



Lake Oroville Spillway Update

Engineering and Operations Committee

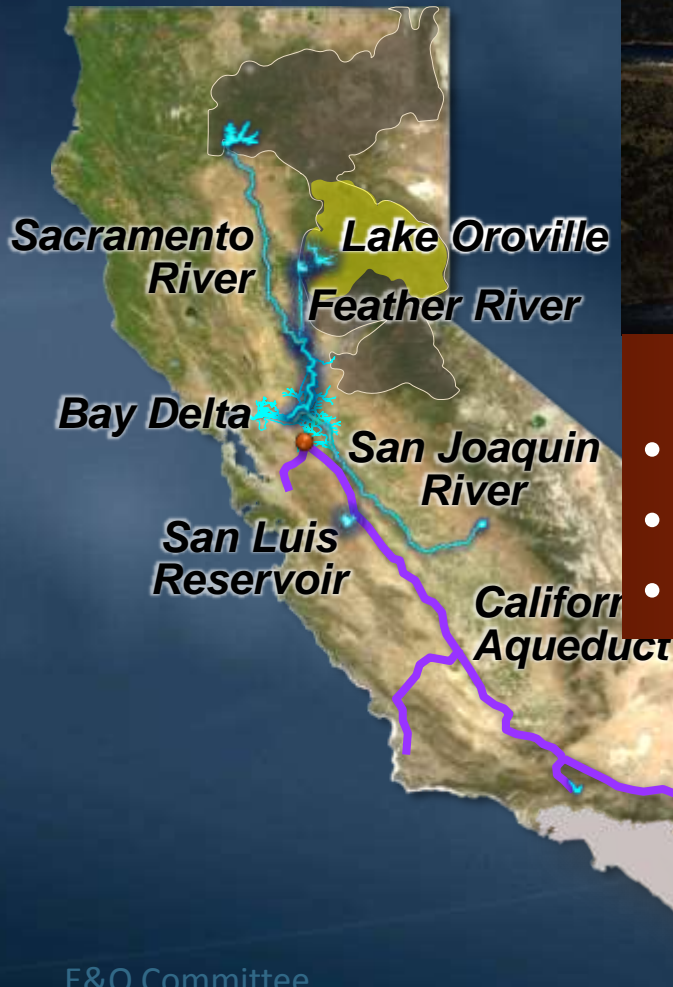
Item 6a

September 11, 2017

Overview

- Background on Lake Oroville
- Spillway incident and damages
- Response and cleanup
- Oroville Spillways Emergency Recovery Project
- Forensic evaluation
- Potential supply impacts
- Update on costs

