



Sites Reservoir Feasibility Report

Prepared for the California Water Commission

November 2021

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Contents

1.	Introduction	1
1.1	Sites Reservoir Project	1
1.2	Sites Project Authority	2
1.3	Project Development	3
1.4	Beneficiary Pays	4
2.	Project Objectives	5
2.1	WSIP Determinations and Funding Decisions	5
2.2	Refinement of Objectives	5
3.	Project Description	7
3.1	Background	7
3.2	Value Engineering Options	7
3.3	Sites Reservoir Diversion Facilities	10
3.3.1	Tehama-Colusa Canal Diversion	10
3.3.2	GCID Main Canal Diversion	10
3.4	Regulating Reservoirs and Conveyance Complex	12
3.4.1	Terminal Regulating Reservoir	12
3.4.2	Funks Reservoir	13
3.5	Sites Reservoir and Related Facilities	17
3.5.1	Inlet/Outlet Works	17
3.5.2	Dams and Dikes	17
3.6	Conveyance to Sacramento River	18
3.6.1	TC Canal Intake	19
3.6.2	Dunnigan Pipeline	19
3.7	Recreation Areas	19
3.8	New and Existing Roadways	22
3.9	Water Operations	24
4.	Technical Feasibility	27
4.1	Sites Reservoir Operations Plan	27
4.2	Analytical Methods	31
4.3	Development Conditions	31
4.4	Hydrologic Period and Timestep	31
4.5	Water Balance	31
5.	Economic Feasibility	33
5.1	Background	33
5.2	Economic Feasibility Approach	33
5.2.1	CALSIM II Water Quantities and Uncertainty	34
5.2.2	Water Supply Benefit Valuation	34
5.2.3	Updated Data and Analysis Assumptions	35
5.2.4	Water Quality Benefit Valuation Approach	37
5.3	Benefits	37
5.3.1	Incremental Level 4 Refuge (WSIP Eligible)	37
5.3.2	Yolo Bypass (WSIP Eligible)	39
5.3.3	Recreation and Flood Reduction (WSIP Eligible)	40
5.3.4	Joint Powers Authority (WSIP Non-Eligible)	40

5.3.5	CVP Operational Flexibility (WSIP Non-Eligible)	46
5.3.6	SWP (WSIP Non-Eligible)	52
5.3.7	Water Quality	53
5.3.8	Summary Findings	54
5.4	Costs	56
5.4.1	Construction Cost	56
5.4.2	Interest During Construction	58
5.4.3	Operation, Maintenance, and Replacement (OM&R)	59
5.4.4	Conveyance Energy Costs	60
5.4.5	Residual Value	60
5.4.6	Cost Summary	60
5.5	Findings	61
5.5.1	Benefit Cost Analysis Results	61
5.5.2	Public Benefit Ratio	62
5.6	Unmonetized Benefits	62
6.	Financial Feasibility	65
6.1	Background	65
6.2	Financial Feasibility Approach	65
6.2.1	Project Purposes	65
6.2.2	Updated Data and Analysis Assumptions	65
6.3	Cost Allocation	68
6.3.1	Maximum Justifiable Expense	68
6.3.2	Separable Costs	71
6.3.3	Results	71
6.4	Cost Assignment	71
6.4.1	Total Cost Assignment	71
6.4.2	Capital Cost Assignment	71
6.4.3	OM&R Cost Assignment	74
6.5	Cost Share Methodology	77
6.6	Plan of Finance	77
6.6.1	Funding Already Secured	77
6.6.2	Funding Still Needed	78
7.	Environmental Feasibility	82
7.1	Introduction	82
7.1.1	Background	82
7.2	Revised Draft Environmental Impact Report/Supplemental Environmental Impact Statement	84
7.2.1	CEQA Objectives	84
7.2.2	Alternatives	85
7.2.3	RDEIR/SDEIS Preparation and Preliminary Findings	86
7.2.4	Coordination, Consultation, and Outreach	93
7.2.5	Permits and other Approvals	97
7.3	Conclusions	98
8.	Constructability	100
8.1	Introduction	100
8.2	Schedule	100
8.3	Construction Materials	101

8.4	Workforce	101
8.5	Equipment Availability	101
8.6	Summary	101
9.	References	107

Tables

Table 1-1.	Feasibility Report Sections and Supporting Appendices.....	1
Table 4-1.	Description of Proposed Sites Project Authority Seasonal Operations	29
Table 5-1.	WSIP Unit Water Values – Revised May 2018	36
Table 5-2.	Conveyance Energy Unit Cost for SOD Deliveries	36
Table 5-3.	Incremental Level 4 Refuge Water Supply Increases (2030 and 2070)	38
Table 5-4.	Incremental Level 4 Refuge Benefits	38
Table 5-5.	Yolo Bypass Supply Increases (2030 and 2070)	39
Table 5-6.	Yolo Bypass Supply Benefits.....	39
Table 5-7.	Recreation and Flood Reduction Benefits – Net Present Value	40
Table 5-8.	JPA Supply Increases (2030 and 2070).....	40
Table 5-9.	Alternative Water Supply System Costs.....	42
Table 5-10.	Future MWD Water Supply Projects.....	43
Table 5-11.	Zone 7 Alternative Water Supply Costs	44
Table 5-12.	JPA Supply Benefits	45
Table 5-13.	CVP Operational Flexibility – Delivery Supply Increases (2030 and 2070)	46
Table 5-14.	CVP Operational Flexibility – Delivery Supply Benefits.....	47
Table 5-15.	CVP Operational Flexibility – Storage Supply Increases (2030 and 2070)	48
Table 5-16.	CVP Operational Flexibility – Storage Supply Benefits.....	49
Table 5-17.	CVP Incidental Supply Quantities (2030 and 2070)	49
Table 5-18.	CVP Incidental Supply Benefits	50
Table 5-19.	CVP Operational Flexibility – Total Benefits	52
Table 5-20.	SWP Supply Increases (2030 and 2070).....	52
Table 5-21.	SWP Supply Benefits	53
Table 5-22.	Water Quality Benefits.....	54
Table 5-23.	Benefits Summary – Net Present Value	56
Table 5-24.	Summary of Construction Costs.....	57
Table 5-25.	Interest During Construction – WSIP IDC Scenario (3.5% Discount Rate)	58
Table 5-26.	Anticipated Project Funding Sources and IDC.....	58
Table 5-27.	Interest During Construction – JPA Recommended IDC Scenario (2.4% Interest Rate)	59
Table 5-28.	Cost Summary – Net Present Value	61
Table 5-29.	Benefit-Cost Analysis Results	61
Table 5-30.	Public Benefit Ratio Results	62
Table 6-1.	Cost Summary – Net Present Value and Annualized Values.....	66
Table 6-2.	Benefits Summary – Net Present and Annualized Value	68
Table 6-3.	Cost Allocation Summary: (Annualized Values)	69
Table 6-4.	Total Cost Assignment – Present Value	72
Table 6-5.	Capital Cost Assignment – Present Value	73
Table 6-6.	OM&R Cost Assignment – Present Value.....	75
Table 6-7.	OM&R Cost Assignment – Annual.....	76
Table 8-1.	Consistency of Construction Schedule with other Large Dams	100

Figures

Figure 3-1. Regulating Reservoirs and Conveyance Facilities	8
Figure 3-2. Conveyance to the Sacramento River.....	9
Figure 3-3. Sacramento River Conveyance	11
Figure 3-4. Funks Reservoir Facilities – Northeast Shore	14
Figure 3-5. Inlet/Outlet Works.....	16
Figure 3-6. Dunnigan Pipeline and Release to the CBD	20
Figure 3-7. Recreation Areas.....	21
Figure 3-8. Sites Lodoga Road and Bridge	23
Figure 8-1. Haul Routes, Borrow, Disposal, Stockpile, Staging, and Rock Processing Areas	102
Figure 8-2. Offsite Quarries Location	104

Appendices

Appendix A Detailed Project Description

Appendix B Operating Plan

B.1 Sites Reservoir Project Preliminary Operations Plan Under a Range of Hydrologic Conditions

B.2 Updated CALSIM 2 Modeling for WSIP Analysis

B.3 Sites Project: 2020 Benchmark Model Assumptions Summary

B.4 Water Balance of CALSIM II Simulation Results for Alternative 1B – WSIP 2030 and WSIP 2070

Appendix C Costs

C.1 Construction Cost

C.1.A Final Feasibility-Level Reservoir Cost Estimate

C.1.B Sites Reservoir Project HC Conveyance Facilities Feasibility Design Basis of Estimate

C.2 Operating Cost

C.2.A Reservoir Operations and Maintenance

C.2.B Final Conveyance HC Operations, Maintenance, and Replacement

C.3 Mitigation Cost

Appendix D Environmental Feasibility

D.1 Summary of Significant Impacts and Mitigation Measures

D.2 Permits, Approvals, Reviews, and Consultation Requirements

Appendix E Constructability

E.1 Reservoir Constructability Analysis Technical Memorandum

E.2 Final Conveyance Constructability Technical Memorandum

Acronyms

AB	Assembly Bill
AF	acre-foot
AN	Above Normal
Authority	Sites Project Authority
B/C	benefit-cost
BCA	benefit-cost analysis
BiOp	Biological Opinion
BMP	Best Management Practice
BN	Below Normal
C	Critical Dry
CALFED	CALFED Bay-Delta Program
CFR	Code of Federal Regulations
CBD	Colusa Basin Drain
CCAPCD	Colusa County Air Pollution Control District
CDFW	California Department of Fish and Wildlife
CDSM	cement deep soil mixing
CEQ	U.S. Council on Environmental Quality
CEQA	California Environmental Quality Act
cfs	cubic feet per second
Commission	California Water Commission
CRHR	California Register of Historic Resources
CRMP	Cultural Resources Management Plan
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
D	Dry
D-1641	State Water Resources Control Board Decision 1641
Delta	Sacramento–San Joaquin Delta
DP	Driest periods
DWR	California Department of Water Resources
EIS	Environmental Impact Statement
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency
F	Final Environmental Impact Report
Farmland	Prime Farmland, Unique Farmland, or Farmland of Statewide Importance
FMMP	Farmland Mapping and Monitoring Program
GCID	Glenn-Colusa Irrigation District
H:V	horizontal: vertical
I/O	inlet/outlet
I/O Works	Inlet/Outlet Works
I-5	Interstate 5
ITP	incidental take permit
JPA	Joint Powers Authority
LTGEN	Long Term Generation Model for the CVP
LTO	Long-term Operation
MAF	million acre-feet
MCED	maximum conditional eligibility determination

MP	Mile Post
n/a	not applicable
NEPA	National Environmental Policy Act
NGOs	non-governmental organizations
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOD	North of the Delta
NODOS	North-of-the Delta Offstream Storage
NOP	Notice of Preparation
NOx	oxides of nitrogen
NRHP	National Register of Historic Places
O&M	Operations and Maintenance
OM&R	operation, maintenance, and replacement
PBR	public benefit ratio
PG&E	Pacific Gas and Electric Company
PGPs	pumping generating plants
PM ₁₀	particulate matter with aerodynamic diameter less than 10 microns
Portfolio	2020 Water Resilience Portfolio
Project	Sites Reservoir Project
RBPP	Red Bluff Pumping Plant
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RDEIR	Revised Draft Environmental Impact Report
ROC	Re-initiation of Consultation
ROD	Record of Decision
SDEIS	Supplemental Draft Environmental Impact Statement
SOD	South of the Delta
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TC	Tehama-Colusa
TC Canal	Tehama-Colusa Canal
TCCA	Tehama-Colusa Canal Authority
TRR	Terminal Regulating Reservoir
USFWS	U.S. Fish and Wildlife Service
W	Wet
WAPA	Western Area Power Administration
WIFIA	Water Infrastructure Finance and Innovation Act
WIIN	Water Infrastructure Improvements for the Nation
WSE	water surface elevation
WSIP	Water Storage Investment Program
YSAQMD	Yolo Solano Air Quality Management District

1. Introduction

The Sites Reservoir Project (Project) is one of eight projects chosen by the California Water Commission (Commission) based on the public benefits the Project will provide, including flood control, ecosystem improvement, and recreation. Following a rigorous selection process, the Commission made a maximum conditional eligibility determination (MCED) to determine the amount of Proposition 1 funding the Project would be eligible for (California Water Commission, 2018). This Feasibility Report has been prepared by the Sites Authority in accordance with the requirements of the Water Storage Investment Program (WSIP) as part of that program’s project eligibility requirement (Water Code Section 79757), and it confirms the benefits and costs associated with the Project.

The organization of this report is consistent with Section 3.5 of the WSIP Technical Reference (California Water Commission, 2016). The sections of the report and supporting appendices are described in Table 1-1. Sections 2 through 8 address each of the topics identified in the WSIP Technical Reference. The appendices corresponding to each report section are also listed in the table below, and provide additional detail and analysis.

TABLE 1-1. FEASIBILITY REPORT SECTIONS AND SUPPORTING APPENDICES

Report Section	Supporting Appendices
1 Introduction	None
2 Project Objectives	None
3 Project Description	Appendix A Detailed Project Description
4 Technical Feasibility	Appendix B Operating Plan
5 Economic Feasibility	Appendix C.1 Construction Cost Appendix C.2 Operating Cost Appendix C.3 Mitigation Cost
6 Environmental Feasibility	Appendix D.1. Summary of Significant Impacts and Mitigation Measures Appendix D.2. Permits, Approvals, Reviews, and Consultation Requirements
7 Environmental Feasibility	Appendix E Mitigation and Monitoring Plan
8 Constructability	Appendix F Constructability

This report also serves as the primary information source for the detailed Project description and Project analyses.

1.1 Sites Reservoir Project

Located 10 miles west of the town of Maxwell in rural Glenn and Colusa Counties, Sites Reservoir would be an off-stream storage facility that stores stormwater flows from the Sacramento River—after all other water rights and regulatory requirements are met—for release in dry and critical years for environmental use and for California communities, farms, and businesses when it is so desperately needed. Stormwater flows are captured at existing diversion on the Sacramento River and conveyed to Sites Reservoir via existing canals.

When operated in coordination with other Northern California reservoirs such as Shasta, Oroville, and Folsom, which function as the backbone to both the Central Valley Project (CVP) and the State Water Project (SWP), Sites Reservoir will greatly increase flexibility, reliability, and resiliency of statewide water supplies in drier periods. With Sites Reservoir, California has a rare opportunity to enhance statewide water supplies and provide a dedicated allocation of water storage specifically for environmental purposes. federal and state resource agencies will have a dedicated and reliable supply of water they can manage to provide benefits. A significant portion of the Project's annual water supplies will be provided for environmental flows, which will help to improve conditions for Delta smelt and wildlife refuges (WSIP benefits), and benefit anadromous fish by improving CVP operations consistent with the laws, regulations, and requirements in effect at the time of operation (federal benefit).

A detailed description of the Project facilities is provided in Chapter 3. The complete Project description from the Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS) (Sites Authority and Reclamation, 2021) is provided in Appendix A.

1.2 Sites Project Authority

The Sites Project Authority (Authority) was formed on August 26, 2010, when seven regional entities, including several local water agencies and Counties, executed the Joint Exercise of Powers Agreement. The primary purpose of the Authority is to pursue the development and construction of the Project. In keeping their commitment to move the Project forward on behalf of the region, the Authority has spent the last 6 years working towards this goal by engaging the public, various stakeholders, state and federal agencies, and landowners, initiating the required environmental planning process, and conducting feasibility studies, among other efforts. The Authority is governed by a board of directors that works in close coordination with other groups in the region interested in eventual construction of the Project.

The Board of Directors includes the following agencies:

- California Department of Water Resources
- City of Roseville
- City of Sacramento
- Colusa County
- Colusa County Water District
- Glenn Colusa Irrigation District
- Glenn County
- Placer County Water Agency
- Reclamation District 108
- Sacramento County Water Agency
- Tehama-Colusa Canal Authority
- United States Bureau of Reclamation
- Westside Water District

Two of the seats on the Board are currently shared. One is shared between the City of Sacramento and the Sacramento County Water Agency. The other is shared between the City of Roseville and Placer County Water Agency. Associate Members include the following agencies:

- TC 4 Districts
- Western Canal Water District

The Sites Authority Board is responsible for all matters pertaining to WSIP funding. There is also a Reservoir Committee with representatives from the agencies investing in the Project. The investors are discussed in greater detail in Section 6 (Financial Feasibility).

1.3 Project Development

Significant progress has been made on the Project since the WSIP application was submitted in 2017. The WSIP application proposed a 1.8-million acre-foot (MAF) reservoir, pumped storage capability to enhance hydropower generation, and filling Sites Reservoir from three intakes on the Sacramento River (two existing and one additional intake to be constructed).

The Project description has been significantly refined through a right-sizing process since the WSIP application was submitted. Right-sizing the reservoir was a result of responding to input from state and federal agencies, non-governmental organizations (NGOs), elected officials, landowners, stakeholders, and local communities. This feedback was critical to developing a reservoir that is the right size for both people and the environment, and better meets the needs of all Californians.

A robust value planning process resulted in a Project that includes facilities and operations at a reduced cost with a smaller reservoir footprint (now 1.5 MAF) and a lower diversion capacity off of the Sacramento River (reduced from 5,900 cubic feet per second [cfs] to 3,900 cfs). The Authority listened to stakeholder and participant feedback and eliminated undesirable components, such as the additional third intake on the Sacramento River and associated Delevan pipeline, to limit diversions to the use of existing facilities with proven state-of-the-art fish screening facilities. The recommended Project reduces impacts to the environment while providing future flexibility to manage the Project for the greatest overall benefit to California. As a result, this Feasibility Report presents a Project with significantly reduced diversions that nevertheless maintains the public benefits determined through the WSIP application review and MCED process.

The right-sized Project includes the following significant changes:

- Reservoir size reduced from 1.8 MAF to 1.5 MAF
- Pumped storage hydropower generation is eliminated (the Project can still generate power on release)
- 13.5-mile Delevan pipeline (bordering Delevan wildlife refuge) is eliminated and replaced with the 4-mile Dunnigan Pipeline (reduced impact to wetlands)
- Elimination of the new Delevan Intake Pumping Plant on the Sacramento River. All diversions would be from the existing Red Bluff and Hamilton City pumping facilities

The resulting Project is smaller, less expensive, has fewer environmental impacts, is easier to permit, will have less construction impacts, and will be less expensive to operate and maintain.

1.4 Beneficiary Pays

WSIP benefits are presented in this report consistent with the MCED determination by the Commission in July 2018. The Authority assigns costs to Project participants on a beneficiary pays principle, consistent with the cost allocation principles specified in the WSIP Technical Reference (California Water Commission, 2016). Although additional potential benefits were identified in the WSIP application process, the refined Project description provided in this report is consistent with the Commission's benefit determination that was the basis for MCED funding.

2. Project Objectives

The Project objectives are consistent with the objectives presented in the WSIP application and include the following:

- Ecosystem Benefits (WSIP benefit)
 - Refuge Water Supply
 - Yolo Bypass Flows for Delta Ecosystem Enhancement
- Flood Damage Reduction (WSIP benefit)
- Recreation (WSIP benefit)
- Water Supply
 - Participating California Water Agencies
 - CVP

2.1 WSIP Determinations and Funding Decisions

In July 2018, the Commission made MCEDs for Sites Reservoir, which established \$816M as the maximum amount of Proposition 1 funding available to support Sites Reservoir. Since July 2018, one project withdrew from the WSIP, and the Commission adjusted the remaining projects' MCEDs. Sites Reservoir is currently eligible for up to \$836,787,128, including \$40,818,884 in early funding.

The WSIP funding level for Sites Reservoir was established through the WSIP application process, which identified the following maximum potential public benefits resulting from the Project:

- Ecosystem Benefits – \$766M
- Recreation Benefits – \$197M
- Flood Damage Reduction Benefits – \$45M

The potential for the Project to provide public benefits exceeded the level of funding available for the Project through WSIP. As a result, the MCED was set at \$816M initially (CWC, WSIP Technical Review for the Sites Project, 2018), and subsequently adjusted to \$837M. Benefits were originally determined in 2015 dollars.

2.2 Refinement of Objectives

The WSIP benefit objectives are unchanged. It is the intent of the Authority to deliver public benefits in a manner consistent with the MCED for the WSIP funding amount to achieve the ecosystem, recreation, and flood damage reduction benefits.

The objectives for non-WSIP funding have been further refined since the original WSIP application. This Feasibility Report includes a more detailed evaluation of water supply benefits for public agencies in California.

After the Commission's 2018 determinations, the U.S. Bureau of Reclamation (Reclamation) published a Final Feasibility Report (Reclamation, 2020). The Reclamation Feasibility Report identified a federal

interest in CVP operational flexibility and benefits to anadromous fish through temperature improvements downstream of Shasta Lake. These are acknowledged in this report as federal water supply benefits. The Reclamation Feasibility Report further clarifies the Project participants and source of funding for benefits that are not funded through WSIP. Reclamation is currently developing an addendum to the Feasibility Report.

3. Project Description

3.1 Background

As described in Section 1.3, the configuration and design of the Project facilities has advanced considerably since the WSIP application. The Project description has been significantly refined through a right-sizing process that responded to input from state and federal agencies, NGOs, elected officials, landowners, stakeholders, and local communities. The Sites Authority has developed a Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS) that documents the Project description and evaluates the Project impacts. The Project description from the RDEIR/SDEIS is provided in Appendix A to this report. A detailed description of the operations is provided in Appendix B.

The project would use existing infrastructure to divert unregulated and unappropriated flow from the Sacramento River at Red Bluff and Hamilton City, and convey water to a new off-stream reservoir west of Maxwell, California. New and existing facilities would move water into and out of the reservoir, with ultimate release back to the Sacramento River system via existing canals and a new pipeline located near Dunnigan (the southern end of the Project). Construction of the reservoir would necessitate construction of a bridge or bypass road to connect Maxwell with the community of Lodoga. Additional components would include future development of new recreation facilities at the reservoir. The RDEIR/SDEIS includes three Action Alternatives to implement the Project. These project alternatives represent the range of facilities, operations, and investor participation under consideration:

- Alternative 1 – 1.5 MAF reservoir, bridge across reservoir, release to the Colusa Basin Drain (CBD), and Reclamation investment ranging up to 7 percent of the Project costs
- Alternative 2 – 1.3 MAF reservoir, South Road around reservoir, partial release to the CBD and Sacramento River, and no Reclamation investment
- Alternative 3 – 1.5 MAF reservoir, bridge across reservoir, release to the CBD, and Reclamation investment up to 25 percent of the Project costs

Alternative 1 is the preferred Project and is described in this section. Project facilities are shown in Figure 3-1 and Figure 3-2. The Project descriptions for Alternatives 2 and 3 are included in Appendix A for completeness.

3.2 Value Engineering Options

The cost estimate incorporates a series of value engineering options to further reduce the costs of the Project. The Project description provided here does not include these items to provide consistency with the draft SEIS. Value engineering options include the following:

- Using a single inlet/outlet (I/O) tunnel rather than two tunnels for reservoir filling and making reservoir releases
- Using a sloping intake tower resting on the reservoir slope rather than a vertical, free-standing tower in the reservoir
- Processing onsite material from borrow areas or required excavations for use in the transition zones in the dams to reduce the amount of hauling required from offsite quarries

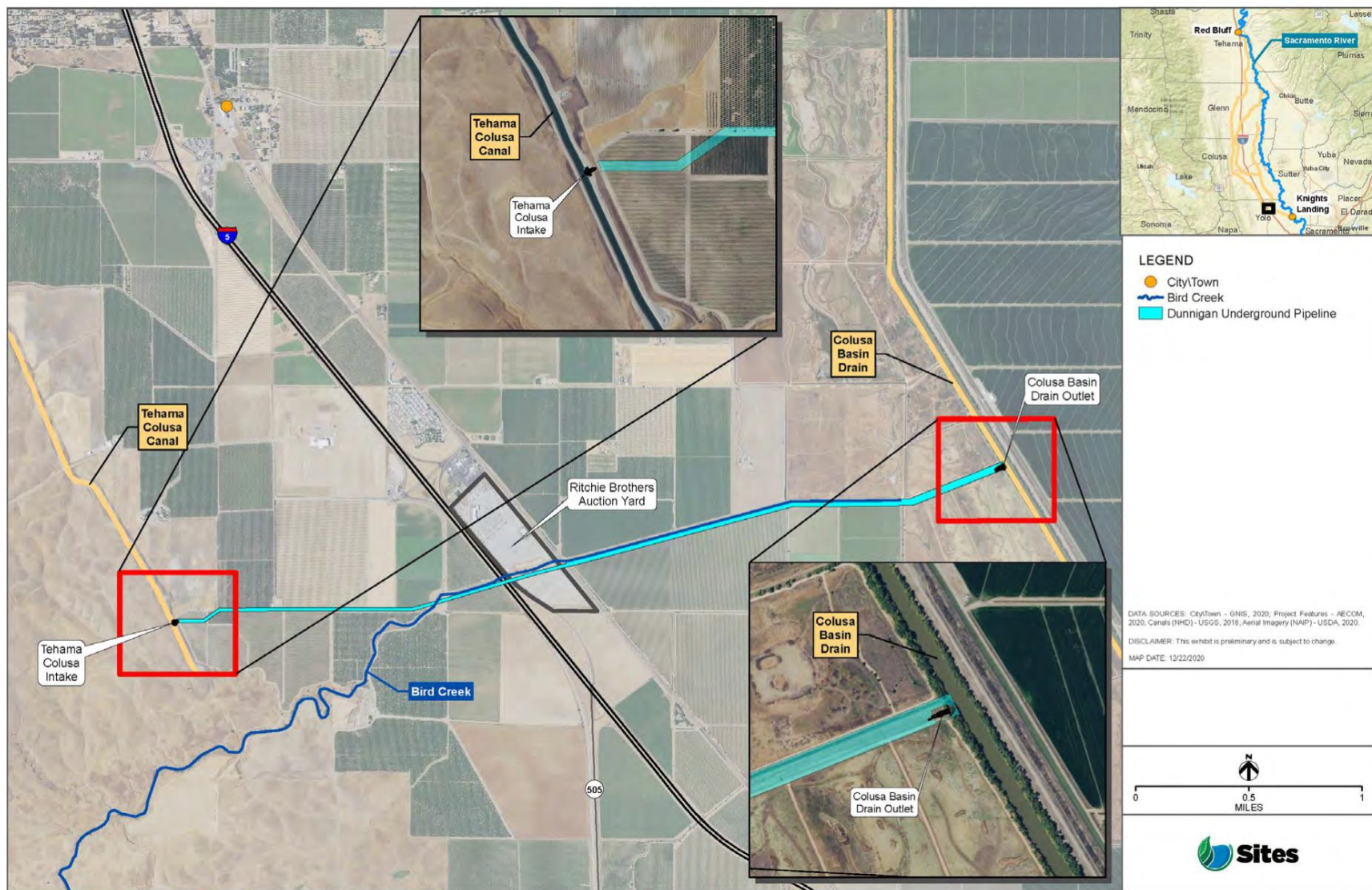


FIGURE 3-2. CONVEYANCE TO THE SACRAMENTO RIVER

- Full-depth reclamation for County roads
- Elimination of the Emergency Reservoir Drawdown Release Structures at Saddle Dams 3 and 5 with enlargement of the I/O tunnel to compensate
- Replacement of the West Bridge for Sites Lodoga Road with a roadway embankment fill
- Adjustments to the location for the Huffmaster Road Realignment and Sites Lodoga Road Realignment

These value engineering options will be included in the Final EIS.

3.3 Sites Reservoir Diversion Facilities

These facilities would divert water from the Sacramento River at the existing Red Bluff Pumping Plant (RBPP) into the existing Tehama-Colusa (TC) Canal and at the existing Hamilton City Pump Station into the existing Glenn-Colusa Irrigation District (GCID) Main Canal (Figure 3-3). The RBPP and TC Canal are owned by Reclamation and operated by the Tehama Colusa Canal Authority. The RBPP has an existing fish screen that meets National Marine Fisheries Service (NMFS) and California Department of Fish and Wildlife (CDFW) fish screen criteria. The Hamilton City Pump Station and GCID Main Canal are owned and operated by GCID. The Hamilton City Pump Station has an existing fish screen that meets NMFS and CDFW fish screen criteria.

3.3.1 Tehama-Colusa Canal Diversion

The existing facility at Red Bluff requires installation of two additional 250-cfs vertical axial-flow pumps into existing concrete pump bays at the RBPP. The addition of these two pumps would increase the capacity of the existing plant from 2,000 to 2,500 cfs and provide redundancy.

3.3.2 GCID Main Canal Diversion

The GCID system would require a new 3,000-cfs Main Canal head gate structure about 0.25 mile downstream of the existing Hamilton City Pump Station (Figure 3-3). This new structure is required because the existing head gate structure would not be adequate for proposed winter operation due to high river levels. The existing head gate structure would be left in place to continue to serve as a bridge between County Road 203 and County Road 205 in Glenn County. This structure would continue to operate during construction of the new head gate structure, and diversion activities would continue throughout construction. The new head gate structure would be constructed upstream of the existing structure and would include eight automated gates. The canal reach immediately downstream of the new head gate structure would be lined with concrete for approximately 35 feet to prevent erosion.

Other improvements to the Main Canal involve replacing the Walker Creek siphon at Mile Post (MP) 24.48 and Willow Creek siphon (MP 24.68) to allow for increased capacity. The siphon under the Union Pacific Railroad (i.e., railroad siphon) at MP 26.6 would be improved by the addition of a barrel to allow for increased capacity. This Project would also entail Main Canal improvements between MP 26 and MP 41.3 to increase the freeboard between Willows and the Terminal Regulating Reservoir (TRR) to a standard 2.5 feet; under existing conditions, the freeboard range is 1 to 2 feet.

