June 27, 2024

**Delta Stewardship Council**

# DELTA CONVEYANCE PROJECT

## Cost Estimate and Benefit Cost Analysis

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# Modernizing California's Water Infrastructure

Agenda Item: 9
Meeting Date: June 27, 2024

January 1, 2024 – June 13, 2024

## 941,000 acre-feet of water = enough water to supply:

Over **9.8 million**
people for one year

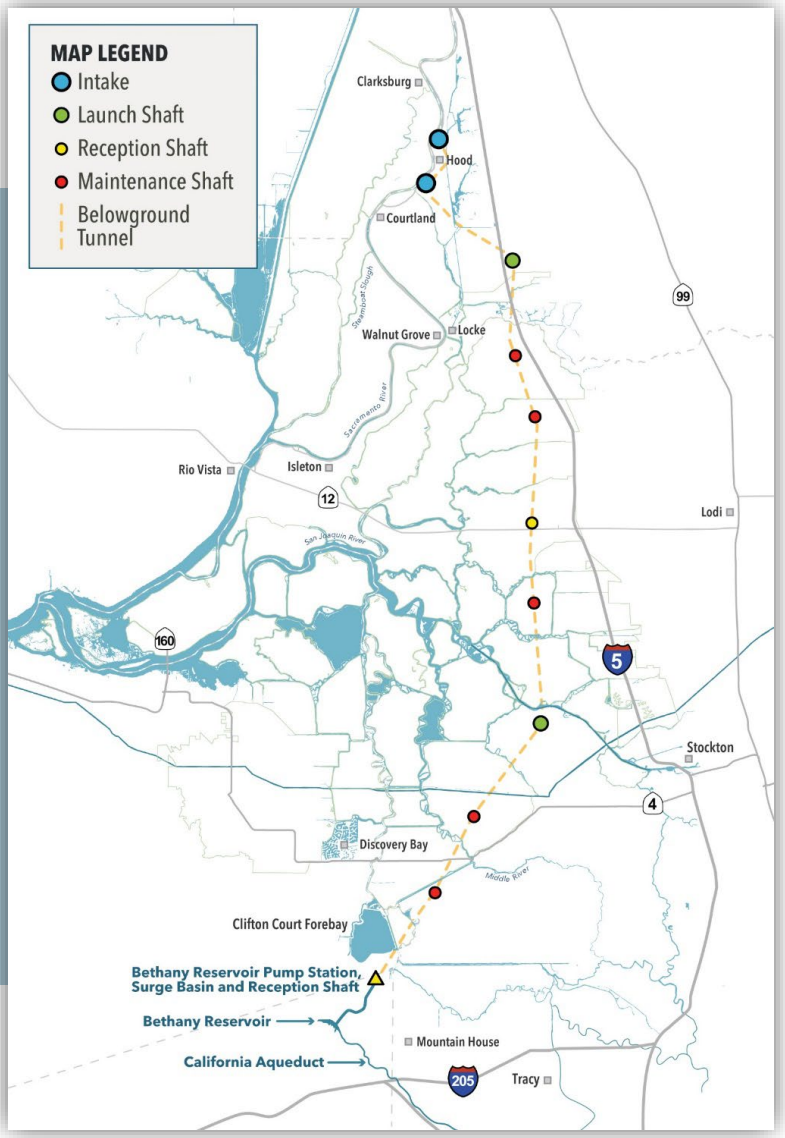
or

Nearly **3.3 Million**
households for one year

# Cost Estimate

# What did we estimate?

- Two (2) new intakes in the North Delta
- Conveyance tunnel: 45 miles of 36-ft ID single tunnel, 11 shafts
- New pumping plant, aqueducts and discharge structure connecting directly to Bethany Reservoir



