The California Water Fix

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April 2015 Construction Cost Estimate

Presented To:

Santa Clara Valley Water District℠

May 25, 2017

Today's Presentation

1. 5RMK Qualifications/experience
2. Scope of program
3. Cost summary
4. Basis of estimate
5. Intakes
6. Clifton Court pump plants
7. Tunnel reaches

1. 5RMK Qualifications

5RMK Is a project management and planning organization providing the following services to the infrastructure and resource development industries:

- Estimating, scheduling, project planning
- Permitting, siting assessments, environmental compliance
- Program & construction management
- Claims support, defense & dispute resolution

1. 5RMK Qualifications

DRAFT

2. Scope of 2015 Estimate

- New class 3 estimate as defined by the Association for The Advancement of Cost Engineering International
- New scope definition based on new quantity take-offs, crew definitions, equipment selections and productivities
- Scope of the Project:
  - 3 - 3000 CFS Intakes
  - 2 - 4500 CFS Clifton Court Pump Plants
  - 1 - Intermediate Forebay
  - 1 - Clifton Court modifications, include embankments, siphons, canals and control structures
  - Tunnels with shafts and safe havens
    - 1- 28 ft inside diameter x 2 mile long (reach 1)
    - 1 - 28 ft inside diameter x 4.8 mile long (reach 3)
    - 1 - 40 ft inside diameter x 6.8 mile long (reach 2)
    - 2 - 40 ft inside diameter x 30.1 mile long (reaches 4-7)

2. Scope of 2015 Estimate

Total constructed value includes:

- All craft labor costs
- Construction equipment operating and ownership cost
- All permanent material and supply cost
- Field offices, laydown and staging area development
- Personnel, material, equipment and other transport cost
- Construction supervision, administration and management

Cost does not include:

- Land Acquisition, Program Management, Construction Management, Engineering, or Contingency

