

Operations & Engineering Workgroup

October 11, 2023



Agenda

1.1 - Consider re-prioritization of Amendment 3 Engineering activities

1.2 - Review the Dunnigan Pipeline design and Colusa Basin Drain considerations

1.3 – Review the Southern Construction Access Road considerations

1.4 – Review Reservoir Emergency Drawdown flow allocation

1.5 – Risk Informed Decision Making design approach

Engineering and Construction Manager's Report

– Future Agenda Items

Agenda Item 1.1

Re-Prioritization of Amendment 3 Engineering Activities

JP Robinette

Today's objectives

- ❑ Review and understand reprioritized engineering activities
- ❑ Review the programmatic schedule showing a completion date in 2032
- ❑ Review program budget and workplan for 2024-2025

The **reprioritized work plan, 2024 budget, and program schedule** will be presented to the RC/AB for approval on October 20

Draft recommendation of budget principles based on schedule optimization efforts (from September with edits)

- Complete required permits, agreements, and cost estimates to support signing Benefits and Obligations Contracts and financing by the end of 2025 (Highest Priority)
- Hire Reservoir Package CMAR and Mitigation Contractor early 2025
- Acquire property for Golden Gate Dam Foundation, Sites Dam Foundation, and Sites Lodoga Detour sub-projects
- ~~Complete~~ Begin programmatic pre-construction requirements
- Execute Golden Gate Dam Foundation sub-project starting ~~Jan~~ early 2024 (after 30% design). Check-in to see if Sites Dam Foundation and Lodoga Detour can be started mid-2024 based on budget forecasts.
- Remain in queue at CA ISO by showing option(s) for land acquisition and layout of electrical infrastructure and paying deposit

Anticipated Construction Critical Path

#0 Investor Commitment

#1 Golden Gate Dam (Land Acquisition)

#2 CAISO Requirements (Land Interest & Deposit)

#3 Golden Gate Dam (Geotech and Design)

#4 Sites Lodoga Rd Detour (Land Acquisition)

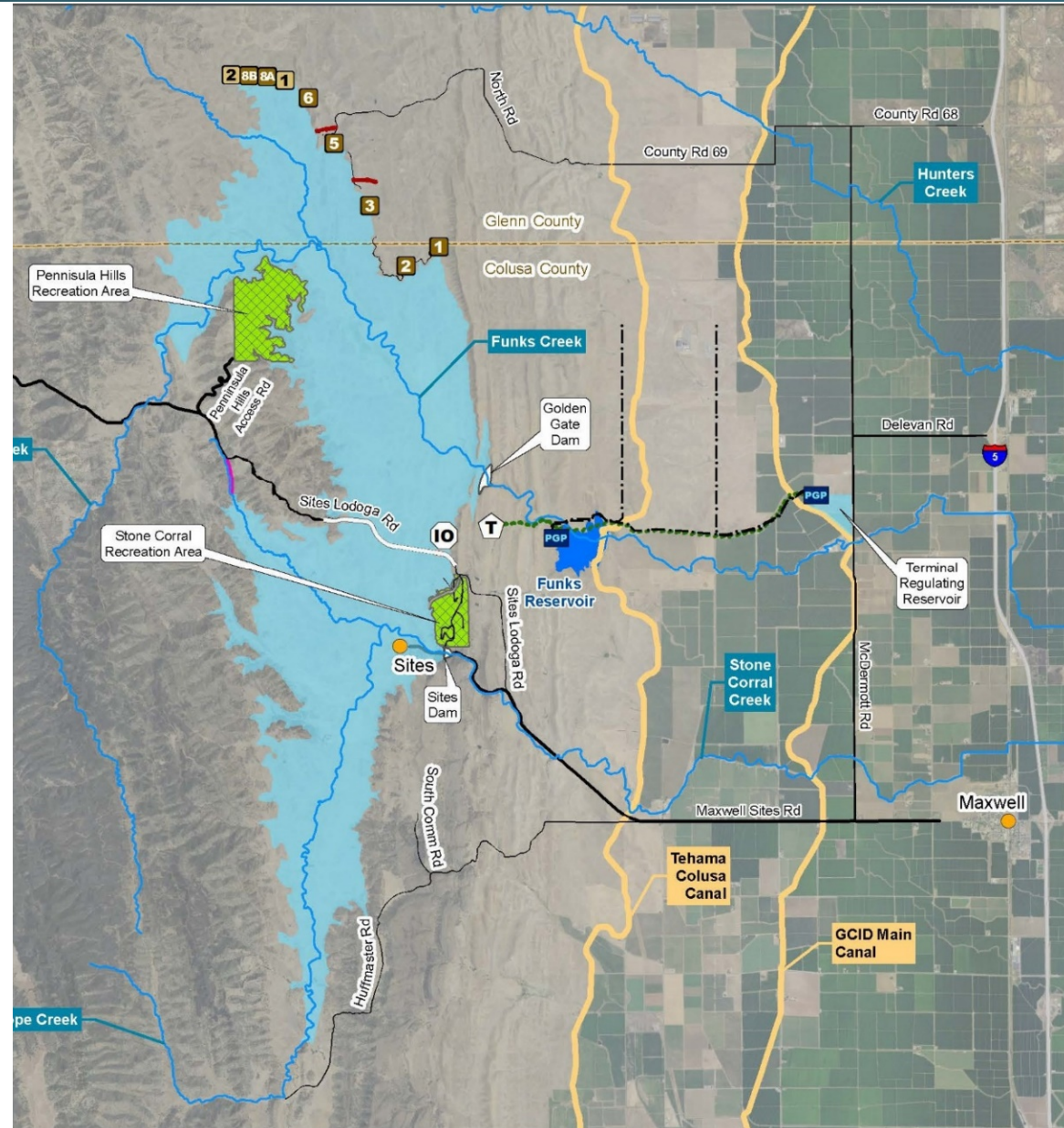
#5 Sites Dam (Land Acquisition)

...

Fully Funded

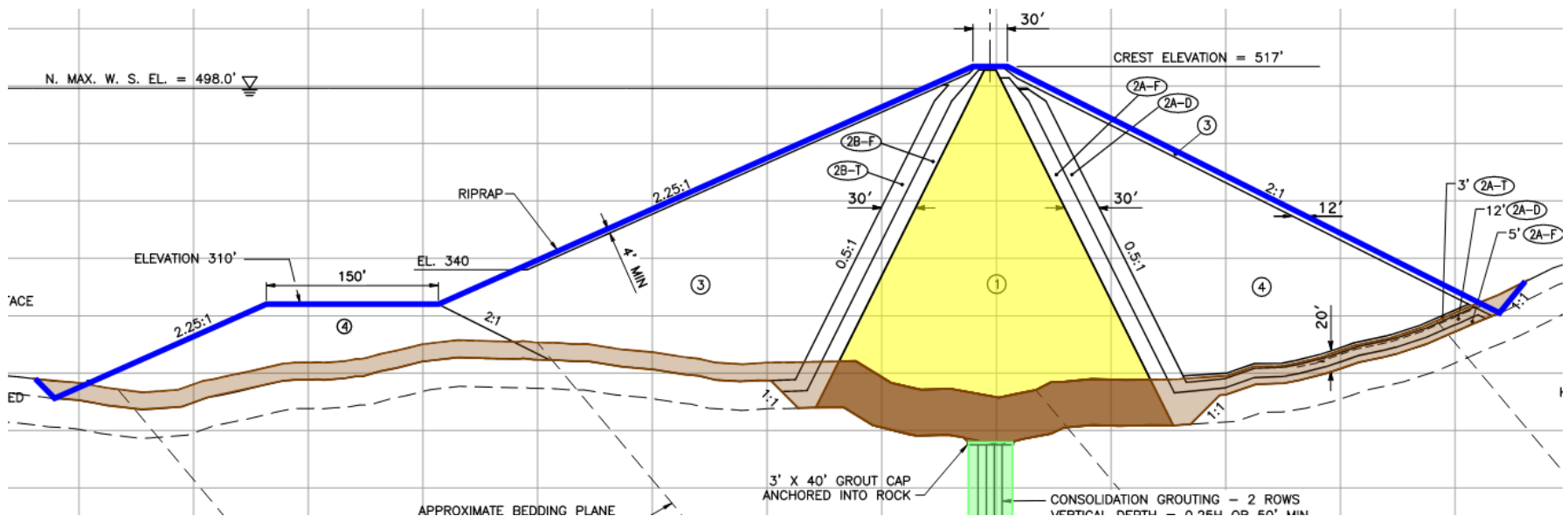
Partially Funded

Deferred until funds are available



Golden Gate Dam (Geotech and Design) Scope

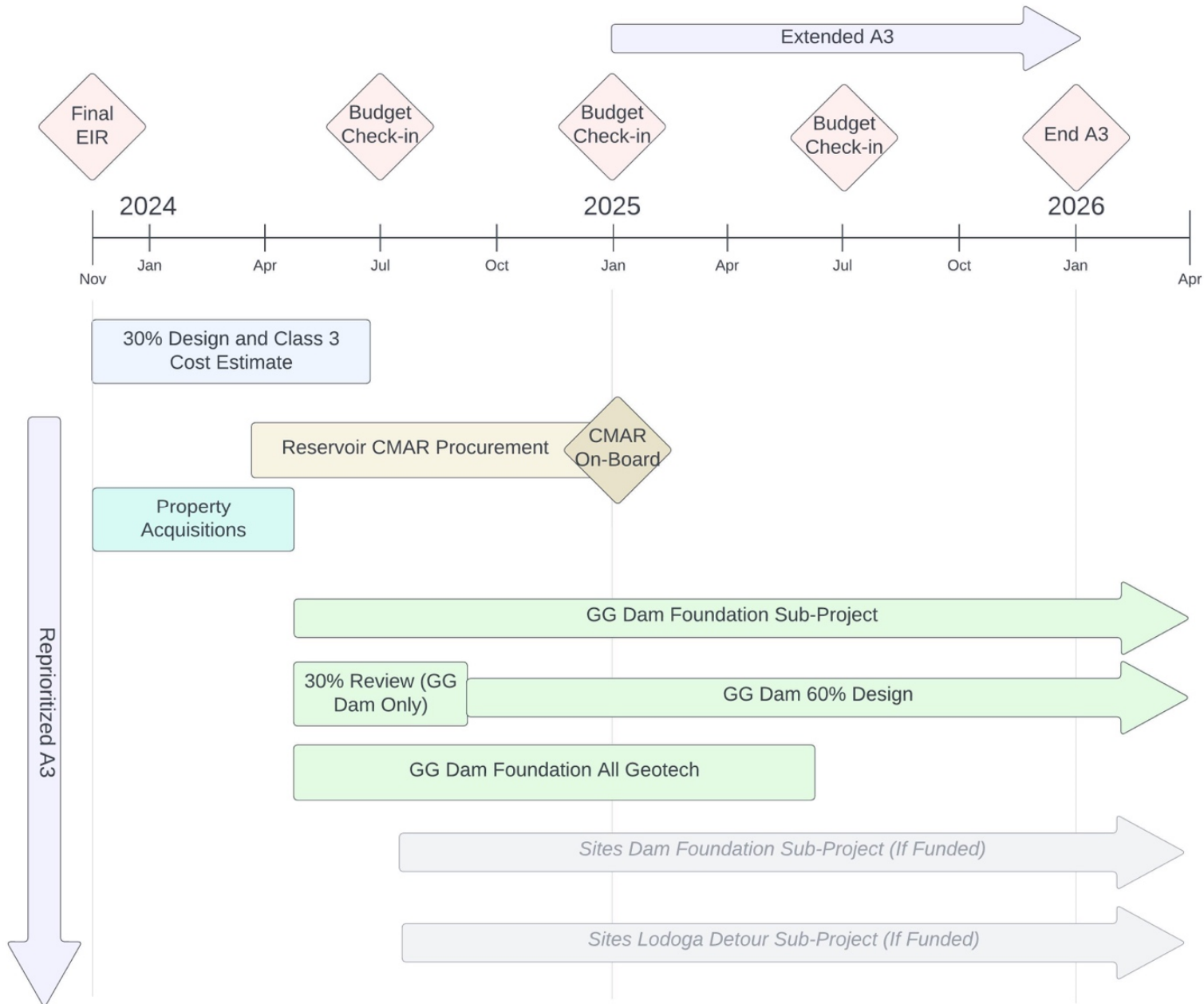
- Reservoir Package
 - Project: Golden Gate Dam
 - Sub Project – Golden Gate Land Acquisition
 - Sub Project – Geotech Investigation
 - Sub Project – Design (Foundation Excavation)
 - Sub Project – Cultural/Bio Clearance for Construction
 - Sub Project - Construction (Foundation, Grout Curtain, Dam)



