Workshop
Lower Clover Valley
Sewer Trunk Replacement

South Placer Municipal Utility District

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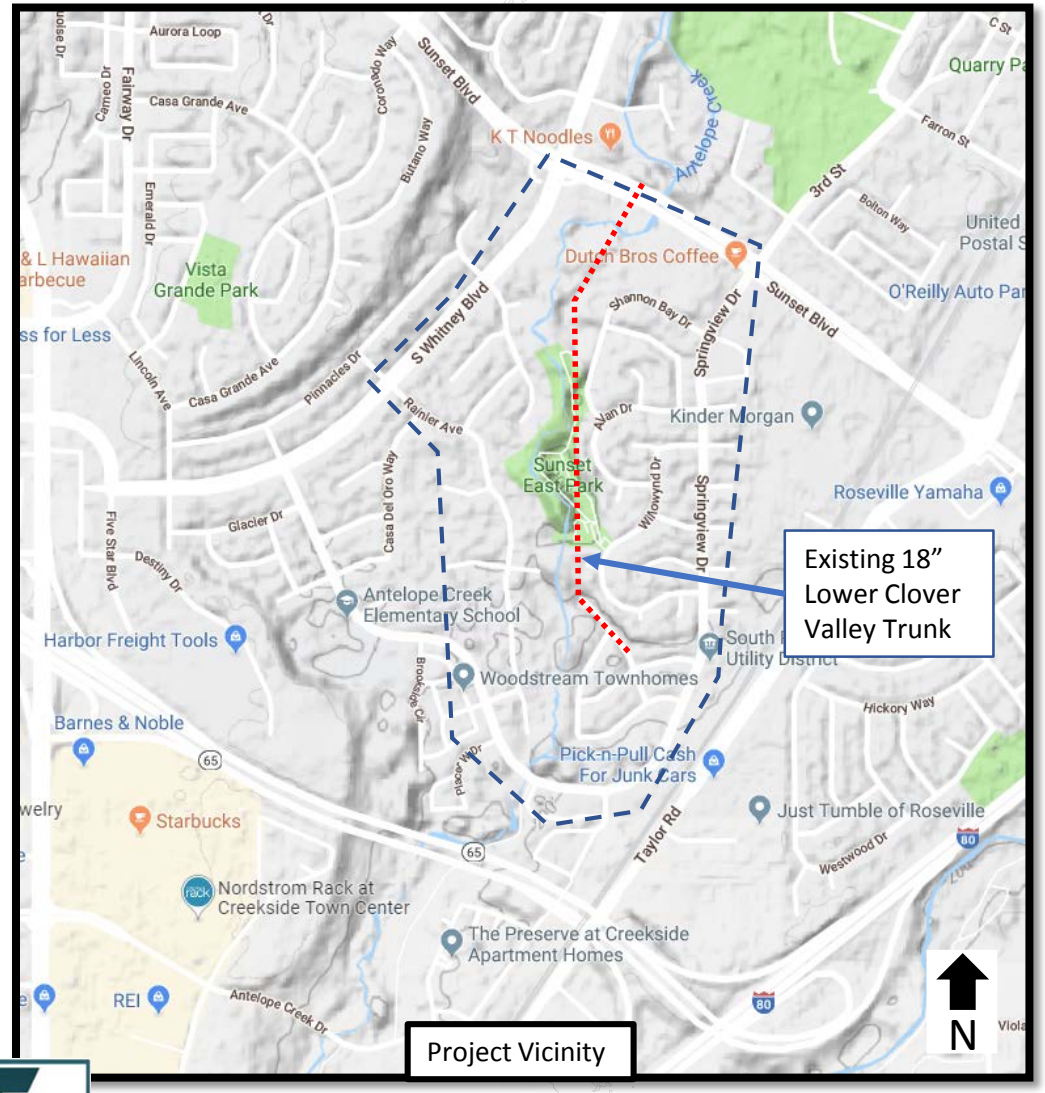
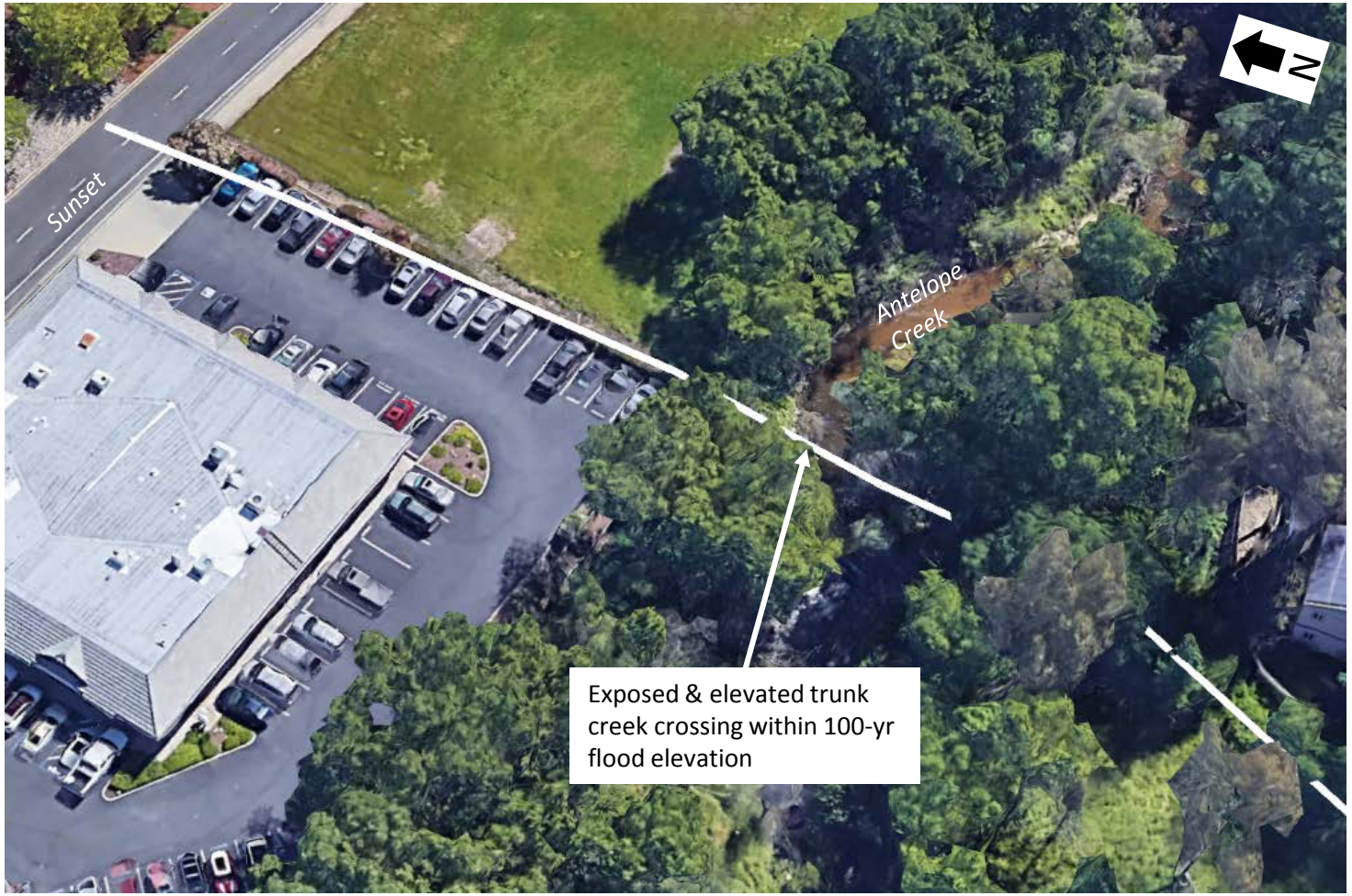
August 1, 2019

