AGENDA

JOINT LAGOON COMMITTEE

REGULAR MEETING - Community Hall Sandy Beach Highway 642

63 Lakeshore Drive

Nov 8th, 2022 @ 7 PM.

1.0 CALL TO ORDER Action

2.0 ACCEPTANCE OF AGENDA Action

3.0 APPROVAL OF MINUTES

A. November 9th, 2021; Action

4.0 DELEGATIONS Info

none

5.0 APPOINTMENT

No scheduled appointment(s);

6.0 BUSINESS ARISING

A. Darwell Transmission Line Phase A (discussion); Action

B. Action

C. Action

D. Action

E. Info/Action

F. Info/Action

7.0 DEVELOPMENT MATTERS None

8.0 NEW BUSINESS

A. ATB Statement Aug 31st, 2022 (***NO ACTION*** required); Info

B. Action

C. Info/Action

9.0 LAGOON MANAGER REPORT

A. Info/Action

10.0 CORRESPONDENCE ITEMS

A. None Info

NEXT MEETING

To be determined Info

ADJOURNMENT Action

MINUTES
JOINT LAGOON COMMITTEE
REGULAR MEETING OF THE JOINT LAGOON COMMITTEE
Sandy Beach Community Hall, Highway 642, 63 Lakeshore Drive
November 9th, 2021 @ 6.30 PM.

IN ATTENDANCE

Committee
Michael Harney (Chair & Councillor Sandy Beach)
Denise Lambert (Mayor Sandy Beach)
Larysa Luciw (Deputy Mayor Sandy Beach)
Jon Ethier (Mayor Sunrise Beach)
Mike Benson (Deputy Mayor Sunrise Beach)
Everett Steenbergen (Councillor Sunrise Beach)
Emily House (Public Member) *(regrets)*

Lagoon Manager & Lagoon Discharge Support
Brett Henkel Lagoon Manager *(regrets)*
Guy Tremblay Lagoon Discharge Support

Administration (recording ONLY)
Robin Murray (Sandy Beach)

1.0 CALL TO ORDER

Chair Michael Harney called the meeting to order at 6.55 p.m.

2.0 ACCEPTANCE OF AGENDA

MOVED by Denise Lambert that the agenda be approved as presented and amended with 6A and 6B changing priority so 6B first.
Res. # 35 - 21 CARRIED

3.0 MINUTES, September 23rd, 2021

Res. # 36 - 21 MOVED by John Ethier that the minutes of the September 23rd, 2021 meeting be accepted and approved as presented and printed.
CARRIED

4.0 DELEGATIONS none

5.0 APPOINTMENTS none

6.0 BUSINESS ARISING

A. Transmission Line Phase A

Res. # 37 - 21 MOVED by Everett Steenbergen that the verbal presentation on the Transmission Line Phase A as presented by the Chair Michael Harney be accepted as information.
CARRIED

B. **Lagoon Scope of Work Nov 2021: Engineer Consultant**

Res. # 38 - 21 MOVED by Everett Steenbergen that prior to an application for funding, Morrison Hershfield be directed to provide a cost break down by Tuesday, November 16th, 2021, for the following:

1. Complete a groundwater monitoring test in the existing wells to determine if there is any leakage in the lagoon liner.
2. Sludge Sampling to determine if the sludge is impacted and what disposal options are available.
3. Topographic survey of the entire lagoon to be used later during detailed design.
4. Bathymetric Survey to determine the amount of sludge and any damage below the existing water level.
5. Preliminary Report summarizing the above work including proposed upgrades.
6. Plus, the proposed cost for the Engineering for the design of Phase II.
7. Further, the Board agreed that the approval for funding application will be done via email.

CARRIED

C. **Lagoon Chair Expenses**

Res. # 39 - 21 MOVED by Larysa Luciw that the lagoon chair expenses as submitted in writing be accepted as information.

CARRIED

7.0 **DEVELOPMENT MATTERS** none

8.0 **NEW BUSINESS**

A. **ATB STATEMENT – September 30th, 2021**

Res. # 40 - 21 MOVED by John Ethier that the ATB bank statement for September 30th, 2021 be accepted as information.

CARRIED

9.0 **LAGOON MANAGER REPORT**

none

10.0 **CORRESPONDENCE ITEMS**

none

11.0 **NEXT MEETING**

to be determined

ADJOURNMENT

Res. # 41 - 21 MOVED by Chair Michael Harney being that the agenda matters had been concluded the meeting be adjourned. CARRIED

The meeting was adjourned at 9:10 PM by Chair Michael Harney.

_____
Chair

_____
Recording Secretary

SUMMER VILLAGES of SANDY BEACH, SUNRISE BEACH, and LAC STE ANNE COUNTY

OPERATION and MAINTENANCE BUDGET

REGIONAL WASTEWATER TRANSMISSION LINE - PHASE A

CAPITAL COSTS

Transmission Lines	$	10,255,520			
SV of Sandy Beach Collection	$	3,999,660	57.81%		
SV of Sunrise Beach Collection	$	1,457,820	21.07%		
Lac Ste Anne County Collection	$	1,461,320	21.12%	$ 6,918,800	
Total Capital Cost	**$**	**17,174,320**			
less W4L Grant	-$	9,229,480		53.74%	
Municipality's Share	$	7,944,840			
10% Amount of Transmission	$	1,025,552			

ANNUAL EXPENSES

CODE	ITEM	YEARLY BUDGET		ASSUMPTIONS		SVs	County @ Onoway
	Town of Onoway Charges	$	91,000	$6.50	per m3	10,000	4,000
	Audit Fees	$	2,000		If operated as separate identity		
	Legal Fees	$	500				
	Mileage/Expenses	$	-	Each municipality covers			
	Contracted Management Fees	$	1,000	Unknown method of management	If operated as separate identity		
	Contracted O&M Fees	$	6,000	O&M assumed to be contracted out			
	General Main./Repairs	$	500				
	Power/Utilities	$	6,000	$500 per month			
	Honorariums	$	-	Each municipality covers			
	Materials/Supplies	$	1,000				
	Insurance/Leases	$	2,500				
	Transfer to Repair/Main. Reserve	$	5,000	1/3 of a $15,000 reserve	Have a Repair Fund @ $15,000		
	Transfer to Capital Reserves	$	-	$9M/100 years	Amount is adjustable		
	Transfer to Rate Stab. Reserve	$	-	TBD	Amount is adjustable		

SUMMER VILLAGES of SANDY BEACH, SUNRISE BEACH, and LAC STE ANNE COUNTY

OPERATION and MAINTENANCE BUDGET

REGIONAL WASTEWATER TRANSMISSION LINE - PHASE A

Amortization of Capital Assets	$ -	See following page		This can be a NON-CASH item but this amount could be transferred to Capital Reserve Fund		
Estimated O&M Costs	$ 115,500					
Debenture Costs	$621,499	$	7,944,840	25	6%	

SUMMER VILLAGES of SANDY BEACH, SUNRISE BEACH, and LAC STE ANNE COUNTY

OPERATION and MAINTENANCE BUDGET

REGIONAL WASTEWATER TRANSMISSION LINE - PHASE A

TOTAL ANNUAL COST **$** **736,999** years

PRO-RATED SHARE BASED on PERCENTAGE OF COLLECTION SYSTEM

			No. of Services	Cost per Service per Year
Summer Village of Sandy Beach	57.81%	$426,049	340	$1,253.08
Summer Village of Sunrise Beach	21.07%	$155,289	180	$862.72
Lac Ste Anne County	21.12%	$155,662	93	$1,673.78

