City of Wasilla Wastewater Treatment Plant

Wetland Discharge Pilot Study

Prepared for:
City of Wasilla
290 E. Herning Avenue
Wasilla, AK 99654

Prepared by:
Stantec Consulting Services Inc.
725 East Fireweed Lane, Suite 200
Anchorage, AK 99503-2245

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Project No.: 204700415

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Acronyms and Abbreviations

ADEC	Alaska Department of Environmental Conservation
BOD_5	5-day biochemical oxygen demand
City	City of Wasilla
deg C	degrees Celsius
DO	dissolved oxygen
FC	fecal coliform bacteria
Feasibility Study	*Wastewater Outfall Feasibility Study*
fpd	feet per day
gpd	gallons per day
L	liter
LF	linear feet
LOQ	limit of quantitation
mg/L	milligrams per liter
MW	monitoring well
PVC	polyvinyl chloride
QAP	Laboratory Quality Assurance Plan
QC	quality control
S&W	Shannon and Wilson, Inc.
Stantec	Stantec Consulting Services Inc.
TKN	Total Kjeldahl Nitrogen
TSS	total suspended solids
WWTP	wastewater treatment plant

1.0 INTRODUCTION

The treatment and disposal capacity of the City of Wasilla (City) wastewater treatment plant (WWTP) is functionally limited by the capacity of the existing percolation beds. At flows greater than approximately 300,000 gallons per day (gpd), the beds flood and effluent leaks from the slope face surrounding the WWTP. In addition, the nitrate levels in the aquifer beneath the WWTP exceed permitted values at the compliance monitoring wells (MW), with nitrate above the 10 milligrams per liter (mg/l) limit. From 2013 to 2017, actual flows have an annual average of 341,129 to 352,705 gallons per day, and nitrate levels of up to 58.9 mg/l (2013 at MW#7) have been recorded. The WWTP is over capacity and out of permit compliance

Among other improvements, the City Wastewater Outfall Feasibility Study (*Feasibility Study*) is to examine development of wetlands treatment for wastewater effluent on the existing property and a 77-acre parcel adjacent to the existing WWTP that is owned by the City. The need for field verification of the proposed disposal concepts has been identified as part of the *Feasibility Study* effort. This *Wetland Discharge Pilot Study (Pilot Study)* outlines the approach and procedures for gathering this information. The goal of the Pilot Study is to confirm if the wetland can treat the WWTP effluent to compliant levels of nitrates and fecal coliforms. Background data will be collected to have a clear metric for comparison once effluent is discharged onto the site.

1.1 STUDY GOALS

The *Feasibility Study* has identified the natural wetlands adjacent to the WWTP as potentially feasible for wastewater disposal. Modeling of the wetlands using the SubWet 2.0 model and other empirical design guides suggest the wetlands will effectively treat the WWTP effluent for nitrates. The Pilot Study will confirm the feasibility and provide data needed to determine the ultimate treatment and disposal capacity of the site, as well as facilitate permitting efforts.

The goals of the Pilot Study are twofold:

1. Establish baseline data.
2. Determine nitrate treatment potential of wetland.

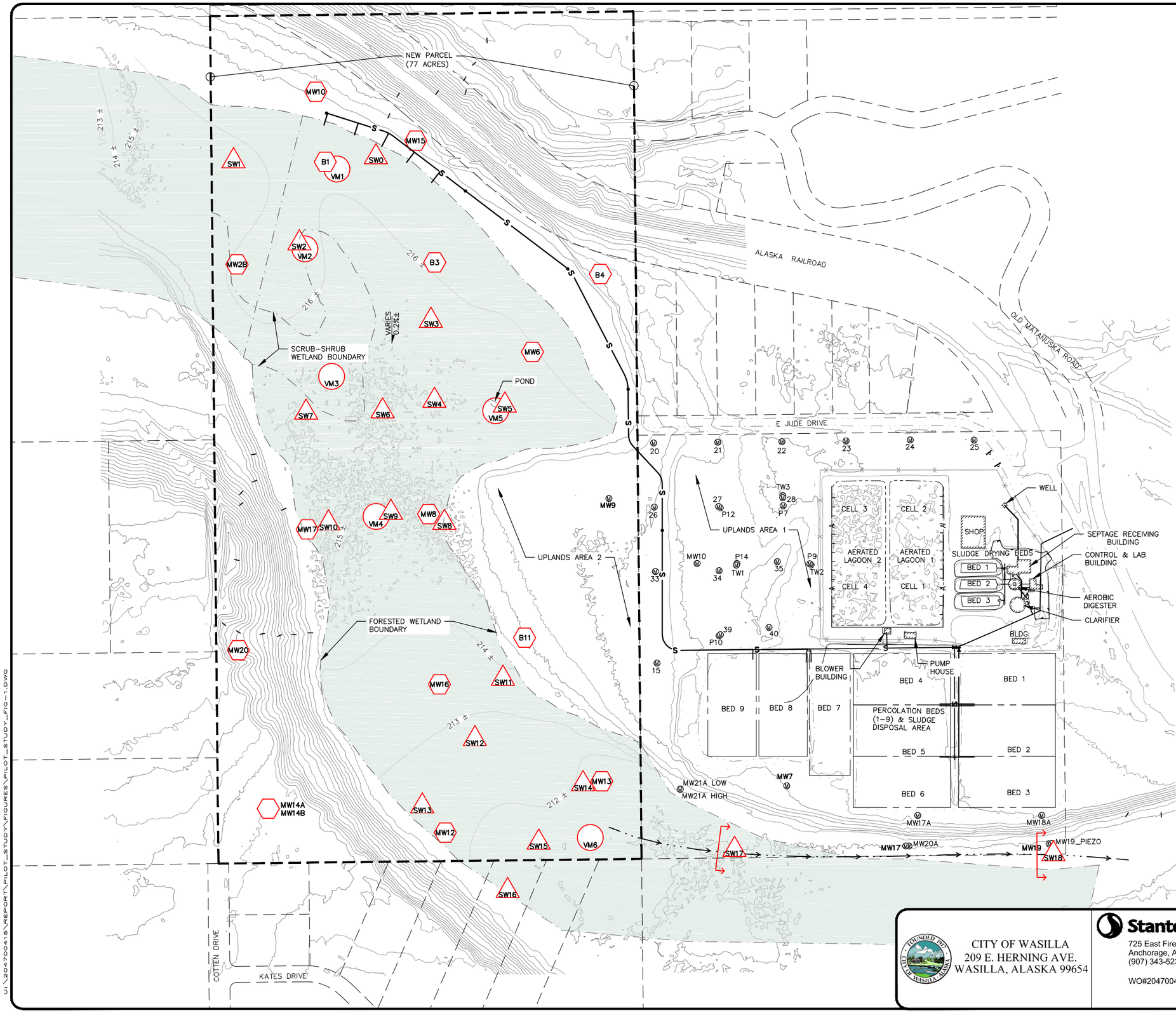
Ultimately the Pilot Study is to support decision making related to use of the wetland for effluent disposal.

1.2 STUDY IMPLEMENTATION

The general tasks and schedule for implementation of the pilot study are shown in Table 1. Background data collection started in July 2017 with monthly surface water sampling and quarterly subsurface water sampling. Subsurface sites were limited to the eight sites available from previous exploration until March 2018 when additional wells were installed. Vegetation plots were established in July and August 2017. Construction of the effluent discharge piping and access road is scheduled for summer 2018 allowing for application of wastewater to the wetland shortly afterwards.

Table 1: Pilot Study Implementation Tasks

Task	Timeframe
Develop project plan and obtain ADEC approval to proceed	February 2016 (initial meeting)
Gather baseline/background data	Monthly starting July 2017 until wastewater application
Install additional subsurface wells	Wells MW2B, MW10, MW12, MW13, MW15, MW16, MW17, MW20 installed March 2018
Construct pipe and discharge piping	June – July 2018
Apply wastewater and gather data	July 2018 to December 2019
Lab analysis	Immediately following each sampling event
Data compilation and review	Immediately following receipt of lab analysis reports
SubWet 2.0 Wetland Model calibration	In conjunction with data compilation and review
Study result reporting	Immediately following study conclusion (approximately February 2020)