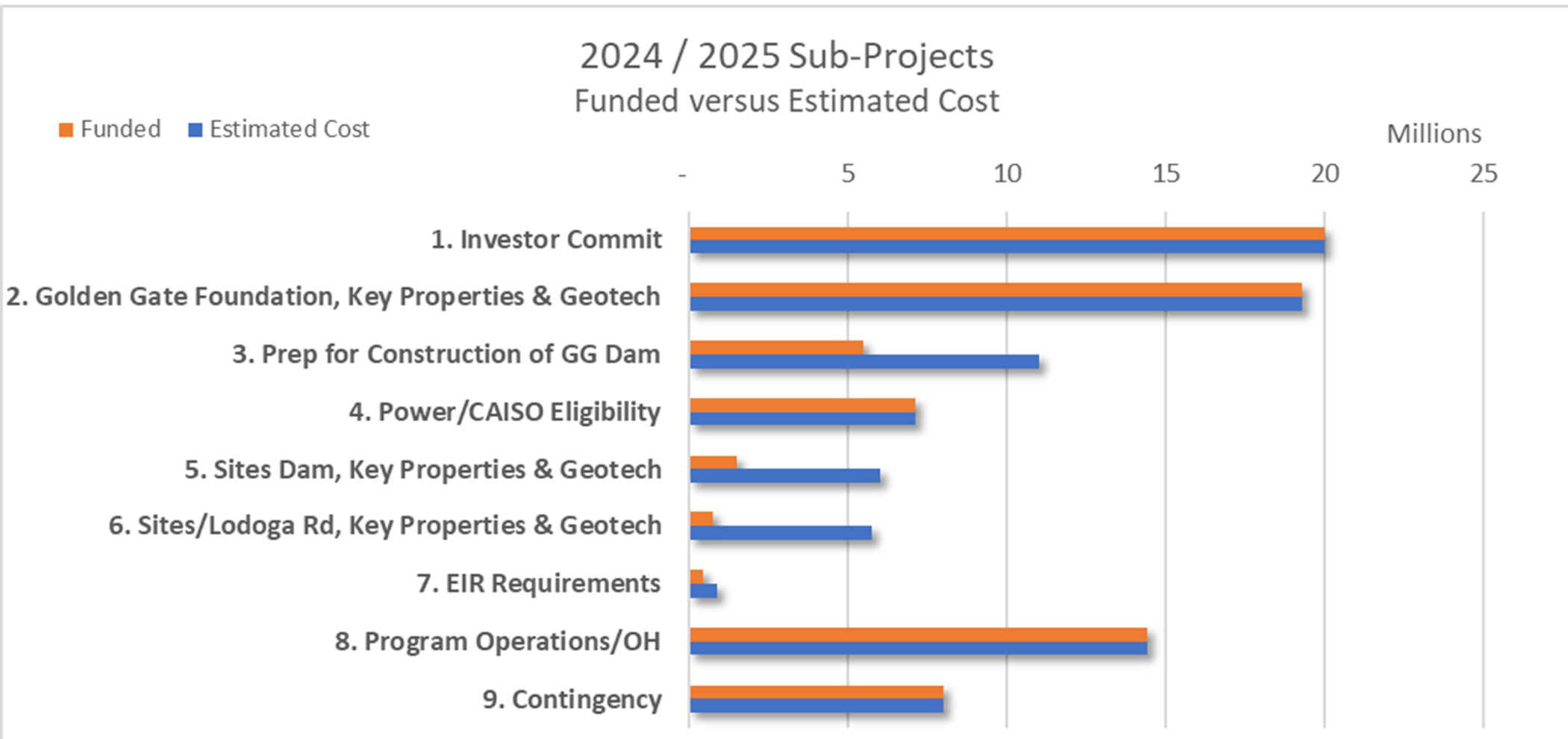
2024-2025 Engineering Activities

- Complete 30% design and Class 3 Cost Estimate (all facilities)
- Focus geotech investigations to inform the Golden Gate Dam Foundation design
- Progress Golden Gate Dam Foundation Sub-Project towards a 60% level of design
- Advance Power Interconnection process with CAISO
- On-board the Reservoir CMAR
- If budget becomes available
 - Sites Lodoga Detour geotech investigations and design
 - Sites Dam geotech investigations and Foundation design

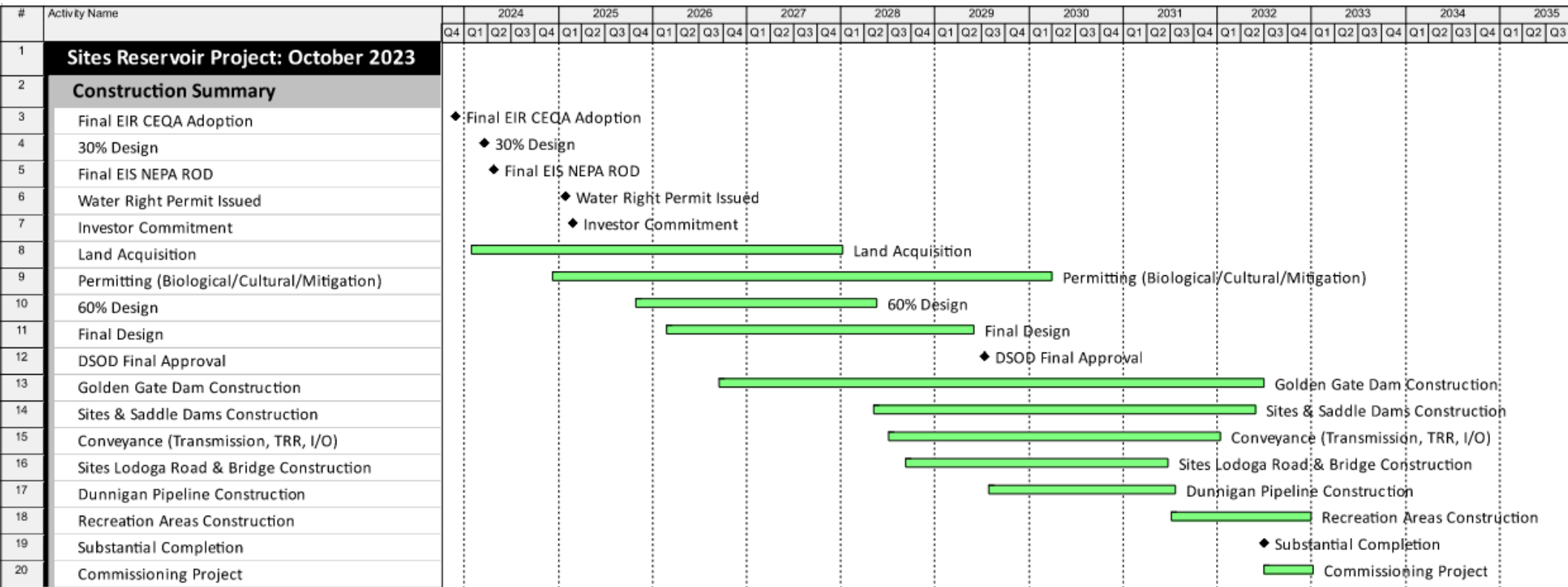
Engineering activities after the 30% design have been reprioritized based on the optimized schedule



Some sub-projects are prioritized to be completed while others are partially funded



With the available budget, the schedule has been optimized and a year can be saved



Reprioritized activities in 2023-2024 budget results in a 2032 operational date, representing an improvement of one year from the baseline presented in 2033.

After completion of the 30% design, the Program will be tracked by Sub-Project

Sub-Project	2024	2025
Investor Commitment	\$13,370,000	\$6,630,000
Golden Gate Dam Foundation, Key Properties & Geotech	\$17,435,000	\$1,865,000
Prep for Construction of Golden Gate Dam	\$2,695,000	\$2,805,000
Power/CAISO Eligibility	\$465,000	\$6,635,000
Sites Dam, Key Properties & Geotech	\$1,500,000	\$0
Sites Lodoga Rd Detour, Key Properties & Geotech	\$750,000	\$0
EIR Requirements	\$221,000	\$230,000
Program Operations/ Overhead	\$8,586,000	\$5,814,000
Contingency	\$3,920,000	\$4,080,000
Total	\$48,942,000	\$28,058,000

Tracking by sub-project is an important step because...

- It allows sub-projects to be more readily started, slowed, or stopped with program changes
- Reporting can focus on sub-project performance and efficiencies
- Activities can be tracked for funding eligibility by funding source (ex: WIFIA eligible costs)
- Project costs can be tracked by facility and as a cost of developing “Base” or “Downstream” facilities
- It represents a movement of the project from **Program Planning to Project Delivery**

The adopted budget will be at the “Subject Area” level

Subject Area	2024	2025
Communications	\$475,000	\$495,000
Engineering	\$27,321,000	\$9,979,000
External Affairs	\$392,000	\$408,000
General Project Activities	\$480,000	\$500,000
Permitting	\$6,958,000	\$7,242,000
Planning	\$436,000	\$454,000
Program Ops	\$6,664,000	\$6,936,000
Real Estate	\$6,215,000	\$2,045,000
Total	\$48,942,000	\$28,058,000

The proposed budget has changed most in the “Engineering” and “Permitting” Subject Areas

Subject Area	Orig 3-yr WP Totals		Proposed 4-yr Totals		Change in %
	2022-2024	%	2022-2025	%	
Communications	\$1,449,000	1.2%	\$2,088,050	1.5%	0.3%
Engineering	\$69,716,000	58.3%	\$64,840,550	45.6%	-12.7%
External Affairs	\$828,000	0.7%	\$1,475,500	1.0%	0.3%
General Project Activities	\$1,730,000	1.4%	\$2,084,000	1.5%	0.0%
Permitting	\$14,829,000	12.4%	\$25,183,600	17.7%	5.3%
Planning	\$6,582,000	5.5%	\$8,999,400	6.3%	0.8%
Program Ops	\$21,724,000	18.2%	\$28,002,500	19.7%	1.5%
Real Estate	\$2,740,000	2.3%	\$9,586,800	6.7%	4.4%
Total	\$119,598,000		\$142,260,400		

Changes to the budget are related to...

1. Revenue certainty has improved as more funds have now been authorized, awarded, allocated, and/or contracted
2. Permitting and planning is costing more than planned.
3. **Engineering is reduced to account for schedule reprioritization and to better align with actual experience and capability to complete field work.** A 30% design and associated Level 3 cost estimate update is still achieved. Phasing of DSOD permit fees also reduces near-term cash needs.
4. The Real Estate increase is mostly associated with acquiring fee title land which was not part of the original plan.
5. Growth in Program Ops is mostly related to the administration cost of adding an extra year to the work plan.
6. Comms and Ext Aff is increased due to adding an extra year.

Next Steps

- Board approval of revision to A3 Work Plan
 - Changes to work plan priorities
 - Extension of A3 period
 - 2024 annual budget
 - Adopt optimized schedule
- Modifications to Consultant contracts to align with revised work plan

Questions?



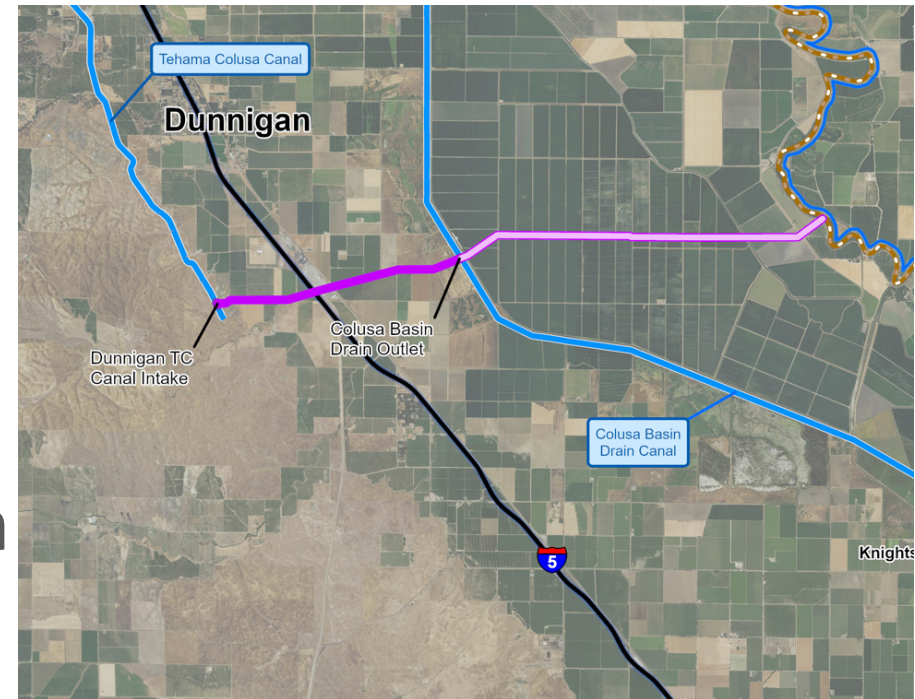
Agenda Item 1.2

Dunnigan Pipeline Design and Colusa Basin Drain Considerations

Henry Luu

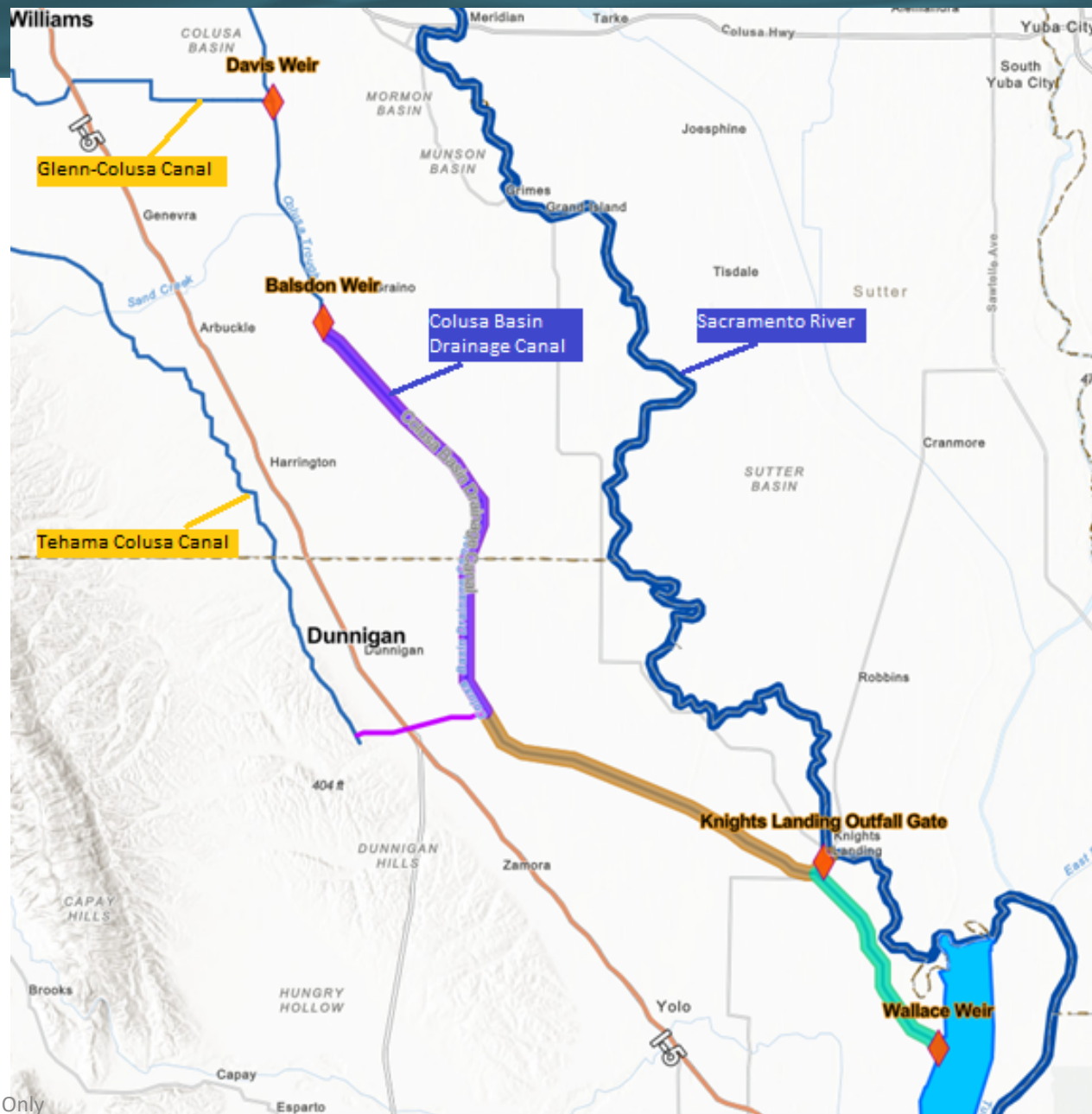
Dunnigan Pipeline

- Conveys water from Tehama Colusa Canal to the Colusa Basin Drain (and/or direct to the Sacramento River – Alt 2)
- Gravity flow from intake to downstream energy dissipation structure
- Pipe diameter: 9-ft (or 10.5-ft)
- Length: 4 miles (or 10 miles)
- Level of Service: up to 1,000 cfs