SUMMER VILLAGES of SANDY BEACH, SUNRISE BEACH, and LAC STE ANNE COUNTY

OPERATION and MAINTENANCE BUDGET

REGIONAL WASTEWATER TRANSMISSION LINE - PHASE A

SUMMER VILLAGES of SANDY BEACH, SUNRISE BEACH, and LAC STE ANNE COUNTY

OPERATION and MAINTENANCE BUDGET

REGIONAL WASTEWATER TRANSMISSION LINE - PHASE A

SUMMER VILLAGES of SANDY BEACH, SUNRISE BEACH, and LAC STE ANNE COUNTY

OPERATION and MAINTENANCE BUDGET

REGIONAL WASTEWATER TRANSMISSION LINE - PHASE A

DARWELL LAGOON COMMISSION
PHASE A - SANDY BEACH to ONOWAY

SECTION	DESCRIPTION	ESTIMATED COST	PERCENT W4L	W4L GRANT	10% PORTION	SV of SANDY BEACH	SV of SUNRISE BEACH	LAC STE ANNE COUNTY
A to B	COLLECTION - SV of SB	$ 1,666,140	0%	$ -	$ -	$ 1,666,140	$ -	$ -
C to B	COLLECTION - SV of SB	$ 353,500	0%	$ -	$ -	$ 353,500	$ -	$ -
B to D	COLLECTION - SV of SB	$ 177,100	0%	$ -	$ -	$ 177,100	$ -	$ -
E to D	COLLECTION - SV of SB	$ 375,900	0%	$ -	$ -	$ 375,900	$ -	$ -
D to F	COLLECTION - SV of SB	$ 735,700	0%	$ -	$ -	$ 735,700	$ -	$ -
G to F	COLLECTION - SV of SB	$ 691,320	0%	$ -	$ -	$ 691,320	$ -	$ -
F to H	TRANSMISSION	$ 755,300	90%	$ 679,770	$ 75,530	$ -	$ -	$ -
I to H	COLLECTION - SV of SRB	$ 748,300	0%	$ -	$ -	$ -	$ 748,300	$ -
H to J	TRANSMISSION	$ 616,560	90%	$ 554,904	$ 61,656	$ -	$ -	$ -
J to K	COLLECTION - SV of SRB	$ 709,520	0%	$ -	$ -	$ -	$ 709,520	$ -
J to L	TRANSMISSION	$ 599,200	90%	$ 539,280	$ 59,920	$ -	$ -	$ -
N to M	COLLECTION - SV of LSA	$ 517,860	0%	$ -	$ -	$ -	$ -	$ 517,860
M to L	TRANSMISSION	$ 211,400	90%	$ 190,260	$ 21,140	$ -	$ -	$ -
L to O	TRANSMISSION	$ 858,200	90%	$ 772,380	$ 85,820	$ -	$ -	$ -
O to P	COLLECTION - SV of LSA	$ 943,460	0%	$ -	$ -	$ -	$ -	$ 943,460
	LIFT STATION	$ 1,845,200	90%	$ 1,660,680	$ 184,520	$ -	$ -	$ -
O to Q	TRANSMISSION	$ 3,250,520	90%	$ 2,925,468	$ 325,052	$ -	$ -	$ -
R to Q	TRANSMISSION	$ 1,111,140	90%	$ 1,000,026	$ 111,114	$ -	$ -	$ -
Q to S	TRANSMISSION	$ 1,008,000	90%	$ 907,200	$ 100,800	$ -	$ -	$ -
	TOTALS	**$ 17,174,320**	**53.74%**	**$ 9,229,968**	**$ 1,025,552**	**$ 3,999,660**	**$ 1,457,820**	**$ 1,461,320**
	TRANSMISSION	$ 10,255,520						
	COLLECTION	$ 6,918,800						
		$ 17,174,320						

an Englobe company

Draft Technical Memorandum I for:

LAC STE. ANNE COUNTY

SANDY BEACH AND SUNRISE BEACH WASTEWATER COLLECTION, PHASE A HYDRAULIC MODELING

Date: July 13, 2022
Project No. 5225-018-00

DRAFT

#101, 10630-172 Street
Edmonton, AB T5S 1H8
Phone: 780-486-2000
Fax: 780-486-9090

an Englobe company

July 13, 2022

Lac Ste. Anne County
PO Box 219
Sangudo, AB T0E 2A0

File: N:\5225\018-00

Attention: Joe Duplessie
General Manager of Infrastructure & Planning

Dear Joe:

Re: Lac Ste. Anne County Technical Memorandum I
Sandy Beach and Sunrise Beach Wastewater Collection, Phase A – Hydraulic Modeling

MPE Engineering Ltd. (MPE) is pleased to provide Lac Ste. Anne County (LSAC) with Technical Memorandum I for the above-referenced project.

Should you have any questions, or require clarification on any item, please do not hesitate to contact the undersigned at 780-509-4301 or rsharpe@mpe.ca.

Yours truly,

MPE ENGINEERING LTD.

Ryan Sharpe, P.Eng.
Project Manager

SK/lp

Enclosure

DRAFT

CORPORATE AUTHORIZATION

This report has been prepared by MPE Engineering Ltd. under authorization of Lac Ste. Anne County. The material in this report represents the best judgment of MPE Engineering Ltd. given the available information. Any use that a third party makes of this report, or reliance on or decisions made based upon it is the responsibility of the third party. MPE Engineering Ltd. accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions taken based upon this report.

Should any questions arise regarding content of this report, please contact the undersigned.

MPE ENGINEERING LTD.

Professional Stamp

DRAFT

Professional Engineer, P.Eng.

Professional Seal

Corporate Permit

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DRAFT

1.0 INTRODUCTION

This technical memorandum is submitted at the completion of the system hydraulic modeling for the Sandy Beach and Sunrise Beach Wastewater Collection, Phase A project. The Bentley's SewerCAD modeling program was used to model and optimize the proposed wastewater collection system for pipe layout and sizing.

Hydraulic modeling is based on Lac Ste. Anne County (County) adopting the Septic Tank Effluent Pumping (STEP) system as the on-lot pressurization system for residents in the communities of Sandy Beach, Sunrise Beach, Tree Farm Estates, Cheviot Hills, and Ardea Park.

The technical memorandum summarizes the design criteria, modeling methodology, pipe size, and layout results and recommendation from the system hydraulic modeling stage. MPE will use the design concepts established in this document for the detailed design of the wastewater collection system. The major task completed for the technical memorandum is the hydraulic modeling of the proposed wastewater collection system to determine the required pipe and pipe sizes to service each community.

2.0 DESIGN CRITERIA

The design criteria established in the *Darwell Lagoon Commission, Sandy Beach/Onoway Regional Wastewater Transmission Line, January 2021* (Regional Wastewater Transmission Report) were generally used, with some updates and modifications. The following provides a summary of key parameters used in the modeling.

2.1 Phase A Collection System

The Phase A Collection System consists of:

- A low-pressure sanitary sewer collection system servicing the communities of Sandy Beach, Sunrise Beach, Tree Farm Estates, Cheviot Hills, and Ardea Park.
- The low-pressure system will discharge into a lift station located south of Cheviot Hills and Ardea Park.
- From this lift station a forcemain will convey sewage to the Town of Onoway's Wastewater Lagoons.
- Lift Stations will convey sewage into this forcemain to collect wastewater for the communities of Aspen Hills, Bridlewood Mews, Hillview Estates, Karma Cay, and Surgeon Heights.

2.2 Septic Tank Effluent Pumping (STEP) System

The system hydraulic modeling is based on the STEP effluent system for the communities of Sandy Beach, Sunrise Beach, Tree Farm Estates, Cheviot Hills, and Ardea Park. It is possible that the detailed design phase may deem a grinder pump system more suitable for a few communities due to specific site circumstances, but these are exceptions and only considered where it does not compromise the integrity, operation, or hydraulic design of the STEP Collection System.

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2.3 Key System Design Criteria

MPE used the following key system design criteria:

- Maximum allowable pressure in line during peak flow = 517 kPa (75 psi)
- Design Velocity at Peak Flows = 1.0 m/s
- Lot Density: 3 people per lot
- Design Period: 25 years
- Per Capita Loading rate: 189 L/capita/day (50 USgal/capita/day)
- Minimum velocity for STEP systems = 0.3 m/s. This velocity is deemed reasonable for STEP systems because the fluid transported is wastewater effluent void of settleable particles but only contains small suspended material.
- Minimum pipe size main or lateral = 75 mm
- Friction Loss Based on Hazen Williams Equation
    - Friction Factor, C = 130

Pipe characteristics are based on the HDPE DR 11 PE4710 with a pressure rating of 1,378 kPa (200 psi) for the following pipe sizes.