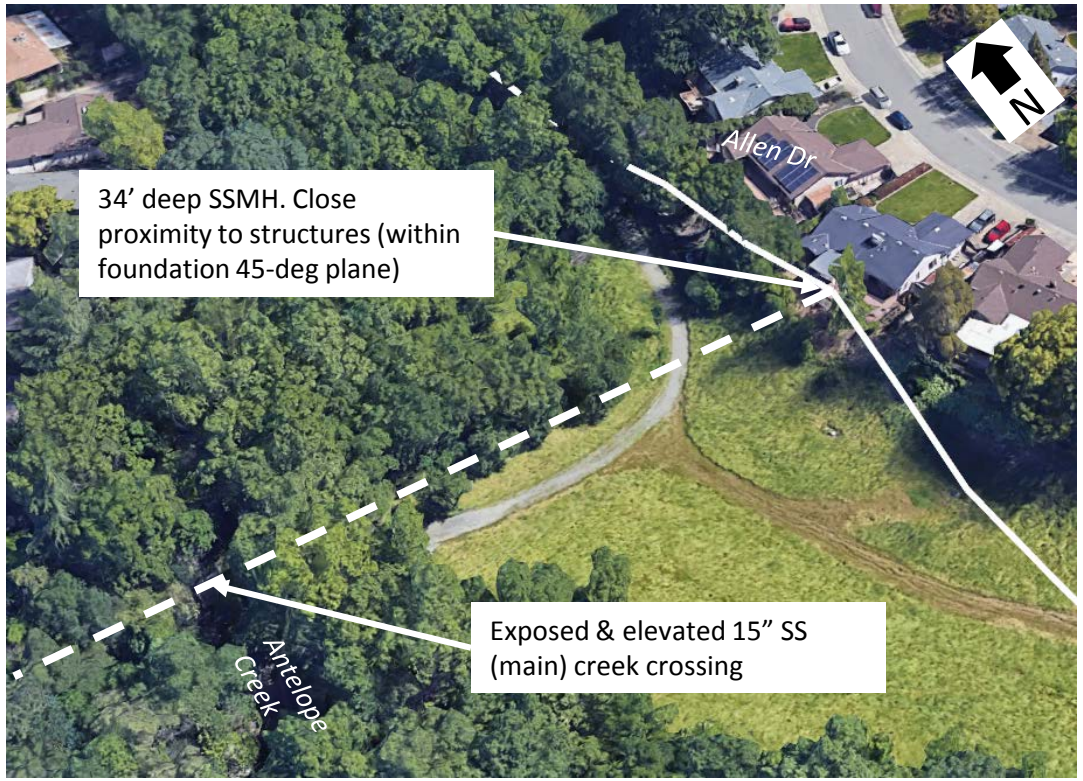
Lower Clover Valley (LCV) Sewer Trunk Replacement Project