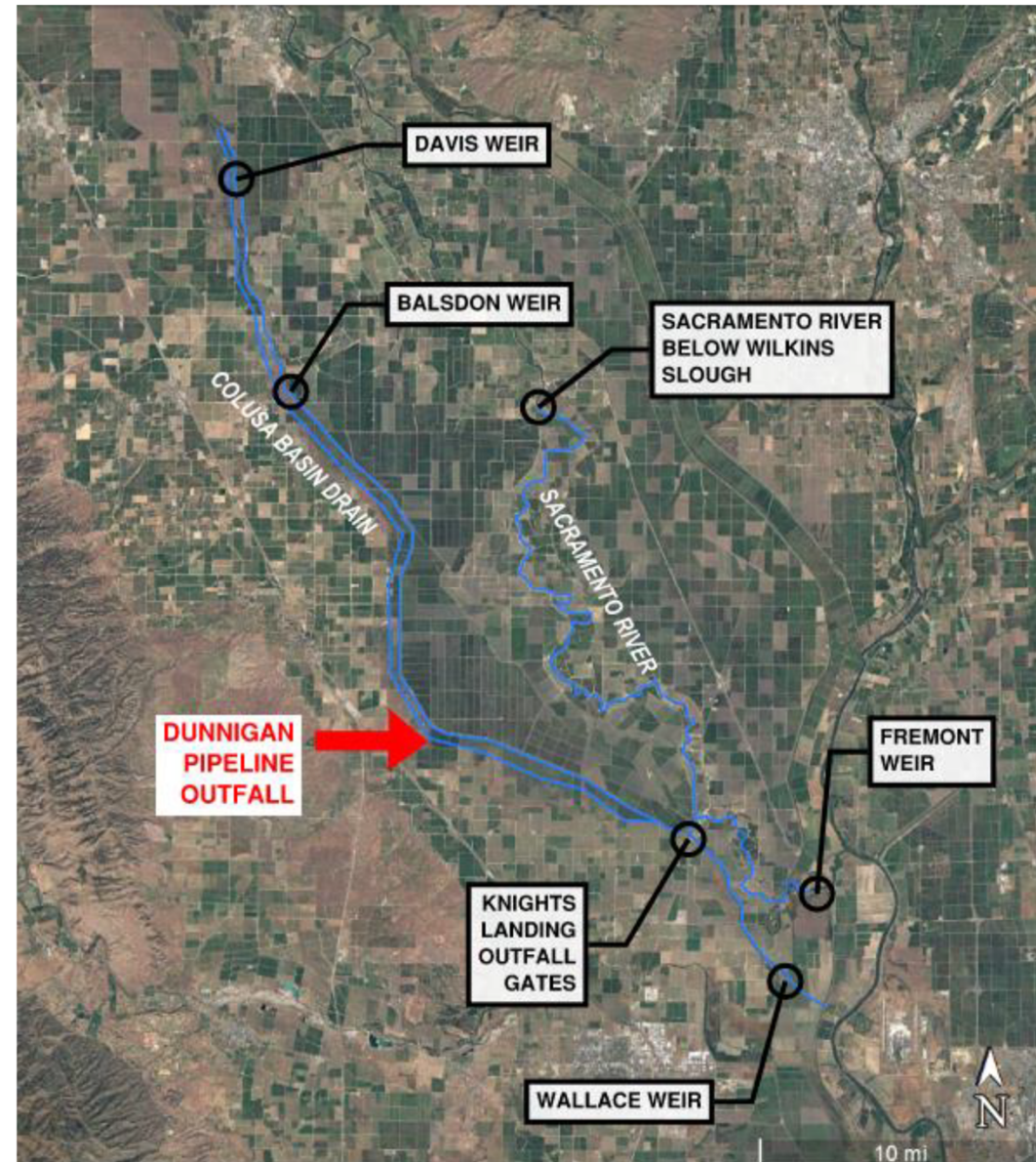
The Lower Colusa Basin Drain System

- 1. Upper Reach:** from the Balsdon Weir to the proposed Dunnigan Pipeline
- 2. Middle Reach:** from the proposed Dunnigan Pipeline to the Knight's Landing Outfall Gates (KLOG)
- 3. Lower Reach:** from the KLOG to Wallace Weir



Colusa Basin Drain Hydraulic Modeling

- Evaluates water surface elevation (WSE) effects within the Colusa Basin Drain (CBD) caused by Project releases of up to 1,000 cfs
- Used for identifying area(s) of concern
- Current analysis incorporates data from the Daily Ops Model



Assumptions for Historical vs. Project Flows

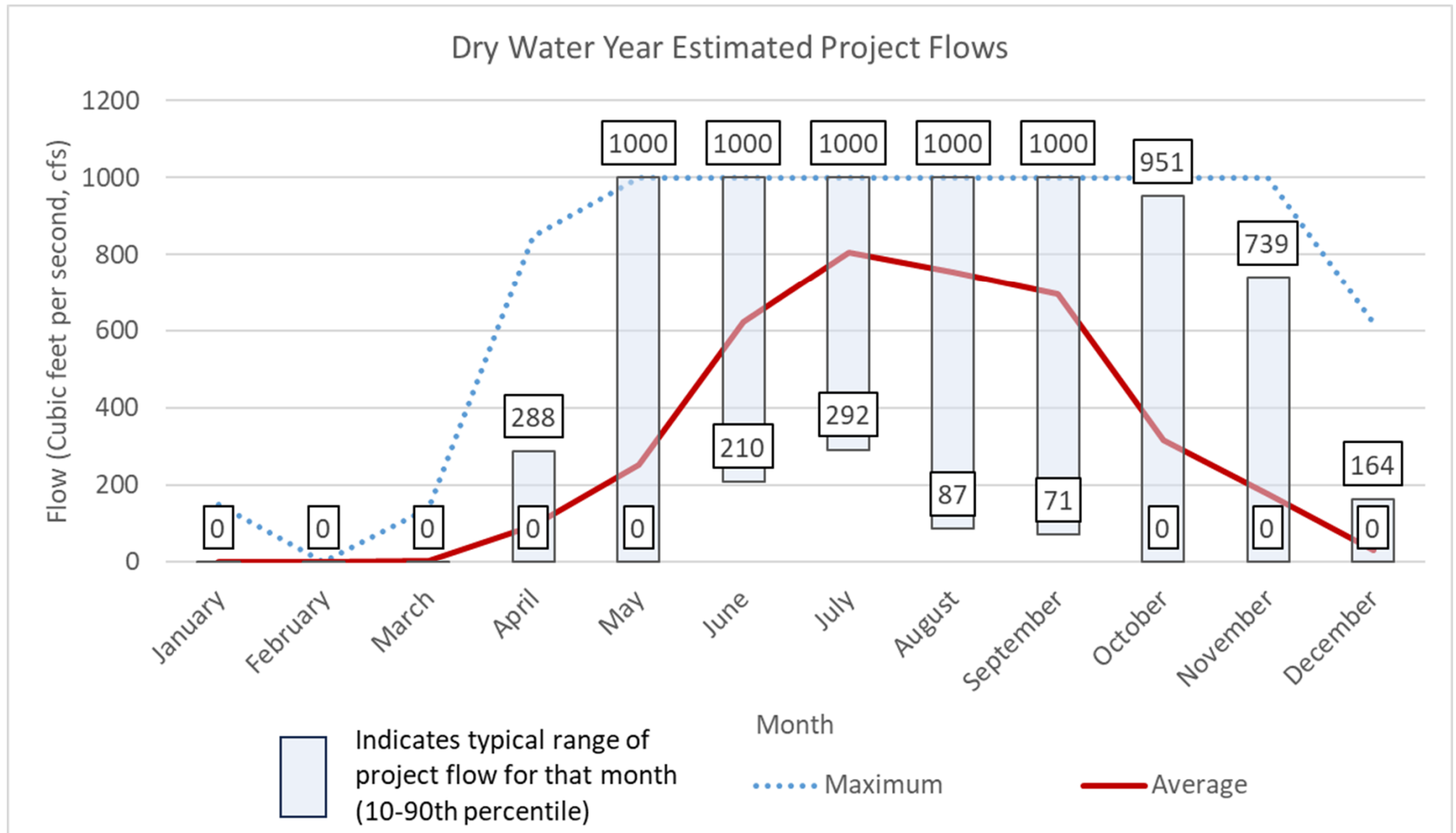
- 1) Historical flows in the CBD peaks between August-October when rice fields are draining, and during the winter months (Nov-April) when winter storms cause local flooding.
- 2) Project flows will vary up to a maximum of 1,000 cfs in April-December.
- 3) If CBD conditions are near or at flood stage, Project flows will not occur.
- 4) Project flows can be controlled remotely to quickly regulate or stop water from entering/exiting the Dunnigan Pipeline.

2013 Dry Year Conditions Assessment (2021 effort)

Percent Chance of Passing Full Project Flows

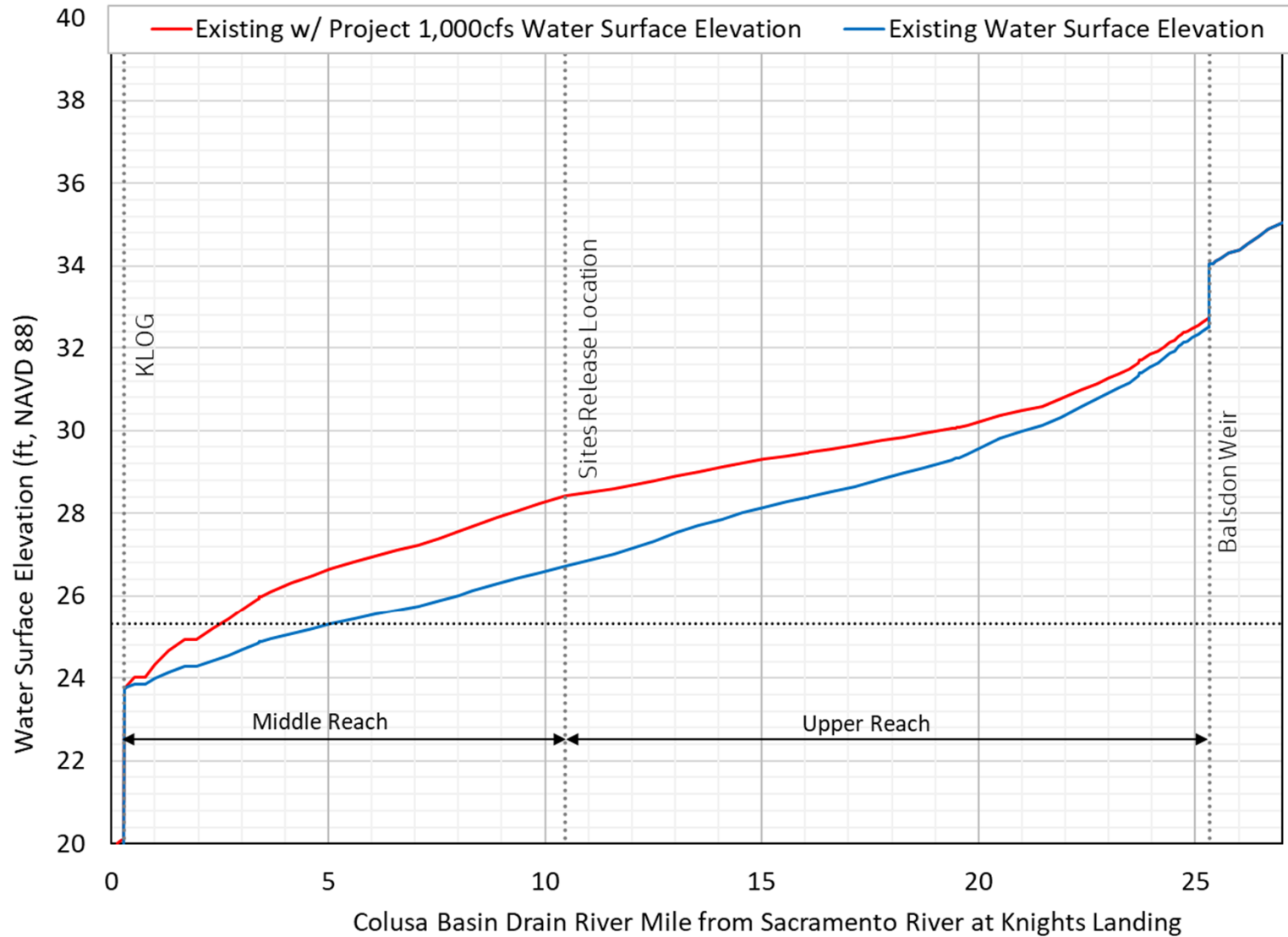
monthly average Project flow by year type												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry Year Project Flow (cfs)	0	15	15	184	178	765	956	840	725	347	119	45
Stage at RM8.9												
Percentile	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10	23.61	23.50	23.46	23.80	23.81	24.75	25.28	25.74	24.81	23.97	23.91	23.79
20	23.95	23.76	23.80	24.06	24.01	24.99	25.50	26.14	25.20	24.10	24.14	24.11
30	24.26	24.07	23.97	24.20	24.23	25.18	25.77	26.52	25.77	24.24	24.56	24.60
40	24.81	24.49	24.18	24.34	24.51	25.36	26.04	27.06	26.08	24.36	24.88	25.02
50	25.49	25.10	24.50	24.55	24.77	25.62	26.37	27.44	26.44	24.61	25.25	25.41
60	26.40	25.83	24.77	24.88	25.05	25.88	26.66	27.72	26.94	24.90	25.43	25.87
70	27.68	27.22	25.19	25.35	25.33	26.22	27.00	28.02	27.55	25.13	25.71	26.46
80	33.35	31.51	26.72	25.66	25.69	26.68	27.29	28.50	28.38	25.48	26.03	28.37
90			33.61	26.53	26.48	27.41	27.75	28.92	29.13	25.87	26.55	35.24
95				36.23	28.37	28.32	28.07	29.31	30.05	27.38	27.52	
Legend:												
<30 ft												
>30 ft												