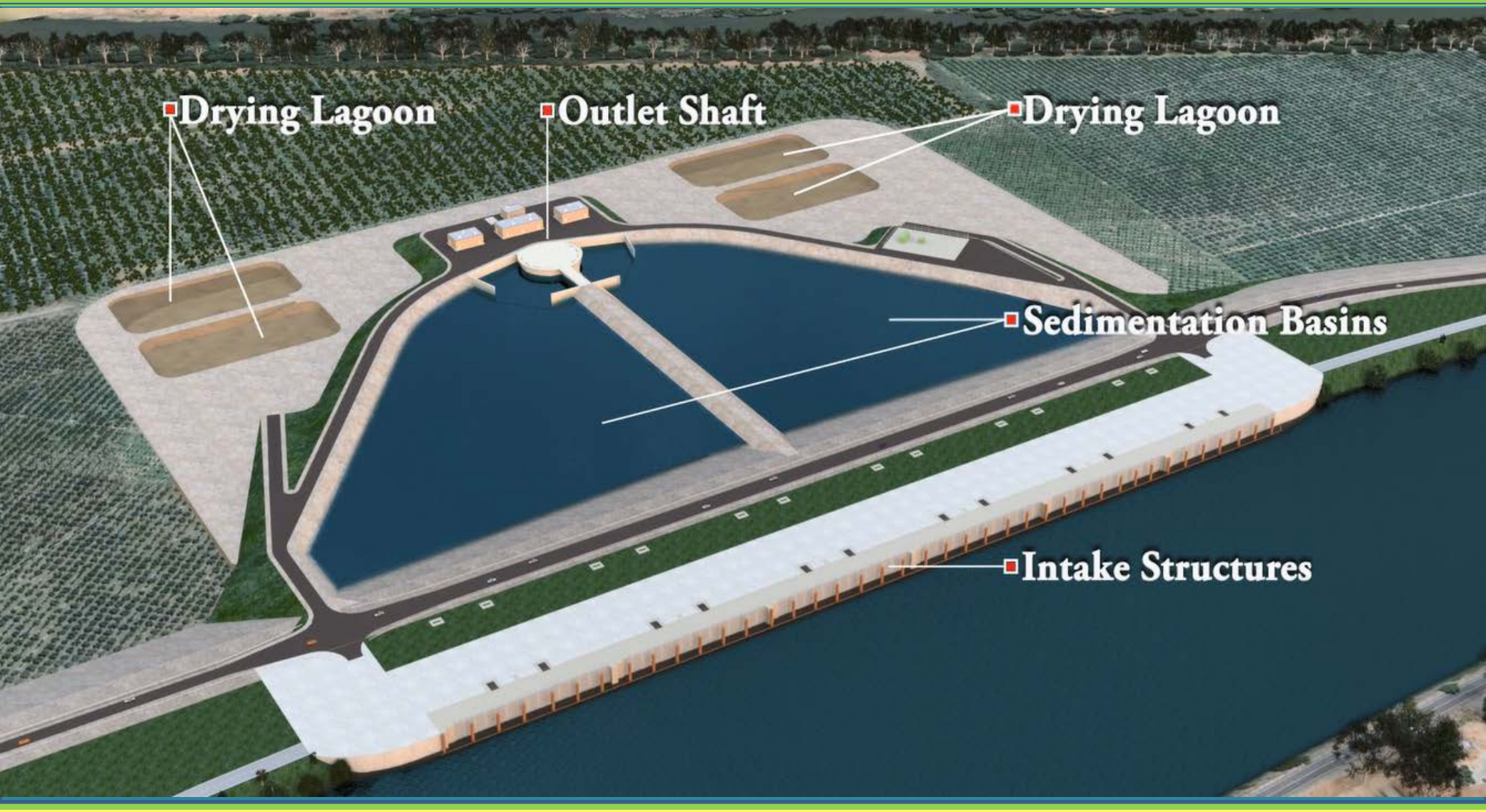
3. Construction Cost

CWF April 2015 Estimate Summary		
Contract		**Estimate**
Intakes 2,3, 5	$	1,082,880,306
Intermediate Forebay	$	159,579,782
Clifton Court Forebay	$	593,720,041
Clifton Court Pump Plant	$	446,577,237
Reach 7 Tunnels	$	1,538,449,966
Reach 6 Tunnels	$	1,559,673,985
Reach 5 Tunnels	$	899,619,545
Reach 4 Tunnels	$	1,603,383,401
Reach 1, 2, & 3 Tunnels	$	1,218,681,541
Communication Network, Scada	$	25,065,734
Access, Power Delivery & Utility Relocations	$	371,300,000
Construction Total	**$**	**9,498,931,538**

4. Basis of Estimate

- Based on April 1, 2015 Conceptual Engineering Report (CER)
- Detailed quantity takeoffs prepared from CER
- Wage & workmen's comp rates based on "prevailing rates" listed by California Department of Industrial Relations
- Equipment ownership and operating costs based on US Army Corps Engineers
- Vendor and subcontract costs based on independent supplier solicitations
- All costs data is in 2014 dollars
- Work shifts – surface facilities: 4 days per week, 10 hours per day
- Work shifts – tunnels: 5 days per week, (2)10 hours shifts per day
- Geotechnical data is limited – further investigations are planned
- Advance rate for 40' diameter tunnels – 31.1 to 34.1 ft/day
- Advance rate for 28' diameter tunnels - 34.5 ft/day (reach 1); 40.4 ft/day (reach 2)

