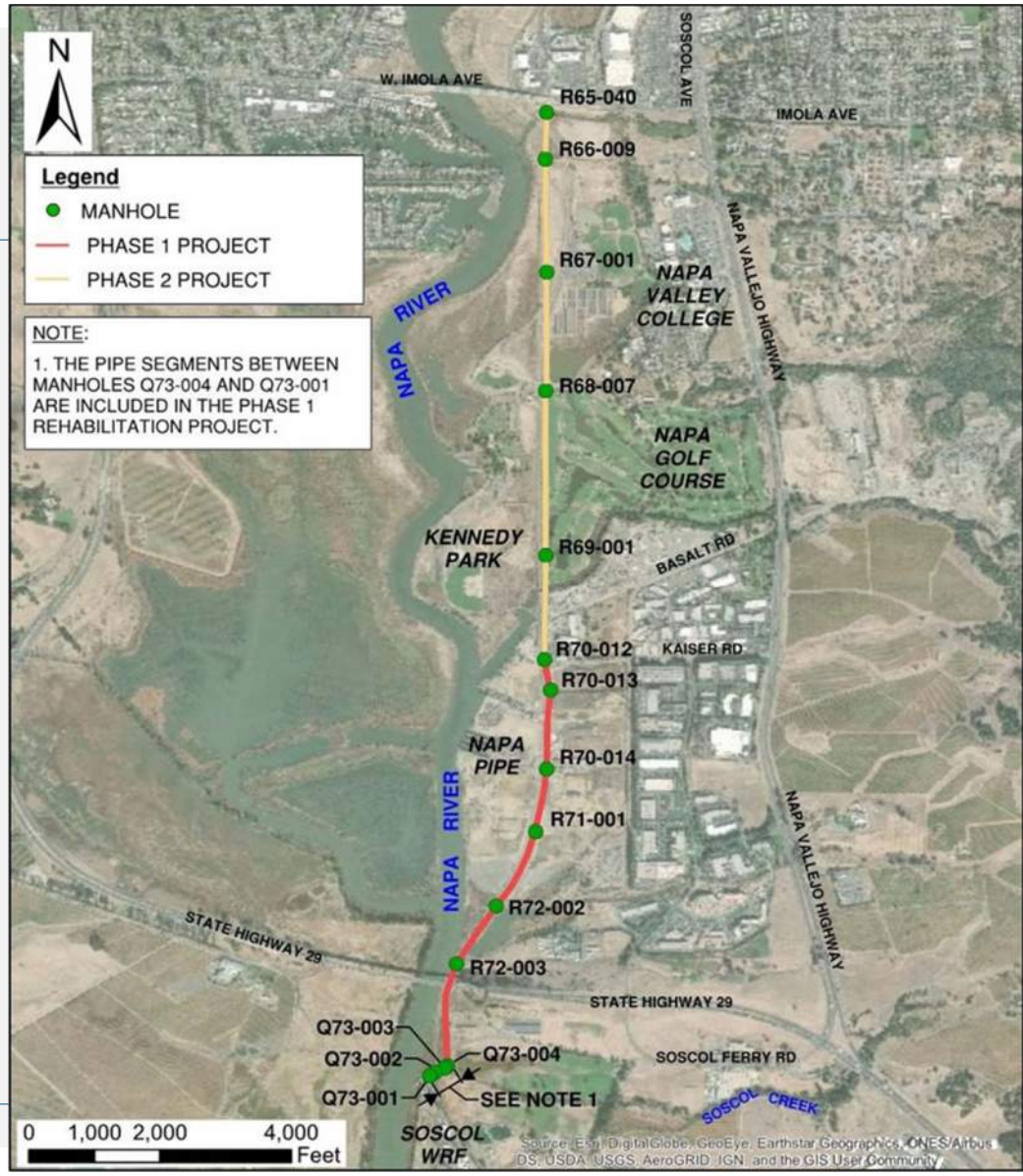
Napa Sanitation District 66” Trunk Sewer Rehabilitation Project