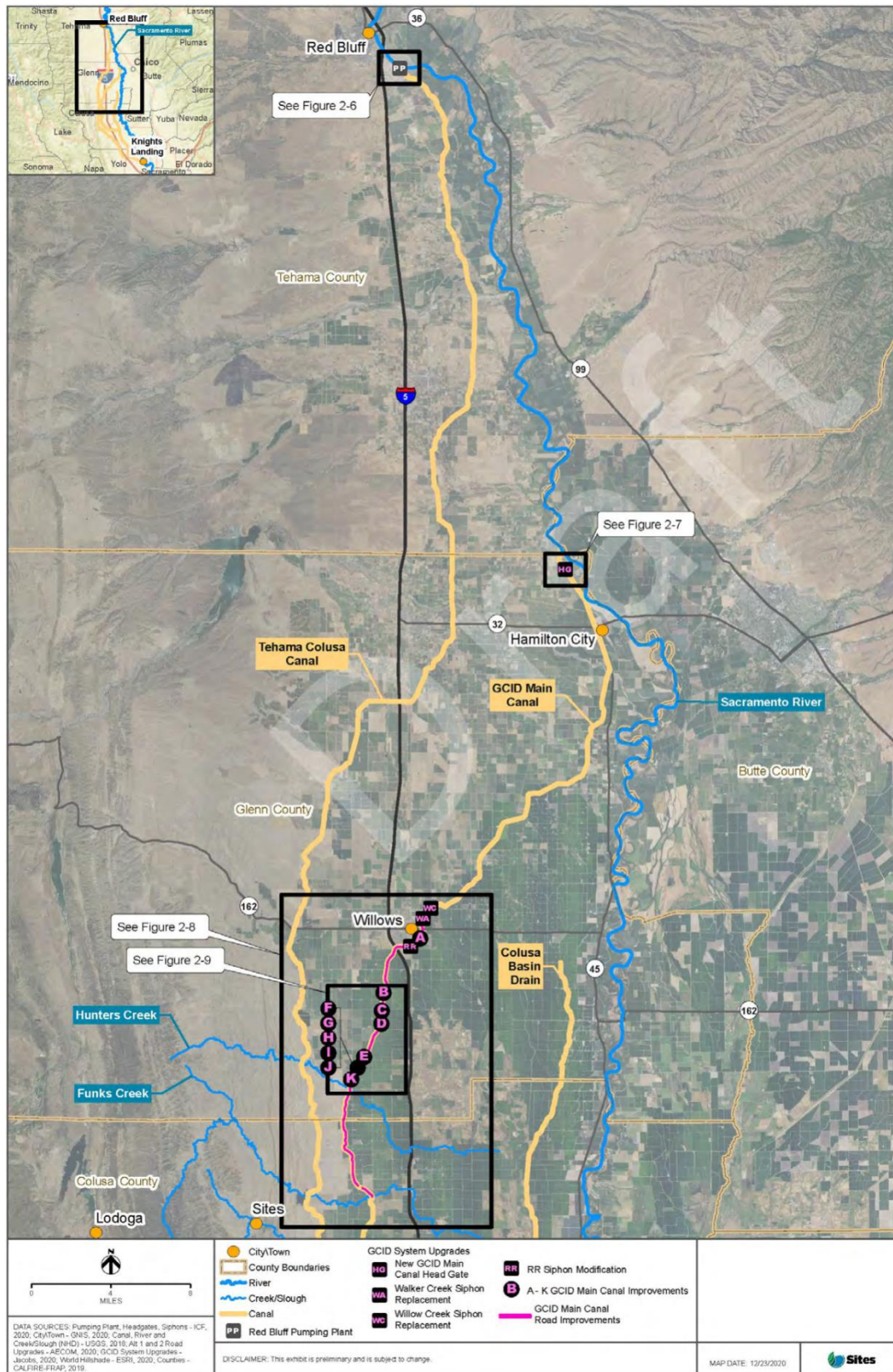


FIGURE 3-3. SACRAMENTO RIVER CONVEYANCE

3.4 Regulating Reservoirs and Conveyance Complex

Multiple facilities would be required to control the conveyance of water between Sites Reservoir and the TC Canal and GCID Main Canal (Figure 3-3). These facilities would include regulating reservoirs, pipelines, pumping generating plants (PGPs), switchyards, and administration and maintenance buildings.

3.4.1 Terminal Regulating Reservoir

Pumping from the GCID Main Canal to Sites Reservoir would require construction of a new regulating facility for this canal. The new facility has four components: the TRR, the TRR PGP, an electrical substation, and TRR pipelines. Two options for the location of the TRR facilities are being evaluated: TRR East and TRR West. Both options and facilities would encompass over 100 acres and would be located in Colusa County near the GCID Main Canal and east of Funks Reservoir. Asphalt concrete paved roads would provide onsite vehicle access between the PGP and electrical substation, with facility spacing to accommodate a mobile crane. Paved parking would be provided near the PGP. The PGP and electrical substation would encompass approximately 7 acres and would be enclosed with security fence with access gates.

TRR East or TRR West would encompass approximately 100 acres and have a storage capacity of approximately 600 acre-feet (AF). The TRR East would have earthen embankments around the perimeter and an impermeable lining consisting of a geomembrane overlying geocomposite placed over compacted earth. The TRR would be hydraulically connected to the GCID Main Canal to allow water to be conveyed to and from the Sites Reservoir. The TRR would accommodate inflows of up to 1,800 cfs. The GCID Main Canal would be the conveyance source of water for the TRR and its PGP to pump water to Sites Reservoir. The canal would also be the primary conveyance for releases of water from the TRR and its PGP from Sites Reservoir.

TRR Pumping Generating Plant

A TRR PGP would pump water from the TRR to Sites Reservoir; the PGP would include hydroelectric turbines to generate electricity when water was released from Sites Reservoir to the TRR. The PGP would include the following three facilities in five buildings: one pump station, two turbine generator buildings, and two energy dissipating structures. The pumping plant would have a design capacity of 1,800 cfs, the generating plant 1,000 cfs, and the energy dissipation 1,000 cfs. The energy dissipation structure provides the capability to make summer releases if the turbine generators are not used for power generation for any reason.

TRR Electrical Substation

The TRR PGP would require a substation to provide electricity to the associated facilities described above for pumping and transmit energy from power generation. The electrical substation would connect to existing Pacific Gas and Electric Company (PG&E) or Western Area Power Administration (WAPA) lines. The facility would be constructed on approximately 1.5 acres within the TRR PGP footprint to the north of the TRR.

TRR Pipelines

Two underground TRR pipelines would convey water approximately 4.5 miles between the TRR PGP and Sites Reservoir. The 12-foot-diameter pipes would extend from the TRR PGP, under Funks Reservoir, and

terminate at the transition manifold south of Funks Creek near the Golden Gate Dam. Both TRR pipelines would connect to one of the two side-by-side, 23-foot-inside-diameter I/O tunnels at the transition manifold.

3.4.2 Funks Reservoir

The existing Funks Reservoir would be used to store water from the TC Canal, both for pumping into the reservoir and for releasing water from the reservoir. Excavation of existing accumulated sediment from Funks Reservoir would be required, as would the construction of three facilities: Funks PGP, an electrical substation, and Funks pipelines (Figure 3-4). These facilities would be constructed in Colusa County, west of the TC Canal, on approximately 7 acres. The overall site would be enclosed by a security fence with access gates on the southern and northwestern sides.

Access to the Funks Reservoir-related facilities would be provided at the northern and southern ends of the site. A gravel parking area would be provided near the PGP.

Funks Pumping Generating Plant

The Funks PGP would be used to pump water from Funks Reservoir to Sites Reservoir. The PGP would be constructed on the northwestern side of Funks Reservoir. The PGP would include the following three facilities in five buildings: one pump station, two turbine generator buildings, and two energy dissipating structures. An electrical building would also be constructed behind the pumps as part of the pump station.

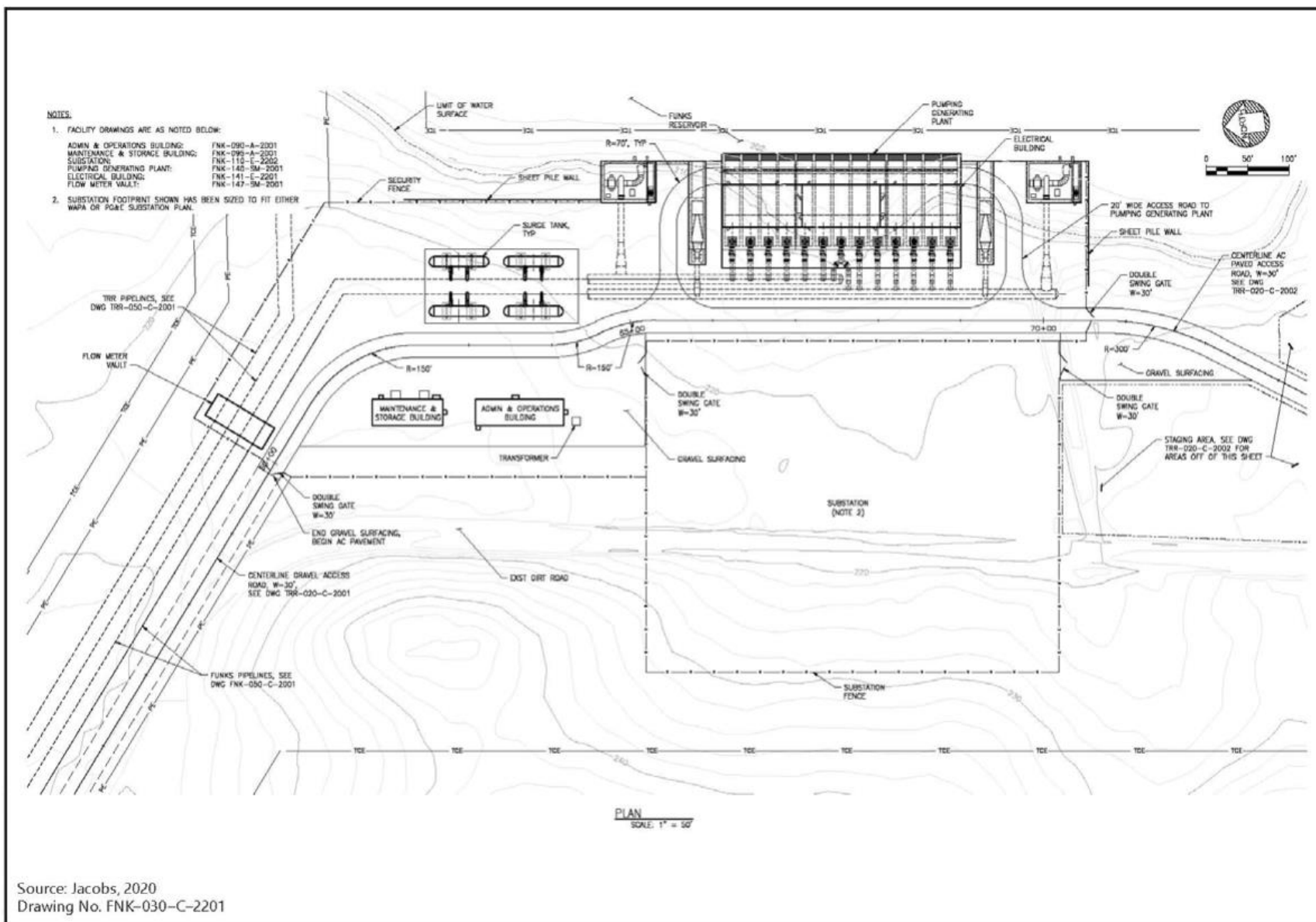
The Funks pump station would be similar to the TRR pump station, except that the orientation of 12-foot-diameter pipelines would be different. The pump station would have a flow rate of 2,100 cfs, and thirteen 800-hp pumps. The turbine generator buildings would be the same as described for the TRR PGP, and each generator would have a design criterion of 1,000 cfs for redundancy. There would be two turbines (20-megawatt [MW] and 14.5-MW). Each of the two energy dissipation structures would consist of a single 60-inch fixed-cone valve with a design criterion of 1,000 cfs. There would be a 60-inch fixed-cone valve on each of the two 12-foot-diameter pipes, for a total of two fixed-cone valves and a total flow of 2,000 cfs (1,000 cfs each).

Funks Electrical Substation

As with the TRR PGP, the Funks PGP would require a substation to provide electricity to the Funks PGP facilities for pumping and to transmit energy from power generation. This substation would connect to either existing WAPA or PG&E lines. The substation would be located west of Funks Reservoir in the footprint of the Funks PGP and would encompass approximately 3 acres.

Funks Pipelines

Two underground Funks pipelines would convey water approximately 1 mile between the Funks PGP and Sites Reservoir. The 12-foot-diameter pipes would extend from the Funks Reservoir and Funks PGP and terminate at the transition manifold south of Funks Creek near the Golden Gate Dam. The Funks pipelines generally run parallel to the TRR pipelines. After curving around Funks Creek and hilly areas, the Funks pipelines run south, deviating from the TRR pipeline alignment, to the Funks PGP. Both TRR pipelines would connect to one of the two side-by-side, 23-foot-inside-diameter I/O tunnels at the transition manifold. After installation, the pipelines would generally be from 6 feet to 25 feet below ground surface.



Transition Manifold

The transition manifold (Figure 3-5) would be constructed south of Golden Gate Dam to connect Sites Reservoir to Funks Reservoir and the TRR. The transition manifold would be installed approximately 6 feet below ground and would be approximately 114 feet long by 92 feet wide. The structure would connect the four 12-foot-diameter conveyance pipelines from Funks Reservoir and TRR to two 23-foot-inside-diameter tunnels extending from the Sites Reservoir I/O Works through the ridge to the east, and emerging to the southwest of Funks Reservoir. The transition manifold from the I/O Works to the Funks and TRR Pipelines would have isolation valves to close off the pipelines and allow for maintenance.

Electrical Transmission Connections

New high-voltage transmission lines would be required to provide power to the Funks and TRR PGPs. Transmission lines connecting Funks and TRR substations would also be required. Interconnecting to the existing transmission system would be necessary to provide the electricity needed to operate the large pumps at the TRR and Funks Reservoir and to receive power from the hydroelectric generating plants when operating.

North-South Transmission Connections

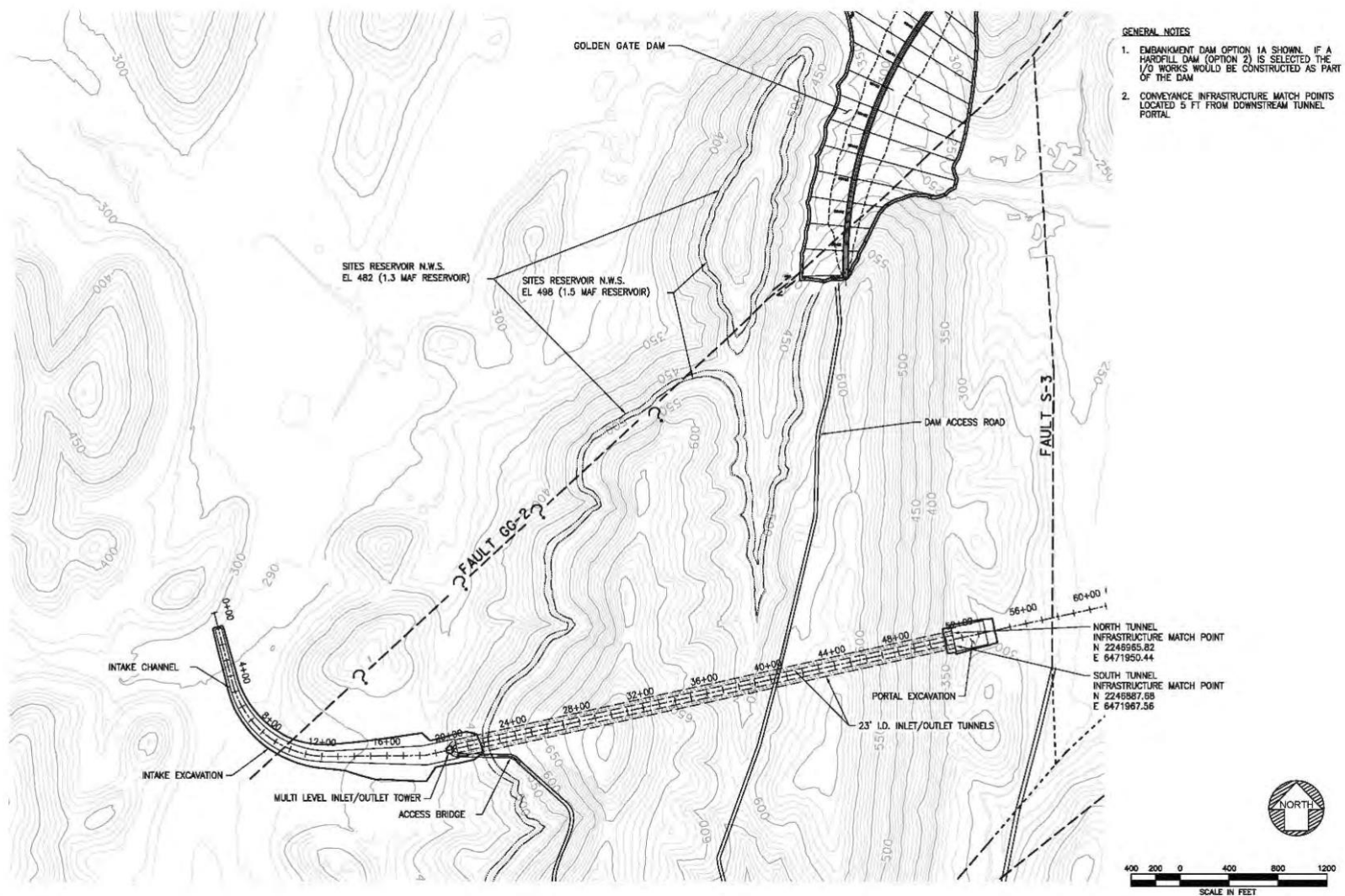
New transmission lines originating between Funks Reservoir and TRR would connect to WAPA or PG&E existing facilities. Two 230-kilovolt (kV) lines owned and operated by WAPA are located north of Funks Reservoir, and four 230-kV lines owned and operated by PG&E are located west and north of the TRR. WAPA and PG&E are defined as the Transmission Owner and the Transmission Operator of their respective high-voltage transmission lines. Each of these lines is a point of interconnection (POI) location; a POI to a high-voltage electric transmission line would be required to provide power. The POI may require a third substation, which would be located adjacent to the WAPA or PG&E 230-kV lines.

The POI between the electrical substations and existing transmission lines would require that an application for interconnection request be submitted and processed under the California Independent System Operator (CAISO) interconnection process. The location of the POI to the WAPA or PG&E 230-kV transmission lines would depend on the results of a system impact study completed by WAPA or PG&E in conjunction with CAISO.

East-West Transmission Lines

There would also be an interconnection between the Funks and TRR PGPs, and it is anticipated that the transmission lines would parallel the pipelines within the same easement. Up to four 230-kV transmission lines would be required: two for the source supply to either of the PGPs and two between the Funks and TRR electrical substations. The two looped source circuits would be installed on a set of common double-circuit steel monopole structures and would require separate easements because they would not parallel any of the pipelines. The two transmission lines between the Funks and TRR electrical substations would be installed on their own common set of double circuit steel monopole structures within the pipeline easement.

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Source: AECOM, 2020
Drawing No. STS-370-C-2601

FIGURE 3-5. INLET/OUTLET WORKS

Administration, Operations and Maintenance, and Storage Buildings

This Project would involve the construction of an administration and operations building and a maintenance and storage building. These buildings would be located along the existing gravel access road to the Funks PGP on approximately 0.15 acre. The administration and operations building would be a one-story building encompassing approximately 3,400 square feet. The maintenance building would be a one-story building encompassing roughly 2,700 square feet that would include space for equipment storage and maintenance rooms to support the Project facilities.

Utilities required for these buildings include a septic system at least 100 feet away from Funks Reservoir and Funks Creek (per county code), potable water provided from groundwater wells, and electricity obtained from the Funks Reservoir switchyard. The building designs would be in accordance with the California Building Code and would provide asphalt-concrete–paved onsite parking and vehicular access.

3.5 Sites Reservoir and Related Facilities

Under this Project, water would be impounded by the Golden Gate Dam on Funks Creek and the Sites Dam on Stone Corral Creek; seven saddle dams and two saddle dikes along the eastern and northern rims of reservoir would close off topographic saddles in the surrounding ridges to form Sites Reservoir.

3.5.1 Inlet/Outlet Works

The I/O Works (Figure 3-5) for the reservoir are located to the south of Golden Gate Dam in Sites Reservoir. The I/O Works consists of a low-level intake, multi-level I/O tower, and two I/O tunnels.

Low-Level Outlet Structure

The low-level outlet structure is not used to make normal operational releases, but is provided primarily to meet Division of Safety of Dams–required emergency reservoir drawdown releases. This outlet also provides the capability to release water at the bottom of the reservoir stored between the lowest ports in the I/O tower and the top of reservoir dead pool during drought conditions if needed.

I/O Tower

The 300-foot-tall, multi-level I/O tower would allow flows into and out of the reservoir through the use of ports around the tower's perimeter. These ports would be at multiple elevations and would be equipped with gates or valves, which would allow for operational flexibility, including managing the temperature/quality of water released from the reservoir. The tower would also have moveable fish screens for the exclusion of adult fish.

3.5.2 Dams and Dikes

This Project would include Sites Dam and Golden Gate Dam along with saddle dams and saddle dikes. The height of these facilities and the number of saddle dams and dikes varies from 12 to 267 feet.

Sites Dam and Diversion Tunnel

Sites Dam would be on Stone Corral Creek approximately 0.25 mile east of the community of Sites, and 8 miles west of the community of Maxwell. The dam would be designed to safely accommodate potential fault displacement by providing widened filter, drainage, and transition zones. Sites Dam would be an

embankment dam consisting of a combination of earth and rockfill embankment zones with a central impervious core, exterior upstream rockfill shell, and downstream earthen shell. Sites Dam would have a permanent diversion pipeline and tunnel that would be constructed in the left abutment of the dam. The tunnel would be approximately 1,600 feet long, and sized to release flows up to 400 cfs into Stone Corral Creek. The Sites Dam piping system is expected to include a bar trashrack, a slide gate, a separate fish screen and inlet valve to support Stone Corral Creek release flows, a stoplog bulkhead, and a permanent air vent assembly. The fish screen would be designed and sized to meet the requirements for aquatic life protection.

Golden Gate Dam

Golden Gate Dam would be on Funks Creek approximately 1.8 miles west of Funks Reservoir. The dam would be designed to safely accommodate potential fault displacement by providing widened filter, drainage, and transition zones. Golden Gate Dam would be an embankment dam consisting of a combination of earth and rockfill embankment zones with a central impervious core, exterior upstream rockfill shell, and downstream earthen shell. Golden Gate Dam would not have a permanent diversion tunnel; all releases made would be through the I/O Works.

Saddle Dams and Saddle Dikes

The saddle dam and saddle dike material would be the same as described above for the Sites Dam. The number and locations of the saddle dams are based on the size of the reservoir, because the saddle dams would be needed at topographic saddle low points along the eastern ridge of the reservoir. The upstream and downstream slopes of saddle dams are 3H:1V and 2.5H:1V, respectively. The upstream slope of the central core for the saddle dams would be 1H:1V with a vertical downstream face.

Dam Monitoring

Instrumentation would be installed in the dam abutments, dam embankments, and downstream of the dams. The objectives of instrumenting the dams include developing physical data for comparison to assumptions made for the design analyses, anticipated behavior based on behavior during the studies, and monitoring of dam performance during construction, first filling of the reservoir, and long-term operation of the Project.

The types and locations of instrumentation would be selected to measure specific engineering parameters, including deformation, seepage flows, piezometric levels, pore-water pressure, and seismic response. Types of instrumentation could include piezometers, inclinometers, extensometers, survey monuments, seepage measurement weirs, and strong-motion accelerographs. A reservoir level indicator and meteorological station would also be included, and an automated data acquisition system would provide for remote data acquisition of the dams.

3.6 Conveyance to Sacramento River

Water released from Sites Reservoir would be conveyed south of the reservoir using the existing TC Canal and a new Dunnigan Pipeline. The water would flow south through the existing TC Canal for about 40 miles to near its southern end, where it would be diverted into the new Dunnigan Pipeline. The flows would subsequently be conveyed to the Colusa Basin Drain (CBD) and ultimately reach the Sacramento River.

3.6.1 TC Canal Intake

A new intake would be required to move water from the TC Canal into the Dunnigan Pipeline. The TC Canal intake site would encompass approximately 0.5 acre and be accessed from the existing TC Canal access road. The intake would be a concrete structure sized for a flow of 1,000 cfs that supports the control gates and associated gate operators. Power would be needed for supervisory control and data acquisition control and gate operation to let water into the Dunnigan Pipeline; however, there would be a gravity outlet structure from the TC Canal into the Dunnigan Pipeline, and no pumping would be required. A concrete bridge deck would provide vehicular access across the top of the intake. Stoplog slots at the inlet and outlet channels would enable isolation of the control gates for maintenance.

3.6.2 Dunnigan Pipeline

The Dunnigan Pipeline would convey water released from the TC Canal to the CBD . The Dunnigan pipeline would be about 4 miles long, have a minimum depth of 6 feet below ground surface, and have an inside diameter of approximately 9 feet. The Dunnigan Pipeline would extend through existing agricultural lands, as well as crossing Interstate 5 (I-5), Road 99W, the railroad, and a commercial auction yard between I-5 and Road 99W. The tunneled crossings at I-5 and the railroad/Road 99W would be 300 feet long and 250 feet long, respectively, and would require 12.5-foot-diameter casings.

A CBD outlet with an energy dissipation facility would be required at the downstream end of the pipeline prior to discharging the water into the CBD. Two 60-inch-diameter, fixed-cone valves would be placed at the discharge stilling basin to dissipate energy and adjust the flow. Hoods on the fixed-cones valves would control spray. The conveyance through the Dunnigan Pipeline to the CBD would use gravity (i.e., no pump station) and have a flow up to 1,000 cfs.

3.7 Recreation Areas

The Project proposes the development of two primary recreation areas and a day-use boat ramp. The recreation areas would also require a network of new roads, and upgrades to existing roads, for maintenance and local access.

Figure 3-7, Recreation Areas, shows a conceptual site map of each recreation area, and the recreation areas are described below.

- Peninsula Hills Recreation Area – The Peninsula Hills Recreation Area would be on the northwestern shore of Sites Reservoir, to the north of the existing Sites Lodoga Road and across the reservoir from the Stone Corral Creek Recreation Area. Access would be provided by the existing Sites Lodoga Road west of the reservoir. This recreation area would encompass up to 373 acres and would include a kiosk, access to electricity and potable water, 10 picnic sites (with parking at each site), and hiking trails. There would also be 19 vault toilets, 200 campsites (car and recreational vehicle), and one group camp area.
- Stone Corral Creek Recreation Area – The Stone Corral Creek Recreation Area would be on the eastern shore of Sites Reservoir, north of the existing Maxwell Sites Road and Sites Dam. Access would be provided from Sites Dam and Sites Lodoga Road near the eastern end of the bridge across the reservoir. This recreation area would encompass up to 235 acres and its facilities would include a kiosk, access to electricity and potable water, 10 picnic sites (with parking at each site), and hiking trails. There would also be 10 vault toilets and 50 campsites (car and recreational vehicle).



Source: Jacobs, 2020
Drawing No. DWG-030-C-2002

(See Figure 3-2 for location of Dunnigan Underground Pipeline)

FIGURE 3-6. DUNNIGAN PIPELINE AND RELEASE TO THE CBD



DAY USE BOAT RAMP



PENINSULA HILLS RECREATIONAL AREA



STONE CORRAL RECREATIONAL AREA

Source: AECOM, 2020
Drawing No. STS-312-C-2602

(See Figure 3-1 for Recreation Area locations)

FIGURE 3-7. RECREATION AREAS

- **Day-Use Boat Ramp and Parking Areas** – The day-use boat ramp would be on the western side of the reservoir where the existing Sites Lodoga Road intersects with the proposed inundation area for the reservoir. A parking area would be added to the existing Sites Lodoga Road where it exits the inundation area footprint of the reservoir. The boat ramp and parking area would encompass up to 10 acres and include a kiosk, access to potable water, and one vault toilet.