LEGEND

- APPROXIMATE STREAM CHANNEL
- PARCEL BOUNDARY
- WETLANDS
- SW5 — SURFACE WATER SAMPLING SITE
- MW6 B5 — SUBSURFACE WATER SAMPLING SITE
- VM5 — VEGETATION MONITORING SITE
- STREAM GAGING STATION

NOTES:

1. CONTOURS SHOWN ARE PRIMARILY BASED ON 2001 MSB LIDAR DATA WITH SUPPLEMENTAL SURVEY DATA. CONTOURS WITHIN WETLANDS HAVE BEEN ESTIMATED
2. SURFACE WATER, SUBSURFACE WATER, AND VEGETATION SAMPLING LOCATIONS WERE COLLECTED WITH A HANDHELD GPS.

N

0 75 150 300 450 600
GRAPHIC SCALE

U:\204700415\REPORT\PILOT_STUDY\FIGURES\PILOT_STUDY_FIG-1.DWG

CITY OF WASILLA
209 E. HERNING AVE.
WASILLA, ALASKA 99654

Stantec
725 East Fireweed Lane, Suite 200
Anchorage, Alaska 99503
(907) 343-5237
WO#204700415
www.STANTEC.com

CITY OF WASILLA
WASTEWATER OUTFALL PILOT STUDY

SAMPLING SITES

DATE 04/20/18

FIGURE 1

1.3 SAMPLING SITES

To evaluate treatment effectiveness and the health of vegetation in the wetland a network of sampling sites and subsurface wells has been identified as shown on Figure 1. The parameters to be collected are discussed in Section 2.0.

While an overall spread of sites has been attempted, surface data collection has been focused on four cross sections across the wetland (upper, upper-middle, lower-middle, and lower) starting at the pond and working south. Subsurface investigations use borings where piezometers were placed and monitoring wells from previous investigations, as well as monitoring wells constructed specifically for this investigation, particularly along the west side and center of the wetland where access in 2016 prevented placements and at the north and west in the upland areas to determine impacts to the surrounding aquifer. Damaged and missing wells are scheduled to be addressed with new wells in March 2018. Figure 1 shows:

- Fifteen (15) subsurface sites: Named B1, B3, B4, B11, MW2B, MW6, MW8, MW10, MW12, MW13, MW14 A/B, MW15, MW16, MW17, and MW20. These sites use wells and piezometers constructed during earlier geotechnical investigations, as well as seven (7) monitoring wells constructed or replaced specifically for the pilot study effort.
- Nineteen (19) surface water sample sites: Named SW 0 to SW 18. These sites were established in July 2017, have been flagged and recorded via GIS.
- Six (6) vegetation monitoring sites: Named VM1 to VM6. These sites were established in July and August (VM3), have been flagged in the field and are recorded via GIS.
- Two (2) stream gaging stations: These are located with and named by surface water sampling sites SW17 and SW18. The sites were established in August 2017.

Figure 2: Stream Gaging Station at SW18

1.4 EFFLUENT APPLICATION

Once background data is collected and the road and pipe built, wastewater is to be applied at the north end of the wetland in the vicinity of SW0.

The discharge area has been signed to discourage public contact. Fencing is also being added to the east side of the wetland along the residential area at E. Jude Drive to discourage trespass. The pipe design is to be provided to the Alaska Department of Environmental Conservation (ADEC) for plan review.

Study data will be collected immediately before starting wastewater application for baseline purposes (vegetation, surface and subsurface as described in Section 2.0) with the first application data taken in the same month if necessary. Construction completion will determine timing.

The amount of flow discharged for the pilot study will depend on initial results. An initial flow of at least 100,000 gpd is planned, with volumes increased until the current daily plant flow of approximately 350,000 gpd is applied. The initial small volumes will be used to determine if there are any immediate issues, with the larger volume desirable and expected to more readily achieve steady state and show changes in the wetland. Studying at full flow will also minimize concerns about having to scale a lower flow and decrease the number of assumptions required in evaluation.

2.0 SAMPLING PARAMETERS

As discussed in the following sections, three types of data collection efforts will be conducted for the pilot study: surface conditions, subsurface conditions, and vegetation health. In addition, effluent parameters collected at the WWTP will be included in the analysis.

