

City of Sandy
City Council Meeting
*Wastewater Discharge
Alternatives Study*

murraysmith



April 5, 2021

AGENDA



1. PURPOSE & BACKGROUND

PURPOSE

- ▶ Report key findings from studies
- ▶ Provide recommendations for next steps



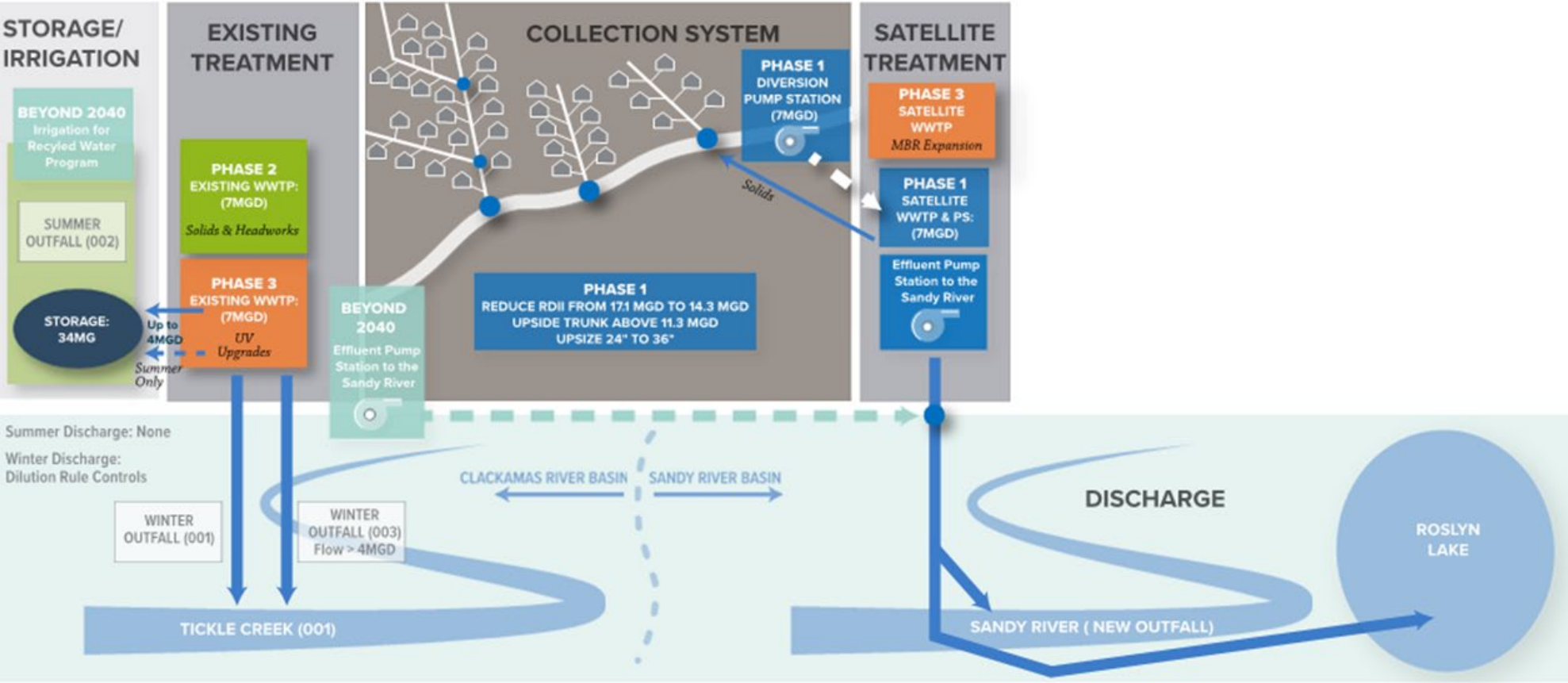
KEY ISSUES

- ▶ High Inflow and Infiltration in the City's sanitary sewer collection system
- ▶ Existing Wastewater Treatment Plant (WWTP) has limited capacity and is located on a constrained site
- ▶ Limited discharge capacity in Tickle Creek
- ▶ City now under Mutual Agreement and Order (MAO) from DEQ

