# 

## A SEWER RUNS THROUGH IT

Navigating SacSewer's Aging Sewer Creek Crossings

SACRAMENTO AREA SEWER DISTRICT SERVING YOU 24/7

## Presented By







Rob Natoli, PE WSC Project Manager/ Vice President Ashley Poole, EIT WSC Project Engineer

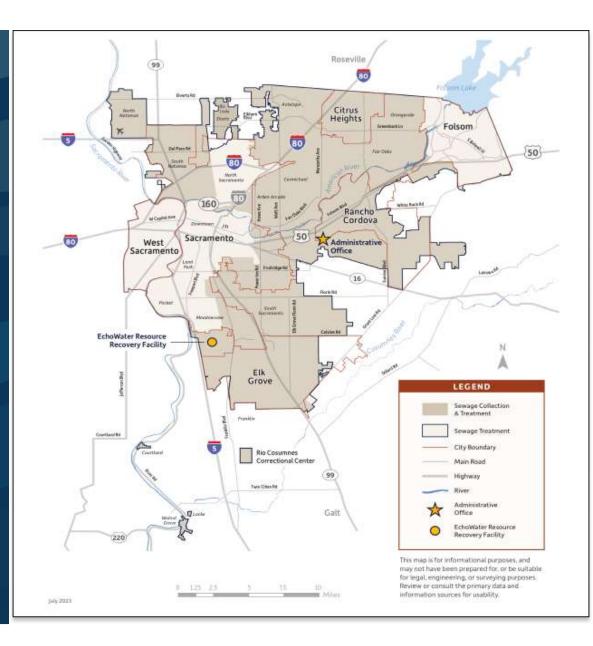
## Agenda

- Project and Client Background
- Crossing Types
- Alternative Analysis
- Design Considerations
- Case Studies/Implemented Solutions
- Recommendations for You!

# Background

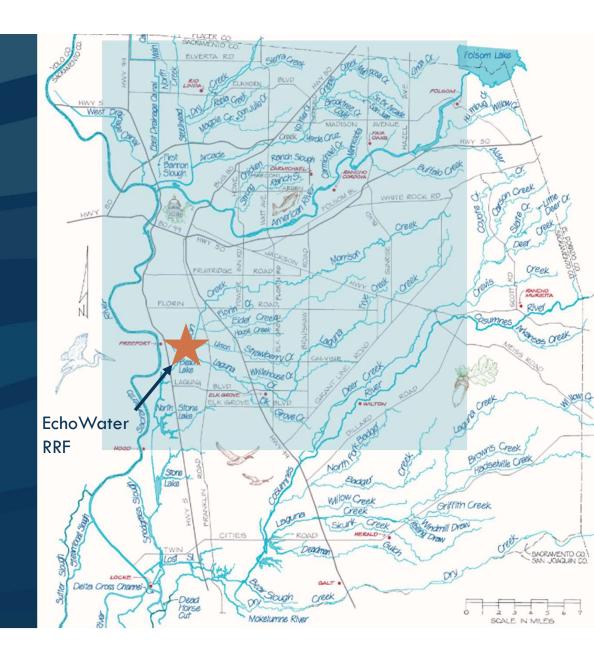
## SacSewer's Service Area

- 5,000 miles of sewer pipe
- 387 square miles
- 1.6 million customers
- 4- to 120-inches in diameter
- ~650 waterway crossings



## Why Creek Crossings?

- Collection system dates back to 1940's
- Creeks provide a low point in the system to aid gravity sewer hydraulics
- Sacramento County has dozens of creeks, drainages, and waterways



## SacSewer's Creek Crossing Asset Management and Maintenance

**Regular Creek Crossing Inspections** 

- Annual Crossing Inspections
- Post 2-year Storm Inspections
- CCTV Inspections
- **As-Needed Reinforcement**
- Erosion control measures
- Joint support Prioritization for Repair
- Asset prioritization



## Why this project is important?

#### Prevent spills!

Exposed creek crossings are at an increased risk for:

- Corrosion
- Impact from debris or trees
- Vandalism
- Erosion
- Infiltration





# **Crossing Types**

## **Partially Exposed Buried Encasement**



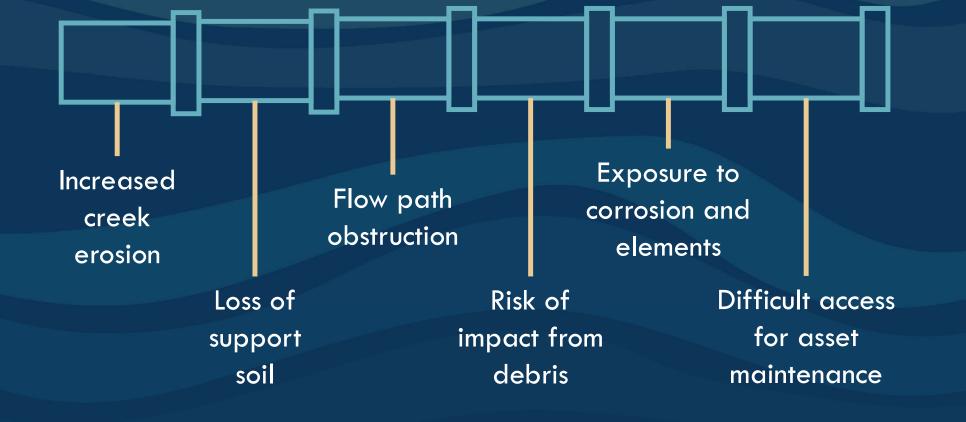
## **Partially Exposed Buried Crossing**



## **Exposed Aerial Crossing**



## **Issues with Creek Crossings**



# **Alternative Analysis**

## **Evaluated Alternatives**

Alternative	Description			
Status Quo	Maintain existing crossing			
Protect in Place	Add protection around existing crossing			
Rehabilitation	Replace pipe, piers, and/or casing			
Vertical Shift Up	Shift up to remove from creek/flowpath			
Vertical Shift Down	Shift down to remove from creek/flowpath			
Gravity Reroute	Find alternate route which avoids crossing			
Replace with Pump Station	Replace crossing with pump station			
Install Inverted Siphon to Eliminate Crossing	Replace crossing with inverted siphon			

# **Design Considerations**

## **Permitting and Environmental**

#### **Seasonal Limits on Biologist Field Work**

02 03

\$ 12/16

\$ 11/10

12/13

#### **CEQA and Permits** are Main Schedule Driver

- California Environmental **Quality Act Process**
- **Army Corps Of**  $\bullet$ Engineers 404 Permit
- Waterboard 401  $\bullet$ Permit
- **CDFW Lake and**  $\bullet$ Streambed Alternation Agreement