- LCV Sewer Trunk CIP recommended in 2015 SECAP
- 2015 SECAP results: 18" trunk under capacity, surcharges in Near-Term PWWF design storm conditions. Needs 24" capacity upgrade to meet Long-Term (Lower Bound) conditions of 9.6 mgd.
- High Risk Facility assessment: high risk assets along Lower Clover Valley (exposed pipe crossings across Antelope Creek and exposure to undermining)
- Poor accessibility, operation and maintenance due to "backyard" easements and proximity to overlying structures



Existing Issues Along 18” LCV Trunk



Existing Issues Along 18” LCV Trunk

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Project Approach

Design Criteria → Identify and develop engineering design criteria (hydraulics, materials, method of construction)

Constraints → Identify major project constraints (environmental, geotechnical, existing utility conflicts, right of way/easement/encroachment access, and concerns of outside stakeholders)

Alternatives Development → Identify and develop alignment alternatives based on physical constraints (elevations, buildings, etc.)

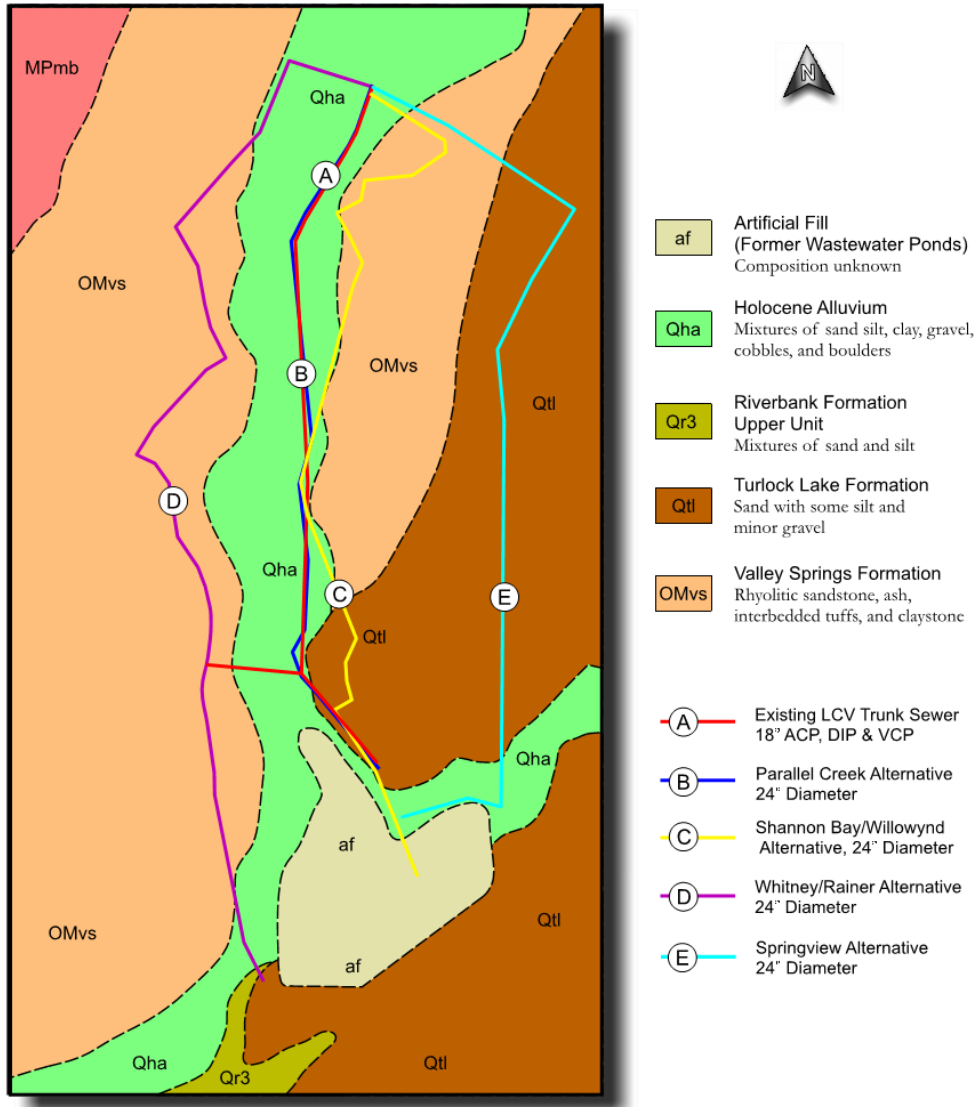
Alternatives Assessment → Assess the alignment alternatives based on non-cost constraints

Estimated Costs → Develop estimated construction costs

Preferred Alternative → Recommend a preferred alternative to be selected for construction based on non-cost constraints and estimated construction costs

Geotechnical Constraints

- Majority of project area is Holocene Alluvium or Valley Springs Formation
- Preliminary site geology research does not suggest presence of hard rock formations but boulders could be present
  - Foothill Trunk and Loomis Diversion Line are located in the Penryn Pluton (granitic) and Rocklin Pluton (granitic)
  - Hard rock excavation risk increases with depth
- Construction in soft sands near creek embankments might require mitigation. Trench stabilization & trench cutoff walls may be necessary for long portions
- Increased scour potential with proximity to creek (fluvial morphology; "oxbow" effect). Alignments located directly in an embankment should use WSP and may require embankment armoring (rip-rap, etc.)
- High GW relative to creek; moderate dewatering likely required on 2/3rd of the alignments
- Care must be taken when installing manholes in fill-slopes due to slip-planes that could occur between native soils and fill from housing developments
- High shrink-swell potential and high surface water runoff potential near creek; mitigate with trench stabilization, CLSM backfill, and/or WSP pipe