Lake Oroville is an Integral SWP Facility



Lake Oroville

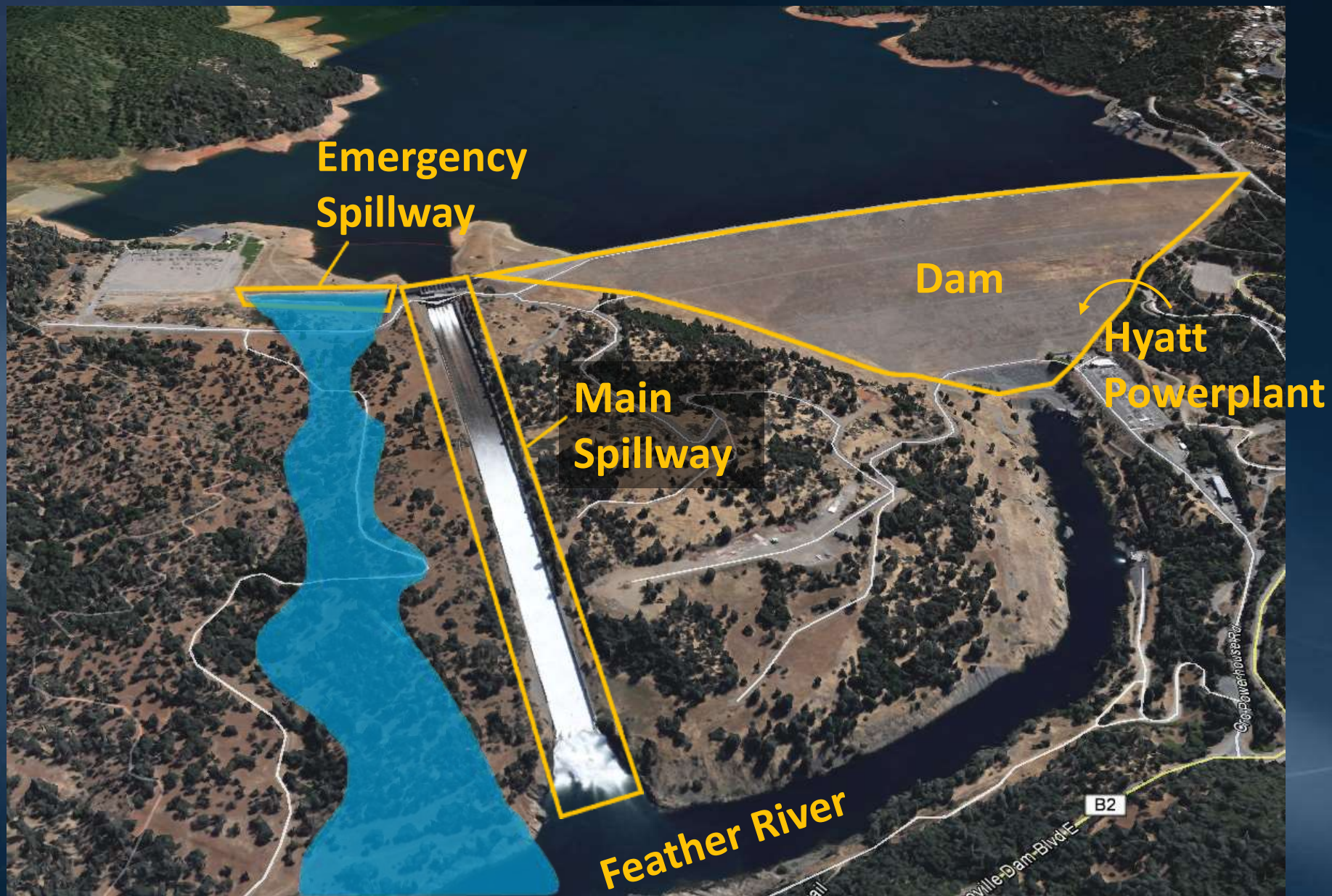
- Main SWP storage facility
- 3.54 MAF capacity
- Operational in 1968



