

Chapter 10 Findings and Conclusions

This Draft Feasibility Report documents the development, evaluation, and comparison of the project alternatives in a way that is consistent with the Federal P&Gs. In coordination with this Draft Feasibility Report, a Draft EIR/EIS has been prepared consistent with NEPA and CEQA (Reclamation and Authority 2017). This chapter summarizes the major findings and conclusions of this Draft Feasibility Report.

Need for the Project

The primary planning objectives address important statewide and local water supply and ecosystem improvement needs. The primary planning objectives are as follows:

- Improve water supply and water supply reliability
- Provide incremental Level 4 water supply
- Improve the survival of anadromous fish and other aquatic species
- Improve Delta environmental and export water quality

To the extent possible, while meeting the above primary planning objectives, the Draft Feasibility Report also recognizes opportunities to accomplish the following:

- Provide sustainable hydropower generation
- Provide opportunities for recreation
- Provide flood-damage reduction

Multiple Cost-Effective Plans

An iterative process was followed to develop alternatives that address each of the planning objectives. All four of the final alternatives for Sites Reservoir would provide net NED benefits.

- **Alternative A:** A 1.27 MAF reservoir at Sites with a new intake/release structure on the Sacramento River. Operations would emphasize south-of-the-Delta export to the SWP.
- **Alternative B:** A 1.81 MAF reservoir at Sites with a new release structure on the Sacramento River. Operations would emphasize south-of-the-Delta export to the SWP.
- **Alternative C:** A 1.81 MAF reservoir at Sites with a new intake/release structure on the Sacramento River. Operations would emphasize south-of-the-Delta export to the SWP.
- **Alternative D:** A 1.81 MAF reservoir at Sites with a new intake/release structure on the Sacramento River. Operations would emphasize a blend of north-of-the-Delta agricultural supply with south-of-the-Delta exports.

As shown in Table 10-1, Alternative C is estimated to provide the highest net NED benefits.

Table 10-1. Summary of Costs and Benefits for NODOS Alternatives (\$ Millions, 2015)

Cost/Benefit	Alternative A	Alternative B	Alternative C	Alternative D
Total Development Cost (\$M) ^a	\$4,825	\$4,873	\$5,278	\$5,308
Annual Costs (\$M/yr) ^b	\$174	\$175	\$187	\$188
Annual Benefits (\$M/yr)	\$288	\$286	\$323	\$279
Annual Net Benefits (\$M/yr)	\$115	\$110	\$136	\$84

Discounted at the Federal discount rate of 2.875% over 100 years. May not total exactly due to rounding.

^a Development cost shown for 2015 price levels.

^b Includes OM&R expenditures.

NODOS = north-of-the-Delta offshore storage

OM&R = operation, maintenance, and replacement

\$M = millions of dollars

\$M/yr = millions of dollars per year

National Economic Development Account Plan – Alternative C

The evaluation of the accomplishments, benefits, and costs indicates that Alternative C would provide the highest net NED benefits. Alternative C is also considered to be protective of the environment. Consistent with the P&Gs, Alternative C is identified as the NED Plan.

Other Principles and Guidelines Accounts

Alternative D provides the highest RED benefits and is the Locally Preferred Alternative developed by the Authority. Alternative D would provide more water supply for local agriculture and would modify facilities to reduce impacts on local landowners.

Alternatives C and D provide the greatest value under the EQ account. The operations under Alternative C would provide greater benefits to Delta environmental water quality (including improved habitat for endangered Delta smelt). The operations under Alternative D would provide greater benefits to anadromous fish (including endangered winter-run Chinook salmon) in the Sacramento River. The operations for either alternative could be adaptively managed to selectively increase benefits for either smelt or salmon.

Long-term drought preparedness, sustainable groundwater management, and emergency water supply and emergency response were considered under the OSE account. Alternative C was considered to provide the highest value under the OSE account, followed by Alternative D.

Costs of the NED and Locally Preferred Alternative

The estimated costs for the NED and Locally Preferred Alternative are shown in Table 10-2. Estimated costs assume that alternative delivery (e.g., design build contracting or similar methods) is an acceptable procurement method. The feasibility-level estimate for the total construction cost of Alternative C is \$4.67 billion.

