concrete batch plants

The approach to minimizing the effects of construction and operation of the project, and information regarding the Stakeholder Engagement Committee involvement is similar to or the same as that described in the *Efforts to Minimize Delta Community Effects* TM for the C-E Options (DCA, 2021a), and related information is not discussed in this TM.

This is a summary document and does not include a full description of the development or siting of key features. Factors considered in the decision process and recommendations for locations, site layouts, and construction methodologies of the key features are described in *Delta Conveyance Final Draft Engineering Project Report—Central and Eastern Options*, and *Delta Conveyance Draft Engineering Project Report—Bethany Reservoir Alternative*, collectively referred to as the EPRs, and their associated TMs (DCA, 2021b, 2021c).

2. Organization

Section 3 summarizes conceptual design considerations and potential applications to minimize potential effects to Delta communities and habitats during construction and operation of the project specifically related to the Bethany Reservoir Alternative.

3. Summary of Methods to Minimize Effects to Delta Communities and Habitats for the Bethany Reservoir Alternative

A series of methods, including design considerations and suggested plans, were identified to meet the objectives outlined in Section 3 of the *Efforts to Minimize Delta Community Effects* TM for the C-E Options (DCA, 2021a). Table 1 includes a summary of the same type of methods that are unique to the Bethany Reservoir Alternative and were identified to minimize effects to Delta communities and habitats during the construction and operation of the project.

Table 1. Methods to Minimize Effects to Delta Communities and Habitats during Construction and/or Operation of the Delta Conveyance Project Facilities Uniquely Related to Implementation of the Bethany Reservoir Alternative¹

Objective	Design Consideration	Suggested Facility Plans
Minimize construction traffic and associated effects to residents, recreationists, wildlife habitat, and agricultural operations	Develop designated access routes, improve or modify roads, and construct new dedicated haul roads	<ul style="list-style-type: none"> • A preliminary traffic analysis (DCA, 2021d, 2021e) was conducted, and the strategies identified included modifying roadway intersections, realigning roadways, and constructing new onsite access roads to support construction vehicles and increased traffic volumes (e.g., modification of the Lindemann Road/Byron Highway interchange near the Bethany Complex, widening of Byron Highway, and providing a traffic circle on Mountain House Road). • A new, project-specific road would be constructed to access the Bethany Reservoir Discharge Structure located along the rim of the Bethany Reservoir (DCA, 2021e). This new road would avoid the need for construction and maintenance vehicles to use existing roads through the Bethany Reservoir State Recreation Area.
Minimize construction areas and activities that could produce noise, dust, GHG emissions, traffic, and land use disturbances	Reduce the number of shafts, and associated construction areas, by modifying the tunnel alignment to shift to longer lengths between shafts	<ul style="list-style-type: none"> • A review of appropriate tunnel lengths between tunnel launch shafts and tunnel reception shafts was conducted to minimize the number of tunnel shafts required (DCA, 2021f, 2021g). It was determined that the length between tunnel launch shaft site and tunnel reception shaft site could be up to 15 miles, with tunnel maintenance shafts located at least every 4 to 6 miles along the alignment. • This allowed for the consolidation of main tunnel launch shaft sites between the intakes and Bethany Complex to only two locations: the Twin Cities Complex and Lower Roberts Island. A launch shaft would not be constructed in the south Delta. Launch shaft construction sites involve more activities and are significantly larger than maintenance or reception shaft sites due to the need to store tunnel liner segments and handle RTM. Minimizing the number of launch shafts reduces the area affected and consolidates extensive construction activities, and associated adverse effects, to fewer locations.
Minimize construction areas and activities that could produce noise, dust, GHG emissions, traffic, and land use disturbances Minimize disturbance to sensitive wildlife and protected terrestrial and/or aquatic habitat areas	Use of the Bethany Reservoir Aqueduct and associated tunneled pipelines to connect the Bethany Reservoir Pumping Plant and Surge Basin to the Bethany Reservoir Discharge Structure	<ul style="list-style-type: none"> • The use of the Bethany Reservoir Aqueduct and associated tunneled pipelines allowed the main tunnel between the intakes and the Bethany Complex to be shorter and allowed the Bethany Reservoir Pumping Plant and Surge Basin to be located away from the conservation easement areas and the Bethany Reservoir State Recreation Area and closer to transportation corridors. • The shorter main tunnel between the intakes and Bethany Complex reduced the number of main tunnel shafts required. • The use of the Bethany Reservoir Aqueduct eliminated the need to have any main tunnel drives launched in the south Delta.

¹ The Bethany Reservoir Alternative would include similar facilities as the Eastern Corridor from the intakes through Lower Roberts Island tunnel launch shaft that are described in the *Efforts to Minimize Delta Community Effects TM* for the C-E Options (DCDCA, 2021a).

