



U.S. ARMY CORPS OF ENGINEERS

SANTIAGO CREEK PROJECT

Presentation for SARFPA

03 June 2021



SANTA ANA RIVER MAINSTEM PROJECT (SARM)



SARM Scope:

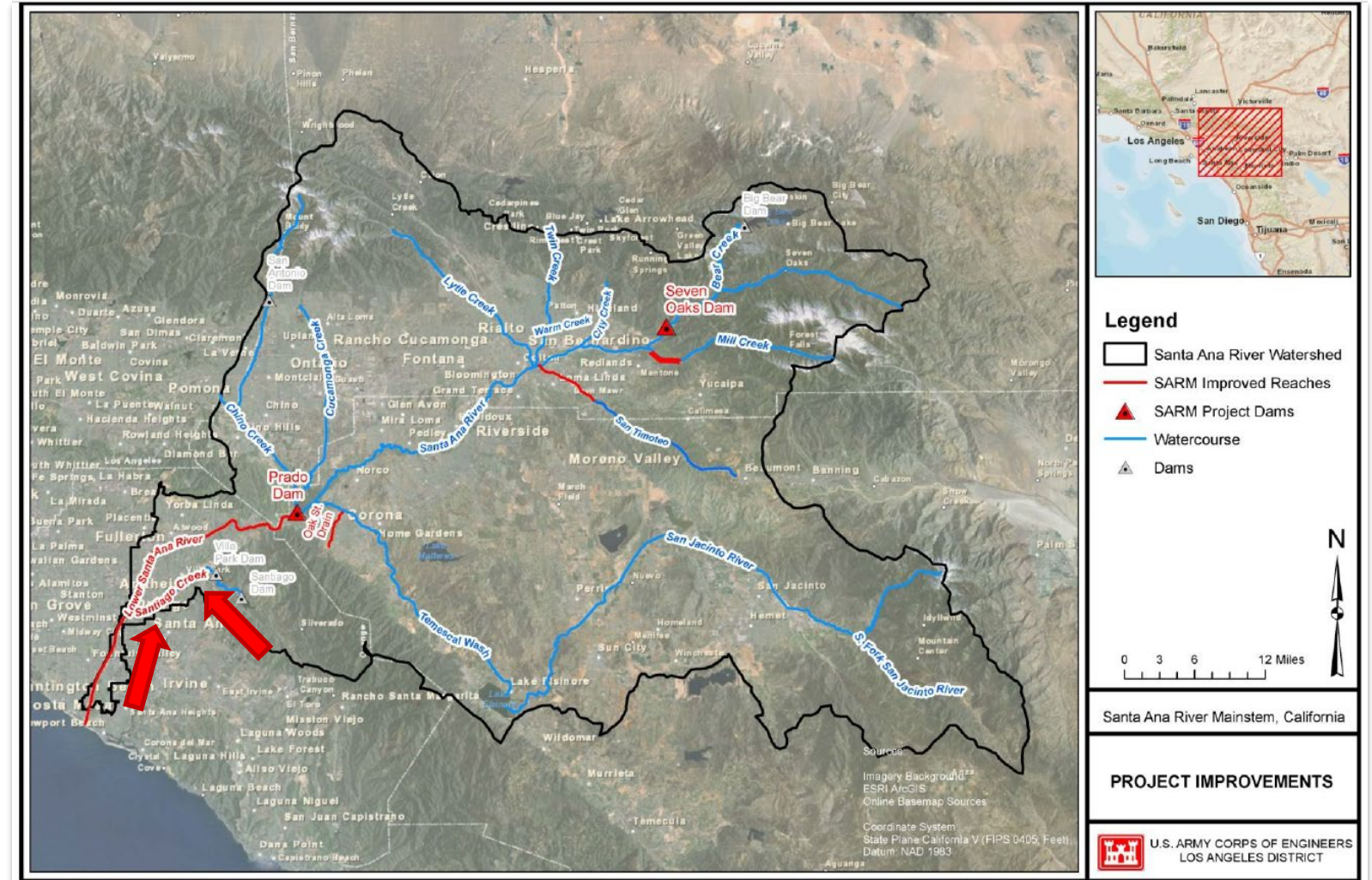
Dam construction/rehabilitation, channel improvements, levee construction, flood plain management, and related work.

Upper Basin:

- 7-Oaks Dam (complete)
- Mill Creek Levees (complete)
- San Timoteo Creek (complete)
- Oak Street Drain (complete)
- Prado Dam & Reservoir

Lower Basin:

- Lower Santa Anna Channel
- **Santiago Creek**





SARM AUTHORIZATION WRDA 1986

SANTA ANA RIVER MAINSTEM, CALIFORNIA

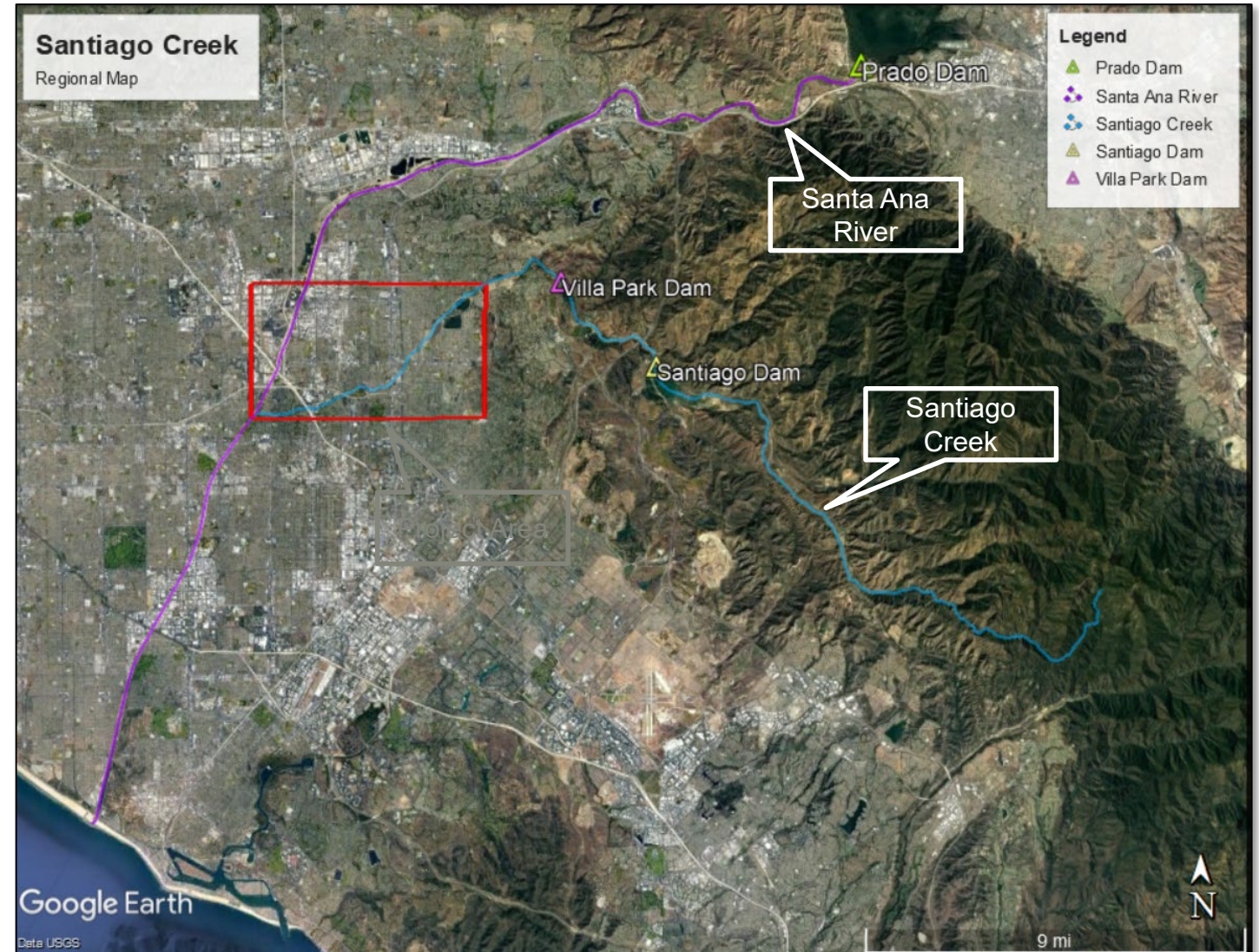
The project for flood control, Santa Ana River Mainstem, including Santiago Creek, California: Report of the Chief of Engineers, dated January 15, 1982, at a total cost of \$1,090,000,000, with an estimated first Federal cost of \$809,000,000 and an estimated first non-Federal cost of \$281,000,000, except that in lieu of the Mentone Dam feature of the project and subject to the provisions of section 903(b) of this Act, the Secretary is authorized to plan, design, and construct a flood control storage dam on the upper Santa Ana River.



SANTIAGO CREEK FLOOD RISK MANAGEMENT (FRM) PROJECT

Santiago Creek Setting:

- Tributary to Santa Ana River, **highly urbanized** downstream of gravel pits.
- **Reservoir at former gravel pits**, currently used for water conservation (groundwater recharge).
- **Ephemeral stream**, dry most of year downstream of gravel pit.
- Headwaters are mountain runoff, **controlled by Villa Park Dam** and Santiago Dam