Dry Year (Daily Ops Model) Project Flows

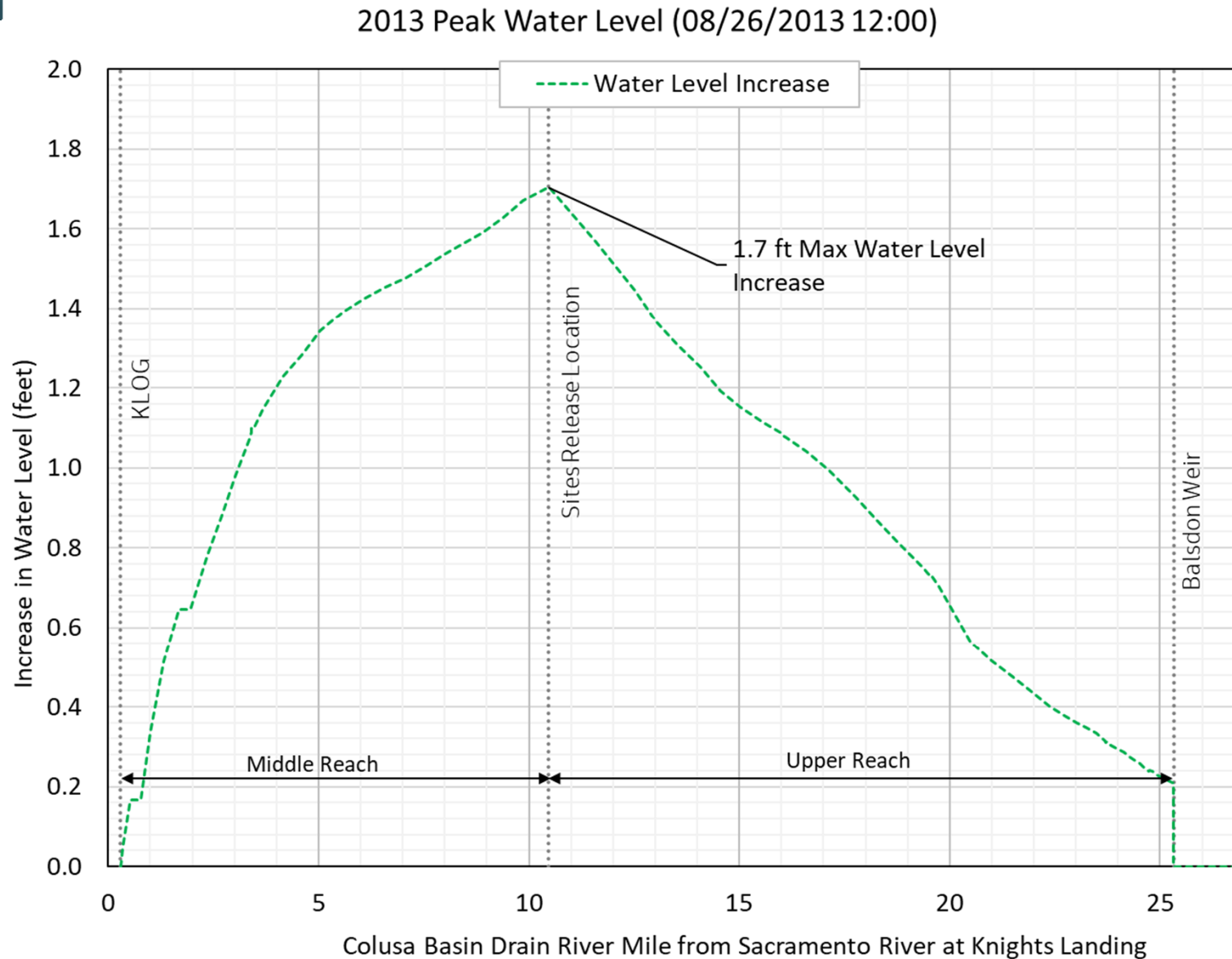


2013 (Dry Water Year) Peak Day Water Surface Elevations

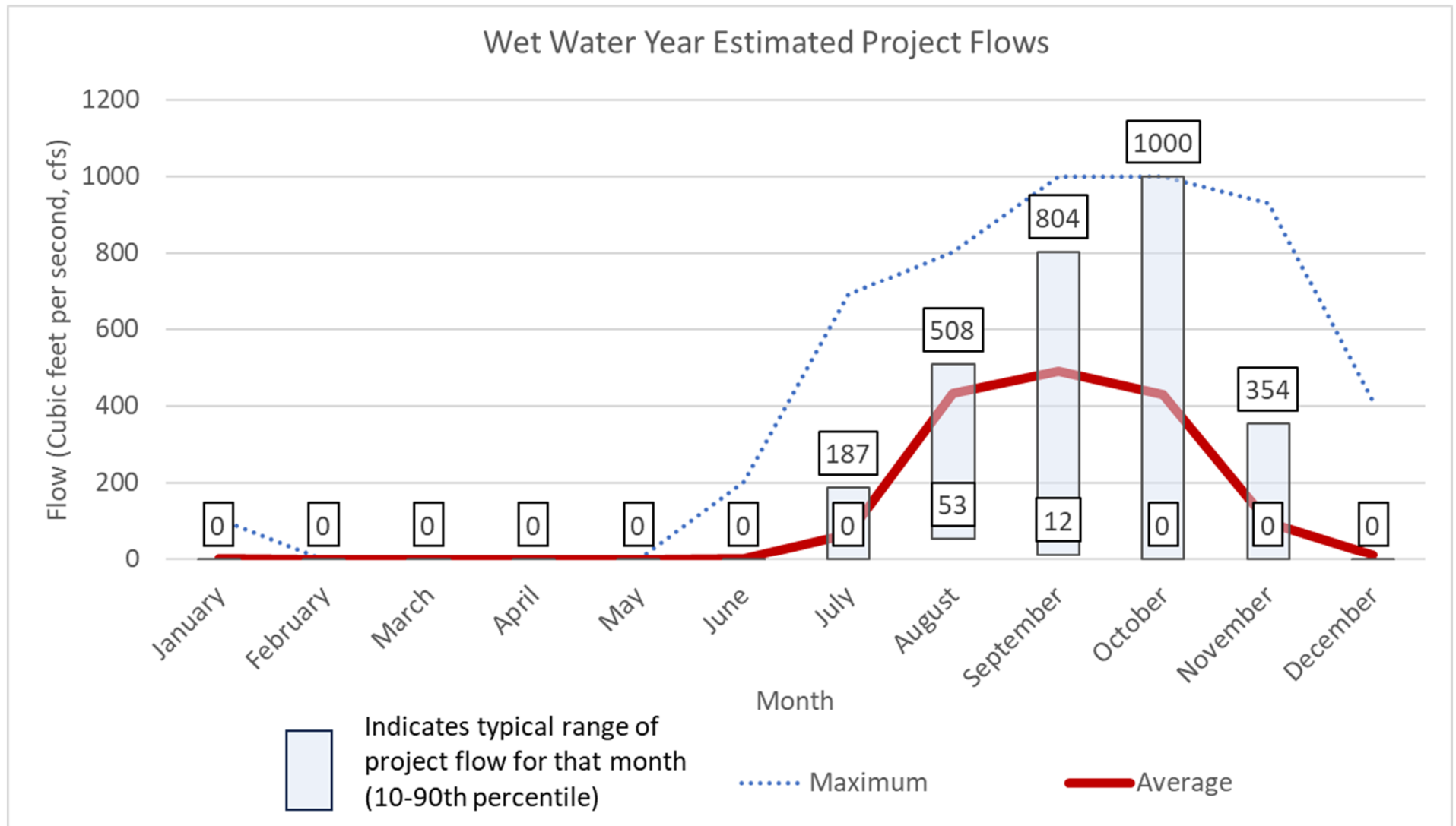
2013 Peak Water Level (08/26/2013 12:00)



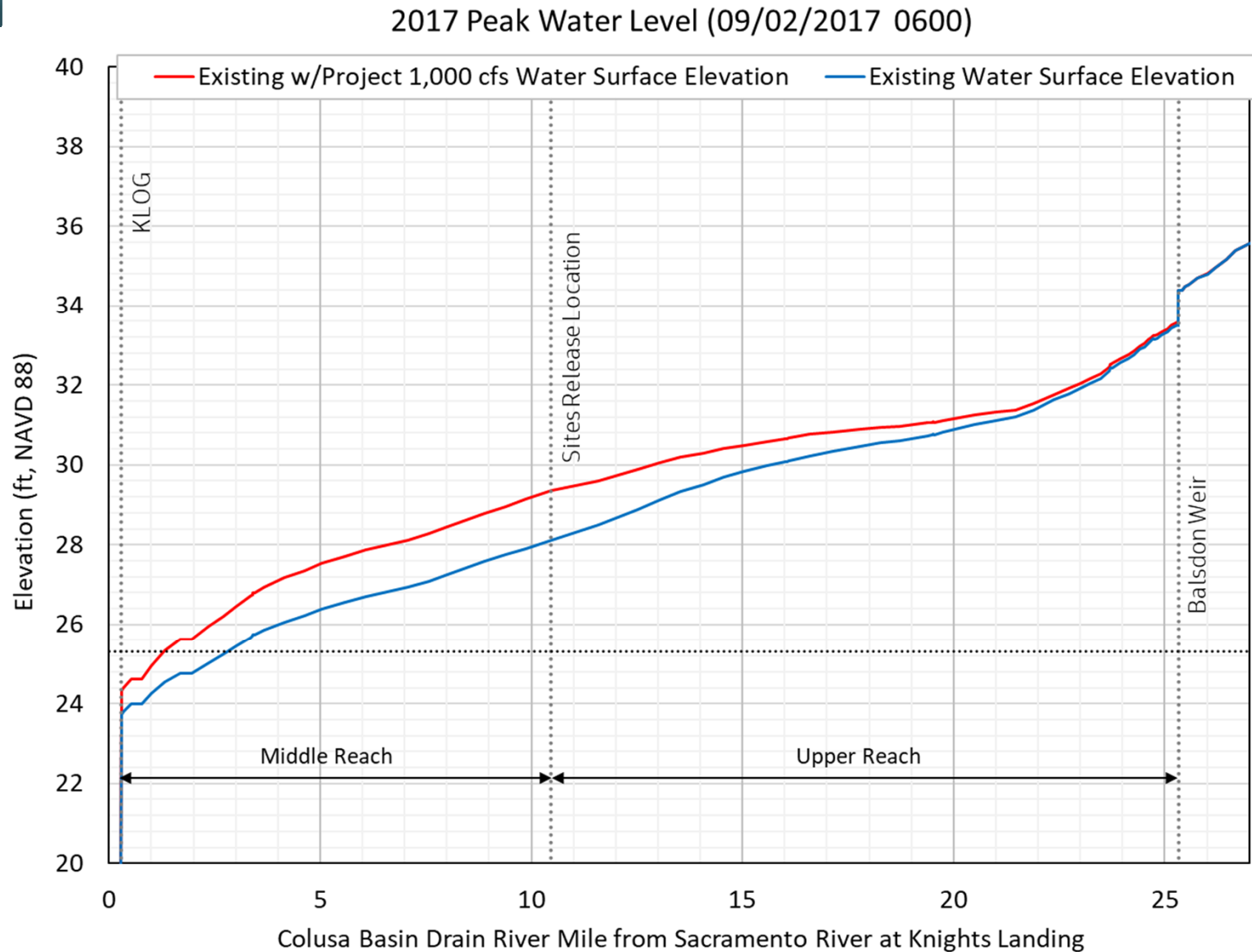
2013 (Dry Water Year) Peak Day Water Level Increase



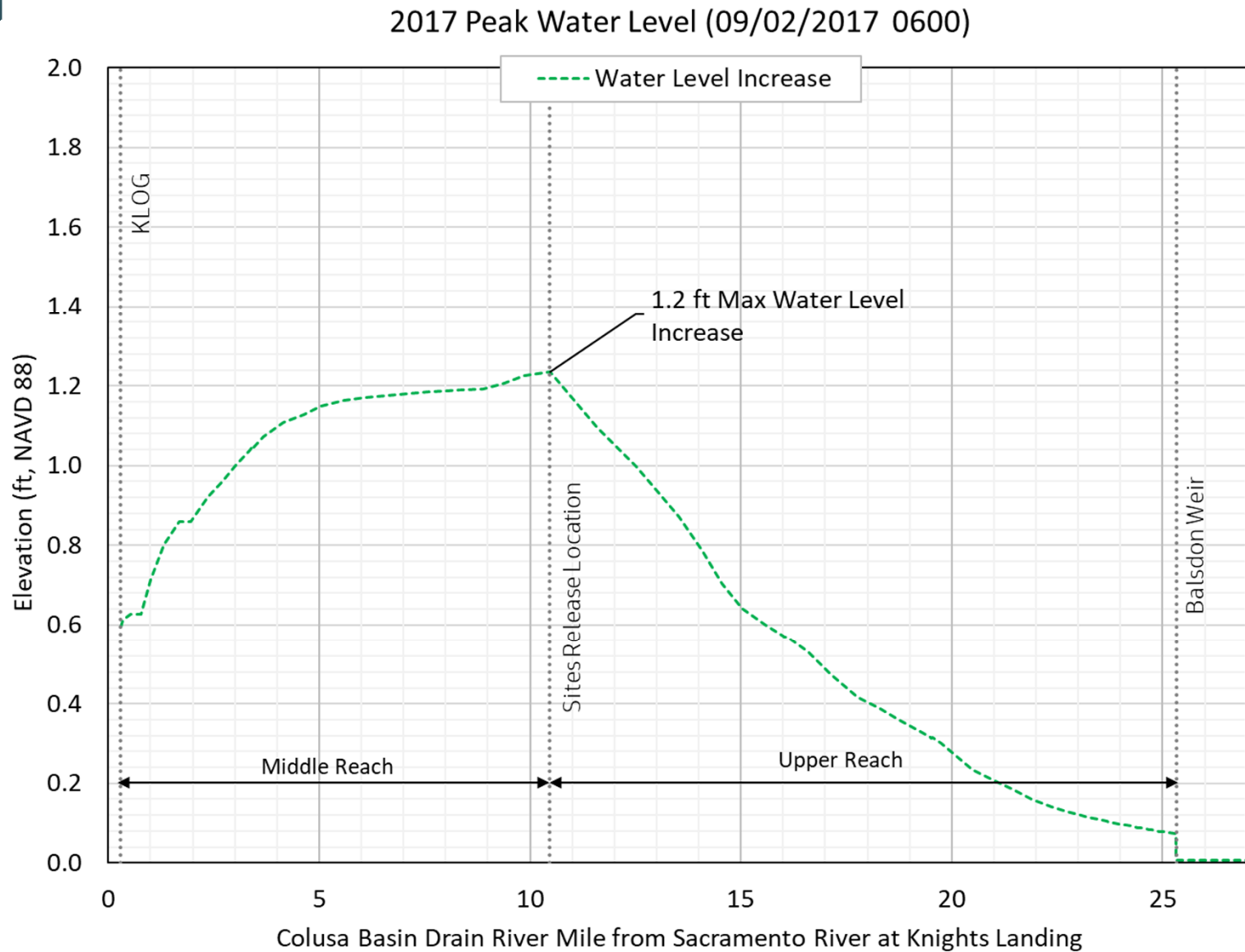
Wet Year (Daily Ops Model) Project Flows