# Estimate Methodology

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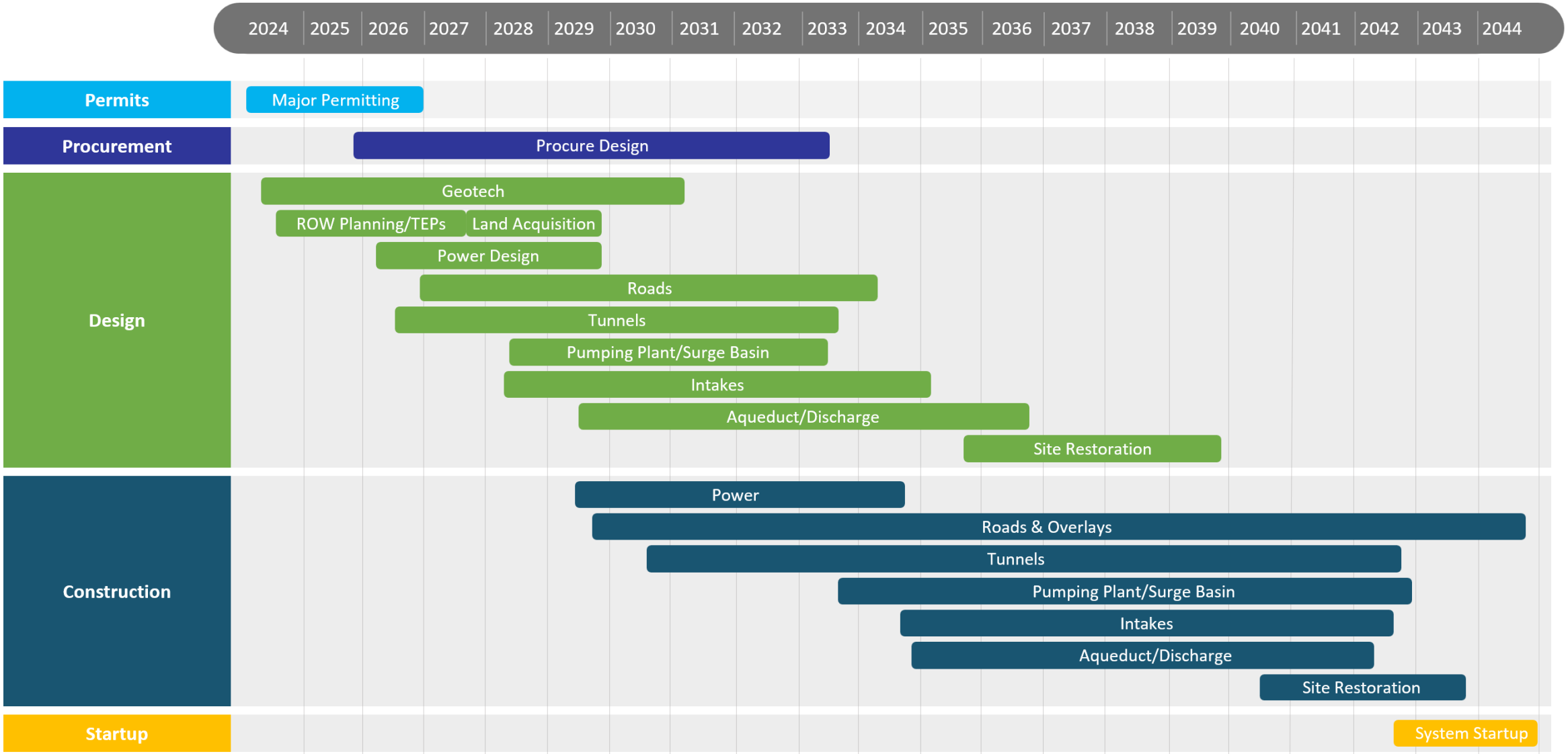
# DCP Schedule Summary





# 2023 Cost Estimate Update



- Independent construction est. prepared by DCA Design and Program Management teams – reconciled cost Δ ~2%
- Independent Soft Cost estimates, reconciled differences and aligned to Master Program Schedule
- Compared to the 2020 cost assessment corrected for inflation

- $467M risk treatment costs included in construction est.
- Construction contingency = 30%
- Other Program Cost contingency = 0%, 15%, or 30% depending on item

| TOTAL CONSTRUCTION COSTS | BETHANY (2023) $15,012,000,000 | % Construction Cost |
|---|---|---|
| Intakes | $1,714,000,000 | -- |
| Tunnel and Shafts | $6,353,000,000 | -- |
| Pumping Plant /Surge Basin/Aqueduct & Discharge | $3,198,000,000 | -- |
| Utilities and Logistics (power included below) | $283,000,000 | -- |
| **Construction Sub-Total** | **$11,548,000,000** | **--** |
| **Contingency (30%)** | **$3,464,000,000** | **--** |
| **OTHER PROGRAM COSTS** | **$5,108,000,000** | |
| **Planning/Design/CM (Soft Costs)** | **$3,328,000,000** | **22.2%** |
| DWR Oversite | $426,000,000 | 2.8% |
| DCA Program Management Office | $668,000,000 | 4.4% |
| DCA Engineering (Design and CM Services) | $2,167,000,000 | 14.4% |
| DCA Permits and Agency Coordination | $67,000,000 | 0.4% |
| **Other Costs** | **$1,780,000,000** | **--** |
| Land Acquisition | $158,000,000 | -- |
| Mitigation Program | $960,000,000 | -- |
| Power | $415,000,000 | -- |
| CCWD Settlement | $47,000,000 | -- |
| Community Benefits Program | $200,000,000 | -- |
| | **TOTAL $20,120,000,000** | |