OVERVIEW OF EXISTING SYSTEM



OVERVIEW OF APPROACH



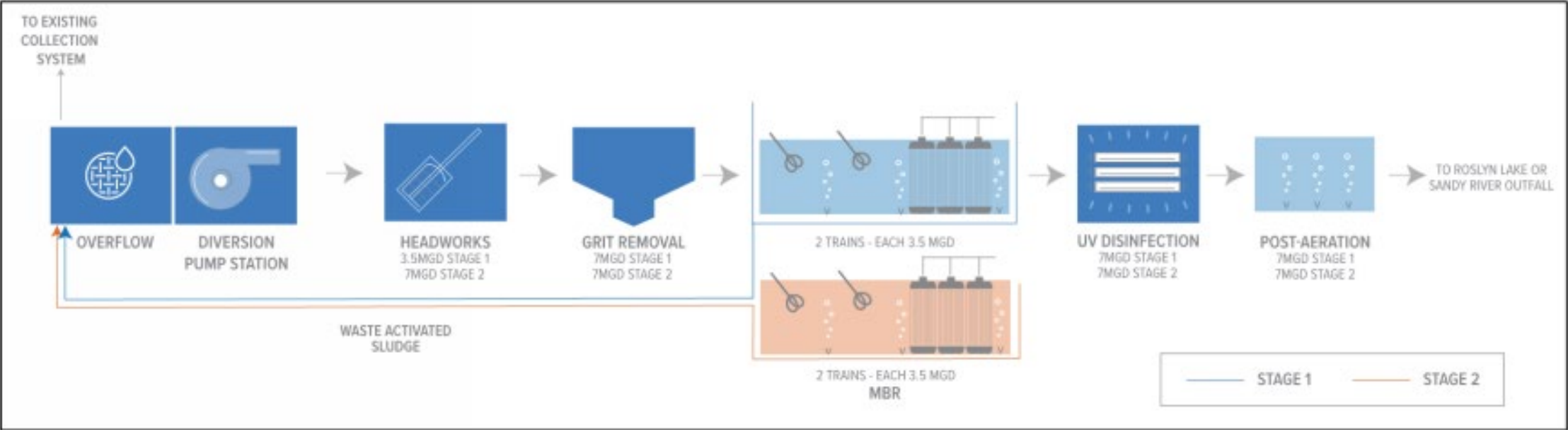
2. FINDINGS

Treatment Facilities

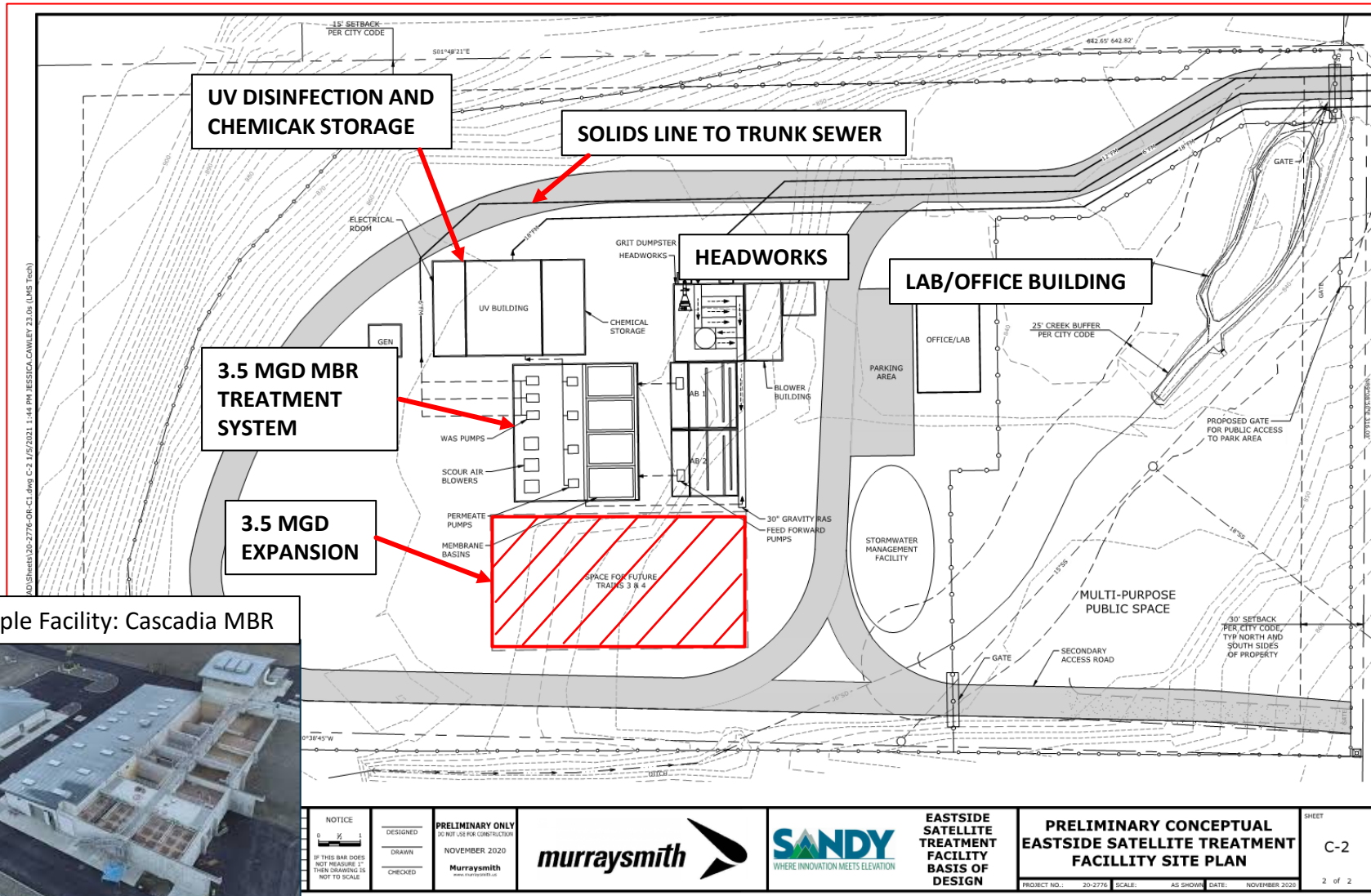


**EASTSIDE SATELLITE
TREATMENT FACILITY**

EASTSIDE SATELLITE TREATMENT FACILITY PROCESS



EASTSIDE SATELLITE TREATMENT FACILITY LAYOUT



Projected Design Flows

Phase	ADWF	Peak Flow
1	0.46 MGD	3.5 MGD
3	0.93 MGD	7.0 MGD

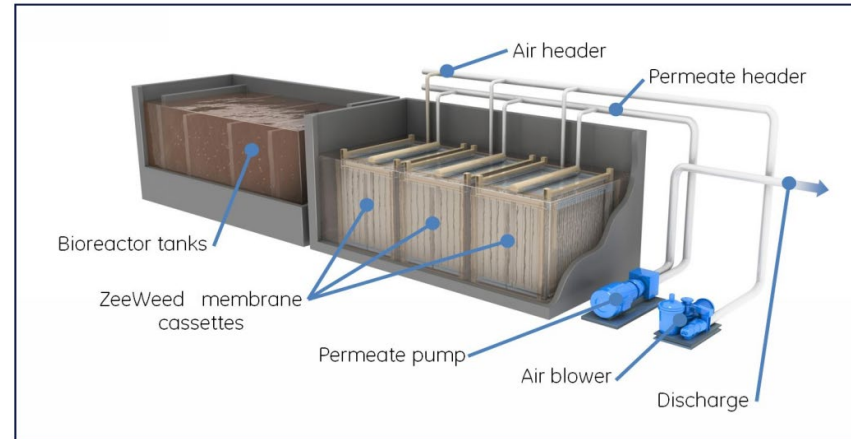
Example Facility: Cascadia MBR



<p>NOTICE</p> <p>IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.</p>	<p>DESIGNED</p> <p>DRAWN</p> <p>CHECKED</p>	<p>PRELIMINARY ONLY</p> <p>DO NOT USE FOR CONSTRUCTION</p> <p>NOVEMBER 2020</p> <p>Murraysmith</p>		<p>WHERE INNOVATION MEETS ELEVATION</p>	<p>EASTSIDE SATELLITE TREATMENT FACILITY BASIS OF DESIGN</p>	<p>PRELIMINARY CONCEPTUAL EASTSIDE SATELLITE TREATMENT FACILITY SITE PLAN</p> <p>PROJECT NO.: 20-2776 SCALE: AS SHOWN DATE: NOVEMBER 2020</p>	<p>SHEET</p> <p>C-2</p> <p>2 of 2</p>
	<p>20-2776-06-C1.dwg C-2 11/5/2021 1:44 PM JESSICA LAWLEY 23.0k (LMS Tech)</p>						

ESTIMATED HIGH QUALITY MBR EFFLUENT

Membrane bioreactors (MBR) produce consistent, high quality finished water



Estimated MBR effluent quality:

BOD ₅ :	< 5 mg/L
TSS:	< 1 mg/L
Total Nitrogen:	< 14 mg/L
Turbidity:	< 0.2 NTU
Total Coliform	typ. non-detect

SANDY RIVER OUTFALL SITING STUDY

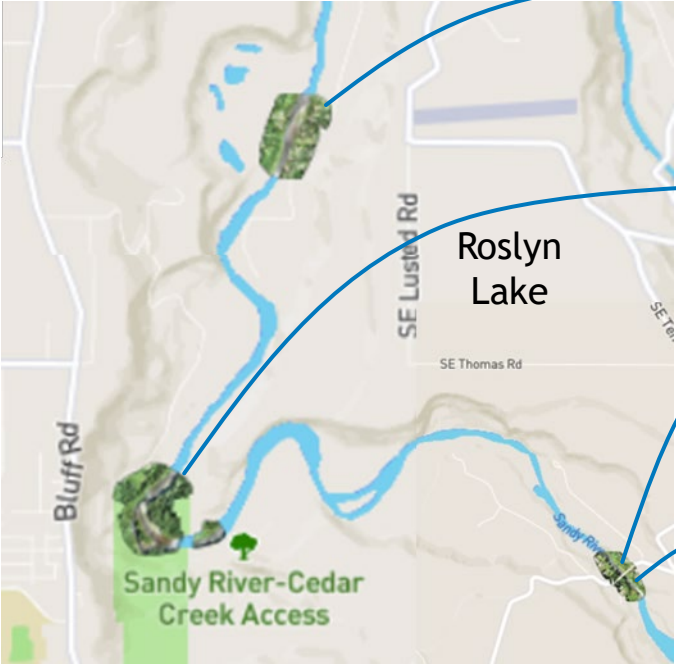


OUTFALL LOCATIONS



PIPELINE ALIGNMENTS

PLANNING LEVEL SITE REVIEWS



Site west of Roslyn Lake and in the PGE easement appears to have geomorphic instability