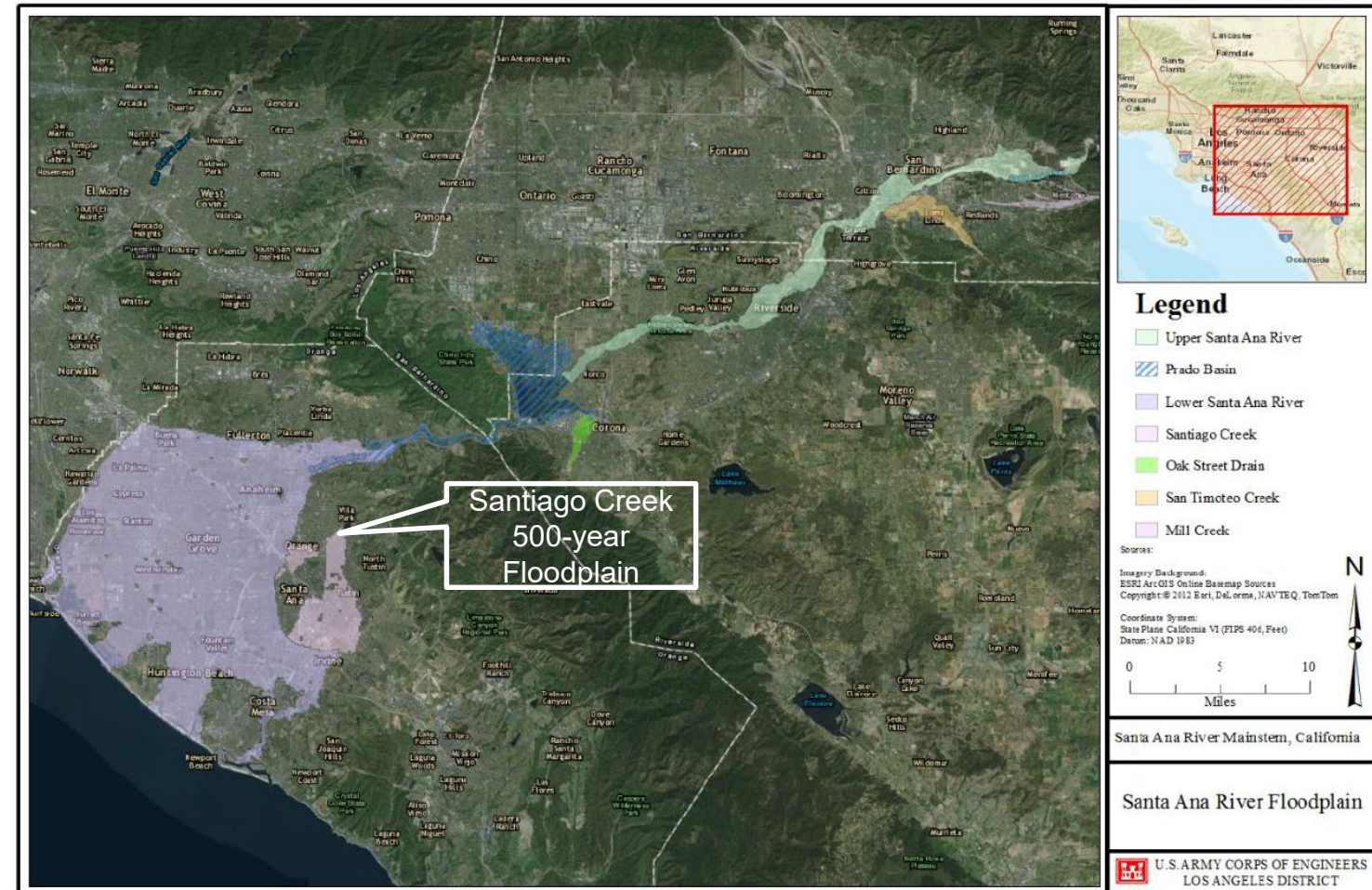
SANTIAGO CREEK FRM PROJECT



Santiago Creek Scope:

Authorization Document: Chief's Report based on Phase I GDM (1980) Urbanization and floodway encroachments have created **flooding** along and downstream of Santiago Creek.

Draft Design - Phase II GDM (1988): Reservoir expansion and channel improvements for containment of 100-year flooding events.





SANTIAGO CREEK FRM PROJECT



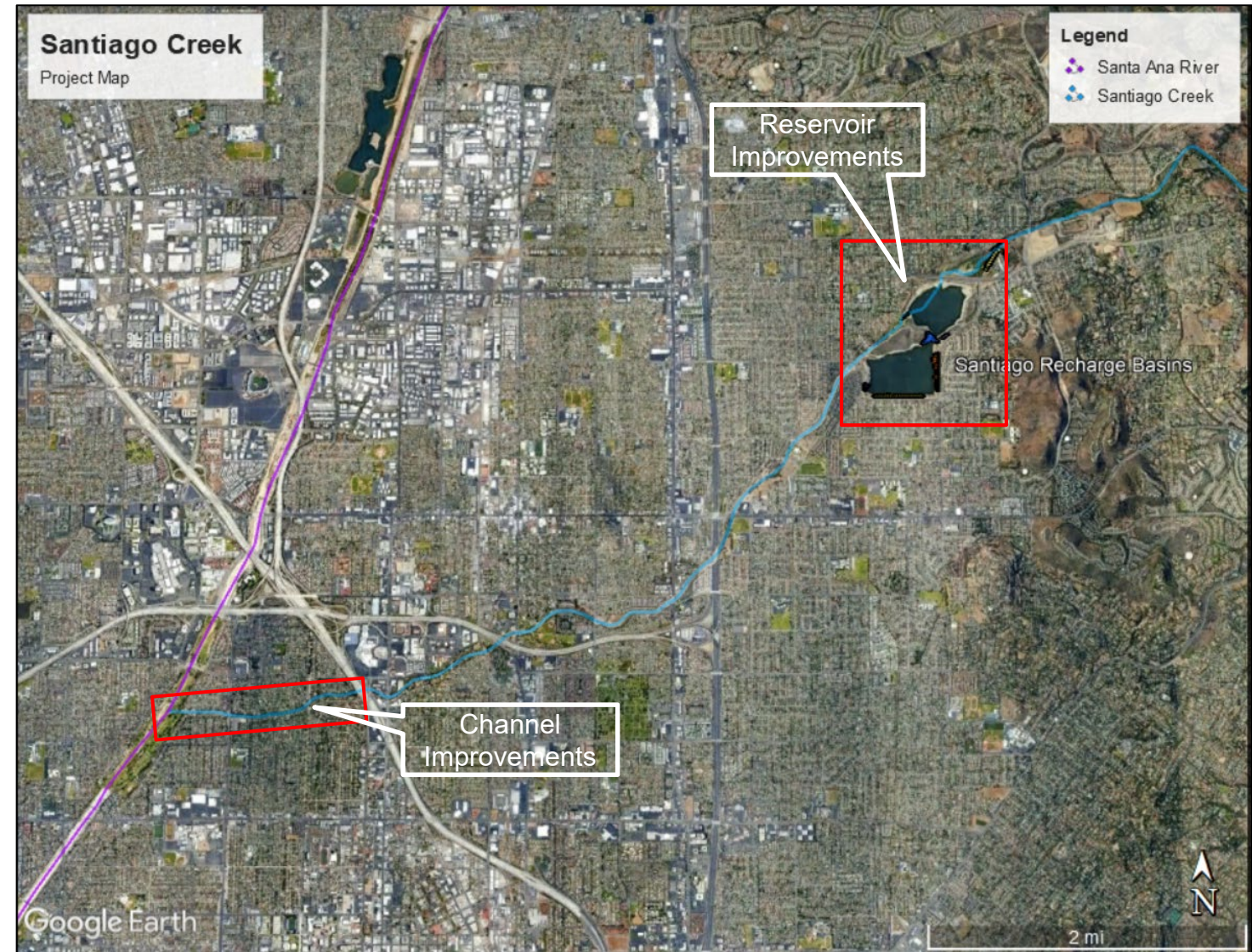
Santiago Creek Scope:

From authorization, 1988 Phase II GDM, and 1998 DM-18:

- 1) Channel Improvements
 - Channel Rehabilitation, including riprap armoring and grade control
 - Energy control at Santa Ana River confluence
 - Improved Channel D/S of Reservoir (completed in 1991)
- 2) Reservoir Improvements
 - Storage Capacity Increase
 - Inlet Culvert at Villa Park Road (completed)
 - Flow and Stage Regulation

Estimated Construction Cost:

- \$87M (2020 cost update, const cost w/ 35% contingency)





SANTIAGO CREEK FRM PROJECT



Reservoir Improvements:

- Stage and Flow Control
 - Gated Outlet Control Structure
 - Overflow Weir Structure
- Storage Capacity Increase
 - Vertical Expansion
(Slope stabilization within existing footprint)
 - Conservation / FRM Joint Use
(No net reduction to groundwater recharge)

GDM Phase II Design Requirements:

- 4,600 acres-feet FRM storage capability
(Storage of uncontrolled overflow from Villa Park Dam)
- 3,500 cfs capacity Gated Outlet Structure
(Matches gated discharge flow at Villa Park Dam)



- Rapid Reservoir Drawdown
(Releases conservation storage and provides FRM storage ahead storm events)



SANTIAGO CREEK FRM PROJECT

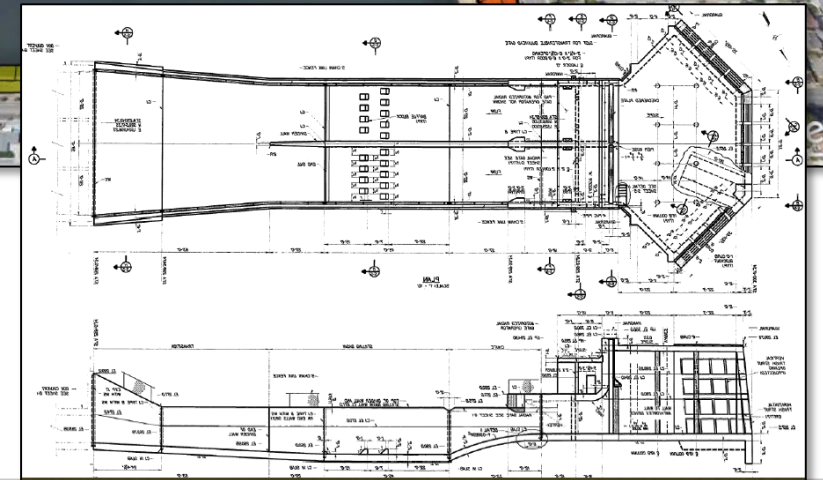


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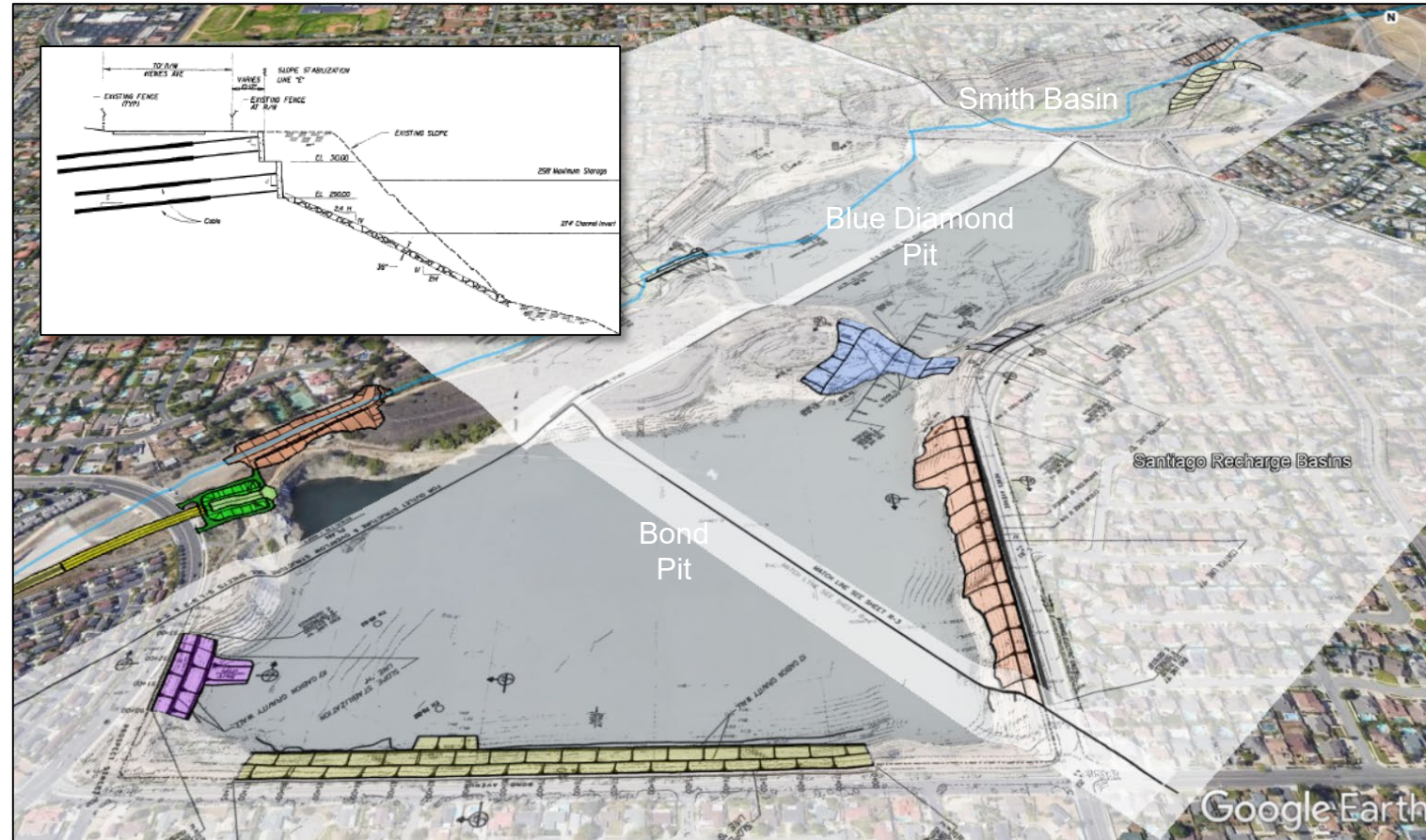