# Comparison to 2020 Cost Assessment



| TOTAL CONSTRUCTION COSTS | BETHANY (2023) $15,012,000,000 | % Const Cost | 2020 Assessment $ 12,101,000,000 | % Const Cost | *2020 in $2023 $15,346,000,000 |
|---|---|---|---|---|---|
| Two Intakes | $1,714,000,000 | -- | $ 1,448,000,000 | -- | $1,836,000,000 |
| Tunnel and Shafts | $6,353,000,000 | -- | $ 4,473,000,000 | -- | $5,672,000,000 |
| Bethany Complex / Southern Complex Facilities (Forebay) | $3,198,000,000 | -- | $ 2,326,000,000 | -- | $2,950,000,000 |
| Utilities, Power and Logistics (Power for Bethany Below) | $283,000,000 | -- | $ 522,000,000 | -- | $662,000,000 |
| **Construction Sub-Total** | **$11,548,000,000** | **--** | **$ 8,769,000,000** | **--** | **$11,120,000,000** |
| **Contingency (30% / 38%)** | **$3,464,000,000** | **--** | **$ 3,332,000,000** | **--** | **$4,226,000,000** |
| **Other Program Costs** | **$5,108,000,000** | | **$3,800,000,000** | | **$4,827,000,000** |
| **Planning/Design/CM (Soft Costs)** | **$3,328,000,000** | **22.2%** | **$3,080,000,000** | **25.5%** | **$3,906,000,000** |
| DWR Oversite | $426,000,000 | 2.8% | $ 180,000,000 | 1.5% | $228,000,000 |
| DCA Program Management Office | $668,000,000 | 4.4% | $ 420,000,000 | 3.5% | $533,000,000 |
| DCA Engineering (Design and CM Services) | $2,167,000,000 | 14.4% | $ 2,420,000,000 | 20.0% | $3,069,000,000 |
| DCA Permits and Agency Coordination | $67,000,000 | 0.4% | $ 60,000,000 | 0.5% | $76,000,000 |
| **Other Costs** | **$1,780,000,000** | **--** | **$720,000,000** | **--** | **$921,000,000** |
| Land Acquisition | $158,000,000 | -- | $ 320,000,000 | -- | $416,000,000 |
| Mitigation Program | $960,000,000 | -- | $ 400,000,000 | -- | $ 505,000,000 |
| Power | $415,000,000 | -- | included above | -- | included above |
| CCWD Settlement | $47,000,000 | -- | $0 | -- | $0 |
| Community Benefits Program | $200,000,000 | -- | $0 | -- | $0 |
| **TOTAL** | **$20,120,000,000** | | **$15,901,000,000** | | **$20,173,000,000** |