2.1 EFFLUENT SAMPLING PARAMETERS

The WWTP operators routinely take measurements and samples as part of WWTP operations and to document regulatory compliance. The parameters in Table 2 are currently collected and will be documented as a measure of the quality of flows to the wetland.

Table 2: Current WWTP Effluent Parameters

Description	Frequency
Flow to Beds (gpd)	Daily
pH	Mondays (at lagoon cells) Monthly at MW7, 17A, 18A Annual at MW19
Temperature (°C)	Daily at effluent manhole Monthly at MW7, 17A, 18A Annual at MW19
Dissolved oxygen (DO)	Mondays (at lagoon cells, use Cell #4 as measure of effluent)
5-day biochemical oxygen demand (BOD_5)	Monthly at effluent manhole
Total suspended solids (TSS)	Mondays at effluent manhole
Fecal coliform (FC) bacteria	Quarterly March, June, September, December) at MW7, 17A, 18A Annual at MW19
Conductivity	Monthly at MW7, 17A, 18A Annual at MW19
Nitrate-N	Monthly at MW7, 17A, 18A Annual at MW19

In addition to the parameters in Table 2 above, the parameters in Table 3 are to be collected at the effluent manhole to represent "end of pipe" values.

Table 3: Additional WWTP Effluent Parameters

Description	Frequency – All at Effluent Manhole
pH	Mondays
Dissolved oxygen (DO)	Mondays
Total suspended solids (TSS)	Mondays
E. Coli bacteria	Monthly
Fecal coliform (FC) bacteria	Monthly
Conductivity	Monthly
Nitrate-N	Monthly
Total Kjeldahl Nitrogen (TKN)	Monthly
Ammonia	Monthly
Nitrite	Monthly
Metals	Monthly Before and after discharge to wetland at MW7, 17A, 18A, and MW19

2.2 WETLAND SAMPLING – SUBSURFACE AND SURFACE

Wetland treatment is expected to occur in the vegetation layer with uptake of nitrogen, as well as denitrification in the anoxic soils. Loses may also occur via infiltration into the groundwater table at the site of application and along the path of surface flow. Two sets of measurements are therefore needed: surface and subsurface. A form for field data collection is provided in Appendix A. The site locations are shown on Figure 1. Sampling for each of these flows are discussed in the following sections.

2.2.1 Subsurface Sampling

Subsurface sampling will measure what is entering the groundwater as treated flow. Additional wells were established to quantity and gather data for groundwater contouring (e.g. determining flow direction). Shannon and Wilson, Inc. (S&W)[1] estimates that average groundwater velocities range from about 0.5 to 1 feet per day (fpd). This means that water entering the groundwater around SW0 will take 0.33 to 0.66 years to travel to MW15 (120 feet), or 5.7 to 11.4 years to MW13 or MW14 (2,075 feet). Accordingly, sampling wells located closer to the effluent release are to determine effects in a more reasonable period, while those on the perimeter are for establishing background and potentially determining regulatory compliance if application is continued.

[1] 2016, October. S&W. Revised Geotechnical Engineering and Hydrogeologic Assessment, Water Treatment Plant Improvements, Wasilla, Alaska.

Borings and other monitoring wells to be included in subsurface sampling are shown on Figure 1. The soil borings and wells MW6, MW8, and MW14 A/B were constructed in 2016 as part of the *Feasibility Study*. The borings were completed as 1-inch groundwater observation wells with slotted tips, backfilled only with auger cuttings. The sites noted as MWs were established as 2-inch groundwater observation wells where the bottom 10 feet of the well is a 0.010-inch slotted schedule 40 polyvinyl chloride (PVC) well screen. Sand was backfilled around approximately the bottom 12 feet of the casing with hydrated bentonite chips placed above the sand to ground surface. The well was developed with a surge block and submersible pump. The remaining wells were constructed in March 2018 as new 2-inch wells to either replace wells that were lost, damaged, or to establish new sites. These wells have 2-inch machine slotted monitoring well casing and a sand filter pack.

Table 4 lists the parameters sampled with quarterly subsurface sampling at the borings and monitoring wells noted on Figure 1.