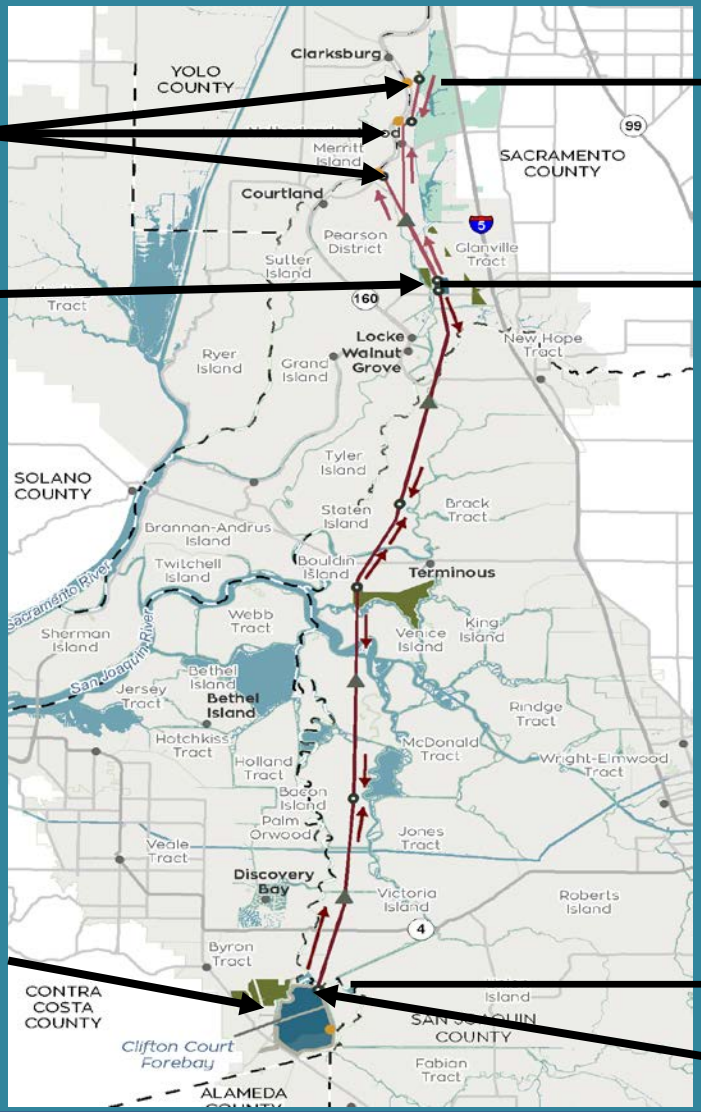
5. Intakes Overview



6. Clifton Court Pump Plants

Combined Surge Shaft and Pump Plants

7. Tunnel Reaches



Intakes

Intermediate Forebay

Clifton Court