Oxbow site has geomorphic instability

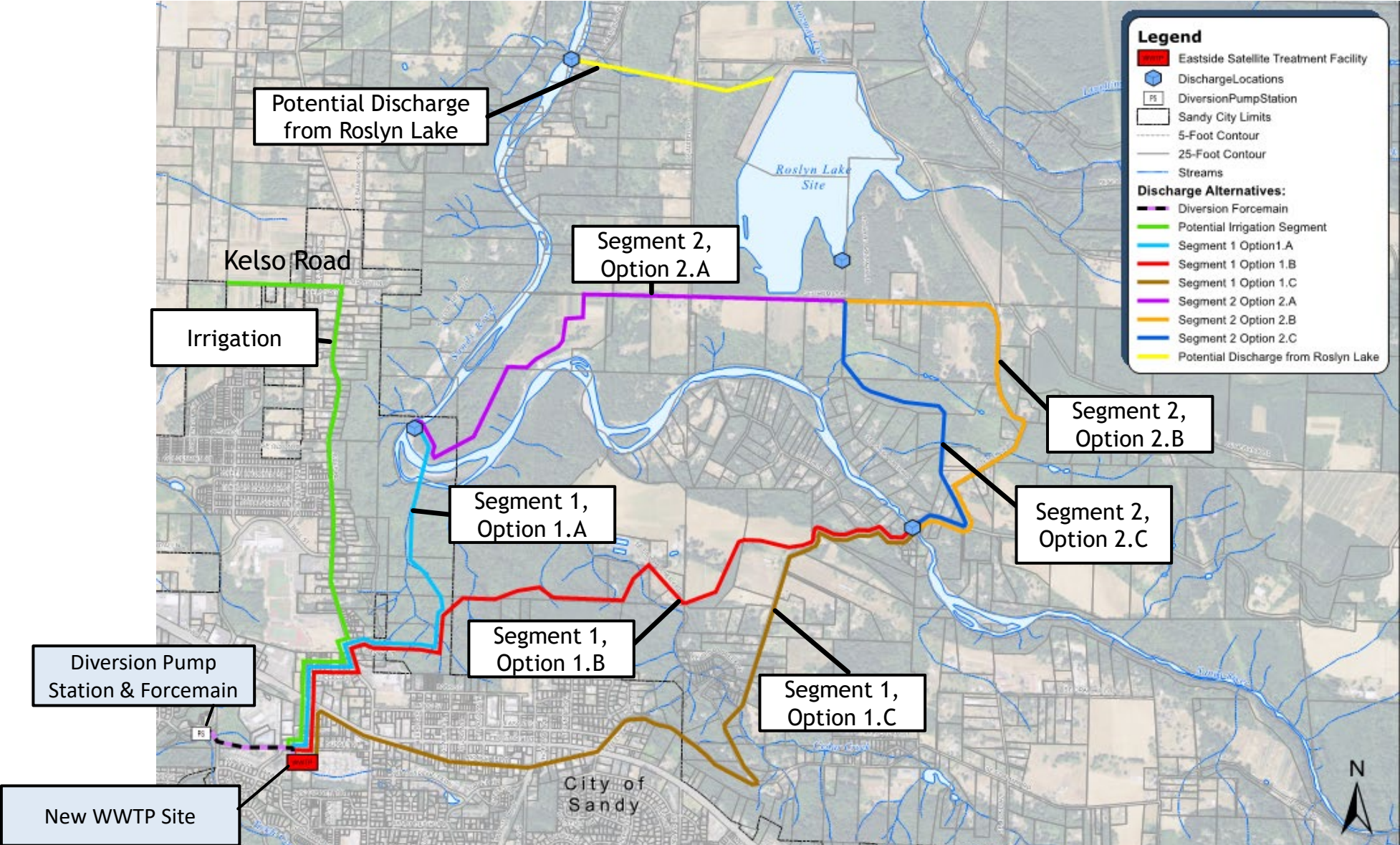
Revenue Bridge site has geomorphic stability and good mixing characteristics

Revenue Bridge site has fewer fishery and recreation concerns

REVENUE BRIDGE POTENTIAL OUTFALL LOCATION



PIPE ROUTING AND POTENTIAL OUTFALL LOCATIONS

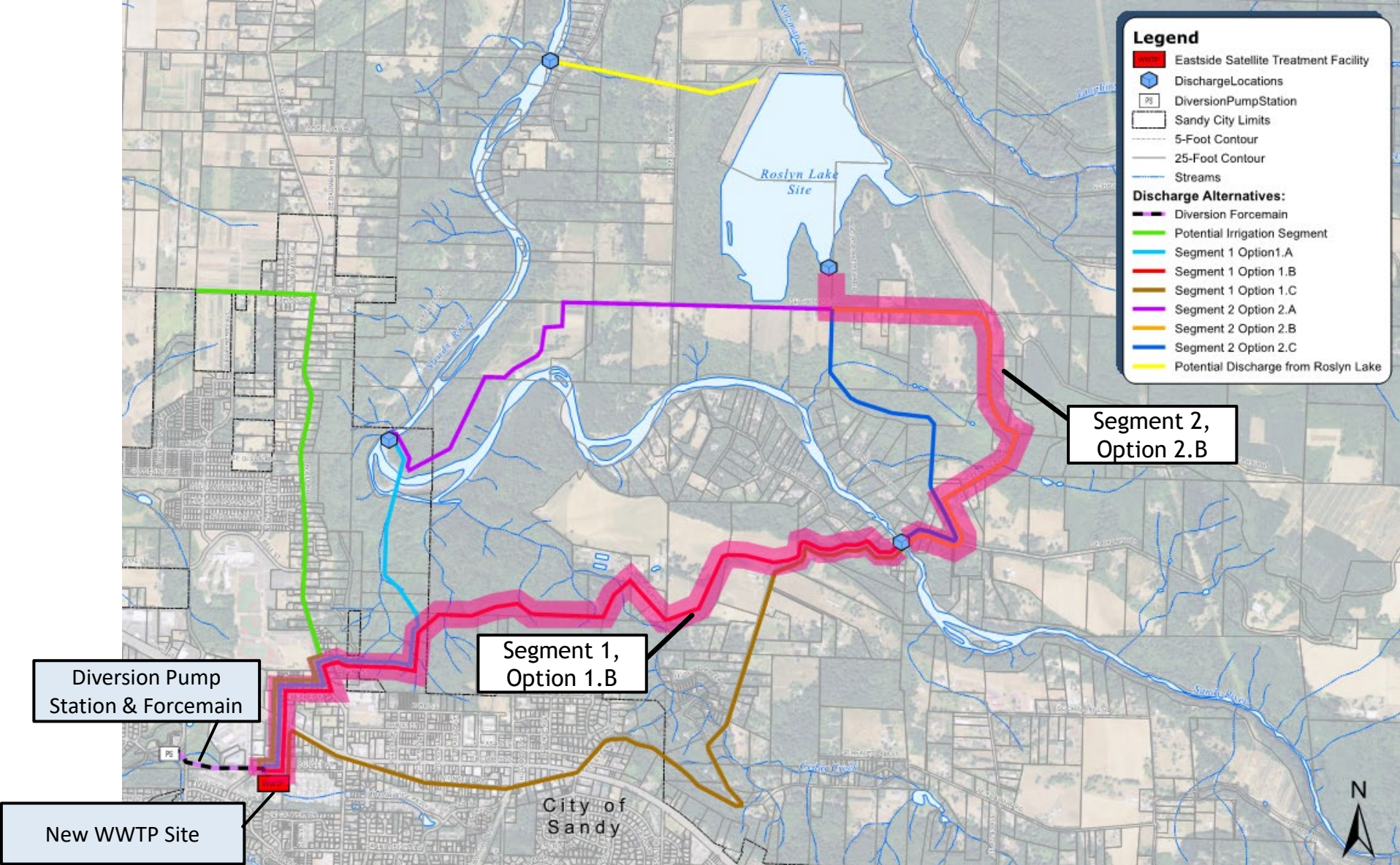


*Note:
 Segment 1 = Discharge to Sandy River
 Segment 2 = Discharge from Sandy River to Roslyn Lake

PIPE ROUTE SELECTION CRITERIA

Cost	Environmental Effects	Impacts to the Public	Required Agency Coordination and Permitting
Constructability	Seismic/Landslide Considerations	Property Acquisition and Easement Needs	Land Use
Opportunities for Hydro Power	Opportunities for Additional Uses of Effluent	Proximity to Selected Discharge Location	Environmental Permitting

RECOMMENDED PIPE ROUTE



*Note:
 Segment 1 = Discharge to Sandy River
 Segment 2 = Discharge from Sandy River to Roslyn Lake

COST ESTIMATE EVALUATION

Pipe Route	Estimated Cost
Segment 1 (Discharge to Sandy River)	
Segment 1, Option 1.A	\$15.6M
Segment 1, Option 1.B	\$7.8M
Segment 1, Option 1.C	\$9.0M
Segment 2 (From Sandy River to Roslyn)	
Segment 2, Option 2.A	\$6.0M
Segment 2, Option 2.B	\$3.9M
Segment 2, Option 2.C	\$13.0M
Additional Alternatives	
WES/(Clackamas County)	\$64.4M
Gresham	\$74.2M
Irrigation - Kelso Road	\$7.6M

