



Sanitary Sewer Capital Improvement Plan

SEPTEMBER 2024

OCEANO COMMUNITY SERVICES DISTRICT





Proposal for Sanitary Sewer Capital Improvement Plan

September 20, 2024

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Dear Peter,

Oceano Community Services District (District) is seeking a consultant to prepare its Sanitary Sewer Capital Improvement Plan (CIP) that provides a cost-effective assessment of current aging infrastructure and capacity needs, incorporates system changes and improvements, and provides a road map for a resilient, reliable collection system. Water Systems Consulting, Inc. (WSC), specializes in delivering customized planning documents and evaluating collection system infrastructure for small- to mid-size municipalities on the Central Coast and throughout California. We know that with a collaborative approach and innovative thinking we can provided the following benefits to the City for this important planning document:

Clear Vision of Infrastructure Needs. Providing a pipe condition evaluation to identify needs and establishing annual pipe replacement and rehabilitation budgets will enable the District to optimally prioritize projects. Using CCTV inspection to assess pipeline condition will result in phased projects that prioritize the most critical deficiencies and are scheduled around budget constraints.

Technical Expertise and Unparalleled Experience. Our project team has delivered similar rehabilitation projects for nearby cities such as San Miguel, Santa Barbara, and Thousand Oaks. We will leverage our knowledge from past projects to effectively navigate challenges while delivering a final product that meets the District’s goals.

Commitment to the District’s Success. Our goal is to build a long-standing relationship based on trust that delivers value to the District and its ratepayers.

If you have any questions or would like clarification on any aspect of our proposal, please contact WSC’s proposed Project Manager, Michael Steele or Principal in Charge and QA/QC, Josh Reynolds.

Sincerely,

Water Systems Consulting, Inc.

Michael Steele, PE
Project Manager

Josh Reynolds, PE
Principal in Charge and QA/QC

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Firm Background

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WSC is Your Trusted Wastewater Partner

Our team will help the District develop a cost-effective and prioritized CIP

WSC is an engineering firm that specializes in the assessment, analysis, planning, design, construction, and optimization of wastewater treatment, collection systems, and disposal solutions. We are purposefully organized to work collaboratively with our clients, applying proven approaches, state-of-the-art tools, and knowledge-driven innovation to deliver truly outstanding results.

WSC's team includes wastewater experts who have experience building sewer models and capital improvement plan tools, supporting wastewater asset management programs, designing collections, conveyance, and treatment systems, and leading infrastructure construction projects.

We are committed to providing proactive and effective coordination, continuous integration with your staff, and our unique understanding of area-specific issues that will help WSC deliver cost-effective, high-quality work. We deliver clear, consistent communication, high-quality deliverables, robust quality assurance and quality control (QA/QC), and industry leading project management processes so our clients can keep their focus on providing safe, reliable service to their customers.

About WSC

Type of Corporation:

S-Corporation

Date of Incorporation:

December 4, 2007

Location of Incorporation:

California

Size of Company:

73 employees

Headquarters:

805 Aerovista Place, Suite 201
San Luis Obispo, CA 93401



APS Environmental
CCTV Inspection & Cleaning

APS Environmental specializes in providing top-tier sewer inspection and cleaning services designed to offer peace of mind and proactive solutions to their clients. APS conducts in-depth inspections to pinpoint issues within pipes and plan effective interventions with their CCTV pipe inspection services and provides cleaning services. Their project experience includes providing hundreds of thousands of feet of NASSCO CCTV Inspection.

Project Team

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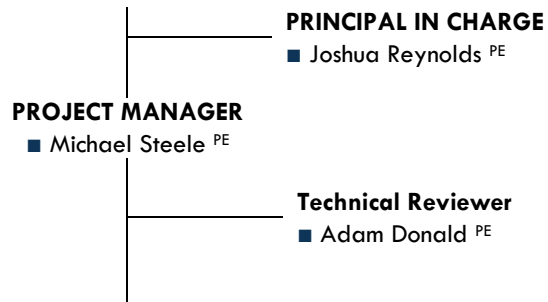


Meet Our Team

We have purposefully organized our team to work collaboratively with the District to apply proven approaches and knowledge-driven innovation to deliver truly outstanding results.

Our team includes strong leadership, starting with our proposed Principal in Charge, Josh Reynolds, and Project Manager, Michael Steele, who will serve as the main points of contact for the District. They will be supported by Project Engineer, David Williams. Josh and Michael are currently working together on the City Arroyo Grande’s Water and Sewer CIP Update. Technical Reviewer, Adam Donald, will leverage his significant wastewater rehabilitation experience to help our team and the District identify optimal solutions. Our team has worked together and knows how to efficiently and collaboratively deliver high-quality sewer system solutions.

Oceano Community Services District



WSC STAFF

Project Engineer
■ David Williams EIT, PACP

Lift Station Analysis
■ Susan Schlangen PE

Data Visualization and Analysis
■ Brendan Hamilton PE, PWAM

SUBCONSULTANTS

CCTCV Inspection and Cleaning
■ APS Environmental

Staff Bios

Our team members provide insight through their experience

WSC team members' qualifications, education, and experience are presented in the table below. Detailed resumes are included in Appendix B.



Josh brings over 25 years of expertise in planning, designing, and constructing wastewater infrastructure. His experience includes master planning, condition assessment, rehabilitation and replacement, and design. His comprehensive sewer system experience enables him to assess CIPs for feasibility, effectiveness, and economic benefit.

Josh Reynolds, PE
Principal in Charge & QA/QC

Wastewater engineer experienced leading and overseeing QC on sewer CIP projects.



Michael has over eight years of engineering experience centered on developing and implementing community-focused water and sanitation projects. His expertise includes program management, water and wastewater planning and management, recycled water, and community development.

Michael Steele, PE
Project Manager

Experienced supporting the Northern Cities Management Area member agencies and master planning.



Adam is a NASSCO PACP and ITCP certified engineer specializing in wastewater planning and design projects. His experience includes CIP development, master planning, cost and life-cycle analyses for sewer systems, and rehabilitation design for projects throughout California and Oregon. He has assisted agencies in developing their standard specifications.

Adam Donald, PE, PACP
Technical Reviewer

Experienced in sewer main rehabilitation strategies and CIP development.



David is an assistant engineer with experience supporting wastewater, water, and reuse projects throughout California. David brings an interest in hydraulics, hydrology, and stormwater control measures. He is PACP trained and experienced reviewing CCTV for making CIP recommendations from supporting WSC’s Sewer System Lining and Manhole Rehabilitation Project for San Miguel Community Services District and Santa Barbara’s Sewer lining projects.

David Williams, EIT, PACP
Project Engineer

PACP certified and experienced supporting projects led by Josh and Michael.



Susan brings 10 years of civil and environmental engineering experience focused on wastewater and collection system planning and design. She has evaluated lift stations, performed alternatives analysis, and designed upgrades and rehabilitations of existing facilities for clients in California and Oregon.

Susan Schlangen, PE
Lift Station Analysis

Lift station expert with extensive experience supporting CIP development.



Brendan brings 10 years of engineering and inspection experience with wastewater collections systems. His experience includes managing and implementing asset management programs, master planning, data engineering, and pipeline inspection which provides unique insight into the sustainable management of aging infrastructure. He has developed tools and systems designed to combine raw data from pipe inspection, CMMS systems, and SCADA into actionable information.

Brendan Hamilton
Data Visualization and Analysis

Extensively experienced in sewer system asset management.

Qualifications and Experience

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Project Experience

Our team brings decades of experience developing dynamic and actionable wastewater planning documents.

WSC has successfully delivered more than 30 sewer system master plans, sewer hydraulic modeling projects, and CIP development. We have completed system-wide plans for clients that provided both short- and long-term CIP recommendations.



Sewer System Lining and Manhole Rehabilitation

San Miguel Community Services District

WSC coordinated and reviewed the visual assessment and documentation of approximately 5 miles of sewer mains and 80 manholes in the District’s collection system. WSC worked with our subconsultant, APS, to collect and review data, develop a condition assessment, and provided rehabilitation recommendations. Mains were prioritized for rehabilitation by scored CCTV data and rehabilitation methods were recommended. Manhole rehabilitation recommendations included structural coating and reforming channels in poor condition. WSC also prepared the preliminary engineering report to meet SRF requirements as the project moved into the design phase.



Annual Trenchless Sewer Pipeline Rehabilitation

City of Santa Barbara

WSC has supported the City’s Wastewater Rehabilitation Program since 2018. WSC reviewed CCTV inspection videos and assigned PACP defect scoring to recommend the appropriate rehabilitation method for each segment. WSC led design workshops with the City’s engineering and operations staff to confirm condition findings, review maintenance history, evaluate probability and consequence of failure, and provide recommendations for each segment. Recommended improvements consisted of point repairs, trenchless pipe rehabilitation, open cut replacement, and manhole rehabilitation. WSC also provided engineering services during construction including submittal review, pre-and post-lining CCTV review, and technical support arising from challenges in the field.

WSC Experience

**Wastewater
Collection System
Rehabilitation
Support**

City of Thousand Oaks

WSC provided design support for the rehabilitation of 1.6 miles of 8-, 10-, 21-, 24-, and 27-inch wastewater mains and 326 vertical feet of maintenance access holes near Highway 101 using CIPP and spiral wound PVC lining technologies. During design, WSC provided technical review for the City’s plans, technical specifications, and cost opinions to help the City augment their deliverables for larger diameter pipelines and accommodate the significant traffic control and bypass needs. WSC also reviewed CCTV video to confirm the appropriate rehabilitation approach and identify areas with defects that needed to be addressed prior to lining. WSC provided engineering services during construction including submittal review, field testing review, CCTV review, bypass pumping plan review, and responding to requests for information during construction.

**Wastewater
Collection System
Infrastructure
Renewal Strategy**

City of San Luis Obispo

WSC created a Wastewater Collection System Infrastructure Renewal Strategy that incorporated asset capacity, condition evaluation, and predictive failure ranking into a prioritized asset renewal strategy. Previously, the City did not possess a wastewater collection system model or accurate elevation data for its sewer lines. WSC also provided several alternative recommendations for implementing a service lateral inspection and rehabilitation program. The project utilized an in-depth evaluation using CCTV inspection data, pipe material, age, and maintenance needs to create a condition rating. Capacity and condition outputs were then combined using a proprietary algorithm to generate a long-term renewal strategy. The City’s annual budget was used to group the projects into manageable sizes.

**Wastewater
Collection System
Master Plan**

Camarillo Sanitary District

WSC developed a plan for a major upgrade of its Water Reclamation Plant (WRP) to reduce the risk of failure, achieve regulatory compliance, and inform budgeting efforts for the WRP and its collection system. This included preparing a clear and concise alternatives analysis and asset condition rankings. WSC’s approach to supporting and delivering the WRP projects involved keeping a broad perspective on how each project fits within or impacted CSD’s long-term vision and overall CIP. This perspective allowed WSC to suggest alternatives or modifications to projects to provide better value to CSD’s operations and asset management.

WSC Experience

Airport Area Sewer Extension

City of Paso Robles

WSC performed an alternatives analysis and developed preliminary and final designs for the expansion of the City's potable water, recycled water, and wastewater system into the area around the Paso Robles Airport. The design work included 8,190 LF of 8-, 10-, and 12-inch PVC SDR 35 gravity sewer main; and 3,500 LF of 6-inch PVC DR-14 sewer force main. WSC also provided evaluation and preliminary design of three lift station projects, two as rehabilitations/upgrades of existing pump stations, and one new regional pump station. The project required existing services and equipment to remain functional during construction. The project also required wetlands permitting and phased implementation to accommodate the permits requirements.

Sewer Main CIPP Lining

Montecito Sanitary District

WSC is providing design and project management services for the 2025 Sewer Main Cured-in-Place Pipe (CIPP) Lining Project. WSC is preparing detailed plans, specifications, and cost estimates. WSC is reviewing the District's CCTV video for the mains to be rehabilitated to develop a design strategy. WSC is also identifying defects that require repair prior to rehabilitation and laterals that need to be dye tested to determine activity before being reinstated. The project includes bypassing Highway 101, permitting, and final design.