Table 10-2. Estimated Costs for NED and Locally Preferred Alternative (Alternatives C and D)

Item	NED Plan (Alternative C)	Locally Preferred Alternative (Alternative D)
Field costs (\$ millions)	\$4,028	\$4,046
Non-contract costs (\$ millions)	\$643	\$651
Interest During Construction (\$ millions) ^a	\$607	\$611
Estimated total development cost (\$ millions)	\$5,278	\$5,308
Annual costs (\$ millions/year) ^b	\$161	\$162

Costs are based on October 2015 price levels, a 100-year period of analysis, and a 2.875 percent interest rate.

^a For Interest During Construction, construction is anticipated to begin in 2022 and require 8 years for completion. IDC is shown at 2015 price levels.

^b Annual costs include OM&R expenditures and are presented in 2015 dollars and at 2015 price levels.

NED = National Economic Development

OM&R = operation, maintenance, and replacement

Federal funding for the Locally Preferred Alternative would be capped by the cost assignment for the NED Plan (the current assignment for the NED Plan is \$730 million, and the current assignment for the Locally Preferred Alternative is \$824 million).

Benefits of the NED and Locally Preferred Alternative

The NED and Locally Preferred Alternative would provide benefits associated with each of the primary and secondary objectives (Table 10-3). Although there are uncertainties (see Chapter 7, Alternative Evaluation), the NED Plan can be adaptively managed to maintain a high level of benefits under a wide range of potential future conditions.

Feasibility of the NED and Locally Preferred Alternative

Preliminary findings in this Draft Feasibility Report indicate that the alternatives appear to be feasible; however, more work is needed to confirm this finding. Additional analysis is under way, as discussed in the section titled “Next Steps,” below. The findings of the additional analysis could modify the conclusions of this Draft Feasibility Report.

Technical Feasibility

Technical feasibility considers both the feasibility of constructing the facilities and the feasibility of the operations for the project.

Facilities: The facilities for Alternatives C and D are considered to be constructable and could be operated and maintained. The engineering design for Alternatives C and D has been developed to support a Class 4 (appraisal) estimate (ACE International) of the construction costs; however, some facilities are currently developed to a Class 3 level (feasibility). Class 3 estimates are based on limited information and intended for project screening and determination of feasibility. A summary of the estimates is provided in the section titled “Design Considerations” in Appendix B, Engineering. Reclamation performed DEC reviews in July 2007 and May 2014 and a special assessment in March 2017. The special assessment identified specific actions that are needed to bring all facilities up to the level of a Class 3 estimate.

Table 10-3. Summary of Estimated Benefits for the NED and Locally Preferred Alternative

Item	NED Plan Benefits	Locally Preferred Alternative Benefits
Increase in Water Supply and Reliability (Primary Objective)		
Total increased annual water supplies (Average Annual)	171 TAF	224 TAF
Total increased annual water supplies (Dry and Critical years)	344 TAF	418 TAF
Increased emergency water supply response capability	Yes	Yes
Anadromous Fish (Primary Objective)		
End-of-September increase in Shasta Lake coldwater pool (Dry and Critical years)	175 TAF	198 TAF
Winter-run Chinook fish production increase (thousand fish – SALMOD)	756	986
Delta Environmental Water Quality (Primary Objective)		
Jul-Aug improvement in X2 position (Full Simulation Period)	1.3 km	1.0 km
Hydropower (Secondary Objective)		
Annual hydropower generation from pump-back operation	42 GWh	47 GWh
Recreation (Secondary Objective)		
Recreation user-days	187,000	187,000
Flood Damage Reduction (Secondary Objective)		
Total area with increased flood protection (100-year flood event)	9,570 acres	9,570 acres

Delta = Sacramento–San Joaquin River Delta
 GWh = gigawatt-hours
 km = kilometer(s)
 NED = National Economic Development
 SALMOD = Salmonid Population Model
 TAF = thousand acre-feet

Specifically, additional geotechnical work is needed on the pumping plants and Holthouse Dam to advance their estimates to a Class 3 level. The geotechnical investigation results will then be incorporated into the facility designs to bring them to a feasibility level. Additional drawings are also needed for the pumping plants to support quantities for the feasibility-level estimate. These actions will be completed before the Final Feasibility Report and could result in changes to the cost estimate (an increase or decrease in costs). Changes to the cost estimate could change the net NED benefits. These changes to the cost estimate will be consistent across alternatives and are not expected to change the NED plan.