LAND APPLICATION OPPORTUNITIES



WETLAND CREATION

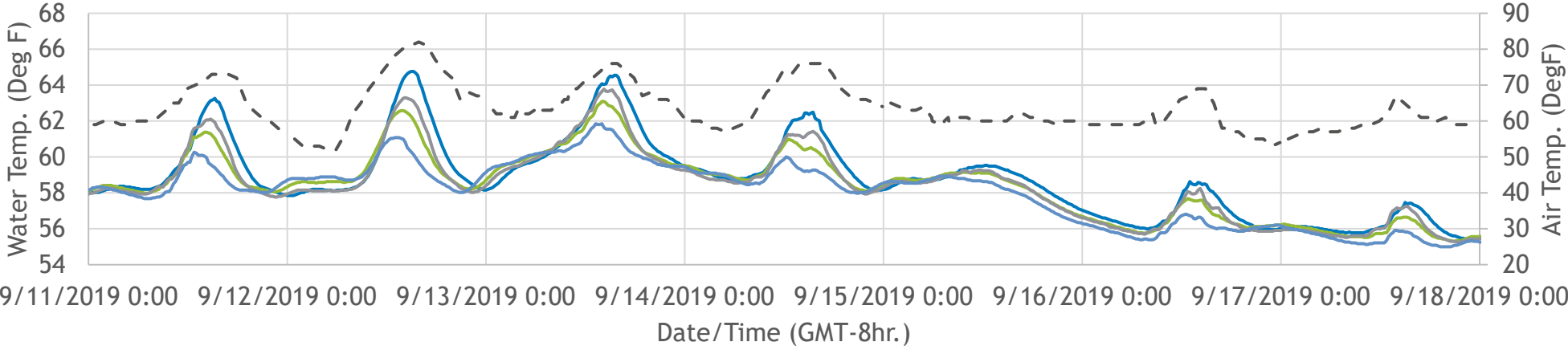


IRRIGATION
OPPORTUNITIES

PRELIMINARY ANTIDEGRADATION RESULTS

- ▶ Discharge to the Sandy River is predicted to be limited due to temperature.
- ▶ Important to maximize land application during the summer months

RIVER TEMPERATURES



— DS Site 13221 Marsh Rd. — Downstream Cedar Creek — Upstream Cedar Creek — Upstream Site - - - Air Temp.

ROSLYN LAKE EXISTING WETLAND

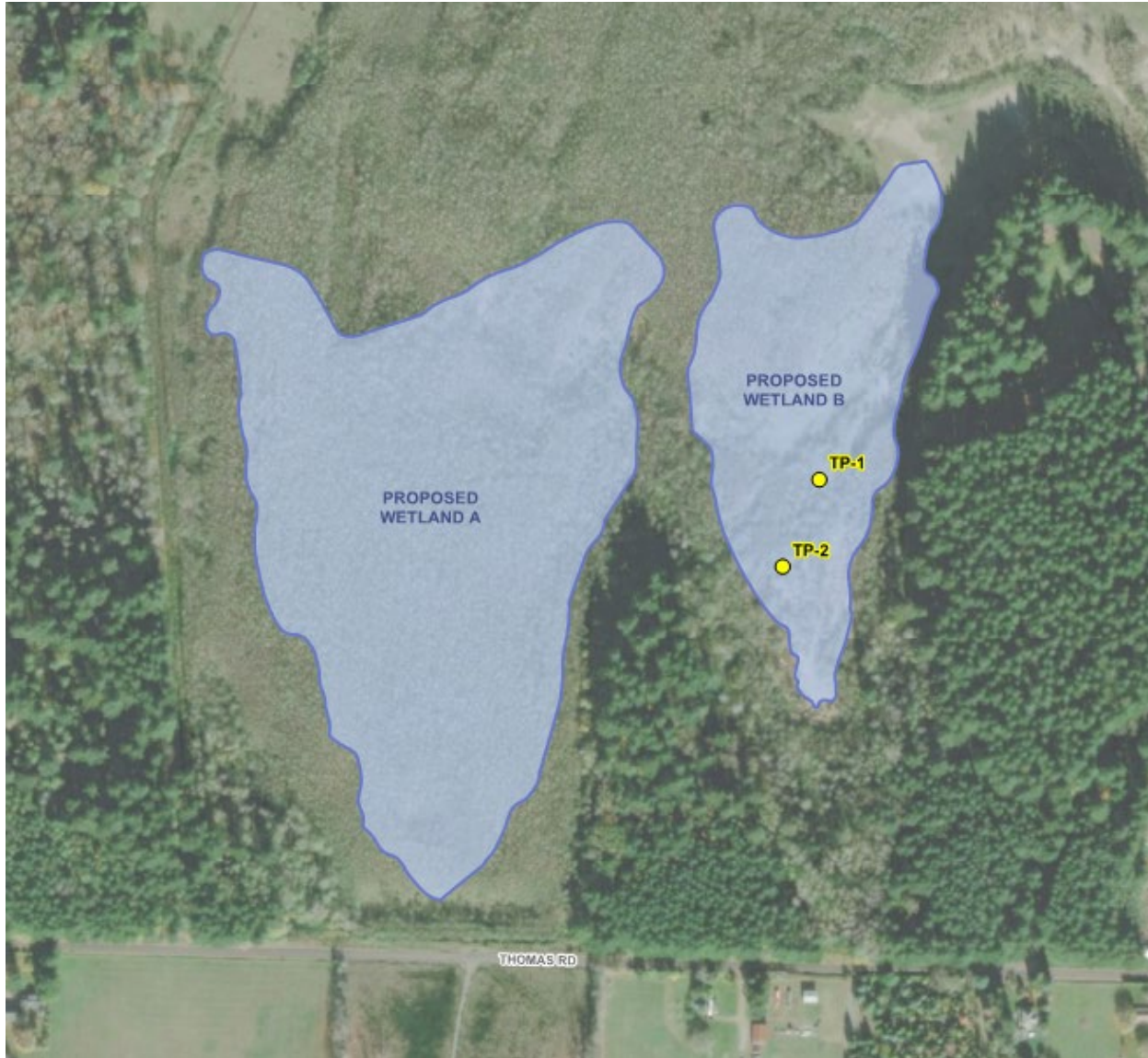
- ▶ TRACKERS EARTH
 - ▶ Environmental education
 - ▶ Conservation
 - ▶ Habitat restoration and stewardship
 - ▶ Ecological diversity