Agenda

- Project Background and Overview
- Rehabilitation Alternatives Analysis
- Recommended Alternative
- Brief Bypass Pumping Discussion
- Other Project Challenges

Project Background

- 15,400 feet of 66” diameter RCP pipe.
- 66” trunk sewer conveys 90% of the District’s flow to the WWTP.
- RCP pipe constructed in 1960s with no lining
  - Began to convey raw wastewater in 2000
- Sewer surcharges during storm events

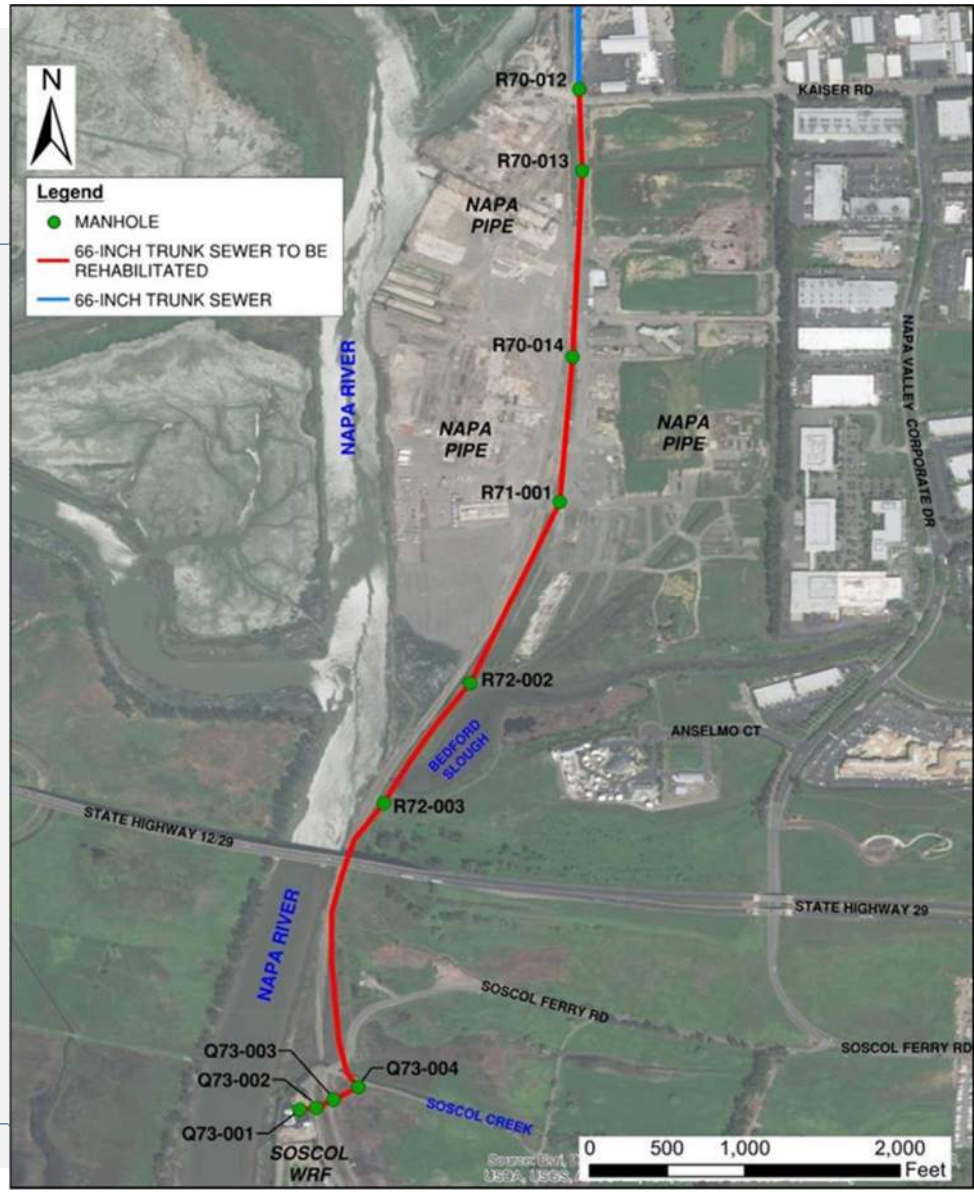


Project Overview

- CCTV Inspection of 3 miles of 66” diameter unlined RCP Pipe
- Condition assessment
- Estimate of remaining useful life
- Project prioritization
- Rehabilitation alternatives analysis
- Final Design