# What are Innovations?

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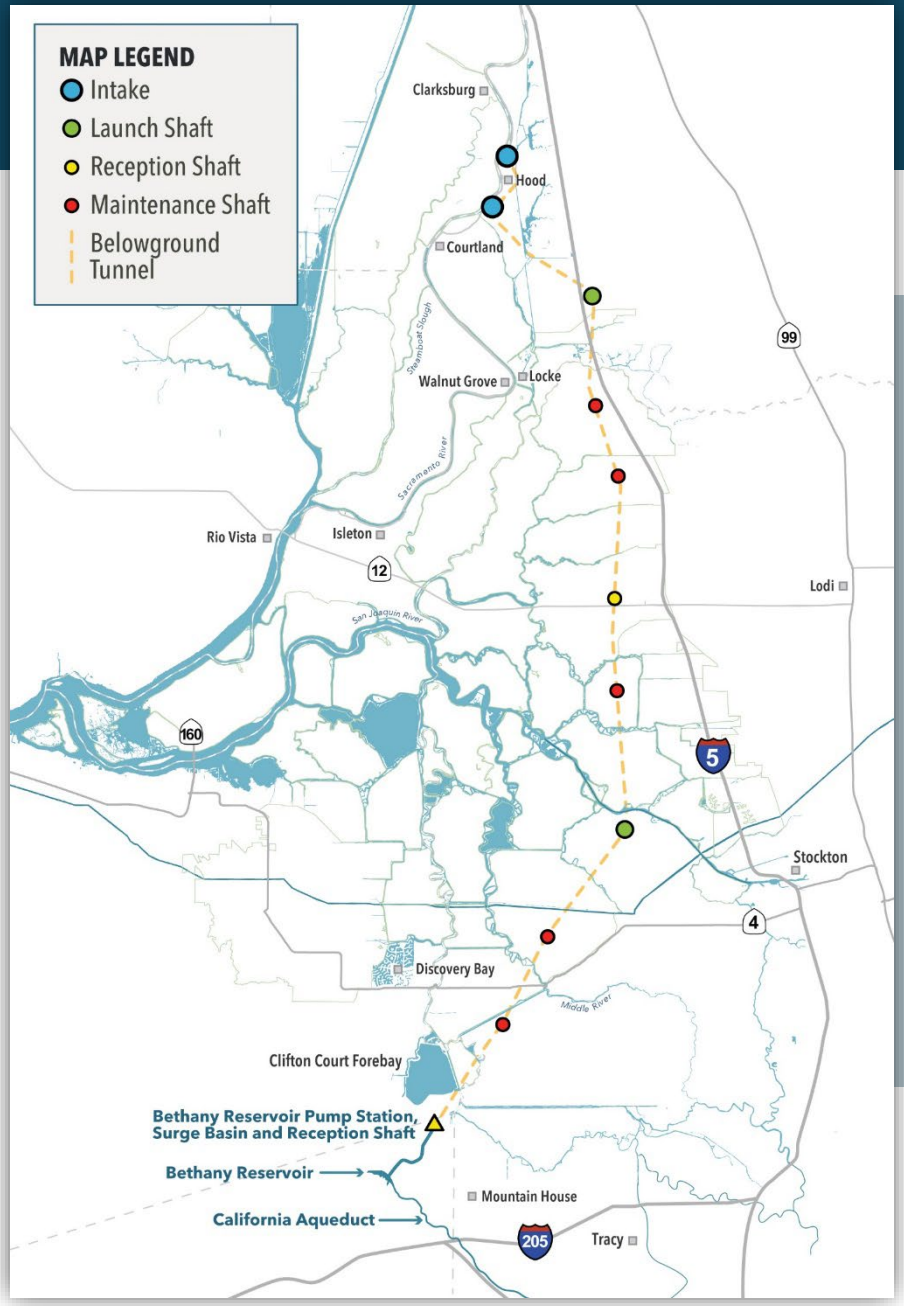