ROSLYN LAKE INFILTRATION STUDY

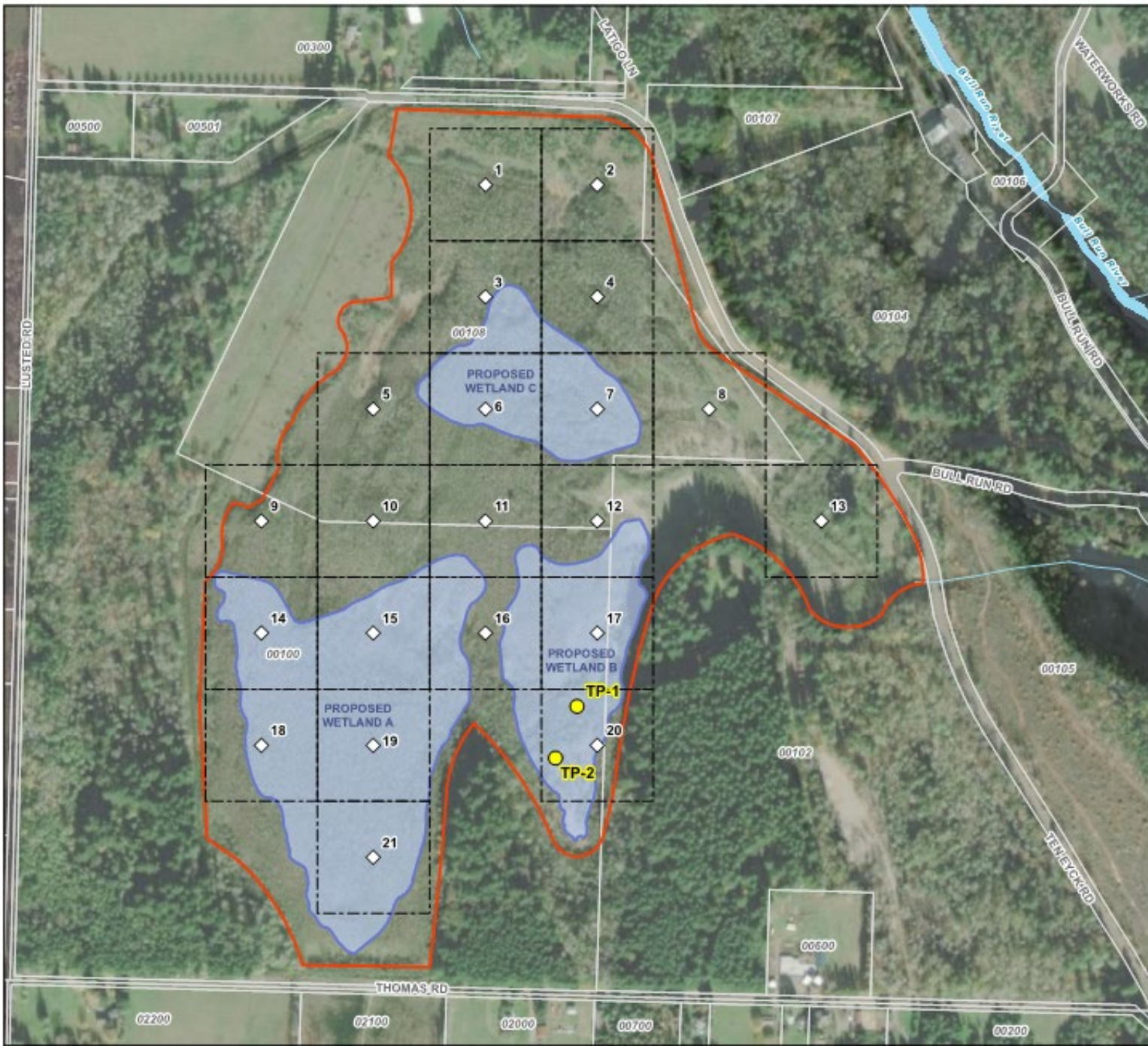


HYDRAULIC CONDUCTIVITY



- ▶ TP1: 432.7 in/hr
- ▶ Poorly Graded Sand (SP)

- ▶ TP2: 31.6 in/hr
- ▶ Sandy Silt (ML)



Proposed Boring Locations Subsurface Soil Investigation

LEGEND

- ◇ Proposed Boring Location
- Sampling Grid
- ▭ Sample Area
- Test Pit
- ☁ Proposed Wetland
- ▭ Tax Lot
- ~ Watercourse

LOCATOR MAP



KEY FINDINGS: ROSLYN LAKE

- ▶ Summer/fall flows from MBR could be used to create/enhance wetlands in Roslyn Lake area
- ▶ Roslyn Lake area soils require further investigation
- ▶ Roslyn Lake area has existing wetlands that need to be delineated
- ▶ Enhancement of existing wetlands may provide for mitigation credit for other project impacts

REUSE/IRRIGATION, HYPORHEIC DISCHARGE, AND POWER GENERATION

- ▶ Reuse/irrigation market is limited
- ▶ Hyporheic Discharge Along the Sandy River – Challenges with geomorphic stability and meeting temperature restrictions
- ▶ Hydropower generation may be feasible but requires further review



3. SUMMARY AND RECOMMENDATIONS

COST ESTIMATE

Wastewater System Improvement	Estimated Cost
Satellite Treatment Facility and Pump Station	\$28.5M
Pipeline	\$12M
Sandy River Outfall	\$0.6M
Roslyn Lake Constructed Wetlands	\$5M
Sub-Total	\$46.1M
Existing WWTP Improvements	\$5.5M
Existing Collection System Rehab	\$7M
Sub-Total	\$12.5M
Grand Total	\$58.6M

SUMMARY AND RECOMMENDATIONS

SUMMARY

- ▶ DETAILED DISCHARGE ALTERNATIVES EVALUATION GOALS
 - ▶ FURTHER ASSESS DISCHARGE ALTERNATIVES
 - ▶ IRRIGATION
 - ▶ LAND APPLICATION
 - ▶ WES/GRESHAM
 - ▶ PIPE ROUTING
 - ▶ MBR/PS BASIS OF DESIGN
 - ▶ DEVELOP PRELIMINARY CONCEPTS

NEXT STEPS

- ▶ ADDITIONAL INVESTIGATIONS AT ROSLYN LAKE SITE
- ▶ CONFIRM PIPE ROUTING CONCEPTS
- ▶ CONFIRM MBR SITING AND LAYOUT OUT CONCEPTS
- ▶ ENVIRONMENTAL AND CONSTRUCTION PERMITTING
- ▶ PRELIMINARY AND FINAL DESIGNS
- ▶ CONSTRUCTION

Questions



CITY OF SANDY

Detailed Discharge Alternatives Evaluation Final Report

March 2021

Detailed Discharge Alternatives Evaluation Final Report

City of Sandy

March 2021

DRAFT

Murraysmith

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Suite 1170
Portland, OR 97204

Executive Summary

Introduction

The City of Sandy (City) Detailed Discharge Alternatives Evaluation (DDAE) Study provides an evaluation of discharge alternatives building on the adopted Recommended Plan contained in the City's Wastewater System Facilities Plan (WSFP) dated January 2019 and adopted by the Sandy City Council in October 2019. In addition to rehabilitation of the City's sewer collection system and upgrades at the City's existing Wastewater Treatment Plant (WWTP), the WSFP Recommended Plan includes the construction of the Eastside Membrane Bioreactor Satellite Treatment Facility (Eastside MBR Facility) and diversion pump station along with a new year-round Sandy River Outfall.

Summary of the Scope

The goal of the DDAES is to identify and evaluate discharge options in lieu of or in combination with a direct year-round discharge to the Sandy as proposed in the WSFP Recommended Plan.

This document is associated with Task 9.1 of the project scope of work, which involves consolidating the information, including evaluations, findings, and recommendations from each of the memoranda into a single report identified in the scope-of-work. This memorandum is divided into sections based on the technical memoranda provided under the scope of work followed by summary conclusions for the DDAE.

Analysis Summary

TM-3: Alternative Wastewater System Connection

Technical Memorandum 3 (TM-3) contains a summary of information regarding pumping raw wastewater from the City to either the Clackamas County Water Environment Services (WES) Tri-City Water Pollution Control Plant (WPCP) or the City of Gresham WWTP (Gresham WWTP). Alignments, capital costs, and lifecycle costs for each option were developed. It was assumed that the cost was a planning estimate to be used solely for the purpose of a detailed discharge alternatives evaluation for the City.

The purpose of documenting these alternatives was to verify the results of previous planning efforts presented in the City's WSFP, prepared in 2018. In the WSFP, it was documented that the discharge alternatives to WES and Gresham represented greater costs than the alternatives outlined for a new discharge to the Sandy River, which totaled approximately \$60M. The evaluation relative to the WES and Gresham alternatives was completed at a planning level effort based several assumptions. The evaluation presented with the memorandum represents

additional details relative to pipe routing and pump stations, additional cost analysis and additional information provided through discussions with staff from WES and the Gresham WWTP. The estimated costs for the WES and Gresham alternatives were \$116M and \$130M, respectively.

The costs outlined within TM-3 are significantly higher than the Sandy River Discharge Alternative. Based on that, as well as the uncertainty associated with exporting flows and the associated, potentially higher operational costs, these alternatives are not recommended for this project.

TM-4: Basis of Design Report

The purpose of this technical memorandum is to summarize the activities of Task 3: Sandy Wastewater Treatment Facilities Basis of Design. Specifically, the report provides greater clarification of the design criteria for the existing City of Sandy WWTP (Sandy WWTP) and the Eastside MBR Facility, as recommended in the WSFP.

As part of the WSFP, the 20-year flow and load projections for the entire system were developed as shown on **Table ES-1** through **Table ES-3**.

A summary of the projected flows from 2017 to 2040 to the existing Sandy WWTP based on proposed staging of the Eastside MBR Facility is shown in **Table ES-4**, and the revised wastewater loads to the Sandy WWTP are show in **Table ES-5** and **Table ES-6**.

For the Eastside MBR Facility, a summary of the projected flows is shown in **Table ES-7**, and the projected wastewater loads are show in **Table ES-8** and **Table ES-9**.