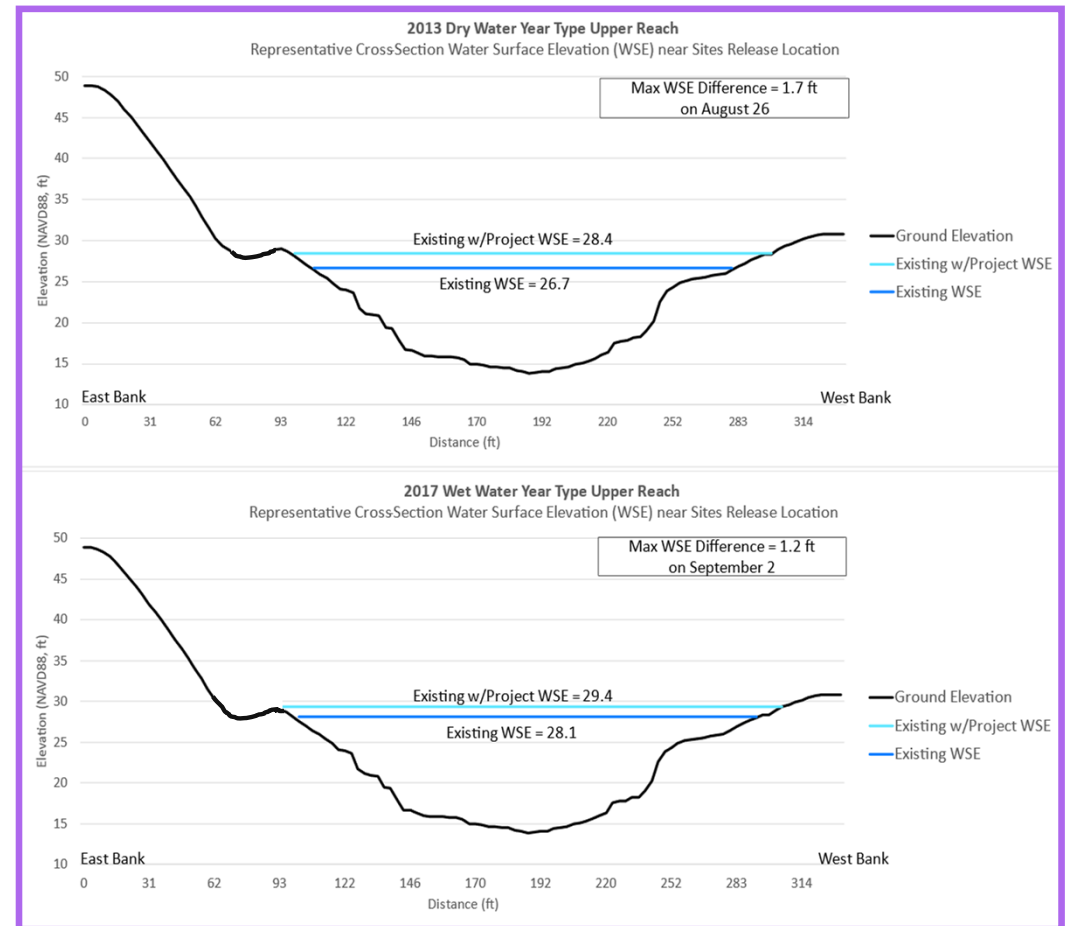
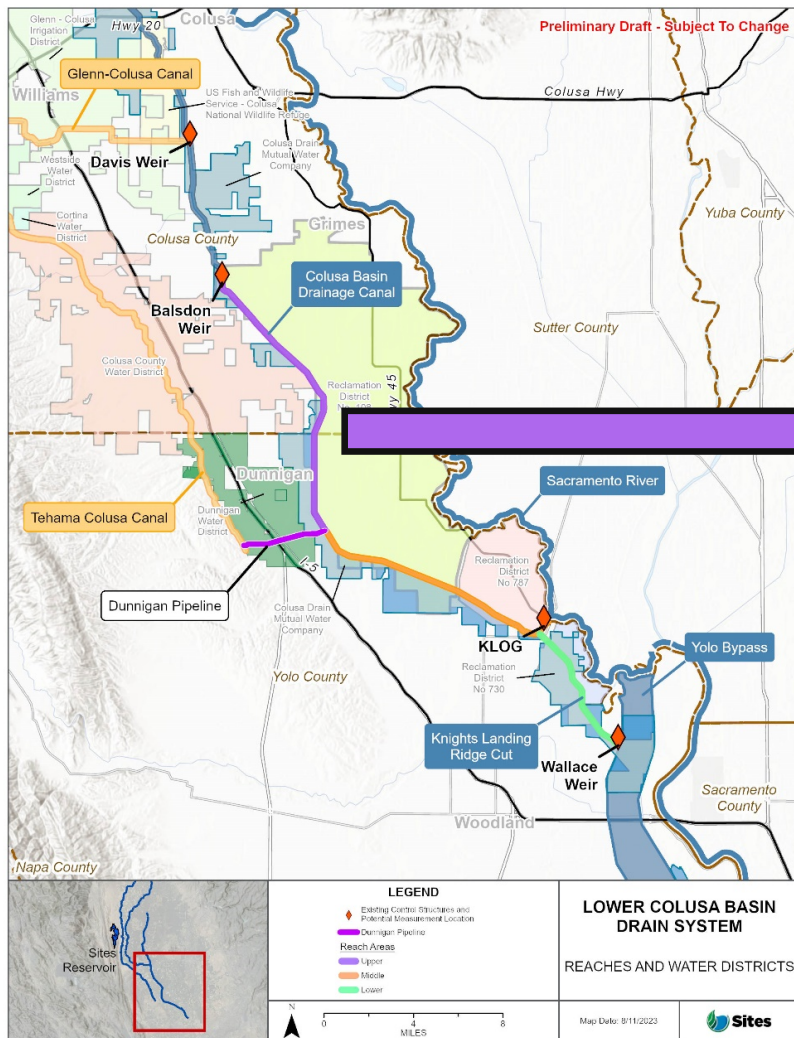
2017 (Wet Water Year) Peak Day Water Surface Elevations



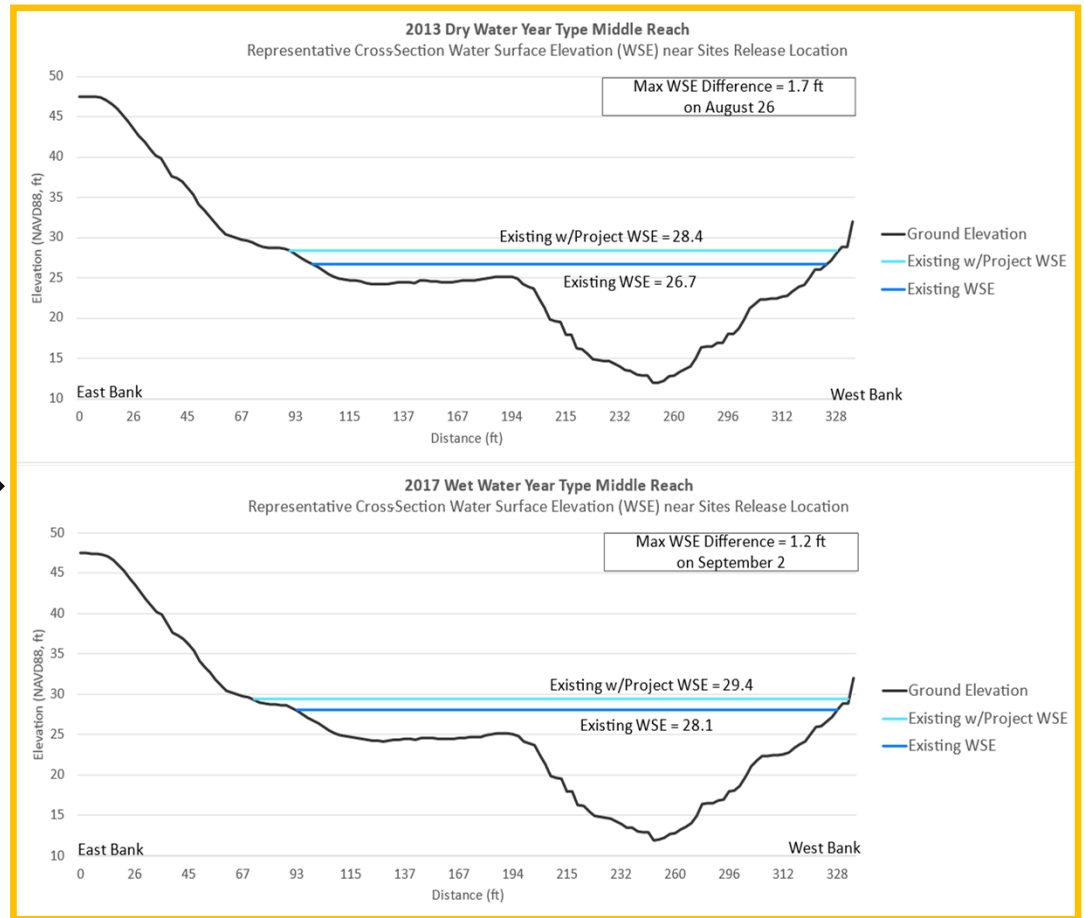
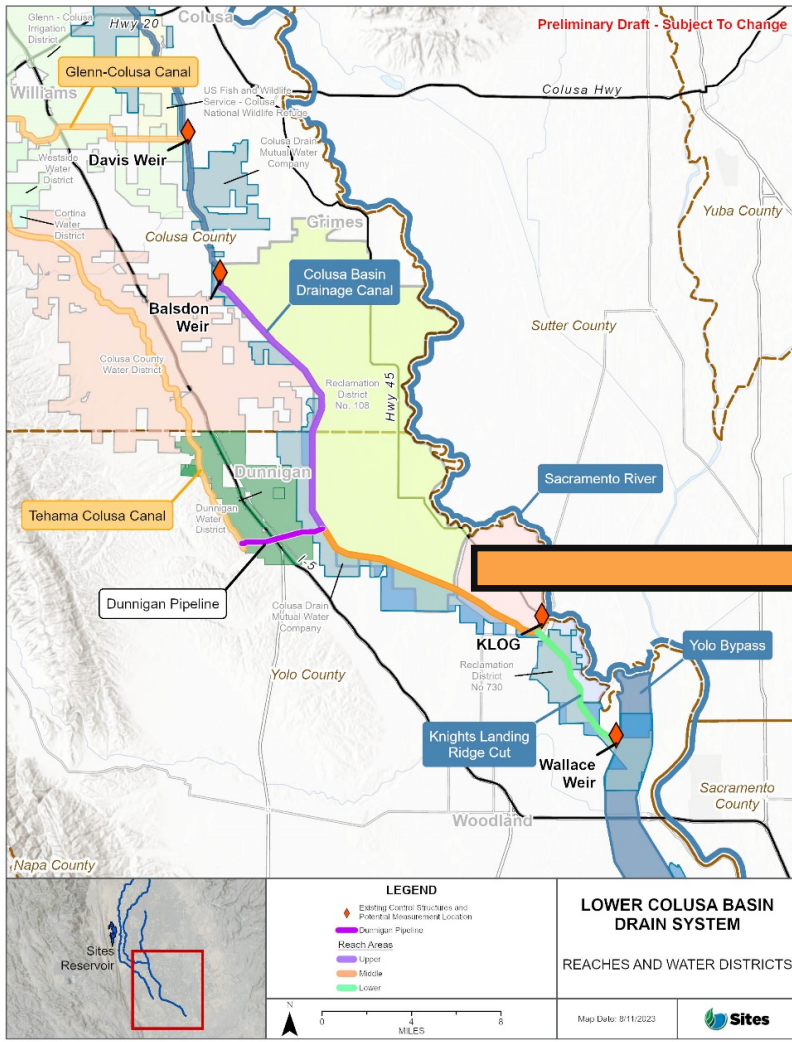
2017 (Wet Water Year) Peak Day Water Level Increase



CBD Upper Reach - WSE Effects



CBD Middle Reach - WSE Effects



Next Steps

1. Continue to update, refine, and validate modeling efforts.
2. Coordinate with landowners for field visit(s) to the CBD west bank between Balsdon Weir to Dunnigan Pipe outfall to validate locations of existing gated/ungated connections between western fields and CBD.
3. Analyze Lower Reach of CBD (Knights Landing Ridge Cut to Wallace Weir) for environmental flows to Yolo Bypass with new project daily data, and coordinate with landowners for field visit(s)/validation.
4. Validate operation requirements to provide environmental flows of up to 460 cfs to the Yolo Bypass.

Questions?