Operations: The ability of an alternative to achieve the level of benefits identified in this Draft Feasibility Report depends on cooperative operation of Sites Reservoir with the CVP and SWP. A Water Rights Strategy and Principles of Agreement between Reclamation, the Authority, and DWR (see Chapter 6, Alternative Development) are needed to support the determination of technical feasibility. The Authority is coordinating an Operations Work Group with Reclamation and DWR to develop the Principles of Agreement. The Principles of Agreement are necessary to achieve the benefits presented for Alternatives C and D in this Draft Feasibility Report. One key principle is that Sites Reservoir operations would cause no negative impacts to the CVP, SWP, or their contractors.

Environmental Feasibility

The environmental effects of Alternatives C and D are evaluated in the Sites Reservoir Draft EIR/EIS (Reclamation and Authority 2017). An environmentally preferred alternative that is consistent with NEPA requirements will be identified in the Final EIR/EIS. Constructing Sites Reservoir would affect environmental resources in the Primary, Secondary, and Extended Study Areas. Beneficial effects correspond to the following resource areas: water management, agricultural resources, fisheries and aquatic resources, socioeconomics, power and energy, and recreation. Some adverse effects (e.g., temporary, construction-related effects) would be reduced to less-than-significant levels through mitigation. Other adverse effects would be permanent, including effects on terrestrial wildlife, land use, air quality, greenhouse gas, and cultural resources. The Draft EIR/EIS is incorporated by reference into this document. The Draft EIR/EIS evaluates the representative environmental effects. The proposed mitigation measures are presented in Appendix 1A of the EIR/EIS and are included in the alternative cost estimates. Reclamation and the Authority will incorporate environmental commitments and BMPs to avoid or minimize potential project impacts.

The evaluation of environmental feasibility is an ongoing process that will incorporate public comment on the Draft EIR/EIS into the Final EIR/EIS. Additional work on climate change will be needed before the Final EIR/EIS.

Economic Feasibility

Based on evaluations to date, Alternatives C and D are economically feasible, and would generate a positive NED average annual benefit of \$323.2 million. Alternative C offers the greatest net NED benefits (\$135.8 million). The benefit-cost ratio is 1.72, and the total net benefit over the 100-year planning horizon is \$4.45 billion. The project's total development cost (construction and IDC) is approximately \$5.28 billion. Ongoing work may modify both the benefits and the costs, but the alternative is expected to remain economically feasible.

These evaluations will be reconfirmed after the engineering and estimates are advanced to prepare a Class 3 estimate. The Final Feasibility Report may also incorporate additional models and methods to determine economic feasibility.

Financial Feasibility

Financial feasibility was evaluated using a variety of ownership and assignment scenarios. An initial allocation of construction costs for Alternative C to project benefits is shown in Table 10-4, which shows the assignment of costs to non-reimbursable purposes. As shown in the table, approximately 86 percent of the total cost is assigned to State and local cost-share partners. Approximately 14 percent of the total cost assigned to the Federal government is non-reimbursable.

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Table 10-4. Cost Assignment for Federal and Non-Federal Partners for Development Costs: Alternative C

Purpose/Action	Total Percent	Total Cost	Cost Assignment (\$ Millions)			
			Federal Non-Reimbursable		Non-Federal Partners ^a	
			Percent	Cost	Percent	Cost
Alternative C: Development Cost Assignment (Construction and IDC) – Nominal						
Water Supply	34%	1,813	0%	0	100%	1,813
M&I Water Supply	91%	1,653	0%	0	100%	1,653
CVP Service Area	3%	49	0%	0	100%	49
SWP Service Area	97%	1,605	0%	0	100%	1,605
Agricultural Water Supply	9%	160	0%	0	100%	160
CVP Service Area	51%	81	0%	0	100%	81
SWP Service Area	49%	79	0%	0	100%	79
Incremental Level 4 Refuge	13%	686	50%	347	50%	347
Anadromous Fish	13%	686	50%	343	50%	343
Water Quality	25%	1,321	0%	0	100%	1,321
M&I Water Quality	10%	130	0%	0	100%	130
Agricultural Water Quality	1%	10	0%	0	100%	10
Delta Environmental Water Quality	89%	1,181	0%	0	100%	1,181
Hydropower	12%	642	0%	0	100%	642
Recreation	1%	42	0%	0	100%	42
Flood Damage Reduction	0.1%	80	50%	40	50%	40
Total	100%	5,278	13.8%	680	86.2%	4,548