Table ES-1 | Summary of Existing and Projected Flow

Flow	Existing Flow, MGD	2040 Flow, MGD
Annual Average Flow (AAF)	1.4	2.39
Average Dry Weather Flow (ADWF)	1.0	2.0
Average Wet Weather Flow (AWWF)	1.78	3.05
Maximum Month Dry Weather Flow (MMDWF)	1.5	2.4
Maximum Month Wet Weather Flow (MMWWF)	2.6	4.1
Peak Week Flow (PWF)	4.0	6.6
Peak Day Flow (PDF)	8.9	12.1
Peak Instantaneous Flow (PIF)	10.3	14.0

Table ES-2 | Current BOD₅ and TSS Loads

2017 Population	Parameter	Monthly Average			Maximum Month		
		Concentration (mg/L)	Load (ppd)	Load Factor (ppcd)	Concentration (mg/L)	Load (ppd)	Load Factor (ppcd)
Summer Season (May 1 through October 31)							
11,800	BOD ₅	286	2,500	0.209	455	3,600	0.305
11,800	TSS	280	2,400	0.201	456	3,500	0.294
Winter Season (November 1 through April 30)							
11,800	BOD ₅	192	2,400	0.203	297	3,500	0.294
11,800	TSS	190	2,400	0.202	342	3,900	0.333

Notes:

1. ppd= pounds per day
2. ppcd = pounds per capita per day

Table ES-3 | 2040 BOD₅ and TSS Loading Projections

2040 Population	Parameter	Monthly Average		Maximum Month	
		Load Factor (ppcd)	Load (ppd)	Load Factor (ppcd)	Load (ppd)
Summer Season (May 1 through October 31)					
22,400	BOD ₅	0.209	4,700	0.305	6,800
22,400	TSS	0.201	4,500	0.294	6,600
Winter Season (November 1 through April 30)					
22,400	BOD ₅	0.203	4,600	0.294	6,600
22,400	TSS	0.202	4,500	0.333	7,500

Notes:

1. ppd= pounds per day
2. ppcd = pounds per capita per day

Table ES-4 | Summary of Current and Projected Flow (MGD) to Existing Sandy WWTP

Flow Event	2017	2020	2025	2026 ¹	2030	2035	2036 ²	2040
AAF	1.4	1.45	1.53	0.93	1.14	1.35	0.76	1.20
ADWF	1.08	1.12	1.18	0.72	0.88	1.05	0.59	0.93
AWWF	1.78	1.85	1.95	1.19	1.45	1.73	0.97	1.53
MMDWF	1.41	1.46	1.54	0.94	1.15	1.37	0.77	1.21
MMWWF	2.66	2.76	2.91	1.8	2.17	2.58	1.44	2.27
PWF	5.01	5.19	5.48	3.34	4.08	4.85	2.71	4.28
PDF	5.87	6.08	6.42	3.91	4.77	5.68	3.18	5.02
PIF	9.05	9.38	9.9	6.40	7.73	9.13	5.63	7.00

Notes:

1. First stage of Eastside MBR Facility begins operation in 2026
2. Second stage of Eastside MBR Facility begins operation in 2036

Table ES-5 | Sandy WWTP Average Day BOD₅ and TSS Loading Projections

Year	Average Dry Weather			Average Wet Weather		
	Flow, MGD	BOD ₅ , ppd	TSS, ppd	Flow, MGD	BOD ₅ , ppd	TSS, ppd
2020	1.12	2,700	2,600	1.85	2,600	2,600
2025	1.18	3,100	3,000	1.95	3,000	3,000
2026 ¹	0.718	1,900	1,800	1.19	1,800	1,800
2030	0.878	2,300	2,200	1.45	2,300	2,200
2035	1.05	2,800	2,700	1.73	2,700	2,700
2036 ²	0.585	1,600	1,500	0.97	1,500	1,500
2040	0.925	2,300	2,200	1.53	2,300	2,300

Notes:

1. First stage of Eastside MBR Facility begins operation in 2026
2. Second stage of Eastside MBR Facility begins operation in 2036

Table ES-6 | Sandy WWTP Maximum Month BOD₅ and TSS Loading Projections

Year	Maximum Month Dry Weather			Maximum Month Wet Weather		
	Flow, MGD	BOD ₅ , ppd	TSS, ppd	Flow, MGD	BOD ₅ , ppd	TSS, ppd
2020	1.46	3,900	3,800	2.76	3,800	4,300
2025	1.54	4,500	4,300	2.91	4,300	4,900
2026 ¹	0.9375	2,700	2,600	1.78	2,700	3,000
2030	1.1475	3,400	3,300	2.17	3,300	3,700
2035	1.37	4,100	4,000	2.58	4,000	4,500
2036 ²	0.765	2,300	2,200	1.44	2,200	2,500
2040	1.205	3,400	3,300	2.27	3,300	3,700

Notes:

1. First stage of Eastside MBR Facility begins operation in 2026
2. Second stage of Eastside MBR Facility begins operation in 2036

Table ES-7 | Summary of Projected Flow for Eastside MBR Facility in MGD

Flow Event	2026 ¹	2030	2035	2036 ²	2040
AAF	0.60	0.60	0.60	1.20	1.20
ADWF	0.46	0.46	0.46	0.93	0.93
AWWF	0.76	0.76	0.76	1.53	1.53
MMDWF	0.60	0.60	0.60	1.21	1.21
MMWWF	1.14	1.14	1.14	2.27	2.27
PWF	2.14	2.14	2.14	4.28	4.28
PDF	2.51	2.51	2.51	5.02	5.02
PIF	3.50	3.50	3.50	7.00	7.00

Notes:

1. First stage of Eastside MBR Facility begins operation in 2026
2. Second stage of Eastside MBR Facility begins operation in 2036

Table ES-8 | Eastside MBR Facility Average Day BOD₅ and TSS Loading Projections

Year	Average Dry Weather			Average Wet Weather		
	Flow, MGD	BOD ₅ , ppd	TSS, ppd	Flow, MGD	BOD ₅ , ppd	TSS, ppd
2026	0.46	1,211	1,164	0.76	1,173	1,167
2040	0.93	2,337	2,248	1.53	2,270	2,259

Table ES-9 | Eastside MBR Facility Maximum Month BOD₅ and TSS Loading Projections

Year	Maximum Month Dry Weather			Maximum Month Wet Weather		
	Flow, MGD	BOD ₅ , ppd	TSS, ppd	Flow, MGD	BOD ₅ , ppd	TSS, ppd
2026	0.60	1,764	1,700	1.14	1,695	1,920
2040	1.21	3,411	3,288	2.27	3,288	3,724

The report further evaluated and determined that flows at the Diversion Pump Station were sufficient to consistently send the required flow to the Eastside MBR Facility.

The Biowin biological process model of the existing Sandy WWTP, developed as part of the WSFP, was evaluated at key points in the phased implementation plan outlined in the WSFP to confirm performance of the Sandy WWTP. The results of the biological process analysis showed that the planned improvements at the Sandy WWTP along with the staged construction of the Eastside MBR Facility will result in the facility meeting its permit through 2040, assuming all equipment operates as designed. The upcoming immediate needs improvements project will improve performance of key unit processes, including the aeration basins and the secondary clarifiers that had resulted in permit exceedances. In addition, increased capacity of the sodium hydroxide feed system was found to be key for meeting the ammonia permit limit. The phasing of the improvements to the Sandy WWTP outlined in Phase 2 of the WSFP should be implemented based on the observation of growth in the community that results in increased flow and load to the WWTP. A summary of the current and future design criteria for the Sandy WWTP can be found on Table 5-1 in TM-4.

As noted in the WSFP, the Eastside MBR Facility will be constructed under two stages. TM-4 provides a basis of design for the unit processes to be constructed including identifying design criteria and redundant equipment requirements. The Eastside MBR Facility will consist of headwork, membrane bioreactor, UV disinfection, and post-aeration. The headworks facility will consist of the three fine screens after Stage 2 construction, each with a rated capacity of 3.5 MGD with openings less than 2 mm. A single vortex grit removal system with a rated capacity of 7.0 MGD will be installed in Stage 1. The MBR will consist of a total of four trains; two trains will be installed during Stage 1 construction, and the remaining two trains will be installed under Stage 2. Four in-pipe UV disinfection systems will be installed to disinfect the secondary treated wastewater to discharge to the Sandy River or to meet either Class A Recycle Water standards for irrigation or discharge to Roslyn Lake. Finally, a post-aeration system will be installed to increase

the dissolved oxygen to 6 mg/L to meet the discharge effluent requirements that were identified in the preliminary anti-degradation analysis (TM-11). A summary of the design criteria can be found on Table 5-2 in TM-4. A preliminary layout of the Eastside MBR Facility is shown on **Figure ES-1**.