North Tunnel Reaches 1,2,3

Main Tunnel Reaches 4-7

Pump Plants

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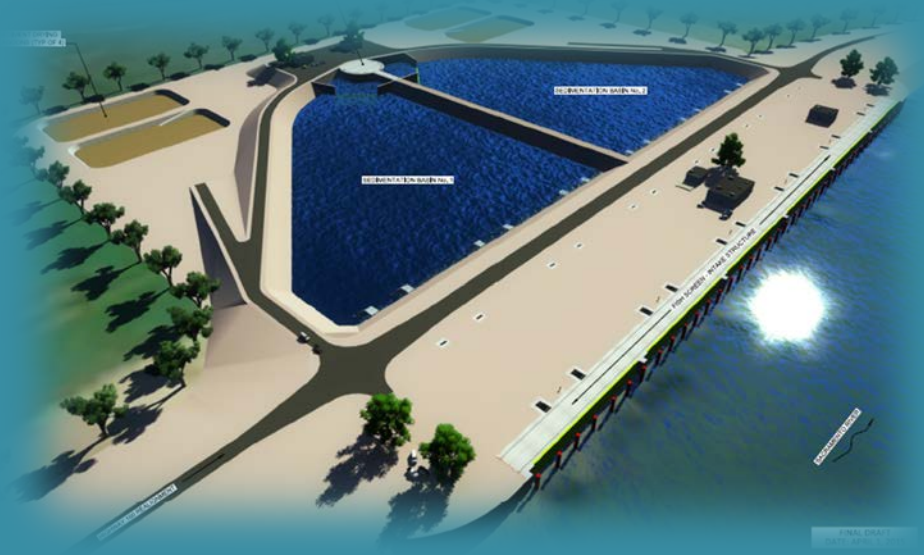
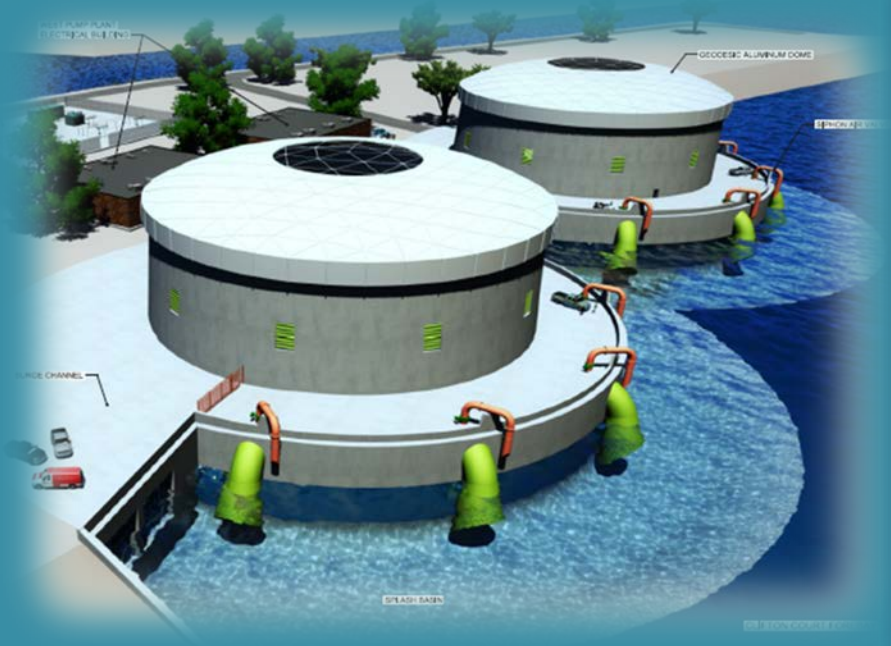