Table 2.1: HDPE DR11 Pipe Sizes

Nom. Size		Interior Dia.	
in	mm	in	mm
2	50	1.917	48.7
3	75	2.825	71.8
4	100	3.633	92.3
6	150	5.348	135.8
8	200	6.963	176.9

2.4 Equivalent Dwelling Units

The service area residential communities and lot counts (or equivalent dwelling units (EDU)) are listed in the Table 2.2. The lot counts for each community were retrieved from the Regional Wastewater Transmission Report as shown below.

Table 2.2: Equivalent Dwelling Units

County & Summer Village	Lot Count EDUs
Sandy Beach	357
Sunrise Beach	180
Tree Farm Estates	45
Cheviot Hills	36
Ardea Park	21
Total Lots	**639**

The total number of EDUs for the service area is **639**.

2.5 STEP System

MPE has assumed a STEP is adopted as the preferred option for all on-lot wastewater servicing. STEP systems are characterized by a working chamber where primary treatment through the removal of grease and solids occurs and a pumping chamber where treated effluent is collected and pumped into the main collection system.

Alberta Private Sewage Systems Standard of Practice (2009) defines the working capacity of a STEP system as the "liquid volume of wastewater held in the septic chamber when the tank is properly installed and is in normal use, and does not include the air space, siphon chamber, pumping chamber, or effluent chamber of a tank."

Alberta Private Sewage Systems Standard of Practice recommends the following working capacity volumes (for given number of bedrooms in a residential dwelling) that will provide adequate pretreatment.

Table 2.3: STEP Working Capacity Volumes

Number of Bedrooms	Working Volume	
	Liters	US Gallons
2 or 3	3,360	888
4	4,260	1,125
5	5,220	1,379
6	6,130	1,619

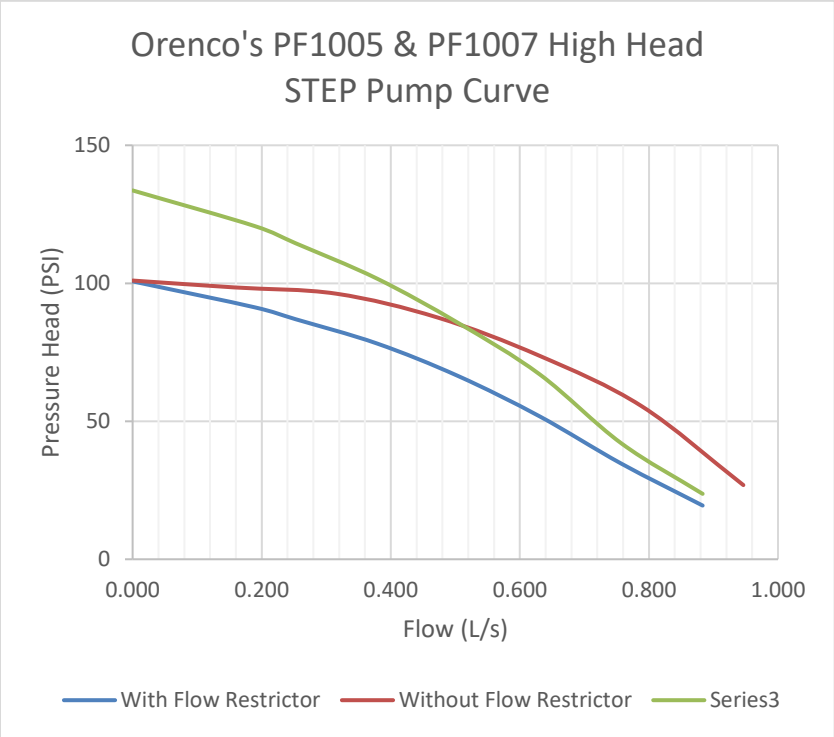
In addition to the working capacity, an adequate emergency storage capacity (essentially the air space between the liquid level and the roof of the tank or overflow) is required to provide a buffer in the event of a power outage, pipe break, line blockage or equipment failure.

This memorandum analyses the emergency storage required only in a situation where it's assumed that the majority of the pumps will come on following a power outage. Further analysis on the required emergency storage shall be reviewed in a separate memorandum specifically for the On-Lot Systems and the higher value shall govern.

2.5.1 STEP Effluent Pump

The STEP pump used for this analysis is a high head semi-positive displacement effluent pump capable of 0.63 L/s (10 gpm). In particular, Orenco's ½ HP PF1005 pump with a shutoff head of 101 psi was used. The pump curve is shown on Figure 2.1 on the following page.

Figure 2.1: STEP Pump Curve



3.0 HYDRAULIC DESIGN METHODOLOGY

MPE approached the wastewater collection system in a two-step process using Bentley's SewerCAD modeling software.

- Step 1 (Design Flow Analysis): included running the model for the design flows, which were established using the Rational Method, to finalize pipe sizes.
- Step 2 (Sensitivity Analysis): included running scenarios to evaluate system performance under low and various peak flow conditions.

The methodology, parameters, and assumptions used for the two-step design process are provided below.

3.1 Step 1 – Rational Method

In the Rational Method, the wastewater collection system is sized for design flow of the downstream users. Design flow was determined using the detailed revised version of USEPA's Simplified Equation (see below) developed for low-pressure systems. This formula is widely used for low-pressure systems design by many engineers, suppliers, and manufacturers.

$$Q_C = \left(\frac{P}{6}\right)\left(\frac{Q_R}{50}\right) EDU + B$$

Where: Q_C Design Flow (gpm)

P Lot Density = 3 people per lot

Q_R Per Capita Loading Rate = 189 L/capita/day (50 USgal/capita/day)

B A factor based on the type of pumps used. For this project, MPE used 10 as represented by the effluent pump capacity of 10 gpm.

EDU Equivalent Dwelling Unit or standard residential lot

Modeling in SewerCAD for this step is focused on sizing the mains, and therefore eliminates individual lots (including pumps, tanks, and services). MPE has applied multiple lots to a single node representing a community as a whole or part of it. EDUs per node range from 10 to 50 depending on the location.

The pipe sizing protocol used was:

- Preliminary pipe sizing from the Regional Wastewater Transmission Report is used as a starting point.
- The design flow for a particular flow path or alignment is distributed evenly over the total number of lots. The model is run and the pressure requirements on each node are observed.
- If the pressures in the highest upstream nodes or nodes located at the lowest elevation are at or exceed the 517 kPa (75 psi) target set point, the pipe sizes downstream are upsized to the next pipe diameter starting with the pipe sections with the highest velocities. Typically, pipe sections with velocities in the 1.5 m/s are upsized.
- If the pressures in the highest upstream nodes are lower than 275 kPa (<40 psi), the pipe sizes downstream are downsized to the next pipe diameter starting with the pipe sections with the lowest velocities.
- Minimum pipe main size is limited to 75 mm diameter.

In sections where the pipeline was not at capacity, the potential additional capacity was determined by adding flow until the pressure increased to the target design pressure of 552 kPa.

3.2 Step 2 – Sensitivity Analysis

In this step of the design process, pumps (using the pump curve in Section 2.5) and tanks are added to the nodes established in Step 1 – Rational Method. Each node represents multiple lots so the model pump curve is adjusted to reflect multiple pumps running (in parallel) for the particular node. This sensitivity analysis exercise is considered a realistic representation of real-life system operation scenarios that could occur under various seasonal loading conditions. This step is an important component of system design for the low-pressure communities, since low flow conditions could occur during off peak (winter) periods; while very high flow conditions could occur during peak periods (i.e., summer long weekends).

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The following sensitivity scenarios were investigated:

1. A single pump running at the furthest downstream node.
2. A single pump running at the furthest upstream node.
3. A single pump running in all nodes simultaneously.
4. Iteration is done to determine the number of pumps running in each node to produce a total flow equivalent to the rational method design flow. With this, MPE can estimate the number of pumps that will be operating simultaneously at design flow.
5. Worst Case Scenario: Multiple pumps running on each node to depict flow rates higher than peak flows during an emergency situation. This scenario represents a power outage situation where numerous pumps are expected to come on at the same time when power is returned. For this scenario, MPE has assumed at least one quarter of the number of pumps in the system are operating simultaneously.

Scenarios that depicted no flow from certain nodes (only noticed for the worst-case scenario) were further analyzed by sequentially isolating pump(s) that had the highest flow and re-running the model until there was flow from all the remaining nodes. This process allowed MPE to determine the maximum wait time expected in each system section.