TM-5: Sandy River Temperature Evaluation

Technical Memorandum 5 (TM-5) is a deliverable under Task 4.2 of the DDAE program. This memo includes a review of potential impacts to temperature on the Sandy River due to effluent discharges from the proposed, new membrane bioreactor facility.

Part of the WSFP Continuing Planning Services project, TM-5 is an update to the memo prepared on May 22, 2019. This update provides the opportunity to review this topic with additional temperature data collected on the Sandy River, and updated estimates of river flows, effluent flows, and effluent temperatures.

The project team used new and updated data to review potential temperature impacts to the Sandy River from the proposed new Eastside MBR Facility. Results from this new review are consistent with those from 2019: the planned effluent discharge into the Sandy River will need thoughtful temperature design and management to meet regulatory temperature thresholds, especially as the community grows. Furthermore, this updated temperature review results in the following conclusions.

- Temperature will be one of the more challenging issues to address during the final design and National Pollutant Discharge Elimination System (NPDES) permitting process for the Eastside MBR Facility and Sandy River discharge.
- With population growth at the City and climate change, temperatures and heat load will increase, resulting in greater need for temperature management and likely more stringent regulatory controls.
- As summarized in TM-5, summer and fall discharges to the Sandy River (especially in the future) could result in violations of current regulatory temperature thresholds if temperature is not managed appropriately.
- The City will want to continue to work closely with the Oregon Department of Environmental Quality (DEQ) to better understand which regulatory thresholds will govern final design and permitting. There are currently several thresholds listed in the total maximum daily load (TMDL) study and in the Antidegradation Internal Management Direct (IMD).
- Likewise, the City will want to coordinate closely with DEQ on methodology for temperature reviews. For planning purposes, it was assumed that 1/4 of the Sandy 7Q10 River flows would mix with effluent (consistent with DEQ's point source temperature

reviews in the Sandy River TMDL). Other methodology could assume 100 percent of 7Q10 river flows for mixing and different temperature thresholds.

- Final NPDES permitting reviews of temperature will require outfall design, dilution modeling, and related mixing zone studies to better estimate mixing and dilution of effluent when it enters the Sandy River. The regulatory temperature thresholds would need to be met after the effluent mixes and travels to the defined regulatory mixing zone boundary.
- The DDAE planning study identified and recommended the Roslyn Lake site for discharging portions of the effluent (into constructed wetlands) during summer and fall periods to help eliminate/minimize temperature impacts to the Sandy River now and into the future.

TM-6: Sandy River Water Quality Sampling and Testing Program Summary

Technical Memorandum 6 (TM-6) contains a summary of 2019-2020 Sandy River water quality data collected in proximity to alternatives for the outfall location of the proposed Eastside MBR Facility. The City and DEQ hope to determine compliance with anti-degradation laws set forth in the Oregon Administrative Rules (OAR) regulated by the DEQ in the NPDES permitting process.

Murraysmith collected grab samples and Alexin Analytical Laboratories, Inc in Tigard, Oregon analyzed the samples in accordance with the Sampling and Testing Plan prepared August 7, 2019. Waterways Consulting, Inc installed temperature probes which recorded measurements on a 15-minute interval from July through October in 2019 and 2020. River discharge was estimated using instantaneous data from USGS Gages. TM-6 summarizes the findings for the following parameters: pH, bacteria, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Total Kjeldahl Nitrogen (TKN), ammonia, nitrate, nitrite, phosphorus, Total Organic Carbon (TOC), hardness, chromium, iron, temperature, and flow.

This ambient water quality data was used to inform design proposals such as outfall site selection as described in Technical Memorandum 7.1 (TM-7.1). The data will be used as the project moves forward to better understand the water quality characteristics of the Sandy River. In this memorandum, Murraysmith recommends continued water quality sampling on a quarterly basis to provide a robust dataset for these evaluations.

TM-7.1: Sandy River Outfall Siting Study

This technical memorandum is a summary of Task 5: The Sandy River Outfall Siting Study. The purpose of Task 5 is to review alternative discharge locations on the Sandy River for placing the outfall from the proposed Eastside MBR Facility.

The reviewers conducted desktop and field studies to evaluate key river characteristics that would make for a good outfall site including:

- River depth and velocity, to provide good water quality mixing conditions
- Channel geologic/geomorphic stability, so that the channel would not migrate away from the outfall over time
- Fish use for spawning/rearing/migration, to minimize fisheries impacts/concerns
- Distance from the new treatment plant, for pipe economy
- Outfall accessibility, for construction and operation and maintenance
- Related characteristics

Based on the results of Task 5 (The Sandy River Outfall Siting Study), the Ten Eyck Road and Revenue Bridge site is the recommended location for the new outfall. This site has several advantages over other alternatives.

- This river reach is dominated by bedrock, so the channel does not migrate in this area, providing for greater geomorphic stability and consistent outfall operating conditions.
- This reach of the river is deep and has reasonable velocity (providing greater dilution and dispersion) and good water quality mixing characteristics.
- The area has less public accessibility than river reaches near the park and less potential for vandalism (although that possibility needs to be considered during final design).
- This location is upstream from the Cedar Creek fish hatchery; therefore, there would be less potential for impacts to hatchery fish.
- This reach is used for anadromous fish migration, not spawning or rearing, so anadromous fish would just be passing through.
- This site seems to have the greatest agency support based on preliminary meetings.
- Revenue Bridge provides a good river crossing location for the effluent pipeline that would carry effluent to the Roslyn Lake area, where it could be reused for creating wetlands, as described in Technical Memorandum 9-10.

TM-7.2: Pipe Routing

Technical Memorandum 7.2 (TM-7.2) summarizes the evaluation and findings associated with routing the effluent pipeline from the proposed Eastside MBR Facility to potential discharge locations identified on the Sandy River, and a recommended pipeline route from the river up to Roslyn Lake. The memorandum includes a summary of route selection criteria and a summary of potential alternatives. The preliminary cost estimates presented in TM-7.2 are planning estimates

to be used solely for the purpose of a detailed discharge alternatives evaluation for the City. The memorandum also outlines, on a preliminary basis, pipeline routing considerations and conceptual design elements for the recommended route for the pipeline.

The purpose of the study is to determine a practical route for the effluent pipe relative to the selected outfall locations and assist with developing conceptual level costs estimates. The purpose of documenting the alternatives and the preferred route is to evaluate the feasibility of routing the pipeline along various alignments and identify the challenges and required engineering to develop a final pipeline route. Other key considerations to develop final alignment recommendations and final routing concepts include permitting, easement and property acquisition needs, geotechnical considerations, pipe material selection, detailed hydraulic analysis, and final designs associated with the effluent pipe. It is anticipated that these elements will be further evaluated in subsequent permitting and preliminary design phases of the project. An overview map of the pipeline routing alternatives is shown in **Figure ES-2**.

The team reviewed three options for routing the pipeline between the plant and the river (Segment 1) and three options between the river and the Roslyn Lake site (Segment 2). The alternatives were assessed relative to several criteria outlined above including construction at highway and bridge crossings, maintenance accessibility, system control, geological stability, opportunity projects, and the cost factors associated with each criterion. Based on the evaluation, the preferred route is Segment 1 Option 1.B and Segment 2 Option 2.B, as shown in **Figure ES-2**. This selected route extends through City right-of-way, through the City's Sandy River Park and across ODFW and private property to the Sandy River. Between the Sandy River and the Roslyn Lake site, it extends along County right-of-way. The estimated cost for this proposed pipeline is approximately \$12.8 M.

Additional data collection and analysis is recommended to verify the concepts presented in TM-7.2. Further evaluations should include geotechnical investigations, outreach to private property owners regarding easements, discussions with ODFW, ODOT, and the County to confirm routing, opportunity projects, and permit requirements.

TM-8 Water Recycling Market Assessment

Technical Memorandum 8 (TM-8) contains a summary of information collected during the Water Recycling Program Customer Outreach study as part of the City's Detail Discharge Alternatives Evaluation. The initial Water Recycling Program Customer Outreach conducted by Barney & Worth, Inc. (B&W) evaluated several sites to determine if a property or properties near the City or along the proposed effluent pipe route had the irrigation demands to take all or most of the effluent from the City's proposed Eastside MBR Facility. The goal was to find an irrigator or irrigators which could take effluent during the summer and shoulder seasons (late spring and early fall) to help minimize the flows to the Sandy River during these times of year. TM-8 provides an analysis which evaluates the options for providing recycled water to potential customers including the pumping requirements, pipeline alignments, and capital and lifecycle costs. Eight options were

initially considered relative to large irrigators and five options are considered for small use irrigators.