3.8 New and Existing Roadways

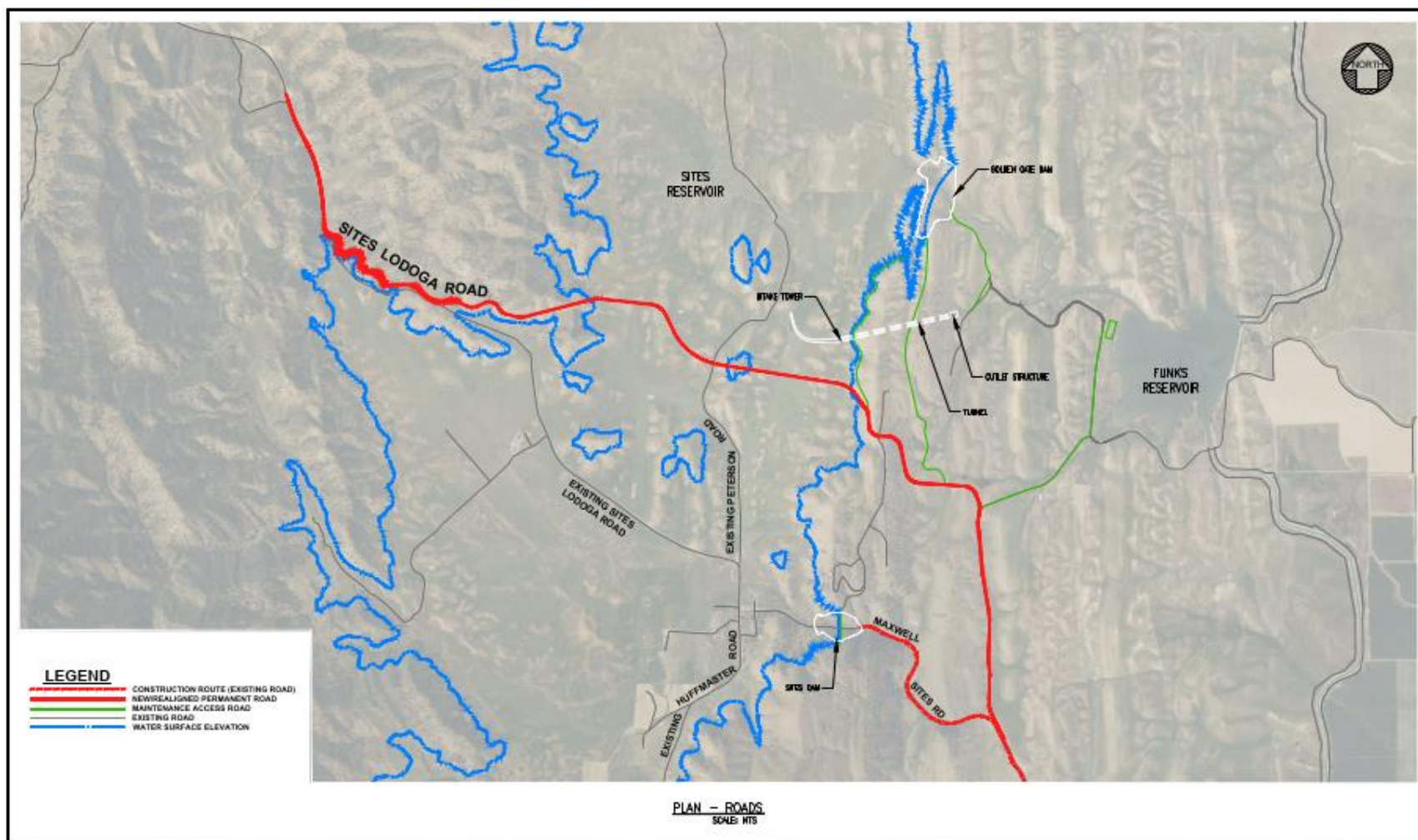
Approximately 46 miles of new paved and unpaved roads would provide construction and maintenance access to the proposed facilities, as well as public access to the proposed recreation areas. The general objectives and maintenance responsibilities for these road types are discussed below, and more detailed information for construction access, local access, and maintenance access roads is subsequently presented in the corresponding subsections. The proposed road improvements and roadway designs are being coordinated with Colusa and Glenn Counties. These improvements include a realignment of the existing Sites Lodoga Road, which will be inundated once the reservoir is constructed; and realignment of Huffmaster Road to maintain access for property owners on the southeastern side and at the southern end of the reservoir.

The realignment of Sites Lodoga Road includes a new bridge and the use of embankments to cross from the eastern to the western side of Sites Reservoir and maintain connectivity between Maxwell and Lodoga. The relocated segment of Sites Lodoga Road would include 5-foot-wide shoulders adjacent to the two 12-foot-wide lanes to accommodate bicycles, and would connect to the new bridge.

The realigned Sites Lodoga Road would be placed across the reservoir and extend 7,800 feet; it would necessitate the construction of fill prisms that would be up to 150 feet tall and would support a bridge segment approximately 1,400 feet long. Figure 3-8, Sites Lodoga Road Realignment and Bridge, shows the road and the bridge alignment that would be needed to cross the reservoir. The bridge would be 10 feet above the maximum water surface elevation for the 1.5 MAF reservoir. This provides clearance for flood storage and wave height.

The bridge structure would consist of a cast-in-place, prestressed concrete box girder that would have two lanes with a total width of 35.5 feet and 4-foot-wide shoulders. The bridge would have California Department of Transportation-approved edge barriers with small-diameter electrical conduits, a suicide prevention barrier, emergency phone service facilities, deck drains, and an opening for potential utilities. The bridge design does not include sidewalks due to the remote rural nature of this site. The bridge would be exposed to high winds; therefore, high wind advisory facilities would be installed, such as static roadside signs or extinguishable message signs that are illuminated when instruments measure high winds.

Maintenance access roads would be constructed or improved in accordance with the equipment and personnel required for operations and maintenance of specific facilities. As discussed above, roads installed for construction access would be repurposed for maintenance following construction. Repurposed maintenance roads would have one 15-foot-wide-minimum gravel lane with no shoulders.



3.9 Water Operations

The Project would provide water supply and water supply–related environmental benefits to the Sites Storage Partners. Water would be diverted into Sites Reservoir from the Sacramento River at the existing RBPP into the TC Canal, and at the existing GCID Hamilton City Pump Station into the GCID Main Canal. Both of these facilities have existing fish screens. Water in the TC Canal would be conveyed to the existing Funks Reservoir and pumped into the new Sites Reservoir via the Funks PGP and associated facilities. Water in the GCID Main Canal would be conveyed to the new TRR and pumped into the new Sites Reservoir via the TRR PGP and associated facilities. Water could be diverted to storage in Sites Reservoir when the diversion criteria are met and when the Sacramento-San Joaquin Delta (Delta) is in excess conditions. Diversions to storage could occur anytime between September 1 to June 15, the timeframe that the Sacramento River is not fully appropriated.

Water would be held in storage in Sites Reservoir until requested for release by a Sites Storage Partner. Water releases would generally be made from May to November, but could occur at any time of the year depending on the Storage Partner’s need, and conveyance capacity to convey water to its intended point of delivery. Water would be released from Sites Reservoir via the I/O Works back through the TRR PGP and into the TRR, or back through Funks PGP and into Funks Reservoir. Water released could be used along the GCID Main Canal, along the TC Canal, or conveyed to the new Dunnigan Pipeline, discharged to the Colusa Basin Drain, and conveyed via the Sacramento River or the Yolo Bypass to a variety of locations in the Delta and South-of-the-Delta. Exchanges of water may also occur with the CVP and SWP. Water would also be diverted and impounded from Funks and Stone Corral Creeks; and releases from Golden Gate Dam and Sites Dam would occur into Funks and Stone Corral Creeks, respectively. Water operations are described in more detail below.

The Authority intends to apply for and obtain a water right permit from the State Water Resources Control Board (SWRCB) for the operations of Sites Reservoir. Actual operations would be subject to the terms and conditions of this water right along with all applicable laws, regulations, biological opinions and incidental take permits, and court orders in place at the time. Operations under all Action Alternatives would also require coordination with Reclamation and the California Department of Water Resources (DWR) as described below. The Authority is working with Reclamation and DWR to develop mutually agreeable operating agreements that would describe the approach for coordinating operations with Sites and the CVP and SWP operations, respectively.

Sites Reservoir would be filled through the diversion of Sacramento River water that generally originates from unregulated tributaries to the Sacramento River downstream from Keswick Dam. Only a small amount of the diversions to Sites Reservoir would come from flood releases from Shasta Lake. Diversions to Sites Reservoir would be made from the Sacramento River at the existing RBPP (River Mile 243) near Red Bluff into the TC Canal, and at the existing GCID Hamilton City Pump Station (River Mile 205) near Hamilton City into the GCID Main Canal.

Water could be diverted to storage in Sites Reservoir from September 1 to June 15. Diversions would only occur when all of the following conditions are met:

- Flows in the Sacramento River exceed the minimum diversion criteria (described below).
- The Delta is in “excess” conditions as determined by Reclamation and DWR; Senior downstream water rights, existing CVP and SWP, and other water rights diversions have been satisfied, including CVP 215 water and Article 3F water and SWP Article 21 (interruptible supply), and other more senior flow priorities (such as diversions associated with Freeport Regional Water Project and existing Los Vaqueros Reservoir).

- Flows are available for diversion above flows needed to meet all applicable laws, regulations, biological opinions, and incidental take permits, and court orders in place at the time that diversion occurs. This would include, but is not limited to, any flow requirements in Water Right Decision 1641 (SWRCB, 2000), the 2019 Re-initiation of Consultation (ROC) on Long-term Operation (LTO) Biological Opinions (BiOps; USFWS, 2019 and NMFS, 2019), and the SWP incidental take permit (ITP; CDFW, 2020).
- There is available capacity at the RBPP and in the TC Canal and GCID facilities to divert and convey water to Sites Reservoir above the capacity needed for deliveries to existing TC Canal users and within the GCID service area.

The RBPP would serve as the primary diversion location and would divert water from the Sacramento River to Funks Reservoir through the TC Canal and into the Sites Reservoir through the Funks PGP and the I/O Works. Up to 2,100 cfs, plus losses, would be diverted at the RBPP for the Project. The RBPP has an existing fish screen that meets NMFS and CDFW fish screen criteria through which all flows diverted for the Project would be screened. The Hamilton City Pump Station would serve as the secondary diversion location, and would divert water from the Sacramento River to the new TRR through the GCID Main Canal and into the Sites Reservoir through the TRR PGP and the I/O Works. Up to 1,800 cfs, plus allowance for unlined canal losses, would be diverted at the Hamilton City Pump Station for the Project. The Hamilton City Pump Station has an existing fish screen that meets NMFS and CDFW fish screen criteria, through which all flows diverted for the Project would be screened. Although the RBPP would be the primary diversion point, both facilities would be operated simultaneously when river conditions, facilities, and capacity are available for a maximum combined diversion rate of 3,900 cfs, plus allowance for unlined canal losses.

Estimated total annual diversion of Sacramento River water from both diversion facilities to Sites Reservoir could be up to the full reservoir amount. Based on model simulations, the estimated annual diversions would usually range from 60 thousand acre-feet (TAF) per year to 390 TAF per year, depending on hydrologic conditions, availability of Sacramento River water, and diversion and conveyance facility capacities.

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4. Technical Feasibility

This section of the report evaluates the ability of the proposed Project operations to reliably deliver the benefits of the Project. Supporting information is provided in Appendix B to this report, including the following:

- Appendix B.1: Sites Reservoir Project Preliminary Operations Plan Under a Range of Hydrologic Conditions
- Appendix B.2: Updated CALSIM 2 Modeling for WSIP Analysis
- Appendix B.3: Sites Project: 2020 Benchmark Model Assumptions Summary
- Appendix B.4: Water Balance of CALSIM II Simulation Results for Alternative 1B – WSIP 2030 and WSIP 2070

The Operations Plan and supporting documents describe the operations data and analytical methods, the hydrologic period, development conditions, hydrologic time step, and provide a water balance for the with- and without-Project conditions to characterize all flows and water supplies relevant to the benefits analysis.

4.1 Sites Reservoir Operations Plan

Appendix B.1 provides the preliminary operations plan proposed by the Authority for the Project. The operations plan describes Project operations and public benefits under a range of hydrologic conditions, from wettest to driest years and multiple dry-year periods. Water year types for this operations plan are classified based on the Sacramento Valley 40-30-30 Index per the SWRCB Water year Hydrologic Classification presented in State Water Resources Control Board Decision 1641 (D-1641). The primary actions that will be taken to meet desired public benefit objectives are described for the range of hydrologic conditions.

The 1.5-MAF reservoir would be filled using the existing TC Canal and GCID Main Canal diversion and conveyance facilities. Operations would rely on diversion of excess Sacramento River water that originates from unregulated tributaries to the Sacramento River downstream from Keswick Dam. These flows are “excess” to those needed to meet current regulatory requirements or other water demands. Operation of the proposed reservoir would be in cooperation with the operations of existing CVP and SWP) system facilities to facilitate and maximize the potential for a wide range of benefits.

The primary operational criteria include the following:

- A defined Proposition 1 public benefits storage account would be established in Sites Reservoir to be managed by the state to provide water for ecosystem and water quality purposes. The storage allocation assumed for Proposition 1 purposes is 244 TAF.
- Each of the participating Authority members would be allocated a defined storage account in the Project to manage their water.
- It is assumed that a water market of some form would be facilitated by the Authority to promote efficient use and exchange of water in Sites Reservoir storage.
- There would be a storage account managed by Reclamation to be flexibly used to meet CVP objectives providing water for water supply and environmental needs (referred to as the CVP operational flexibility account).

- All storage accounts would receive an equal proportional share of new water diversions into Sites Reservoir storage. A set of operating guidelines and rules are identified in *Principles for the Storage, Delivery, and Sale of Sites Reservoir Project Water* (Authority, 2021).
- All water stored in Sites Reservoir storage accounts is subject to evaporation and other losses.

The Project would operate in cooperation with CVP and SWP system facilities to facilitate a wide range of benefits. Sites Reservoir would provide water through four primary mechanisms:

- Water could be released directly to Colusa Basin users
- Water could be released to the Sacramento River
- Water could be released through the CBD and Knights Landing Ridge Cut
- Water stored in Sites Reservoir could be exchanged for water stored in Shasta Lake, Lake Oroville, or other CVP and SWP system reservoirs

This last mechanism could be used to significantly increase upstream North-of-the-Delta storage to support multiple water supply and ecosystem benefits.

The operation of Project would allow for the development and administration of a Proposition 1 public benefits storage account that could be actively managed by the state to provide water for ecosystem and water quality purposes. Such an account would provide a pool of dedicated storage to manage in cooperation with existing operations to increase flows through certain watercourses and/or facilities (such as Yolo Bypass), and increase availability of wetlands in wildlife refuges, and/or enhance habitat conditions.

Appendix B.1 includes a detailed description of proposed Project operations that correspond to Proposition 1 benefits for a range of hydrologic conditions, including actions needed to deliver public benefits under each hydrologic condition.

Operations in any given year will be a function of the current year hydrology, as well as a function of the system conditions resulting from the previous year's hydrology and operations. Implementation of actions to provide public benefits would need to be evaluated on a continuing basis in response to changing system parameters (such as reservoir storage), ecological needs, forecasts of future hydrologic and atmospheric conditions, and system operations.

Total average annual diversions of excess Sacramento River flow to Sites Reservoir, based on CALSIM-II model results, for current, 2030, and 2070 conditions are 255 TAF, 277 TAF, and 281 TAF, respectively. These results indicate that the Sites Project readily adapts to the predicted future hydrologic conditions provided by the Commission. The increase in average annual diversions of excess flow is a function of the anticipated reduction in spring snowmelt and increase in winter precipitation under the future climate conditions.

Table 4-1 provides the proposed schedule for operations.

TABLE 4-1. DESCRIPTION OF PROPOSED SITES PROJECT AUTHORITY SEASONAL OPERATIONS

Sites Reservoir Project Operations Plan

Objective	Detail of Operation	Year Type Most Suitable for Operation ^a	Months Most Suitable for Operation ^b											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Diversions to storage	Convey Sacramento River diversions through the TC Canal and GCID Main Canal. Diversions would only occur once existing regulatory requirements such as D-1641, CVPIA 3406(b)(2), USFWS BiOp, and NMFS BiOp requirements have been met, and existing senior water rights and Delta diversions have been satisfied. Diversions to Sites Reservoir would be restricted by Sacramento River bypass flow criteria at Red Bluff, Hamilton City, Wilkins Slough, and Freeport, and restrictions for protecting fish outmigration and Sutter/Yolo Bypass weir spills. Diversions would be subject to future criteria to be determined as part of the state and federal agency permitting process.	W, AB, BN												
Seasonal Reservoir Operations	Fill Sites Reservoir by diversion and storage of Sacramento River water throughout the winter and spring and release water from storage during the primary demand period throughout the summer and fall.	n/a	Fill Cycle High Point			Drain Cycle Low Point						Fill Cycle		
Releases to Sites Project Authority Members	Provide Sites Reservoir storage releases to create supplemental water supplies for Project participants in the Sacramento Valley and South-of-the-Delta to improve water supply reliability. Operations would require agreements for conveyance with Reclamation and DWR.	AN, BN, D, C												
Shasta Coldwater Pool	Potential to increase Shasta Lake storage levels through exchange to improve coldwater pool management. This action would have particular emphasis in Dry and Critical water-year types under ROC on LTO Tier 2 and 3 temperature management conditions. This benefit would be achieved by (1) exchanging water from Sites Reservoir for water storage in Shasta, and then releasing water from Sites Reservoir to meet CVP contract requirements for GCID, Reclamation District 108, and the Member Units of the TCCA; (2) releasing water from Sites Reservoir to meet CVP South-of-the-Delta needs instead of releasing water from Shasta; and (3) releasing water from Sites Reservoir to meet a portion of the CVP commitment for Delta outflow. Benefits would be dependent on ability to exchange water per agreements to be developed with Reclamation.	D, C												
Sacramento River Flows for Temperature Control	Potential to improve water temperatures suitable for all species and life stages of anadromous salmonids in the Sacramento River between Keswick Dam and Bend Bridge during the July through September period for Dry and Critical water-year types. This objective would be achieved by improved coldwater pool management from increased storage in Shasta.	D, C												
Augment Sacramento River Fall Flows	Potential to augment flows in the Sacramento River between Keswick Dam and the Red Bluff Diversion Dam to minimize dewatering of fall-run Chinook salmon redds (for the spawning and embryo incubation life-stage periods) during fall months. Operations would avoid adverse impacts to coldwater pool operations in Dry and Critical water-year types. Benefits will be dependent on ability to exchange water per agreements to be developed with Reclamation.	D, C												
Folsom Lake Coldwater Pool	Potential to increase Folsom Lake storage levels to preserve additional coldwater pool to achieve temperatures that are more suitable for juvenile steelhead and fall-run Chinook salmon spawning in the lower American River during Dry and Critical water-year types. The additional storage would be achieved by releasing Sites Reservoir water to assist with meeting CVP Delta objectives that are currently met through releases from Folsom. Benefits would be dependent on ability to exchange water per agreements to be developed with Reclamation.	D, C												
Augment American River Flows	Potential to augment flows in the lower American River to reduce dewatering of fall-run Chinook salmon redds (i.e., October through March) and steelhead redds (i.e., January through May). This objective would be accomplished by releasing a portion of the additional water stored at Folsom Reservoir resulting from Sites Reservoir releases to meet CVP Delta objectives. Benefits will be dependent on ability to exchange water per agreements to be developed with Reclamation.	D, C												
Yolo Bypass Flow Enhancement	Release flow through the Colusa Basin Drain and Knights Landing Ridge Cut during summer and fall months to help increase productivity in the Yolo Bypass in the lower Cache Slough and lower Sacramento River areas to increase desirable food sources for Delta smelt and other fish species.	AN, BN, DC												
Lake Oroville Coldwater Pool and Augment Feather River Flows	Potential to improve the reliability of coldwater pool storage in Lake Oroville to improve water temperature suitability for steelhead and Chinook salmon. Additional storage would be accomplished through releases from Sites Reservoir to meet Lake Oroville compliance obligations such as Fall X2. Augment flows in the lower Feather River to minimize redd dewatering, juvenile stranding, and isolation of anadromous salmonids. Benefits would be dependent on ability to exchange water per agreements to be developed with DWR.	BN, D, C												
Incremental Level 4 Water Supply for Wildlife Refuges	Provide water toward meeting Incremental Level 4 Wildlife Refuge water needs North- and South-of-the-Delta to supplement refuges supplies up to Level 4 criteria (CVPIA).	AN, BN, DC												

Notes for Table 4-1

- a Water year type when conditions are generally suitable for developing the benefit based on the D1641 40-30-30 year types.
- b The heavier shaded bars highlight the months in which conditions would be most suitable to the operations; the lighter shaded bars highlight the months that would be less suitable to the operations.

D1641 Water Year Types

AN	=	Above Normal
BiOp	=	Biological Opinion
BN	=	Below Normal
C	=	Critical Dry
CVP	=	Central Valley Project
CVPIA	=	Central Valley Project Improvement Act
D	=	Dry
D-1641	=	State Water Resources Control Board Decision 1641
DP	=	Driest periods
DWR	=	California Department of Water Resources
GCID	=	Glenn-Colusa Irrigation District
LTO	=	Long-term Operation
n/a	-	not applicable
NMFS	=	National Marine Fisheries Service
Reclamation	=	Bureau of Reclamation
ROC	=	Re-initiation of Consultation
TC	=	Tehama-Colusa
TCCA	=	Tehama-Colusa Canal Authority
USFWS	=	U.S. Fish and Wildlife Service
W	=	Wet

4.2 Analytical Methods

Since the completion of the 2017 WSIP application with the Commission, the Sites Project assumptions have been refined (see Appendix B.2). The reservoir has been reduced from 1.8 MAF to 1.5 MAF, a federal investment account has been incorporated, and the diversion criteria and delivery logic have been refined in coordination with the Authority, Reclamation, and DWR. Additionally, the baseline was changed from DWR's Delivery Capability Report 2015 to the 2020 Reclamation Benchmark CALSIM II model, described below.

The analyses conducted for the Project used the model products and assumptions described in Section 6004(a)(1) of the California Code of Regulations. This includes the 2030 and 2070 future conditions CALSIM II and DSM2 models provided by the Commission on November 2, 2016. These models were updated to include modifications to existing CVP and SWP operating criteria based on the 2020 Reclamation Benchmark CALSIM II model. The models were modified to include the facilities and operation of the Sites Project as described in the Project Description (Appendix A).

As of the February 2020 Record of Decision (ROD), Reclamation is operating the CVP to the ROC on LTO Alternative 1/Proposed Action published in December 2019, and BiOp published by U.S. Fish and Wildlife Service (USFWS) in October 2019. As of August 2020, DWR is operating the SWP to the 2020 ITP proposed Project as described in the SWP LTO Final Environmental Impact Report (FEIR) published in March 2020. Reclamation developed a version of the CALSIM II model in January 2021, in coordination with DWR and CDFW. This model includes both ROC on LTO and SWP ITP proposed actions. High-level modeling assumptions are summarized in the 2020 Benchmark Model Assumptions Summary document (Appendix B.3).

4.3 Development Conditions

CALSIM II input hydrology is based on an analysis of agricultural and urban land use and population estimates. The assumptions for Sacramento Valley land use result from aggregation of historical survey and projected data developed for the California Water Plan Update (Bulletin 160-98). Generally, land use projections are based on Year 2020 estimates (hydrology serial number 2020D09E). However, the San Joaquin Valley hydrology reflects draft 2030 land use assumptions developed by Reclamation. Where appropriate, Year 2030 projections of demands associated with water rights and SWP and CVP water service contracts have been included. Specifically, projections of full build-out are used to describe the American River region demands for water rights and CVP contract supplies, and California Aqueduct and the Delta Mendota Canal SWP/CVP contractor demands are set to full contract amounts.

4.4 Hydrologic Period and Timestep

CALSIM II simulates CVP and SWP operations on a monthly timestep from Water Year 1922 through Water Year 2003.

4.5 Water Balance

Appendix B.4 provides a water balance for the Project. A water balance is an accounting of all the flows of water into and out of an account for a defined period. An account can represent a location or geographic boundary, such as a reservoir, watershed, or region. The following accounts have been identified for the evaluation of the Project:

1. Sites Reservoir
 - a. Method 1 – by beneficiary
 - b. Method 2 – by conveyance facility
2. Sites Reservoir Private Account
3. Sites Reservoir Public Account
4. Colusa Basin
5. Sacramento Valley
6. Delta

The Delta account consists of the region upstream of Delta outflow and downstream of inflows at Freeport and Vernalis. The Sacramento Valley account includes the region upstream of Freeport and downstream of inflows at Shasta Lake and Trinity Lake, not including the Colusa Basin. The Colusa Basin account consists of the entire Colusa Basin region, not including Sites Reservoir. The Sites Reservoir account provides a water balance for the reservoir itself.

Appendix B.4 provides tables showing inputs, outputs, and changes in reservoir storage for each account. The parameters are presented as water-year (October through September) annual averages based on the full simulation period (82 years; 1922-2003). The water balance is computed as the total volume of inputs subtracted by the total volume of outputs and the total volume of change in storage. A water balance value of zero indicates that all water entering the account is equal to all water leaving the account and accumulating in storage. Moreover, a water balance of zero confirms that there are no net gains or losses within the account that are unaccounted for. As shown in Appendix B.4, all the CALSIM II models achieve water balance values of zero for each of the four accounts defined above.

5. Economic Feasibility

This section provides a brief overview of the analytical approaches, data, and calculations used to update the prior economic analysis performed for the project's WSIP application, in accordance with the right-sized project design and planned operations. The section also reports the findings of the benefit-cost analysis (BCA) performed to determine the project's economic feasibility in accordance with the WSIP program guidance and requirements.

5.1 Background

In July 2018, the Commission established \$816M (in 2015 dollars) as the MCED for Sites Reservoir, which is the maximum amount of Proposition 1 funding available to the project. This funding level was established through the WSIP application process, which identified the following maximum potential public benefits resulting from the project:

- Ecosystem Benefits – \$766M
- Recreation Benefits – \$197M
- Flood Damage Reduction Benefits – \$45M

The Commission subsequently increased Sites Reservoir's MCED. As a result, the project is currently eligible for up to \$836,787,128 in Proposition 1 funding.

As described in Section 1.3, the configuration and design of the Project facilities has advanced considerably since the WSIP application. A robust value planning process resulted in a project that includes facilities and operations at a reduced cost with a smaller reservoir footprint (now 1.5 MAF) and a lower diversion capacity off of the Sacramento River (reduced from 5,900 cfs to 3,900 cfs). The right-sized project also has eliminated the pumped storage hydropower generation facilities, although the project will generate power on release. The resulting project is smaller, less expensive, has fewer environmental impacts, is easier to permit, is easier to construct, and will be less expensive to operate. As a result, pumpback hydropower production is no longer a project purpose, and the project's energy revenues generated from its water releases are included in the Operations and Maintenance (O&M) expenses as a joint revenue.

As discussed in Section 2, the WSIP benefit objectives are unchanged, and the Authority intends to deliver public benefits in a manner consistent with the MCED for the WSIP funding amount to achieve the ecosystem, recreation, and flood damage reduction benefits. The objectives for the project's non-WSIP-funded purposes have been further refined since the original WSIP application. More specifically, Reclamation's recently published Final Feasibility Report (Reclamation, 2020) identified a federal interest in CVP operational flexibility and benefits to anadromous fish through temperature improvements downstream of Shasta Lake (an addendum to the report is currently being prepared). In addition, the economic benefits of the project's incidental supply increases for the CVP and SWP are quantified, and their estimated economic benefits are included in the economic feasibility analysis. The project's water quality benefits have also been estimated and added to the economic feasibility analysis.

5.2 Economic Feasibility Approach

No new benefit valuation methodologies have been used for the majority of the 2021 economic feasibility analysis update. Consequently, the prior methodological explanations provided in the 2017

and 2018 WSIP applications (e.g., Attachment A5) are incorporated by reference for those benefit analyses. The new benefit valuation methodologies used to estimate the project's M&I water quality benefits and the Participant specific M&I water supply benefits for the Metropolitan and Zone 7 water districts are described in this section.

The following section focuses on briefly identifying the input data changes used for the benefit valuation update.

5.2.1 CALSIM II Water Quantities and Uncertainty

The economic benefit analyses for Project-provided water supply relies on updated CALSIM II modeling to quantify the Project's expected future water deliveries under different water-year conditions. The CALSIM II operational studies determined future water deliveries for both 2030 and 2070 conditions. The CALSIM II analysis also incorporated the WSIP TR required future climate change assumptions to determine its 2070 future water system operations and deliveries. Straight-line interpolation was used to estimate the year-by-year quantities for the interim 2031 to 2069 analysis period. Supply quantities for all post-2070 years were assumed to remain at the 2070 values.

As compared to historical climate, long-term average Sites deliveries increase by 8% and 15% under 2030 and 2070 climate conditions, respectively. Generally, deliveries remain similar in Wet years, increase in Above Normal and Below Normal years, and decrease in Dry and Critically Dry years. Deliveries are affected by sea level rise and hydrology. Looking to more distant time horizons, uncertainty in future sea level rise and hydrology increases. Therefore, modeled results of 2030 (sea level and hydrologic) conditions represent future climate with an uncertainty of roughly +/-10%. Under 2070 conditions, hydrologic and sea level uncertainty could affect deliveries by roughly +/-50%. However, under extreme climate conditions, project operations would be adapted to sustain benefits.

5.2.2 Water Supply Benefit Valuation

All supply benefits for the Project are estimated using the WSIP Unit Water Valuation approach. Consistent with that approach, when applicable, the WSIP unit water values were adjusted to account for energy conveyance costs to determine the full benefit value of the Project's water supplies to its water users. Unadjusted WSIP unit water values were used for all North-of-the-Delta supplies.

Agency-specific benefit value determinations were also made for Metropolitan Water District (MWD) and Zone 7 Water Agency to better represent their individual circumstances. In consultation with Metropolitan Water District and Zone 7 Water Agency, additional analysis of their demand, planned project water use and supply alternatives was performed to identify their agency-specific water supply benefits based on their alternative supply costs for replacement supplies to substitute for their expected future Sites Reservoir deliveries. MWD and Zone 7 identified alternative supply projects from their current water supply development portfolio to represent their water supply alternative that could provide sufficient supply quantities to replace future Sites Reservoir deliveries. Detailed analysis and discussion of their estimated alternative supply cost benefits are provided below in Section 5.3.4 Joint Powers Authority. As a conservative representation of Metropolitan's and Zone 7's future M&I water supply benefits, the average of their Alternative Cost and WSIP unit water supply benefits is used by the economic feasibility analysis for the project's M&I supply benefit valuation.

The future benefits for each individual water supply purpose were estimated on both: (1) annual basis; and (2) for each water year type during each individual year. More specifically, for each water supply purpose:

- Specific unit water benefit values under each water year type were determined on an annual basis over the entire 93-year operating period.
 - Unit water benefit values for 2031 to 2044 were interpolated on a straight-line basis.
 - Unit water benefits values for 2046 to 2122 were set at 2045 values per Commission guidance.
- Individual delivery quantities under each water year type were determined on an annual basis over the entire 93-year operating period. These quantities were obtained from the 2021 CALSIM II water modeling analysis for 2030 and 2070.
 - Water quantities for 2031 to 2069 were interpolated on a straight-line basis.
 - Water quantities for 2071 to 2122 were set at 2070 quantities per Commission guidance.
- Annual average expected benefits were estimated by multiplying corresponding water benefit values by their respective projected water year type quantities. The annual average was weighted based on the projected water year frequencies.
 - Sacramento Valley’s Hydrologic Region’s projected water-year frequencies were applied for North-of-the-Delta deliveries.
 - San Joaquin Valley’s Hydrologic Region’s projected water-year frequencies were applied for South-of-the-Delta deliveries.