Table 4: Quarterly Subsurface Sampling

(March, June, September, December)

Parameter	Analytical Method	Sample Container	Preservative	Holding Time	LOQ [1]
Temperature	Field Measurement	N/A	N/A	N/A	N/A
Conductivity	Field Measurement	N/A	N/A	N/A	N/A
pH	Field Measurement	N/A	N/A	N/A	N/A
Dissolved Oxygen	Field Measurement	N/A	N/A	N/A	N/A
FC bacteria	SM21 9222D	150 mL Sterile HDPE	Cool <4 deg C, do not freeze, Na_2SO_4 preservative	8 hours	1 colony / 100 mL
Nitrate NO_3-N	SM21 4500NO_3-F or EPA 300.0	125 mL polyethylene (1 bottle with Nitrite)	Cool <4 deg C, do not freeze, No preservative	48 hours	0.1 or 0.2 mg/L depending on method
Nitrite-N	SM21 4500NO_3-F or EPA 300.0	125 mL polyethylene (1 bottle with Nitrate)	Cool <4 deg C, do not freeze, No preservative	48 hours	0.1 or 0.2 mg/L depending on method
Ammonia (NH_3) – N	SM21 4500-NH3 G	250 mL polyethylene (1 bottle with TKN)	Cool <4 deg C, do not freeze Sulfuric acid H_2SO_4 to pH < 2	28 days	0.1 mg/L

Parameter	Analytical Method	Sample Container	Preservative	Holding Time	LOQ [1]
Total Kjeldahl Nitrogen	SM21 4500-N D	250 mL polyethylene (1 bottle with TKN)	Cool <4 deg C, do not freeze Sulfuric acid H_2SO_4 to pH < 2	28 days	1 mg/L
RCRA Metals +Cu/Zn [2]	SW6020A	250 mL polyethylene	Cool <4 deg C, do not freeze Nitric acid HNO_3 to pH<2	Hg – 28 days Others – 120 days	Varies, mg/L

Note:
1. Limit of quantitation (LOQ, reporting or practical quantitation limit) based on SGS Reporting Limits 1/19/2017).
2. RCRA metals to be tested twice before and after effluent application.

During subsurface sampling water elevation levels will also be collected.

2.2.2 Surface Sampling

In order to determine changing conditions within the vegetative mat related to the application of wastewater, the parameters noted in Table 5 will be collected at sites noted for surface collection. Surface samples will be taken within 5 feet of a stake marking the site by pressing a sample dipper into the saturated vegetation and transferring the water contents to appropriate sample containers. This will minimize disturbances while allowing collection of flow from within the vegetation. If difficulties are encountered with collection, shallow (approximately 2-foot) perforated pipes will be placed as a stilling well. Stilling wells will be purged before sample collection.

Table 5: Surface Sampling
(Monthly during discharge, approximately May to October)

Parameter	Analytical Method	Sample Container	Preservative	Holding Time	LOQ
Temperature	Field Measurement	N/A	N/A	N/A	N/A
pH	Field Measurement	N/A	N/A	N/A	N/A
DO	Field Measurement	N/A	N/A	N/A	N/A
BOD_5	SM21 5210B	1 L polyethylene	none	48 hours	2 mg/L
TSS	SM21 2540D	1 L polyethylene	none	7 days	1 mg/L