	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Q2 Q3 Q4 Q1 Q2 Q
68	-	Task 5 - Permitting Assistance	413 days	Wed 5/19/21	Fri 12/16/22		
69	-	Site Visit & Identify Permits	5 days	Wed 5/19/21	Tue 5/25/21	1155	1
70	-	CEQA	380 days	Wed 5/26/21	Wed 11/9/22		
71	-	CEQA Field Investigations	30 days	Wed 5/26/21	Tue 7/6/21	69	
72	-	Arborist Tree Survey	20 days	Wed 7/7/21	Tue 8/3/21	71	¥
73	-	Final CEQA Field Investigations	10 days	Mon 1/31/22	Fri 2/11/22	54	
74	-	Draft Environmental Reports to SASD	30 days	Mon 2/28/22	Fri 4/8/22	56	<b>1</b>
75	-	SASD Review of Env. Reports	10 days	Mon 4/11/22	Fri 4/22/22	74	Ĭ.
76	<b>1</b>	Finalize Enviromental Reports	20 days	Mon 4/25/22	Fri 5/20/22	75	
77	-	AES Draft CEQA Document	20 days	Mon 5/23/22	Fri 6/17/22	76	
78	-	Draft CEQA for SASD/WSC review and approval	0 days	Fri 6/17/22	Fri 6/17/22	77	1.5vr ₩6/1
79	-	SASD review and approval/WSC review	10 days	Mon 6/20/22	Fri 7/1/22	78	1.5yr + timeline
80	щ,	Final CEQA Edits	5 days	Mon 7/4/22	Fri 7/8/22	79	1 I <u>I</u>
81	-	30 day Public Review of CEQA Document	23 days	Mon 8/15/22	Wed 9/14/22	80FS+25 days	timeline
82	щ,	Finalize CEQA	15 days	Thu 9/15/22	Wed 10/5/22	81	
83	щ,	CEQA Approved and submitted to State Clearing House	0 days	Wed 10/5/22	Wed 10/5/22	82	
84 📷	-,	CEQA Board Approval	0 days	Wed 11/9/22	Wed 11/9/22		
93	-	Prepare Permit Applications	15 days	Mon 6/6/22	Fri 6/24/22	76FS+10 days	1
94	-	401 Permit	89 days	Tue 8/16/22	Fri 12/16/22		
95 📅	-	Draft application submittal/Preapplication meeting	0 days	Tue 8/16/22	Tue 8/16/22	81FS-30 days	- H
96	-	Prefiling Consultation Process	24 days	Tue 8/16/22	Fri 9/16/22	95	
97 🚟	-	SASD Check Request	10 days	Mon 8/22/22	Fri 9/2/22		
98	-	Submit Permit Application	0 days	Fri 9/16/22	Fri 9/16/22	96	
99	=	30 day initial review period	21 days	Mon 9/19/22	Mon 10/17/22	98	
100	-	60 day final review period	44 days	Tue 10/18/22	Fri 12/16/22	99	
101	-	401 Permit Anticipated Approval Date	0 days	Fri 12/16/22	Fri 12/16/22	100	
102	н,	LSA CDFW Permit	59 days	Mon 8/22/22	Thu 11/10/22		
103 📅	-	SASD Check Request	10 days	Mon 8/22/22	Fri 9/2/22		
104 🚟	-	Submit Permit Application	0 days	Fri 9/9/22	Fri 9/9/22	81SS+20 days	
105	-	60 day review period	44 days	Mon 9/12/22	Thu 11/10/22	104	
106	-	LSA Permit Anticipated Approved	0 days	Thu 11/10/22	Thu 11/10/22	105	
107	-	404 NWP Notification	67 days	Fri 9/9/22	Tue 12/13/22		
108 📰	-	Submit Permit Application	0 days	Fri 9/9/22	Fri 9/9/22	81SS+20 days	
109	-	Coordination and Authorization of Project under NWP	67 days	Mon 9/12/22	Tue 12/13/22	108	
110	-	404 NWP Anticipated Authorization	0 days	Tue 12/13/22	Tue 12/13/22	109	

## Geotechnical/Geomorphology Issues

Remote access and hand augered borings



Higher erosion rates on banks at bends

Flowline

Creek beds and banks are mobile!

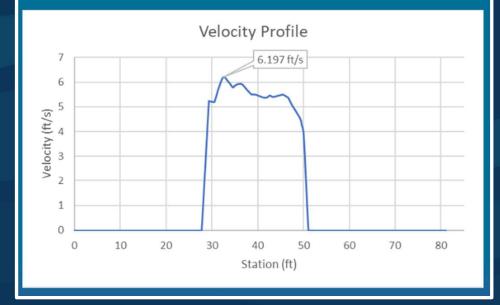
Scour analysis and geotechnical borings are valuable

## **Creek Flow Velocity Analysis**

#### Floodway Modeling Informed Design Criteria

- Maximum velocities occurred in lower flow periods
- Horizontal Loading Criteria
- Vertical Impact Criteria

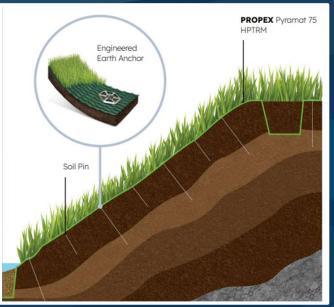
Depth = 0.5 ft Max Velocity = 6.20 ft/s Water Surface Elevation = 108 ft