The specific input assumptions for each water supply purpose are provided below, along with estimated 2030, 2070, and total present value results determined by the economic feasibility analysis. The present values for both the project benefits and costs are calculated on an end of year basis for the first year of project operations in 2030 using the WSIP TR required 3.5 percent discount rate. Individual yearly benefit unit values, quantities, and expected total benefit amounts for each water supply purpose are provided in the BCA model spreadsheet.

Net present, annualized and IDC values are estimated for the project using the WSIP TR required 3.5 percent discount rate. These values are conservative in comparison to those being used for federal feasibility analysis which apply a lower discount rate in accordance with Office of Management and Budget guidelines. The current (FY 2022) discount rate required for federal feasibility analyses of water supply projects is 2.25 percent (OMB 2021). Use of a lower discount rate both reduces the estimated IDC cost attributed for project development and increases the net present value of the benefits resulting from future project operations. Both factors would improve the project’s economic feasibility.

5.2.3 Updated Data and Analysis Assumptions

WSIP Unit Water Values – North-of-the-Delta (2045) Revised May 2018

During its May 2018 WSIP hearings, the Commission revised the 2045 North-of-the-Delta unit water values. This revision was implemented because it was recognized that the November 2016 WSIP Technical Reference’s North-of-the-Delta unit water benefit values for 2045 under-represented the likely actual economic value of those supplies during periods of reduced water supply and scarcity, when strong demand for that water would occur from South-of-the-Delta users—especially given the increased scarcity of groundwater supply resulting from Sustainable Groundwater Management Act restrictions. The Commission updated the North-of-the-Delta unit water values for Below Normal, Dry, and Critical water years to be 80 percent of the corresponding South-of-the-Delta water years. Table 5-1 shows both the original and revised 2045 WSIP unit values.

TABLE 5-1. WSIP UNIT WATER VALUES – REVISED MAY 2018 (\$/AF, 2015\$)

Water Year Type	NOD – 2045 (\$/AF)		SOD – 2045 (\$/AF)
	Original	Revised (May 2018)	Original
Wet	\$150	\$150	\$414
Above Normal	\$198	\$198	\$519
Below Normal	\$264	\$506	\$633
Dry	\$285	\$539	\$674
Critical	\$355	\$845	\$1,056

Notes:

AF = Acre-feet

NOD = North of Delta

SOD = South of Delta

WSIP = Water Storage Investment Program

The economic feasibility analysis uses the Revised North-of-the-Delta unit values shown in Table 5-1 for benefit valuations of water supply and environmental benefits that include North-of-the-Delta supplies (e.g., Yolo Bypass and Incremental Level 4 Refuge deliveries). The WSIP Unit Water Benefit Values for 2030 are unchanged from their reported values in the WSIP Technical Guidance.

South-of-the-Delta Conveyance Energy Unit Costs

The future power costs for delivery of the Project's 2030 and 2070 water supply quantities to their end-user locations were estimated using the LTGEN power model. The conveyance costs were estimated separately for each Project purpose receiving Project deliveries. The conveyance costs were also estimated separately for JPA participants located in the San Francisco South Bay region, those receiving deliveries on the East and West Branches of the SWP in southern California and for the small quantities expected to be used for Central Valley agricultural production. The power analysis determined that conveyance energy costs for Sites Reservoir's North-of-the-Delta deliveries are negligible.

Table 5-2 shows the estimated conveyance costs per AF for each recipient group located South-of-the-Delta based on their modeled total conveyance energy costs and average annual delivery quantities.

TABLE 5-2. CONVEYANCE ENERGY UNIT COST FOR SOD DELIVERIES (\$/AF, 2015\$)

	Refuge	JPA – South Bay	JPA – Ag Use	JPA – So. Cal	CVP Ops Flex	CVP Incidental	SWP
2030	\$10	\$16	\$24	\$154	\$53	n/a	n/a
2070	\$11	\$19	\$26	\$156	\$63	n/a	n/a

Source: Jacobs 2021.

Note:

AF = acre-feet

CVP = Central Valley Project

JPA = Joint Powers Authority

n/a = not applicable

SOD = South of Delta

SWP = State Water Project

The conveyance unit costs in Table 5-2 are used to adjust the WSIP unit values for the Project's South-of-the-Delta deliveries. For each year between 2030 and 2070, the unit conveyance cost for each purpose

and location were interpolated. The estimated 2070 conveyance unit cost was applied for each year after 2070.

5.2.4 Water Quality Benefit Valuation Approach

The Lower Colorado River Basin Water Quality Model (LCRBWQM) estimates the benefits of salinity reduction in terms of avoided costs and damages from water quality improvements for water users within the Metropolitan Water District of Southern California (MWD) service area. LCRBWQM was developed by Reclamation and MWD. LCRBWQM divides MWD's service area into 15 sub-areas to reflect each sub-region's unique water supply conditions and benefit factors. The salinity model is designed to assess the average annual salinity benefits or costs based on demographic data, water deliveries, total dissolved solid (TDS) concentration, and cost relationships for typical household, industrial, and commercial water uses. It uses mathematical functions that define the relationship between TDS and key items in each affected category, such as the useful life of appliances and costs to industrial and commercial customers.

The LCRBWQM calculates the economic benefits or costs of State Water Project (SWP) and Colorado River Aqueduct salinity changes compared to a selected baseline condition. The model inputs from CALSIM II are SWP East and West Branch deliveries and TDS of these deliveries in milligrams per liter (mg/L). LCRBWQM outputs are used to compare changes in average salinity and annual salinity costs. To properly reflect the changes between without- to with-project conditions under NODOS, several updates were made to the water quality economics models. The updates include indexing all prices to 2007 dollars and developing LCRBWQM to include 2009, 2025, and 2060 levels of development.

While the LCRBWQM is the best available model for determining the project's future water quality benefits, a key limitation is that it only considers economic benefits for salinity improvements. The economic benefits of other water quality constituents are not estimated. Research has shown that consumers are willing to pay to avoid many other water quality constituents, and hence only valuing salinity will underestimate the water quality benefit. These "other" constituents include many manmade chemicals, pathogens, and byproducts that may have health implications.

The model also uses somewhat dated information about the current ownership patterns and costs of modern water using appliances. An input to the models is the average expected water quality of water supplies over the full hydrologic period. This simplification could result in error in economic benefit estimates. More detail on the quality of supplies used over the hydrologic period might result in a different expected value and could also provide better insights about water management during dry/critical periods.

5.3 Benefits

5.3.1 Incremental Level 4 Refuge (WSIP Eligible)

Water Supply Quantities

Table 5-3 shows water supply increases to National Wildlife Refuges, State Wildlife Areas, and privately managed wetlands projected in 2030 and 2070.

TABLE 5-3. INCREMENTAL LEVEL 4 REFUGE WATER SUPPLY INCREASES (2030 AND 2070) (TAF/YEAR)

Period	North-of-the-Delta	South-of-the-Delta ^(b)	Total
2030 Results			
Long-Term Average ^(a)	5	11	17
Wet	0	0	0
Above Normal	9	5	14
Below Normal	9	13	22
Dry	8	27	34
Critical	6	17	23
2070 Results			
Long-Term Average ^(a)	5	10	15
Wet	0	0	0
Above Normal	9	1	10
Below Normal	7	8	16
Dry	7	10	17
Critical	6	21	27

Source: CALSIM II.

Notes:

(a) Average weighted based on water-year frequency rates

(b) Includes both San Joaquin and Tulare Lake Refuge deliveries and based on San Joaquin Valley 60-20-20 Index Year Class.

TAF = thousand acre-feet

Estimated Benefit Value

Table 5-4 shows Sites Reservoir's Incremental Level 4 Refuge water supply benefits as estimated based on WSIP Unit Water Values. As discussed in Section 5.2.2, the refuge benefit estimation includes adjustments increasing the WSIP unit benefit values for South-of-the-Delta deliveries to account for a \$10/AF conveyance cost.

TABLE 5-4. INCREMENTAL LEVEL 4 REFUGE BENEFITS (\$1,000s)

Purpose	Annual Benefits ^(a)		Total Benefit – Present Value ^(b)	Total Benefit – Present Value ^(b)
	2030	2070		
	(2015\$)			(2021\$)
IL4 Refuge	\$5,014	\$11,927	\$286,644	\$325,506

Notes:

(a) Based on WSIP Unit Water Values by water-year type.

(b) Present value based on annual benefits between 2030 and 2122 for 2030 using a 3.5 percent discount rate.

IL4 = Incremental Level 4

WSIP = Water Storage Investment Program

As an example of the estimating process: the 2045 benefit unit value for SOD refuges during a critical water year is estimated to be \$1,066/AF. This South-of-the-Delta benefit value is based on a South-of-the-Delta (SOD) critical year WSIP unit water value (\$1,056) and a \$10/AF conveyance energy cost to transport the water to the San Joaquin and Tulare refuges to determine the water's overall benefit value.

The Project's Incremental Level 4 refuge water supply benefits were estimated to increase from \$5.0 million in 2030 to approximately \$11.9 million in 2070 (in 2015 dollars). The corresponding present value benefit for the future 2030 to 2122 operating period was estimated to be \$286.6 million in 2015 dollars. This is equal to approximately \$325.5 million in 2021 dollars.

5.3.2 Yolo Bypass (WSIP Eligible)

Water Supply Quantities

Table 5-5 shows improved deliveries to national wildlife refuges, state wildlife areas, and privately managed wetlands projected in 2030 and 2070.

TABLE 5-5. YOLO BYPASS SUPPLY INCREASES (2030 AND 2070) (TAF/YEAR)

Period	North-of-the-Delta
2030 Results	
Long-Term Average ^(a)	36
Wet	46
Above Normal	48
Below Normal	39
Dry	27
Critical	15
2070 Results	
Long-Term Average ^(a)	31
Wet	35
Above Normal	38
Below Normal	34
Dry	29
Critical	18

Source: CALSIM II (2021)

Note:

(a) Average weighted based on water-year frequency rates

TAF = thousand acre-feet

Estimated Benefit Value

Table 5-6 shows Sites Reservoir's Incremental Level 4 Refuge water supply benefits as estimated based on unadjusted WSIP Unit Water Values for North-of-the-Delta supplies.

TABLE 5-6. YOLO BYPASS SUPPLY BENEFITS (\$1,000S)

Purpose	Annual Benefits ^(a)		Total Benefit – Present Value ^(b)	Total Benefit – Present Value ^(b)
	2030	2070		
	(2015\$)			(2021\$)
Yolo Bypass	\$7,629	\$11,484	\$304,629	\$345,930

Notes:

(a) Based on WSIP Unit Water Values by water-year type.

(b) Present value based on annual benefits between 2030 and 2122 for 2030 using a 3.5 percent discount rate.

WSIP = Water Storage Investment Program

The Project's Yolo Bypass water supply benefits were estimated to increase from \$7.6 million in 2030 to approximately \$11.5 million in 2070. The corresponding present value benefit for the future 2030 to 2122 operating period was estimated to be \$304.6 million in 2015 dollars. This is equal to \$345.9 million in 2021 dollars.

5.3.3 Recreation and Flood Reduction (WSIP Eligible)

The revised 2021 Project's recreation facilities, recreational demand, and flood protection effects are projected to remain unchanged from the prior 2017 project. As a result, the annual benefits are similarly projected to remain unchanged from the Commission approved in the July MCED determination. However, the present value calculation has been adjusted to an end of year basis for consistency with the approach applied to the other project benefits and costs.

Table 5-7 shows the July MCED determined recreation and flood reduction benefits in both 2015 dollar and current 2021 dollars terms.

TABLE 5-7. RECREATION AND FLOOD REDUCTION BENEFITS – NET PRESENT VALUE (\$MILLIONS)

Beneficiary	Benefit Value (2015\$)	Benefit Value (2021\$)
Recreation	\$197.2	\$224.9
Flood Reduction	\$44.6	\$50.9
Total WSIP Non-Environmental Benefits	\$241.8	\$275.8

Note:

WSIP = Water Storage Investment Program

5.3.4 Joint Powers Authority (WSIP Non-Eligible)

Water Supply Quantities

Table 5-8 shows increased deliveries to the Joint Powers Authority (JPA) in 2030 and 2070.

TABLE 5-8. JPA SUPPLY INCREASES (2030 AND 2070) (TAF/YEAR)

Period	North-of-the-Delta	South-of-the-Delta	Total
2030 Results			
Long-Term Average ^(a)	37	103	140
Wet	16	4	21
Above Normal	14	17	31
Below Normal	32	76	109
Dry	72	209	281
Critical	64	222	286
2070 Results			
Long-Term Average ^(a)	48	107	155
Wet	41	11	52
Above Normal	44	12	57
Below Normal	44	60	104
Dry	60	133	193
Critical	48	221	269

Source: CALSIM II. (2021)

Note:

(a) Average weighted based on water-year frequency rates

JPA = Joint Powers Authority

TAF = thousand acre-feet

Estimated Benefit Value

The North-of-the-Delta supply benefits are based on unadjusted WSIP Unit Water Values. The South-of-the-Delta supply benefits for the majority of the JPA Participants are based on adjusted WSIP Unit Water Values determined based on their location's respective estimated annual conveyance cost as shown in Table 5-3.

Agency-specific benefit value determinations were made for Metropolitan Water District (MWD) and Zone 7 Water Agency to better represent their individual circumstances. MWD is the largest single project participant with future project deliveries of 42.6 TAF/yr (LTA) and 80 TAF/yr (Dry/Critical) deliveries. Sites Reservoir's projected dry and critical water supply increases are considered the most needed of its future benefits to MWD's water system. Zone 7 is another major project participant with future project deliveries of 8.6 TAF/yr (LTA) and 16.2 TAF/yr (Dry/Critical) deliveries.

MWD and Zone 7 staff reviewed WSIP TR unit values and both agencies reported the use of substantially higher internal valuations of their water supply benefits and costs that are specific to their agencies to meet current and future District needs. For both agencies major market, institutional, political, and regulatory pressures constrain the transferability of water supplies from existing agricultural users to serve future water needs. As a result, their water supply economic benefit valuations exceed those based on large-scale substitution and long-term reallocation of water use from agricultural producers.

MWD and Zone 7 indicated that water supply alternative costs of other planned projects would appropriately represent the benefit value of the Sites Reservoir supplies for their future operations. Both agencies also expect that future development of their identified alternate projects will nonetheless likely be necessary due to their projected long-term water supply needs. Consequently, strictly-speaking the specified values would not represent water supply *avoided* cost benefits but do represent appropriate comparative values for water supply alternatives.

MWD and Zone 7 have significant storage in Sites Reservoir and anticipate significant delivery in dry and critical periods. Both agencies also make significant use of imported water and have invested in local infrastructure to provide imported water to their customers. As noted above, their agency-specific circumstances vary from the assumptions used for development the WSIP TR unit values (TR Section 5.3.3).

MWD and Zone 7 identified recycled water and desalination projects as representative of the types of water supply projects that could adequately provide supplies of sufficient magnitude to replace future Sites Reservoir deliveries in their portfolios. Recycled water could potentially provide future potable supplies (with treatment) or non-potable water for irrigation or to support groundwater recharge.

Several published studies provide unit supply cost estimates for alternative water supply projects. Table 5-9 provides estimated average costs surveyed for California water projects (Cooley 2019). These unit costs are generally consistent with the findings reported by other alternate supply cost analyses (Luthy 2020; SWRCB 2013).

The subsequent analysis outlines the participant-specified assessments of their expected water supply benefits from future use of Sites Reservoir deliveries. The context and key factors for each agency-specified alternative cost valuation are identified individually below.

TABLE 5-9. ALTERNATIVE WATER SUPPLY SYSTEM COSTS (\$/AF; \$2021)

	Supply Cost (\$/AF; \$2021)			Integration (\$/AF; \$2021)	Total Cost (\$/AF; \$2021)		
	Low	Medium	High		Low	Medium	High
Stormwater Capture							
Small (<1.5 TAF)	\$653	\$1,293	\$1,415	\$381	\$1,061	\$1,674	\$1,796
Large (6.5 TAF - 8.1 TAF)	\$259	\$272	\$286		\$626	\$653	\$667
Recycled Water - Non-Potable Reuse							
Small (< 9.7 TAF)	\$599	\$653	\$1,265	\$1,048	\$1,646	\$1,701	\$2,313
Recycled Water - Indirect Potable Reuse							
Small (< 9.7 TAF)	\$1,646	\$2,041	\$2,449	\$503	\$2,163	\$2,558	\$2,953
Large (> 9.7 TAF)	\$1,238	\$1,442	\$1,742		\$1,742	\$1,946	\$2,259
Brackish Water Desalination							
Small (< 16.2 TAF)	\$993	\$1,660	\$1,905	\$122	\$1,129	\$1,782	\$2,027
Large (> 9.73 TAF)	\$925	\$1,116	\$1,347		\$1,048	\$1,238	\$1,469
Seawater Desalination							
Small (< 16.2 TAF)	\$2,735	\$2,898	\$4,504	\$218	\$2,953	\$3,116	\$4,721
Large (> 9.73 TAF)	\$2,082	\$2,136	\$2,585		\$2,299	\$2,340	\$2,803

Source: Cooley H., The Cost of Alternative Urban Water Supply and Efficiency Options in California 2019.

AF = acre feet

TAF = thousand acre-feet

Metropolitan Water District

Metropolitan published its 2020 Urban Water Management Plan (UWMP) in June 2021 (Metropolitan 2021a). The UWMP identifies a broad and extensive range of challenges to its future ability to meet customers' water needs (UWMP Section 1.4). Metropolitan foresees limited supply growth opportunities for several of its local sources (e.g. conjunctive use and advanced water technologies) and declines in its existing supplies (e.g. local storage and stormwater capture) due to climate change and increased recycled water use (UWMP 2020 Table A.11-2).

Consequently, Metropolitan is continuing to pursue new water supply development as a critical component of its water planning. These supply increases are expected to be achieved predominantly through increased water recycling (156 TAF/yr) (UWMP 2020 Table 1-5). Appendix A-5 of the UWMP identifies a surveyed inventory of existing and potential projects within the Metropolitan service area with their ultimate yield/capacity. The UWMP also reports District projects currently in planning or under construction (Metropolitan 2021a).

Table 5-10 summarizes the Metropolitan's current near-term planned major water supply developments. Individually most of Metropolitan's existing and planned projects would not provide sufficient water supplies to replace its planned future Sites Reservoir deliveries – especially during dry and critical water years.

TABLE 5-10. FUTURE MWD WATER SUPPLY PROJECTS

	Existing		Under Construction / Planned	
	Supply	Key Projects	Supply	Key Projects
Recycled Water / Groundwater Recharge	441 TAF	GWRS Phase 1 and Expansion; West Basin Water Recycling	113 TAF	San Diego Pure Water North City; GWRS Final Expansion
Groundwater Recovery / Desal	112 TAF	Chino Basin Desalination; Mesa Water Reliability	13.2 TAF	Perris II Desalter; North Pleasant Valley Regional Desalter
Desalination	56 TAF	Carlsbad	94.3 TAF	Huntingdon Beach; Doheny Ocean

Source: Metropolitan 2021a.

GWRS = Groundwater Replenishment System

MWD = Metropolitan Water District

TAF = Thousand Acre Feet

Metropolitan Alternative Water Supply Cost Estimates

Metropolitan performed extensive internal analysis of its alternative water supply options for participation in the California WaterFix (Metropolitan 2017). Metropolitan staff recommended use of this study's alternative cost approach and analysis for replacement supplies as the most appropriate way to estimate the economic benefits of future Sites Reservoir deliveries for the District (Metropolitan 2021c).

Metropolitan's 2017 study analysis focused on supply alternatives: recycled water and seawater desalination, rather than developing an alternative mix of local resources. For the recycled water alternative, the estimated cost of the proposed Regional Recycled Water Project (RRWP) was used. The Carlsbad Desalination Plant was also analyzed for the seawater desalination alternative but was determined to be significantly more costly than the RRWP (Metropolitan 2017).

Metropolitan's 2015 IRP Update estimates that the annual water supply cost from new recycled water facility development would range between \$526/AF and \$8,412/AF in 2015 dollars (Metropolitan 2016b). Escalating these costs to 2021 dollars results in recycled water development costs ranging from \$580/AF to \$9,280/AF. These cost ranges were based on historical project development costs. As such they provide a reasonable basis for projecting future development and operating costs which are unknown, but would likely be higher based on cost escalation, regulatory requirements, and scarcity of options (Metropolitan 2021c).

Metropolitan completed a comprehensive feasibility study for the Regional Recycled Water Project (RRWP) in 2016 (Metropolitan 2016a). The RRWP is a large-scale indirect potable reuse project that could provide 165 TAF per year of water. The feasibility included both a survey of unit costs for similar advanced treatment facilities in California (Metropolitan 2016a, Table 9.6) and reported future resource development unit cost data (Metropolitan 2016a, Figure 11.1) previously developed for Metropolitan's Integrated Waste Resource Plan 2015 Update (Metropolitan 2016b). For comparison purposes, estimated unit cost data for other alternative water supply projects in Southern California used by Metropolitan for its water system planning is available from several other analyses and sources (Bay Delta Commission 2017; The Brattle Group 2013).

The feasibility study estimated a RRWP supplied water cost of \$1,580/AF adjusted into 2021 dollars (Metropolitan 2016a). The costs for most of the other facilities were comparable or higher than the

estimate for RRWP supplies. The unit cost for RRWP were determined to be lower than those for both stormwater distributed and seawater desalination systems. RRWP estimated costs were also in the low end of the cost range for recycled water development. This \$1,580/AF unit benefit value corresponds to Metropolitan's expected alternate cost it will otherwise incur for substitute water quantities from development of an additional major recycled water facility and represents the economic benefit of Metropolitan's future Sites Reservoir deliveries.

Using the WSIP TR values, the average water supply benefit of Metropolitan's future Sites Reservoir deliveries have an estimated average unit benefit value of \$1,021/AF. As a conservative representation of Metropolitan's future M&I water supply benefits, the \$1,301/AF average of these unit benefit values is used by the economic feasibility analysis.

Zone 7 Water Agency

Imported water from the State Water Project makes up approximately 80 percent of Zone 7 Water Agency's (Zone 7) water supply with much of the remainder coming from groundwater (which also originated as imported water). Zone 7 has been evaluating several potential future water supply and storage options. Table 5-11 shows the key findings from the Zone 7 Waste Supply Evaluation Update (Zone 7 Water Agency 2019).

TABLE 5-11. ZONE 7 ALTERNATIVE WATER SUPPLY COSTS (2018\$)

Project	Average Assumed Yield (AFY)	Total Capital Cost (\$M)	Zone 7 Share of Capital Cost (\$M)	\$/AF (Inc. Debt Service and O&M)
Water Storage				
Los Vaqueros Reservoir Expansion	max. storage 10,000 AF avg. delivery 1,600 AFY	\$863		\$1,540
Water Supply				
Bay Area Regional Desalination Project	5,600	\$150	\$80	\$1,800
CA WaterFix	11,000	\$16,700	\$220	\$740
Potable Reuse	4,000 to 7,000	\$120 to \$250	\$120 to \$150	\$2,500 to \$2,700
Sites Reservoir	5,000 to 10,000	\$5,500	\$110	\$900 to \$1,200
SWP Long-Term Transfers	5,000 to 7,000	\$16,700	\$100	\$640
SWP Short-Term and Other Transfers	5,000 to 12,500	\$0.2	\$0.2	\$420 to \$1,100

Source: Zone 7 2019

Note: Water Supply cost shown in 2018 dollars.

As discussed above, Zone 7 cannot rely on large-scale future water transfers as a long-term and reliable supply for its future water needs - especially during dry and critical periods. Zone 7's 2019 Water Supply Evaluation report recommended the agency's future participation in the Sites Reservoir (Zone 7 2019 WSE Section 11) and its essential and central role in Zone 7 future water supply planning is shown in its UWMP (Zone 7 2021a Table 7-12 to 7-19).

Zone 7 Alternative Water Supply Cost Estimates

The agency considers that its supply value of the Sites Reservoir deliveries is best represented by the alternate costs for potable reuse and desalination since they can provide a reliable water source even during dry and critical years (Zone 7 2021b).

Zone 7 is one of five Bay Area water districts that have been partnering in the potential development of the Bay Area Regional Desalination Project (BARDP). BARDP is a brackish desalination project located in eastern Contra Costa County and a comprehensive feasibility study of the project was completed in 2014 (BARDP 2014). The study estimated that BARDP's larger 20 mgd facility alternative's water supply unit would be about \$1,800/AF (in 2013 dollars) or approximately \$2,045/AF in 2021 dollars. Zone 7's most recent estimate of future BARDP unit supply costs range from \$1,890 to \$2,310/AF (for 10-MGD facility) in 2021 dollars which would provide Zone 7 with a 5.6 TAF per year supply (Zone 7 2019 WSE Section 6.2.1.2). It should be noted that BARDP's ability to provide critical year supplies could be significantly reduced if Contra Costa Water District's water rights are curtailed.

The future water benefit value for Zone 7 Water Agency for Sites Reservoir supplies is estimated to be \$1,890 per acre foot based on the 2019 BARDP unit water supply low-end estimate for a 10-MGD facility discussed above. This is a conservative estimate given the higher unit cost range estimated for potable reuse options. This valuation approximates the avoided cost savings that Zone 7 expects to achieve, given its constrained water sourcing options for reliable dry and critical water year supplies.

Using the WSIP TR values, the average water supply benefit of Zone 7's future Sites Reservoir deliveries have an estimated average unit benefit value of \$875/AF. As a conservative representation of Zone 7's future M&I water supply benefits, the \$1,383/AF average of these unit benefit values is used by the economic feasibility analysis.

Table 5-12 shows Sites Reservoir's JPA supply benefits based on use of WSIP Unit Water Values for most of the JPA participants except for MWD and Zone 7 which were estimated on their agency specific water supply unit benefit values discussed above.

TABLE 5-12. JPA SUPPLY BENEFITS (\$1,000s)

Purpose	Annual Benefits ^(a)		Total Benefit – Present Value ^(b)	Total Benefit – Present Value ^(b)
	2030	2070		
	(2015\$)			(2021\$)
JPA – NOD	\$9,961	\$20,624	\$511,348	\$580,674
JPA – SOD	\$81,879	\$120,148	\$3,063,692	\$3,479,053
Total JPA	\$91,841	\$140,772	\$3,575,040	\$4,059,727

Notes:

(a) Based on WSIP Unit Water Values by water-year type.

(b) Present value based on annual benefits between 2030 and 2122 for 2030 using a 3.5 percent discount rate.

JPA = Joint Powers Authority

NOD = North of Delta

SOD = South of Delta

WSIP = Water Storage Investment Program

Annual expected benefit values are estimated for each year during the 93-year operating period using interpolated supply quantities by specific water year type for years 2031 to 2069. These water benefit values similarly interpolated for the 2031 to 2044 period, after which 2045 values are used.

The Project's JPA total water supply benefits were estimated to increase from \$91.8 million in 2030 to approximately \$140.8 million in 2070. The corresponding present value benefit for the future 2030 to 2122 operating period was estimated to be approximately \$3,575 million in 2015 dollars. This is equal to approximately \$4,060 million in 2021 dollars.

5.3.5 CVP Operational Flexibility (WSIP Non-Eligible)

Three distinct CVP Operational Flexibility supply benefits were identified by the CALSIM II modeling analysis. CVP Operational Flexibility for delivery represents the water quantities future for agricultural, municipal and industrial and/or refuge supply use by CVP participants or the federal government. These supplies include both North-of-the-Delta and South-of-the-Delta deliveries.

CVP Operational Flexibility for Storage represents the water quantities used by the federal government to support its increased storage quantities in Shasta to improve its coldwater supplies for anadromous fish. The benefits for each of these two CVP Operational Flexibility purposes are estimated separately below.

Finally, the Project will also result in increased water availability for CVP users. These incidental supply increases are the result of the Project's future operations (i.e., scheduling of its imports and deliveries), which will have beneficial effects on Delta water quality and increase water availability within the CVP water system. These indirect water supply increases, quantified by the CALSIM II modeling of the Project's future operations, are represented as CVP incidental quantities. The future supply quantities and estimated economic benefits are also shown below.

CVP Operational Flexibility – Delivery

Water Supply Quantities

Table 5-13 shows the increased supply quantities for CVP Operational Flexibility for delivery in 2030 and 2070.

TABLE 5-13. CVP OPERATIONAL FLEXIBILITY – DELIVERY SUPPLY INCREASES (2030 AND 2070) (TAF/YEAR)

Period	North-of-the-Delta	South-of-the-Delta	Total
2030 Results			
Long-Term Average ^(a)	1.8	2.7	4.5
Wet	0.0	(0.2)	(0.2)
Above Normal	0.2	7.6	7.8
Below Normal	1.5	3.9	5.4
Dry	4.0	2.9	6.9
Critical	4.6	1.0	5.5
2070 Results			
Long-Term Average ^(a)	0.4	2.7	3.1
Wet	0.3	6.5	6.7
Above Normal	0.4	8.3	8.7
Below Normal	0.1	(20.5)	(20.4)
Dry	2.4	8.7	11.1
Critical	(2.2)	2.2	0.0

Source: CALSIM II. (2021)

Note:

(a) Average weighted based on water-year frequency rates

CVP = Central Valley Project

TAF = thousand acre-feet

Estimated Benefit Value

Table 5-14 shows Sites Reservoir’s CVP Operational Flexibility for delivery supply benefits. The North-of-the-Delta supply benefits are based on unadjusted WSIP Unit Water Values. The South-of-the-Delta supply benefits are based on adjusted WSIP unit water values determined using an average annual \$53/AF conveyance cost.