Table 1. Methods to Minimize Effects to Delta Communities and Habitats during Construction and/or Operation of the Delta Conveyance Project Facilities Uniquely Related to Implementation of the Bethany Reservoir Alternative¹

Objective	Design Consideration	Suggested Facility Plans
Minimize disturbance to existing land uses, including agricultural and residential lands and wildlife refuges and preserves	Minimize demolition of existing structures and reduce agricultural activities	<ul style="list-style-type: none"> • Facilities on Upper Jones Tract, Union Island and at the Bethany Complex were sited to minimize the need to demolish existing structures or reduce agricultural activities (DCA, 2021h). • Launch shaft sites were consolidated to only two locations: the Twin Cities Complex and Lower Roberts Island. Launch shaft construction sites involve more activities and are significantly larger than maintenance or reception shaft sites due to the need to store tunnel liner segments and handle RTM. Minimizing the number of launch shafts reduces the area affected and consolidates extensive construction activities, and associated adverse effects, to fewer locations.
Minimize disturbance to existing land uses, including agricultural and residential lands and wildlife refuges and preserves	Restore land after construction to habitat or agricultural uses	<ul style="list-style-type: none"> • Following construction, areas previously used for material and equipment laydown and staging, material stockpiles, retention ponds, parking areas, bus drop off and pick up, onsite access roads, contractor trailers, and other facilities would be reclaimed for either agriculture or habitat uses. This would occur at the intakes, tunnel launch shaft sites, and the Bethany Complex. DCA conducted an analysis to evaluate and determine the appropriate post-construction land reclamation treatments for temporary construction areas for the Bethany Reservoir Alternative and the approximate acreage identified to be reclaimed is discussed in the EPRs and attachments (DCA, 2021b, 2021c, 2021i, 2021j).
Minimize construction effects to existing infrastructure or other community resources, including powerlines, and groundwater and surface water resources	Avoid existing infrastructure	<ul style="list-style-type: none"> • The presence of existing infrastructure was a factor in siting project facilities (DCA, 2021h). Sites with fewer occurrences of existing infrastructure ranked higher than those with more existing infrastructure. Sites with some types of particularly significant infrastructure were entirely avoided in the process. • The Bethany Complex and associated access roads were sited to minimize disturbance to a nearby school. • A portion of the Bethany Reservoir Aqueduct would be tunneled under the existing Jones Pumping Plant Penstocks. • Coordination would be conducted, and provisions would be included in the design, for crossings of BBID canals along the Bethany Reservoir Aqueduct. • A dual launch shaft site would be constructed at Lower Roberts Island for the Bethany Reservoir Alternative. This avoids placing a launch shaft site at the Bethany Complex, which is closer to residential communities and supporting infrastructure. Launch shaft construction sites involve more activities and are significantly larger than maintenance or reception shaft sites due to the need to store tunnel liner segments and handle RTM. Minimizing the number of launch shafts reduces the area affected and consolidates extensive construction activities, and associated adverse effects, to fewer locations
Minimize disturbance to sensitive wildlife and protected	Reroute and realign facilities to avoid wetlands	<ul style="list-style-type: none"> • The Bethany Reservoir access road and Bethany Reservoir Aqueduct were realigned to avoid or minimize effects on wetlands and conservation easement areas (DCA, 2021h).

Table 1. Methods to Minimize Effects to Delta Communities and Habitats during Construction and/or Operation of the Delta Conveyance Project Facilities Uniquely Related to Implementation of the Bethany Reservoir Alternative¹

Objective	Design Consideration	Suggested Facility Plans
terrestrial and/or aquatic habitat areas		
Minimize disturbance to sensitive wildlife and protected terrestrial and/or aquatic habitat areas	Avoid conservation easements in siting of key features	<ul style="list-style-type: none"> • Facilities were moved and surface effects to conservation easement areas were avoided (e.g., existing conservation easements were considered in facility siting and a portion of the Bethany Reservoir Aqueduct would be tunneled under an existing conservation easement, and the Bethany Reservoir access road was rerouted to avoid the conservation easement) (DCA, 2021h).
Manage seismic risks to people and property due to construction and operation of the project avoiding placement of facilities or including specialized design criteria in the vicinity of known fault lines	Consider the Bethany Fault in facility siting and design facilities to withstand design seismic loads to prevent structural failures.	<ul style="list-style-type: none"> • Geophysical investigations would be conducted during the preconstruction phase to further investigate the nature and location of the Bethany Fault north of the Bethany Reservoir (DCA, 2021k). • The design and construction of Bethany Reservoir Discharge Structure would be reviewed and approved by the Division of Safety of Dams.
Minimize construction areas and activities that could produce noise, dust, GHG emissions, traffic, and land use disturbances	Consider soil conditions as part of the siting methodology to minimize the need for ground improvement during construction	<ul style="list-style-type: none"> • Where possible, sites with more stable soils were selected to minimize the need for ground improvement. It is not anticipated that ground improvement would be required at Bethany Complex facilities. • Site-specific ground improvement methods were identified to minimize the need for over-excavation and to efficiently use the available site space (DCA, 2021l).
Avoid increasing demand for existing emergency services in the Delta due to construction and operation of the project	Implement emergency response strategies	<ul style="list-style-type: none"> • Project-specific emergency response facilities would be constructed at the intakes, tunnel launch shaft sites, and the Bethany Complex. These facilities could be developed in coordination with communities to increase their emergency response capabilities (DCA, 2021m).