# Innovation Example – Bethany Reservoir Pumping Plant

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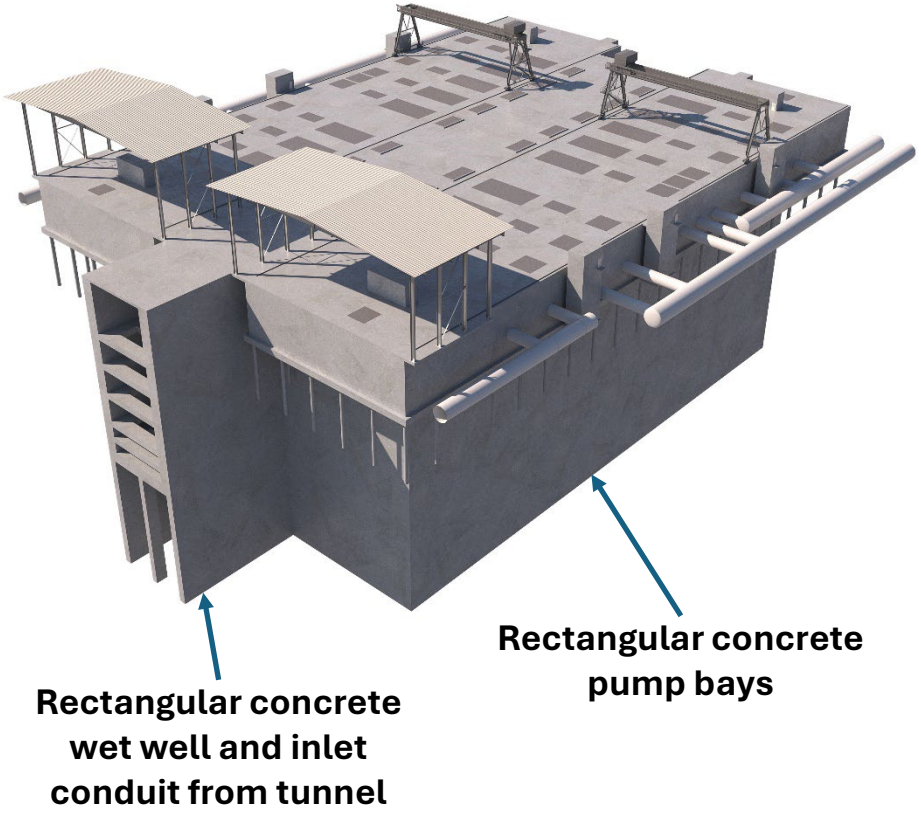
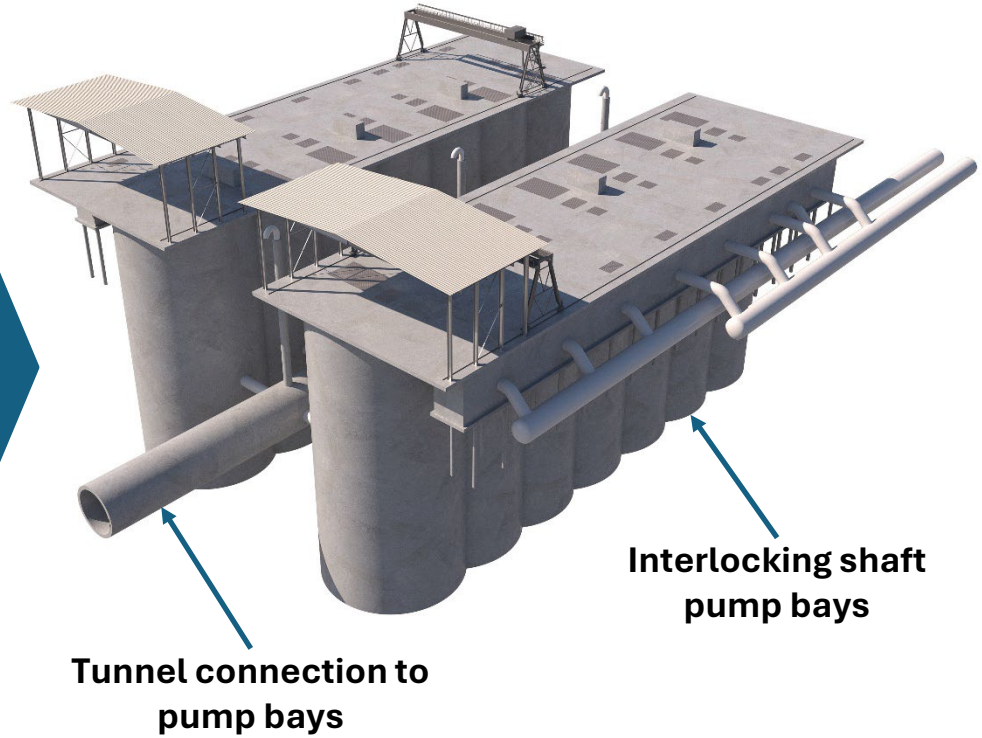



**INNOVATION ADVANTAGES**

- Reduced quantities, saves:
  - 274,000 $yd^3$ soil excavation
  - 84,000 $yd^3$ concrete
  - 10,400 tons rebar
- Shortens construction schedule by **981 days**
- Reduces direct construction cost by **$138,720,000**
- No changes to above ground configuration or features

## Innovation Design



# Comparison of Costs w/ Innovations



- proportion of risk treatment costs
- contingency %, labor %
- direct application of “other costs”

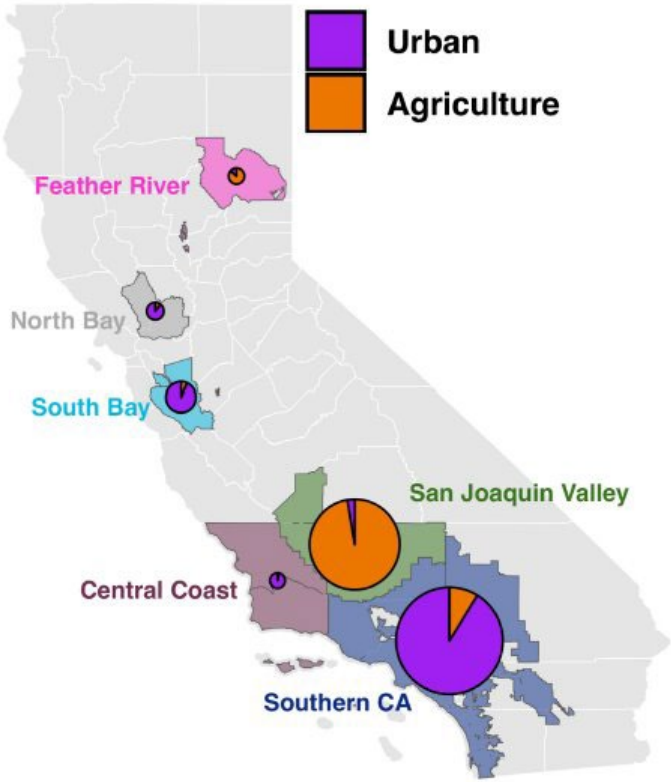
- **Innovations reduce total project cost by $1.23B , or 6% of total cost**