Small Diameter CCTV Program

City of Santa Barbara

WSC is supporting the City in their Wastewater Small Diameter CCTV Project. The City is making a significant investment into its collection system by televising all pipelines 12-inches in diameter or less, or approximately 1.2 million linear feet of pipe. This data is instrumental to understanding the current condition of the system, address critical defects requiring immediate repairs, and to inform the ongoing system rehabilitation program. WSC is assisting the City in administering the CCTV contract and providing QA/QC, optimizing City resources and helping make sure the CCTV data is correct and readily accessible.

WSC’s Collection System Planning and Evaluation Experience Meets the District's Needs

WSC has spent more than 15 years providing sewer system engineering services to municipal utilities throughout California. Listed below are a few examples of relevant wastewater planning and CIP projects that WSC’s team has delivered.

	Hydraulic Evaluation	Condition Evaluation	CCTV Inspection	Lift Station Evaluation	CIP Preparation	Master Planning
Wastewater Condition Assessment and Rehabilitation Program San Miguel Community Services District		✓	✓		✓	
Annual Trenchless Sewer Pipeline Rehabilitation City of Santa Barbara		✓	✓		✓	
Wastewater Collection System Infrastructure Renewal Strategy City of San Luis Obispo	✓	✓	✓	✓	✓	✓
Collection System Master Plan City of Paso Robles	✓	✓		✓	✓	✓
Sewer Service Study Los Olivos Community Services District	✓	✓		✓		
Lift Station Piping Improvements City of Paso Robles	✓	✓		✓		
Wastewater Master Plan City of Solvang	✓	✓		✓	✓	✓
2014 Sewer Master Plan City of Arroyo Grande	✓	✓		✓	✓	✓
2024 Sewer CIP Update City of Arroyo Grande	✓			✓	✓	
Five Cities Lift Station Replacement City of Pismo Beach	✓	✓		✓		
Airport Area Sewer Extension City of Paso Robles	✓	✓		✓	✓	
Wastewater Collection System Master Plan Camarillo Sanitary District	✓			✓	✓	✓
Wastewater Master Plan City of Santa Maria	✓				✓	✓
Lift Station 3 Improvements City of Arroyo Grande	✓	✓		✓		
Lift Station Analysis City of Portland Bureau of Environmental Services		✓		✓		

Understanding and Approach

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Project Understanding

The District is a special district that serves the community of Oceano and its approximately 7,500 residents with services that include wastewater collection. The District's sanitary sewer collection system consists of approximately 16 miles of gravity sewer pipes ranging in size from 6 to 12 inches in diameter. The District's system also includes a lift station and force main.

The District is seeking a qualified consultant to assist in the development of a Sanitary Sewer CIP that will help guide future investment to maintain the system and continue providing customers with reliable and affordable service. The CIP will be comprised of a list of prioritized projects and their anticipated costs which will be used to support the development of a 2025 Sewer Rate Study.

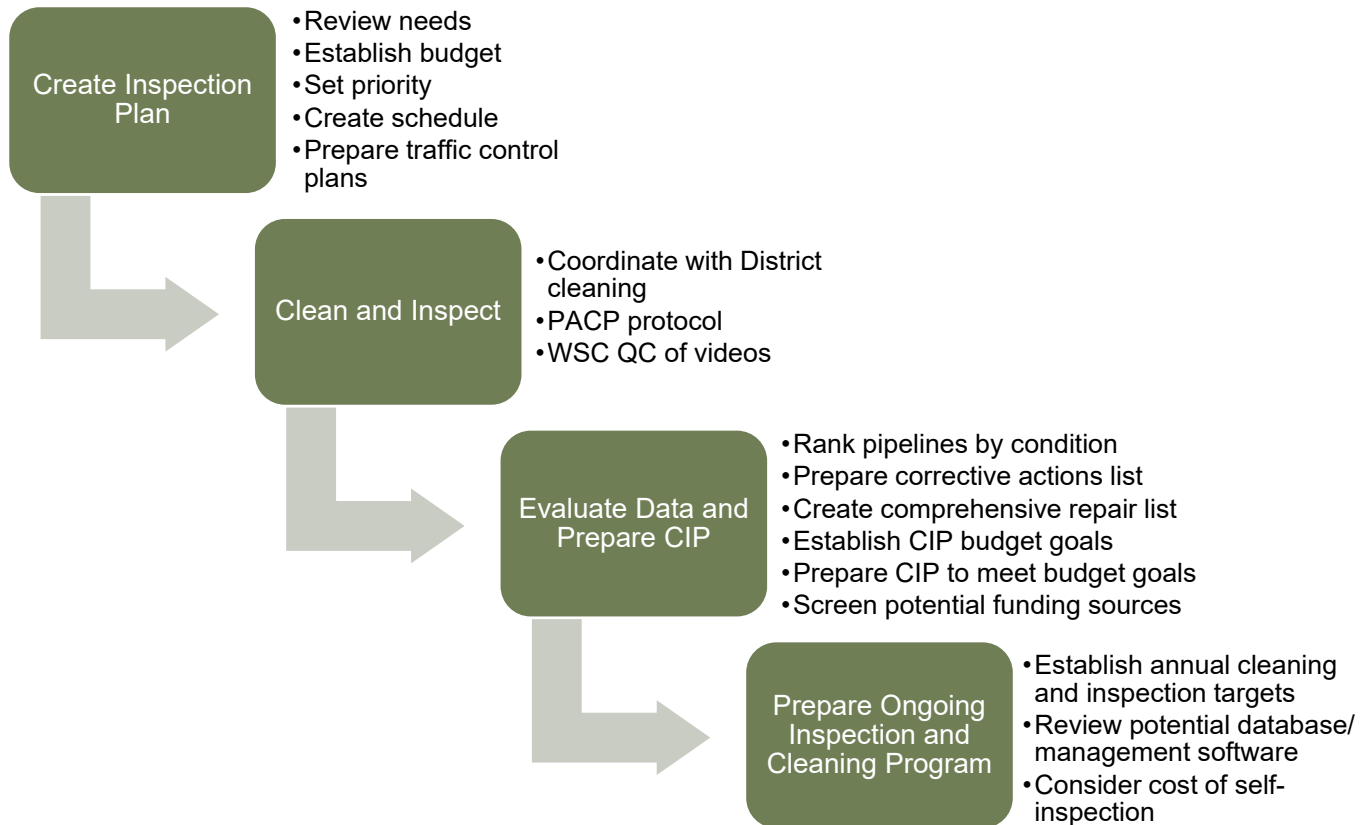
A **data-driven, cost-effective, and prioritized** CIP is critical to serve as the basis for the sewer rate study that can maximize the value that ratepayers receive and implement necessary rate increases in a predictable manner that balances continued affordability and reliable service. The District also has several known issues that will be evaluated as part of the project. Staff deal with sand infiltration issues in sewer mains near Pier Avenue and in the vicinity of the District's lift station. The District is also planning how the lift station should be upgraded to continue serving the area. Coordination with the City of Arroyo Grande is also needed to develop a framework for a maintenance agreement for pipes that the District maintains that receive sewage flow from the City.

Factors that will contribute to the success of the project include:

- **Length of pipe inspected** – Video inspection of the District's collection system was last completed in the 1990s. Data collected during inspection form the basis for a data-driven and informed repair program. The District does not have the budget in the current fiscal year for CCTV of the entire system, so targeting inspection to include areas of interest will help characterize critical parts of the system and jumpstart full system inspection which could be completed in future years.
- **Quality of CCTV data** – Recommendations are only as good as the quality of the data used in the evaluation. The District is making a significant investment by performing CCTV inspections to establish a condition baseline and identify mains in need of immediate repair. It is important that the CCTV data from the contractor be accurate and in the appropriate format so that the District can effectively access and leverage it without having to expend additional resources.
- **Flexible CIP that can integrate with annual budgets** – A successful CIP needs to not only identify prioritized projects, but also be flexible enough to allow scaling up or scaling down implementation in any given year based on customer rates and the annual budgets they support.
- **Clear Nexus between needs, the CIP, and rates** – the CIP the District is developing will be an investment in continued high-quality service funded by the ratepayers, ideally alongside other funding sources. For this investment to have broad support, it is critical that the public and funding programs can clearly understand the scope of their investment, the importance, the cost, and the benefit its implementation will provide.

Approach

WSC’s approach to inspecting the District’s sanitary sewer collection system and preparing a CIP is discussed in the following sections. Our approach focuses on maximizing the return on investment of the District’s funds to collect meaningful data that can be leveraged into projects that maximize the benefit to the system and its rate payers. The way we propose to do this is summarized below and detailed in the following sections.



WSC will Coordinate with the District to Create an Inspection Plan Tailored to Your Needs

This proposal includes assumptions about the length and diameter of pipelines that need inspection. These assumptions are based on information obtained from the District during the pre-proposal meeting (e.g., hot spot locations, maintenance concerns, risky pipelines) and prior District reports and maps. The initial step in this process will be to revisit that information, clarify our assumptions, understand the District’s inspection budget, and create a final list of pipelines for inspection. We anticipate working with the District to refine these assumptions prior to finalizing a contract with our proposed CCTV subcontractor that balances inspection of high-priority areas, a strategic methodology for eventual CCTV of the District’s entire system (if desired), and the District’s budgetary constraints.

Meeting the District’s Needs is Paramount

The District’s existing CCTV data are dated, originating in 1992, and are obviously no longer representative of the condition of the collection system. Although it is ideal to inspect the full collection system, budget and time constraints will likely preclude that. Therefore, we need to work together to identify which pipelines should be inspected first.

Inspection Amount can be Adjusted to Meet a Budget

WSC’s initial assumption for the amount of pipe to clean and inspect was for approximately 38,000 linear feet of pipeline based on preliminary analysis of the District’s system. This would be close to half of the District’s entire sewer collection system. The total amount of pipeline to be cleaned and inspected will be refined as the Inspection Plan is prepared and will depend on the District’s needs and budget. **The total amount of pipeline to be inspected can be increased or decreased to meet the District’s budget constraints.** WSC will work with the District to refine the length of pipe to be inspected based on need and budget.

Prioritizing Pipelines for Inspection Stretches Limited Budget

WSC recommends cleaning and inspecting full drainage areas above connection to the South San Luis Obispo County Sanitation District trunk sewer. WSC understands this aligns with the District’s current cleaning practice. Cleaning and CCTV inspection should focus on hot spot areas, backup prone areas, areas that need more frequent cleaning, and pipelines that have a high consequence of failure (i.e., railroad crossings and along or across Highway 1). Focusing on clay pipe as an initial screening criterion is also recommended, but most of the District’s pipelines are clay pipe. The color-shaded areas in Figure 1 is an initial recommendation of prioritized areas for inspection based on a target inspection amount and the District’s system.

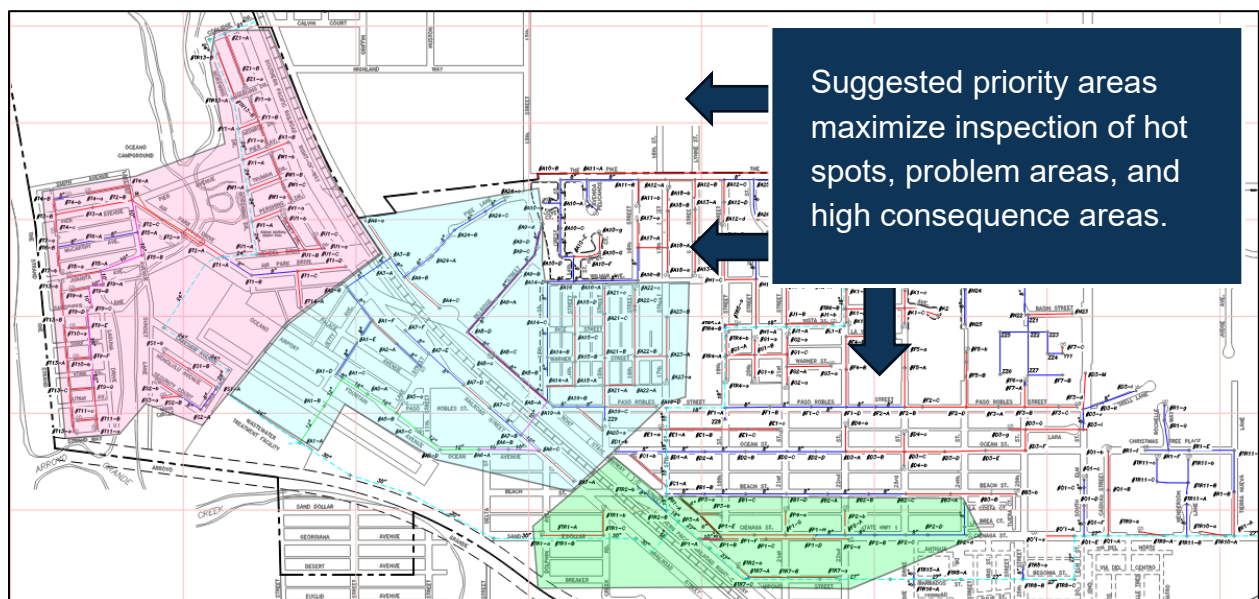


Figure 1. Map of Suggested Priority CCTV Locations

As part of the Inspection Plan, we will prepare maps of the areas to be inspected, with a focus on the high priority areas. The list of pipelines for inspection can then be revised based on District input, budget constraints, and cleaning schedule.