ALDEA SERVICES

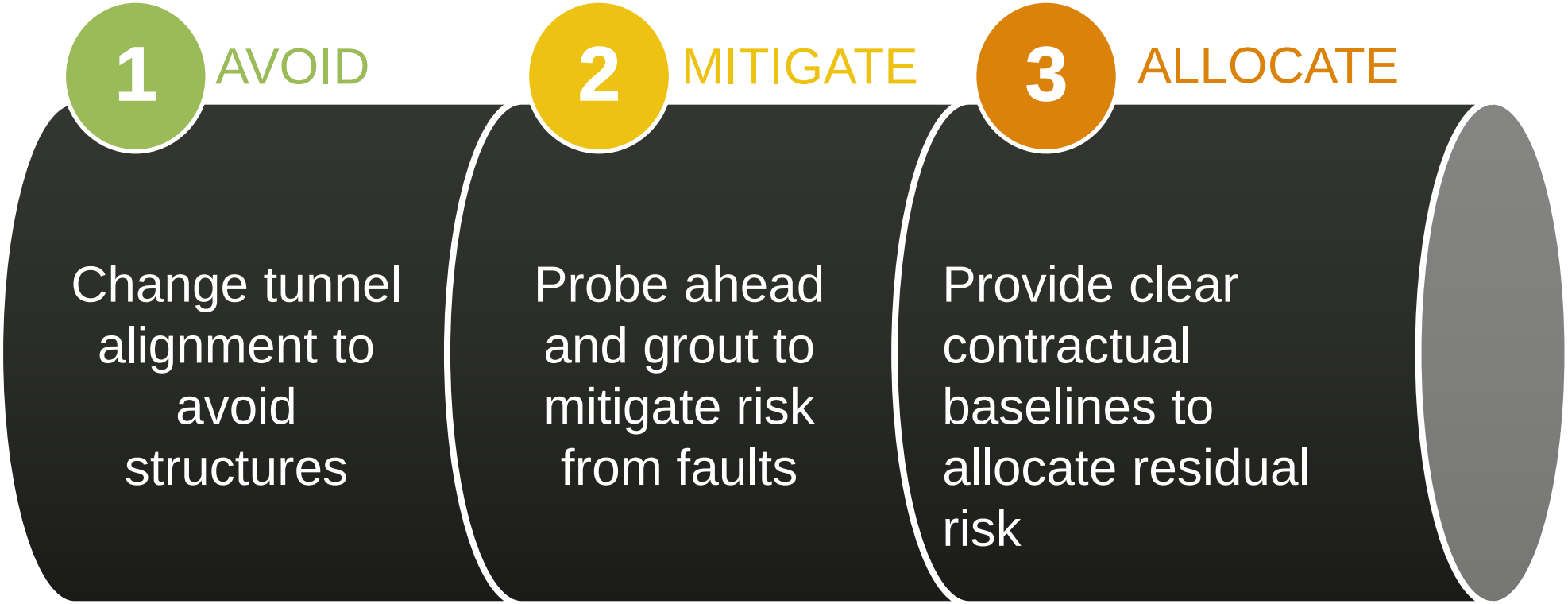
CALIFORNIA WATER FIX

RISK MANAGEMENT – DESIGN AND CONSTRUCTION

ALDEA SERVICES LLC
RELIABLE RESOURCES DELIVERED

Process of Risk Management

Three-Step Risk Management Process



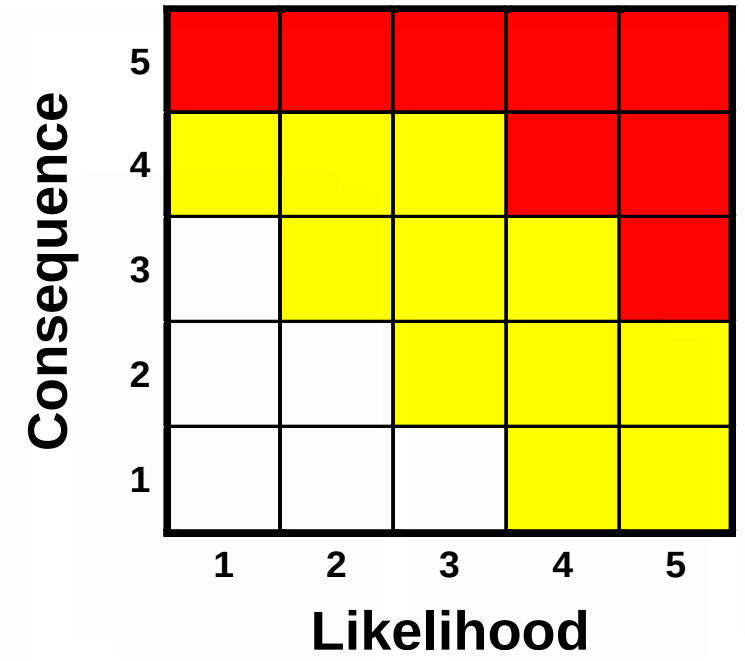
US Guidelines Exist for Risk Management on Tunnel Projects

- US Risk Management practice established by this document
- Published and available online by Underground Construction Association of Society for Mining, Metallurgy, and Exploration
- Emphasizes:
  - The importance of experience in project team
  - The use of Risk Registers as a risk management tool
  - Consistent risk management approach from early planning throughout life of project