| TOTAL CONSTRUCTION COSTS | Total Project Cost Estimate ($2023) $15,012,000,000 | % Const Cost | Total Project Cost w/ Innovations ($2023) $ 14,008,000,000 |
|---|---|---|---|
| Two Intakes | $1,714,000,000 | -- | $ 1,678,000,000 |
| Tunnel and Shafts | $6,353,000,000 | -- | $ 6,130,000,000 |
| Pumping Plant /Surge Basin/Aqueduct & Discharge | $3,198,000,000 | -- | $ 2,703,000,000 |
| Utilities and Logistics | $283,000,000 | -- | $ 264,000,000 |
| **Construction Sub-Total** | **$11,548,000,000** | **--** | **$ 10,775,000,000** |
| **Contingency (30%)** | **$3,464,000,000** | **--** | **$ 3,223,000,000** |
| **Other Program Costs** | **$5,108,000,000** | | **$4,838,900,000** |
| **Planning/Design/CM** | **$3,328,000,00** | **22.2%** | **$3,106,000,000** |
| DWR Oversite | $426,000,000 | 2.8% | $ 398,000,000 |
| DCA Program Management Office | $668,000,000 | 4.4% | $ 623,000,000 |
| DCA Engineering (Design and CM Services) | $2,167,000,000 | 14.4% | $ 2,022,000,000 |
| DCA Permits and Agency Coordination | $67,000,000 | 0.4% | $ 63,000,000 |
| **Other Costs** | **$1,780,000,000** | **--** | **$1,780,000,000** |
| Land Acquisition | $158,000,000 | -- | $158,000,000 |
| Mitigation Program | $960,000,000 | -- | $960,000,000 |
| Power | $415,000,000 | -- | $415,00,000 |
| CCWD Settlement | $47,000,000 | -- | $47,000,000 |
| Community Benefits Program | $200,000,000 | -- | $200,000,000 |
| **TOTAL** | **$20,120,000,000** | | **$18,894,000,000** |

# Benefit-Cost Analysis

# The State Water Project

- **Service Area:**
  - 27 million people
  - GDP $2.3 trillion, equivalent to the world's 8th largest economy
- **Current Water Supply:**
  - ~2.56 million acre-feet per year (MAF/yr) of deliveries to urban and agricultural customers
- **Future Challenges:**
  - Climate change and sea level rise expected to reduce deliveries by ~22% by 2070
  - Risk of extended disruption during seismic event