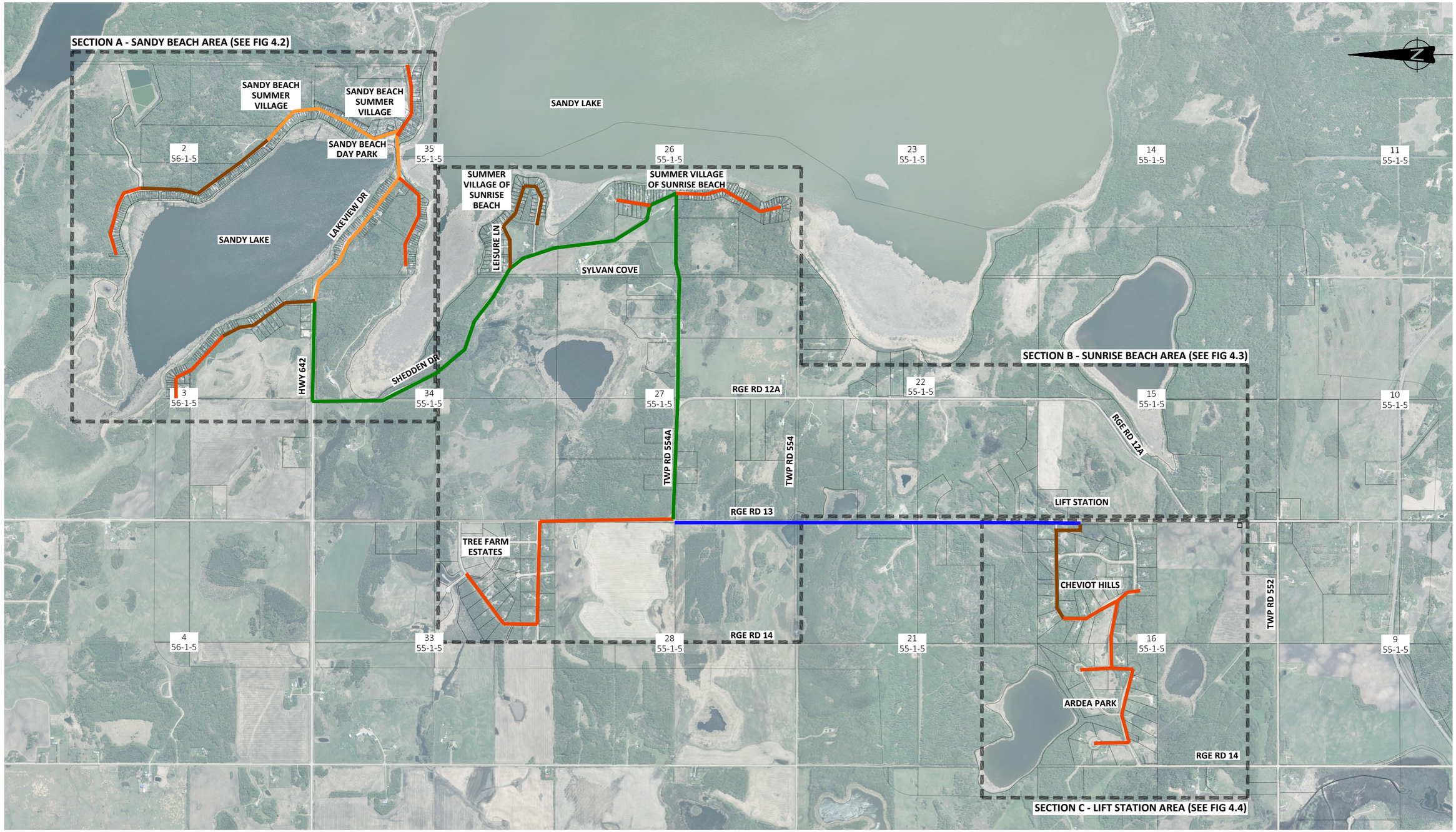
4.0 HYDRAULIC MODEL RESULTS

4.1 Forcemain Alignment Revision and Update

The original forcemain alignment developed in the Regional Wastewater System Report was reviewed using SewerCAD modeling and Orenco pumps data. The hydraulic analysis results indicated that the selected Orenco PF-1005 pump is not sufficient to drive the wastewater to the Lift Station location. With the original Lift Station site downstream of the hill on Range Road 12A, the system pressure drops below zero (0).

With the Orenco pump not sufficient to drive the wastewater to the Lift Station location, MPE examined the option of relocating the Lift Station north of the hill at a lower elevation (around 710 m). This showed that a lower lift station location would allow the Orenco pumps to deliver wastewater to the relocated lift station.

MPE also examined an alternate pipe route. This consists of running the main sewer collection pipeline along Range Road 13. This routing is shown in Figure 4.1. This route relocates the Lift Station to Cheviot Hills, and will allow for direct access to the Lift Station for flows from this subdivision. It would also provide easy access to power utilities.



LEGEND:

- SANITARY MAIN 65mm DIA.
- SANITARY MAIN 75mm DIA.
- SANITARY MAIN 100mm DIA.
- SANITARY MAIN 150mm DIA.
- SANITARY MAIN 200mm DIA.
- SANITARY MAIN 250mm DIA.
- SANITARY MAIN SIZE UNKNOWN

LAC STE. ANNE COUNTY

MPE Engineering Ltd.

LAC STE ANNE COUNTY

SANDY BEACH AND SUNRISE BEACH WASTEWATER COLLECTION PHASE A HYDRAULIC MODELLING OVERALL PLAN

SCALE: 1:25000	DATE: JUNE 2022	JOB: 5225-018-00	FIGURE: 4.1

In discussions with the County, the Lift Station was relocated to the Municipal Reserve lot on the east side of Cheviot Hills as shown in Figure 4.1. MPE undertook rational method and sensitivity analysis on the low-pressure system using the alternate pipeline alignment and the relocated lift station site to determine the feasibility. See ***Figure 1: Model Results – Rational Method***, in ***Appendix A***.

The results are discussed below.

4.2 Model Configuration

To simplify the hydraulic design of various scenarios and alternatives, MPE separated the service area into three sections:

1. Section A: Sandy Beach
2. Section B: Sunrise Beach to Lift Station
3. Section C: Lift Station Area

Figure 4.1 shows the three sections. Table 4.1 lists the communities for each model section.

Table 4.1: Communities Per Model Section

A: Sandy Beach	B: Sunrise Beach	C: Lift Station Area
Sandy B. Summer Village	Sunrise Beach - North	Ardea Park
Sandy B. Campground	Sunrise Beach - South	Cheviot Hills
Sandy B. Day Park	Tree Farm Estates	

Results from the analysis of the system are presented below.

4.3 Section A: Sandy Beach

4.3.1 System Layout

Section A consists of multiple flow paths that run from lots at the northeast and northwest limits of Sandy Beach south, meeting at Highway 642 west of Sandy Beach into a 200 mm diameter main.

See Figure 4.2 for the system layout and pipe sizes for Section A.

4.3.2 Rational Method

The results of the Rational Method modeling for Section A showed pressures that vary between 47 psi 324 kPa (47 psi) and 469 kPa (68 psi) as provided in the Table 4.2. The ***Pressure Junction Table for Section A is attached*** in ***Appendix A***.

SECTION A - SANDY BEACH AREA

SANDY BEACH SUMMER VILLAGE

SANDY BEACH SUMMER VILLAGE

SANDY BEACH DAY PARK

SANDY LAKE

SANDY LAKE

SUMMER VILLAGE OF SUNRISE BEACH

SUMMER VILLAGE OF SUNRISE BEACH

LAKEVIEW DR

LEISURE LN

SYLVAN COVE

HWY 642

SHEDDEN DR

RGE RD 12A

TWP RD 554A

TWP RD 554

2
56-1-5

3
56-1-5

34
55-1-5

35
55-1-5

26
55-1-5

27
55-1-5

LEGEND:

- SANITARY MAIN 65mm DIA.
- SANITARY MAIN 75mm DIA.
- SANITARY MAIN 100mm DIA.
- SANITARY MAIN 150mm DIA.
- SANITARY MAIN 200mm DIA.
- SANITARY MAIN 250mm DIA.
- SANITARY MAIN SIZE UNKNOWN

LAC STE. ANNE COUNTY

MPE Engineering Ltd.