^a Includes non-Federal and beneficiaries' paid funding. Assumes cost assignment based on beneficiaries' benefits. Totals may not add exactly due to rounding.
CVP = Central Valley Project
IDC = interest during construction
M&I = municipal and industrial
OM&R = operation, maintenance, and replacement
SWP = State Water Project

From the allocated costs for various project purposes, an initial assessment of financial repayment capability was developed for Alternative C. The beneficiaries for irrigation water supply, M&I water supply, and hydropower would have the ability to pay the allocated costs.

Table 10-5 provides a similar analysis for the Locally Preferred Alternative.

Table 10-5. Cost Assignment for Federal and Non-Federal Partners for Development Costs: Alternative D

Purpose/Action	Total Percent	Total Cost	Cost Assignment (\$ Millions)			
			Federal Non-Reimbursable		Non-Federal Partners ^a	
			Percent	Cost	Percent	Cost
Alternative D: Development Cost Assignment (Construction and IDC) – Nominal						
Water Supply	41%	2,115	0%	0	100%	2,115
M&I Water Supply	85%	1,795	0%	0	100%	1,795
CVP Service Area	1%	20	0%	0	100%	20
SWP Service Area	99%	1,775	0%	0	100%	1,775
Agricultural Water Supply	15%	319	0%	0	100%	319
CVP Service Area	79%	251	0%	0	100%	251
SWP Service Area	21%	68	0%	0	100%	68
Incremental Level 4 Refuge	10%	521	50%	260	50%	260
Anadromous Fish	19%	1,035	50%	517	50%	517
Water Quality	17%	893	0%	0	100%	893
M&I Water Quality	34%	302	0%	0	100%	302
Agricultural Water Quality	2%	20	0%	0	100%	20
Delta Environmental Water Quality	64%	572	0%	0	100%	572
Hydropower	11%	604	0%	0	100%	604
Recreation	1%	48	0%	0	100%	48
Flood Damage Reduction	2%	92	50%	46	50%	46
Total	100%	5,308	14.5%	770^b	85.5%	4,484

^a Includes non-Federal, and beneficiaries' paid funding.

^b The potential future Federal allocation has not yet been determined and it may be limited by the potential Federal contribution for the NED Plan (Alternative C). In this case, the non-Federal partners would have to cover the differential despite its current assignment as Federal non-reimbursable.

Assumes cost assignment based on beneficiaries' benefits.

Totals may not add exactly due to rounding.

CVP = Central Valley Project

IDC = interest during construction

M&I = municipal and industrial

SWP = State Water Project

Prior to completion of the Final Feasibility Report, additional analysis will be performed to better define the cost-share for project beneficiaries, further evaluate the costs, and characterize risk to determine the guaranteed maximum price.

Federal Interest

For an action to be implementable, a Federal interest in the action is required, and the action must be feasible. Federal actions must contribute to the NED in accordance with the requirements of the P&Gs. The NED and Locally Preferred Alternative indicate net benefits while protecting the environment.

Reclamation's Interest: Reclamation's interest in the action is based on the agency's mission: to manage, develop, and protect water and related resources in an environmentally and

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economically sound manner in the interest of the American public. Implementing the NED Plan, in an environmentally and economically sound manner, would accomplish the following:

- Improve water supply reliability and the system flexibility for water supplies throughout the CVP and SWP service areas for agricultural, urban, and environmental uses
- Improve deliveries of incremental Level 4 supply for optimum habitat management in the Central Valley refuges
- Improve Sacramento and American River water temperatures and flow conditions for salmon and other native fish
- Improve Delta outflows and the X2 position to provide better conditions for Delta smelt and other aquatic species in the Delta, and higher water quality in south-of-the-Delta exports.

Reclamation will work to avoid negative impacts to the CVP and its contractors should Sites Reservoir be constructed and operated.