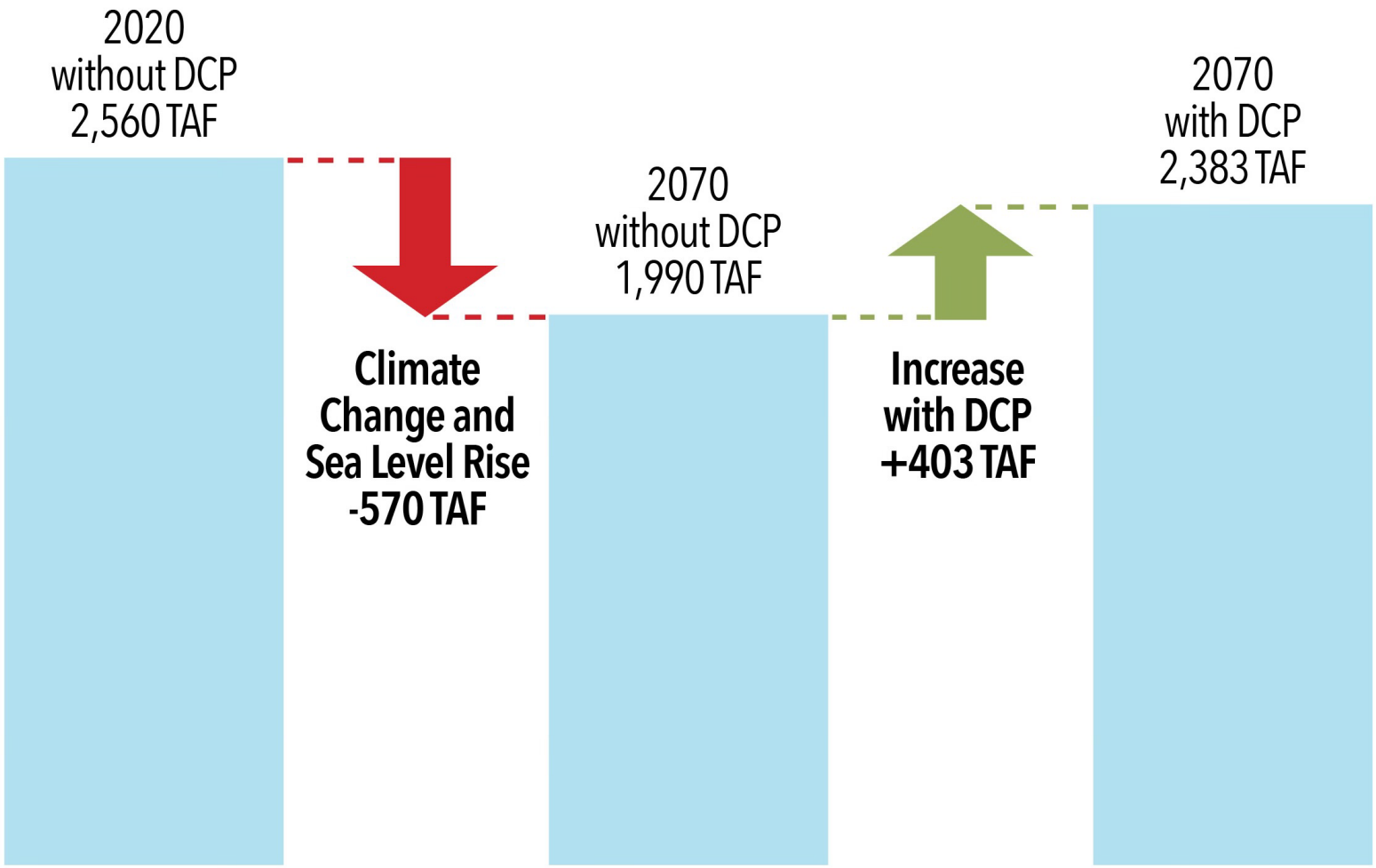


# DCP Readily Passes the Benefit-Cost Test

- **Project Benefits:**
  - **Water Supply Reliability and Quality:** Offset negative impacts of climate change on water deliveries
  - **Seismic Reliability:** Maintain deliveries even after major seismic events
- **Project Costs:**
  - DCA Cost estimate (discounted)
  - + additional O&M costs and environmental impacts
- **Benefit Cost Ratio: 2.20**
  - Passes the Benefit-Cost Test
  - **Every $1 spent = $2.20 gained**

# Water Supply Benefits

## State Water Project Deliveries:



# Water Supply Benefits

- **More SWP deliveries allow** agencies to:
  - Fill storage more frequently
  - Enter drought periods with higher reserves
  - Impose fewer periods of mandatory rationing
  - Reduce severity and frequency of shortages
- **Urban**: measured as consumers' willingness to pay to avoid shortages
  - Economic impact based on peer-reviewed economic models
- **Ag**: based on widely-used SWAP model and water market transaction data

# Water Quality Benefits

- **Benefits** of reduced salinity for SWP contractors **outweigh costs** of 'less than significant' increase in Delta salinity

- **Salinity Impacts:**
  - **Urban:** Reduces treatment cost, improves taste, useful life of appliances, cost of water softening
  - **Ag:** More efficient water use; reduces use of irrigation water needed to flush salts from root zones

# Seismic Benefits

- **Avoiding disruption** to statewide water supply during potentially significant earthquakes **saves money and protects water quality**