Design and Construction Risks

Probability Rating	AKA
5	Probable
4	Likely
3	Possible
2	Unlikely
1	Improbable

Consequence



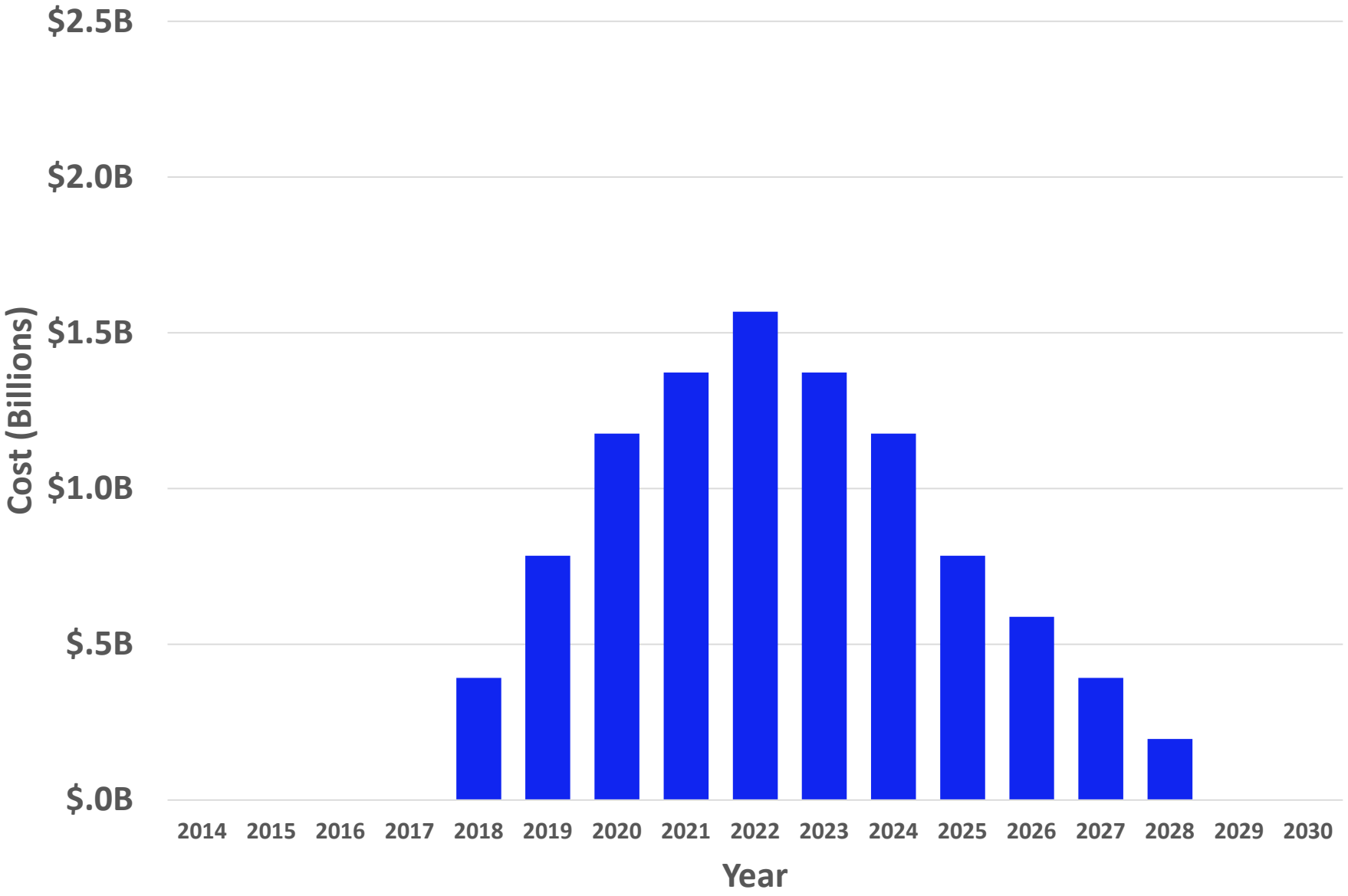
Risk Examples

- Initial works delayed leading to consequent delays to main construction
- Geotechnical investigation delayed leading to delay in design completion and start of construction
- Transmission power delayed leading to delay to start of tunneling
- Differing geotechnical conditions leading to slower progress, increased cost and delay to completion of tunneling
- Substantial design change required during construction leading to delay in commissioning