TABLE 5-14. CVP OPERATIONAL FLEXIBILITY – DELIVERY SUPPLY BENEFITS (\$1,000S)

Purpose	Annual Benefits ^(a)		Total Benefit – Present Value ^(b)	Total Benefit – Present Value ^(b)
	2030	2070		
	(2015\$)			(2021\$)
CVP Operational Flexibility for Delivery				
NOD	\$534	\$81	\$13,316	\$15,121
SOD	\$889	\$1,782	\$44,148	\$50,133
Total	\$1,423	\$1,863	\$57,464	\$65,254

Notes:

(a) Based on WSIP Unit Water Values by water-year type.

(b) Present value based on annual benefits between 2030 and 2122 for 2030 using a 3.5 percent discount rate.

CVP = Central Valley Project

NOD = North of Delta

SOD = South of Delta

WSIP = Water Storage Investment Program

Annual expected benefit values are estimated for each year during the 93-year operating period using interpolated supply quantities by specific water year type for the years 2031 to 2069. These water benefit values were similarly interpolated for the 2031 to 2044 period, after which 2045 values are used.

The Project’s CVP Operational Flexibility for delivery total water supply benefits were estimated to increase from \$1.4 million in 2030 to \$1.9 million in 2070. The corresponding present value benefit for the future 2030 to 2122 operating period was estimated to be approximately \$57.5 million in 2015 dollars. This is equal to approximately \$65.3 million in 2021 dollars.

CVP Operation Flexibility Storage Supporting Shasta Lake Operations

Water Supply Quantities

Table 5-15 shows the increase in Shasta Lake’s End-of-September storage levels supported by the Project’s operations in 2030 and 2070. Table 5-14 also shows estimated equivalent annual deliveries required to support the storage increases. These quantities are determined based on an estimated 25 percent conversion factor between the increase in average End of September storage and the estimated reservoir release quantities required to achieve those Shasta Lake storage gains. The increase in Shasta Lake carryover due to Sites is assumed to be the result of Sites CVP Operational Flexibility related releases in excess of the related releases for improving CVP water supply deliveries. A “rule of thumb” of 1:4 Sites releases to Shasta Lake storage carryover has been approximated by the modeling team based on the observed CALSIM modeling results. This rule of thumb approximates that for every 4 TAF of carryover improvement in Shasta Lake, there will need to be 1 TAF of releases from Sites Reservoir dedicated to the Shasta carryover purpose.

The Sites CVP Operational Flexibility pool is very active, repeatedly filling up in wetter years and draining over the following drier years as water is released, moved to CVP storage in Shasta Lake or delivered to

CVP contractors. The average modeled end of April storage in the Sites CVP Operational Flexibility pool in 2030 and 2070 is 47.5 TAF and 39.6 TAF respectively. The average Sites CVP Operational Flexibility release in 2030 and 2070 is 30.0 and 30.7 TAF/year respectively. As shown in Table 5-15, the average improvement in end of September storage in Shasta Lake in 2030 and 2070 is 30.2 and 24.6 TAF respectively. The average increase in Sites CVP deliveries in 2030 and 2070 is 4.5 and 3.1 TAF/year respectively, as shown in Table 5-13. Using the 1:4 “rule of thumb” assigns 7.6 and 6.2 TAF/year releases, in 2030 and 2070 respectively, from CVP Sites to Shasta Lake storage use. This leaves a remainder of CVP Sites releases unassigned to deliveries or Shasta Lake storage improvement of 17.9 TAF/year and 21.4 TAF/year, in 2030 and 2070 respectively. This unassigned release quantity could be salinity costs associated with deliveries or spills from Shasta Lake storage or changes in other metrics, such as change in Folsom storage or abandonment of water to SWP use. Given that this unassigned quantity is a significant portion of CVP Operational Flexibility releases, use of the 1:4 “rule of thumb” is a conservative approach to estimating the Sites releases that contribute to Shasta Lake carryover increases for CVP operational flexibility.

**TABLE 5-15. CVP OPERATIONAL FLEXIBILITY –
STORAGE SUPPLY INCREASES (2030 AND 2070) (TAF/YEAR)**

Period	Shasta Lake End of Sept. Storage	North-of-the-Delta Supply
2030 Results		
Long-Term Average ^(a)	30.2	7.6
Wet	(0.4)	(0.1)
Above Normal	55.8	14.0
Below Normal	36.2	9.1
Dry	46.6	11.7
Critical	40.3	10.1
2070 Results		
Long-Term Average ^(a)	24.6	6.2
Wet	3.2	0.8
Above Normal	49.6	12.4
Below Normal	26.8	6.7
Dry	47.8	11.9
Critical	9.1	2.3

Source: CALSIM II. (2021)

Note: (a) Average weighted based on water-year frequency rates

CVP = Central Valley Project

TAF = thousand acre-feet

These North-of-the-Delta supply amounts represent the Project-related CVP Operational Flexibility for Shasta Lake storage benefit quantities.

Estimated Benefit Value

Table 5-16 shows Sites Reservoir’s CVP Operational Flexibility for Shasta Lake storage supply benefits. The North-of-the-Delta supply benefits are based on unadjusted WSIP Unit Benefit Values.

TABLE 5-16. CVP OPERATIONAL FLEXIBILITY – STORAGE SUPPLY BENEFITS (\$1,000s)

Purpose	Annual Benefits ^(a)		Total Benefit – Present Value ^(b)	Total Benefit – Present Value ^(b)
	2030	2070		
	(2015\$)			(2021\$)
CVP Operational Flexibility for Storage				
NOD	\$1,989	\$2,760	\$80,649	\$91,583

Notes:

(a) Based on WSIP Unit Water Values by water-year type.

(b) Present value based on annual benefits between 2030 and 2122 for 2030 using a 3.5 percent discount rate.

CVP = Central Valley Project

NOD = North of Delta

WSIP = Water Storage Investment Program

Annual expected benefit values are estimated for each year during the 93-year study period using interpolated supply quantities by specific water year type for years 2031 to 2069. These water benefit values were similarly interpolated for the 2031 to 2044 period, after which 2045 values are used.

The Project's CVP Operational Flexibility for storage total water supply benefits were estimated to increase from approximately \$2.0 million in 2030 to nearly \$2.8 million in 2070. The corresponding present value benefit for the future 2030 to 2122 operating period was estimated to be approximately \$80.6 million in 2015 dollars. This is equal to \$91.6 million in 2021 dollars.

Water Supply Quantities

Table 5-17 shows CVP incidental supply quantities in 2030 and 2070.

TABLE 5-17. CVP INCIDENTAL SUPPLY QUANTITIES (2030 AND 2070) (TAF/YEAR)

Period	North-of-the-Delta	South-of-the-Delta	Total
2030 Results			
Long-Term Average ^(a)	(3.4)	5.8	2.3
Wet	(4.0)	3.8	(0.2)
Above Normal	(0.9)	(4.6)	(5.4)
Below Normal	(0.0)	16.9	16.9
Dry	(6.9)	2.0	(4.9)
Critical	(4.7)	13.6	8.9
2070 Results			
Long-Term Average ^(a)	(1.9)	11.5	9.6
Wet	(4.1)	3.5	(0.6)
Above Normal	(2.4)	(6.8)	(9.2)
Below Normal	(2.0)	26.5	24.5
Dry	(2.4)	2.1	(0.3)
Critical	3.8	26.2	30.0

Source: CALSIM II

Note:

(a) Average weighted based on water-year frequency rates

CVP = Central Valley Project

TAF = thousand acre-feet

Estimated Benefit Value

Table 5-18 shows Sites Reservoir's CVP incidental supply benefits. The North-of-the-Delta supply benefits are based on unadjusted WSIP Unit Water Values. The South-of-the-Delta supply benefits are based on unadjusted WSIP Unit Water Values. No conveyance energy cost was applied in the benefit estimation. Accordingly, the Project's annual O&M expense estimate similarly does not include any conveyance energy expenses for these supply quantities.

TABLE 5-18. CVP INCIDENTAL SUPPLY BENEFITS (\$1,000s)

Purpose	Annual Benefits ^(a)		Total Benefit – Present Value ^(b)	Total Benefit – Present Value ^(b)
	2030	2070		
	(2015\$)			(2021\$)
CVP Incidental				
NOD	(\$818)	(\$256)	(\$21,071)	(\$23,927)
SOD	\$1,627	\$10,972	\$195,866	\$222,421
Total	\$810	\$10,717	\$174,796	\$198,494

Notes:

(a) Based on WSIP Unit Water Values by water-year type.

(b) Present value based on annual benefits between 2030 and 2122 for 2030 using a 3.5 percent discount rate.

CVP = Central Valley Project

TAF = thousand acre-feet

NOD = North of Delta

SOD = South of Delta

WSIP = Water Storage Investment Program

Annual expected benefit values are estimated for each year during the 93-year study period using interpolated supply quantities by specific water year type for years 2031 to 2069. These water benefit values were similarly interpolated for the 2031 to 2044 period, after which 2045 values are used.

The Project's CVP incidental total water supply benefits were estimated to increase from approximately \$0.8 million in 2030 to \$10.7 million in 2070. The corresponding present value benefit for the future 2030 to 2122 operating period was estimated to be approximately \$175 million in 2015 dollars. This is equal to approximately \$198.5 million in 2021 dollars.

CVP Operational Flexibility – Total

Table 5-19 shows Sites Reservoir's CVP Operational Flexibility total benefits based on the combined benefits from its delivery, Shasta Lake storage and incidental CVP supply purposes.

The Project's CVP Operational Flexibility for delivery total water supply benefits were estimated to increase from \$4.2 million in 2030 to over \$15.3 million in 2070. The corresponding present value benefit for the future 2030 to 2132 operating period was estimated to be \$313 million in 2015 dollars. This is equal to approximately \$355 million in 2021 dollars.

TABLE 5-19. CVP OPERATIONAL FLEXIBILITY – TOTAL BENEFITS (\$1,000s)

Purpose	Annual Benefits ^(a)		Total Benefit – Present Value ^(b)	Total Benefit – Present Value ^(b)
	2030	2070		
	(2015\$)			(2021\$)
CVP Operational Flexibility				
Delivery	\$1,423	\$1,863	\$57,464	\$65,254
Shasta Storage	\$1,989	\$2,760	\$80,649	\$91,583
Incidental	\$810	\$10,717	\$174,796	\$198,494
Total	\$4,221	\$15,340	\$312,908	\$355,331

Notes:

(a) Based on WSIP Unit Water Values by water-year type.

(b) Present value based on annual benefits between 2030 and 2122 for 2030 using a 3.5 percent discount rate.

CVP = Central Valley Project

WSIP = Water Storage Investment Program

5.3.6 SWP (WSIP Non-Eligible)

The Project will also result in increased water availability for SWP users. These indirect supply increases are the result of the Project's future operations (i.e., scheduling of its imports and deliveries), which will have beneficial effects on Delta water quality and Article 21 water availability within the SWP water system.

These indirect water supply increases, quantified by the CALSIM II modeling of the Project's future operations, are represented as SWP quantities. The future supply quantities and estimated economic benefits are shown below.

Water Supply Quantities

Table 5-20 shows the increase in SWP quantities in 2030 and 2070.

TABLE 5-20. SWP SUPPLY INCREASES (2030 AND 2070) (TAF/YEAR)

Period	South-of-the-Delta Supply
2030 Results	
Long-Term Average ^(a)	4.0
Wet	5.7
Above Normal	(1.1)
Below Normal	(17.4)
Dry	30.0
Critical	(1.9)
2070 Results	
Long-Term Average ^(a)	10.0
Wet	(1.2)
Above Normal	30.2
Below Normal	19.4
Dry	14.0
Critical	(1.0)

Source: CALSIM II (2021)

Note: (a) Average weighted based on water-year frequency rates

SWP = State Water Project

TAF = thousand acre-feet

Estimated Benefit Value

Table 5-21 shows Sites Reservoir’s SWP supply benefits. The South-of-the-Delta supply benefits are based on adjusted WSIP Unit Water Values. No conveyance energy cost was applied in the benefit estimation. Accordingly, the Project’s annual O&M expense estimate similarly does not include any conveyance energy expenses for these supply quantities.

TABLE 5-21. SWP SUPPLY BENEFITS (\$1,000s)

Purpose	Annual Benefits ^(a)		Total Benefit – Present Value ^(b)	Total Benefit – Present Value ^(b)
	2030	2070		
	(2015\$)			(2021\$)
SWP – SOD	\$1,047	\$5,597	\$102,391	\$116,272

Notes:

(a) Based on WSIP Unit Water Values by water-year type.

(b) Present value based on annual benefits between 2030 and 2122 for 2030 using a 3.5 percent discount rate.

SOD = South of Delta

SWP = State Water Project

WSIP = Water Storage Investment Program

Annual expected benefit values are estimated for each year during the 93-year operating period using interpolated supply quantities by specific water year type for years 2031 to 2069. These values were similarly interpolated for the 2031 to 2044 period, after which 2045 values are used.

The Project’s SWP supply benefits were estimated to increase from approximately \$1.0 million in 2030 to nearly \$5.6 million in 2070. The corresponding present value benefit for the future 2030 to 2122 operating period was estimated to be \$102 million in 2015 dollars. This is equal to over \$116 million in 2021 dollars.

5.3.7 Water Quality

Sites Reservoir would improve the quality of urban water supplies for participants who import water from both the SWP and the Colorado River. Water quality in urban service areas would be improved by changes in both the volume and relative quality of Delta-supplied water that is superior in quality to water supply from the Colorado River. Salinity and disinfection byproduct precursors (DBPPs) are among the most economically important constituents, but nutrients, pathogens and a range of other pollutants are also present in lower concentrations than Colorado River supply. Only changes in salinity are evaluated in this analysis.

As discussed in Section 5.2.4, The Lower Colorado River Basin Water Quality Model (LCRBWQM) estimates the benefits of salinity reduction in terms of avoided costs and damages from water quality improvements for water users within the Metropolitan Water District of Southern California (MWD) service area. The estimated water quality benefits represent the expected avoided cost savings for residential, commercial, and industrial water users as result of future use of higher quality water supplies from Site Reservoir compared with MWD reliance on Colorado River water imports with higher salinity levels.

Estimated Benefit Value

Table 5-22 shows Sites Reservoir’s water quality benefits for the South-of-the-Delta M&I deliveries based on the LCRBWQ modeling results for Metropolitan, Coachella and Desert Valley Water Districts. These benefits are based on the mid-point of the water quality benefits estimated by the LCRBWQM

modeling which ranged between \$2.4 million and \$10.1 million (in 2015 dollars) for 2030. The low-end water quality results assumed that the Sites Reservoir deliveries would not substitute for any Colorado River imported water deliveries. The high-end benefit valuation assumes that the Sites Reservoir would fully substitute for a corresponding quantity of Colorado water imports.

TABLE 5-22. WATER QUALITY BENEFITS (\$1,000s)

Purpose	Annual Benefits ^(a)		Total Benefit – Present Value ^(b)	Total Benefit – Present Value ^(b)
	2030	2070		
	(2015\$)			(2021\$)
M&I Water Quality	\$6,239	\$6,353	\$181,485	\$206,090

Notes:

(a) Based on LCRBWQM analysis.

(b) Present value based on annual benefits between 2030 and 2122 for 2030 using a 3.5 percent discount rate.

LCRBWQM = Lower Colorado River Water Quality Model

M&I = municipal and industrial

Annual expected benefit values are estimated for each year during the 93-year operating period using interpolated supply quantities by specific water year type for years 2031 to 2069. These values were similarly interpolated for the 2031 to 2044 period, after which 2045 values are used.

The Project's water quality benefits for SOD M&I use were estimated to total \$6.2 million in 2030 and remain at a relatively constant unit basis and result in \$6.3 million in 2070. The corresponding present value of the water quality benefits for the future 2030 to 2122 operating period was estimated to be over \$181 million in 2015 dollars. This is equal to approximately \$200 million in 2021 dollars.

Note that use of the Metropolitan-determined water supply benefits requires adjustment of the water quality benefits shown in Table 5-22 to avoid double counting the project's water quality benefits. Coachella and Desert Valley Water Districts' water deliveries account for approximately 31.7 percent of the water quality benefits estimated above. As a result, the corresponding present value benefit for their water quality benefits over the future 2030 to 2122 operating period was estimated to be over \$57.5 million in 2015 dollars. This is equal to approximately \$65.3 million in 2021 dollars.

5.3.8 Summary Findings

The WSIP Technical Report guidelines require that each benefit category reports the present value of its expected net monetized benefits over the planning horizon in 2015 dollars; and that these be discounted to the start of Project operations using the required 3.5 percent discount rate. Net monetized benefits are benefits minus any impacts caused by the proposed Project or other costs (other than Project costs) that are required to realize the benefit.

Table 5-23 shows Sites Reservoir’s estimated benefits on a net present basis for the 93-year operating period. As discussed above, the net present value (NPV) of the Project’s future benefits using the WSIP-required 3.5 percent discount rate. The BCA model spreadsheet provides the complete benefit estimates on a yearly basis over the full study period.

TABLE 5-23. BENEFITS SUMMARY – NET PRESENT VALUE (\$MILLIONS)

Beneficiary	Benefit Value (2015\$)	Benefit Value (2021\$)
WSIP Public Benefits	\$841.3	\$955.3
Ecosystem improvement	\$591.3	\$671.4
Incremental Level 4 Refuge	\$286.6	\$325.5
Yolo Bypass	\$304.6	\$345.9
Recreation	\$197.2	\$231.6
Flood Reduction	\$44.6	\$52.3
Non-Proposition 1 Eligible Benefits	\$4,066.5	\$4,617.9
Water Supply	\$4,047.8	\$4,596.6
JPA	\$3,575.0	\$4,059.7
CVP Operational Flexibility	\$312.9	\$355.3
SWP Deliveries	\$102.4	\$116.3
Water Quality	\$57.5	\$65.2
Residual Value (2123) ^(a)	\$18.7	\$21.3
Total Benefits	\$4,907.8	\$5,573.2

Note:

(a) The project's residual value in 2123 is recognized as a benefit for the BCA per WSIP guidance.

CVP = Central Valley Project

JPA = Joint Powers Authority

SWP = State Water Project

WSIP = Water Storage Investment Program

Overall, Sites Reservoir is estimated to result in total benefits with a present value of \$5,573.2 million (in 2021 dollars). The project's WSIP environmental benefits are estimated to have a present value of \$671.4 million, which is equivalent to 70.3 percent of the Project's \$955.3 million in total WSIP public benefits (in 2021 dollars).

5.4 Costs

5.4.1 Construction Cost

Construction costs for the project are summarized in Table 5-24. Cost estimate details are provided in Appendices C.1 and C.2. Mitigation costs are summarized in Appendix C.3.

Table 5-25 shows the planned future construction expenditure on an annual rate, and corresponding interest incurred during construction, based on a 3.5 percent discount rate. The total construction cost for the Project is estimated to be \$3,934.2 million. Mitigation costs are estimated to account for \$579 million of this cost. After exclusion of this expense and the non-structural components of the electrical and mechanical facilities, the Project's total structural cost is estimated to total \$3,031 million. Additional Project cost information is available in Appendix C.1.

TABLE 5-24. SUMMARY OF CONSTRUCTION COSTS

Facility	Total Project Cost (2019)	Total Project Cost (2021)
Develop Sites Reservoir, including Sites Lodoga Road, Clearing and Demolition	\$220,600,000	\$227,400,000
Other Roads (Project and Recreation)	\$68,800,000	\$70,900,000
South Road to Residents	\$44,200,000	\$45,500,000
Sites Lodoga Road Bridge	\$167,600,000	\$172,700,000
North Construction Access Road	\$28,400,000	\$29,300,000
Construct Sites Dam and Golden Gate Dam	\$1,025,200,000	\$1,056,800,000
Construct Saddle Dams	\$470,300,000	\$484,800,000
Construct TRR	\$205,600,000	\$212,000,000
Funks Reservoir Dredging/Structures	\$38,900,000	\$40,000,000
Hunters Creek Release Structures	-	-
Construct I/O Structure and Tunnels for Reservoir	\$255,700,000	\$263,600,000
Construct TRR Pumping/Generating Plant	\$109,400,000	\$112,700,000
Construct Funks Pumping/Generating Plant	\$111,000,000	\$114,400,000
Construct Funks Release Channel	-	-
Red Bluff Pump Addition	\$4,700,000	\$4,900,000
Construct TRR Pipeline	\$220,100,000	\$226,900,000
Construction Dunnigan Pipeline to CBD (1,000 cfs)	\$93,800,000	\$96,700,000
Release Structure	-	-
Transmission Lines, Substations, Switchyards	\$151,900,000	\$156,600,000
General Property, including Recreation Areas and OM&R Facilities	\$32,000,000	\$33,000,000
Mitigation	\$562,500,000	\$579,400,000
GCID Improvements	\$6,400,000	\$6,600,000
Total	\$3,817,100,000	\$3,934,200,000

Notes:

CDB = Colusa Basin Drain
 cfs = cubic feet per second
 GCID = Glenn-Colusa Irrigation District
 I/O = inlet/outlet
 OM&R = operation, maintenance, and replacement
 TRR = Terminal Regulating Reservoir

TABLE 5-25. INTEREST DURING CONSTRUCTION – WSIP IDC SCENARIO (3.5% DISCOUNT RATE)

Year	%	Construction Expenditure	Interest-Bearing Amount	Interest During Construction (3.5%)
2023	6.0%	\$234.6	\$117.3	\$4.1
2024	9.4%	\$371.3	\$424.4	\$14.9
2025	18.5%	\$726.9	\$988.4	\$34.6
2026	24.4%	\$959.6	\$1,866.2	\$65.3
2027	23.6%	\$929.4	\$2,876.0	\$100.7
2028	14.3%	\$561.7	\$3,722.3	\$130.3
2029	3.8%	\$150.6	\$4,208.7	\$147.3
TOTAL	100%	\$3,934.2	\$4,431.3	\$497.1

Notes:

IDC = Interest During Construction

WSIP = Water Storage Investment Program

5.4.2 Interest During Construction

Two sets of capital costs scenarios are shown, and each is used to derive its corresponding BCA results:

- WSIP IDC Scenario:** The interest during construction (IDC) cost for the Project's 7-year construction schedule is based on a 3.5 percent discount (real interest) rate as recommended in the WSIP Technical Guidance that is applied to all construction expenditures. Table 5-24 above shows the planned future construction expenditure and corresponding interest during construction incurred based on a 3.5 percent discount rate.
- JPA Recommended IDC Scenario:** The IDC cost for the Project's 7-year construction schedule is based on the Project's received or anticipated capital borrowing terms instead of the Commission-specified higher 3.5 percent real interest rate. This results in reduced IDC for project development.

Table 5-26 shows the anticipated funding sources, interest rates, and funding amounts anticipated by the Project's fundraising efforts and financial analysis to date.

TABLE 5-26. ANTICIPATED PROJECT FUNDING SOURCES AND IDC

Funding Source	Interest Rate (Nominal)	Interest Rate (Real)	Funding Amount (\$Millions)
Revenue Bonds	5.0%	2.9%	\$2,115
USDA Loan	3.9%	1.8%	\$440
WIFIA Loan	3.5%	1.4%	\$600
WIIN Act Funding		2.9%	\$303
WSIP Funding		2.9%	\$837
TOTAL		2.6%	\$4,295

Source: Montague De Rose and Associates 2021

IDC = Interest During Construction

USDA = U.S. Department of Agriculture

WIFIA = Water Infrastructure Finance and Innovation Act

WSIP = Water Storage Investment Program

The Project has secured \$439.6 million in USDA loan funding at a 3.9 percent nominal interest rate. Based on a Project future average annual Gross Domestic Product deflator rate of 2.1 percent, the real interest rate for that U.S. Department of Agriculture (USDA) loan is estimated to be 1.4 percent, and 2.1 percentage points below the comparable interest rate specified in the WSIP guidance. Table 5-26 also assumes that the majority of Project funding would be obtained using Revenue Bond financing at a 2.9 percent real interest rate.

Based on the capital funding assumptions shown in Table 5-26, the average interest rate for the Project would be 2.6 percent, and the Project's future IDC cost would be \$360.4 million (see Table 5-27). This represents a \$136.7 million cost savings when compared to the \$497.1 million IDC cost under the WSIP IDC scenario. As a result, the JPA Recommended IDC scenario provides both a more realistic and lower representation of the Project's actual future interest during construction.

TABLE 5-27. INTEREST DURING CONSTRUCTION – JPA RECOMMENDED IDC SCENARIO (2.6% INTEREST RATE)

Year	%	Construction Expenditure	Interest-Bearing Amount	Interest During Construction (2.6%)
2023	6.0%	\$234.6	\$117.3	\$3.0
2024	9.4%	\$371.3	\$423.3	\$10.9
2025	18.5%	\$726.9	\$983.3	\$25.3
2026	24.4%	\$959.6	\$1,851.9	\$47.7
2027	23.6%	\$929.4	\$2,844.1	\$73.2
2028	14.3%	\$561.7	\$3,662.9	\$94.3
2029	3.8%	\$150.6	\$4,113.4	\$105.9
TOTAL	100%	\$3,934.2	\$4,268.9	\$360.4

Notes:

IDC = Interest During Construction

JPA = Joint Powers Authority

Note that the JPA Recommended IDC Scenario **does not** incorporate the additional IDC reduction if future WSIP and/or federal funding is obtained. Because future WSIP and federal funding would be disbursed as construction expenses are incurred, the Project would incur a lower amount of capital debt over its 7-year construction period, which would significantly decrease in its actual future IDC expenses. If the Project receives the \$837 million WSIP funding, its future IDC expense would be expected to total \$272.8 million, which would be more than \$224 million less than the IDC cost projected under the WSIP IDC scenario.

5.4.3 Operation, Maintenance, and Replacement (OM&R)

The future O&M costs for the Project consist of the operations necessary to support the reservoir operations. These include the pumping cost for filling the Reservoir and is net of the hydropower revenues gained from water releases. Wheeling costs for the water imported to fill the Reservoir are also included in the project's annual OM&R costs at an average \$22 per AF. Other OM&R costs include management and maintenance staffing. OM&R costs are summarized in Appendices C.2a and C.2b

In addition, the Project's expected annual inspections and periodic major repair and replacement expenses were similarly projected over the study period. The repair and replacement schedule is based on a 20-year cycle for mechanical, 40-year cycle for electrical equipment, and 60-year cycle for

transmission lines. Based on its expected 100-year useful life, no repair and replacement expense is included for the Project's structural facilities.

The Project's expected future OM&R expenses are projected annually for each year of the study period. The individual years were then discounted and aggregated to determine their total net present value. The total lifecycle cost of the Project's OM&R expenditures is estimated to have a net present value of \$502 million.

5.4.4 Conveyance Energy Costs

The future power costs for delivery of the Project's 2030 and 2070 water supply quantities to their end-user locations were estimated using the LTGEN power model. The conveyance costs were estimated separately for each Project purpose receiving Project deliveries (see Table 5-2). The power analysis determined that the conveyance energy costs for Sites Reservoir's North-of-the-Delta deliveries are negligible. The analysis estimated that the conveyance cost for the Project's water supply deliveries is \$15.3 million per year in 2030 and would increase to \$16.4 million in 2070. Over the 93-year operating period, the total conveyance energy cost for the Project is estimated to have a net present value of \$450.4 million (in 2021 dollars).

Table 5-2 shows the estimated conveyance costs per AF for each recipient group located South-of-the-Delta based on their modeled total conveyance energy costs and average annual delivery quantities. Due to the uncertainty of the specific recipients of the CVP incidental and SWP increased supplies, power analysis was not performed for those recipient-groups.

End uses are in the northern area of the Central Valley for the South-of-the-Delta Refuges and for CVP Operational Flexibility purposes. The higher conveyance costs for the JPA deliveries reflect the greater distance those supplies travel to their end uses, which are in the southern region of the Central Valley. These conveyance energy unit cost estimates are also incorporated into the benefit valuation determination (Section 5.2).

5.4.5 Residual Value

The residual value for the reservoir facility with the remaining years of useful life is based on straight line depreciation of its estimated structure construction cost (i.e., excluding mitigation, electrical and mechanical components) and the 93-year operating period. Based on its estimated total construction cost of \$3,031 million, the 2123 residual value of the Project's structural facilities are estimated to have a nominal value of \$242.5 million, with a net present value of \$10.6 million.

The residual value of the Project's repair and replacement expenditures were also estimated based on their specific implementation schedule and remaining useful life at the end of the analysis period (on December 31, 2122). The 2123 residual value of the facilities' repair and replacement expenditures are estimated to have a nominal value of \$244.2 million and a net present value of \$10.7 million. As a result, the Project's total projected residual value in 2023 is estimated to have a nominal value of \$486.7 million, with a net present value of \$21.3 million.

5.4.6 Cost Summary

Table 5-28 shows Sites Reservoir's estimated capital cost on net present basis for the 100-year study period using the WSIP-required 3.5 percent discount rate. The total Project cost is shown using both IDC funding scenarios (i.e., the WSIP Technical Guidance's 3.5 percent interest rate and the JPA's projected lower 2.6 percent average interest rate assumptions).

TABLE 5-28. COST SUMMARY – NET PRESENT VALUE (\$MILLIONS, 2021\$)

Expense	Cost – NPV (2021\$)	
	IDC – WSIP TG (@ 3.5%)	IDC – JPA (@ 2.6%)
Capital Cost	\$4,431	\$4,295
Construction (Including Env. Mitigation)	\$3,934	\$3,934
Interest During Construction	\$497	\$360
OM&R	\$502	\$502
Conveyance	\$450	\$450
Total Cost	\$5,384	\$5,247

Notes:

IDC = Interest During Construction

JPA = Joint Powers Authority

NVP = net present value

OM&R = operation, maintenance, and replacement

WSIP TG = Water Storage Investment Program Technical Guidance

The total capital cost of Sites Reservoir is estimated to have an NPV of \$4,431 million using the WSIP IDC Scenario. The Project's total capital cost would decrease to \$4,295 million under the JPA recommended IDC scenario.