LAC STE ANNE COUNTY

SANDY BEACH AND SUNRISE BEACH
WASTEWATER COLLECTION PHASE A
HYDRAULIC MODELLING
SECTION A - SANDY BEACH AREA

SCALE: 1:15000	DATE: JUNE 2022	JOB: 5225-018-00	FIGURE: 4.2

The effluent pump (PF-1005) with a capacity of 0.63 L/s (10 gpm) similar to that in Section 2.5.1, is deemed sufficient to service each lot.

Table 4.2: Section A – Sandy Beach Design Flow and Node Pressure

Node	Downstream Node	EDUs	Cu. EDUs	Design Flow (L/s)	Node Pressure (PSI)
SB-1	SB_a1	72	72	2.0	68
SB_a1	SB_a2	76	148	[5.5]	61
SB_b1	J-123	57		2.1	61
SB_c1	J-9	30		1.8	59
J-9	SB_d1	58	293	[11.4]	62
SB_e2	J-75	67		2.8	55
J-75	J-16		360	[14.2]	51
TOTAL - A			**360**	**14.2**	

[-]: Cumulative flows at node.

4.3.3 Sensitivity Analysis

The results of the Sensitivity Analysis modeling for Section A are provided in Table 4.3.

Table 4.3: Section A - Sandy Beach Sensitivity Modeling Results

Scenario	Number of Pumps On	Peak Flow	Section A System Pressures	Effluent Pump Flows	Comment/Observations
		L/s	Psi	L/s	
1	Single pump running highest upstream at the far northeast corner (Node SB-1).	0.87	5-21	0.87	Operating pressure in some sections is below the PF1005 curve.
2	Single pump running downstream at the far southeast (Node J-120).	0.97	6-20	0.97	Flow restrictor required.
3	Single pump running at the far southwest (Node J-52).	0.92	5-20	0.92	Effluent pumps running to the right of pump curve (higher flows).
4	Single pump running at the highest northwest upstream (Node J-68).	0.91	5-20	0.91	

Scenario	Number of Pumps On	Peak Flow	Section A System Pressures	Effluent Pump Flows	Comment/Observations
		L/s	Psi	L/s	
5	One pump at each of the representative Nodes (8 total).	6.98	14-29	0.81 - 0.92	
6	3 Pumps at each of the 8 representative Nodes (24 total).	15.38	42-59 (within Section A)	0.55 - 0.70	Peak flow slightly higher than peak flow in rational method. It is reasonable to assume that a maximum of approximately 24 pumps are running simultaneously to provide peak flows.

4.3.4 Conclusions and Recommendations

The conclusions derived from the modeling results that will be taken to detailed design include:

- MPE will incorporate the system pipe sizes identified on Figure 4.2.
- At worst case scenario, no pumps are locked out, but most pumps are running near the top right side of the curve.
- MPE recommends providing flow regulators for all lots.

4.4 Section B: Sunrise Beach

4.4.1 System Layout

Section B consists of a north and south branch through Sunrise Beach and a collection system in Tree Farm Estates. These areas flow into the main trunk and discharge into the Lift Station wet well. The system layout is shown in Figure 4.3 on the following page.

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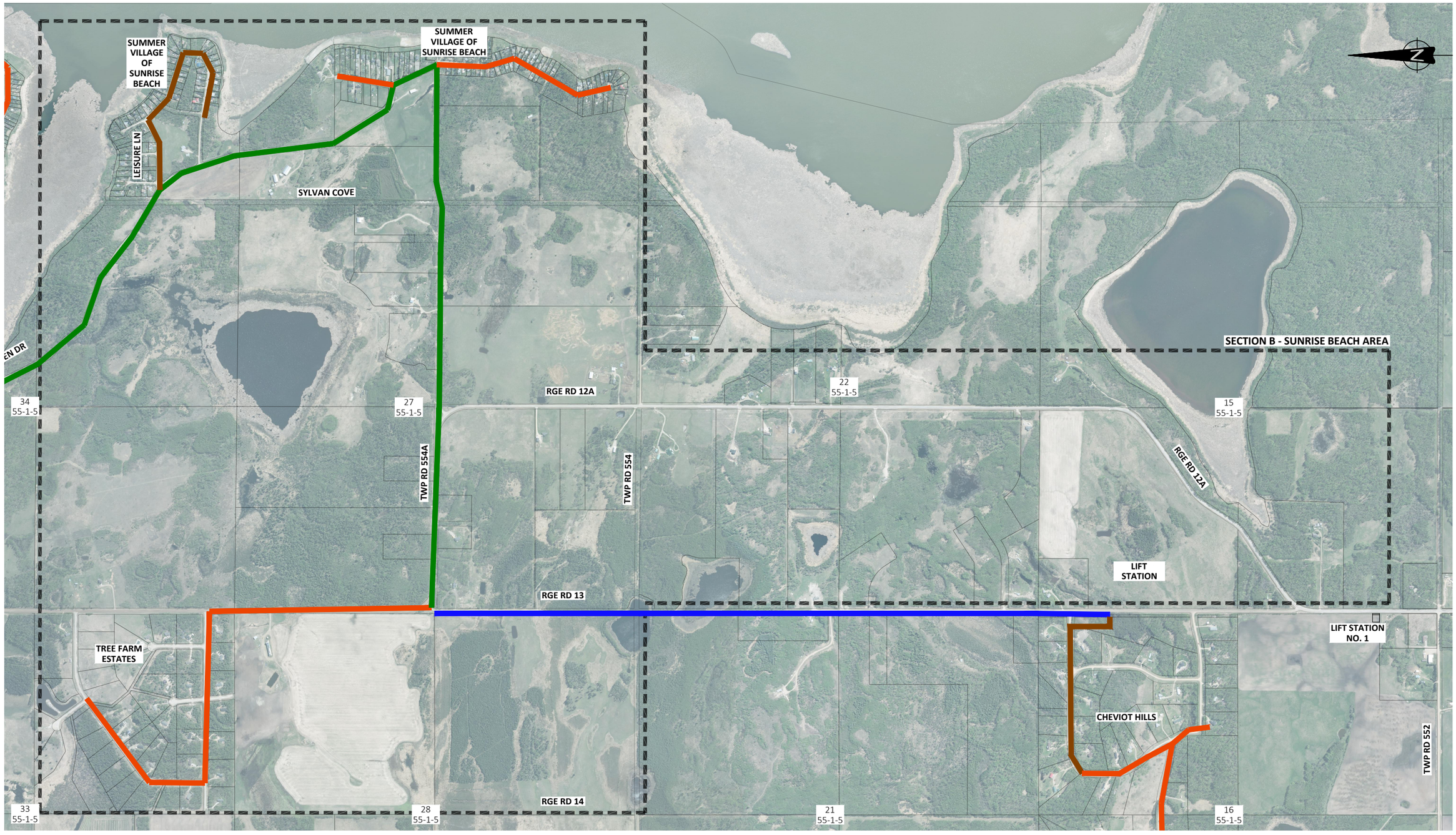

LEGEND:

- SANITARY MAIN 65mm DIA.
- SANITARY MAIN 75mm DIA.
- SANITARY MAIN 100mm DIA.
- SANITARY MAIN 150mm DIA.
- SANITARY MAIN 200mm DIA.
- SANITARY MAIN 250mm DIA.
- SANITARY MAIN SIZE UNKNOWN

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SANDY BEACH AND SUNRISE BEACH WASTEWATER COLLECTION PHASE A HYDRAULIC MODELLING
SECTION B - SUNRISE BEACH AREA

SCALE: 1:15000	DATE: JUNE 2022	JOB: 5225-018-00	FIGURE: 4.3

4.4.2 Rational Method

The results of the Rational Method modeling for Section B showed pressures that vary between 55kPa (8 psi) and 345kPa (50 psi) as summarized in Table 4.4. The ***Pressure Junction Table for Section B*** is attached in ***Appendix A***.