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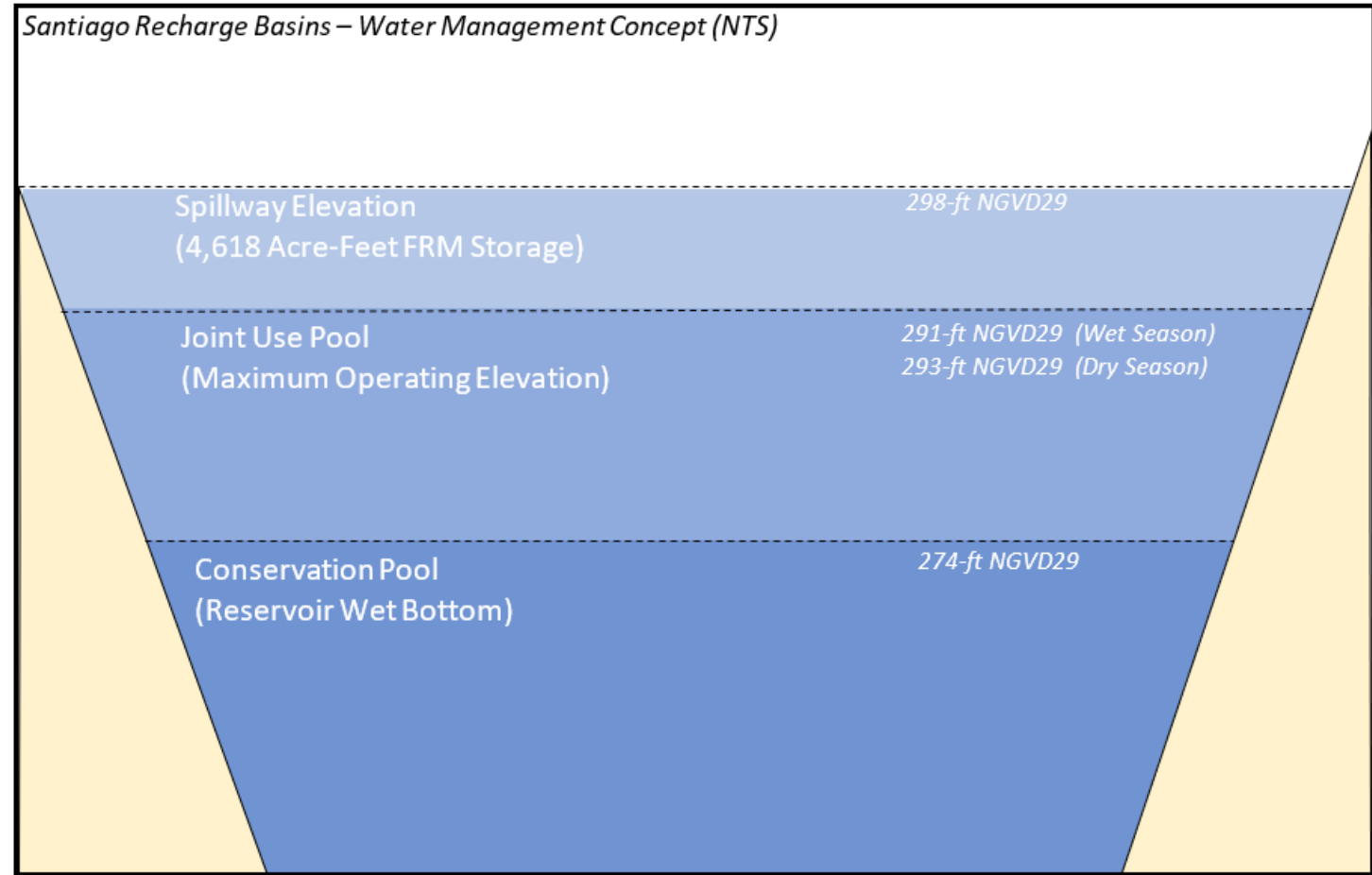