When the Project's expected future OM&R and Conveyance expenses over the future 93-year operating period are added, the Project's total future lifecycle cost is estimated to have an NPV of \$5,247 million (under the WSIP IDC scenario).

5.5 Findings

5.5.1 Benefit Cost Analysis Results

The updated BCA determined that the Project would result in total net benefits with a NPV of \$190 million (in 2021 dollars) using the WSIP IDC Scenario (see Table 5-29). Under the JPA-recommended IDC scenario the Project's total net benefits would increase to \$326 million (in 2021 dollars).

TABLE 5-29. BENEFIT-COST ANALYSIS RESULTS (\$MILLIONS; 2021\$)

Results	Project w/ IDC – WSIP TG	Project w/ IDC – JPA
Total Benefits – NPV ^(a)	\$5,573	\$5,573
Total Cost – NPV	\$5,384	\$5,247
Net Benefits – NPV	\$190	\$326
Benefit Cost Ratio	1.04	1.06

Note:

(a) Includes the project's Residual Value (2123).

IDC = Interest During Construction

JPA = Joint Powers Authority

NVP = Net present value

WSIP TG = Water Storage Investment Program Technical Guidance

If it receives its conditionally approved \$836.8 million in WSIP funding, **the Sites Reservoir project would have an overall B/C ratio of 1.04** (based on the WSIP specified IDC expenses). The Project's overall B/C ratio increases to 1.06 if the JPA-recommended IDC scenario's more realistic borrowing interest rates are instead applied.

Considering only the state accounting perspective, the portion of costs paid by the federal government is not a state cost. The Economic Feasibility analysis assigned 100% of costs allocated to CVP operational flexibility to federal funding. As discussed below in Section 6.4.1, this share corresponds to 6.9% of the total construction cost and 4.1% of the total OM&R cost.

Reducing the federal cost share by 13 percent to account for the share of federal funds paid by Californians, the remaining federal contribution of \$263.9 million (capital) and \$33.8 million for future OM&R can be deducted from the total project cost to represent the state accounting perspective. With these assumptions the BCR of the project from the State perspective is 1.10. This BCR is relevant only if the project obtains federal funding as assumed by the feasibility analysis.

5.5.2 Public Benefit Ratio

Table 5-30 shows the economic analysis's finding specific to the WSIP program requirements and evaluation criteria. The updated BCA determined that the Project would result in total WSIP-eligible public benefits with a net present value of \$841.3 million (in 2015 dollars) over its 93-year operating period. The equivalent value of these public benefits is \$955.3 million in 2021 dollars terms.

TABLE 5-30. PUBLIC BENEFIT RATIO RESULTS (\$MILLIONS)

Results	2015 Dollars	2021 Dollars
Total Public Benefits (NPV)	\$841	\$955
Total Ecosystem Improvement Benefits (NPV)	\$591	\$671
Ecosystem Improvement as % of Public Benefit	70.3%	70.3%
WSIP Conditionally Approved Funding (2021 Dollars)	\$837	\$837
PBR	1.01	1.14

Notes:

NPV = net present value

PBR = public benefit ratio

WSIP = Water Storage Investment Program

Table 5-27 also shows that **the Sites Reservoir Project would have a PBR of 1.14** (based on its estimated WSIP benefits in 2021 dollars) if it receives the full amount of its conditionally approved \$836.8 million WSIP funding. Using the Project's estimated WSIP benefits in 2015 dollars, the Sites Reservoir Project would have a PBR of 1.01.

Ecosystem improvements account for 70.3 percent of the Project public benefits, which far exceeds the 50 percent WSIP funding requirement. These values indicate that WSIP funding for the Project would be an economically feasible and cost-effective investment.

5.6 Unmonetized Benefits

In addition to the benefits that have been monetized for the evaluation of economic feasibility, the Sites Project is expected to provide significant additional benefits that are difficult to monetize at this time. These benefits are described in this section.

- **Sustainability of Groundwater Supplies** – The project would provide a more reliable surface water supply for agricultural use, lowering dependency on groundwater pumping for crop irrigation in the Sacramento Valley and the San Joaquin Valley for Storage Partners (see Table 5-8). Surface water use could increase deep percolation that would subsequently increase groundwater storage and improve groundwater quality because surface water has been shown to have better water quality than groundwater, especially in the San Joaquin Valley. This increase in groundwater storage could also reduce land subsidence and disconnections from surface water. The increased surface water use for agriculture would also decrease dependency on micro-irrigation systems, which rely on groundwater pumping and have been shown to result in little to no groundwater recharge and a buildup of salt in the upper layers of the soil profile, both due to lack of deep percolation (Fahey 2012).

Some Sites Authority participants and CVP contractors have invested in recharge facilities that can take imported water from the CVP and SWP. These facilities allow agencies to receive additional water supplies in wet and above normal years and recharge their local aquifers. Colusa County is also investing in water supply with the future intent of using a portion of these supplies to address areas where the aquifer is being depleted. The details of how the specific participants will use water from Sites for direct or in lieu recharge are still under development but are expected to be incorporated into forthcoming sustainable groundwater management plans if this project is approved.

- **Water Supplies During Drought Emergencies** - The Water Storage Investment Program recognizes M&I water supplies during declared drought emergencies as a public benefit which includes water for human health and safety during declared emergencies (Water Code Section 79753(a)(4)). The WSIP TR provides that benefits for M&I water supplies during drought emergencies. Drought emergency events can be recognized for a critical year that is the third or later year in an extended drought (see TR Section 4.11.2.3).

Sites Reservoir would deliver over 190 TAF of M&I supplies to SOD participants during future declared drought emergency events when their other sources of supply are severely reduced or unavailable. The provision of these supplies during drought emergency will have a major benefits for health and human safety and as such could be recognized as eligible for WSIP funding based at a minimum on their TR unit valuation. Recognition of the project's drought emergency benefits of Sites Reservoir's M&I deliveries would greatly increase the public benefits attributed to the project and thereby improve its public benefit ratio estimated in Section 5.5.2.

- **Benefits to Ecosystems and Agriculture during Extended Drought Conditions** – The Water Storage Investment Program does not attribute any drought emergency supply benefits for non-M&I deliveries during such periods of severe water shortage conditions. Nonetheless, it is likely that a similar severe shortage reduction benefits above and beyond the current benefit determined for could be applied to water supplies to ecosystems and agricultural supplies. The TR critical year unit values are suitable for the average of all critical years. Drought emergency events are not the same as an average critical year; 2014 and 2015 were the third and fourth year of a drought were among the driest on record. The commission has recognized data referenced in the TR for that period to establish the value of water for M&I drought emergency benefit determinations. Water transactions data from a study referenced and used by the TR reported average south-of-Delta prices of \$582 per AF in 2014 and \$683 per AF 2015, for an average of \$632.50 per AF (Scheer 2016). This unit value has been used to estimate net additional M&I drought emergency benefits for 2030 through 2045 conditions. Arguably this water supply benefit value adjustment could be similarly applicable for other non-M&I water uses. Note that 2021 has been one of the driest years on record and recently

observed water transfers provides evidence of large volumes of water transactions at prices substantially higher than even those \$2015 values documented by Scheer.

- Operational Flexibility for the SWP and CVP Systems - The addition of the Sites Project would provide increased operational flexibility for the SWP and CVP that would support both public and non-public benefits. It is difficult to find a suitable metric for this benefit given the wide variety of short-term operational adjustments that could be made in response to immediate water needs; nevertheless this is a real benefit. This flexibility is beneficial to the Sacramento River watershed, the Delta, and all beneficiaries served by the SWP and CVP. This is consistent with the Natural Resources Agency, California Water Action Plan (2016) which states:

“Today, water storage is also needed to help provide widespread public and environmental benefits, such as seasonal fish flows, improved water quality, water cool enough to sustain salmon, and increased flexibility to meet multiple demands, especially in increasingly dry years. The financing of additional water storage in California must reflect not just specific local benefits, but also these broader public benefits.”

- Recreation Benefits to Nearby Reservoirs - The addition of Sites Reservoir would improve water surface elevations in existing reservoirs, including Lake Oroville, Shasta Lake and Folsom Lake. All of these reservoirs are popular for recreation that is dependent on maintaining an adequate surface water elevation. This benefit was not monetized.
- Emergency Water Supply – Sites Reservoir will provide an additional source for water for firefighting activities in the vicinity of the reservoir or emergency Delta response actions. The frequency of these occurrences is not well understood at this time and no benefits have been monetized for this purpose.
- Preservation of Working Farmlands - Many of the storage partners are irrigation districts that provide water to existing agricultural lands, including acres that are Important farmland in Glenn, Colusa, and Yolo Counties, as well as south-of-Delta. As indicated in the description of Sites Reservoir operation, the storage partners would primarily receive water May to November (i.e., irrigation season), particularly in Dry and Critically Dry Water Years. Increased water supply reliability would allow some land classified as Important Farmland to remain in production during times it may have otherwise been fallowed or taken out of production for longer periods because of lack of water. This would apply to prime farmland, unique farmland, or farmland of Statewide importance and land under Williamson Act contract.

6. Financial Feasibility

This section describes the analytical approaches, data, and calculations used to update the prior financial analysis performed for the Project's WSIP application in accordance with the right-sized Project design and planned operations. The section reports the findings of the cost allocation analysis performed to determine the Project's financial feasibility in accordance with the WSIP program guidance and requirements.

6.1 Background

The financial feasibility analysis is fundamentally based on the results of the economic feasibility analysis (Section 5) and shares the same background context as that reported in Section 5.1.

6.2 Financial Feasibility Approach

The 2021 financial feasibility analysis update applies the same analytical methods used for the prior WSIP cost allocation analysis. Consequently, the prior Separable Cost-Remaining Benefits methodological explanations provided in the WSIP application and appeal (Authority, WSIP Application for Sites Reservoir, 2017) are incorporated by reference.

The following sections briefly identify the input data and other factor changes applied for cost allocation and cost assignment updates.

6.2.1 Project Purposes

As discussed in the economic feasibility analysis (Section 5), during the interim period since the May 2018 approval of its WSIP application, the Project has right-sized its facilities and proposed operations. The right-sized Project also has eliminated the pumped storage hydropower generation facilities, although the Project will generate power on release. The resulting Project is smaller, less expensive, has fewer environmental impacts, is easier to permit, is easier to construct, and will be less expensive to operate. As a result, pumped storage hydropower production is no longer a Project purpose, and the Project's energy revenues generated from its water releases are included within the O&M expenses as a joint revenue.

As a result of the Project right-sizing and operational changes, the Project's non-WSIP funded purposes have been updated since the original WSIP application. More specifically, Reclamation identified a federal interest in CVP operational flexibility and benefits to anadromous fish by improving CVP operations consistent with the laws, regulations, and requirements in effect at the time of operation. In addition, the economic benefits of the Project's incidental supply increases for the CVP and SWP are included in both the economic and financial feasibility analyses.

6.2.2 Updated Data and Analysis Assumptions

The cost allocation and cost assignments for the Project are based on the Project's expected construction, interest during construction, and lifecycle OM&R costs identified in Section 5.4.6 under the WSIP IDC Scenario. These Project costs and their annualized values (based on a 3.5 percent discount rate) are shown in Table 6-1. The net present, annualized, and IDC values estimated for the project are conservative comparative to those that are used for federal feasibility analysis which apply a lower

discount rate in accordance with Office of Management and Budget which currently requires use of a 2.25 discount rate (OMB 2021). Use of a lower discount rate both reduces the estimated IDC cost attributed for project development and increases the net present value of the benefits resulting from future project operations. Both factors will improve the project's economic feasibility.

TABLE 6-1. COST SUMMARY – NET PRESENT VALUE AND ANNUALIZED VALUES (\$MILLIONS)

Expense	Costs (2021\$) – WSIP TG	
	<i>Present Value</i>	<i>Annualized (3.5%) \$/yr</i>
Development Cost	\$4,431	\$156.2
Construction (Including Env. Mitigation)	\$3,934	\$138.7
Interest During Construction	\$497	\$17.5
OM&R	\$502	\$17.7
Conveyance	\$450	\$15.9
Residual Value (2123)	(\$21)	(a)
Total Cost	\$5,363	\$189.8

Note:

(a) The Project's residual value in 2123 is recognized as a cost savings for the annualization and cost allocation.

OM&R = operation, maintenance, and replacement

WSIP TG = Water Storage Investment Program Technical Guidance

The total development cost of Sites Reservoir is estimated to have an annualized cost of \$156.2 million/year under the WSIP IDC Scenario. When the Project's expected future OM&R and Conveyance expenses over the future 93-year operating period are added, the Project's total future lifecycle cost is estimated to have a \$189.8 million/year annualized cost (under the WSIP IDC scenario).

Under the JPA recommended IDC scenario (which more accurately represents the Project's actual future capital borrowing expenses), the Project's interest during construction cost would decrease to \$335 million present value. This would correspond to a lower annualized cost of \$11.8 million/year compared to a \$17.5 million/year IDC cost under the WSIP IDC scenario. Furthermore, if the Project receives the \$836 million WSIP funding, its future IDC expense would be further reduced to a \$248 million present value cost. In that case, the interest during construction cost actually incurred by the Project would correspond to a \$8.7 million/year annualized cost.

Table 6-2 shows Sites Reservoir’s estimated benefits on a net present basis for the 93-year operating period using the WSIP-required 3.5 percent discount rate.

Overall, Sites Reservoir is estimated to result in \$5,552 million (in 2021 dollars) in total annual benefits. The Project’s WSIP public ecosystem improvement benefits are expected to total \$671.4 million, which is equivalent to 70.3 percent of the Project’s \$955.3 million in total WSIP public benefits (in 2021 dollars).

TABLE 6-2. BENEFITS SUMMARY – NET PRESENT AND ANNUALIZED VALUE (\$MILLIONS)

Beneficiary	Benefits (2021\$)	
	<i>Present Value</i>	<i>Annualized (3.5%) \$/yr</i>
WSIP Public Benefits	\$955.3	\$33.7
Ecosystem improvement	\$671.4	\$23.7
Incremental Level 4 Refuge	\$325.5	\$11.5
Yolo Bypass	\$345.9	\$12.2
Recreation	\$231.6	\$8.2
Flood Reduction	\$52.3	\$1.8
Non-Proposition 1 Eligible Benefits	\$4,596.6	\$162.0
JPA	\$4,059.7	\$143.1
CVP Operational Flexibility	\$355.3	\$12.5
SWP Deliveries	\$116.3	\$4.1
Water Quality	\$65.2	\$2.3
Residual Value (2123)	(a)	(a)
Total Benefits	\$5,551.9	\$195.7

Notes:

(a) The project's residual value in 2123 is recognized as a capital cost reduction for the purposes of the cost allocation.

CVP = Central Valley Project

JPA = Joint Powers Authority

SWP = State Water Project

WSIP = Water Storage Investment Program

yr = year

6.3 Cost Allocation

Table 6-3 shows the estimated annualized total costs allocated to each Project purpose. The cost allocation also shows the Project's construction, IDC, and OM&R costs for each Project purpose. Table 6-3 also shows the corresponding nominal amount of each purpose's portion of the Project's \$4,410 million development cost (net of the Project's 2123 Residual Value).

6.3.1 Maximum Justifiable Expense

Due its large quantity of annual water deliveries, a single purpose cost for Sites Reservoir was determined for the JPA supply purpose. The single purpose cost is based on the estimate used for USBR's cost allocation (Reclamation 2020). The annualized single purpose cost for the JPA supply purpose is estimated to total \$168.1 million (in 2021 dollars). This cost includes \$136.6 million in annualized capital costs and \$31.5 million is estimated OM&R costs per year.

Consistent with the approach used in the prior WSIP cost allocation analysis, the single purpose cost for the other smaller water supply purposes were set to their benefit valuation obtained using the WSIP unit values, because those values are considered to best represent the market cost for alternatively obtaining those supplies through purchased water transfers. As discussed in Section 5, the updated economic analysis has used the WSIP unit value approach for its benefit valuation for all the Project's water supply purposes except for the M&I benefits for Metropolitan and Zone 7 water supplies. Consequently, the maximum justifiable expense for the Project's non-JPA water supply purposes is equal to its estimated benefits.

TABLE 6-3. COST ALLOCATION SUMMARY: (ANNUALIZED VALUES: 2021\$; \$MILLIONS)

Category	Non-WSIP Eligible Benefits			WSIP Public Benefits				Total
	CVP Operational Flexibility	SWP	JPA	Level 4 Refuge	Yolo Bypass	Flood Reduction	Recreation	
Allocated Total Cost								
Total Project Costs								\$189.0
Benefits by Purpose	\$12.5	\$4.1	\$145.4	\$11.5	\$12.2	\$1.8	\$8.2	\$195.7
Single Purpose Cost	\$12.5	\$4.1	\$168.1	\$11.5	\$12.2	\$3.2	\$152.7	-
Justifiable Expenditures	\$12.5	\$4.1	\$145.4	\$11.5	\$12.2	\$1.8	\$8.2	\$195.7
Separable Costs	\$0.2	\$0.0	\$15.6	\$0.1	\$0.0	\$0.0	\$1.5	\$17.4
Remaining Benefits (Justifiable Expenditures Less Separable Costs)	\$12.4	\$4.1	\$129.8	\$11.4	\$12.2	\$1.8	\$6.7	\$178.3
Percent (Distribution of Remaining Benefits)	6.9%	2.3%	72.8%	6.4%	6.8%	1.0%	3.7%	100%
Allocated Joint Costs	\$11.9	\$3.9	\$124.9	\$10.9	\$11.7	\$1.8	\$6.4	\$171.6
Total Allocated Costs (Separable Plus Allocated Joint Costs)	\$12.1	\$3.9	\$140.6	\$11.0	\$11.7	\$1.8	\$7.9	\$189.0
Allocated OM&R Annual Costs								
Separable OM&R Cost	\$0.2	\$0.0	\$15.6	\$0.1	\$0	\$0	\$0.2	\$16.1
Percent (Distribution of Remaining Benefits)	6.9%	2.3%	72.8%	6.4%	6.8%	1.0%	3.7%	100%
Allocated Joint OM&R Cost	\$1.2	\$0.4	\$12.7	\$1.1	\$1.2	\$0.2	\$0.7	\$17.5
Total Allocated OM&R Cost	\$1.4	\$0.4	\$28.4	\$1.2	\$1.2	\$0.2	\$0.9	\$33.6
Allocated Capital Costs (Annualized)								
Separable Capital Cost	\$0	\$0	\$0	\$0	\$0	\$0	\$1.3	\$1.3
Percent (Distribution of Remaining Benefits)	6.9%	2.3%	72.8%	6.4%	6.8%	1.0%	3.7%	100%
Allocated Capital Cost	\$10.7	\$3.5	\$112.2	\$9.8	\$10.5	\$1.6	\$5.8	\$154.2
Total Allocated Annual Capital Cost	\$10.7	\$3.5	\$112.2	\$9.8	\$10.5	\$1.6	\$7.1	\$155.5
Allocated Construction Costs (Annualized)								
Separable Construction	\$0	\$0	\$0	\$0	\$0	\$0	\$1.2	\$1.2
Percent (Distribution of Remaining Benefits)	6.9%	2.3%	72.8%	6.4%	6.8%	1.0%	3.7%	100%

Category	Non-WSIP Eligible Benefits			WSIP Public Benefits				Total
	CVP Operational Flexibility	SWP	JPA	Level 4 Refuge	Yolo Bypass	Flood Reduction	Recreation	
Allocated Construction	\$9.5	\$3.1	\$99.6	\$8.7	\$9.4	\$1.4	\$5.1	\$136.8
Total Allocated Construction Cost	\$9.5	\$3.1	\$99.6	\$8.7	\$9.4	\$1.4	\$6.3	\$137.9
Allocated IDC Costs (Annualized)								
Separable IDC	\$0	\$0	\$0	\$0	\$0.0	\$0	\$0.1	\$0.1
Percent (Distribution of Remaining Benefits)	6.9%	2.3%	72.8%	6.4%	6.8%	1.0%	3.7%	100%
Allocated IDC	\$1.2	\$0.4	\$12.6	\$1.1	\$1.2	\$0.2	\$0.6	\$17.4
Total Allocated IDC	\$1.2	\$0.4	\$12.6	\$1.1	\$1.2	\$0.2	\$0.8	\$17.5
Allocated Capital Costs (Nominal)								
Allocated IDC	\$34	\$11	\$359	\$31	\$34	\$5	\$23	\$497
Construction Cost	\$269	\$89	\$2,824	\$247	\$265	\$40	\$178	\$3,913
Allocated Total Capital Cost	\$303	\$101	\$3,183	\$279	\$299	\$45	\$200	\$4,410

Notes: Values are rounded and may not sum to totals.

CVP = Central Valley Project
 IDC = Interest During Construction
 JPA = Joint Powers Authority
 OM&R = operation, maintenance, and replacement
 SWP = State Water Project
 WSIP = Water Storage Investment Program

6.3.2 Separable Costs

Separable capital costs were identified only for the Reservoir's recreation purpose. The Project's recreation facilities are estimated to have a \$33.0 million construction cost, which corresponds to an average annualized cost of \$1.2 million per year. The Project's recreational operations are projected to have an OM&R annual cost of \$0.2 million per year net of its revenues.

Conveyance energy costs for the Project's South-of-the-Delta deliveries are the other separable costs identified. The total conveyance energy cost is estimated to be \$15.9 million per year. JPA deliveries are estimated to be \$15.6 million per year. Level 4 refuge supplies are expected to incur annual conveyance energy costs of \$0.1 million per year. The annual conveyance cost for CVP Operational Flexibility deliveries is estimated to be \$0.2 million per year.

6.3.3 Results

Table 6-3 provides the cost allocation for the Project's annualized total cost of \$189.0 million (i.e., the annualized value of both the Project's \$4,410 million total capital cost and its average future OM&R expenses over its 93-year period of operations

The JPA water supply is allocated 74.4 percent of the Project total cost (\$140.6 million per year). The WSIP-eligible Yolo Bypass supply purpose has the next largest individual cost share of 6.2 percent (\$11.0 million per year). Combined with the other public purposes (Refuge, Flood Reduction, and Recreation), the WSIP/state allocated cost share totals 17.1 percent (\$32.5 million per year and includes \$3.5 million in non-WSIP eligible allocated annual OM&R costs). The CVP Operational Flexibility purpose is allocated 6.4 percent of the Project total cost (\$12.1 million per year).

6.4 Cost Assignment

A cost assignment analysis was also performed to determine the expected WSIP, federal and/or non-federal partners total funding requirements.

6.4.1 Total Cost Assignment

Table 6-4 provides the cost assignment for the Project's total cost of \$5,362 million in present value terms. The total Project cost consists of the Project's \$4,410 million capital cost and its future \$952 million OM&R present value.

The total federal cost share for its CVP Operational Flexibility benefits have a present value of \$342 million. The total cost assignment for the WSIP Public Benefits (Refuge, Yolo Bypass, Flood Reduction, and Recreation) has a \$921 million present value. The JPA total cost share is estimated to have a present value of \$3,987 million. The total cost assignment for the Project's SWP benefits have a \$112 million present value.

6.4.2 Capital Cost Assignment

Table 6-5 shows the capital cost assignment for the Project's estimated capital cost of \$4,410 million (present value). The capital cost includes both the Project's cost of construction (\$3,934 million) and estimated interest during construction of \$497 million (based on a 3.5 percent discount rate) with a \$21 million reduction to account for the present value of the Project's residual value in 2123.

TABLE 6-4. TOTAL COST ASSIGNMENT – PRESENT VALUE (2021\$; \$MILLIONS)

Purpose/Action	Total		Total Cost (Capital and OM&R) - Present Value							
			Federal		WSIP/State Public		Other State		Non-Federal Partners	
	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)
Cost Assignment:										
JPA	74.4%	\$3,987							100%	\$3,987
CVP Ops Flex	6.4%	\$342	100%	\$342						
Level 4 Refuge	5.8%	\$313			100%	\$313				
SWP	2.1%	\$112					100%	\$112		
Yolo	6.2%	\$333			100%	\$333				
Flood Damage Reduction	0.9%	\$50			100%	\$50				
Recreation	4.2%	\$224			100%	\$224				
Total	100%	\$5,362	6.4%	\$342	17.2%	\$921	2.1%	\$112	74.4%	\$3,987

Notes: Values are rounded and may not sum to totals.

CVP = Central Valley Project
 JPA = Joint Powers Authority
 OM&R = operation, maintenance, and replacement
 SWP = State Water Project
 WSIP = Water Storage Investment Program
 yr = year

TABLE 6-5. CAPITAL COST ASSIGNMENT – PRESENT VALUE (2021\$; \$MILLIONS)

Purpose/Action	Total		Capital Cost (Construction and IDC) - Present Value							
			Federal		WSIP/State Public		Other State		Non-Federal Partners	
	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)
Cost Assignment:										
JPA	72.2%	\$3,183							100%	\$3,183
CVP Ops Flex	6.9%	\$303	100%	\$303						
Level 4 Refuge	6.3%	\$279			100%	\$279				
SWP	2.3%	\$101					100%	\$101		
Yolo	6.8%	\$299			100%	\$299				
Flood Damage Reduction	1.0%	\$45			100%	\$45				
Recreation	4.5%	\$200			100%	\$200				
Total	100%	\$4,410	6.9%	\$303	18.7%	\$823	2.3%	\$101	72.2%	\$3,183

Notes: Values are rounded and may not sum to totals.

CVP = Central Valley Project
 IDC = Interest During Construction
 JPA = Joint Powers Authority
 OM&R = operation, maintenance, and replacement
 SWP = State Water Project
 WSIP = Water Storage Investment Program
 yr = year

The capital cost assignment for the combined WSIP Public Benefits (Refuge, Yolo Bypass, Flood Reduction, and Recreation) has a total present value of \$823 million. It should be noted that capital costs will continue to escalate through the construction period (WSIP does not include any provisions for future escalation of capital costs). The Federal capital cost assigned for CVP Operational Flexibility has a \$303 million present value. The JPA capital cost assignment has a \$3,183 million present value. The capital cost assignment for the Project's SWP benefits have a \$101 million present value.

6.4.3 OM&R Cost Assignment

Table 6-6 shows the OM&R cost assignment in present value terms for the Project's estimated OM&R cost of \$952 million (present value). The OM&R cost includes both the Project's facility-related OM&R expenses (with a \$502 million present value) and the conveyance costs for its South-of-the-Delta deliveries (with a \$450 million present value).

Table 6-7 shows the OM&R cost assignment in annualized terms for the Project's estimated average OM&R cost of \$33.6 million per year. In both cases, the OM&R costs for each purpose have been assigned entirely to their beneficiary.

This assumption is most relevant for the \$3.5 million annual OM&R cost assigned to the combined State public benefits. WSIP funding cannot be used to pay for these future OM&R costs. As a result, other funding sources would instead have to be used to meet their OM&R obligations. Collected fees from recreation users could be applied to meet the recreation purposes OM&R. However, other funding sources or actions would be necessary for the OM&R costs assigned for the Refuge, Yolo Bypass, and Flood Reduction purposes.

There are on-going discussions regarding OM&R costs that are anticipated to be incurred by the delivery of public benefits to the State and how to equitably cover this expense. The Sites Authority is using a beneficiary pays model for cost assignment, which may include the use of other funds (not associated with Proposition 1 monies) or actions to address the State's share of OM&R costs. Arrangement details and agreements are in development. WIIN funding is not expected to cover OM&R for WSIP public benefits identified for Sites Reservoir. It is anticipated that Reclamation could cover a portion of the conveyance costs for Incremental Level 4 Refuge Water Supply (from the reservoir to the refuge) consistent with CVPIA, but will not be covering other costs associated with the delivery of WSIP public benefits.

The federal OM&R cost assigned for its CVP Operational Flexibility benefits is \$1.4 million per year. The JPA OM&R cost assignment is \$28.4 million per year, of which \$15.6 million would consist of conveyance cost for its South-of-the-Delta participants. The OM&R cost assignment for the Project's SWP benefits is \$0.4 million annually.

TABLE 6-6. OM&R COST ASSIGNMENT – PRESENT VALUE (2021\$; \$MILLIONS)

Purpose/Action	Total		OM&R Cost - Present Value							
			Federal		State Public Benefits		Other State		Non-Federal Partners	
	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)
Cost Assignment:										
JPA	84.4%	\$804							100%	\$804
CVP Ops Flex	4.1%	\$39	100%	\$39						
Level 4 Refuge	3.6%	\$35			100%	\$35				
SWP	1.2%	\$11					100%	\$11		
Yolo	3.6%	\$34			100%	\$34				
Flood Damage Reduction	0.5%	\$5			100%	\$5				
Recreation	2.5%	\$24			100%	\$24				
Total	100%	\$952	4.1%	\$39	10.3%	\$99	1.2%	\$11	84.4%	\$804

Notes: Values are rounded and may not sum to totals.

CVP = Central Valley Project
 IDC = Interest During Construction
 JPA = Joint Powers Authority
 OM&R = operation, maintenance, and replacement
 SWP = State Water Project
 WSIP = Water Storage Investment Program
 yr = year

TABLE 6-7. OM&R COST ASSIGNMENT – ANNUAL (2021\$; \$MILLIONS)

Purpose/Action	Total		OM&R Cost - Present Value							
			Federal		State Public Benefits		Other State		Non-Federal Partners	
	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)	Percent	Cost (\$M)
Cost Assignment:										
JPA	84.4%	\$28.4							100%	\$28.4
CVP Ops Flex	4.1%	\$1.4	100%	\$1.4						
Level 4 Refuge	3.6%	\$1.2			100%	\$1.2				
SWP	1.2%	\$0.4					100%	\$0.4		
Yolo	3.6%	\$1.2			100%	\$1.2				
Flood Damage Reduction	0.5%	\$0.2			100%	\$0.2				
Recreation	2.5%	\$0.9			100%	\$0.9				
Total	100%	\$33.6	4.1%	\$1.4	10.3%	\$3.5	1.2%	\$0.4	84.4%	\$28.4

Notes: Values are rounded and may not sum to totals.