A Cleaning and Inspection Schedule Allows Coordination of Effort

The District cleans their entire system annually. If inspection can be aligned with the District's planned cleaning, there is potential for some cost savings. Although best practice requires cleaning within 48 hours prior to inspection, it may be possible to extend this if initial CCTV inspection indicates that the pipelines are clean enough to obtain quality data. WSC will work with the District to understand the cleaning program and minimize cleaning costs.

Once the pipelines to receive CCTV inspection are known, a detailed inspection schedule can be prepared, and if desired, the District's cleaning schedule can overlay the inspection schedule to prevent double cleaning and potentially save project costs.

Prepare TCP and Coordinate with Encroachment Permits

The cleaning and CCTV inspection costs included in this proposal include general traffic control and coordination with the County and Caltrans, assuming the District's maintenance easements can be utilized to minimize the need to acquire encroachment permits. Once the pipelines to be inspected are known, we can prepare general traffic control plans and initiate outreach and coordination with applicable agencies. MUTCD guidelines will be utilized, where possible, to provide safe traffic control while maximizing budget.



Figure 2. APS Inspecting a Sewer in a Residential Neighborhood

Clean and Inspect the Selected Pipelines Using PACP Protocol and Modern CCTV Equipment

The National Association of Sewer Service Companies' (NASSCO's) Pipeline Assessment Certification Program (PACP) is the industry standard for CCTV inspection of sewer pipelines. WSC, and our subcontractor, APS Environmental, have the appropriate training, experience, and qualifications to perform this work.

Effective Quality Control Improves Confidence and Reliability of Inspection Data

System maintenance recommendations are only as good as the quality of the data used in the evaluation. The District is making a significant investment by performing CCTV inspections of pipelines to establish a condition baseline and identify mains in need of repair, rehabilitation, or replacement. As such, it is important that the CCTV data from the inspection contractor be accurate and in the appropriate format so that the District can effectively use it without having to expend additional resources to access and leverage it. WSC has staff with PACP qualifications that will QC (i.e., spot review) the inspection contractor's work, increasing the reliability and usefulness of the CCTV data. NASSCO Guidelines for QC will be followed.

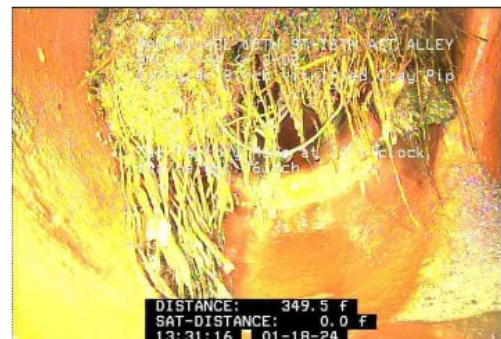


Figure 3. Severe Roots in a Pipeline

Evaluate Data and Prepare CIP

Once the CCTV data has been collected, WSC will analyze it to create a prioritized CIP using the following process.

Likelihood of Failure Analysis Maximizes Value by Prioritizing Worst Condition Pipelines

The PACP system has a standardized coding system for defects identified within the pipeline and assigns a condition score to the defect on a 1 through 5 basis, with a 5 indicating the main is likely to experience a failure in the immediate future. Grade 5 defects typically need to be addressed in the next five years if not sooner depending on the actual defect. Grade 4 defects

typically need to be replaced in the next five to 10 years and are at risk of progressing into a Grade 5 defect in the imminent future.

To prioritize the sewer main lines, a likelihood of failure (LOF) score will be derived for each main, which represents the probability a main will fail on a scale of 1 to 6 based on the physical condition of the pipe. NASSCO’s PACP Based Risk Management system determines LOF based on the main’s PACP Quick Rating which identifies the highest-grade defects and their relative frequencies. To determine LOF, values are assigned and scores determined in a standardized way, allowing for the creation of a list of pipe segments that are recommended for rehabilitation, repair, or replacement.



Figure 4. APS Deploying a CCTV Rover

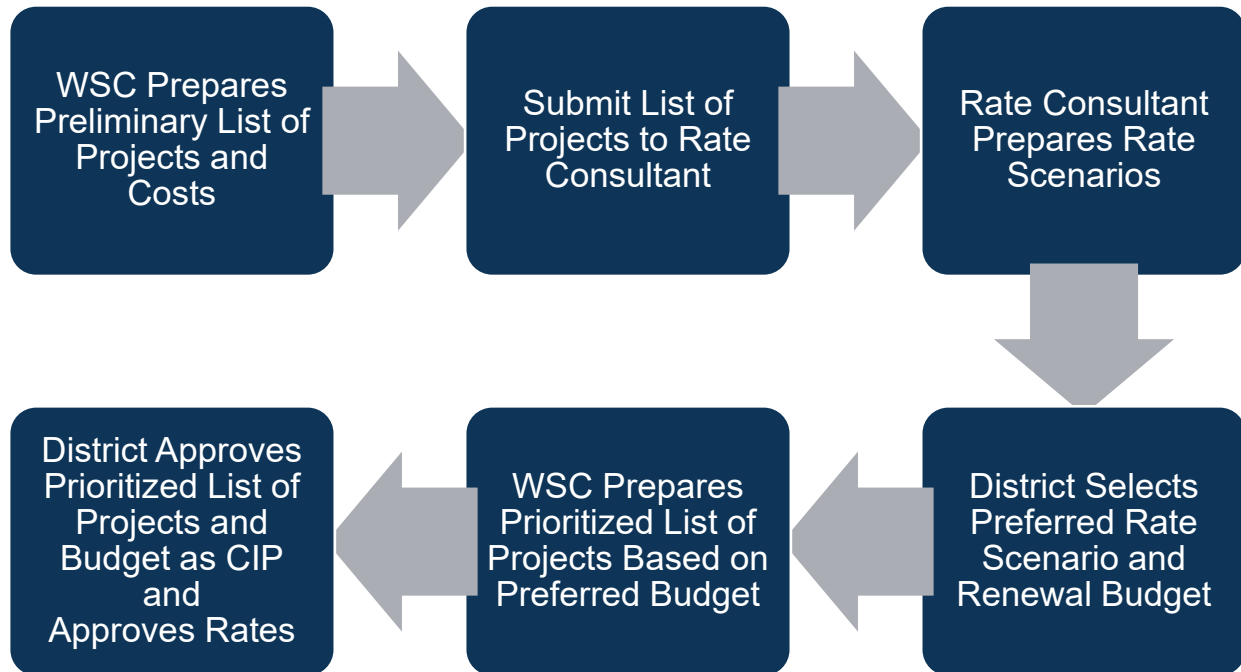
Understanding Pipeline Deficiencies Leads to Tailored Renewal Strategies that Maximize Benefit to the District

WSC will work with the District to create a list of renewal strategies (i.e., repair, rehabilitation, or replacement) that meet the District’s goals (e.g., long life, low budget, most pipe rehabilitated). Each renewal strategy has pros and cons and optimal deficiencies for correction. Typical renewal strategies are discussed in the following table. WSC will work with District staff to confirm observations of the collection system condition and select the preferred renewal options.

Table 1. Renewal Strategy Options and Discussion

Renewal Strategy	Targeted Deficiency	Pros	Cons	Relative Cost
Trenchless Spot Repair	Localized pipe damage, spot infiltration	Cost effectively rehabilitate mains with small number of defects (fractures, breaks, holes, pinholes, etc.); stop infiltration to avoid resin washout during CIPP installation	Cannot correct sags, slope issues, or joint offsets	\$
Open Cut Point Repair	Sags, offset joints, bad laterals	Repair bedding to eliminate pipe sags; install new wye connections for defective laterals; eliminate offset joints	Limited to few feet of repair; not cost effective when large area requires repair	\$\$
CIPP Rehabilitation	Extensive pipe damage	No excavation required; large number of installers; installation can be done in a matter of hours; reinstate laterals via trenchless technology	Cannot correct sags, slope issues, or joint offsets; styrene odor must be monitored	\$\$
Spiral Wound PVC Pipe Lining Rehabilitation	Extensive pipe damage	No excavation required; able to install under live flows (no bypass necessary); no chemicals used in installation process; installation can be done in a matter of hours; reinstate laterals via trenchless technology	Not appropriate for 6-inch pipe; heavy root areas can penetrate through PVC strips; cannot correct sags, slope issues, or joint offsets; limited number of installers	\$\$
HDPE Slip Lining Rehabilitation	Extensive pipe damage	Effective for large, straight runs of pipe without capacity issues	Reduces internal diameter more than other trenchless methods; not suitable for small diameter pipes; can't correct sags or slope issues; must excavate to reinstate laterals	\$\$\$
Pipe Bursting Pipe Replacement	Extensive pipe damage, hydraulic capacity limitations	Can upsize pipe diameters with less excavation than open cut	Can't correct sags or slope issues; not well suited for small repairs; must excavate to reinstate laterals	\$\$\$
Open Cut Pipe Replacement	Extensive pipe damage, hydraulic capacity limitations, alignment issues	Correct alignment/joint issues; upsize undersized pipe; can lay parallel pipes to expand capacity	Time intensive; highest level of impact on the public; highest cost	\$\$\$\$

Renewal Project List and Sewer Rates Come Together to Create a Flexible CIP



The corrective action list and the prioritized list of pipelines requiring renewal come together to form the initial project list. The CIP preparation phase of the project can then begin. The CIP translates a list of projects into a series of projects, scheduled over time, with budgets that can be supported by the District’s rates. This phase requires a coordination effort with the District’s Rate Consultant or guidance from the District’s General Manager on a budget for pipeline renewal. A general process for this is presented above. Once the budget is established the list of projects can then be scheduled overtime and grouped to improve efficiency and meet the budget constraints.

Prepare Ongoing Inspection and Cleaning Program

WSC can support the District’s operations by evaluating existing annual sewer cleaning targets and helping establish new inspection and cleaning targets. This evaluation can look at the cost of annual cleaning and inspection and help the District evaluate the required frequency of cleaning and inspection. The evaluation can also look at costs for annual contracts for inspection compared to obtaining a CCTV rig for self-inspection. Most agencies are not cleaning their full collection system on an annual basis, so there might be opportunities to decrease annual cleaning rates. Depending on the outcome of the CCTV inspection being performed with this project, we may be able to confirm if annual cleaning is needed and create an expectation for the inspection needs for the remainder of the collection system. This District can then plan to

release future CCTV projects or bring the work in-house depending on cost and workload projections.

Coordinate with Neighboring Agencies to Establish Equitable Infrastructure Sharing

WSC understands there is a segment of the sewer collection system that accepts wastewater from the City of Arroyo Grande. It is our further understanding that there is not a facility maintenance and sharing agreement in place for this action. WSC can facilitate meetings with the City of Arroyo Grande to coordinate negotiation of an equitable agreement between the two agencies for shared operation, maintenance, and renewal of the shared infrastructure. WSC can also prepare a conceptual framework for the potential agreement.

Why WSC?

We will leverage our experience to make sure the investment the District is making in the development of a CIP is well-informed, based on objective metrics and clear decision making, flexible to meet the future needs of the District, and resilient to future challenges that might occur. We have the organizational depth and breadth to build on the development of a CIP and help the District design the resulting project, access funding opportunities, and manage projects through construction.

As a company, two of our core commitments are to deliver value and leave it better. With our robust team, depth of experience, and local knowledge, WSC will be a committed partner working to serve the needs of the District and the community of Oceano.