The assigned costs of implementing the Locally Preferred Alternative exceed the assigned costs of the NED Plan. A waiver would be required for the Secretary of the Interior to approve the Locally Preferred Alternative rather than the NED Plan. The Federal contribution may be capped based on the Federal cost assignment for the NED Plan.

Consistency with CALFED and CVPIA: The NED and Locally Preferred Alternative would contribute to CALFED objectives, including ecosystem quality, water supply reliability, and water quality. Both plans would support the CVPIA objective of improving the survival of anadromous fish. The CVPIA identifies actions and programs to mitigate for the impacts of the existing CVP. The possible implementation of Sites Reservoir would not be a substitute for any CVPIA activities. These activities are expected to be completed as required, independent of any enhancement associated with the project alternatives.

Cooperative Operations

The Authority proposes to operate Sites Reservoir with no negative impacts to CVP or CVP contractors. Reclamation anticipates that a modification to the COA would be needed to accommodate cooperative operations for Sites Reservoir.

Licensing for Hydropower Facilities

The Reclamation Lease of Power Privilege provides a contractual right to a non-Federal entity to use a Reclamation asset (e.g., Funks Reservoir) for electric power generation consistent with Reclamation project purposes. These projects cannot impair the efficiency of Reclamation-generated power or Reclamation water deliveries (including no impacts to CVP power users), jeopardize public safety, or negatively affect other Reclamation project purposes.

It is recommended that the Sites Pumping/Generating Plant hydropower generation facilities be permitted using the Lease of Power Privilege process. Reclamation owns the existing Funks

Reservoir, which will be expanded into the forebay/afterbay (Holthouse Reservoir) for pump-back storage. The Lease of Power Privilege permitting process would greatly expedite the permitting and construction of the reservoir. Otherwise, the hydropower generation facilities will be permitted through the Federal Energy Regulatory Commission process.

Feasibility Report – Next Steps

The following efforts are expected to be completed before issuing the Final Feasibility Report.

Technical Feasibility

This section discusses how the Final Feasibility Report will address water rights, operations, and engineering.

- **Water Rights** – The Authority is developing a Water Rights Strategy. This strategy will comprehensively identify the water rights requirements (Place of Use, Purpose of Use, Point of Diversion, diversion to storage, and re-diversion to storage) and provide an implementation plan for securing them. This strategy will inform the Final Feasibility Report. Finalizing the strategy will require meetings with Reclamation, DWR, the Authority, and SWRCB related to any of the possible actions.
- **Operations** – The Authority has formed an Operations Work Group with Reclamation and DWR participation to define cooperative operations that are critical to maximizing the benefits of the project. The Authority proposes to operate Sites Reservoir in a cooperative manner with the existing CVP and SWP facilities to increase public benefits and Federal interest in the project. Cooperative operations would require a new agreement with Reclamation and DWR, with the Principles of Operations to govern system operations.

Additional modeling is recommended to address limitations in using the data output and conclusions based on Sites Reservoir CALSIM II models. The CALSIM II model used for Sites is a “stand-alone” model that is unable to consider some large systemic changes anticipated for the CVP and SWP systems.

- **Engineering:** The Final Feasibility Report will address the six findings in the 2017 DEC special assessment.
 - **Geotechnical Studies:** Geotechnical investigation is needed for the pumping plants, Holthouse Dam, and the TRR.
 - **Power Requirements:** System impact studies are needed for the utilities that would supply power for the pumps.
 - **Cost Estimates:** Additional engineering is needed to bring all facilities to feasibility-level cost estimates. The resulting cost estimates should be a Class 3 estimates.

Environmental Feasibility

The Final Feasibility Report will incorporate the findings of the Final EIR/EIS. Additional evaluation of climate change will also be completed to support the Final EIR/EIS.

Economic Feasibility

The Class 3 cost estimates will be used to confirm economic feasibility. Additional economic modeling may also be performed.

Financial Feasibility

The Authority will deliver an evaluation of financial capability based on the award of WSIP funding that would provide a clearer definition of the beneficiaries and their respective cost-shares, including State funding commitments. Forthcoming efforts would also include a risk assessment of the construction cost estimate and a schedule to establish a guaranteed maximum price. Once the State determines its level of contribution to the project through WSIP, the non-public water supply, along with the corresponding cost-share, will be allocated between the agencies participating in the Authority.