Table 4.4: Section B – Sunrise Beach Design Flow and Node Pressure

Node	Downstream Node	EDUs	Cu. EDUs	Design Flow (L/s)	Node Pressure (PSI)
SR#1	SR#2	38	38	1.9	50
SR#2	J-21	36	74	[3.1]	43
SR#3	J-27	*68*		2.8	41
SR#4	J-27	*38*		1.2	44
J-27	J-32		180	[7.1]	37
TFE#1	J-32	45		2.2	25
J-32	*Lift Station (LS-3)*		225	[9.3]	8
TOTAL - B			**225**	**9.3**	

[-]: Cumulative flow at node.

4.4.3 Sensitivity Analysis

The results of the Sensitivity Analysis modeling for Section B are provided in Table 4.5.

Table 4.5: Section B - Sunrise Beach Sensitivity Modeling Results

Scenario	Number of Pumps On	Peak Flow	Section B System Pressures	Effluent Pump Flows	Comment / Observations
		L/s	**Psi**	**L/s**	
1	Single pump running at the highest upstream of the north branch (Node J-46).	0.88	14 - 20	0.88	Operating pressure in some sections is below the PF1005 curve.
2	Single pump running upstream of the south branch (Node J-40).	0.87	14 - 21	0.87	Flow restrictor required.
3	Single pump running at the highest upstream of Tree Farm Estates (Node TF-1).	0.97	6 - 8	0.97	Effluent pumps running to the right of pump curve (higher flows).
4	Single pump running downstream of the south branch (Node J-27).	0.97	5 - 8	0.97	

5	One pump at each of the most representative nodes (6 total).	5.44	1 - 22	0.87 - 0.94	
6	3 Pumps at Tree Farm Estates, 6 pumps at Sunrise Beach north branch, and 6 pumps at Sunrise Beach south branch (15 total).	11.8	3 - 30, (3 @ the Intersection J-32)	0.67 - 0.91	Peak flow approximately the same as rational method peak. 15 pumps running simultaneously equates to 7% of total.
7	Worst Case Scenario. (Assumed 5 pumps per representative node for total of 30 pumps - 15%)	20.5	6 - 66, within Section B	0.42 - 0.75 Across Section B	All pumps are capable of flow but will run at high pressure heads. The lowest 0.45 L/s pump flow is higher than 0.017 L/s inflow from a 6 people/resident during peak period.

4.5 Section C: Lift Station Area

4.5.1 System Layout

Section C has a separate flow path that directs wastewater flows from Ardea Park and Cheviot Hills and converge to the proposed intermediate Lift Station.

Refer to Figure 4.4 on the following page for the system layout and pipe sizes for Section C.

4.5.2 Rational Method

The results of the Rational Method modeling for Section C showed pressures that vary between 42kPa (6 psi) and 235 kPa (34 psi) as summarized in Table 4.6. The ***Pressure Junction Table for Section C*** is attached in ***Appendix A***.

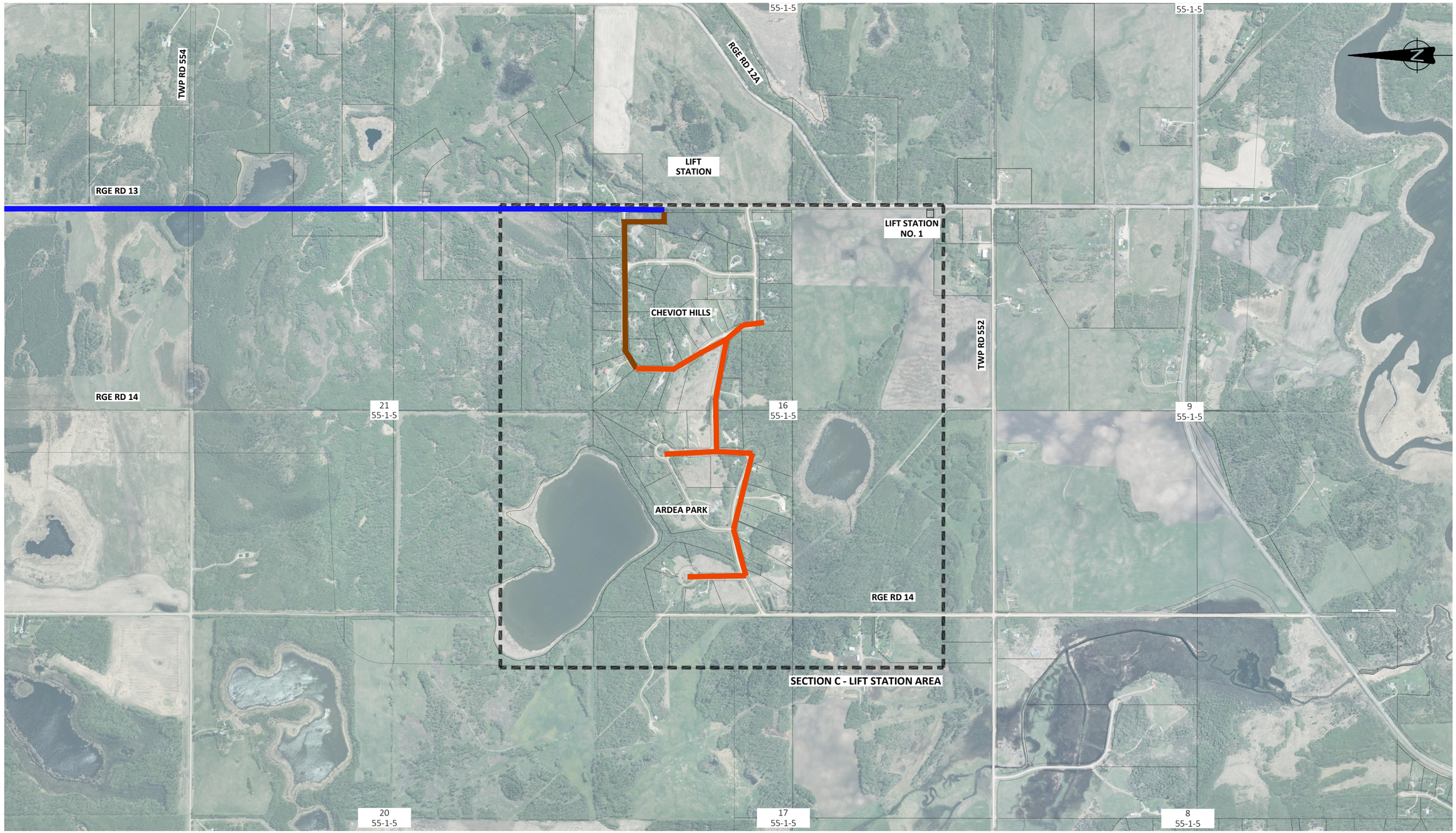
Table 4.6: Section C - Lift Station Area - Design Flow and Node Pressure

Node	Downstream Node	EDUs	Cu. EDUs	Design Flow (L/s)	Node Pressure (PSI)
AP #1	CH #1	21	21	1.5	34
CH #1	Lift Station LS-3	36	57	[3.3]	6
TOTAL - C			**57**	**3.3**	

[-]: Cumulative flow at node.

4.5.3 Sensitivity Analysis

Due to the small size of Section C and the topography and location of the lift station relative to the residents at higher elevations, issues of pump lockout at peak flow and worst-case scenario are not anticipated. For this reason, MPE will not complete a sensitivity analysis for this section. MPE recommends that the County provide minimum storage requirements in case of system failure.



LEGEND:

- SANITARY MAIN 65mm DIA.
- SANITARY MAIN 75mm DIA.
- SANITARY MAIN 100mm DIA.
- SANITARY MAIN 150mm DIA.
- SANITARY MAIN 200mm DIA.
- SANITARY MAIN 250mm DIA.
- SANITARY MAIN SIZE UNKNOWN

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SANDY BEACH AND SUNRISE BEACH WASTEWATER COLLECTION PHASE A
HYDRAULIC MODELLING
SECTION C - LIFT STATION 1 AREA

SCALE: 1:15000	DATE: JUNE 2022	JOB: 5225-018-00	FIGURE: 4.4

4.5.4 Conclusions

The conclusions derived from the modeling results that will be taken to detailed design include:

- MPE will incorporate the system pipe sizes identified on Figure 4.4.
- Air vacuum valves are required for the high points.
- MPE recommends providing flow regulators for all lots.