CVP = Central Valley Project
 IDC = Interest During Construction
 JPA = Joint Powers Authority
 OM&R = operation, maintenance, and replacement
 SWP = State Water Project
 WSIP = Water Storage Investment Program
 yr = year

6.5 Cost Share Methodology

The Project intends to demonstrate the 75 percent non-public cost share commitment by the statutory deadline of January 1, 2022 through the development of the following: Sites Reservoir Benefits and Obligations Contract Guiding Principles and Preliminary Terms, Plan of Finance, and Successor Agreement—each of which is described in additional detail below. Prior to submitting these documents to the Commission, the Authority will develop a Resolution describing how these three documents will work together to satisfy the 75 percent non-public cost share commitment.

The Sites Reservoir Benefits and Obligations Contract Guiding Principles and Preliminary Terms (GPPT) will form the basis of the future agreement between the Authority and the Project Participants (water agencies) that are investing in non-public benefits through participation in the Project. The four key elements in the GPPT are the allocation of Project benefits, costs, financing obligations, and ownership obligations among the Project Participants.

The Plan of Finance will provide assurances to the Project Participants investing in non-public benefits that a plan to finance their share of Project costs has been approved by the Reservoir Committee and Authority Board. The Plan of Finance will evaluate key considerations for both near-term and long-term financing, including financing phases, borrowing approach, credit approach, debt instrument, cost of capital, and integration into other Project agreements.

The Successor Agreement is the method through which the Project Participants receive authorization to fund their share of activities based on their individual participation (percentage of non-public benefits). The Successor Agreement will continue through the end of Phase 2 (i.e., acquisition of a water rights permit, completion of final environmental documents, and acquisition of other key permits), which will conclude the planning phase of the Project. To protect each Participant's financial interests and to confirm funding through the end of the planning phase, the Authority will establish progress check-ins that are anticipated to coincide with key deliverables and funding calls. Agreements representing 75 percent of non-WSIP cost share must be returned with signatures for the Successor Agreement to be active, and the agreement will include an itemized budget describing activities to be completed, as well as a table indicating the participation levels of each member agency.

To assure that participants have a clear understanding of the obligations required by project participation as well as an understanding of the flexibility and other benefits that will be available to them, the Authority has provided detailed information to each participant regarding its projected costs and benefits. Also included in the information that is being provided is information regarding possible ways to reduce annual costs including the sale of water in years when there is projected to be surplus. Workshops have been held for participants to discuss the cost information that has been provided and each agency is completing an individual assessment of the project's utility and affordability. The project's participants understand and continue to evaluate the project's costs in terms of their own individual ability to pay. Participants continue to show their support, not just by stating it, but by meeting the cash calls that have funded a large portion of project development costs to date.

6.6 Plan of Finance

6.6.1 Funding Already Secured

The Authority has made meaningful progress in securing funding for a significant portion of Project costs, and currently pays a portion of Project development costs with funding from both state and federal sources.

Proposition 1 – The Authority’s Proposition 1 award from the Water Commission totals \$836 million, some of which (approximately \$16.8 million) has already been used for planning and permitting costs. The majority of the Proposition 1 funding will be available for general Project design and construction costs, once permitting and water rights are secured.

USDA Rural Development Loan – In 2018, the Authority pursued and received approval for a USDA Rural Development Community Facilities loan to be used for the construction of the Project’s canal intertie facilities. This type of USDA loan is only available to communities with populations of less than 20,000, and the Project’s eligibility is therefore tied to the participation of the smaller, rural Project Participants. The \$449 million loan can be used for the reimbursement of up to \$439 million of qualified facility construction costs plus the funding of a \$10 million depreciation reserve. The loan will be used to refinance short-term canal intertie construction debt once the intertie is completed. The loan, if used, will have an interest rate that is the lesser of 3.875 percent, or the USDA loan rate determined at the time of the closing of the loan. The USDA loan rate would be 2.25 percent, if the loan closed today. The USDA also leaves open the possibility of refinancing the loan in the future, if interest rates decline after the loan closing. The loan can have a term of up to 40 years.

Federal Funding – Although the Authority has not yet received a commitment of federal Water Infrastructure Improvements for the Nation Act (WIIN Act) monies, it continues to receive funding from Reclamation for Project-related studies (e.g., Congressional appropriations totaling \$6 million and \$13.7 million in Fiscal Years 2020 and 2021, respectively). The Authority and Reclamation typically split the Congressional appropriations. The Authority is continuing its discussions with Reclamation regarding future WIIN Act commitments and other forms of federal funding.

6.6.2 Funding Still Needed

The Authority believes it has a viable plan to secure funding for the remainder of the Project’s permitting, design, and construction.

Cash Calls – Until water rights and key permits are secured, Project Participants will continue to be responsible for funding Project development costs from internal sources or “cash calls.” The Authority continues to evaluate the level of cash calls required to fund future critical path activities. The most recent estimate of the cash call needed for 2022 is \$100 per acre-foot of Project subscription, for 2023 is \$140 per acre-foot, and for 2024 is \$160 per acre-foot.

Interim Financing – Once Project permits and water rights are secured, the Authority will have the option of continuing to fund the balance of pre-construction costs through cash calls or to secure external financing. Assuming the Authority decides to pursue external borrowing for the balance of pre-construction costs, the Authority could pursue either a direct line of credit with a commercial bank or a federal Water Infrastructure Finance and Innovation Act (WIFIA) loan.

Bank Line of Credit – The Authority has been in discussions with a number of commercial banks who have shown significant interest in the Project. If most of the key credit questions are answered before (e.g., permitting, water rights) the time comes to solicit bank line of credit proposals, the level of interest should be high. It is estimated that a bank line of credit for the Project in the current market would cost approximately 1.50 to 1.75 percent per annum. Given that the Authority is some time away from formally soliciting bank proposals, current modeling projections incorporate a conservative assumption of 3 percent for the cost of a bank line.

WIFIA Loan for Interim Costs – Although a bank line of credit may be the most conventional source of financing for Project costs once cash calls have ended and before Project construction begins, it may

also be possible to use the proceeds of a federal WIFIA loan to finance these costs. The Authority plans to submit a Letter of Interest for a WIFIA loan in July 2021, which is the first step in securing a WIFIA loan.

Long-Term Financing – After all permitting, planning, and design is complete, but before Project construction contracts can be awarded, the Authority will determine the optimal sources of funding for construction. Some of the funding will come from already identified state and federal sources. Although these sources of funding may cover a significant portion of construction costs, eventually the Authority expects to secure additional long-term financing from the capital markets through the public sale of long-term tax-exempt municipal bonds. The Authority will also use either the proceeds of long-term bonds or a WIFIA loan to refinance the interim bank line of credit (if utilized) once Project construction begins.

Fixed-Rate Bonds – Fixed-rate bonds pay interest semi-annually at a fixed interest rate, and would be structured with annual maturities to provide Project Participants with level annual debt service. The fact that the interest rate on the bonds does not change will make all future annual debt service obligations known, and will aid Project Participants in budgeting and setting rates and charges. The final maturity of long-term bonds is customarily 30 years, but could be as long as 40 or more years. The Authority's current modeling projections are conservative and assume a fixed-rate bonds cost of 5 percent, whereas current rates are closer to 3.5 percent. Some or all Project Participants may elect to only pay interest on the bonds during construction, and defer principal repayment until after the Project is operational.

WIFIA Loans – As stated previously, the Authority expects to apply for one or more WIFIA loans for the Project. In 2014, Congress enacted the Water Infrastructure Finance and Innovation Act, a low-cost loan funding program to be administered by the United States Environmental Protection Agency (EPA). WIFIA authorizes the EPA to issue long-term, low-interest loans to a wide variety of water and wastewater infrastructure projects, and WIFIA financing can be used to finance up to 49 percent of the total cost of a project. Total federal assistance for a project may not exceed 80 percent of the project's eligible costs.

The WIFIA Program offers loans with low, fixed-interest rates and flexible financial terms that can provide savings to borrowers and their customers. Importantly, a single, fixed interest rate is established at closing for the loan. This means that a borrower may receive multiple disbursements over several years at the same fixed interest rate, which is locked at loan closing. The maximum final maturity date is 35 years from "substantial completion" of a project, and the maximum time that repayment may be deferred after substantial completion of the project is 5 years.

Eligible project costs include development-phase activities (i.e., planning, feasibility analysis, environmental review, permitting, and preliminary engineering and design work); construction, reconstruction, rehabilitation, and replacement activities; acquisition of real property; environmental mitigation; construction contingencies; equipment; capitalized interest necessary to meet market requirements; reasonably required reserve funds; capital issuance expenses; carrying costs during construction, and WIFIA application and credit processing fees.

The interest rate on a WIFIA loan is based on US Treasury rates of a similar maturity plus .01 percent. This rate can be locked in at closing, even if loan disbursement is deferred until later in the process of project implementation. A WIFIA loan for the Project is estimated to have a rate of 2.38 percent based on current market rates. For purposes of modeling, we have used a 3.50 percent assumed rate for WIFIA loans.

There are a number of meaningful benefits to WIFIA funding for the Project; primarily, its flexibility with regard to structure, repayment timing, and the incremental funding flexibility with reduced rate risk resulting from the Authority's ability to lock-in an interest rate at the time the WIFIA loan closes.

Moreover, the ability to use WIFIA funds for planning, permitting, and design costs, as well as for previously incurred project costs, will be valuable to the Authority.

As noted, Participants in the Project have signed on to provide funding for their share of the construction and operation costs of the Project in exchange for a proportionate percentage of the annual water supplies. Accordingly, Participants will be required to execute certain operating agreements in connection with any external borrowing the Authority pursues that will obligate Participants to repay borrowed amounts. Payments on any external borrowing will be payable solely from payments to be made to the Authority by Participants that execute said agreements. The agreements will include provisions and mechanics to address the Project's financing obligations of the Participants. By signing the agreements, Participants are pledging to pay their respective share of the debt obligations; and in order to ensure the Project's continued viability, the Participants will also be committed to cover any shortfall in Project funding costs. Participants have agreed that the Project's sustainability is paramount and will commit to fulfilling debt repayment obligations to ensure that future.

Project Operating Costs – The Authority has modeled both the construction phase and the operating phase of the Project to confirm both the availability of internal and external funding through Project construction, as well as the feasibility of the payment of debt service and projected operating costs once the Project is completed and operational. This financial modeling is based on operating and water market assumptions generated using water industry standard Sites Reservoir/CALSIM data.

Similar to the external borrowing agreements noted above, mechanics for funding O&M costs will be established in a future operating agreement and are expected be based on the concept of a "sufficiency" pledge that binds all Project Participants to provide revenues that are sufficient to operate and maintain the Project during its useful life [including making up shortfalls for any defaulting Participants].

In summary, the Authority believes that the Plan of Finance it has developed is both feasible and will provide Project Participants with a low cost of capital, thereby improving Project affordability.

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7. Environmental Feasibility

7.1 Introduction

The following provides an overview of the California Environmental Quality Act (CEQA) process completed to date for the Project, as well as a summary of the preliminary findings of the Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS). The joint RDEIR/SDEIS is currently being prepared to evaluate the potential environmental impacts of the construction and operation of the Project, an offstream surface water reservoir to provide water supply for environmental, municipal, industrial, and agricultural needs throughout the State of California. The Authority is the lead agency under CEQA, and Reclamation is the lead agency under the National Environmental Policy Act (NEPA). The RDEIR/SDEIS evaluates potential direct, indirect, and cumulative impacts on the environment that could result from implementing the Project. In addition, the RDEIR/SDEIS includes feasible mitigation measures to avoid, minimize, rectify, reduce, or compensate for significant adverse impacts.

In August 2017, the Authority and Reclamation jointly issued a Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Project pursuant to their respective lead agency obligations under CEQA and NEPA. The RDEIR/SDEIS is a complete revision of the 2017 Draft EIR/EIS (Sites Project Authority and U.S. Department of the Interior, Bureau of Reclamation, 2017) to address changes to the Project that have occurred since the issuance of the 2017 Draft EIR/EIS. The RDEIR/SDEIS is being recirculated for public review and comment in accordance with Section 15088.5 of the State CEQA Guidelines.

Efforts to complete the joint EIR/EIS for the Project are ongoing. The RDEIR/SDEIS will be released in August 2021, and the Final EIR/EIS is anticipated to be complete in July 2022.

7.1.1 Background

Throughout the CALFED Bay-Delta Program (CALFED) process between 1995 and 2000, the social and environmental effects of water shortages and reliability within California were thoroughly analyzed and documented, along with a diverse suite of potential solutions to be implemented at the local, state, and federal levels. The CALFED review entailed an extensive multi-stakeholder and public process that culminated with the issuance of the CALFED ROD in August 2000 (CALFED, 2000). The Preferred Program Alternative in the CALFED ROD identified eight program components to build a framework for managing California's water resources into the future. The storage component identified the potential for groundwater and surface water storage as a method of improving water supply reliability, providing water for the environment at times when it is needed most, providing flows for water quality maintenance, and protecting levees through coordination with existing flood control reservoirs. Preliminary studies in support of the CALFED ROD considered more than 50 potential surface water storage sites throughout California, many previously studied, and recommended more detailed study of five locations. One of these locations was the Project, which was known at that time as the NODOS Investigation. Consistent with the CALFED ROD, which identified that water storage north of the Sacramento–San Joaquin Delta (Delta) was needed to support Delta fisheries and statewide water supply reliability, Reclamation and DWR began further investigation of the viability of the Project in 2001.

2017 Draft EIR/EIS

DWR originally published a Notice of Preparation (NOP) for the Sites Reservoir Project EIR/EIS on November 5, 2001. The Authority assumed the role of CEQA lead agency in 2016 and issued a supplemental NOP on February 2, 2017. Reclamation issued a Notice of Intent to prepare an EIS under NEPA on November 9, 2001. In addition to the scoping process in January 2002, the Authority conducted two scoping meetings in February 2017, following publication of the supplemental NOP. During both scoping periods, the public was invited to submit written comments by mail, fax, or email regarding the scope, content, and format of the environmental document. The Authority and Reclamation prepared an original Scoping Report, as well as a Supplemental Scoping Report, following the scoping meetings conducted in 2017.

The Authority and Reclamation released the Draft EIR/EIS in August 2017. The Authority, as the CEQA lead agency, issued a Notice of Availability (NOA) on August 14, 2017. An NOA of the 2017 Draft EIR/EIS and notice of public meetings was also published in the Federal Register on August 18, 2017. The 2017 Draft EIR/EIS was initially made available for public review from August 14, 2017, to November 13, 2017. This review period was ultimately extended to January 15, 2018, to accommodate additional public review and comments. A total of 137 comment letters and emails was received on the 2017 Draft EIR/EIS, along with comments received at two public hearings held during the public review period. Comments and/or issues raised in these letters include:

- Project description and range of alternatives
- Modeling approach, modeling baseline, and modeling analysis
- Operational impacts on fisheries
- Impacts to Trinity River resources
- Indian Trust Assets and impacts on tribal cultural resources
- Impacts on terrestrial species
- Water quality
- Water rights
- Geotechnical and geological data and seismicity
- Additional cumulative impacts

Additional comments were received after the close of the public review period that generally raised similar issues and concerns to those received during the public comment period. All letters with comments on the 2017 Draft EIR/EIS, including those received after the public comment period ended, have been reviewed. The Authority and Reclamation have taken into consideration all comments in developing the approach to the revised alternatives and the analysis included in this RDEIR/SDEIS.

Value Planning and Revised Project

In October 2019, the Authority undertook a value planning process—an effort to identify and evaluate additional alternatives that could make the Project more affordable for the Project’s participants while also addressing comments received on the 2017 Draft EIR/EIS. This decision was based on ongoing discussions with permitting agencies, expected Project costs and the cost per AF of reservoir releases, and existing participation levels. The value planning process focused on meeting the following objectives: (1) improve water supply and water supply reliability; (2) provide Incremental Level 4 water

supply for refuges; (3) improve the survival of anadromous fish; (4) enhance the Delta ecosystem; (5) provide opportunities for recreation; and (6) provide flood damage reduction. Through the value planning process, the Authority considered numerous different options to reduce Project costs while continuing to meet the Project objectives.

In April 2020, the Authority accepted the Value Planning Report and its findings (Sites Project Authority 2020). The report focused on three options, including reservoir sizes of 1.3 and 1.5 million AF, and focused on using existing facilities to the extent practical for the diversion and release from the reservoir.

7.2 Revised Draft Environmental Impact Report/Supplemental Environmental Impact Statement

At the same time as acceptance of the Value Planning Report, the Authority also directed staff to analyze the environmental effects of the new alternatives in the report and to recirculate the Draft EIR for public review and comments.

7.2.1 CEQA Objectives

Section 15124 of the State CEQA Guidelines requires that a lead agency identify a statement of objectives to assist the lead agency in developing a reasonable range of alternatives for evaluation in the EIR, and to aid decision makers in preparing findings or a statement of overriding considerations, if necessary. The U.S. Council on Environmental Quality's (CEQ) NEPA regulations (40 Code of Federal Regulations [CFR] Section 1502.13) require a statement of the purpose and need to which the agency is responding. The statement of objectives/purpose and need should include the purpose of the Project and may discuss the Project benefits.

The Project objectives are as follows:

- OBJ-1: Improve water supply reliability and resiliency to meet Storage Partners' agricultural and municipal long-term average annual water demand in a cost-effective manner for all Storage Partners, including those that are the most cost-sensitive.
- OBJ-2: Provide public benefits consistent with Proposition 1 of 2014, and use WSIP funds to improve statewide surface water supply reliability and flexibility to enhance opportunities for habitat and fisheries management for the public benefit through a designated long-term average annual water supply.
- OBJ-3: Provide public benefits consistent with the WIIN Act by using federal funds, if available, provided by Reclamation to improve CVP operational flexibility in meeting CVP environmental and contractual water supply needs and improving cold-water pool management in Shasta Lake to benefit anadromous fish.
- OBJ-4: Provide surface water to convey biomass from the floodplain to the Delta to enhance the Delta ecosystem for the benefit of pelagic fishes in the north Delta (e.g., Cache Slough).
- OBJ-5: Provide local and regional amenities, such as developing recreational facilities, reducing local flood damage, and maintaining transportation connectivity through roadway modifications.

7.2.2 Alternatives

The Authority, as the CEQA lead agency, is responsible for the development of alternatives that meet CEQA requirements. Section 15126.6 of the State CEQA Guidelines requires that:

- An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation. An EIR is not required to consider alternatives which are infeasible.
- The range of potential alternatives to the proposed project shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects.
- The specific alternative of “no project” shall also be evaluated along with its impact.
- The EIR should briefly discuss the rationale for selecting the alternatives to be discussed. The EIR should also identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency’s determination. Among the factors that may be used to eliminate alternatives from detailed consideration in an EIR are:
 - Failure to meet most of the basic project objectives
 - Infeasibility
 - Inability to avoid significant environmental impacts.

The Project would use existing infrastructure to divert unregulated and unappropriated flow from the Sacramento River at Red Bluff and Hamilton City and convey water to a new offstream Sites Reservoir west of the community of Maxwell, California. New and existing facilities would move water into and out of the reservoir. Releases from Sites Reservoir would ultimately return to the Sacramento River system via existing canals and a new pipeline located near Dunnigan. Construction of the Sites Reservoir would necessitate building a bridge across the reservoir or constructing a bypass road (i.e., South Road) to connect Maxwell with the community of Lodoga. Additional components would include development of new recreational facilities at the reservoir. The RDEIR/SDEIS evaluates the potential environmental effects of:

- No Project Alternative
- Alternative 1, 1.5-MAF reservoir, bridge, release to the CBD, and Reclamation investment of up to 7 percent of the Project costs
- Alternative 2, 1.3-MAF reservoir, South Road, partial release to the CBD, discharge to the Sacramento River, and no Reclamation investment
- Alternative 3, 1.5-MAF reservoir, bridge, release to the CBD, and Reclamation investment of up to 25 percent of the Project costs

The RDEIR/SDEIS has been prepared in accordance with both NEPA and CEQA, with Alternatives 1, 2, and 3 analyzed at an equal level (consistent with NEPA standards).

7.2.3 RDEIR/SDEIS Preparation and Preliminary Findings

Although an EIR must analyze reasonable alternatives, it also needs to identify a proposed project, which is also referred to as the preferred alternative. At the September 2020 Board meeting and after consideration of the preliminary description of alternatives, the Authority designated Alternative 1 as the Authority's proposed project (Project) based on its meeting the intent and the goals of the Value Planning effort, its close alignment with VP-7, and its ability to meet the project objectives. RDEIR/SDEIS preparation continued with Alternative 1 as the Authority's Project, and the draft project description *Sites Reservoir Project Preliminary Project Description and Alternatives* (Authority, 2021) was published on the Authority's website and circulated to other agencies to facilitate early consultation.

The RDEIR/SDEIS further defines the Project and alternatives, and identifies a number of best management practices (BMPs) and plans to avoid and minimize the environmental effects of the Project. These measures are considered part of the Project, and will be implemented during the design, construction, and operation phases of Project implementation.

The administrative RDEIR/SDEIS was completed in June 2021 and is anticipated to be released for public review in August 2021. It presents the results of the analysis of the following resource topics:

- Surface Water Resources*
- Surface Water Quality
- Fluvial Geomorphology*
- Groundwater Resources*
- Vegetation and Wetlands
- Wildlife Resource
- Aquatic Resources
- Geology and Soils
- Minerals*
- Land Use
- Agricultural Resources
- Recreation*
- Energy*
- Navigation, Transportation, and Traffic
- Noise*
- Air Quality
- Greenhouse Gases
- Cultural Resources
- Tribal Cultural Resources
- Visual Resources
- Population and Housing*

- Public Services and Utilities*
- Public Health and Environmental Hazards*
- Climate Change*
- Indian Trust Assets*
- Socioeconomics and Environmental Justice

Under the proposed Project (Alternative 1), environmental effects associated with the resource topics noted with an asterisk (*) above have been found to be less than significant. The environmental effects associated with the other resource topics and mitigation identified to reduce those impacts are included in Table D-1.

Significant Impacts (Preliminary – Subject to Change)

In some cases, Project environmental effects cannot be mitigated to less-than-significant levels. Those associated with implementation of the Project (Alternative 1) are described below:

Surface Water Quality

- **Impact WQ-1:** Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality during construction

Construction of the Project could result in significant impacts on water quality in the CBD, Funks and Stone Corral Creeks and in the north Delta due to increases in aqueous and fish methylmercury at these locations during the initial filling of the reservoir or for up to 10 years after the initial filling. Methylmercury water quality effects would be minimized with implementation of mitigation. However, because of the uncertainty of the effectiveness of the mitigation for reducing methylmercury concentrations in the reservoir such that releases do not cause exceedances of the sport fish methylmercury tissue objective and the methylmercury TMDL fish tissue objectives, this effect would remain significant and unavoidable.

- **Impact WQ-2:** Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality during operation

Operation of the Project could cause significant water quality impacts downstream of Sites Reservoir. Releases may cause measurable long-term degradation of water quality downstream in the north Delta by causing increases in aqueous and fish tissue methylmercury concentrations, relative to existing conditions, in dry and critical water years, and causing exceedances of the methylmercury TMDL fish tissue objectives to occur more frequently and/or by greater magnitudes during these years and release period. Mercury and methylmercury in reservoir releases to Funks and Stone Corral Creeks would be reflected in the tissue of fish in these creeks and could cause exceedances of the 0.2 mg/kg ww sport fish objective. The effectiveness of the methylmercury minimization actions to reduce reservoir methylmercury concentrations such that there would be no substantial measurable increase in aqueous and fish tissue methylmercury concentrations at

downstream locations is not known at this time. Therefore, this impact would be significant and unavoidable.

Vegetation and Wetland Resources

- **Impact VEG-2:** Substantial adverse effect (i.e., loss or removal) on any riparian habitat or other sensitive natural community (Construction)

The Project would result in significant impacts on state- and federally protected sensitive natural communities by direct removal of vegetation in these communities for the regulating reservoirs and conveyance complex, Sites Reservoir, roads, and recreation areas. Mitigation will reduce most impacts to less than significant. However, the removal of mature trees within the reservoir footprint would be a long-term impact because of the length of time that would be required for newly planted trees to reach mature size and fully replace the habitat function and habitat value of the removed trees. This impact would remain significant and unavoidable even with mitigation because of the long-term loss of upland riparian and oak savanna habitat.

- **Impact VEG-4:** Conflict with any local policies or ordinances protecting vegetation resources (including wetlands and non-wetland waters), such as a tree preservation policy or ordinance (Construction)

In Colusa County, construction of the Sites Reservoir and related facilities would result in permanent and temporary impacts on special-status species habitats, sensitive natural communities, wetlands, non-wetland waters, and blue oak woodland. In Yolo County, construction of the Dunnigan Pipeline and CBD outlet would result in permanent and temporary impacts on upland riparian habitat, wetlands, and non-wetland waters. Mitigation will reduce most impacts to less than significant. However, oak woodlands are considered important under the state Oak Woodlands Conservation Act and county general plans. Loss of blue oak woodland from construction of the reservoir would be considered significant in this context. As noted under Impact Veg-2, there would be a long-term and permanent loss of blue oak woodland habitat from construction, even with mitigation, and this impact would remain significant and unavoidable.

Wildlife Resources

- **Impact WILD-1:** Substantial adverse effect (i.e., loss or removal), either directly or through habitat modifications, on wildlife species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. (Construction)

Construction and operation of the Project would result in a significant impact on golden eagle and bald eagle. With implementation of mitigation, effects on bald eagle from construction would be reduced to less than significant. Similarly, with implementation of mitigation, there would be less-than-significant impacts on golden eagle and bald eagle due to operation of the Project. However, with implementation of mitigation, construction effects on golden eagle would be reduced but the removal of mature trees within blue oak woodland, foothill pine, and oak savanna communities would be a long-term adverse effect on golden eagle and would remain a significant and unavoidable impact, even with mitigation.

- **Impact WILD-2:** Substantial interference with the movement of a native resident or migratory or wildlife species or with established native resident or migratory wildlife corridors, or impediment of the use of native wildlife nursery sites (Construction and Operation)

Construction would create barriers to or impede wildlife movement within existing natural landscape blocks and essential connectivity areas. Fragmentation and loss of natural landscape blocks and essential connectivity areas would result in a significant impact on wildlife movement and wildlife corridors. Construction would also result in removal or disturbance of nursery sites. Operation would result in increased human activity at facilities and recreation areas, additional vehicles on roadways, and fencing that would create barriers to or impede wildlife movement. These impediments would also result in a significant impact on wildlife movement. Mitigation measures would reduce permanent and temporary construction impacts on nursery sites, but they would not mitigate impacts on wildlife movement and the loss of habitat connectivity within existing habitat blocks. Implementation of mitigation measures would also reduce the impact on wildlife movement under operation of the Project, but it would not mitigate the substantial barrier created by Sites Reservoir. Impacts after mitigation would remain significant and unavoidable.

Agriculture and Forestry Resources

- **Impact AG-1:** Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program (FMMP) of the California Resources Agency, to nonagricultural use (Construction and Operation)

Consistent with the objectives, including OBJ-1 (above), the Project will support agricultural viability by improving water supply reliability and resiliency. However, placement of aboveground Project facilities, including the reservoir, would result in permanent conversion of Important Farmland. A total of 152 acres of Important Farmland would be permanently converted to nonagricultural uses, and would result in direct permanent conversion of approximately 0.02 percent of the total Important Farmland, as classified under FMMP in the study area. Although the percentage of land affected by alternatives is small and the magnitude of the impact small, because the alternatives would result in permanent conversion of Important Farmland to nonagricultural uses, this impact would be significant. Purchasing agricultural conservation easements or donating to mitigation fees to preserve regional important farmland would only ensure continued productivity and preservation of existing Important Farmland. The measure would not replace or restore the acres of Important Farmland permanently converted to nonagricultural uses under each alternative. Therefore, while this measure is feasible and would partially mitigate the impact, it would not reduce impacts to less than significant.

- **Impact AG-2:** Conflict with existing zoning for agricultural use or a Williamson Act contract (Construction and Operation)

Placement of aboveground Project facilities on land under Williamson Act contract would result in removal of this land from contract and would also create remnant parcels. The Project would remove a total of 13,868 acres from Williamson Act contract as a direct impact. This acreage of direct impact accounts for 1.3 percent of the land under Williamson Act contract in the study area. In addition, placement of aboveground Project facilities could result in creation of remnant parcels of land under Williamson Act that are smaller than County requirements for such contracts, resulting in contract nonrenewal or cancellation for affected parcels. The Project would create a total of 1,220 acres of remnant parcels of land currently under Williamson Act contract. Increased water supply reliability resulting from the Project would allow some lands currently in Williamson Act contracts to remain in production during times it may have otherwise been fallowed or taken out of production for longer periods because of lack of water. However, this effect cannot be quantified, nor would it fully reduce permanent impacts on lands experiencing Williamson Act

cancellation because the water could not be used on lands anticipated to experience Williamson Act cancellations. Impacts would remain significant and unavoidable with implementation of proposed mitigation.

Air Quality

- **Impact AQ-1:** Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard during construction, or conflict with or obstruct implementation of the applicable air quality plan (Construction)

Construction would result in an exceedance of the applicable thresholds for Colusa County Air Pollution Control District (CCAPCD) and Glenn Colusa Air Pollution Control District for oxides of nitrogen (NO_x) and particulate matter with aerodynamic diameter less than 10 microns (PM₁₀) for multiple years. Additionally, construction would result in an exceedance of the applicable Yolo Solano Air Quality Management District (YSAQMD) threshold for PM₁₀, for multiple years. Impacts associated with fugitive dust emissions would be minimized through implementation of a dust control plan and the use of soil stabilizers on road surfaces. Reducing the amount of unpaved road surface is a strategy that can reduce fugitive dust-related emissions for some projects; however, because most of the road surfaces are located in the inundation area, it is not feasible to use road paving to reduce emissions. Exhaust-related pollutants would be reduced through use of Tier 4 diesel engines in most equipment, the use of on-road engines from 2010 or newer, and other Best Management Practices. Even so, exceedances of the applicable thresholds used by CCAPCD and GCAPCD for NO_x and PM₁₀ would occur, and exceedances of the PM₁₀ threshold would occur in YSAQMD as well. Therefore, the Project would contribute a significant level of regional NO_x and particulate matter pollution in the Sacramento Valley Air Basin.