Scope of Work

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Task 0 Project Management

0.1 Project Administration

- Prepare monthly progress reports to be submitted with each invoice. It is assumed that the project duration is 10 months.

0.2 Progress Meetings

- As-needed coordination meetings with the District to review projects, costs, prioritization, and deliverables.

0.3 Quality Assurance and Quality Control

- Comprehensive quality control and quality assurance of deliverables and updated project costs.

Deliverables:

- (1) Monthly progress reports and invoices; meeting notes.

Assumptions:

- (1) Project duration is 10 months. Progress meetings are limited to 4 one-hour and 4 half-hour meetings.

Task 1 Project Research

1.1 Kickoff Meeting

- Meet with the District at the start of the project to discuss scope, data request, systems needs and hot spots, potential projects, prioritization methodology, and finalize scope of CCTV inspection.

1.2 Data Collection and Review

- Prepare data request for the District.
- Review flow data and inflow and infiltration assumptions from South San Luis Obispo County Sanitation District, Arroyo Grande, and Grover Beach.
- Review existing District reference documents.

Deliverables:

- (1) Meeting agenda
- (2) Meeting minutes
- (3) Data request log
- (4) Data Collection Summary Memo

Task 2 Field Inspection

2.1 Sewer Main and Manhole Inspection Plan

- In coordination with the District, prepare a Sewer Main and Manhole Inspection Plan that identifies the manholes and pipelines to be inspected, responsibility for cleaning (District or Contractor), preliminary inspection and cleaning schedule, need for traffic control plans, inspection methodology, establishes a staging area, and identifies a disposal location for removed liquid and debris.
- Identify appropriate traffic control based on Caltrans' California Manual on Uniform Traffic Control Devices typical applications.

2.2 Sewer Pipeline Cleaning and Inspection

- WSC's subcontractor will clean and inspect sewer pipelines according to the National Association of Sewer Service Companies' (NASSCO's) Pipeline Assessment Certification Program (PACP) standards.
- CCTV inspection of +/- 38,000 LF of 6-12" sanitary sewer pipes.
- WSC's subcontractor will perform NASSCO Manhole Assessment Certification Program (MACP) Level 1 inspection of +/- 10 manholes.
- Traffic control as needed.
- Coordination with Caltrans and San Luis Obispo County as needed.

Assumptions:

- (1) Inspection includes CCTV of 38,000 LF of 6-12" diameter sanitary sewer pipes (as summarized below) and visual aboveground inspection of 10 manholes, plus a \$5000 allowance for additional work if needed based on variation in actual conditions. Assumption will be confirmed with the District prior to finalization.

Diameter	Linear Feet
6"	21,600
8"	11,600
10"	3,200
12"	2,000
Total	38,400

- (2) Encroachment permits will not be required; existing District easements should cover cleaning and inspection of pipelines.
- (3) Standard temporary traffic control typical applications from Caltrans California Manual on Uniform Traffic Control Devices will suffice for traffic control plans.
- (4) Sanitary sewer segments will be cleaned within 48 hours prior to inspection.

2.3 CCTV Quality Control

- PACP-certified staff will review the files submitted by the contractor. WSC will spot review (approximately 10% of videos) the CCTV video to confirm defects are coded per PACP standards. WSC will also review the PACP Standard Exchange database file to verify the contractor has correctly populated the required fields. The database review will flag items such as missing fields, incorrect manhole or pipe ID formats, and other incorrect inputs which are critical to maximizing the value of the CCTV data for the District.

Deliverables:

- (1) Video files of each main coded to PACP standards; PDF reports for each main; CCTV Standard Exchange database with all inspection information and condition scoring; Sewer System Condition Assessment Technical Memorandum; Sewer System Rehabilitation Technical Memorandum

Assumptions:

- (1) Flow metering field investigation is assumed to not be required to develop the 2025 CIP. Future metering will be considered as a potential future CIP project.

Task 3 Engineering Analysis & Recommendations

3.1 Condition Assessment and Rehabilitation Technical Memorandum

- Summarize PACP standardized risk-based management system for coding system defects and assigning likelihood of failure scores.
- Review CCTV database Quick Ratings, pipeline reports, and manhole inspections to prepare a Condition Assessment Technical Memorandum which identifies proposed rehabilitation methods and prioritizes pipeline segments and manholes for repair. The Condition Assessment Report will be used to determine cost estimates to be included in the Project Report and will include relevant field evaluation report data.
- Perform likelihood of failure analysis per PACP.
- Prepare a map and GIS shapefile for the proposed projects.

3.2 Pier Avenue Lift Station Conceptual Plan

- WSC will develop lift station and force main design parameters for the upgrade or replacement of the Pier Avenue Lift Station based on existing standards and District preferences.
- WSC will determine the Annual Average Flow (AAF) and Peak Hour Wet Weather Flow (PHWWF) to the lift station based on input from the District and previous planning studies. WSC assumes the service area for the lift station is built out and will not increase in the future.
- WSC will evaluate the lift station hydraulics to determine adequate pump size (flow and head) and use flow and pump capacity to size the wet well and force main.

Sizing will consider pump cycle time, sewage age, wet well volume, pump spacing, force main velocity, and force main maintenance.

- WSC will prepare a conceptual design for the lift station that will include a preliminary force main alignment to the bridge, initial pump selection, and site layout. The conceptual design will allow space for a backup generator in the future.
- WSC will briefly summarize construction sequencing and constraints to maintain the existing lift station during construction.
- WSC will prepare a Conceptual Opinion of Construction Cost for the lift station.
- WSC will investigate potential sea level rise impacts on the replacement lift station. To perform this analysis, WSC will utilize existing sea level rise mapping information to investigate potential impacts on the proposed location for the replacement lift station.

3.3 Potential Funding Opportunities Evaluation

- Identify and screen potential funding opportunities.
- Potential funding opportunities will be identified and ranked in the Condition Assessment and Rehabilitation TM.

3.4 Maintenance Agreement Framework

- Prepare for and facilitate a meeting with the city of Arroyo Grande to discuss a potential maintenance agreement.
- Develop preliminary framework for future MOU negotiations with the city of Arroyo Grande.

3.5 Long-term Management Plan

- Develop a long-term plan for the District to manage ongoing cleaning and inspection needs to optimize sewer system operations and cost effectiveness.
- Focus will be on general cleaning frequency recommendations for hotspots, predictive maintenance areas, and normal sewers.
- WSC will review proposed costs for CCTV inspection using a contractor compared to District purchase of a CCTV vehicle and self-performing inspections.

Deliverables:

- (1) Condition Assessment and Rehabilitation TM; draft chapters to be incorporated into Capital Improvement Plan report.
- (2) The District will provide existing design flows to the lift station.
- (3) Only one lift station site will be evaluated.
- (4) Maintenance Agreement Framework could be open-ended, WSC has a limited budget that is intended to be an allowance for initiating discussions. WSC does not provide legal advice.

- (5) Potential Funding Opportunities Evaluation could be open-ended, WSC has a limited budget that is intended to be an allowance for first pass screening and source identification. No applications are included.
- (6) Cost opinions will be prepared to AACE Class 5 accuracy, which is a conceptual design level.

Task 4 Capital Improvement Plan

4.1 Develop Capital Improvement Plan

- Develop prioritization methodology to group projects into high, medium, and low priority projects and update project cost estimates for each project and grouping.
- Develop a map and list of prioritized Capital Improvement Plan projects based on budget constraints as identified by the District. Coordinate with the District and the District’s rate consultant to establish annual budgets. Depending on budget constraints, it may be advisable to perform renewal projects less frequently than annually to take advantage of economy of scale.
- Verify and update project prioritization/timing based on District input and feedback.

Deliverables:

- (1) Draft and Final Capital Improvement Plan Report
- (2) Draft and Final CIP Map
- (3) Draft and Final Prioritized Project List

Assumptions:

- (1) CIP will be limited to 5 prioritization groupings

Optional Task 1 Additional Engineering Services

O1.1 Develop Preliminary Engineering Report for Funding Opportunities

- The District qualifies as a low-income community for many state grant funding programs and is interested in leveraging opportunities to apply for and pay for essential sewer system projects with grant funding. One potential source of funding is the Clean Water State Revolving Fund (SRF). If this is chosen as a preferred funding option, there are certain requirements that must be met in preliminary engineering documents, such as evaluation of consolidation options. WSC can develop a Preliminary Engineering Report that meets SRF requirements.

O1.2 Develop Detailed Asset Management Plan and Maintenance Program

- Support the District in development of an asset management plan based on CCTV inspection data and general work order data. This can support ongoing cleaning and

inspection work and assist the District with flexible CIP prioritization in the future by establishing baseline conditions and trending the conditions overtime.

O1.3 Environmental Support Services

- WSC can help define project construction extents, methods, and other assumptions to allow for evaluation and permitting by an environmental consultant consistent with the California Environmental Quality Act

O1.4 Engineering Design Services

- WSC can provide engineering design services from preliminary engineering through construction bid documents, as needed.

O1.5 Construction Management Services

- WSC can provide construction management services, as needed.

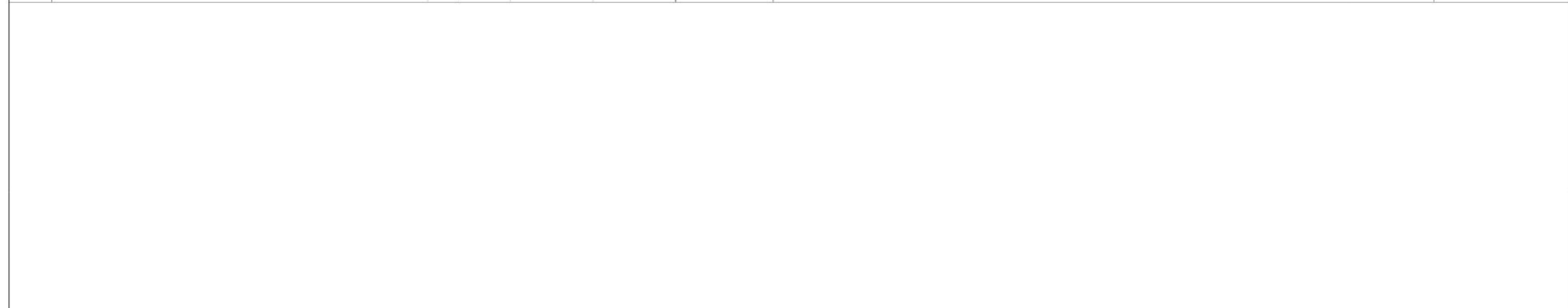
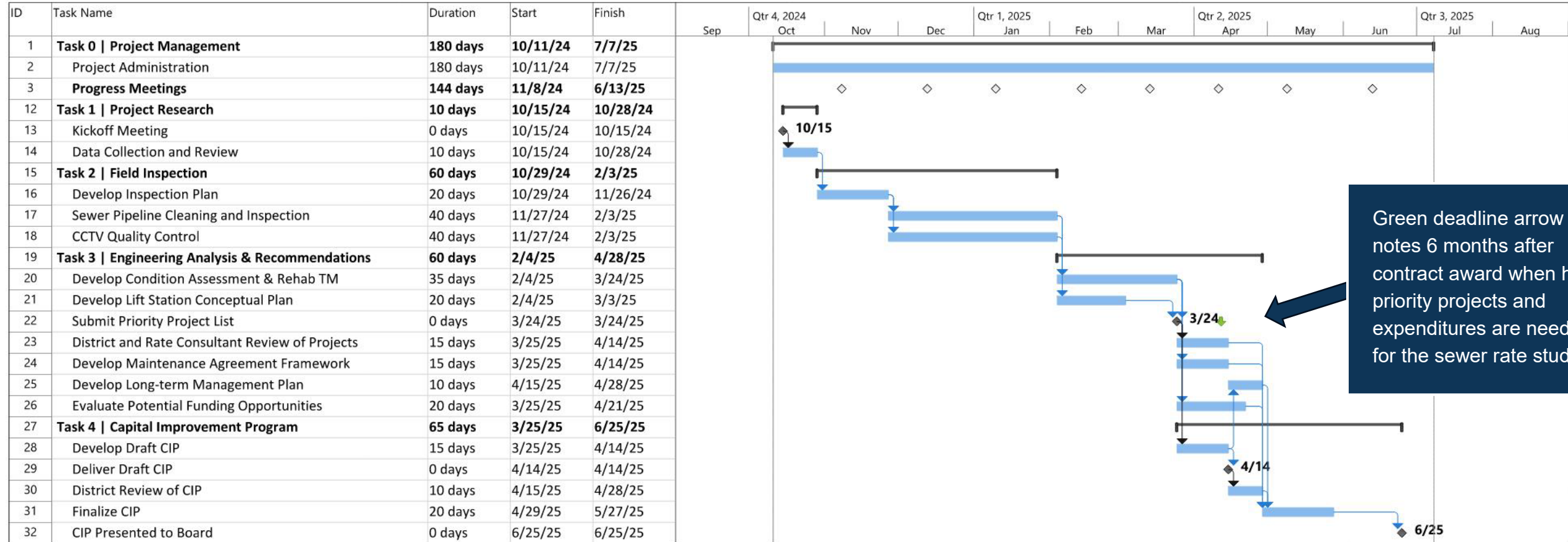
Assumptions:

- (1) Scope and fee for Optional services will be developed for District review if needed and requested by the District.