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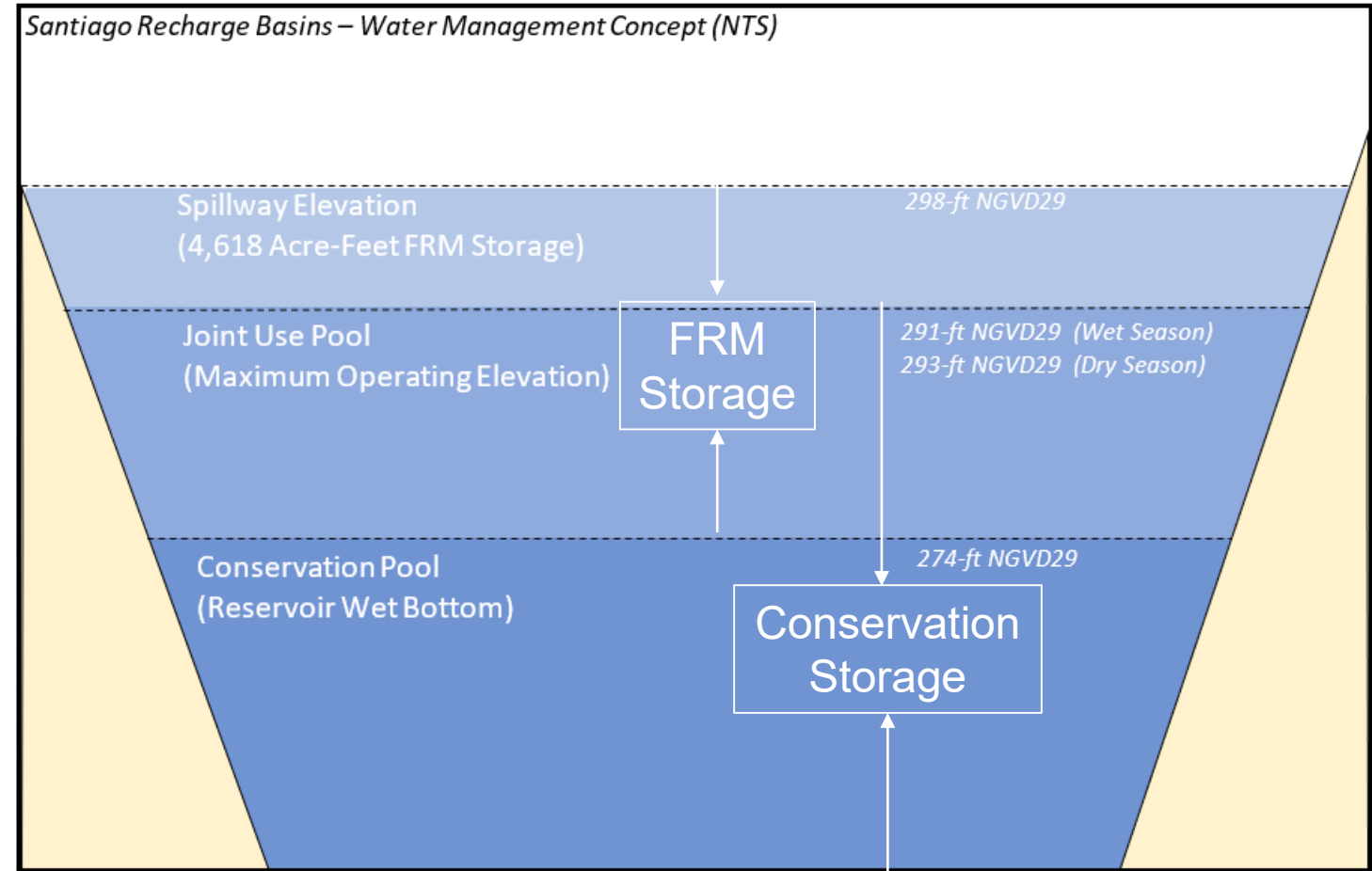
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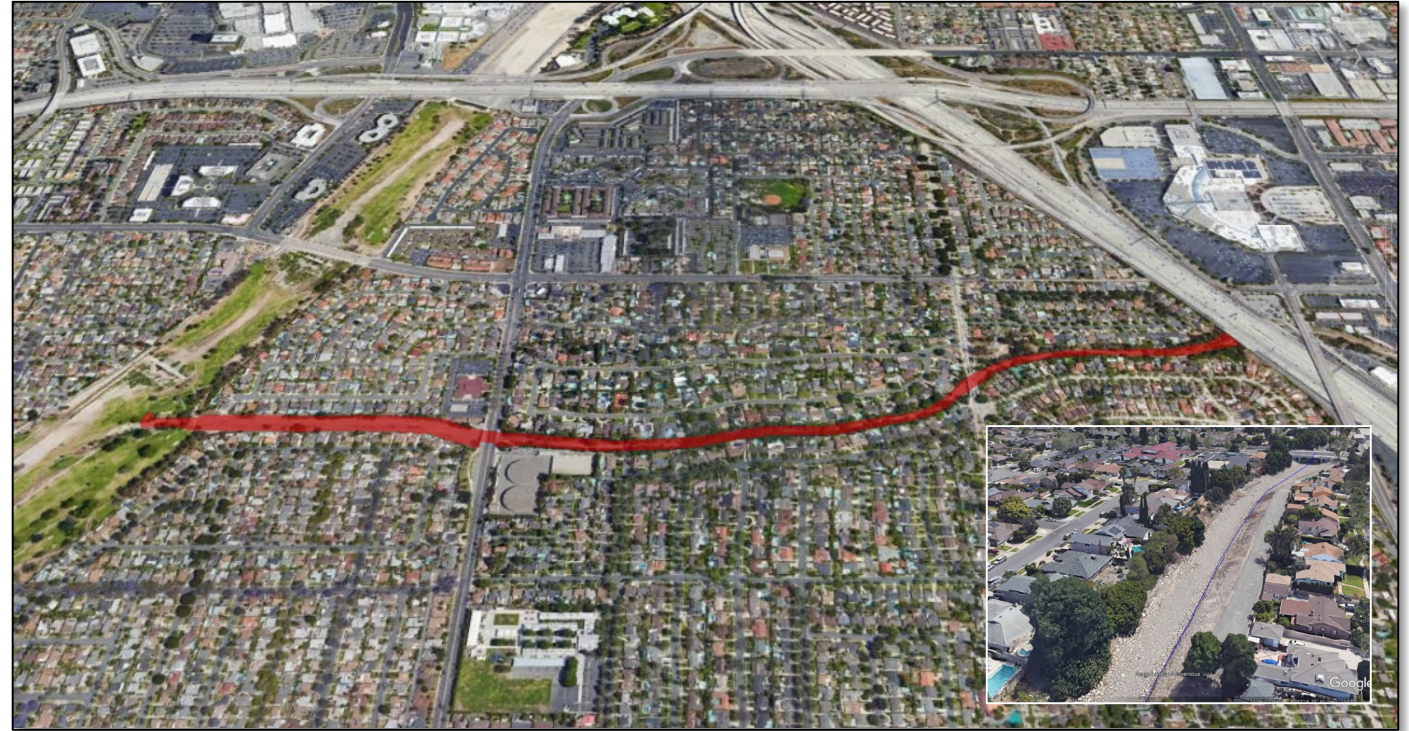