Recommended Project

- Structural rehabilitation of approximately 6,985 feet of 66” RCP between manholes R70-012 and Q73-001.
- Manhole rehabilitation



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Summary of Rehabilitation Alternatives Considered

Rehabilitation Alternative	Viable
CIPP – UV Cured	✗
"Structural" Spray-On Liner	✗
Segmental Slipliner (Vylon)	✗
CIPP – Water Cured	✓
Segmental Slipliner (Hobas)	✓
Spiral Wound Pipe	✓
Tight Fit / Compression Liner	✓

Analysis Categories

- Constructability
- Access Requirements
- Typical Construction Durations / Productivity Rates
- Easement / TCE Requirements
- Permitting Requirements
- Bypass System Requirements
- Hydraulic Impacts
- Relative Costs

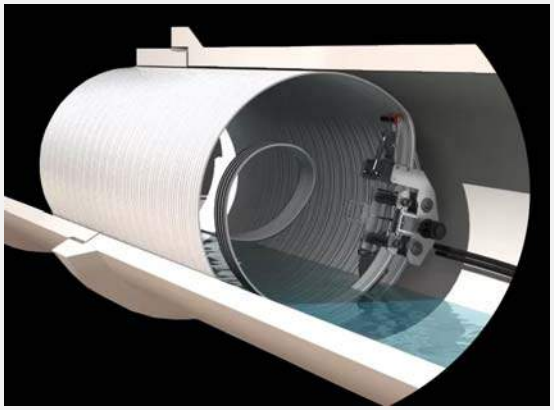
CIPP – Water Cured

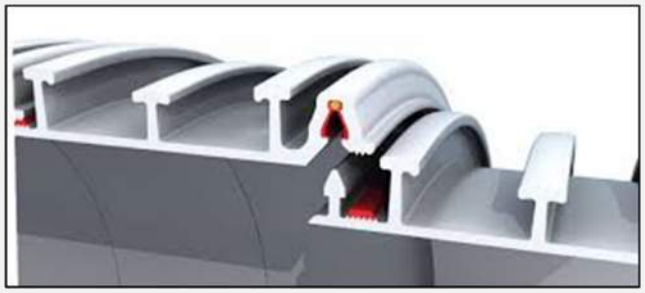
- Tight-fit liner with negligible annular space
- Maximum continuous installation length of 1,200’ for water cure at this diameter
- Small insertion pit excavation (12’ x 12’)
- Approx. 1 week to insert liner, cure, cool, and seal at manholes for each installation
- 63.5” ID (estimated)
- Manning’s n = 0.010 – 0.012 - “improved hydraulics”
- Full bypass required

Segmental Sliplining (Hobas)

- Large insertion pits (13’ x 30’)
- Up to 1,800 LF/day
- 57” ID (60” OD) with flush-bell joints plus annular space grouting
- Manning’s n = 0.010 - “improved hydraulics”
- No bypass required.