- **Impact AQ-2:** Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard during operation, or conflict with or obstruct implementation of the applicable air quality plan

Operation of the Project would result in an exceedance of the applicable thresholds for CCAPCD for ROG associated with recreational activities at the reservoir as a result of recreationist vehicle trips and boating activity. The net increase in emissions would result in a cumulatively considerable net increase of a criteria pollutant. Although emissions in GCAPCD would be below the applicable threshold, the analysis conservatively concludes that the impact would be significant in GCAPCD because of the reservoir's location on the border of CCAPCD and GCAPCD. Implementation of mitigation would reduce emissions by implementing strategies to minimize the effects of boating activity. However, even with implementation of mitigation, impacts would be significant and unavoidable

- **Impact AQ-4b:** Expose sensitive receptors to substantial pollutant concentrations—localized criteria pollutant emissions

Construction of the Project would contribute substantially to existing PM violations of the CAAQS and NAAQS and would cause a new violation of the NAAQS. Fugitive dust emissions would be minimized through implementation of best management practices (BMPs), which would involve using soil stabilizers on unpaved road surfaces and watering visibly dry surfaces. The use of soil stabilizers and watering on road surfaces would result in substantial reductions in fugitive PM emissions. However, given the magnitude of unpaved road travel that would be required for

construction, the fugitive PM emissions would result in several localized impacts even with the implementation of BMPs to reduce dust. Mitigation would result in the purchase of emissions offsets, but this measure, which would mitigate regional impacts associated with PM, would not mitigate localized impacts from PM. Sensitive receptors and/or other members of the public could be exposed to the concentrations regardless of whether an equal amount of emissions is offset somewhere else in the SVAB. As a result, the localized PM impacts cannot be mitigated, and the Project would expose sensitive receptors to substantial concentrations of localized criteria pollutants. This impact would be significant and unavoidable.

Cultural Resources

- **Impact CUL-1:** Cause a substantial adverse change in the significance of a historical resource pursuant to California Code of Regulations Section 15064.5 (Construction)

Any built cultural resource located in the Sites Reservoir or TRR inundation areas would be permanently destroyed as a result of construction, and impacts to those determined eligible to the National Register of historic Places (NRHP) or California Register of Historic Resources (CRHR) would be significant. Mitigation would be implemented for these resources; however, the resources would ultimately be permanently lost due to their location and inundation, and the mitigation would not fully reduce the permanent loss.

- **Impact CUL-2:** Cause a substantial adverse change in the significance of an archaeological resource pursuant to California Code of Regulations Section 15064.5 (Construction and Operation)

Construction impacts associated with inundation areas and operations impacts associated with the fluctuation of reservoir levels on resources within the inundation areas would destroy or otherwise render resources unavailable. Implementation of the proposed mitigation may reduce impacts on these resources; however, impacts would ultimately be significant and unavoidable because these resources would be permanently lost.

- **Impact CUL-3:** Disturb any human remains, including those interred outside of formal cemeteries (Construction and Operation)

Construction and operation of the Project would disturb human remains. Implementation of proposed mitigation would minimize potential construction impacts on known and previously unknown human remains in much of the construction footprint by documenting and following standard procedures to respectfully handle and remove human remains. Operation impacts on resources within the reservoir inundation area would remain significant and unavoidable due to erosion caused by the fluctuation of water levels within the inundation areas.

Tribal Cultural Resources

- **Impact TCR-1:** Substantial adverse change in the significance of a tribal cultural resource that is listed or eligible for listing in the California Register of Historical Resources or other local register or that the lead agency has determined to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1 (Construction and Operation)

Construction of the reservoir and new facilities would result in disturbance or destruction of tribal cultural resources. Implementing mitigation measures could reduce some, but not all, impacts of construction and operation of the Project to a less-than-significant level. Ultimately, tribal cultural resources could be permanently destroyed by inundation of the reservoir or construction of other

facilities if the resources are located in the footprints of these facilities. Impacts would be significant and unavoidable.

Visual Resources

- **Impact VIS-1:** Substantially degrade the existing visual character or quality of public views of the site and its surroundings (Construction)

Construction of most of the proposed Project features would blend with the existing landscape, would not affect sensitive viewers, or would include implementation of BMPs to minimize visual changes. However, although the Sites Reservoir would eventually serve as a visual amenity to the region for future viewer groups, it is conservatively assumed that the construction of the reservoir and its associated facilities would substantially degrade the existing visual character and visual quality of the area and adversely affect existing viewers at this location. This degradation is because existing viewer groups associated with the site may be highly sensitive to changes that would occur at the site. These viewers may respond negatively to the demolition of residential and ranch structures, removal of oak woodlands, and alteration of the visual character of the foothill environment in a manner that would replace such features and transform the existing visual character to a reservoir and associated features, even though the reservoir would serve as a visual amenity to the region for future viewer groups. Therefore, impacts to the existing visual character and quality resulting from construction would be significant and unavoidable.

Geology and Soils

- **Impact GEO-7:** Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature (Construction)

Construction activities that would have a significant impact on paleontological resources are those that involve excavation in sensitive units, such as most construction in the regulating reservoir complex and trenching and staging for the Dunnigan Pipeline. For most activities, implementation of mitigation would reduce this impact by requiring that a qualified paleontologist be retained, and design a paleontological resource monitoring and mitigation plan so that fossils in the construction areas would be preserved. Construction techniques would also include amending the ground under the TRR East embankment using the cement deep soil mixing (CDSM) method to provide a stable foundation and key into more competent material for the embankment. For soil amendment under the TRR East, the use of CDSM could destroy fossils in the Riverbank and Modesto Formations. The ground disturbance would be deep, and a paleontological monitor would not be able to observe the disturbance or halt construction. Therefore, this impact would be significant and unavoidable.

Socioeconomic and Environmental Justice (NEPA Only)

- **Impact EJ-1:** Disproportionate and Adverse Effects on Minority Populations

Construction and operation of the Project would have substantial adverse effects related to air quality and visual resources that would be likely to disproportionately affect an identified minority community in Colusa County. The substantial adverse effects related to air quality and greenhouse gases would also be likely to disproportionately affect an identified minority community in Yolo County. This would result in a Substantially Adverse Effect under NEPA.

- **Impact EJ-2: Disproportionate and Adverse Effects on Low-Income Populations**

Construction and operation of the Project would have substantial adverse effects related to air quality and visual resources that would be likely to disproportionately affect identified low-income populations in Colusa County. This would result in a Substantially Adverse Effect under NEPA.

It should be noted that many of the significant and unavoidable effects are associated with the reservoir footprint. The Authority has made every effort to identify feasible mitigation, and will continue to work with stakeholders to develop an approach to protecting resources, wherever possible.

7.2.4 Coordination, Consultation, and Outreach

The Authority has engaged in an extensive process of outreach and coordination with various stakeholders. The following sections describe coordination efforts with local agencies, counties, Tribes, state and federal agencies, and NGOs throughout the environmental documentation process.

Local Agencies

The Authority has met informally and formally with local agencies to address local issues of concern. These agencies include:

- Colusa County
- Glenn County
- Yolo County
- Maxwell Unified School District
- Maxwell Fire Protection District
- Colusa County Sheriff's Office
- CalFire

Responsible Agencies

Pursuant to CEQA, responsible agencies are the public agencies (other than the lead agency) that have discretionary approval power over a project. In addition to the counties notes above, the Authority has coordinated on an ongoing basis with the following applicable responsible agencies:

- CDFW
- SWRCB
- Central Valley Regional Water Quality Control Board, Central Valley Region 1
- Central Valley Flood Protection Board
- DWR
- Commission
- Sites Storage Partners, including the TC Canal Authority and GCID

Trustee Agencies

Pursuant to CEQA, trustee agencies are state agencies that have jurisdiction by law over natural resources affected by a project that are held in trust for the people of the State of California. Trustee agencies include:

- CDFW with regard to the fish and wildlife of the state, to designated rare or endangered native plants, and to game refuges, ecological reserves, and other areas administered by the department
- California State Lands Commission with regard to state-owned sovereign lands, such as the beds of navigable waters and state school lands

There has been ongoing coordination with the applicable trustee agencies regarding the Project.

Cooperating Agencies

In December 2020, as the lead agency for NEPA, Reclamation sent letters to the following agencies and federally recognized tribes to request participation in the NEPA process based on “jurisdiction by law or special expertise with respect to the environmental issues which should be addressed in the RDEIR/SDEIS.” All of the following were specifically asked to “be a Cooperating Agency in this project as defined by the CEQ Regulations for Implementing NEPA in 40 CFR 1508.1(e).”

- WAPA
- EPA
- USFWS
- NMFS
- U.S. Army Corps of Engineers
- CDFW
- Bureau of Indian Affairs
- Colusa Indian Community Council, Cachil Dehe Band of Wintun Indians of the Colusa
- Yocha Dehe Wintun Nation
- Kletsel Dehe Band of Wintun Indians

Since January 2021, the first five agencies listed above expressed interest, and coordination with those agencies has been ongoing. CDFW formally declined, given its role as a CEQA responsible agency.

Native American Tribes

Since 2017, the Authority and Reclamation has coordinated with Native American tribes both formally under Assembly Bill (AB) 52, and informally. These Tribes include:

- Colusa Indian Community Council (Cachil Dehe Band of Wintun Indians)
- Cortina Indian Rancheria of Wintun Indians
- Grindstone Indian Rancheria of Wintun-Wailaki
- Paskenta Band of Nomlaki Indians
- Round Valley Indian Tribe of Round Valley (only Reclamation)

- Wintun Tribe in Redding (only Reclamation)
- Yoche Dehe Wintun Nation
- Estom Yumeka Maidu Tribe of the Enterprise Rancheria (only Authority)
- Mechoopda Indian Tribe (only Authority)

Recently, outreach to tribes has been expanded to include:

- Lone Band of Miwok Indians
- Konkow Valley Band of Maidu
- Moortown Rancheria of the Maidu Indians of California
- Redding Rancheria
- Shingle Springs Band of Miwok Indians
- The Berry Creek Rancheria of Maidu Indians of California (Tyme Maidu Tribe)
- United Auburn Indian Community of the Auburn Rancheria
- Wilton Rancheria
- Wintu Tribe of Northern California

Non-Government Organizations

A series of one-on-one and group meetings have been held with NGOs and other interested parties since 2017. The following outlines the most recent outreach.

On August 13, 2019, the Authority and key consultants met with the following NGOs to discuss the revisions made to the Project since 2017, review their collective comments on the 2017 Draft EIR/EIS, and solicit additional input on the Project:

- Natural Resources Defense Counsel
- Defenders of Wildlife
- Western Water Strategies
- The Bay Institute
- Baykeeper
- California Sportfishing Association

From May to July 2020, the Sites Executive Director and Environmental Planning and Permitting Manager provide updates to NGOs on the “rightsizing” of the Project, including reviewing the Scenario B diversions criteria used in the value planning analysis.

Between December 2020 and July 2021, the Authority conducted workshops to update NGOs on the status of the Project, and to provide an opportunity for input and the identification of key concerns. A survey was conducted in January 2021 to identify topics for focused small group meetings. Small Working Groups subsequently met to discuss Water Rights, Trinity River Effects, Terrestrial Species, Project Benefits, Water Quality, and Fisheries Protections and Effects.

The following NGOs were invited to the Workshops:

- AquAlliance
- The Bay Institute
- Butte Environmental Council
- California Indian Water Commission
- California Native Plant Society, Sacramento Valley Chapter
- California Sportfishing Protection Alliance
- California Water Impact Network
- California Wilderness Coalition
- Center for Biological Diversity
- Chico 350
- Coast Action Group
- Defenders of Wildlife
- Environmental Justice Coalition for Water
- Environmental Water Caucus
- Fly Fishers of Davis
- Fly Fishers International Northern California Council
- Friends of the River
- Golden Gate Salmon Association
- Natural Resources Defense Council
- North Coast Environmental Center
- Pacific Coast Federation of Fishermen’s Associations, Institute for Fisheries Resources
- Planning and Conservation League
- Protect American River Canyons
- Sacramento River Council
- Sacramento River Preservation Trust
- Safe Alternatives for our Forest Environment
- San Francisco Baykeeper
- Save the American River Association
- Save California Salmon
- Sierra Club, Mother Lode Chapter
- Southern California Watershed Alliance
- Water Climate Trust

- Women’s International League for Peace and Freedom Earth Democracy

The Winnemem Wintu Tribe was also invited due to comments submitted with NGOs in 2019.

The distribution list for Small Working Group meetings was subsequently expanded to include the following NGOs and non-NGOs that expressed interest in participating:

- Audubon Society
- California Trout
- California Waterfowl
- Ducks Unlimited
- Environmental Defense Fund
- Grasslands Water District (non-NGO)
- Humboldt County Planning Department (non-NGO)
- The Nature Conservancy
- Point Blue Conservation Science
- Public Policy Institute of California
- Restore the Delta
- River Partners
- Trout Unlimited

In addition, the Vice Chair of the Yurok Tribe attended the first of the Trinity River Small Working Group meetings.

7.2.5 Permits and other Approvals

Tables D-2, D 3 and D-4 in Appendix D provide a list of permits and other approvals anticipated for the Project. Since 2019, the Authority and key consultants have participated in more than 25 discussions and/or working sessions with the CDFW technical staff and/or management to explore modifications to Project operations that would meet the requirements of CEQA and the California Endangered Species Act (Fish and Game Code Section 2081). The Sites Technical Team has provided Project background information and analysis results covering a wide range of topics, including:

- 60-day work plan, key topics
- General Project overview, models used, and published results
- Terrestrial species models and GIS analysis methods
- Biological metrics
- Temperature modeling of the Upper Sacramento River
- Delta outflow analysis
- Diversion flow options
- Floodplains and bypass habitat benefits and impact

Preapplication and coordination meetings have also been held with several of the regulatory agencies listed in Tables D-2, D-3, and D-4.

7.3 Conclusions

Implementation of Alternative 1, the Authority's designated Project, has been analyzed for the potential to result in significant environmental effects, consistent with CEQA requirements. For many of the resource areas, potential impacts would be less than significant. The Project incorporates a number of BMPs and plans designed to avoid and minimize environmental impacts. The RDEIR/SDEIS also identifies residual impacts after implementation of BMPs and mitigation measures to reduce most of those impacts to less-than-significant levels. However, significant impacts have been identified where either there is no feasible mitigation, or mitigation would not reduce the effects to less than significant. Most of these are associated with the construction and operation of the reservoir itself.

CEQA (Section 15093) requires the decision-making agency to balance, as applicable, the economic, legal, social, technological, or other benefits, including region-wide or statewide environmental benefits, of a proposed project against its unavoidable environmental risks when determining whether to approve the project. If the specific economic, legal, social, technological, or other benefits, including region-wide or statewide environmental benefits, of a proposal project outweigh the unavoidable adverse environmental effects, the adverse environmental effects may be considered "acceptable."

In accordance with CEQA, the Authority, as lead agency, will prepare a Statement of Overriding Considerations before it approves the Project if significant effects are identified in the Final EIR that are not avoided or substantially lessened through mitigation and/or other changes to the Project. The Authority will also prepare findings to support the Statement of Overriding Considerations, consistent with CEQA, which requires both: 1) that a finding be made that there are specific considerations which make identified mitigation measures or alternatives infeasible, and 2) that there are "overriding economic, legal, social, technological, or other benefits of the project" that outweigh the project's significant unmitigated impacts. CEQA defines "feasible" to mean "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors."

The Project is consistent with the CALFED ROD, which identified that water storage north of the Sacramento–San Joaquin Delta (Delta) was needed to support Delta fisheries and statewide water supply reliability. Since the issuance of the CALFED ROD more than 20 years ago, the pressures on surface and groundwater resources in the state, as well as on the existing water supply infrastructure, have only intensified (Executive Order N-10-19). In April 2019, the Governor signed Executive Order N-10-19, which identified the state's current water challenges and emphasized that the "future prosperity of our communities and the health of our environment depend on tackling pressing current water challenges while positioning California to meet broad water needs through the 21st century." To that end, the order required the preparation of a water resilience portfolio by the California Natural Resources Agency, the California Environmental Protection Agency, and the California Department of Food and Agriculture, in consultation with the Department of Finance, to meet the needs of California's communities, economy, and environment through the twenty-first century. The 2020 Water Resilience Portfolio (Portfolio) was completed in July 2020 (California Natural Resources Agency et al., 2020).

The Portfolio identifies the need for tools and leadership to advance projects of statewide scale and importance, and to help address challenges that are beyond the scope of any region (California Natural Resources Agency et al., 2020). The Portfolio embraces a broad, diversified approach and is organized into four categories of goals and actions: (1) maintain and diversify water supplies, (2) protect and

enhance natural ecosystems, (3) build connections, and (4) be prepared. The Portfolio emphasizes that advanced planning, thoughtful investments, integrated management, and unprecedented collaboration are required to meet the substantial water challenges facing the state, and it acknowledges that no quick or singular fix will safeguard communities in the coming decades and preserve access to water for all Californians. To this end, the Portfolio identifies the need to expand smart surface water storage where it can benefit water supply and the environment. To achieve this important goal, the Portfolio proposes the acceleration of state permitting for projects selected under the WSIP that protect and enhance both fish and wildlife and water supply reliability. The Portfolio specifically identifies the Project as one of the smart water storage projects that should qualify for such expedited permitting.

For these reasons, and because the Project (Alternative 1) meets the CEQA objectives listed above, the Project is considered environmentally feasible.

8. Constructability

8.1 Introduction

The purpose of this chapter is to evaluate and confirm that the Sites Project can be constructed given the complexity, schedule, and availability of materials and labor. The conclusions provided in this chapter are supported by two appendices.

- Appendix E.1 – Constructability of Reservoir Facilities and Roads
- Appendix E.2 – Constructability of Conveyance Facilities

These appendices provide a detailed evaluation of construction, including public safety, procurement packages, site access, weather considerations, site staging, geotechnical considerations, cost and schedule risks, utilities and power requirements, construction water, labor force, materials and borrow areas, workforce, and equipment requirements.

8.2 Schedule

The construction schedule is to have all Project facilities complete by end of 2029, with commissioning to follow in 2030. Meeting the schedule will require careful planning to secure real estate and permits. Early specification and ordering of long-lead-time equipment is also needed. This equipment includes the pumps and motors, generators and turbines, and transformers and switchgear for substations. The timing of completing work at existing facilities such as installing new pumps at the RBPP, dredging of the Funks Reservoir and tying into the GCID Main Canal would be performed over several seasons given the short duration that these facilities may be taken out of service.

Table 8-1 shows recent precedence for large reservoir projects that have been constructed in California approximately within the duration estimated for Sites. This table suggests that it is possible to construct a facility of this size in accordance with the construction schedules provided in Appendices E.1 and E.2.

TABLE 8-1. CONSISTENCY OF CONSTRUCTION SCHEDULE WITH OTHER LARGE DAMS

Project	Reservoir Capacity (MAF)	Embankment Dam Volume (million CY)	Years of Construction
Sites, Colusa and Glen Counties	1.5	18 (2 main dams, & 7 saddle dams)	Est. 2024–2029 (5 years)
Diamond Valley, Riverside County	0.8	110 (3 large dams)	1995–2000 (5 years)
Seven Oaks, San Bernardino County	0.146	38	1993–2000 (7 years)

Notes:

CY = cubic yards

MAF = million acre-feet

8.3 Construction Materials

About 85 percent of the earth and rock construction materials to build the dams is available on site (Figure 8-1). The remaining 15 percent (sand and gravel) would need to be hauled from existing commercial quarries some 35 miles from the Project site (Figure 8-2). It is anticipated this would come from the Orland area, which has several operating quarries. Specific borrow areas are described in Appendix E.1. This appendix also includes a material balance for the dams.

It is anticipated that concrete for the I/O works and bridge would be batched on site, and that the concrete aggregate would be imported from the quarries near Orland, about 35 miles from the reservoir location. Aggregate road base would be imported or produced from onsite quarry operations. Earthwork may require moving surplus excavated soils and rock for reuse on other Project features.

8.4 Workforce

Sites Reservoir is anticipated to employ up to 1,100 to 2,000 workers at the peak of construction activities (estimate is based on the construction schedules provided in Appendices E.1 and E.2). Providing for a sufficient labor force for this Project poses a challenge, but is manageable. It is anticipated that much of the labor force would come from the surrounding region, with contractors also bringing some skilled work force from other areas. The surrounding counties, including Placer, Sacramento, and Yolo Counties, have a regional population of over 2 million. It may be advantageous to consider Project labor agreements with trade unions as a means of accommodating the Project labor requirements, as well as avoiding labor disputes. This strategy has been used successfully on other large civil works projects in California.

8.5 Equipment Availability

The required equipment consists of standard heavy earthmoving and excavation equipment. Detailed equipment tables, including peak equipment pieces, are provided in Appendices E.1 and E.2. The actual daily maximums would not necessarily occur every day across all equipment categories, but would rise and fall based on what activities are being performed across the Project at any given time. For example, drilling and blasting, rock bolting, and excavation may not all occur simultaneously during portal excavation for any one of the tunnel portals. During the drill/blast shifts, the equipment necessary for the excavation and rock bolting may sit idle, depending on work room available. The table does not include light equipment, such as generators, pumps, and light plants.

Although the quantity of equipment may be large, especially for reservoir construction, this type of equipment is commonly found in the region and elsewhere. Large contractors would use their own equipment, or lease or purchase new equipment.

8.6 Summary

In summary, although there are risks to the scheduled 5-year completion of construction, the facilities of the Sites Reservoir Project can be constructed with existing technology and available construction materials, work force, and equipment.

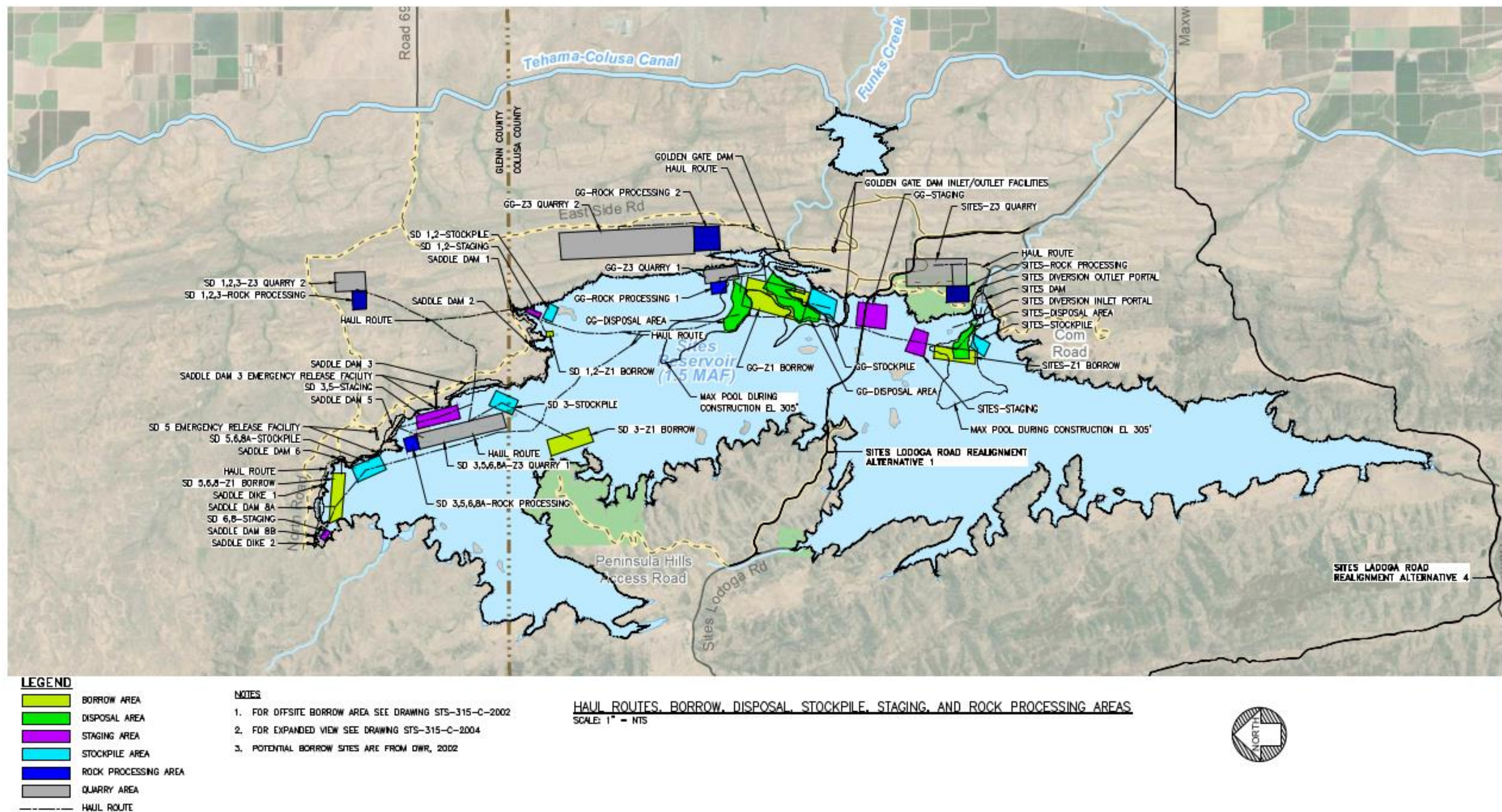


FIGURE 8-1. HAUL ROUTES, BORROW, DISPOSAL, STOCKPILE, STAGING, AND ROCK PROCESSING AREAS

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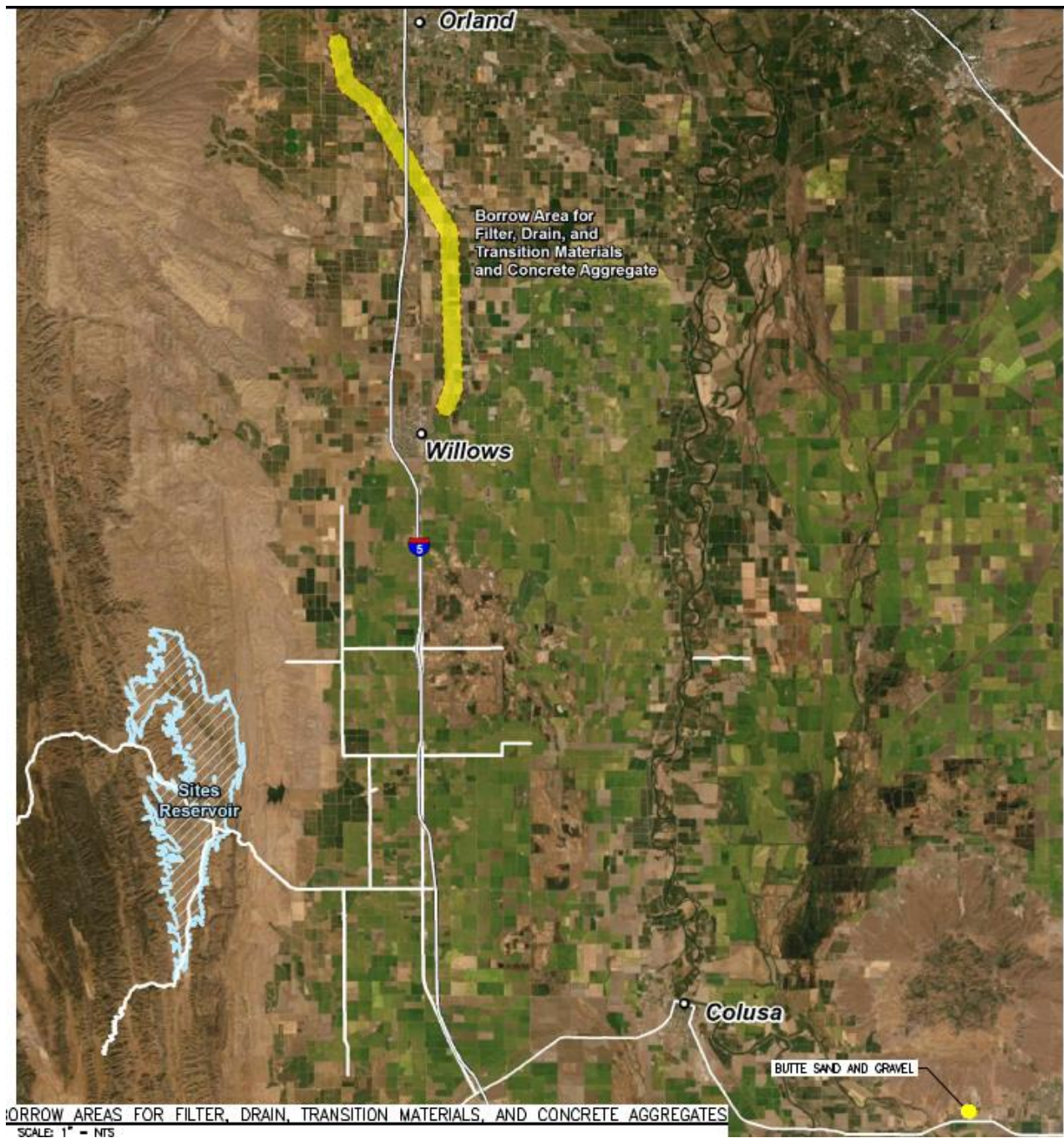


FIGURE 8-2. OFFSITE QUARRIES LOCATION

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