Schedule

6





Project: Schedule Date: 9/19/24	Task		Project Summary		Manual Task		Start-only		Finish-only		Manual Summary Rollup		External Tasks		External Milestone		Deadline
	Split		Inactive Task		Duration-only		Finish-only		External Tasks		Manual Progress		Progress			Manual Progress	
	Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		External Milestone			Manual Progress					
	Summary		Inactive Summary		Manual Summary		External Milestone					Manual Progress					

References

A



Wastewater Collection System Rehabilitation Support, City of Thousand Oaks**Gareth Madrid**

Project Manager

City of Thousand Oaks

2100 Thousand Oaks Boulevard Thousand Oaks, CA 91362

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Annual Trenchless Sewer Pipeline Rehabilitation, City of Santa Barbara**Heidi Braunger**

Project Engineer

City of Santa Barbara

630 Garden Street,

Santa Barbara, CA 93101

P | (805) 897-1902

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Sewer System Lining and Manhole Rehabilitation, San Miguel Community Service District***Kelly Dodds***

General Manager

San Miguel Community Service District

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Resumes

B



Joshua Reynolds PE

PRINCIPAL IN CHARGE

Josh is a Principal Engineer with 24 years' expertise in the construction, planning, and design of wastewater infrastructure. His particular areas of focus include the planning, design, and construction sanitary sewers and sewer pump stations. His experience allows him to identify and analyze initial project concepts and monitor construction of the project through project completion. As Principal for this project, he will bring knowledge of your unique challenges and opportunities coupled with local experience and expertise delivering similar sewer main projects.

REPRESENTATIVE PROJECTS

Water and Wastewater Master Plans, San Miguel Community Services District, San Miguel, CA.

Project Engineer. Created a sewage collection system spreadsheet model of the San Miguel Community Services District collection system. Used the spreadsheet to make recommendations for improvements to the existing sewage collection system. Prepared a comprehensive water master plan for the community of San Miguel, including water modeling of the distribution system. The plan included detailed recommendations for water storage and distribution system capital improvements, and a capital improvements program to serve current and 20-year build-out needs.

Wastewater Collection System Rehabilitation, City of Thousand Oaks, CA. Technical Advisor.

Provided design support for the rehabilitation of 1.6 miles of 8-, 10-, 21-, 24-, and 27-inch wastewater mains and 326 vertical feet of maintenance access holes near Highway 101 using CIPP and spiral wound PVC lining technologies. Special consideration was given to traffic control and bypass pumping, as a significant portion of the larger diameter pipe was located within one of the City's busiest intersections. Provided technical review for the City's plans, technical specifications, and cost opinions to help the City augment their deliverables for larger diameter pipelines and accommodate the significant traffic control and bypass needs.

Wastewater Master Plan Update & Treatment Alternatives, Camarillo Sanitary District, Camarillo, CA. Project Manager. Preparing a wastewater plan to evaluate the District's collections system and water reclamation plant.

The collections system evaluation consists of developing land-use based loading factors, an all-pipes collection system hydraulic model to identify capacity constrained pipes, pump station evaluations, and a pipe age analysis for determining a long-term pipe replacement strategy. The water reclamation plant evaluation consists of a regulatory review, a site planning study, wastewater characterization, liquid streams and solids stream analysis, condition assessment, and development of treatment alternatives to meet future regulations. A capital improvement plan is being developed to incorporate the recommended projects.

Wastewater Collection System Infrastructure Renewal Strategy, City of San Luis Obispo, CA. Project Manager.

Develop a Wastewater Collection System Infrastructure Renewal Strategy that includes; creation of a hydraulic model for the wastewater collection system, evaluation of pipeline capacity to deliver current and future loading, assessment of pipeline condition and the development of an asset management plan to guide future capital improvement projects. Utilize spatially allocated sewer loads, based on water demands, and an all-pipes model to implement a prioritized manhole data collection strategy that enables the City to focus its surveying efforts to the capacity impacted portions of the collection system. Intersect current wastewater loading with underlying parcel and land use data to develop area based loading factors for use in quantify loading for areas of future growth and densification. Develop a decision algorithm incorporating capacity and condition data to identify highest risk assets and prioritize replacement to limit the City's risk exposure.



EDUCATION

MS, Civil and Environmental Engineering, Cal Poly San Luis Obispo, CA

BS, Civil Engineering, California Polytechnic University, San Luis Obispo, CA

PROFESSIONAL REGISTRATIONS

Professional Engineer - Civil, California, No. C65400

Professional Engineer - Civil, Oregon, No. 92927

Professional Engineer - Civil, Washington, No. 57917

"I am grateful that I have the life-long opportunity to apply thoughtful and creative solutions to problems big and small that support the health and well-being of the clients and communities I serve."

Josh Reynolds

Final Design of Water and Sewer Extensions to the Airport Area, City of Paso Robles, CA. Project Manager. Completed final designs for the expansion of recycled water, wastewater, and potable water services in the area around the Paso Robles Airport. WSC designed approximately 8,190 LF of 8-, 10-, and 12-inch PVC SDR 35 gravity sewer main, 3,500 LF of 6-inch PVC DR-14 sewer forcemain, 4,800 LF of 16-inch ductile iron recycled water main, and 7,650 LF of 16-inch ductile iron and 12-inch PVC C900 water main. This project included the design of a new duplex submersible pump lift station with 20 hp pumps operating at 275 gpm each to replace the existing Lift Station. Also provided engineering services during construction.

Sewer Master Plan Update, City of Solvang, Solvang, CA. Project Manager. Preparing an update to the City's existing wastewater system master plan. Utilizing the City's GIS data to develop an all-pipes collection system hydraulic model to evaluate the City's collection system for capacity deficiencies. Work includes development of loading based on land use data, flow monitoring for use in model calibration, determination of capacity driven projects, a lift station condition assessment, and pipe age analysis for condition-based improvements. Based on the findings of the Work, a capital improvement plan will be developed.

2018 Wastewater Collection System Renewal Strategy and Master Plan, City of Paso Robles, CA. Project Manager. Evaluated Paso Robles' wastewater collection system and updating the Master Plan. The update included condition-based improvement planning and a survey of the capacity limitations to anticipate the expected growth along the outskirts of the existing infrastructure. The analysis of the aging pipeline detailed needed for replacement and rehabilitation of distribution system infrastructure to avoid failure in the future. A CIP was created to address deficiencies and needs identified in the system analysis for the City to act upon. Projects prioritized based on what planning horizon they were needed for, including existing, 5-year, 10-year, and build out, and estimated construction costs.

Sewer Master Plan, Big Bear City Community Service Department, Big Bear City, CA. Project Manager. Evaluating the existing sewer collection system, current and future sewer flows, hydraulic capacity of gravity sewers and lift stations, and recommending improvement projects to address capacity based deficiencies. Will include approaches for the rehabilitation and replacement of existing infrastructure.

Five Cities Lift Station Replacement, City of Pismo Beach, CA. Project Manager/Senior Project Engineer. Prepared plans and specifications for replacement of an existing self-priming solids handling pump station. The new lift station uses two 20-hp submersible solids handling pumps in pre-rotation basins rated at 625-gpm each. The project included replacement of 2,300 LF of 8-inch force main with a bridge crossing over the Pismo Creek. Assisted the City with obtaining a Streambed Alteration Agreement from CA Department of Fish and Game for the creek crossing work, and provided engineering services during construction.

Wastewater Treatment and Collection System Analysis, GHD/Atascadero State Hospital, Atascadero, CA. Project Manager. Josh Evaluated the Hospital's wastewater treatment facility and collection system. The wastewater study establishes a plan to address the changes

in regulation and deficiencies of the entire wastewater system. WSC's main focus was evaluating the collection system which consisted of CCTV inspection of sewer piping to inform the overall health of each pipeline. The evaluation also determined if there was sufficient capacity to accommodate an 250-bed expansion of the facility. WSC supported the alternatives evaluation for the wastewater treatment plant, which was based on treatment and regulatory requirements, costs, and beneficial reuse. The study resulted in a CIP plan that will allow the hospital to plan necessary improvements appropriately.

Wastewater System Master Plan, City of Arroyo Grande, CA. Project Manager. Preparing a Master Plan to assess the capacity and condition of the City's wastewater collection system, and develop a prioritized, risk-based capital improvement plan. Developing GIS risk-based model for condition assessment as well as a hydraulic model in SewerGEMS for capacity assessment. Performed detailed site evaluation of each of the City's five (5) lift stations.

Wastewater Master Plan, King City, CA. Project Engineer/Project Manager. Prepared a comprehensive Master Plan for the City's wastewater collection system and WWTP Facility. The project included analysis of the individual WWTP pond performance, monitoring of water quality at the WWTP, SewerCAD modeling of the collection system, developing demand loading rates and project sewage flows, and preparation of a comprehensive Capital Improvements Program to meet the anticipated growth in and around the City.

Pump Station Decommissioning Design, City of Bend, OR. Principal in Charge/Technical Advisor. Supported the evaluation of 10 pump stations for decommissioning by rerouting flows into the Southeast Interceptor. Phase 1 involved preparing a detailed design for a new pipe system to handle the flows from four pump stations that were operating beyond their useful life. Phase 2 consisted of preparing business cases for the remaining pump stations to determine a cost-effective solution. A detailed pipeline design was prepared to decommission the stations that were cost effective.

Wastewater Collection System Hydraulic Modeling Services, City of Santa Barbara, CA. QA/QC. Prepared and updated collection system hydraulic model to assist the City in complying with its Consent Decree with the Santa Barbara Channel Keeper and to plan future CIP projects. Utilized updated GIS data to develop an all pipes collection system hydraulic model to replace the City's existing skeletonized model. Developed spatially allocated average daily sewer flow estimates through an analysis of winter water demands and developed wet weather flow estimates by analyzing storm events and corresponding wastewater flows. Utilized the hydraulic model to identify capacity-constrained pipelines under the current and future sewer flow scenarios and to develop list of necessary capital projects

Pump Station System Plan, Bureau of Environmental Services, Portland, OR. Principal in Charge. Oversaw the development of a condition based rehabilitation prioritization program for pumping stations. Desktop evaluations using existing data from the CMMS, GIS databases, and other sources were used to prioritize pumping stations for detailed field assessments based on risk.

Michael Steele ^{PE}

PROJECT MANAGER

Michael has over six years of engineering experience centered on the development and implementation of community-focused water and sanitation projects. He has consulted for a range of clients across cultures and in multiple countries. The contexts in which he has implemented solutions range from small, rural villages to large municipalities. He is passionate about creating innovative technical solutions to large, difficult problems through diverse interdisciplinary teams. Michael's expertise includes program management, water resources planning and management, recycled water, rural water system design, and community development.

REPRESENTATIVE PROJECTS

Sewer System Master Plan, East Valley Water District, Highland, California. *Staff Engineer.*

Michael developed an updated sewer master plan for the client. He analyzed historical production and consumption data, used spatial analysis to characterize the existing system, updated the sewer system model, projected future demand scenarios, and evaluated the effectiveness of recommended improvements.

2024 Sewer CIP Update, City of Arroyo Grande, Arroyo Grande, CA. *Project Engineer.* Supporting development of City's Sewer CIP Update. Updates are focused on CIP projects, costs, and timing recommended in the 2012 Water and Wastewater Master Plans. These updated projects and cost estimates are needed to feed into future capital planning and rate studies.