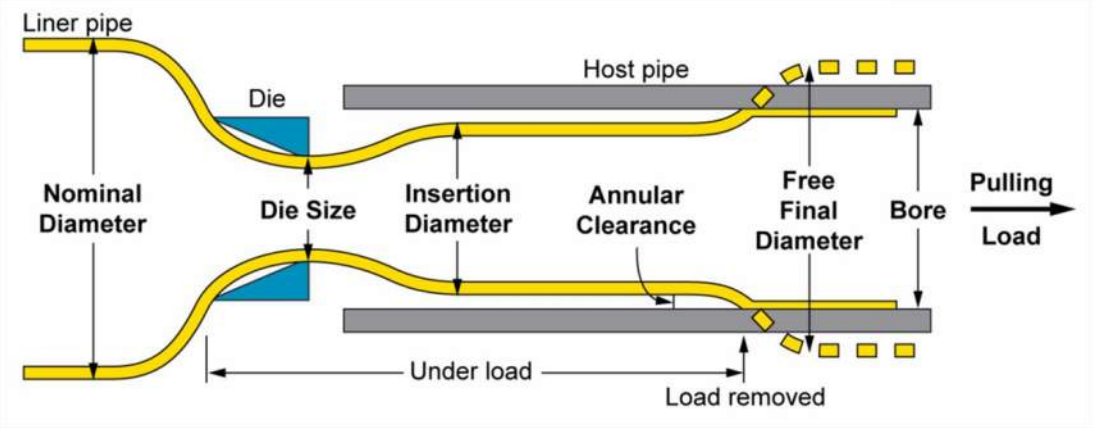
Spiral Wound Pipe (Sekisui SPR™ TF)





- Tight-fit liner with negligible annular space
- Max continuous installation length of 750 feet.
- Six access pits required between manholes due to installation length limitations (8’ x 8’)
- No excavation for insertion at manholes
- Up to 300 LF/day
- 63” ID (estimated)
- Manning’s n = .009-.011 - “improved hydraulics”
- Partial bypass required (pipe 20-30% full [max])

Tight Fit / Compression Lining (Swagelining)



Source: Swagelining

- Large insertion pits (8’ x 80’)
- Up to 2,000 LF/week
- HDPE (jointless)
- Improved hydraulics because of smooth new liner surface.
- No annular space / no grouting
- Full bypass required
- Typically used for pressure pipe

Summary of Rehabilitation Alternatives Evaluated

Rehab Alternative	Constructability/Work Area Requirements	Typical Construction Durations / Installation Rates	Hydraulic Impacts	Bypass Needs	Regulatory / Permitting (excluding bypass)(1)	Relative Cost
CIPP – Water Cure	• Maximum continuous installation length of approximately 1,200-feet (water cure only). • Approx. 12-foot x 12-foot access pit required at each insertion location. • Approx. 200-foot x 40-foot work area footprint at each insertion location for over-the-hole wet-out. • Can negotiate bends up to 45 degrees unless compound bends are encountered.	• Approximately one week to line each segment, which includes liner insertion, curing, cool down, and liner seal at manholes. Equivalent average installation rate of approximately 400-feet / day.	• Low. • Liner thickness estimated at 1.25", resulting in new pipe ID of 63.5". • n = 0.010 – 0.012, resulting in improved hydraulics. • Tight fit liner with no annular space.	• Full bypass required.	• Launch pit at R70-013: adjacent to railroad • Launch pit at R71-001: adjacent to railroad • Launch pit at R72-002: potential wetlands / habitat, adjacent to Bedford Slough, adjacent to railroad • Launch pit approx. 900 feet downstream of R72-003: potential wetlands/habitat, adjacent to Napa River, adjacent to railroad	Medium
Spiral Wound Pipe	• Maximum continuous installation length of 750-feet. Access pits required between the following manholes due to installation length limitations: - One access pit required between R70-013 to R70-014 - One access pit required between R70-014 to R71-001 - One access pit required between R71-001 to R72-002 - One access pit required between R72-002 to R72-003 - Two access pits required between R72-003 to Q73-004 • No excavation required for insertion of liner through existing manholes. Approx. 