Hyatt Powerplant

- 6 Units
- Generating capacity up to 819 MW at 16,950 cfs

Oroville Dam Facility



Spillway Incident and Damages

Oroville Spillway Incident

February 7, 2017



Deck and Foundation Erosion

February 9, 2017



February 11-12, 2017



Inflows to Lake
Oroville reach
nearly 200,000 cfs

Flows over the
Emergency Spillway

Sizeable Inflows and Outflows



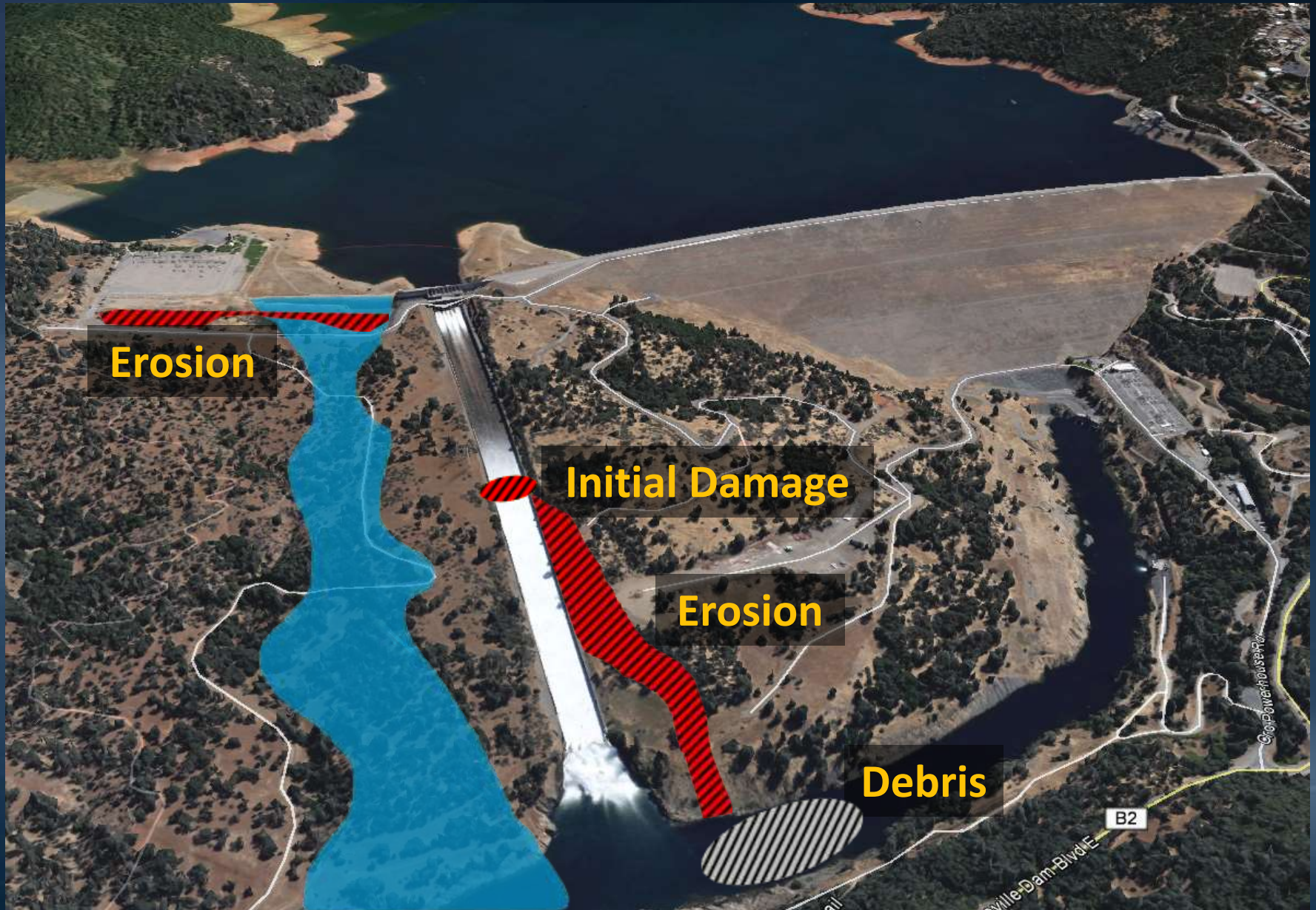
Inflows (Jan-May 2017)

- 6.5 Million AF
- Almost 2 times the max reservoir capacity

Outflows (Jan-May 2017)

- 5.2 Million AF through the main spillway
- Twice the previous record
- Nearly 1.5 times the max reservoir capacity