Environmental Constraints

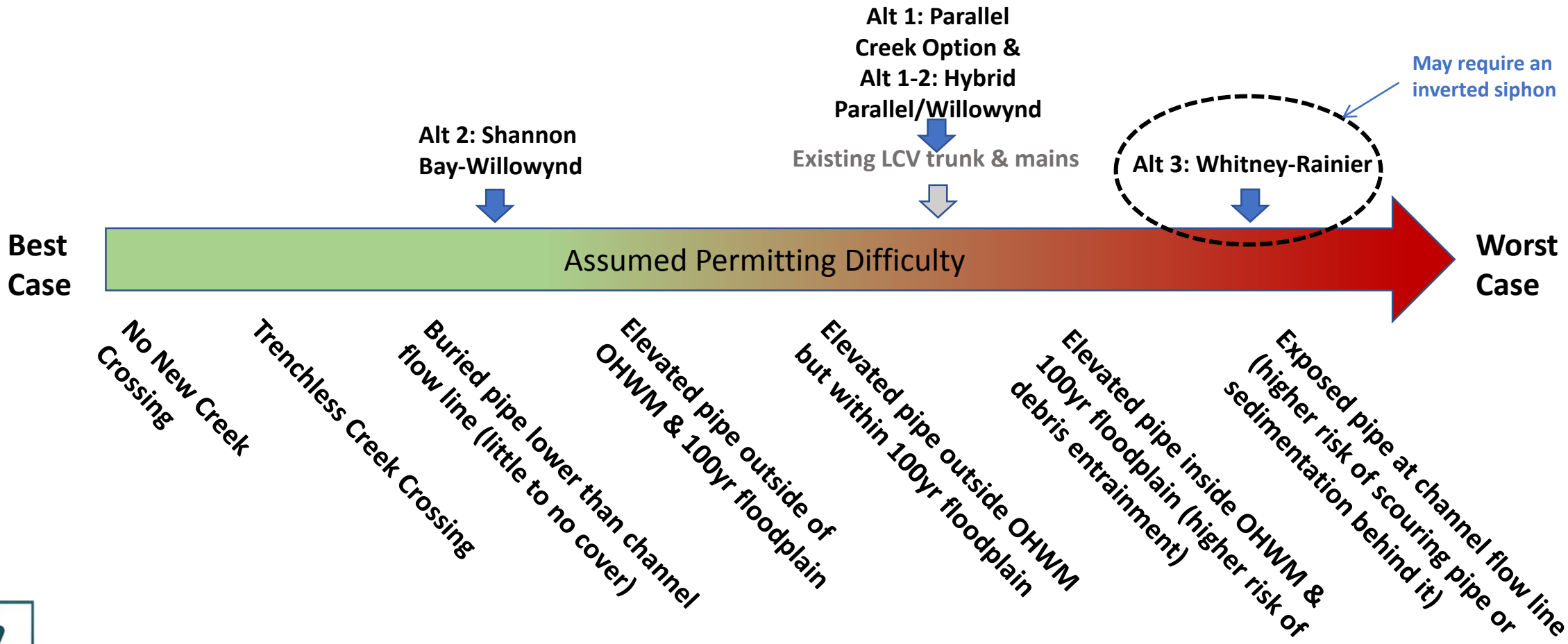
- Antelope Creek (perennial) runs through valley but is not listed as impaired water body
- Extensive valley foothill riparian habitat and annual grassland habitat present along with wetlands
- 100 YR floodplain is expansive
- Close proximity to residential homes mean construction noise will likely need to be mitigated
- Area is within USACE, RWQCB, and CDFW jurisdiction.
- Oak Tree removal governed by Rocklin (City)
- California Species of Special Concern (CDFW) present
- Raptors and bats may be present in trees
- Elderberry shrubs were not observed, but may be present
- Western pond turtle may be present
- Steelhead and Chinook Salmon may be present
- No known cultural sites identified within study limits nor observed during field survey along with UAIC tribal representative. Project area has low sensitivity for cultural resources.
- Moderate potential of discovering paleontological (fossils) resources