Parameter	Analytical Method	Sample Container	Preservative	Holding Time	LOQ
FC bacteria	SM21 9222D	150 mL Sterile HDPE	Cool <6 deg C, do not freeze Na_2SO_3 preservative	8 hours	1 colony / 100 mL
E. Coli Bacteria (Total Coliforms)	SM21 9223B	150 mL Sterile HDPE	Cool <6°C, do not freeze Na_2SO_3 preservative	30 hours	1 colony / 100 mL
Nitrate NO_3-N	SM21 4500NO_3-F or EPA 300.0	125 mL polyethylene (1 bottle with Nitrite)	Cool <6 deg C, do not freeze No preservative	48 hours	0.1 or 0.2 mg/L depending on method
Nitrite-N	SM21 4500NO_3-F or EPA 300.0	125 mL polyethylene (1 bottle with Nitrate)	Cool <6 deg C, do not freeze No preservative	48 hours	0.1 or 0.2 mg/L depending on method
Ammonia (NH_3) – N	SM21 4500-NH3 G	500 mL polyethylene (1 bottle with TKN & TP)	Cool <6 deg C, do not freeze Sulfuric acid H_2SO_4 to pH < 2	28 days	0.1 mg/L
Total Kjeldahl Nitrogen	SM21 4500-N D	500 mL polyethylene (1 bottle with Ammonia & TP)	Cool <4 deg C, do not freeze Sulfuric acid H_2SO_4 to pH < 2	28 days	1 mg/L
Total Phosphorus	SM21 4500P-B,E	500 mL polyethylene (1 bottle with Ammonia & TKN)	Cool <6 deg C, do not freeze Sulfuric acid H_2SO_4 to pH < 2	28 days	0.01 mg/L
RCRA Metals +Cu/Zn	SW6020A	250 mL polyethylene	Cool <4 deg C, do not freeze Nitric acid HNO_3 to pH<2	Hg – 28 days Others – 180 days	Varies, mg/L

Note:
Limit of quantitation (LOQ, reporting or practical quantitation limit) based on SGS Reporting Limits (1/19/2017).
Metals sampling is limited to sites MW14 A/B, MW15, MW16 and MW17 and is to be conducted twice a year.

2.3 VEGETATION HEALTH

Six locations have been selected to represent various plant communities and expected conditions within the wetland, as shown on Figure 1. The composition and health of vegetation at these sites will be assessed monthly during the growing season, both before, during, and after flows are applied. Conversion or alteration of vegetation may or may not occur depending on depth of flow and other factors; however, the Corps of Engineers will likely require and consider vegetation impact data as part of any future permitting (e.g. mitigation) for the project.

A data collection form for field data collection at these sites is provided in Appendix A. The site locations (VM1 - VM6) are shown on Figure 1.

The sites have been staked to allow for consistent data collection, with data collected for the area within a 15-foot radius of the stakes. Sites are located so that there is minimal disturbance to area vegetation (i.e. area not disturbed by boring or other investigations).

2.4 AREA INFORMATION

To estimate losses and other inputs to the wetland system, the parameters in Table 6 will be collected.

Table 6: Site Parameters

Description	Location	Frequency
Air Temperature	WWTP	Daily (in morning) with note of general conditions (e.g. clear, cloudy)
Precipitation	See note	Daily
Stream flow	SW17, SW18	Monthly during surface sampling
Note: Precipitation data will be gathered from the Wasilla Airport (PAWS). https://www.wunderground.com/history/airport/PAWS/2018/4/24/MonthlyHistory.html?&reqdb.zip=&reqdb.magic=&reqdb.wmo=		

3.0 QUALITY CONTROL REQUIREMENTS

Quality Control (QC) is the overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the project's data quality objectives

3.1.1 Field Quality Control (QC) Measures

QC measures in the field include, but are not limited to:

- Proper maintenance of sampling equipment.
- Maintenance, cleaning, and calibration of field equipment/kits per the manufacturer's specification, and field procedures.
- Chemical reagents and standard reference materials used prior to expiration dates.
- Proper field sample collection and analysis techniques.
- Correct sample labeling and data entry.
- Proper sample handling and transport techniques.
- Field replicate samples (blind to the laboratory) at a rate of one replicate per ten samples or a minimum of one per sampling event.
- Field replicate measurements (e.g. one replicate measurement) at a rate of one replicate per ten measurements.

3.1.2 Laboratory QC Measures

Analytical data will be generated by the laboratory and covered by the Laboratory Quality Assurance Plan (QAP) of that company, which will be confirmed to be on file with ADEC. These will include the associated required matrix spike/matrix spike duplicates, sample duplicates, calibration verification checks, surrogate standards, external standards, and other procedures required by the laboratory's QAP and standard operating procedures.

A laboratory blank composed of distilled water (commercially purchased) will be sent to the laboratory at a rate of one sample per two sampling events.

The contracted laboratories will provide analytical results after verification and validation by the laboratory Quality Assurance Officer. The laboratory must provide all relevant QC information with its summary of data results so that a field data verification and validation, and review of the laboratory reports can be completed by Stantec project staff. If a QC concern is identified in the review process, additional information will be requested from the contracted laboratory to resolve the issue and take appropriate corrective action.