Overview of the Damage



Response and Cleanup

Interim Repair Work

Erosion Protection



Concrete Repair Work



Rock Bag Reinforcement



Patching, Inspecting, Studies



Commenced Major Cleanup



**Debris Removed from
the Thermalito
Diversion Pool**

Total of 1.9 million cubic
yards



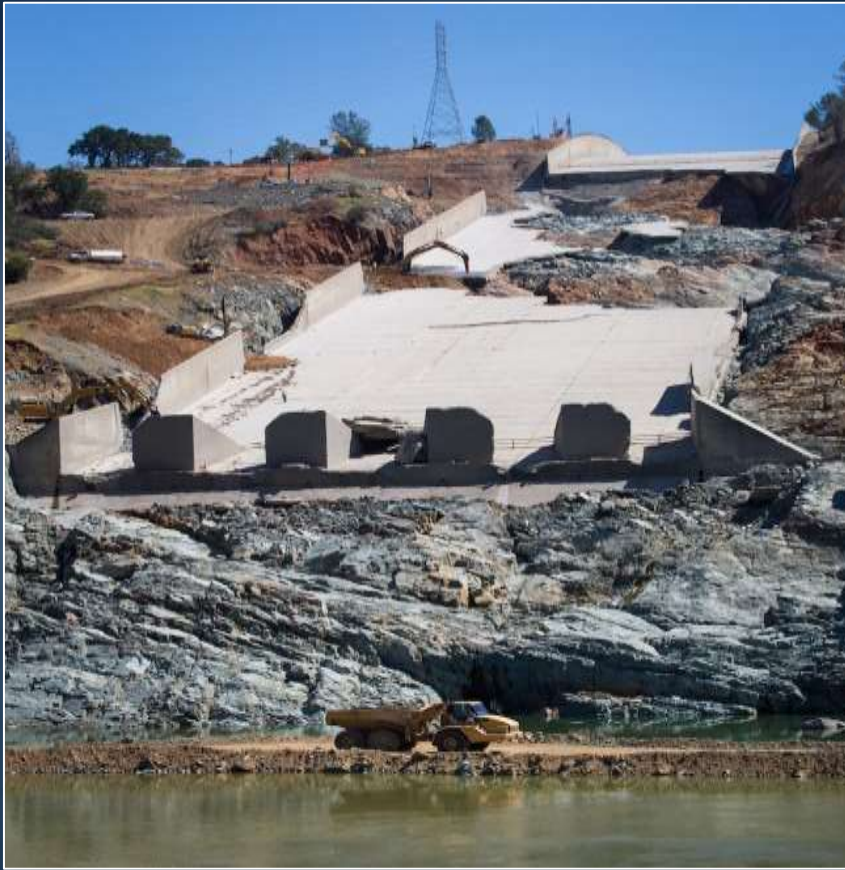
Hired Contractors and Finalized the Design and Specifications