Potential Permits

- 404 – USACE
- 401 - CDFW
- 1602 - RWQCB
- Air - PCAQB
- Tree Removal: Rocklin
- General Permit - SWPPP

Channel (Antelope Creek) Hydraulics

- It is assumed that given all alternatives require some modification of an existing creek crossing, or "trading" for a new crossing and removal of others, then the District's position is defensible and a new elevated/exposed creek crossing would be approved.
- An elevated or exposed pipeline may negatively impact channel hydraulics or exacerbate the 100yr floodplain. Rocklin and/or USACE may request a detailed surface flow hydraulic analysis (open-channel flow modeling).



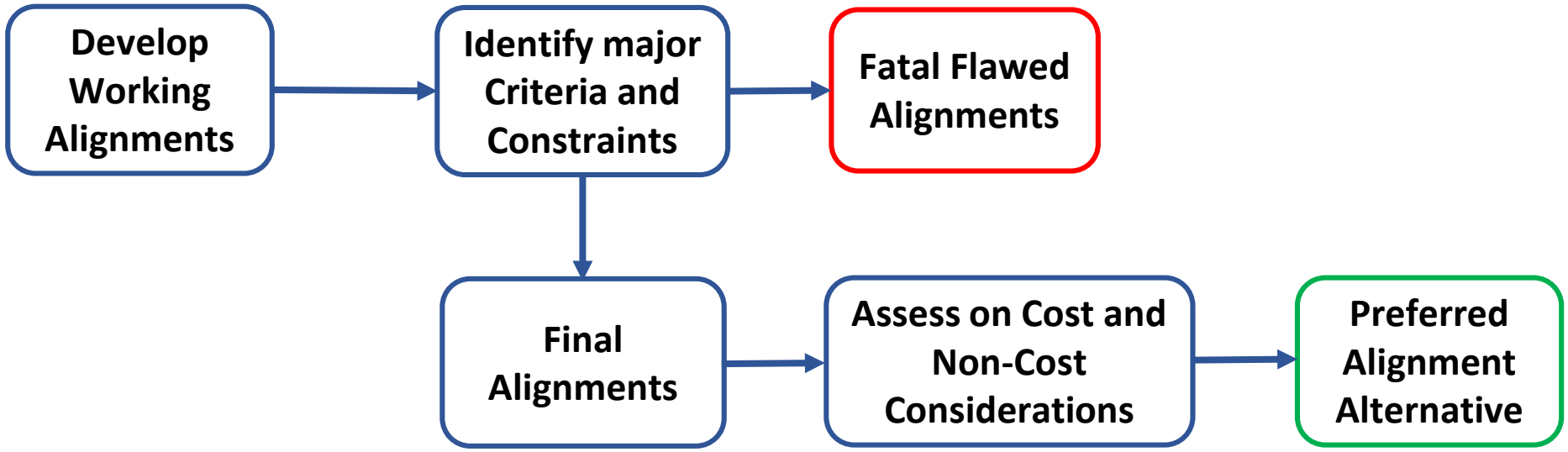
Alignment Alternatives Development and Assessment Process