8-foot x 8-foot access pit required at each access pit between manholes. • Can negotiate bends up to 45 degrees.	• Up to 300-feet / day. • A single, continuous run does not have to be completed in a single day (i.e., liner machine can be left in pipe overnight).	• Moderate. • Liner thickness estimated at 1.5", resulting in new pipe ID of 63.0". • n = 0.009 – 0.011, resulting in improved hydraulics. • Tight fit liner with no annular space, but with a thicker wall than CIPP.	• Can be completed in partial live flow. • Target: pipe less than 20% full during liner installation. • Partial bypass required to maintain water level below 20% if installation is scheduled to occur during non-low flow periods.	• Excavation required for the six access pits between manholes due to liner installation length limitations. These access pits would be located adjacent to a railroad, water bodies, and wetland/habitat	Medium
Segmental Sliplining	• Approx. 13-foot x 30-foot access pit at R70-014, R71-002 and Q73-004. • Construction area approx. 20-feet x 80-feet at each access pit. • Curves are navigated using 10-foot segments. • Angle points (manufactured bends) must be excavated to be replaced, if applicable.	• Up to approx. 1,800-feet / day (after access shafts have been constructed).	• High. • 57" ID (60" OD) with flush-bell joints. • n = 0.010, resulting in improved hydraulics.	• Can be completed in live flow. • Target: pipe less than 50% full during liner installation.	• Access pit at R70-014: adjacent to railroad • Access pit at R71-002: potential wetlands/habitat, adjacent to Bedford slough, adjacent to railroad • Access pit at Q73-004: wetlands / habitat; adjacent to railroad.	Low
Tight Fit / Compression Lining	• Approx. 8-foot x 80-foot access pits at R72-002, Q73-004, R70-013 and Q73-001. • Pipe laydown area required to string out liner pipe behind pits at R72-002 and Q73-004 in each lining direction. • Typically, cannot navigate through angle points (manufactured bends).	• Approx. 2,000-feet / week (including construction setup). • Each individual pull must be completed within 1 day regardless of length.	• Moderate to High. • n = 0.010 – 0.012, resulting in improved hydraulics. • No annular space grouting.	• Full bypass required.	• Access launch pit at Q73-004: wetlands / habitat; adjacent to railroad. • Access launch pit at R72-002: wetlands / habitat, adjacent to Bedford Slough; adjacent to railroad.	High