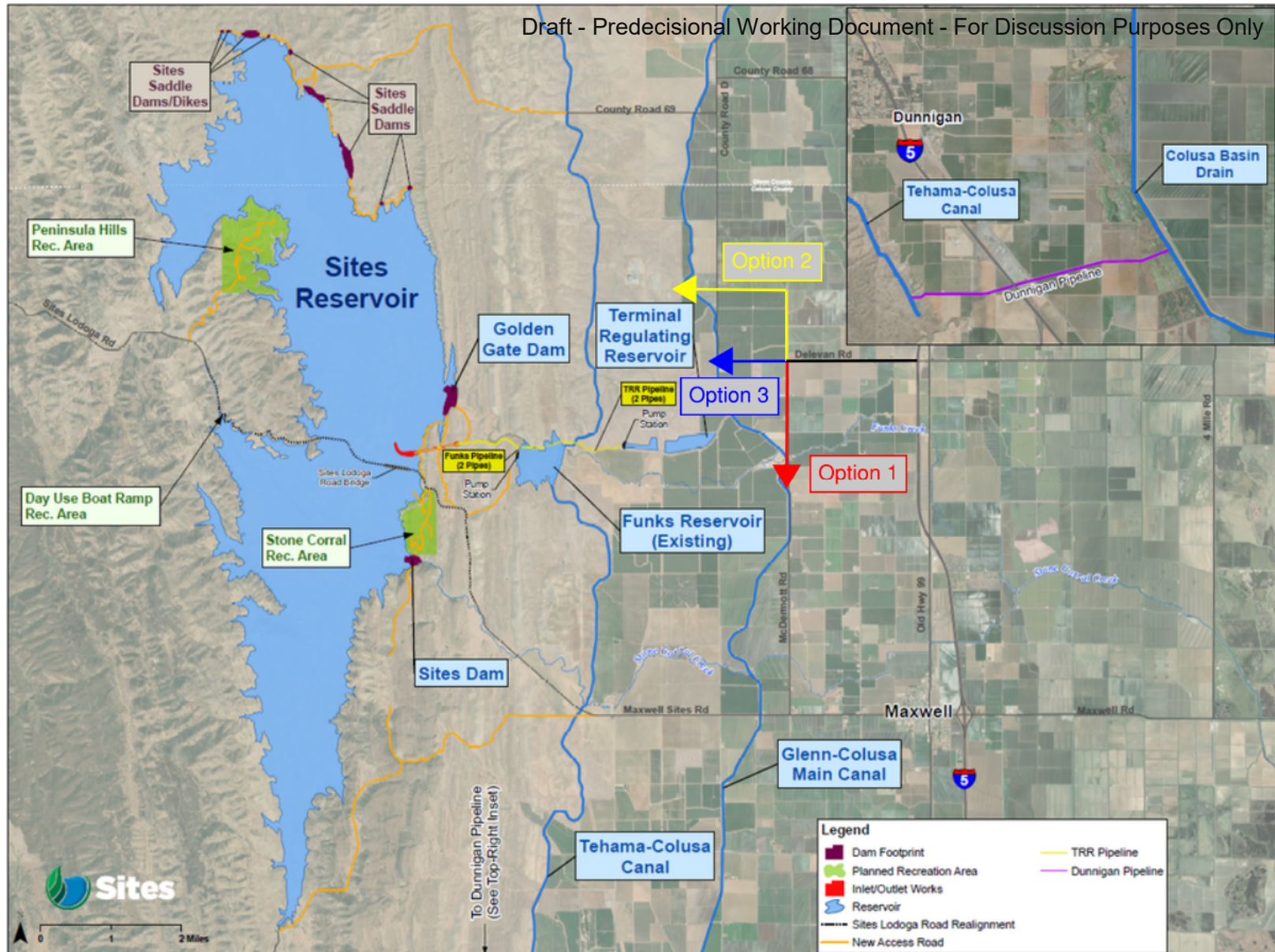


Agenda Item 1.3

Southern Construction Access Road Considerations

Henry Luu

Southern Construction Access Road Options

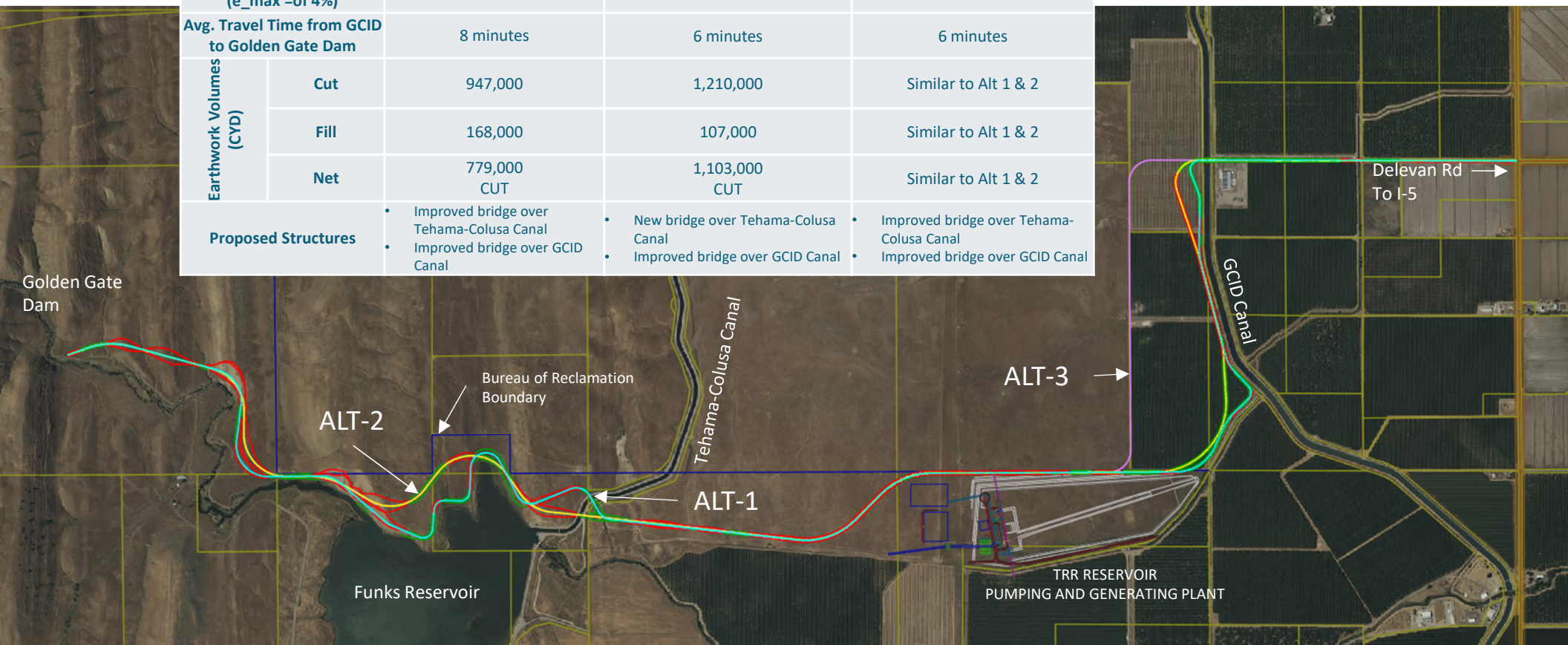


Considerations

- Community
 - Community/landowner input
 - Minimize impacts to existing land use (e.g., orchards)
- Construction (temporary)
 - Safety
 - Route optimization
- Permanent
 - Access for long-term OM&R activities

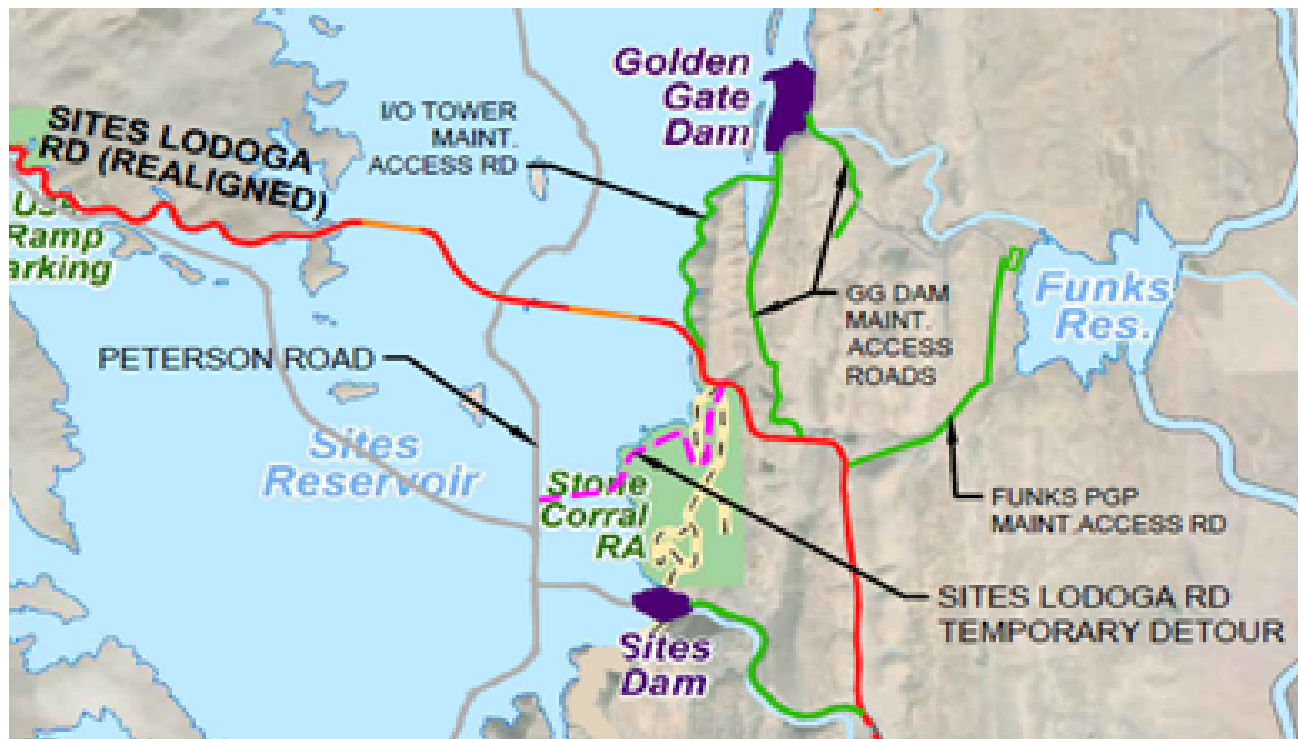
Option 3: Funks Construction Access Road Considerations

Funks Construction Access Road			
Alignments	ALT-1	ALT-2	ALT-3
Distance from I-5 to Golden Gate Dam	43,800' (8.3 miles)	42,000' (8.0 miles)	41,400' (7.8 miles)
Design Speed (e_max =of 4%)	25-55 MPH	35-55 MPH	35-55 MPH
Avg. Travel Time from GCID to Golden Gate Dam	8 minutes	6 minutes	6 minutes
Earthwork Volumes (CYD)	Cut	947,000	1,210,000
	Fill	168,000	107,000
	Net	779,000 CUT	1,103,000 CUT
Proposed Structures	<ul style="list-style-type: none"> Improved bridge over Tehama-Colusa Canal Improved bridge over GCID Canal 	<ul style="list-style-type: none"> New bridge over Tehama-Colusa Canal Improved bridge over GCID Canal 	<ul style="list-style-type: none"> Improved bridge over Tehama-Colusa Canal Improved bridge over GCID Canal



Sites Lodoga Temporary Detour Road (Maintains East-West Connectivity)

- Prior to beginning construction of the Sites Dam, a temporary detour road will be built to maintain continuous access between the towns of Lodoga and Maxwell



Next Steps

- Validate Funks Construction Access Road alignment with landowners
 - If acceptable, advance preliminary design
- Verify bridge improvement needs and coordinate design progression with the jurisdictional agency
- Coordinate any potential drainage and utility impacts with owners
- Continue discussing roadway OM&R responsibilities and establishment of interagency agreements

Questions?



Agenda Item 1.4

Reservoir Emergency Drawdown Analysis Update

Henry Luu

DSOD Drawdown Requirement

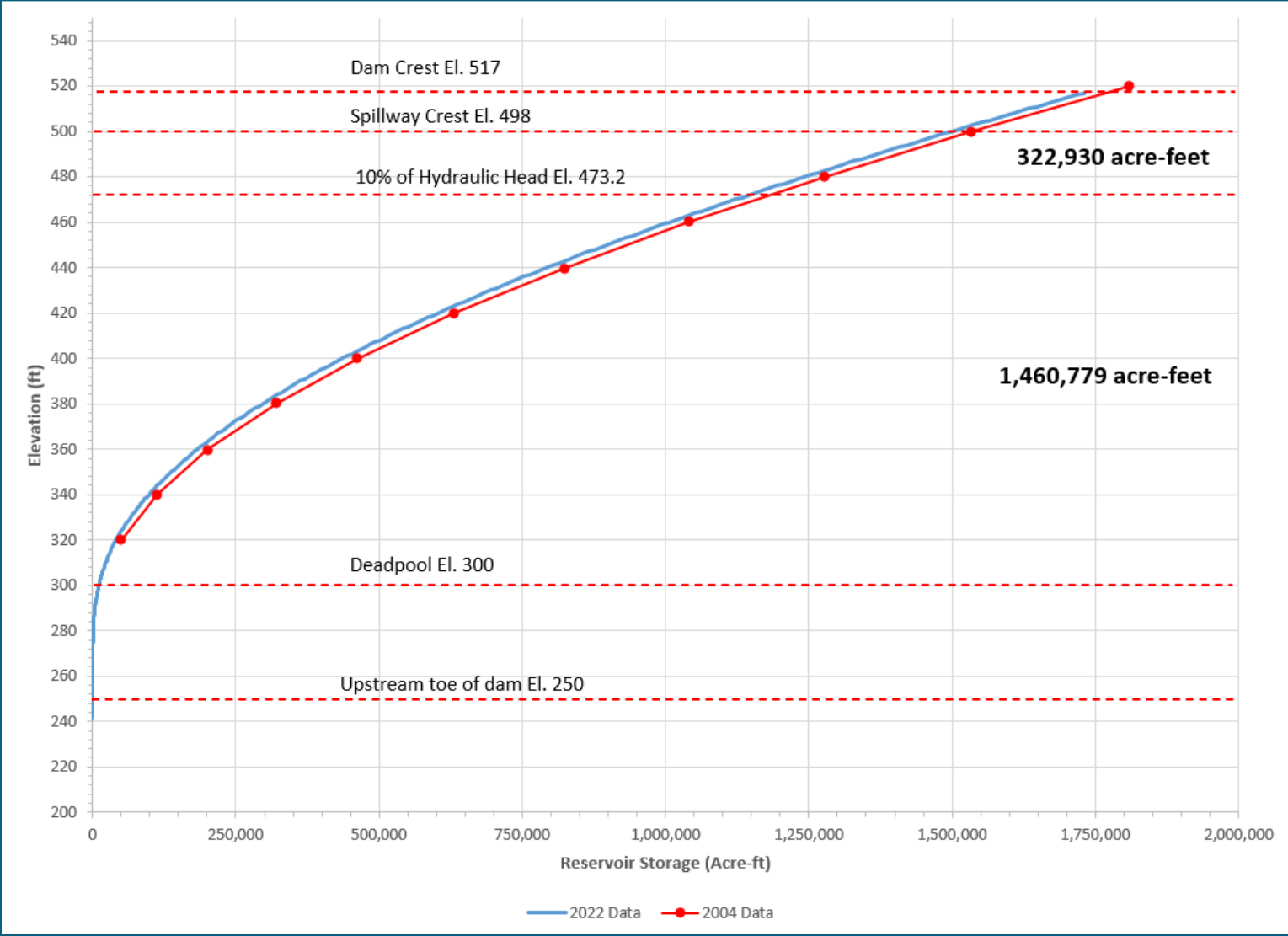
*“For reservoirs that impound over 5,000 acre-feet of water, the outlet system should be capable of lowering the **maximum storage depth by 10 percent within 7 or 10 days and draining its full contents within 90 or 120 days**, respectively, depending on factors such as downstream and seismic hazard, dam construction methods and age, known deficiencies, and type of dam; as determined by the Division.”*

These guidelines are evaluated on a case-by-case basis, particularly for very large reservoirs that are in excess of 100,000 acre-feet.