Oroville Spillways Emergency Recovery Project

Large-Scale Recovery Effort

Demolition and Site Preparation



May 2017



June 2017

Large-Scale Recovery Effort

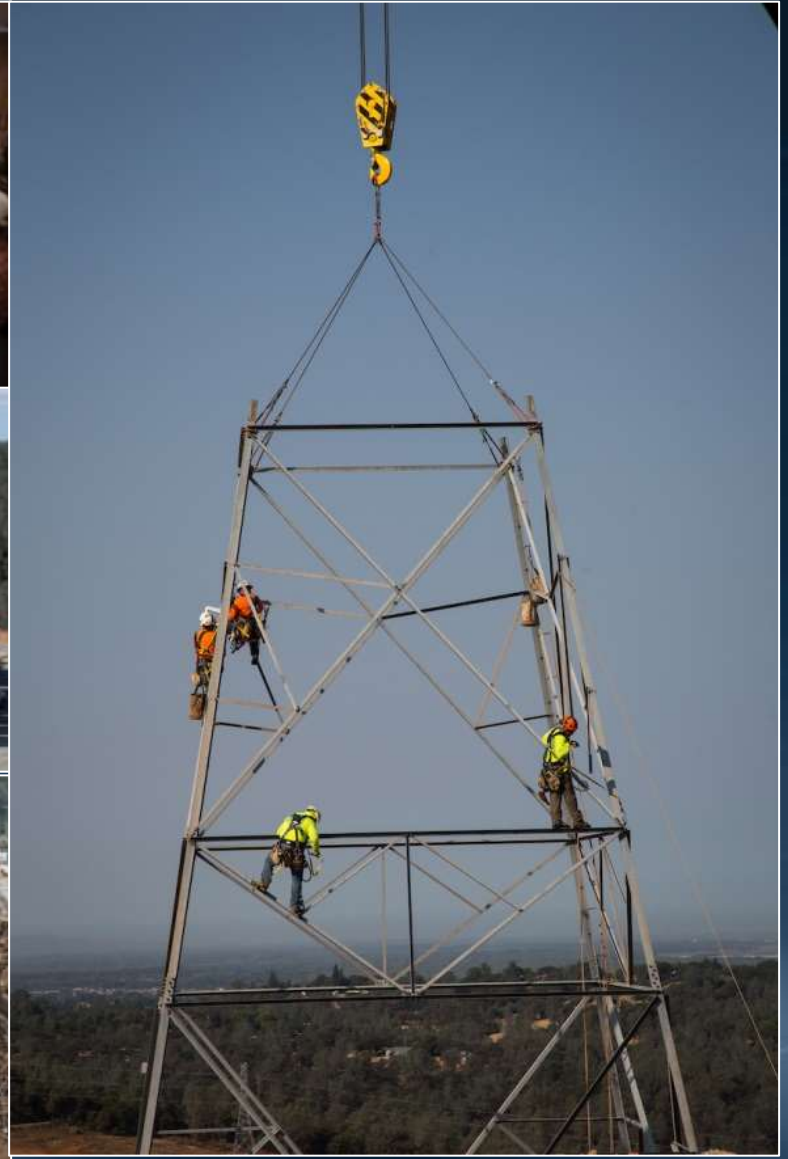
Logistics



**Equipment
and
Materials**



**Access
Roads**



Large-Scale Recovery Effort



Phased Construction

2 year construction strategy (2017-2018)

- 2017: Have systems in place by November 1st that can safely pass winter flows
 - Includes temporary solutions of portions of the main spillway to meet timelines
- 2018: Complete permanent solutions of returning both the gated flood control and emergency spillways to service to pass design flows