The purpose of TM-8 is to document the evaluation of potential options and opportunities to expand the City's successful water recycling program based on effluent from the Eastside MBR Facility.

Based on the analysis of cost and potential discharge rates, the large-scale irrigator sites did not show real market demand for the recycled water and required larger capital investments because of the longer pipeline lengths required between the main effluent piping routed to the Sandy River and the potential irrigation sites. The small-scale irrigator sites showed greater current irrigation utilization rates and required a much smaller capital investment due to the shorter pipeline lengths from the preferred pipeline alignments.

It is recommended to pursue a recycled water program for irrigators close to the preferred pipeline alignment. In TM-8, Murraysmith recommends the City establish a fair basis to extend recycled water to interested users based on the length of pipe required for service and the total supply of recycled water requested. Some of these potential users of the recycled water will require little capital investment to connect to the main pipeline and will benefit from the availability of recycled water. Additionally, irrigation use of the recycled water will help reduce discharges to the Sandy River during the critical dry months of the year.

TM-9 & 10 Indirect Discharge and Roslyn Lake Alternatives Site Review

This technical memorandum summarizes Task 7 of the Detailed Discharge Alternatives Evaluation: Indirect Discharge and Roslyn Lake Alternatives. The regulations surrounding indirect discharge (Technical Memorandum 9) and site reviews and analysis of indirect discharge (Technical Memorandum 10) are related. Thus, both aspects are summarized in this one document, Technical Memorandum 9 and 10 (TM-9 & 10).

Based on this review, it is anticipated that DEQ will regulate the proposed discharge to the Sandy River and the Roslyn Lake constructed wetlands through a single NDPES permit. DEQ currently regulates the City's discharge to Tickle Creek and the container nursery that way. It is not clear if DEQ will modify the existing Tickle Creek permit by adding the Sandy River and Roslyn Lake discharges, or if they will issue a new permit for the Sandy River and Roslyn Lake discharges.

The City has the opportunity to construct wetlands to beneficially recycle/reuse the high-quality effluent from the proposed Eastside MBR Facility. The Roslyn Lake site seems well suited for this approach and Trackers Earth (the property owner) is interested in partnering with the City on this type of a project. The project team will need to conduct further reviews of soils/infiltration and of existing wetlands and waterways on the Roslyn Lake property as the project moves into final design to better understand associated opportunities and constraints.

Based on these planning level reviews, the City would need to construct approximately 30 to 60 acres of wetlands and the construction cost would be approximately \$3 million to \$6 million dollars. See **Figures ES-3** and **ES-4** for a plan and profile view of the proposed wetlands concept.

TM-11 Anti-degradation Report

Technical Memorandum 11 (TM-11) describes the proposed Eastside MBR Facility and the proposed discharge into the Sandy River. The discharge into the Sandy River would constitute a new, permitted effluent discharge. Therefore, the proposed project is subject to a water quality antidegradation review (OAR-340-041-0026). Furthermore, since the proposed discharge would be to a water quality limited waterbody, the antidegradation review would follow the approach outlined for these waterbodies in the IMD for antidegradation reviews (ODEQ, 2001).

The purpose of TM-11 is to describe the proposed project and summarize the antidegradation review and findings. The following conclusions are based on the results of that review.

- The new Eastside MBR Facility would discharge into the Sandy River using a new pipeline and outfall. The final pipe alignment and outfall location are currently being determined.
- The Eastside MBR Facility would generate high-quality effluent using modern technology.
- The project engineers have evaluated the potential impacts from the proposed discharge using DEQ's methodology for evaluating discharges into the Sandy River from the Sandy River Basin TMDL (assuming 25 percent of the 7Q10 river flows mix with effluent).
- The antidegradation thresholds under review include: (1) no greater than 0.25 °F temperature increase, and (2) no greater than 0.1 mg/L decrease in dissolved oxygen, after mixing at the end of an assumed mixing zone.
- With estimated effluent flows from the Eastside MBR Facility for existing (2020) conditions, the discharge would not exceed the antidegradation thresholds for temperature or dissolved oxygen.
- With estimated flows from the Eastside MBR Facility for future (2040) conditions (as the community grows), the discharge would start to exceed the antidegradation thresholds for temperature and dissolved oxygen during the summer and fall months.
- The City proposes a temperature management plan where they would land apply a portion of the high-quality effluent during summer and fall to prevent possible thermal impacts to the river.
- The exact months and amount of effluent to be land applied will be determined during final design and through the NPDES permitting process.
- To prevent possible impacts to dissolved oxygen, the City proposes a DO management plan where they would land apply a portion of the effluent during the summer and fall, and also oxygenate the effluent as needed.

- The exact months and amount of effluent to be land applied will be determined during final design and through the NPDES permitting process.
- The review of other water quality parameters will occur, as needed, during the NPDES permitting process once a new outfall location has been identified and when mixing zone boundaries and estimated dilution are better known.
- Other environmental reviews for the project under local, state, and federal regulations will progress as the project moves from the planning to design phases.

DDAE Program Summary

The City is a growing community and has an aging existing WWTP and collection system. Based on growth and deterioration of the existing sanitary sewer system, the City's existing WWTP does not have adequate capacity to continue to serve the City. To address capacity issues in the system, the recent WSFP and continuing analysis associated with this plan recommend a new satellite treatment facility and a new year-round outfall to the Sandy River.

The City's DDAE Study provides an evaluation of discharge alternatives to the Sandy River for the proposed Eastside MBR Facility. It also included reviewing alternatives to the discharge to the Sandy River including irrigation potential and the potential to conveying raw sewage to WES and the City of Gresham WWTP which were found to be less cost effective.

The DDAE included development of concepts for the diversion pump station and the Eastside MBR Facility, furthering concepts for effluent pipeline routing and development of concepts for improvements at the Roslyn Lake site.

Based on analyses in the DDAES, it was found that, as the community grows, discharges to the Sandy River will start to exceed the temperature impacts threshold during the summer months. To address this, the DDAE assessed concepts for discharging to Roslyn Lake and reviewed these with the property owner of the former lake. The concepts involve constructed wetlands sized to accept the flows without discharge to downstream water bodies. The DDAE also reviewed 3 alternatives for effluent pipeline routing. The selected route extends through City right-of-way, through the City's Sandy River Park and across ODFW and private property to the Sandy River. Between the Sandy River and the Roslyn Lake site, it extends along County right-of-way.

The goal of the DDAE Study was to build on previous planning work to select an outfall location, assess the feasibility of discharging to the Sandy River relative to temperature and other impacts and evaluate the feasibility of discharging to the former Roslyn Lake site if there were limitations identified relative to discharges to the River. Following preliminary concept development and analyses, the City and the engineering team met with regulatory agencies to review the feasibility relative to the agencies perspective and identify potential issues relative to permitting. The agencies were in favor of the proposed outfall location and leveraging the Roslyn Lake site to minimize temperature impacts to the River. The team also reviewed the feasibility of discharging to the Roslyn Lake site with the property owner. There were several site visits and meetings with the property owner to outline preliminary concepts. The concepts of constructed wetlands and trail

system were acceptable to the property owner. Additionally, the feasibility of routing the effluent pipeline through ODFW property and private properties was assessed. Based on discussions with ODFW and property owners, the proposed route appears to be feasible on a preliminary basis.

The DDAE Study evaluated alternatives and assessed the feasibility of preliminary concepts relative to the satellite facility, the outfall location and pipeline routing. The City has a program that includes acquiring permits, developing final design and eventually construction of the wastewater system improvements. The next steps following the DDAE Study include further assessments and analysis to further establish concepts outlined in the DDAE Study. These include further investigations at the Roslyn Lake site, the satellite facility, and diversion pump station sites and additional assessment of the pipeline routing to confirm routing and property owners' willingness to provide easements. There is significant permitting work to be completed prior to final designs including acquiring an NPDES permit for the outfall, permitting associated with the Roslyn Lake site and permits associated with the effluent pipeline.



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