5.0 LOW-PRESSURE LINE ALIGNMENT

The air photo available to MPE shows potential wetlands to cross with the Low-Pressure System line if it is aligned south on Range Road 13. Prior to confirming the final alignment, MPE recommends the determination of wetlands and their boundaries. CPP Environmental Corp. has completed work on the original forcemain project, and MPE can obtain a quote to complete this work.

Any disturbance to a wetland will require an application to Alberta Environment under the Water Act. If the wetlands are crossed using trenchless methods of construction, then these crossings are covered under a Water Act Code of Practice.

If trenchless construction methods are used, there are concerns regarding the depth of the low-pressure system piping under the wetlands. MPE will address these depths prior to confirming the final alignment.

6.0 EFFECT OF LIFT STATION RELOCATION ON FORCEMAIN PUMP SIZE

MPE checked the hydraulic modeling of the forcemain discharge into the Onoway Lagoon. This check indicated that a larger pump than previously designed is required to accommodate the proposed lift station site Option 3. The forcemain is shown on Figure 6.1 on the following page. A preliminary sizing suggested a 40 hp pump with an approximate capacity of 25L/s @ 67 m TDH. MPE will confirm this pump size during detailed design.

7.0 COST ESTIMATE

MPE has prepared a cost estimate for the alternate Lift Station location and alternate low-pressure system alignment. This estimate is broken out by sections on the attached Figure 7.1 and 7.2. The total estimated cost of the Phase A wastewater collection system is approximately $17,201,000.00, and the ***Detailed Cost Estimate*** is attached as ***Appendix B***.

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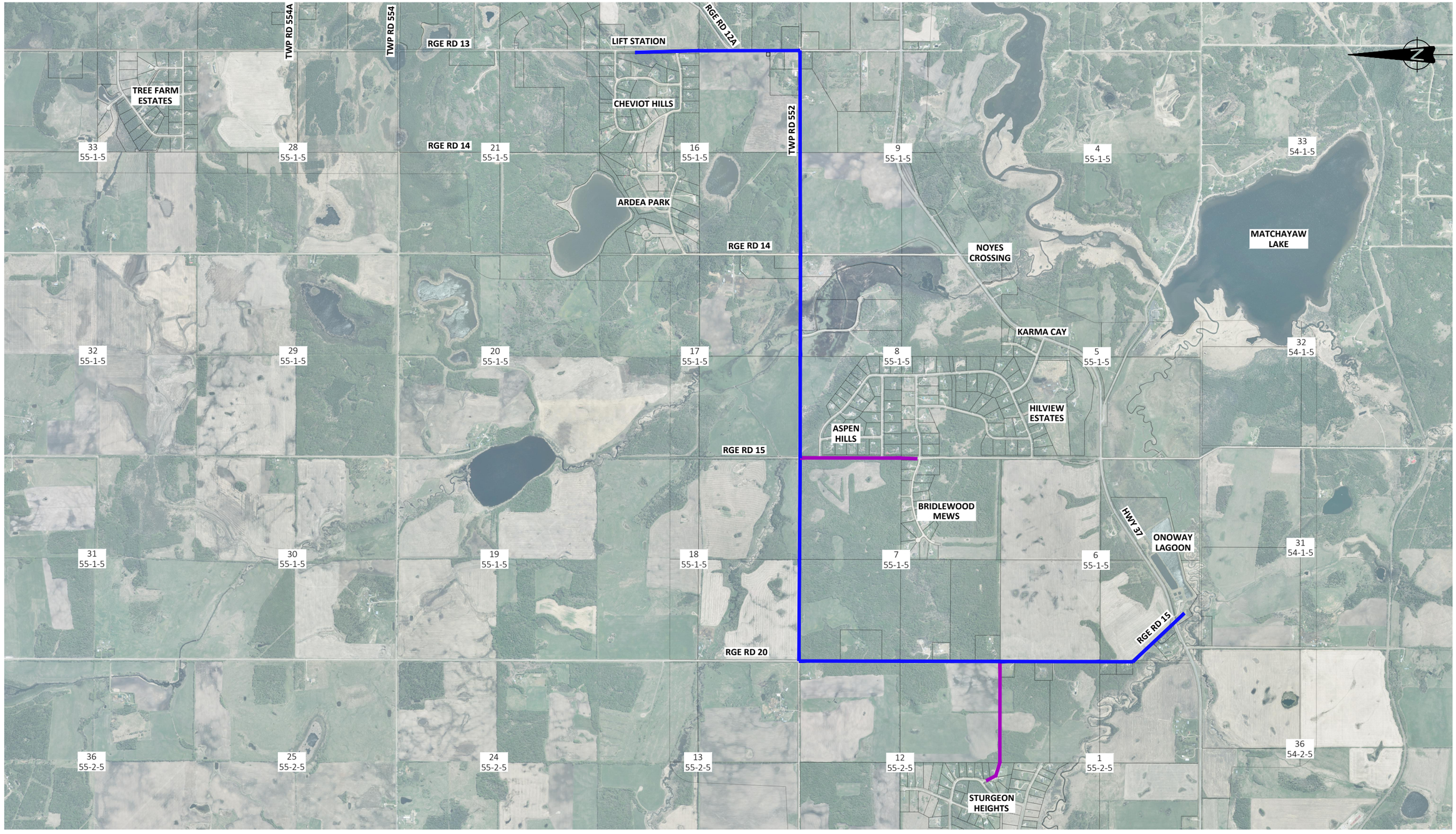

LEGEND:

- SANITARY MAIN 65mm DIA.
- SANITARY MAIN 75mm DIA.
- SANITARY MAIN 100mm DIA.
- SANITARY MAIN 150mm DIA.
- SANITARY MAIN 200mm DIA.
- SANITARY MAIN 250mm DIA.
- SANITARY MAIN SIZE UNKNOWN

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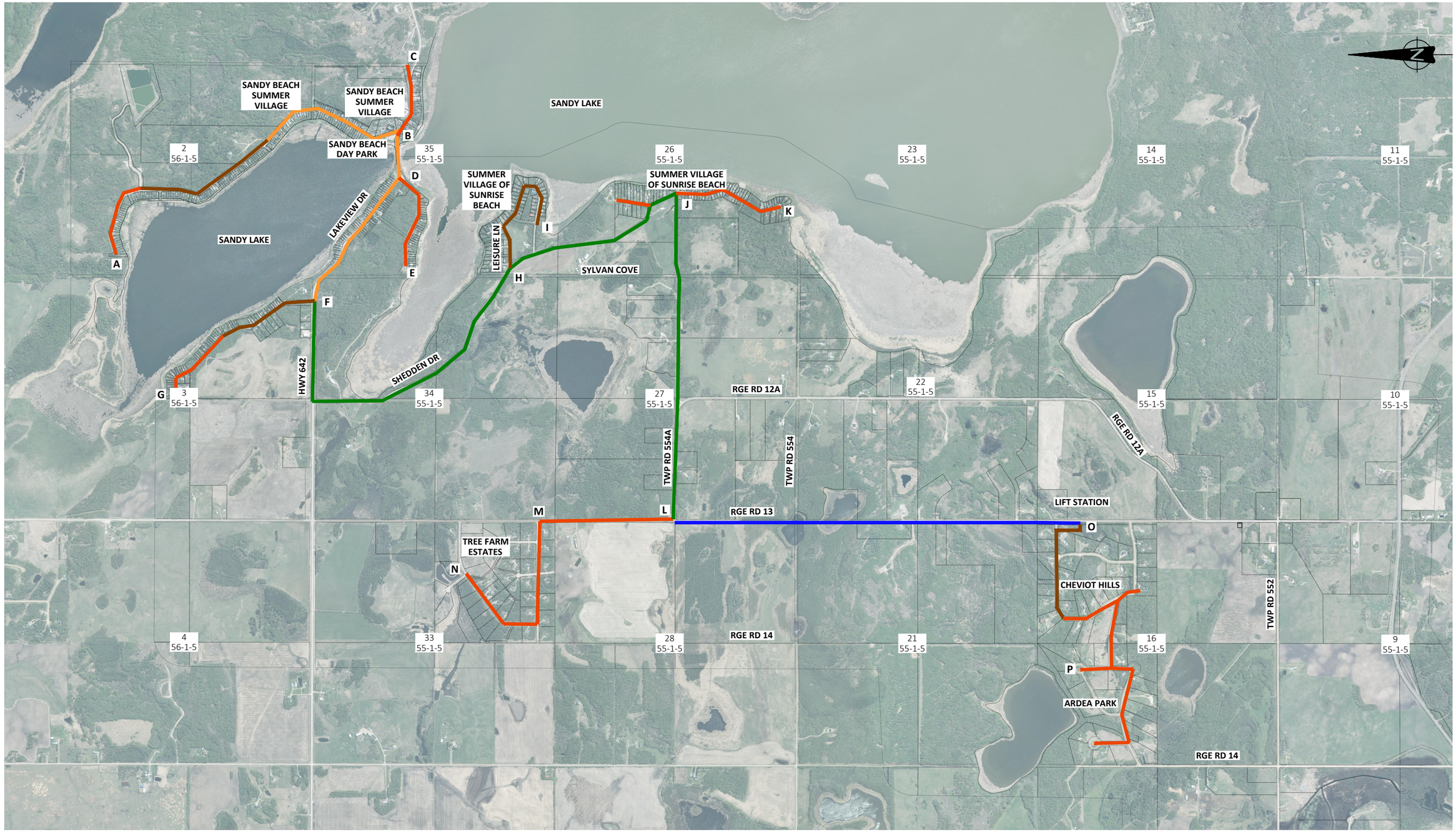
SANDY BEACH AND SUNRISE BEACH
WASTEWATER COLLECTION PHASE A
HYDRAULIC MODELLING
FORCEMAIN DISCHARGE TO ONOWAY LAGOON