Central Coast Blue, City of Pismo Beach, CA. *Deputy Program Manager.* Central Coast Blue is a regional water reuse project that will create a new, local water supply and protect the Santa Maria Groundwater Basin from seawater intrusion. A partnership between the cities of Arroyo Grande, Grover Beach, and Pismo Beach, this collaborative, multi-phase effort will benefit Southern San Luis Obispo County for generations to come. Serving as the Deputy Program Manager, Michael is coordinating designs between different teams, providing engineering review and oversight, pursuing grant funding and financing opportunities, implementing program controls, and helping to deliver the estimated \$93M program. He led

development of the program's Prop 1 Round 2 IRWM Implementation Grant application to the County.

Alternative Disinfection Study, North Texas Municipal Water District, Wylie, Texas. *UV Disinfection Evaluation.* The Alternative Disinfection Study recommended alternative technologies to chlorine gas for disinfection at three existing wastewater treatment plants. Michael led the evaluation of UV disinfection implementation at each plant. In response to site-specific operational constraints, Michael developed a plan to implement an innovative technology to enhance operational flexibility and increase permit compliance. Michael also managed the compilation of all evaluations and authored a cohesive summary document.

New Biosolids Tank, Village Creek Water Reclamation Facility, Fort Worth, Texas. *Staff Engineer.* Michael designed the preliminary process-mechanical layout for a new 5 million gallon sludge storage tank. Michael also estimated the effect of various design changes on the overall project cost in order to maximize project value and desired outcomes as the client budget and scope evolved.

California Water Plan Update 2018 - Sustainability Outlook Indicator Descriptions and Methodology, California Department of Water Resources. *Staff Engineer.* In the 2018 update of the California Water Plan, sustainability outlook indicators were developed to help the State track its progress toward a sustainable water future, measure effectiveness of State water policies, and quantify return on investments. Michael helped develop



EDUCATION

BS, Civil Engineering, Texas A&M University

PROFESSIONAL REGISTRATIONS

Professional Engineer - Civil, California, No. 91874

“I am passionate about developing sustainable solutions to complex problems, especially as it relates to keeping water safe, available, and affordable.”

Michael Steele

Michael Steele ^{PE} continued...

multiple indicators through the gathering and analyzing of data from a variety of sources, creating methodologies, assessing indicators, and authoring descriptions detailing the development.

Water Needs Reliability Update, Clean Water Services, Hillsboro, Oregon. Staff Engineer. Michael provided technical and analytical support to help inform policy makers of the reliability of potential future water supply projects. He updated a river system model to predict future outcomes of storage and demand variations on Scoggins Creek and subsequently the Tualatin River. He determined water availability through hydrologic and water rights analysis. He also created a dynamic Excel-based tool that filtered and visualized a water resource dataset based on real-time user input.

Water, Sanitation, and Hygiene (WASH) Projects, Svay Leu & Ratanakiri, Cambodia. Supervising Engineer. Provided engineering oversight and supervision for the planning, design, contracting, and construction of 70 water points in rural Cambodian communities. Mentored Cambodia technical staff and managed engineering and construction efforts. This included leading water quality testing training, teaching drilling oversight concepts, developing standard contracts, updating and contextualizing hardware standards, created construction supervision checklists, and . Reviewed and approved hardware construction reports and analyzed data to identify trends, reduce construction costs, and improve program effectiveness.

Basin Planning Consultant – Sanitary Sewer Overflow Reduction Program, San Antonio Water Systems, Texas. Staff Engineer. Michael provided engineering support for the Basin Planning project in a variety of roles and capacities throughout multiple stages of the project. Supported the development of the 10% design for a new 90” sanitary sewer main which included developing and evaluating over a dozen alternatives. He then supported the 30% design of the preferred alternative, a new 5-mile, 96-inch diameter, \$210M tunnel currently under construction. He created standards, templates, work products, and optimized work-flow processes that were adopted by the entire project team. Michael also managed the Quality Control process for the 30% design phase.

Long Beach Municipal Underground Stormwater Treatment (LB-MUST), City of Long Beach, CA. Staff Engineer. The Long Beach Municipal Urban Stormwater Treatment (LB-MUST) Project will divert and treat polluted stormwater runoff at the 2 MGD LB-MUST facility. Michael sampled stormwater during multiple storms across multiple rainy seasons to characterize stormwater runoff water quality. He was trained in confined-space entry.

Hurricane Maria Disaster Response, Puerto Rico. Staff Engineer. Michael conducted over 50 technical assessments of rural community water systems in Puerto Rico. Through coordination with FEMA, the EPA, and the Department of Health, Michael and a small team implemented power and treatment solutions in over 35 high-priority communities. The team implemented the first solar-powered community water projects on the island, which served as proof-of-concept examples to inform the development of FEMA’s future disaster mitigation plan.

Integrated Water and Power Project, Guadalupe-Blanco River Authority, Seguin, Texas. Staff Engineer. Michael supported water resources planning efforts for preparation of a feasibility study for a seawater desalination plant and potential co-located power plant along the Texas Gulf Coast. Michael researched data from across the study area and compared results with the 2017 Texas State Water Plan to strengthen water demand forecasts and establish water needs. He also created a comprehensive river system schematic, combining major water rights and water infrastructure with the physical characteristics of the watershed.

Barry Rose Water Reclamation Facility Expansion, City of Pearland, Texas. Staff Engineer. Michael created the preliminary disinfection design for the expansion of a treatment plant from an average of 3 to 8 MGD. He evaluated a variety of disinfection technologies for safety, operational, maintenance, implementation, and life-cycle cost considerations in order to help inform the client of the best disinfection technology for their desired outcome.

Major Maintenance, Central Wastewater Treatment Plant, Dallas, Texas. Staff Engineer. Michael developed the preliminary design for new screens and a screenings conveyance system at the plant headworks as part of several improvements at the 75 MGD average daily flow treatment plant. Michael also managed the visualization of different manufacturer’s designs in a 3D model in order to optimize the preferred technology for deployment in a spatially constricted area.

2015 Earthquake Disaster Response, Nepal. Michael worked in Nepal to provide safe drinking water to communities affected by the 7.8 magnitude earthquake. Michael coordinated logistics, procurement, design, and installation of a drinking water package treatment plant that halted the mandatory relocation of a particularly remote village with 200 residents. Michael also engineered solutions to water and sanitation needs in two displaced-person camps.

Adam Donald PE, PACP, ITCP



PROJECT ENGINEER

Adam is a NASSCO PACP and ITCP certified engineer specializing in wastewater design and planning projects with 8 years of experience. His experience includes rehabilitation design, master planning, cost and life-cycle analyses for sewer systems, and CIP development for projects throughout California and Oregon. Adam has served as Project Engineer for the past five years on the City of Santa Barbara's Annual Sewer Rehabilitation Program. His sewer main experience includes assessing infiltration and inflow (I/I) issues, conducting seismic risk assessments, trenchless design, and CIPP technologies. He brings a high attention of detail to his work and has assisted agencies in developing their standard specifications.

REPRESENTATIVE PROJECTS

Sewer Lining and Manhole Rehabilitation, San Miguel Community Services District, CA. Project Engineer. San Miguel CSD received funding from the Clean Water State Revolving Fund (CWSRF) to evaluate and improve their collection system. WSC prepared contract documents to procure an inspection contractor to perform CCTV inspection of their 87 vitrified clay sewer mains and inspections of 79 of their manholes. After receiving the inspection data, we prepared a condition assessment report prioritizing the sewer mains and manholes and recommending a subset for rehabilitation. Next steps include preparing a preliminary engineering report in compliance with Project Report requirements of the CWSRF program and preparing design plans and specifications for the rehabilitation work.

Desal Link CCTV Review, City of Santa Barbara, CA. Project Engineer. Performed CCTV review on behalf of the City for sewer mains, sewer laterals, and storm drains that the 24" Desal Link pipeline crosses or runs parallel to. Work consisted of reviewing pre-construction CCTV for the sewer mains, laterals, and storm drains to document the existing condition of the assets and performing post-construction CCTV review of the same assets to document if any damage occurred as a result of the pipeline installation. Technical memos were prepared to document shortcomings in the CCTV data submittals and to document any areas with damage warranting repairs.

Unit W Wastewater Pipe and Maintenance Access Hole Lining, City of Thousand Oaks, CA. Project Engineer. Project consisted of rehabilitation of 1.6 miles of 8", 10", 21", 24", and 27" wastewater mains and 326 vertical feet of maintenance access holes near the 101 Freeway using CIPP and Spiralwound PVC. Special attention was required for traffic control as much of the larger diameter pipe was located within one of the City's busiest intersections. During design, provided technical review for the City's plans, technical specifications, and cost opinion to help the City augment their deliverable for larger diameter pipelines and the significant traffic control and bypass needs. Also, reviewed CCTV video to confirm appropriate rehabilitation strategy and identify any areas with defects that need to be addressed prior to lining. Provided engineering services during construction including submittal review, field testing review, CCTV review, and answering requests for information.

FY23 Sewer Main Rehabilitation Project, City of Santa Barbara, CA. Project Manager/Project Engineer. Project includes evaluating 2.3 miles of gravity sewer main ranging from 6" to 18" in diameter and preparing construction documents. Rehabilitation strategies included dig and replace, trenchless rehabilitation through CIPP, point repairs, rehabilitation of manholes, and replacement of cleanouts with new manholes. Prepared technical specifications and engineer's opinion of probable construction cost. Reviewed the exhibits prepared by the City and provided



EDUCATION

MS, Civil and Environmental Engineering, Stanford University

BS, Environmental Engineering, California Polytechnic State University, San Luis Obispo

PROFESSIONAL REGISTRATIONS

Professional Engineer – Civil, Oregon, No. 95325

Professional Engineer – Civil, California, No. 89089

Professional Engineer – Civil, Washington, No. 57893

PACP/MACP/LACP – Certificate U-0520-70309436

ITCP CIPP - Certificate C0045390-122023ITCP

ITCP Manhole Rehabilitation - Certificate M0048320-062024

"I'm passionate about helping our clients meet the needs of their communities through tailored, best-fit solutions."

Adam Donald

Adam Donald ^{PE} continued...

input on rehabilitation strategy. Provided engineering services during construction including submittal review, response to requests for information, CCTV review and tracking of all work completed.

FY22 Sewer Main Rehabilitation Project, City of Santa Barbara, CA.

Project Engineer. Project includes evaluating 2.4 miles of gravity sewer main ranging from 6" to 16" in diameter and preparing construction documents. Rehabilitation strategies included dig and replace, trenchless rehabilitation through CIPP or spiral wound PVC pipe liner, point repairs, rehabilitation of manholes, and replacement of cleanouts with new manholes. Prepared technical specifications and engineer's opinion of probable construction cost. Reviewed the exhibits prepared by the City and provided input on rehabilitation strategy. Provided engineering services during construction including submittal review, response to requests for information, CCTV review and tracking of all work completed.

FY 20 Sewer Main Rehabilitation Project, City of Santa Barbara, CA.

Project Engineer. Project includes evaluating 3.5 miles of gravity sewer main, recommending rehabilitation strategies for each segment, and preparing construction documents. Rehabilitation strategies included dig and replace, trenchless rehabilitation through CIPP or spiral wound PVC pipe liner, point repairs, rehabilitation of manholes, and replacement of cleanouts with new manholes. Prepared the technical specifications and engineer's opinion of probable construction cost and reviewed design plans. Assisted the City during the bidding phase by preparing addenda and evaluating products. Assisted the City during Construction by evaluating pre-lining CCTV videos.

FY 18 Sewer Main Rehabilitation Project, City of Santa Barbara, CA.

Project Engineer. Project includes evaluating 4.2 miles of gravity sewer main, recommending rehabilitation strategies for each segment, and preparing construction documents. Rehabilitation strategies included dig and replace, trenchless rehabilitation through CIPP or spiral wound PVC pipe liner, point repairs, rehabilitation of manholes, and replacement of cleanouts with new manholes. Prepared the technical specifications and engineer's opinion of probable construction cost, assisted the City during the bidding phase by preparing addenda and evaluating products, and assisted the City during Construction by evaluating pre-lining CCTV videos.

Creek Crossing Project, Sacramento Area Sewer District, CA. Engineering Support.