2017 Main Spillway Repair

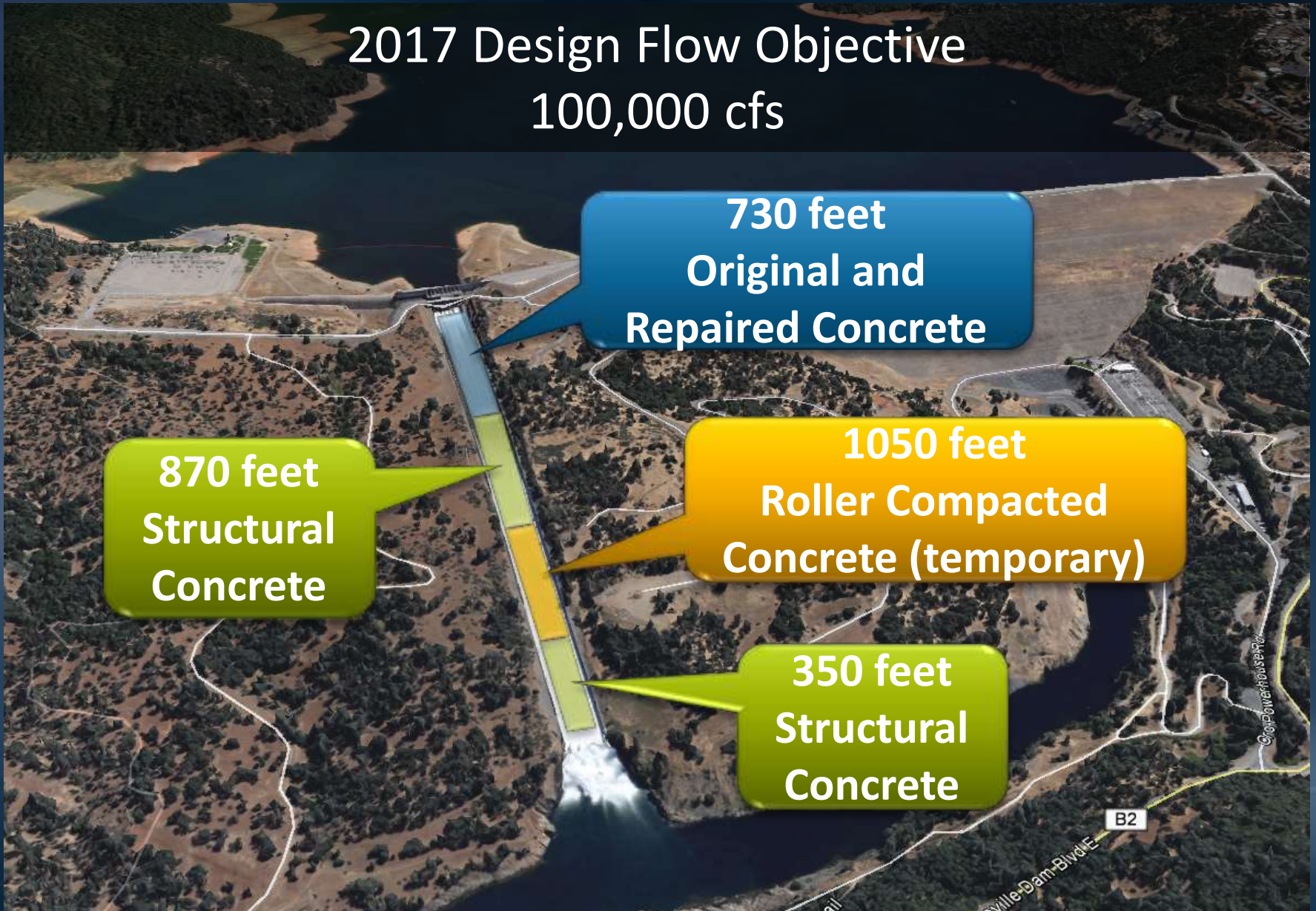
2017 Design Flow Objective
100,000 cfs

730 feet
Original and
Repaired Concrete

870 feet
Structural
Concrete

1050 feet
Roller Compacted
Concrete (temporary)

350 feet
Structural
Concrete



2018 Main Spillway Repair

Scheduled to be completed by late 2018
Return the spillway capacity to 270,000 cfs

An aerial photograph of a dam spillway. The spillway is a long, narrow concrete structure extending from a reservoir on the left towards a river on the right. The spillway is divided into several sections. Three callout boxes are overlaid on the image: a green box at the top pointing to the upper section, a larger green box in the middle pointing to the middle section, and a purple box at the bottom pointing to the lower section. The surrounding landscape is a mix of green trees and brownish soil. A road labeled 'B2' and 'ville-Dam-Blvd E' is visible at the bottom right. A small vertical text '© 2018 Powerhouse' is on the right edge.