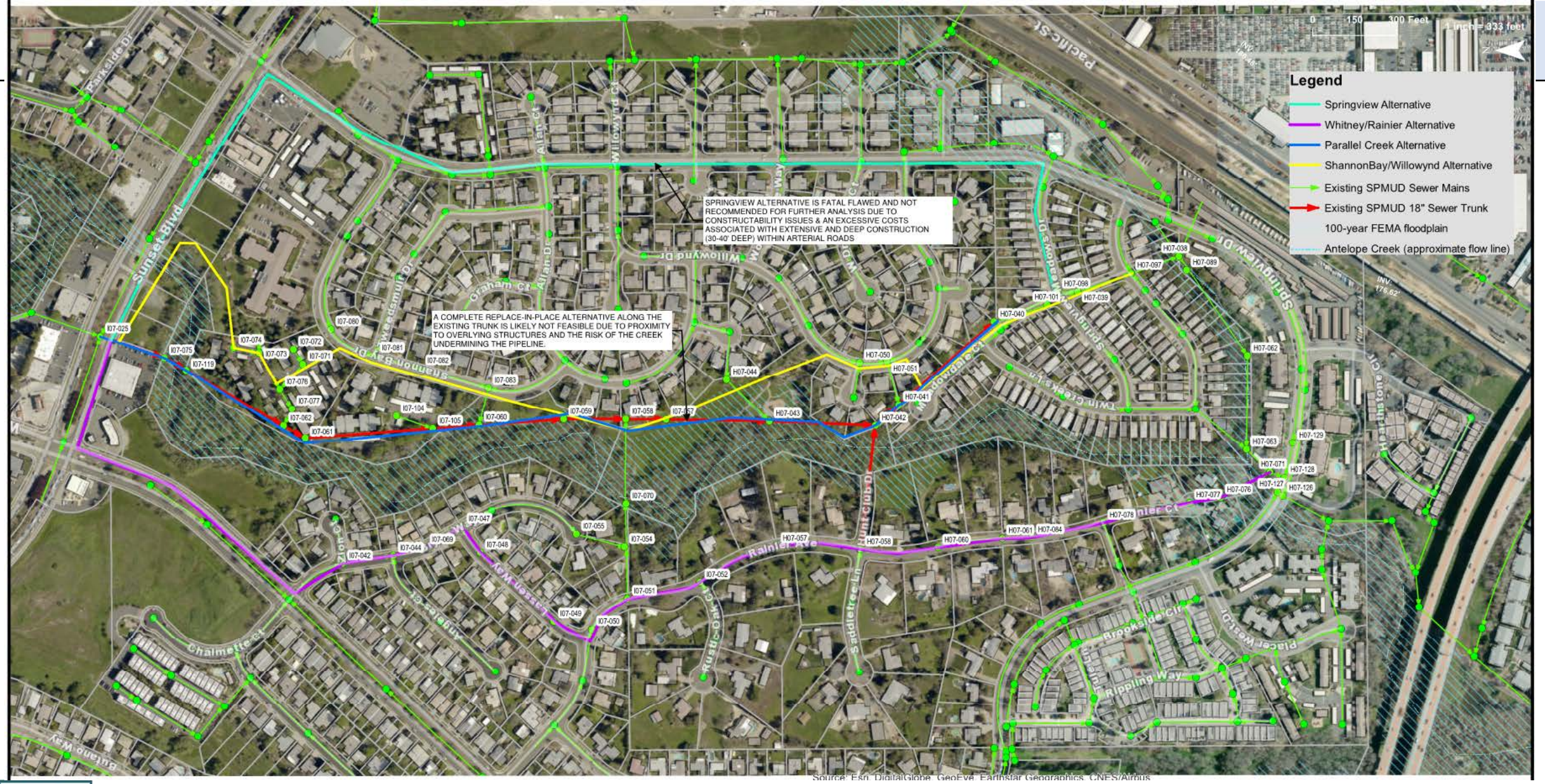
- Five preliminary working alignment alternatives were developed:
  - Replace in Place Existing LCV Trunk
  - Replace in Place & Parallel Replacement – Creek Alignment
  - Parallel Replacement – Shannon Bay / Willowynd
  - Parallel Replacement – Whitney / Rainier
  - Parallel Replacement – Springview
  - Parallel Replacement – Creek / Willowynd Hybrid

	Working Alignment Alternative	Length	General Description
	Replace-in-Place Existing Trunk	3878	Capacity upgrade only
	Replace-in-Place/Parallel Replacement along Creek	3490	Capacity + O&M upgrades
	Parallel Replacement – Shannon Bay/Willowynd	4531	Capacity + O&M + Creek Risk Reduction Upgrades
	Parallel Replacement – Whitney/Rainier	5231	Capacity + O&M + Creek Risk Reduction Upgrades
	Parallel Replacement - Springview	4471	Capacity + O&M + Creek Risk Reduction Upgrades
	See Figure 5 for Alternative 1-2: Parallel Replacement Creek-Willowynd Hybrid (4000 LF)		