Channel Improvements Scope:

- Rip Rap Channel D/S of I-5
- Energy control at Santa Ana River confluence

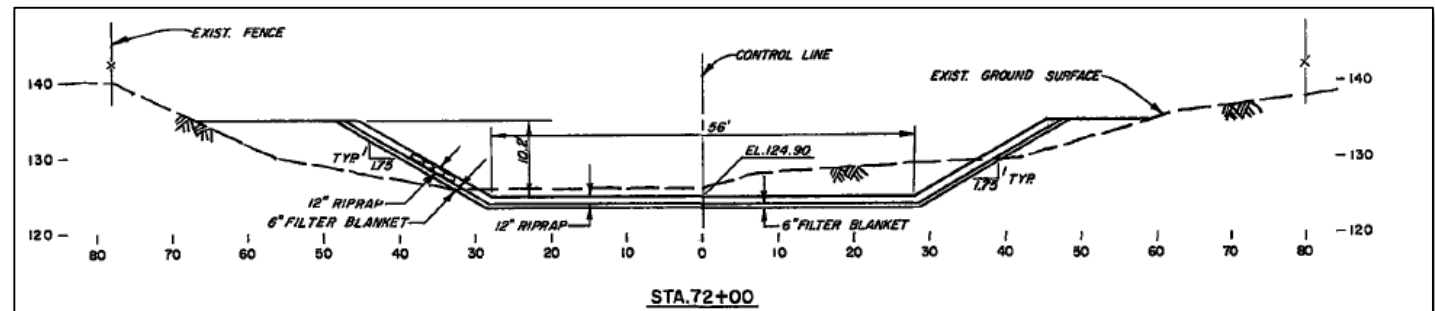
Current Conditions:

- Floodway Encroachments (e.g., vegetation)
- Heavy Erosion (e.g., channel incision)
- Inconsistent Armoring (e.g., residential installations)
- Overtopping during large storm events



GDM Phase II Requirements:

- Contain 100-year ACE flows
- Maintain 5,000 cfs flowrate at SARM confluence
- Improvements constrained to available real estate
- Prevent erosion & stabilize channel





SANTIAGO CREEK PROJECT



Environmental Considerations:

- Reservoir is known habitat for protected species, including California Gnatcatcher and Least Bell's Vireo.
- Habitat Mitigation Areas at Reservoir
- NEPA & CEQA coordination ongoing
- SHPO coordination ongoing





SARM SC DESIGN DOCUMENTATION REPORT LA & CHICAGO DISTRICT PARTNERSHIP

- ❖ A Design Documentation Report (DDR) is defined in ER 1110-2-1150:
 - The design documentation report (DDR) is a record of final design effort after the feasibility phase. A DDR is required for all engineering design products. The DDR provides the technical basis for the plans and specifications and serves as a summary of the final design. It is used by the ITR team and for future reference. The approval level for a DDR, which is an engineering implementation document, is at the District command.
 - When completed, a DDR represents an overall 35% level of design for a project. The remaining levels of design beyond 35% are represented by plans and specifications for construction contracts. The as-built drawings produced by the construction contractors and used for the operation and maintenance of the project would represent the 100% design.



SARM SC DESIGN DOCUMENTATION REPORT, CONTD.



Details of the scope of the DDR:

- Geotechnical: borings to provide data; 35% design of reservoir slope stabilization, hydraulic structures foundation, and channel improvements
- H&H: verify design hydrology, develop hydraulic models, design reservoir hydraulic structures and gates, design of channel improvements
- Structural: design of reservoir hydraulic structures
- Mechanical and Electrical: design of hydraulic structure gates
- Civil: project technical mapping and site design
- Environmental Engineering: verify HTRW status of site, assist in environmental compliance
- Real Estate: determine real estate required for project and develop plan for acquisition
- Environmental Compliance and NEPA: verify requirements of project for environmental compliance; conduct NEPA, coordinate with local sponsor for CEQA compliance
- Economic evaluation: limited to coordinating cost information for next 5 year ERR
- Construction: constructability reviews of DDR submittals
- VE/VM: conduct certified VE study on 35% DDR submittal; evaluate and incorporate VE findings
- Project Management
- Certified Cost Estimate