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Recommended Rehabilitation Alternative - CIPP

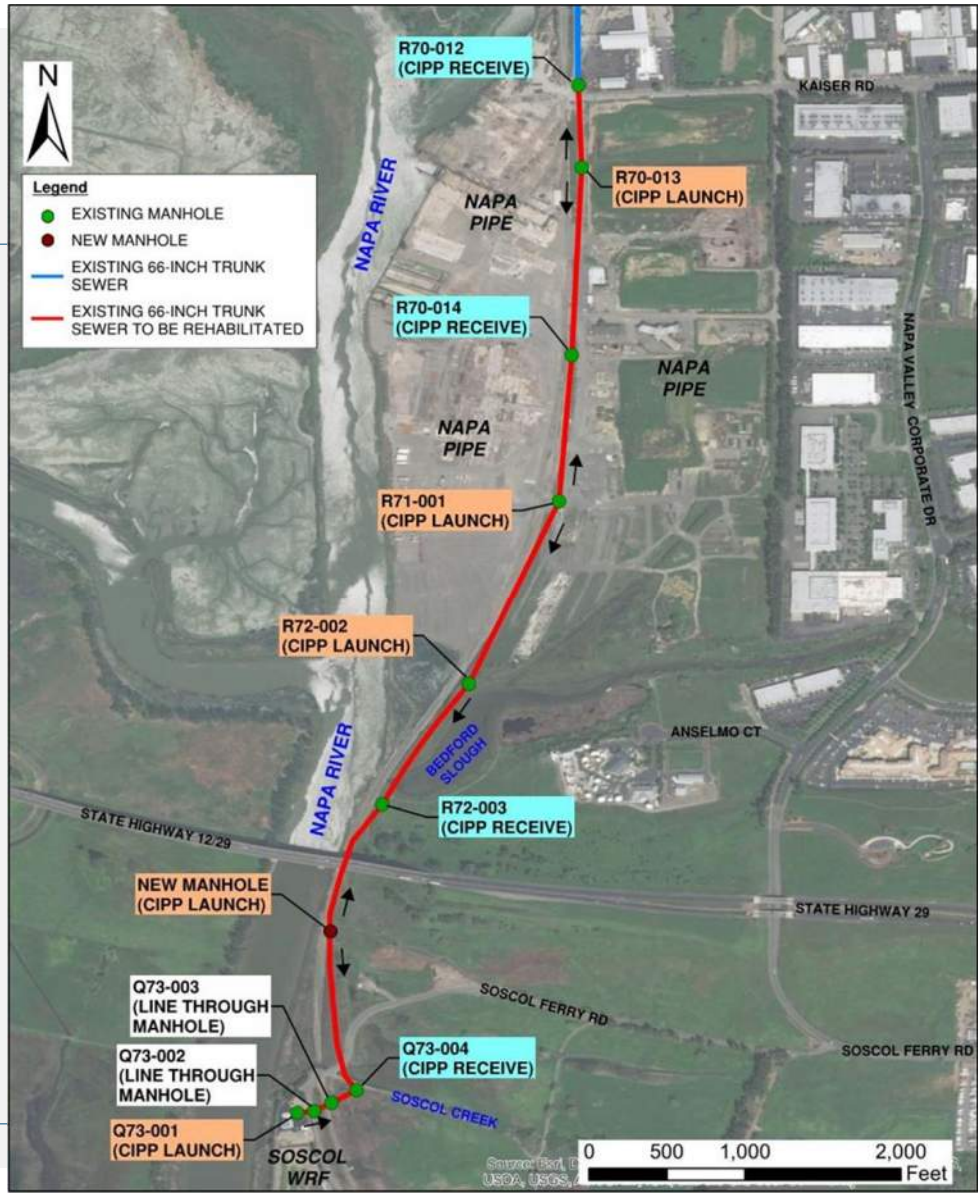
- Thinnest liner wall thickness of all the alternatives evaluated
  - Least hydraulic impacts on the system
- Competitively priced and high contractor availability
- Least disturbance (and related permitting considerations) associated with liner installation
- Relatively fast installation