## **Bank and Bed Protection**



**Engineered Mattress** 



**Bank Armoring** 



**Soil Filled Gabions** 

# Implemented Solutions

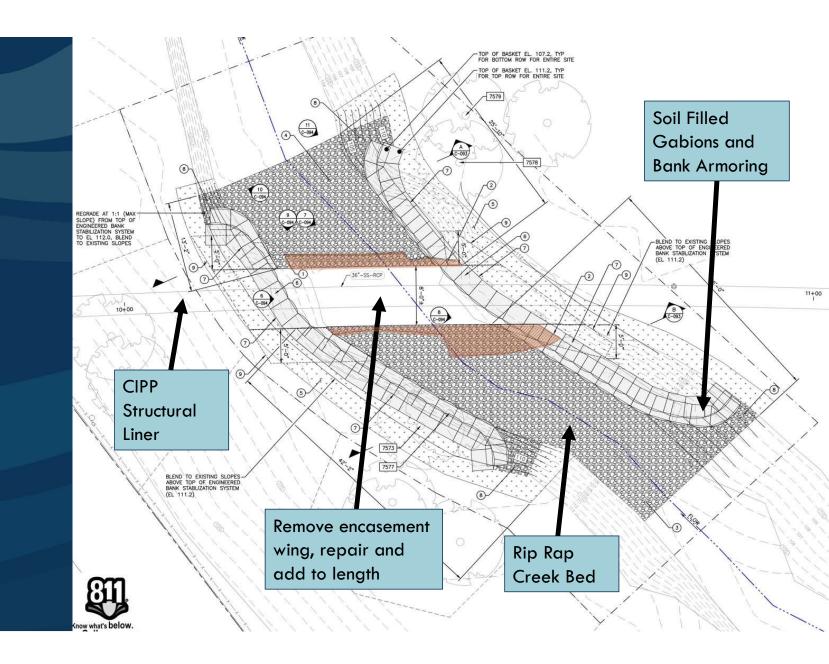
# **Campfire Way**

## **Existing Issues**

Bank Erosion



Solution





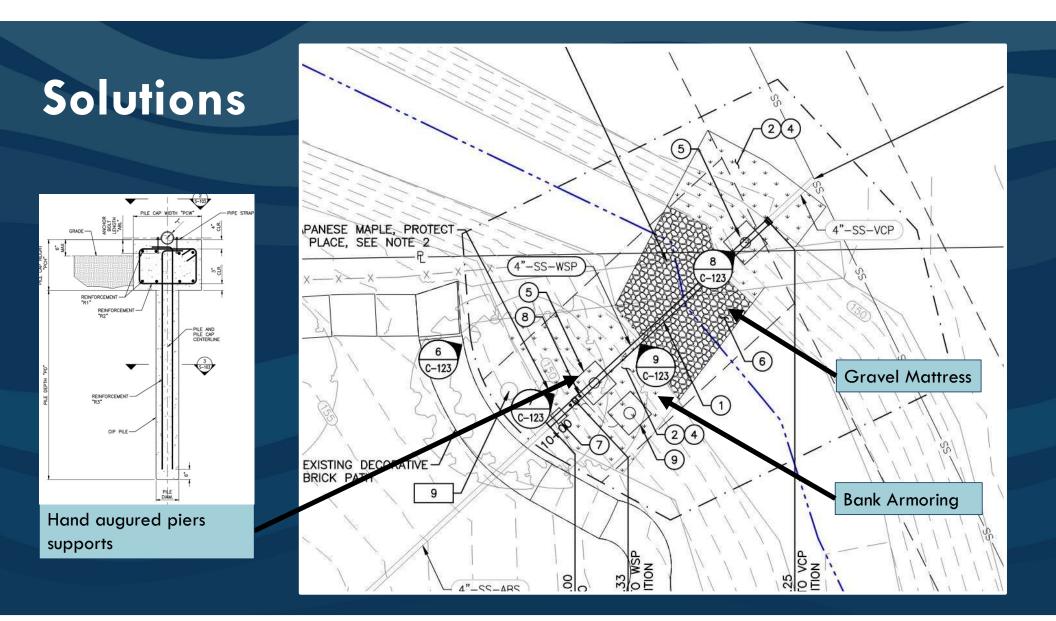
# Dietz Way



## Access

- Very remote access through wood stairs and walkways
- All equipment must be hand carried







# Arcade Creek



## Recommendations

## For Owners

- 1. Bundle Creek Crossings when possible
- 2. Timeline Permitting and Field Work Considerations

## **For Designers**

- 1. Consider manufactured products for bed and bank projection -- \$\$ Savings
- 2. Timeline Permitting and Field Work Considerations
- 3. Everything is moving, plan for changes at your sites

# Questions?