2021 Emergency Drawdown Modeling

- Drawdown criteria:
 - 10% drawdown within 7-days
 - Deadpool elevation is the lowest storage depth
- Evaluated up to 4 release locations:
 - Inlet/Outlet (I/O) to Funks Reservoir and TRR East
 - Sites Dam
 - Emergency release structure in the vicinity of Saddle Dam 3 (no longer considered)
 - Emergency release structure in the vicinity of Saddle Dam 5 (no longer considered)
- Maximum flow of 20,700 cfs split unevenly
 - I/O = 16,000 cfs
 - Sites Dam = 4,700 cfs

Updated Data and Coordination with DSOD



Risk and Safety Considerations for an Emergency Drawdown Even Flow Split

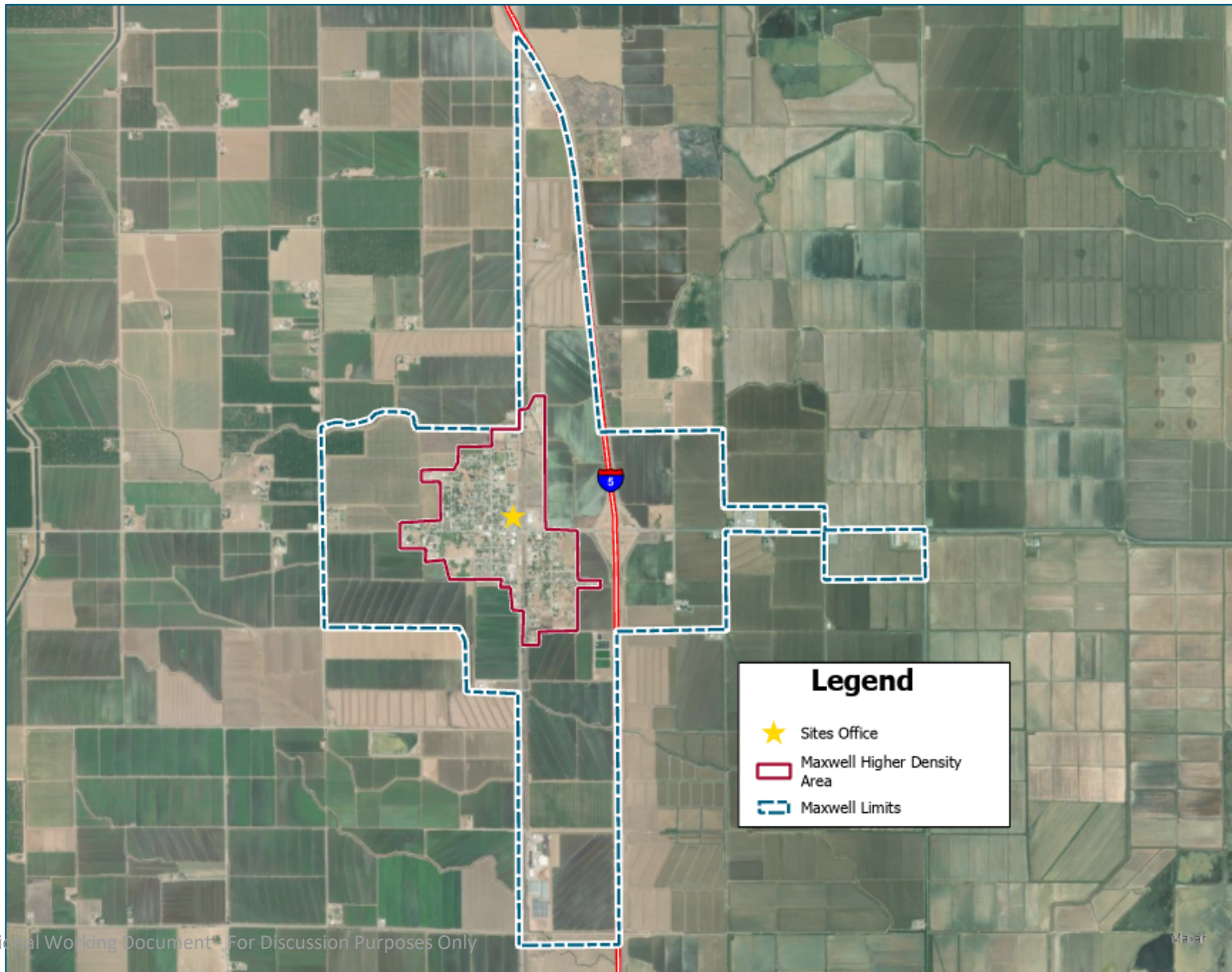
- Emergency drawdown actions are rare and very unlikely
- However, if one is required, an even flow split reduces risk of potential dam failure(s) due to an inability to adequately drawdown the reservoir
- Greater flexibility to control intermittent releases

Drawdown Duration	Day 1 Total Discharge (cfs)	I/O (cfs)	Sites Dam (cfs)
7-day (2021)	20,700	16,000	4,700
10-day (2023)	16,100	8,050	8,050

2023 Emergency Drawdown Modeling

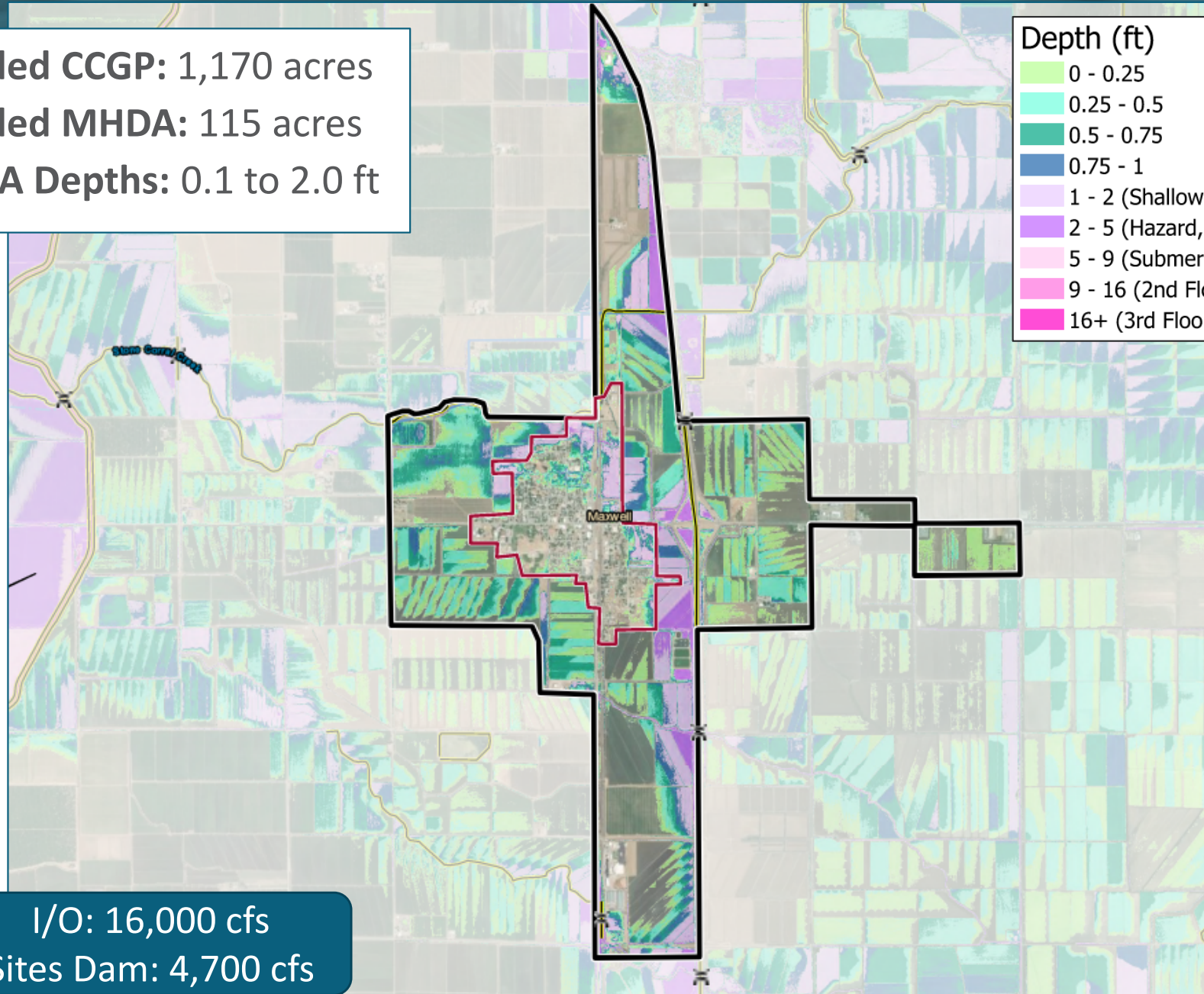
- Drawdown criteria:
 - 10% drawdown within 10-days
 - Upstream toe of dam elevation is the lowest storage depth
- Evaluated 2 release locations:
 - Inlet/Outlet (I/O) to Funks Reservoir and TRR West
 - Sites Dam
- Maximum flow of 16,100 cfs split evenly
 - I/O = 8,050 cfs
 - Sites Dam = 8,050 cfs

Colusa County General Plan (CCGP) & Maxwell Higher Density Area (MHDA)



Total Maxwell Depths: 7-day (2021) Results

Flooded CCGP: 1,170 acres
Flooded MHDA: 115 acres
MHDA Depths: 0.1 to 2.0 ft

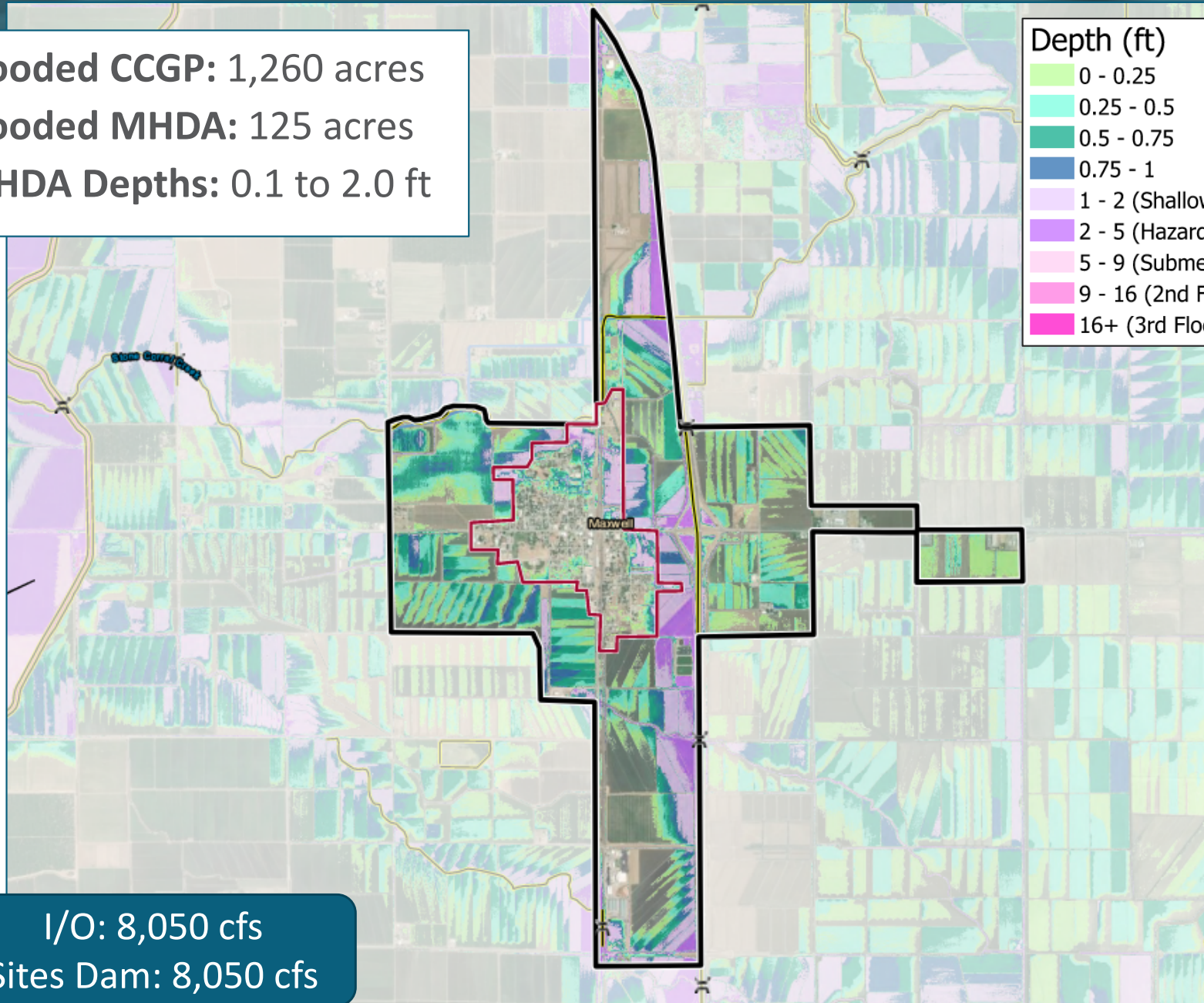


Depth (ft)	
0 - 0.25	
0.25 - 0.5	
0.5 - 0.75	
0.75 - 1	
1 - 2 (Shallow 1st Floor)	
2 - 5 (Hazard, Property Damage)	
5 - 9 (Submerge Autos, 1st Floor)	
9 - 16 (2nd Floor)	
16+ (3rd Floor)	