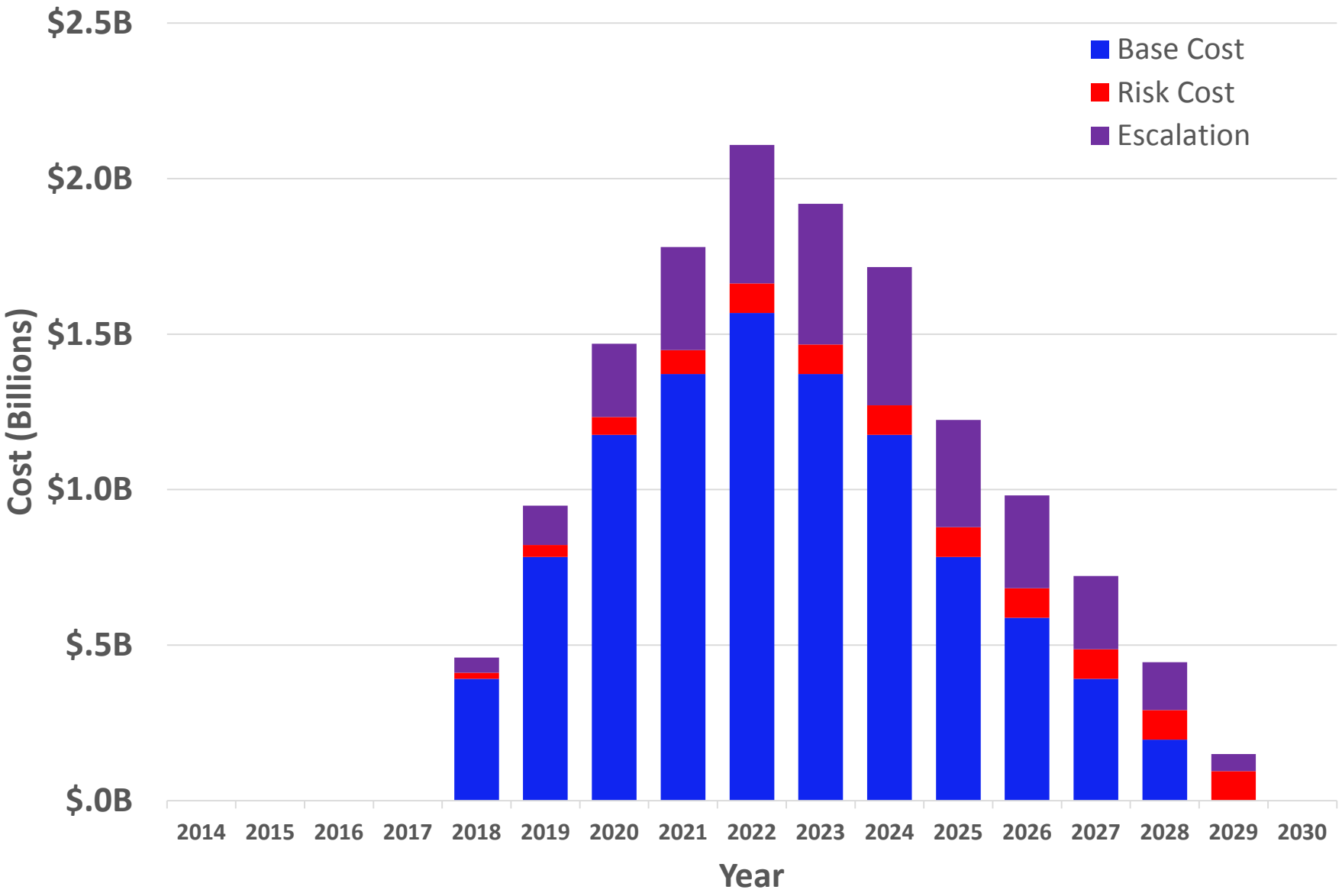
Program Estimate

Item	5RMK Estimate (Billions)
Estimated Base Construction Cost	$9.50
Contingency	$3.38
Program Management/Construction Management/Engineering	$1.91
Land Acquisition	$0.15
Grand Total	**$14.94**