Appendix A Data Collection Forms

A.1 WETLAND SAMPLING DATA COLLECTION

Collected by/ Team Lead:			**Collection Date:**
Field Team:			**Weather:**
RSM01 reviewed and RSM02 Completed? Yes No	**Temperature:**	**Equipment Used:**	**Equipment Calibrated?** Yes No

Site ID	**Time**	**Sample Type**	**Water Temperature** (all)	**Conductivity** (subsurface)	**pH** (surface)	**DO** (surface)	**Well Purged?** (Yes or No)	**Visible Surface Water? Depth?** (Yes or No)	**Depth to Groundwater** (feet bgs)	**Photo Taken?** (Yes or No)	**Lab Sample ID** (complete COC)	**Comments**
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										

CITY OF WASILLA WASTEWATER TREATMENT PLANT

Appendix A Data Collection Forms
April 23, 2018

Site ID	**Time**	**Sample Type**	**Water Temperature** (all)	**Conductivity** (subsurface)	**pH** (surface)	**DO** (surface)	**Well Purged?** (Yes or No)	**Visible Surface Water? Depth?** (Yes or No)	**Depth to Groundwater** (feet bgs)	**Photo Taken?** (Yes or No)	**Lab Sample ID** (complete COC)	**Comments**
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										

Additional Notes on Field Activities, Necessary Corrective Actions, or Conditions

A.2 LABORATORY DATA – CHAIN OF CUSTODY

Laboratory Reports to:	**Invoice to:**
Stantec 725 East Fireweed Lane, Suite 200 Anchorage, Alaska 99503 Attn: Stephanie Gould, Stephanie.gould@stantec.com	Stantec 725 East Fireweed Lane, Suite 200 Anchorage, Alaska 99503 Attn: Dean Syta, dean.syta@stantec.com Quote/PO #: 348183

Sample Identification	**Time**	**Type / Matrix**	**Number of Containers**	**BOD_5**	**TSS**	**FC Bacteria**	**Nitrate -N**	**Nitrite - N**	**Ammonia - N**
			Preservative	none	none	Na_2SO_3	none	none	H_2SO_4
		Grab / Water							
		Grab / Water							
		Grab / Water							
		Grab / Water							
		Grab / Water							

Temp Blank Present: Yes / No
Yes / No

Chain of Custody Seals Placed: Yes / No

Trip Blank Present:

Relinquished by:	**Date:**	**Time:**	**Relinquished to:**

A.3 WETLAND VEGETATION DATA FORM

Completed by:		**Collection Date:**	**Site Id:**
Time Arrived on Site:	**Time Left Site:**	**Wetland Classification:**	**Photo Taken:** Yes / No
Local relief concave / convex / none	**Has site been disturbed?** If yes, describe disturbance in remarks below. Yes / No		**RSM01 reviewed and RSM02 Completed?** Yes / No
Surface water present: Yes / No	**Water depth:** inches	**Flow Rate:** Feet/sec	**Landform**: (hillside, hummock, etc.)
Weather Description:		**Are climate / hydrologic conditions on site typical for this time of year?** Yes / No **If no, explain:**	
Field Team:		**Remarks on site:**	

Vegetation Use scientific names of plants. List all species in the plot (15-foot radius of stake).

Type	Absolute % Cover	Condition/Remarks
Tree Stratum		
1.		
2.		
3.		
Sapling/Shrub Stratum		
4.		
5.		
6.		
7.		
8.		

Herb Stratum		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		

Stem Density and Height

Randomly place three 1ft quadrats within sample area and count total number of stems and average stem height (cm).

	Grasses		**Sedges**		**Herbaceous**		**Shrubs**		**Trees**	
Quadrat	**# Stems**	**Avg Height**	**# Stems**	**Avg Height**	**# Stems**	**Avg Height**	**# Stems**	**Avg Height**	**# Stems**	**Avg Height**
1										
2										
3										

Additional Notes on Field Activities, Necessary Corrective Actions, or Conditions

CITY OF WASILLA WASTEWATER TREATMENT PLANT

Appendix A Data Collection Forms
April 23, 2018

Stantec