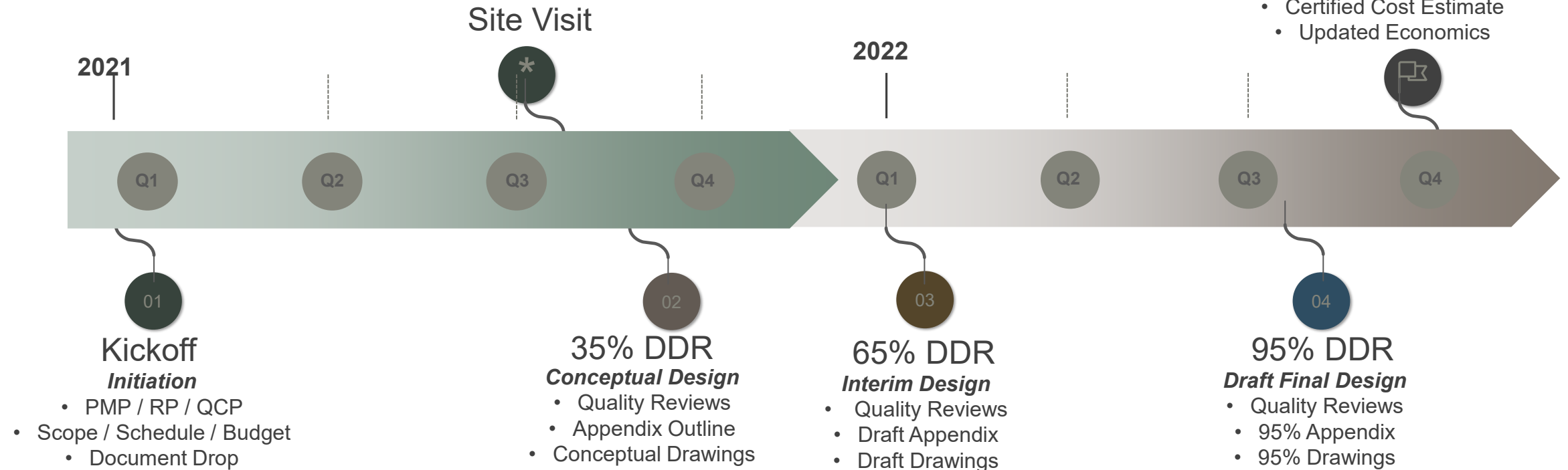


SARM SC DESIGN DOCUMENTATION REPORT COST CONSIDERATIONS

- Project will be designed as economical as possible
- Some project components have already been completed
 - Channel downstream of the basin has already been upgraded by a third party.
 - Orange County Water District has performed some slope stabilization in the basins and will improve the saddle area of the basins in 2021.
- Team has noted relatively high design and construction administration costs as a percentage of the total estimated construction cost in current estimate. This can likely be reduced through analysis.



DDR TIMELINE: 2-YEARS



Major Activities:

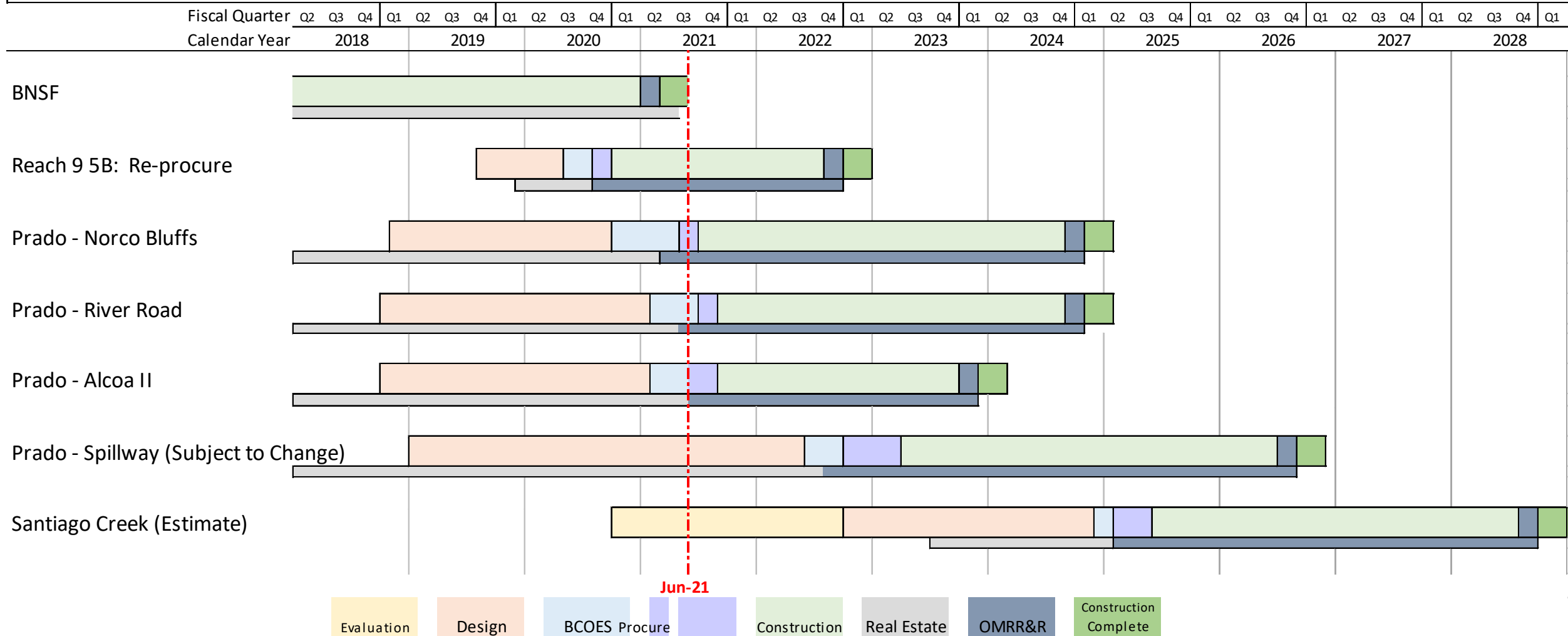
- **Stakeholder Coordination:** Operations
- **Site Visit:** Ground Truthing
- **Env Coordination:** CEQA, SHPO, NEPA
- **Hydraulics Update:** Design Parameters
- **Surveys:** Reservoir/Channel, if needed
- **AE Support:** TBD (unlikely)
- **Slope Design:** Geotech / Struc Analysis
- **Outflow Design:** Structural / Mech Analysis
- **Real Estate:** Acquisition Plan
- **Econ Update:** Benefits Update
- **Certified Cost:** Cost estimate w/ approvable contingency



SARM – SCHEDULE



SARM Timeline



Not Shown Above: Corona Dike, Adobe, CIW, Ancillary Work or Maintenance mitigation