Alignment Alternatives Development and Assessment Process

- Five preliminary alignment alternatives were developed:
  - Replace in Place Existing LCV Trunk ✗
  - Replace in Place & Parallel Replacement – Creek Alignment ✓
  - Parallel Replacement – Shannon Bay / Willowynd ✓
  - Parallel Replacement – Whitney / Rainier ✓
  - Parallel Replacement – Springview ✗
  - Parallel Replacement – Creek / Willowynd Hybrid ✓




SPRINGVIEW ALTERNATIVE IS FATAL FLAWED AND NOT RECOMMENDED FOR FURTHER ANALYSIS DUE TO CONSTRUCTABILITY ISSUES & AN EXCESSIVE COSTS ASSOCIATED WITH EXTENSIVE AND DEEP CONSTRUCTION (30-40' DEEP) WITHIN ARTERIAL ROADS
A COMPLETE REPLACE-IN-PLACE ALTERNATIVE ALONG THE EXISTING TRUNK IS LIKELY NOT FEASIBLE DUE TO PROXIMITY TO OVERLYING STRUCTURES AND THE RISK OF THE CREEK UNDERMINING THE PIPELINE.
Legend
Springview Alternative
Whitney/Rainier Alternative
Parallel Creek Alternative
ShannonBay/Willowynd Alternative
Existing SPMUD Sewer Mains
Existing SPMUD 18" Sewer Trunk
100-year FEMA floodplain
Antelope Creek (approximate flow line)
0 150 300 Feet
1 inch = 333 feet
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus

Final Alignment Alternatives

- Three alternatives were further assessed:
  - Alt 1: Replace in Place & Parallel Replacement – Creek Alignment
  - Alt 2: Parallel Replacement – Shannon Bay / Willowynd
  - Alt 1-2: Parallel Replacement – Creek / Willowynd Hybrid
  - Alt 3: Parallel Replacement – Whitney / Rainier

Alignment Alternative Goals and Risks

- The various working alignment alternatives are not functionally equivalent as they meet different goals and offer different risks. These are summarized in the following table.

Alt 1	Alt 2	Alt 1-2	Alt 3	Goal/Risk Item
+	+	+	+	Provide new capacity & trunk asset life
-	+	-	0	Eliminate trunk exposed crossings (high risk & consequence)
-	-	-	+	Eliminate main-line exposed crossings
-	+	0	+	Improve O&M accessibility
-	+	-	0	Reduce exposure to 100-yr floodplain and USACE permitting
-	+	0	+	Eliminate creek scour potential to trunk
+	-	0	-	Public impact
+	-	0	-	Reduce hard rock excavation risk
0	-	-	+	Right-of-Way procurement
-	0	-	0	Reduce environmental permitting & schedule risk

Alignment Alternative Cost Comparison

Segment	Segment Length (ft)	Construction Subtotal	Total Construction Cost	Total Indirect Construction Cost	Total Segment Cost	Cost [$ / LF]
Alt 1: Parallel Creek Option	3500	$ 1,745,200	$ 2,304,000	$ 179,000	$ 2,483,000	$ 709
Alt 2: Shannon Bay / Willowynd	4550	$ 3,170,600	$ 4,186,000	$ 172,000	$ 4,358,000	$ 958
Alt 1-2: Creek / Willowynd Hybrid	4000	$ 2,356,000	$ 3,110,000	$ 182,000	$ 3,292,000	$ 823
Alt 3: Whitney / Rainier	5174	$ 4,055,500	$ 5,353,000	$ 125,000	$ 5,478,000	$ 1,059

*Includes 10% design contingency and 20% construction contingency

*Cost per linear foot is the total segment cost divided by the length of replacement trunk length; note that there are additional linear improvements (CIPP lining, abandonment, etc.) that is not reflected in the length total