WSC oversaw an alternatives evaluation for mitigating the risks of 12 exposed sewer crossings of creeks across the County service area. WSC designed, provided permitting support, and assisted in construction of the creek crossing repairs of gravity sewers which included obtaining necessary easements, U.S. Army Corp of Engineers and Regional Water Quality Control Board Section 404/401 permits, and California Department of Fish and Wildlife Lake and Streambed Alteration Agreements. Sizes ranged from 4-inch to 48-inch sewers. Repairs and replacements will include protections in place from ongoing erosion within the creek, additional structural protections for aerial crossings, and CIPP linings. Several locations were designed as aerial crossings using drilled piers.

Auburn Ravine Force Main Replacement, Placer County, CA. Engineering Support.

Evaluation of alternatives to address condition deficiencies within the 12-inch diameter, 6,500 foot long asbestos cement pipeline. Alternatives included rerouting the pipeline, rehabilitation in replace, or

installation of a parallel pipeline. Designed a parallel pipeline that included the installation of a permanent bypass into the neighboring City of Auburn collection system, allowing significant cost savings by reusing the existing alignment in sections to avoid hard rock removal. A variance from separation requirements with potable water utilities was obtained from the Division of Drinking Water through the use of DR17 14-inch diameter butt-fusion welded HDPE pipe with a pressure rating exceeding the project requirements. Utility location was critical within the narrow corridor, and both ground penetrating radar, electromagnetic sounding, and hydraulic potholing were used to positively locate utilities along the alignment. An 800 foot long horizontal directional drill installation was required to avoid an environmentally sensitive Auburn Ravine creek, and required a Lake and Streambed Alteration Agreement. Supported the development of a CEQA Initial Study and declaration of Mitigated Negative Declaration. Coordination with Caltrans was required for connection to existing pipelines within the Highway 49 right-of-way.

Conejo North Waterline Rehabilitation, City of Thousand Oaks, CA.

Engineering Support. The project included rehabilitation of nearly 1,230 linear feet (LF) of welded steel pipe with cured-in-place pipeline (CIPP) and replacement of over 100 LF of pipeline with new 12-inch concrete mortar lined and coated welded steel pipe. The use of CIPP in this segment of the water infrastructure provides a solution to a site with unique land use and physical constraints. Supported the project by preparing technical specifications related to the rehabilitation of the pipeline with CIPP and preparing and opinion of probable construction cost.

Sewer Manhole Rehabilitation, City of Camarillo, CA. Engineering Support.

Prepared specifications for the rehabilitation of over 200 sewer manholes within the City of Camarillo. Rehabilitation generally included polyurethane coating of 4-ft and 5-ft concrete and brick manholes, reconfiguring the channel, crack repair, and replacement of manhole lids.

Toro Creek Bridge Replacement Pipeline Improvements, Cayucos, CA.

Engineering Support. Prepared carrier system loading calculations, technical specifications, cost estimates, and permitting documents for a phased design accommodating a CA state highway bridge replacement for the Cayucos Sanitary District, which currently supports a sanitary force main crossing. The project includes multiple design packages that will implement transition from a dual force main system to a single plant effluent pipeline in coordination with ongoing sanitary system projects; installation of a temporary utility bridge to provide a bypass during bridge construction; permanent pipeline and carrier system; and implementation of corrosion control measures. Supported the project by preparing technical specifications for the design of the force main.

2021 Sanitary Sewer Master Plan, Oak Lodge Water Services, Oak Grove, OR. Project Engineer.

Utilizing the District's GIS data, WSC developed an all-pipes collection system hydraulic model to evaluate the City's collection system for capacity deficiencies. Performed flow monitoring and smoke testing to evaluate wet weather flows for model calibration and identify sewer basins with high infiltration and inflow (I/I). Work included the evaluation of existing and future flows, development of an I/I reduction strategy, identification capacity deficient pipes, an evaluation of pump station capacity, and an evaluation of collection system condition based on PACP scores.

Brendan Hamilton PE, PWAM



DATA VISUALIZATION AND ANALYSIS

Brendan brings 10 years of engineering and inspection experience with water collections and distribution systems. His experience in the management and implementation of asset management programs, master planning, demand analysis, data engineering, and pipeline inspection provides unique insight into the sustainable management of aging infrastructure. He has led several asset and data management projects to facilitate utility maintenance, process, and strategic planning goals. He has developed several tools and systems designed to combine several types of raw data from pipe inspection data, CMMS system data, AMI hourly data, and SCADA into reliable and actionable information that is vital to comprehensive decision making in real time.

REPRESENTATIVE PROJECTS

2023 Closed-Circuit Television and Inspection of Sanitary Sewer Mains, Arlington Water Utilities, TX. Project Manager. Managed and scoped third-party CCTV inspection of up to 150,000LF of 6-inch to 16-inch small diameter sanitary sewer mains. The scope includes several areas of high maintenance frequency main identified by the Preventative Maintenance Cleaning Program that Brendan developed.

Sewer System Overflow Initiative, Arlington Water Utilities, TX. Project Lead. Developed Arlington Water Utility's planning document and Notice of Intent to Participate in the SSO Initiative (SSOI) (Form TCEQ-20630) which focus on creating a comprehensive strategy to minimize sanitary sewer overflows. This included establishing clear goals aligned with TCEQ requirements and formulating a detailed plan that integrates the existing Preventative Maintenance Cleaning Program and the Reactive Maintenance Scheduling Program. Leveraged data from the Asset Management Program to identify high-risk areas and prioritize maintenance efforts. Designed a centralized data warehouse to streamline reporting and analysis of SSO occurrences, facilitating improved tracking of mitigation measures and performance indicators. Collaborated with cross-functional teams to ensure feasibility of the SSOI plan, enhancing operational efficiencies and reinforcing the utility's commitment to sustainable wastewater management practices.

Asset Management Program, Arlington Water Utilities, TX. Program Developer and Manager. Led the asset management team that verifies asset attributes and condition information. Developed customized data pipelines, database architecture, and automated data analytics tools to process and analyze asset management related data. Developed and validated several machine learning models that predict pipe condition, population growth, and other utility needs. Developed CIP and asset replacement criteria and processes. Developed asset replacement costing tools used to budget and determine rates required for the long-term sustainability of the Utility and its assets. Managed all in-house proactive small diameter sewer main inspection operations.

Water and Sanitary Sewer Utility Asset Inventory and Financial Evaluation, Arlington Water Utilities, TX. Project Manager. Scoped and managed the third-party engineering team responsible for determining original cost and replacement cost estimates of the Utility's horizontal and vertical assets. Coordinated the Gap Analysis and field inspections. Provided and cleaned database exports required for the evaluation. Verified that acceptable fiscal methodologies and assumptions were followed. Ensured that the deliverable quality meet with AWU's standards.

2015 Large Diameter Sanitary Sewer Inspection & Evaluation, Arlington Water Utilities, TX. Project Manager. Completed all plan research and created the inspection plan for all 45 miles of 24-inch to 72-inch large diameter sewer inspection.



EDUCATION

BS, Civil Engineering, University of Texas at Arlington

PROFESSIONAL REGISTRATIONS

Professional Engineer - Civil, Texas, No. 144358

Professional Water Asset Manager (PWAM), Buried Asset Management Institute - International

"I enjoy bringing attention to the often unseen world of water and communicating the ways in which it impacts our communities and environment."

Brendan Hamilton

Brendan Hamilton ^{PE, PWAM} continued...

Conducted site visits and developed detailed final inspection plans for each inspection. Performed as engineering crew chief of the 3 teams required to complete each multi-sensor inspection. Processed and provided laser, sonar, and CCTV data to the University of Texas at Arlington for processing. Managed 3 Audits of UTA deliverables. Performed as the architect of the database that all inspection reports and data were merged into. Performed the NASSCO PACP conversion of the inspection data.

Cartograph CMMS Data Refinement Project, Arlington Water Utilities, TX. Project Manager. Developed the scope and proposal for changing the Utility's CMMS schema and processes such that work order management system data can be used for correcting asset attribute information, determining asset condition, and for estimating cost of failure. Managed the team charged with the implementation of the project. Designed the processes implemented by the team. Worked as the architect of several quality control systems, developed the required data conversions, modernized several custom access databases and VBA based programs to SQL and python. Developed documentation, training classes, and materials for staff.

Development of Sanitary Sewer Hydraulic Model Quality Control Program, Arlington Water Utilities, TX. Project Lead. Developed processes to provide a streamlined approach to collecting plan invert, slope, and diameter data and prepare it for model import. Developed a program that interpolates missing inverts and flags potential issues with input data. Created the process for joining this information to GIS assets and correcting the GIS asset geometry. Developed a dry weather flow model calibration tool. Built and calibrated three basins with sewer main 6-inch and above in the model. Analyzed flow studies to determine I&I characteristics of all sewer basins for model calibration.

Annual Pressure Plain Demand Analysis, Arlington Water Utilities, TX. Program Manager. Developed a program that accepts SCADA, AMI, and Treatment TCEQ reports, customer connection data, and population projection data, as input to calculate pressure plain demands. Developed data cleaning algorithms that estimate demand when input devices fail to report or report erroneous values. The program exports Pressure Plane Demand Summaries that were used in two requests to TCEQ for Alternative Capacity Requirements (ACR). Analyzed the combined data on an annual basis to determine and revise current and buildout demand projections for the Utility including its four customer cities. Analyzed each pressure plane to determine future elevated storage tank and pump recommendations.

Large Diameter Water Assessment Program, Arlington Water Utilities, TX. Project Manager. Scoped and managed five large 24-inch to 54-inch large diameter water main inspections utilizing acoustic, electromagnetic, and CCTV inspection data. Inspection platforms utilized include robotic, tethered, and free-swimming tools. Coordinated in-house and third-party staff to facilitate main shutdowns, access point installation, temporary service, and disinfection procedures. Coordinated inspection day field support.

Reactive Maintenance Scheduling Program, Arlington Water Utilities, TX. Project Developer. Led discussions between multiple parties to determine the methodology to best automate reactive event follow-up

maintenance. Developed a program that linked inputs from multiple sources and generated task tables based on the agreed upon criterion. Managed the team that used the CMMS systems API to schedule nightly follow-up tasks from the task lists.

Dead-end Water Main Flushing Analysis, Arlington Water Utilities, TX. Project Manager. Developed a program that accepts GIS exports and scans the water system for dead-end mains which have a TCEQ flushing requirement. Developed a program to scan each branch of each dead-end main group to determine the time for each branch's volume to be used by the attached customers during non-irrigating winter months. Recommended which dead-end mains should be placed on an automated flushing schedule. Developed a program to determine larger areas with a single point of failure. Made recommendations on which of these areas need flushing and proposed several projects to increase redundancy.

Pipeline Asset Management Software Implementation, Arlington Water Utilities, TX. Project Manager. Managed the custom implementation of sanitary sewer pipeline inspection software. Worked with the software vendor to write a process to upload data from a specialized camera not currently accepted by the current software sweet. Developed python functions used by the third-party software to convert inspection media to the necessary formats. Using backend access to the third party's AWS SQL server, developed custom data cleaning and analysis scripts. Developed functions to automatically apply a custom scoring algorithm to CCTV inspection data. Engineered data pipelines between this software and the asset management data warehouse so that the third-party cloud-based interface can be used as an asset management interface.

Manhole Corrosion Protection Assessment, Arlington Water Utilities, TX. Project Manager. Defined the scope of, and managed the manhole corrosion study in partnership with the University of Texas at Arlington (UTA). Developed several initial hypotheses for which sewer main configurations are likely to produce the most H₂S related corrosion on manhole structures. Helped to develop the testing procedures, and trained university personnel in the implementation of the tests. Managed the Utility's operations and UTA staff during the testing phase of the project. Provided quality control for the project's final report. Verified the validity and real world usefulness of the machine learning model provided by UTA that predicts H₂S corrosion rates based on sewer main configuration at manholes.

Development of AWU's Preventative Maintenance Cleaning Program, Arlington Water Utilities, TX. Project Developer. Developed a program that combines inputs from the SSO database and CMMS system to determine the reactive event frequencies of each branch of sanitary sewer main. Designed the program to holistically scan all mains within a defined distance upstream and downstream to customize preventative cleaning for a given area. Developed the program to consider the recommended frequency over prior years to stabilize the frequency recommendation. Designed scheduling functionality that coordinates preventative cleanings of mains with different frequencies such that cleanings are generally grouped in a similar area at the same time to increase operational efficiency. Developed the process to schedule these preventative cleanings in the CMMS system.