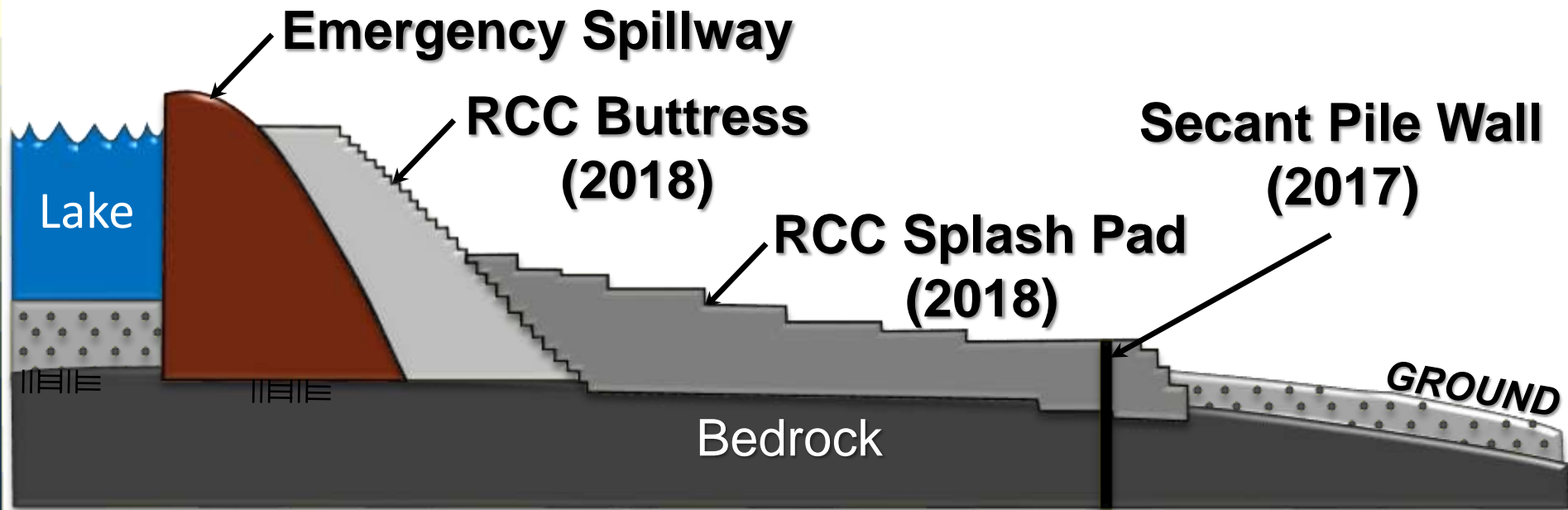
730 feet
Structural Concrete

1050 feet
Structural Concrete

Energy Dissipaters
Hydro-blasted and
Resurfaced

Emergency Spillway Repair Plan

- Designed to address erosion concerns
- Scheduled to be completed by late 2018
- Repairs will continue year-round until completed



Cutoff Wall Conceptual Construction



Forensic Evaluation

Identified Potential Factors to Spillway Incident

- May 5 and Sept 5, 2017 memos from the Forensic Team with preliminary findings
- Final report due in fall 2017
- Highlights
 - Slab thickness and reinforcement
 - Slab joint design
 - Slab drainage
 - Slab foundation
 - Prior slab repairs
 - Rate of flow change before failure

Incorporating Lessons Learned



Potential Supply Impacts

Impacts Depend on Hydrology

- Oroville storage will start the water year at a lower level
 - **Could be around 1.2 MAF (about one-third full)**
- This is lower than normal because of the spillway event and project
- Hydrology will play a significant role in the final 2018 SWP allocation
 - **More snow than rain is better for supplies**
 - **Timing of precipitation**

Update on Costs

Update on Costs

Response and Cleanup Costs

- Clean-Up Costs - \$250 Million
 - Several FEMA reimbursement applications to date
 - FEMA is reviewing and approving reimbursements
 - \$22.8 Million approved for DWR as of late July 2017
 - Additional FEMA applications pending

2017/2018 Recovery Project

- Main spillway temporary and permanent repairs
- Emergency spillway repairs
- Kiewit Infrastructure West Co.: \$275 Million

Update on Costs

Unknowns

- Change orders
- Additional contracts and staff time
- Total FEMA reimbursement
- Other potential federal/state funding

Summary

- Work is progressing quickly
 - 2017 work is on track for the upcoming rainy season
- Extensive collaboration and coordination
- Dynamic and evolving process
- Metropolitan will continue to monitor the progress and adapt to future conditions