Notes:

BBID = Byron-Bethany Irrigation District

RTM = reusable tunnel material

4. References

Delta Conveyance Design and Construction Authority (DCA). 2021a. Efforts to Minimize Delta Community Effects Technical Memorandum. (Final Draft). Attachment H to the Delta Conveyance Final Draft Engineering Project Report—Central and Eastern Options.

Delta Conveyance Design and Construction Authority (DCA). 2021b. *Volume 1: Delta Conveyance Final Draft Engineering Project Report—Central and Eastern Options. (Final Draft 2)*. November.

Delta Conveyance Design and Construction Authority (DCA). 2021c. *Volume 1: Delta Conveyance Draft Engineering Project Report—Bethany Reservoir Alternative. (Final Draft 2)*. November.

Delta Conveyance Design and Construction Authority (DCA). 2021d. *Traffic Impact Analysis Technical Memorandum. (Final Draft)*. Attachment F to the Delta Conveyance Final Draft Engineering Project Report—Central and Eastern Options.

Delta Conveyance Design and Construction Authority (DCA). 2021e. *Logistics Strategy – Bethany Reservoir Alternative. (Final Draft)*. Attachment to the Delta Conveyance Final Draft Engineering Project Report—Bethany Reservoir Alternative.

Delta Conveyance Design and Construction Authority (DCA). 2021f. *Tunnel Excavation and Drive Assessment. (Final Draft)*. Attachment B to the Delta Conveyance Final Draft Engineering Project Report—Central and Eastern Options.

Delta Conveyance Design and Construction Authority (DCA). 2021g. *Supplementary Tunnel Information – Bethany Reservoir Alternative. (Final Draft)*. Attachment to the Delta Conveyance Final Draft Engineering Project Report—Bethany Reservoir Alternative.

Delta Conveyance Design and Construction Authority (DCA). 2021h. *Facilities Siting Study –Bethany Reservoir Alternative. (Final Draft)*. Attachment to the Delta Conveyance Final Draft Engineering Project Report—Bethany Reservoir Alternative.

Delta Conveyance Design and Construction Authority (DCA). 2021i. *Post Construction Land Reclamation Technical Memorandum. (Final Draft)*. Attachment H to the Delta Conveyance Final Draft Engineering Project Report—Central and Eastern Options.

Delta Conveyance Design and Construction Authority (DCA). 2021j. *Post-Construction Land Reclamation Supplement – Bethany Reservoir Alternative. (Final Draft)*. Attachment to the Delta Conveyance Final Draft Engineering Project Report—Bethany Reservoir Alternative.

Delta Conveyance Design and Construction Authority (DCA). 2021k. *Potential Future Field Investigations – Bethany Reservoir Alternative. (Final Draft)*. Attachment to the Delta Conveyance Final Draft Engineering Project Report—Bethany Reservoir Alternative.

Delta Conveyance Design and Construction Authority (DCA). 2021l. *Liquefaction and Ground Improvement Analysis for Bethany Reservoir Alternative. (Final Draft)*. Attachment to the Delta Conveyance Final Draft Engineering Project Report—Bethany Reservoir Alternative.

Delta Conveyance Design and Construction Authority (DCA). 2021m. *Project Emergency Response Plan – Bethany Reservoir Alternative. (Final Draft)*. Attachment to the *Delta Conveyance Final Draft Engineering Project Report—Bethany Reservoir Alternative*.

5. 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.

Rev.	Date	Version Description	Approval Names and Roles			
			Prepared by	Internal QC review by	Consistency review by	Approved for submission by
1	12/23/2021	Conformed Final Draft	Karen Askeland/ EDM Environmental Liaison	Gwen Buchholz/ DCA Environmental Consultant	Phil Ryan / EDM Design Manager	Terry Krause / EDM Project Manager

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