Susan Schlangen PE

LIFT STATION ANALYSIS

Susan Schlangen is a professional engineer with 10 years of civil and environmental engineering experience focused on wastewater and collection system planning and design. She has evaluated sanitary pump stations, performed alternatives analysis, and designed upgrades and rehabilitations of existing facilities for clients in Oregon and California. Susan also brings significant regulatory compliance and permitting experience, having performed analysis and implementation of regulatory programs in over 25 states, including Oregon.

REPRESENTATIVE PROJECTS

Pump Station System Plan, Bureau of Environmental Services, Portland, OR.

Project Engineer. Developed a condition-based rehabilitation prioritization program for Bureau of Environmental Services pumping stations. Desktop evaluations using existing data from the Computerized Maintenance Management System (CMMS), GIS databases, and other sources prioritized pumping stations for detailed field assessments based on risk. Digital forms utilized to collect field data and establish condition and performance ratings for individual pump station components. Developed an aggregate risk cost for each station based on remaining useful life calculations, and time-based consequences of failure. Results were summarized in standard operating procedures that will be used by City staff for future assessments, along with a georeferenced database for visually accessing system connectivity and component data. Short- and long-term funding and staffing recommendations provided for the program.

Pump Station Decommissioning Design, City of Bend, OR. *Project Engineer.* Evaluated 10 lift stations for decommissioning for the City of Bend. Phase 1 involved preparing a detailed design to abandon the four most problematic stations operating beyond useful life. Phase 2 consisted of preparing business cases for the remaining pump stations to determine a cost-effective solution and the design and construction to decommission 3 pump stations in addition to Phase 1 sites. Phases 1 & 2 were constructed in 2019-2020, while Phase 3 (currently in design phase) will abandon 3 additional pump stations. The project is tracking on schedule

and under budget, and WSC has incorporated City preferences to promote ease of sewer maintenance.

SE 101st Avenue Pump Station Improvements, City of Portland BES, OR. *Deputy Project Manager/Civil Engineer.*

Evaluation of alternatives and design of pump station upgrades for SE101st Pump Station, a City sewage pump station serving Southeast Portland. Critical improvements include conversion to a submersible pumping station, construction of a valve vault with flow meter, site drainage and stormwater improvements, evaluation and modification of a retaining wall, and evaluation of additional property acquisition to expand the site footprint. Located adjacent to Kelly Butte Park, the site requires complex land use permitting processes and is subject to environmental zoning. Susan is leading the development of site layout alternatives, storm water management and design, and other civil components as well as supporting additional project elements as a deputy project manager.

Inverness Pump Station Integrated Facility Plan, City of Portland BES, OR. *Project Engineer.*

WSC participated in the first Integrated Planning approach developed for a BES pump station site and lead the development of a Risk Management Plan to identify and recommend strategies for maintaining operations during planning, design, and construction of site improvements. Inverness is one of the most complex and crucial pump station sites owned and operated by BES. As project engineer, Susan helped lead development of the decision-making framework used to recommend risk management strategies. She conducted site walks and observed operations, interviewed PUMA staff, performed desktop analysis, and supported team workshops to define the risk management



EDUCATION

M.Eng., Environmental Engineering,
Portland State University,
Portland, OR

BS, Civil Engineering, University of
Minnesota, Minneapolis, MN

PROFESSIONAL REGISTRATIONS

Professional Engineer - Civil,
Oregon, No. 93692

Professional Engineer - Civil,
Washington, No. 56785

“Clean water is essential to life and provides a sense of place and identity to our communities, and I am proud to play a part in protecting this vital resource.”

Susan Schlangen

Susan Schlangen ^{PE} continued...

strategies. A series of evaluations including risk quantification, planning level cost estimates, benefit/cost analysis, level of confidence were used to select and prioritize recommendations.

Elk Rock Pump Station Improvements, City of Portland BES, OR.

Civil Design Lead. Leading development of civil site design, stormwater design, and storage facility alternatives for the Elk Rock Pump Station. The station is capacity limited, requiring analysis of future flows, available storage, and alternatives for improving active and emergency storage. It is located on a significantly constrained site with a small footprint and requiring a complex and robust land use permitting effort. To balance complicated requirements with future pump station needs, Susan provided decision-making frameworks and recommendations to guide internal BES stakeholders toward preferred solutions.

Wastewater Treatment Plant and Field Station Condition Assessment, South Tahoe Public Utilities District, CA. Project Engineer. Evaluating critical electrical, structural, and piping assets at the District's wastewater treatment plant and pump stations. The project includes asset prioritization, development of condition assessment budgets for each asset, replacement cost analysis, and rankings for assets. To meet the District's goals, final deliverables include an asset roadmap that provides clear guidance and prioritization for future actions by the District. This includes actively engaging District staff, leveraging institutional system knowledge, and Business Case Screenings (BCSs) to provide an early look at asset values and assessment priorities.

Lift Station No 5 Design, Cayucos Sanitary District, CA. Engineering Support. Provided hydraulic calculations and prepared drawings and specifications for the Cayucos Sanitary District pump station. Analyzed how to convey wastewater most efficiently from an existing lift station to the new plant site and then from the new plant site to a rehabilitated outfall formerly operated by Chevron.

King City Reuse Pump Station Feasibility Study, Clean Water Services, Hillsboro, OR. Project Manager. Susan is managing the development of a feasibility study for expanding recycled water distribution from the Durham WWTP. Initial steps are to identify and characterize the potential demand for recycled water within King City and portions of the City of Tigard. Conceptual alternatives for recycled water infrastructure will be evaluated against benefits for CWS, including the ability to meet thermal loading limits on the Tualatin River, to determine feasible and preferred projects. The team will also identify and evaluate models for cost sharing and recycled water revenue.

Cayucos Sustainable Water Project Construction Services, Cayucos Sanitary District, CA. QA/QC. Provided QC support for the construction of Lift Station No 5. Reviewed pump curves, pump selection and valve vault laydown.

Auburn Ravine Force Main Analysis and Design, Placer County, CA. Engineering Support. Developed, evaluated, and recommended a preferred replacement alternative for 6,300-LF of 12-inch asbestos cement force main. The project included developing cost estimates and feasibility assessments of three bypassing scenarios. Currently supporting the full design of the project.

Toro Creek Bridge Replacement Pipeline Improvements, Cayucos Sanitary District, CA. Engineering Support. Prepared carrier system loading calculations, technical specifications, cost estimates, and permitting documents for a phased design accommodating a California state highway bridge replacement for the Cayucos Sanitary District, which currently supports a sanitary force main crossing. Supported the team in coordinating design approval from Caltrans and is coordinating final design reviews prior to bidding and construction. The project includes multiple design packages that will implement transition from a dual force main system to a single plant effluent pipeline in coordination with ongoing sanitary system projects; installation of a temporary utility bridge to provide a bypass during bridge construction; permanent pipeline and carrier system; and implementation of corrosion control measures.

Center Street Facility Upgrade Concept Study, Tualatin Valley Water District, Beaverton, OR. Project Engineer. Evaluated hydraulic performance, facility condition, and seismic resiliency of an important flow and pressure control facility within the Tualatin Valley Water District, impacted by the Willamette Water Supply Project. On-site inspection, desktop review of existing equipment, and hydraulic model evaluation provided analysis and recommendations discussed with the client through a collaborative workshop. Performed review of existing documentation including record drawings, Willamette Water Supply flow and pressure projections, and historical reports in consultation with equipment vendors to develop recommendations for future facility operations.

Cascade Groundwater Development Package 9 Project, Cascade Groundwater Alliance: City of Gresham and Rockwood Water People's Utility District (RWPUD), Gresham, OR. Project Manager. WSC is working in partnership with the Cascade Groundwater Alliance, made up of the City of Gresham (Gresham) and Rockwood Public Utility District (RWPUD), to lead the design of four water main packages as part of the Cascade Groundwater Development Project. The project will enable Gresham and RWPUD to develop an independent source of water supply and end their current wholesale water purchase contracts by 2026. Package 9 includes the design and construction of over 4,000 feet of distribution infrastructure to serve the South Shore area with groundwater supply.

Cascade Groundwater Development Program Package 6, Cascade Groundwater Alliance: City of Gresham and Rockwood Water People's Utility District (RWPUD), Gresham, OR. Pipeline Design Lead. The project will allow the City and RWPUD to supply their own water and end the wholesale contracts with the Portland Water Bureau (PWB) by 2026. Package 6 consists of the design of an 18-inch diameter raw water transmission pipeline that will deliver untreated groundwater to the RWPUD headquarters. The water main runs through several large roadways and will connect to a groundwater production well in Kirk Park. The project is schedule driven and requires thoughtful coordination and sequencing with surveying, traffic control, and utilities protection.

David Williams PACP

PROFESSIONAL EXPERIENCE

David is an assistant engineer with experience supporting water, wastewater, and reuse projects throughout California. David brings an interest in hydraulics, hydrology, and stormwater control measures. David started with WSC as an engineering intern but joined the team full time as an engineering assistant supporting projects in Central California. Prior to joining WSC, David worked in residential construction and building and grounds maintenance. He credits this background with his strong respect for constructability and maintainability, something which informs his current work.

REPRESENTATIVE PROJECTS

Desal Link CCTV Review, Santa Barbara, CA. Engineering Support. Performed CCTV review on behalf of the City for sewer mains, sewer laterals, and storm drains that the 24" Desal Link pipeline crosses or runs parallel to. Work consisted of reviewing pre-construction CCTV for the sewer mains, laterals, and storm drains to document the existing condition of the assets and performing post-construction CCTV review of the same assets to document if any damage occurred as a result of the pipeline installation. Technical memos were prepared to document shortcomings in the CCTV data submittals and to document any areas with damage warranting repairs.

Sewer Trunkline Replacement Design, Cayucos Sanitary District, Cayucos, CA. Project Engineer. Providing engineering design services to replace two feedlines serving Lift Station 5 with approximately 2,000 LF of 36-inch diameter sewer trunkline, adding equalization volume and reducing inflow and infiltration issues. Tasks include preparing design drawings, applying for a CalTrans encroachment permit, and utility research.

Central Coast Blue, Northern Cities Management Area, Pismo Beach, CA. Engineering Support. WSC is providing Program Management, Preliminary Design, Funding, and Environmental Document Support services for the Indirect Potable Reuse project, Central Coast Blue, that will recover secondary effluent from the City of Pismo Beach and the South San Luis Obispo County Sanitation District's wastewater treatment plants, a resource currently discharged to the Pacific Ocean. The advanced treatment facility will use microfiltration

or ultrafiltration, reverse osmosis, and ultraviolet radiation and advanced oxidation process before being injected into the Santa Maria Groundwater Basin to supplement groundwater supplies and protect the basin from seawater intrusion.

Carpinteria Advanced Purification Project Grant Funding, Carpinteria Valley Water District, CA. Engineering Support. The project entails purification of up to 1.0 MGD of secondary wastewater effluent via advanced treatment (MF/RO/AOP), conveyance to injection wells, and injection for groundwater replenishment in compliance with California DDW and RWQCB regulations. Supported programmatic efforts, including the Title 16 Feasibility Study approved by USBR, successful SRF application, and stakeholder outreach. The program management is ongoing.

Drought Relief Project, Baron Canyon Mutual Water Company (BCMWC), San Luis Obispo, CA. Engineering Support. Supported efforts with BCMWC to identify and develop project elements to provide immediate drought relief infrastructure improvements for a small community with 30 residential connections. Supported the writing of the funding application for the Department of Water Resources (DWR) Small Community Drought Relief Program which was successful in being awarded \$1,986,000 in grant funds. Supported efforts to finalize a grant agreement with DWR and advance efforts to equip well and connect them to the existing water supply; replace a 64,200 water storage tank with a new larger tank; installation of a ground mount solar system and battery backup system; and installation of smart meters.



EDUCATION

BS, Civil Engineering, California Polytechnic State University

PROFESSIONAL REGISTRATIONS

PACP Certified No. P0041682-032023

“I take pride in supporting projects that provide optimal solutions for WSC's clients and partners.”

David Williams