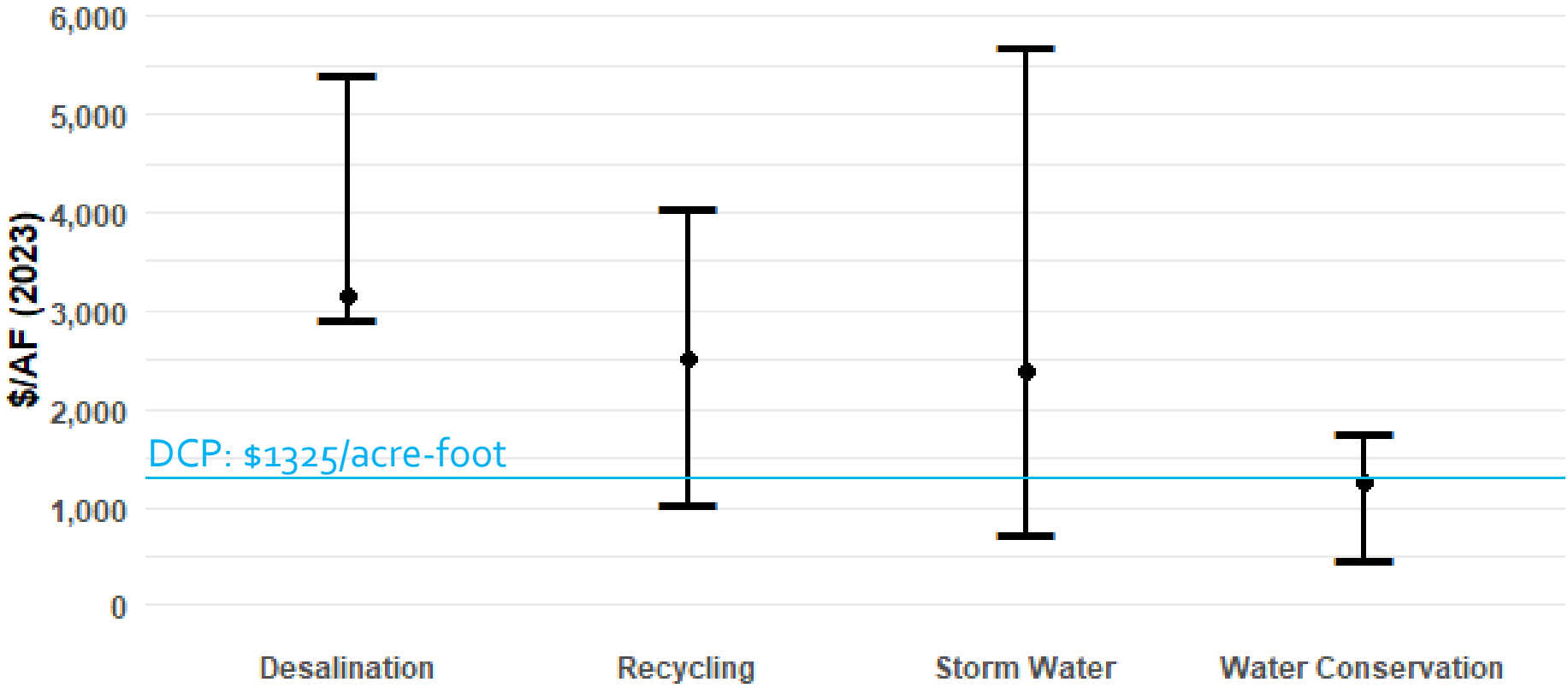
- **Scenario Analyzed: Delta Flood Emergency Management Plan (2018) Scenario 1**
  - 500-year event, 50 levee breaches & 20 islands flooded
  - Economic impacts assessed with water supply reliability and water quality models for urban and agriculture

# Positive Benefit-Cost Ratio Across All Climate Scenarios

## Sensitivity Analysis

| | Main Scenario | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 4 | Scenario 5 |
|---|---|---|---|---|---|---|
| | 2070 Median 1.8′ SLR | 2070 Median 1.8′ SLR & mitigation | 2070 Median 3.5′ SLR | 2070 Median 3.5′ SLR & mitigation | 2040 Median 1.8′ SLR | 2040 Central Tendency 1.8′ SLR |
| Benefit-Cost Ratio | 2.20 | 2.20 | 2.63 | 2.45 | 1.78 | 1.54 |

# Comparison to Alternative Supplies




Source: Sunding, Browne, Zhu (2023) The Economy of the State Water Project
Constructed using data from previous studies by the Pacific Institute, PPIC and CPUC and updated for inflation
DCP cost does not include South-of-Delta conveyance

# Cost of Doing Nothing

- **Cost of Inaction on Climate and Seismic Risk**
  - 22% reduction in deliveries by 2070 (570,000 AF/yr)
- **Direct impacts** of climate change and seismic risk:
  - **Reduced reliability** and flexibility for SWP operations
  - **Water shortages** and mandatory restrictions
  - Ongoing risk of **major seismic disruption**
  - Expensive **alternative supplies**
- **Indirect Impacts** (not evaluated):
  - **Higher rates** for local agencies
  - Impacts on **employment and economic activity** for agricultural economies in Central Valley and urban development in SoCal
  - Higher **food prices**
  - Depletion of **groundwater resources**
- **The cost of inaction** on climate and seismic risk **exceeds the calculated project benefits**

# Other Permitting Activities

- **State Water Board:** Change in Point of Diversion
- **CESA:** DFW Incidental Take Permit
- **ESA**: USFWS/NMFS Biological Opinions for construction / operations
- **NEPA**: Army Corps of Engineers final EIS

**Bethany Cost Estimate**

**Benefit Cost Analysis**

# Stay Informed

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# Questions?