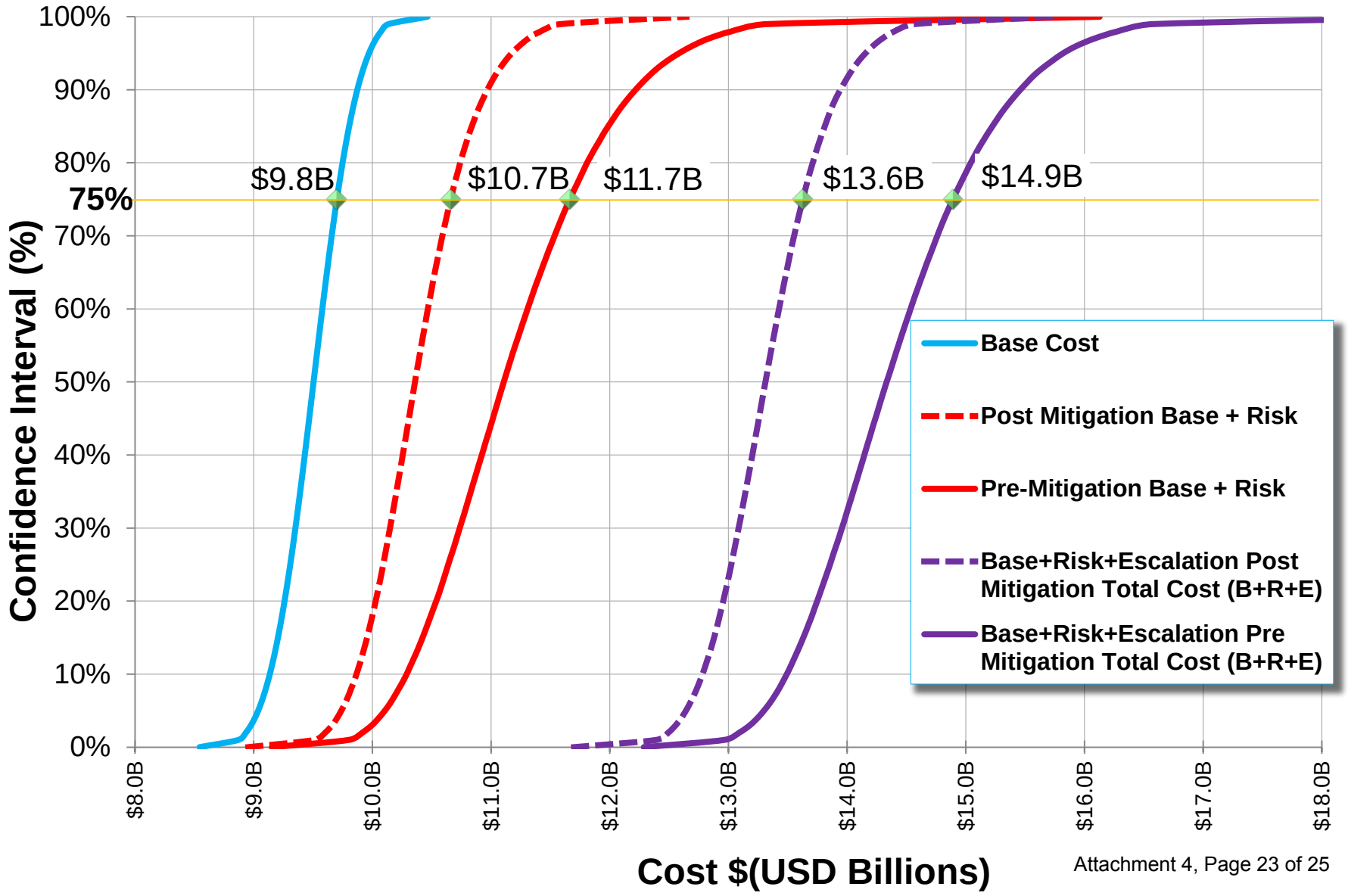
Annual Expenditures – 2014 Dollars



Annual Expenditures – with Risk and Inflation Cost



Construction Cost Distribution Profile



Estimate Summary

Item	Risk with Mitigation at 75% Confidence Interval [1][3] (Billions)	5RMK Estimate [1],[2] (Billions)	Jacobs Eng Estimate [1],[2] (Billions)
Construction	$10.66	$9.50	$8.86
Contingency	—	$3.38	$3.15
Construction Subtotal	**$10.66**	**$12.88**	**$12.01**
PM/CM/Eng	$1.91	$1.91	$1.91
Land acquisition	$0.15	$0.15	$0.15
Grand Total	**$12.72**	**$14.94**	**$14.07**

(1) Program estimates in 2014 dollars
(2) ~36% Contingency on construction for 5RMK and Jacob Engineering estimates
(3) Based on risks known at time of assessment

Questions ?