CIPP Design Issues

- Insertion Points
  - Manholes will be removed for lining – 12’ X 12’ excavation
  - Existing pipe will be saw-cut to yield a 5’ diameter opening
- Wet-out
  - Over-the-hole wet-out will be required due to liner size, liner weight, and trucking limitations
- Water Curing
  - Need to identify water source
  - Styrene - store or filter cure water on-site prior to sending through biological processes at treatment plant.

Prescribed CIPP Layout

- Maximum lining distance will likely be approximately 1,200 feet.
- One new intermediate manhole will likely be required.



New MH Location

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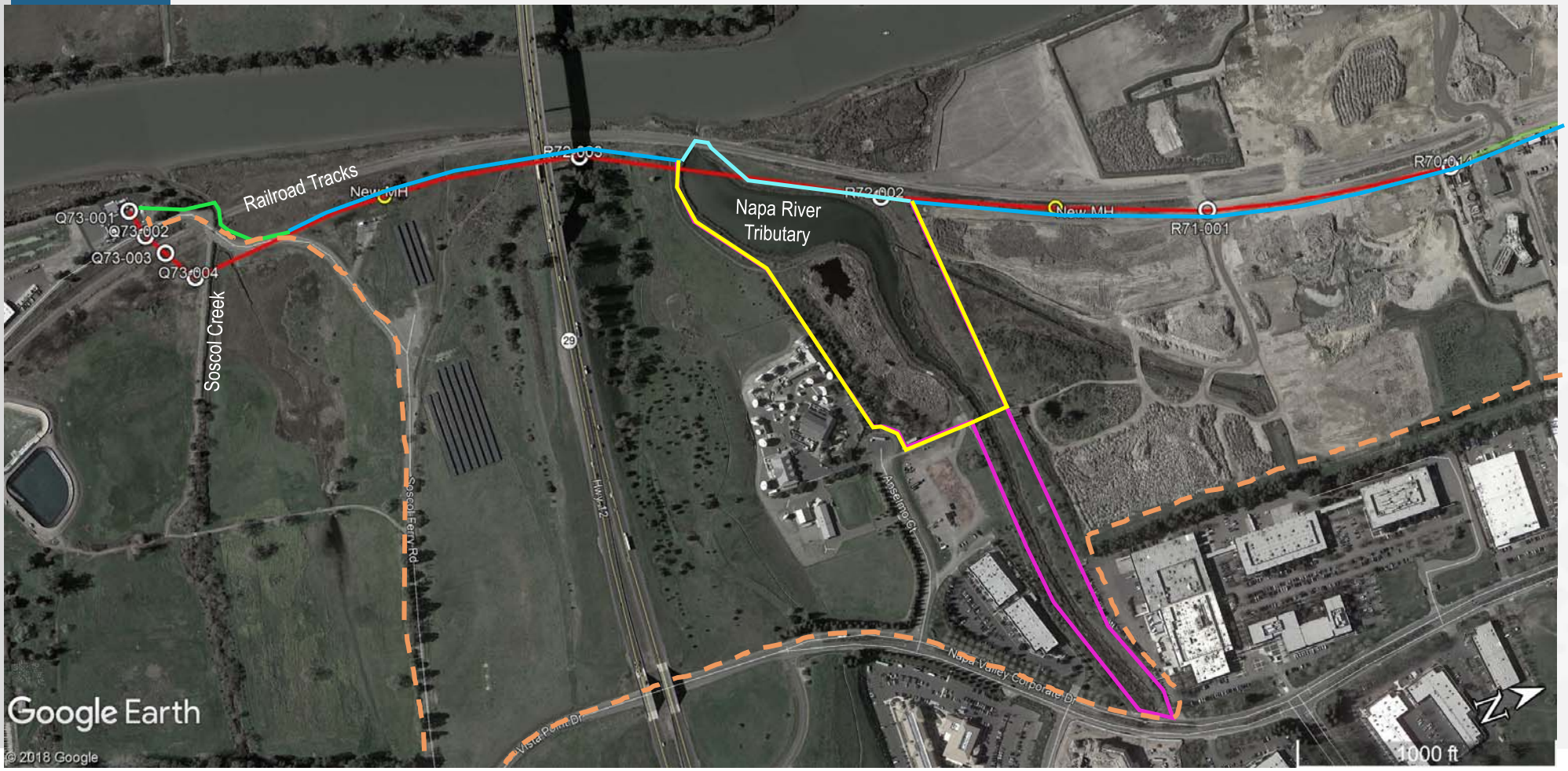
Sewer Bypass

- 21.5 MGD peak dry weather flow
- 100% pump redundancy
- 3 parallel 18-inch diameter HDPE pipes estimated
- One large set-up for the entire project
- Estimated duration: 5 ½ months

Sewer Bypass



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CEQA

- Initial Study / Mitigated Negative Declaration
- Sewer bypass, alterations to existing manholes, and installation of a new manhole may impact wetlands or river riparian habitat
- CEQA process will include:
  - Air Quality/Greenhouse Gas Analyses
  - Biological Resources Assessment and Technical Report
  - Jurisdictional Wetland Delineation and Report
  - US Fish and Wildlife Service Section 7 Endangered Species Act Consultation and Biological Assessment
  - Cultural Resources Assessment and Technical Report
- CEQA process will start after the Preliminary Design Report has been completed.

Permitting

- Regional Water Quality Control Board
  - Discharge Permit for cure water discharge, if needed for storage of cure water at treatment plant
  - Section 401 Water Quality Certification
- City of Napa
  - Encroachment permit for manhole access in public right-of-way
- Union Pacific / California Northern Railroad
  - Letter of Permission for activities within the railroad right-of-way, such as temporary above-ground bypass piping parallel to the railroad tracks

Permitting (Continued)

- CA Dept of Fish and Wildlife
  - Section 1600 Streambed Alteration Agreement for bypass in Napa River tributary
  - Incidental Take Permit (not scoped because we think avoidance is feasible- only needed if any impact to state-listed species)

- US Army Corps of Engineers
  - Section 404 Nationwide for potential effects to navigable waters
  - May require consultations with: US Fish and Wildlife Service for potential impacts to Endangered Species and National Marine Fisheries Service for impacts to anadromous fish

- Start permitting process after submittal of 60% design.

QUESTIONS?