I/O: 16,000 cfs
Sites Dam: 4,700 cfs

Total Maxwell Depths: 2023 Even Flow Split

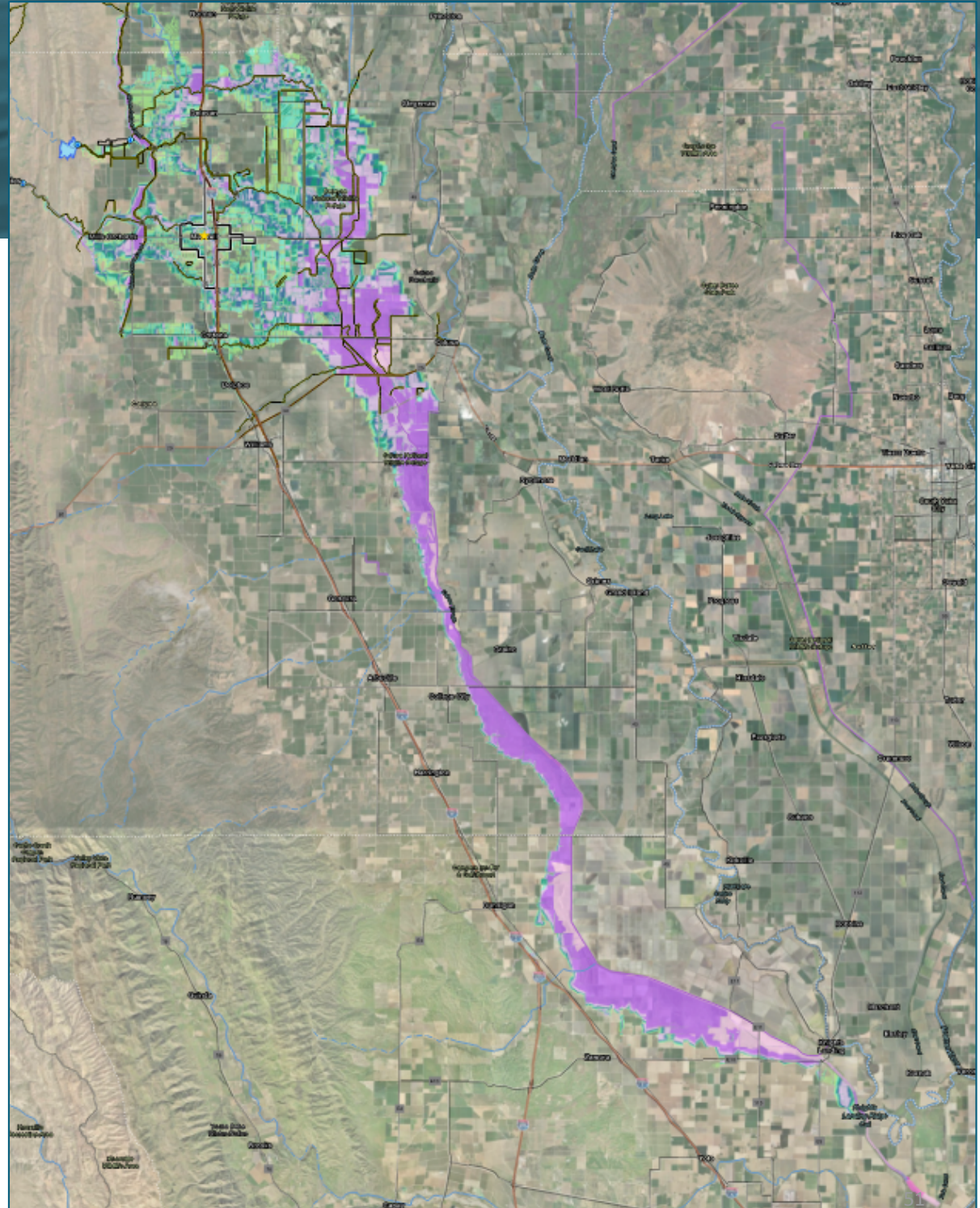
Flooded CCGP: 1,260 acres
Flooded MHDA: 125 acres
MHDA Depths: 0.1 to 2.0 ft



I/O: 8,050 cfs
Sites Dam: 8,050 cfs

Modeling 10-day Flows to Yolo Bypass

- Lower flow rates (from 7-day to 10-day) in the Colusa Basin Drain reduce inundation limits
- Timing of flood peak at the top of CBD for 10-day vs. 7-day takes 6-hours longer due to lower velocities



Next Steps

- Identify approach for addressing model limitations
 - Verify existing infrastructures
 - Analyze emergency drawdown impacts during wet conditions
 - Evaluate potential scenarios of downstream existing infrastructure failures (e.g., levee breach and/or overtopping)
- Collaborate with DSOD to advance required analyses
 - Refine Emergency Drawdown assessment
 - Begin coordinating dam breach evaluations

Questions?



Agenda Item 1.5

Risk Informed Decision Making Design Approach

Robert Kunde

Engineering and Construction Manager's Report

JP Robinette

Future Topics

- Status of geotechnical investigations
- Considerations for Cost Estimate updates
- Ops Plan update
- Others?

Thank you!

Next Meeting:

Wednesday, December 13, 2023 (1:30 pm – 3:30 pm)



Bullpen



2024-2025 Critical Path Items

- In developing 2024-2025 optimized schedule, the following top critical items were identified
 - Programmatic Environmental plans and compliance
 - Required to achieve clearance for Geotech and Construction activities to commence
 - Critical Land Acquisition
 - Land required to construct first three projects
 - Golden Gate Dam, Sites Dam, Sites Lodoga Rd Detour
 - Golden Gate Dam
 - Critical Path of the project to reach Operations

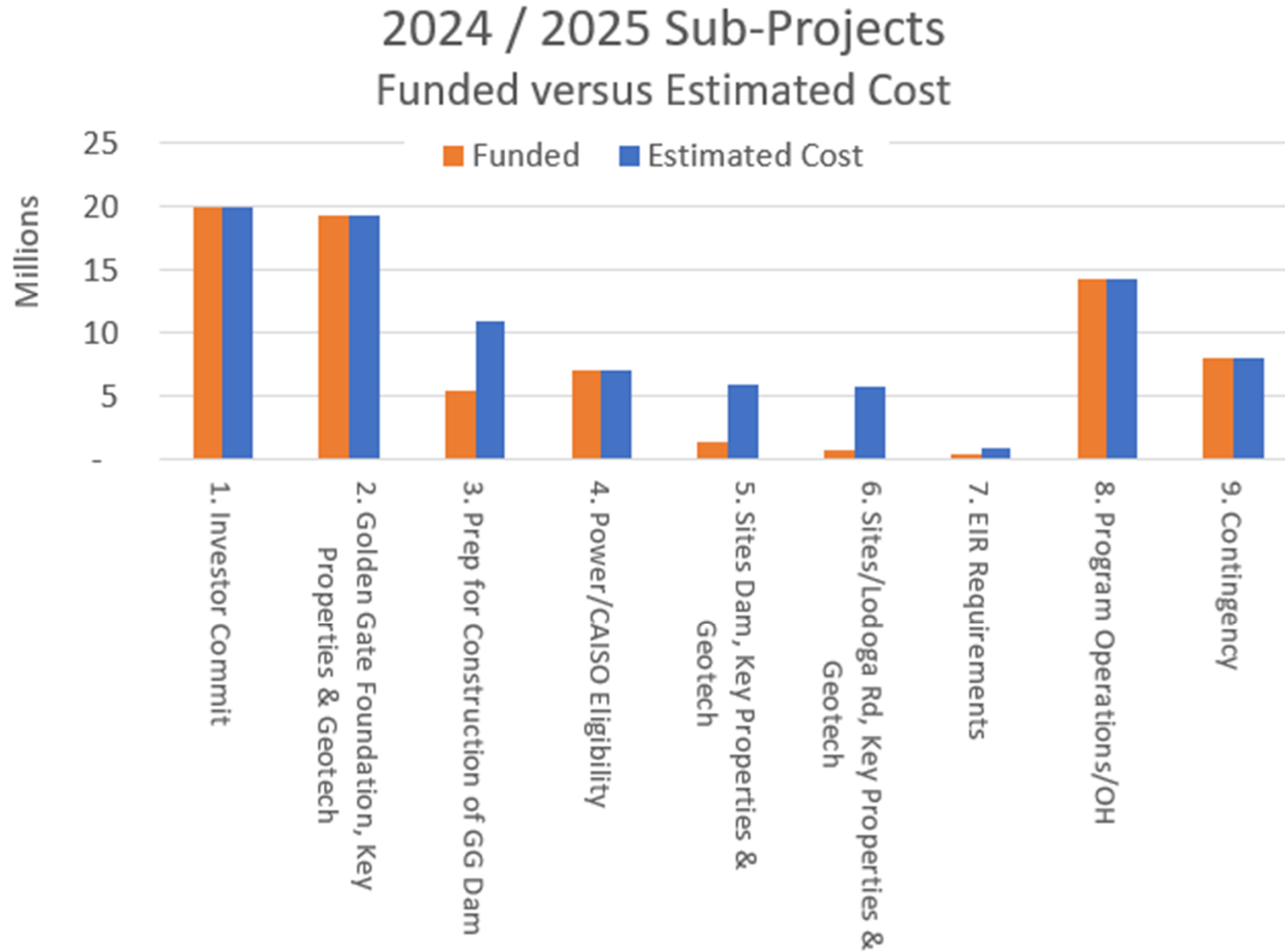
Re-Prioritize Amendment 3 Work

- Focus activity on higher priority work for advancing critical features
- Continue progress on activities that continue defining Level 3 cost estimate

Benefits:

- ✓ Geotechnical investigation on Golden Gate Dam (cost certainty)
- ✓ Advance 60 % Foundation design for Golden Gate Dams (cost certainty and early start construction)

Some sub-projects are prioritized to be completed while others are partially funded



The overall Amendment 3 budget

Proposed 2023 WP Update – Includes actual and forecasted values

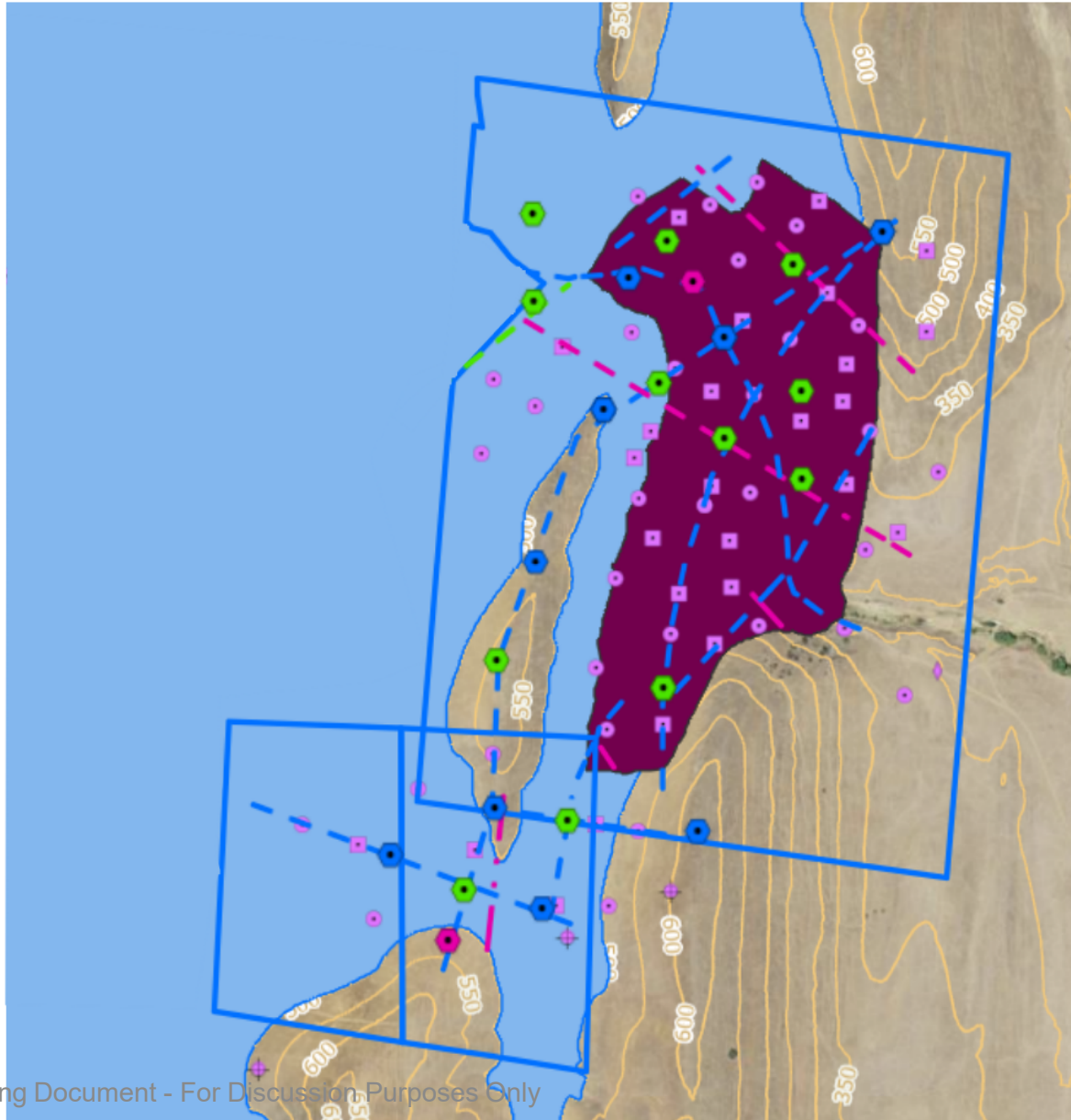
	2022	2023	2024	2025	Total
Expenses	\$24.7M	\$40.5M	\$48.9M	\$28.0M	\$142.2M
Revenue*	\$36.7M	\$53.0M	\$39.1M	\$14.1M	\$142.9M

*For cash flow purposes, includes some carryover from previous periods

Revenue Budget by Source	Revised 2024 Budget
Reservoir Committee Cash Call	\$25.6M
Authority Board Seat Dues	\$0.5M
Federal (WIIN Act) Funding	\$13.0M
State (Prop 1 [WSIP])	--
Revenue Total	\$39.1M
Estimated Cash on Hand 1/1/2024	\$24.7M
Estimated Available Funds	\$63.8M

Subject Areas	Orig 3-yr WP Totals 2022 - 2024		Proposed 4 -yr Totals 2022 - 2025		Change in %
		%		%	
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Real Estate	\$ 2,740,000	2.3%	\$ 9,586,800	6.7%	4.4%
Total	\$ 119,598,000	100.0%	\$ 142,260,400	100.0%	

Golden Gate Dam Geotech Investigations



Draft - Predecisional Working Document - For Discussion Purposes Only