SCALE: 1:30000	DATE: JUNE 2022	JOB: 5225-018-00	FIGURE: 6.1



LEGEND:

- SANITARY MAIN 65mm DIA.
- SANITARY MAIN 75mm DIA.
- SANITARY MAIN 100mm DIA.
- SANITARY MAIN 150mm DIA.
- SANITARY MAIN 200mm DIA.
- SANITARY MAIN 250mm DIA.
- SANITARY MAIN SIZE UNKNOWN

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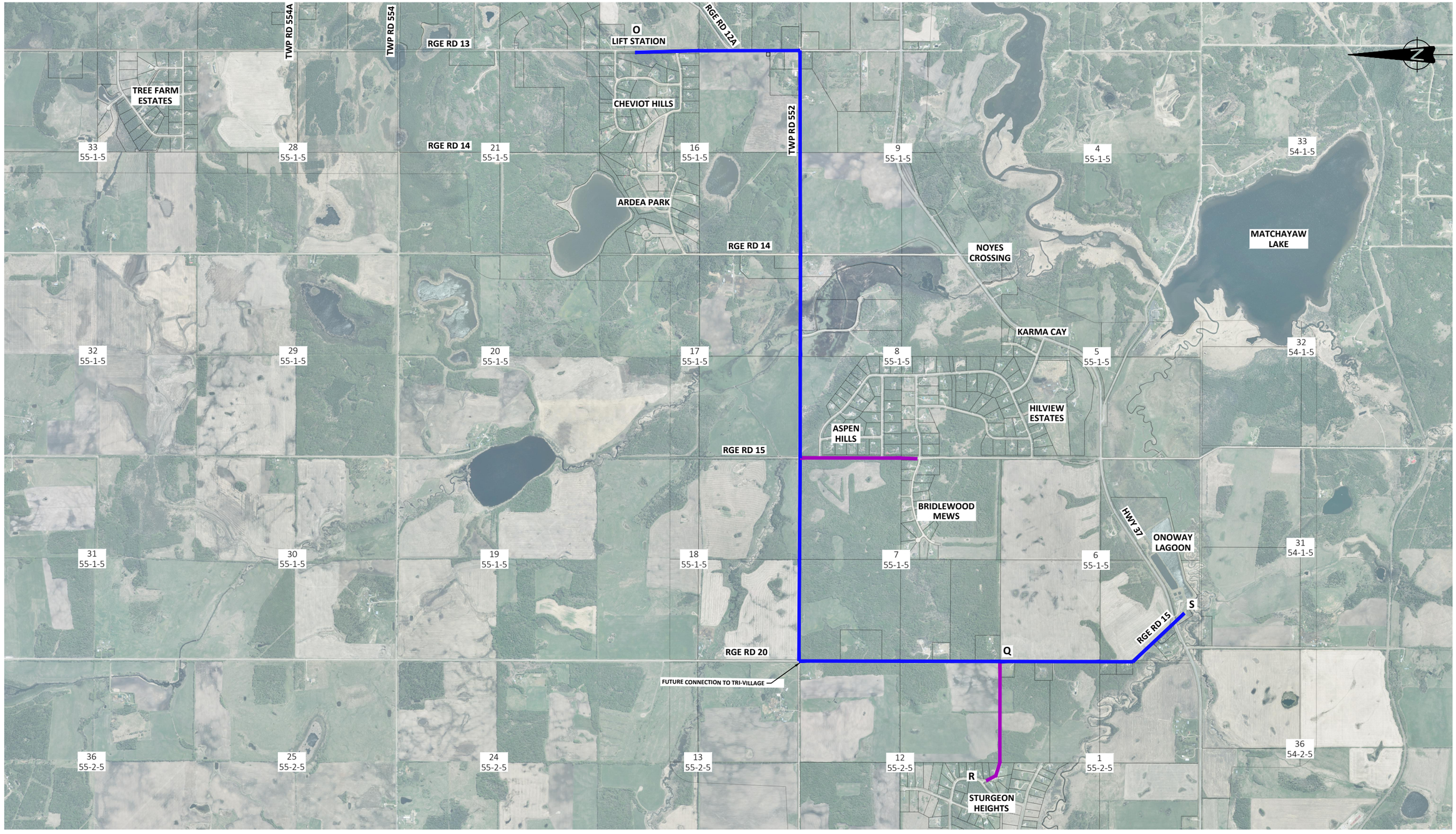
SANDY BEACH AND SUNRISE BEACH WASTEWATER COLLECTION PHASE A COST ESTIMATE SEGMENTS

SCALE:	DATE:	JOB:	FIGURE:
1:25000	JUNE 2022	5225-018-00	7.1



LEGEND:

- SANITARY MAIN 65mm DIA.
- SANITARY MAIN 75mm DIA.
- SANITARY MAIN 100mm DIA.
- SANITARY MAIN 150mm DIA.
- SANITARY MAIN 200mm DIA.
- SANITARY MAIN 250mm DIA.
- SANITARY MAIN SIZE UNKNOWN

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SANDY BEACH AND SUNRISE BEACH WASTEWATER COLLECTION PHASE A COST ESTIMATE SEGMENTS

SCALE: 1:30000	DATE: JUNE 2022	JOB: 5225-018-00	FIGURE: 7.2

8.0 CONCLUSIONS AND RECOMMENDATIONS

- The sensitivity analysis showed that the Orenco PF-1005 pump is capable to drive the wastewater to the proposed lift station site. MPE recommends that the County use pumps with a flow restrictor to ensure that the pumps do not run with higher flow and lower pressure head.
- The Low-Pressure Sewer scenarios with fewer pumps running result in low flow rates, thus, lower velocities through the main trunk with a minimum of 0.02 m/s. MPE recommends the installation of cleanouts along the pipeline length to prevent sedimentation and maintain the integrity of the system.
- Based on the existing Lidar info and the proposed alternate Lift Station location and low-pressure system alignment, the model shows that the system pressures were improved compared to the previous pipe alignment with the original Lift Station Site. MPE recommends that the County proceed with the alternate Lift Station location and alternate low-pressure system alignment for the Phase A wastewater collection system.
- MPE recommends a topographic survey of the proposed alternate Lift Station site to confirm the above results.
- A pump slightly larger than previously designed pump is required to accommodate the proposed lift station.

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APPENDIX A

Figure 1: Model Results – Rational Method

Pressure Junction Table for Section A

Pressure Junction Table for Section B

Pressure Junction Table for Section C

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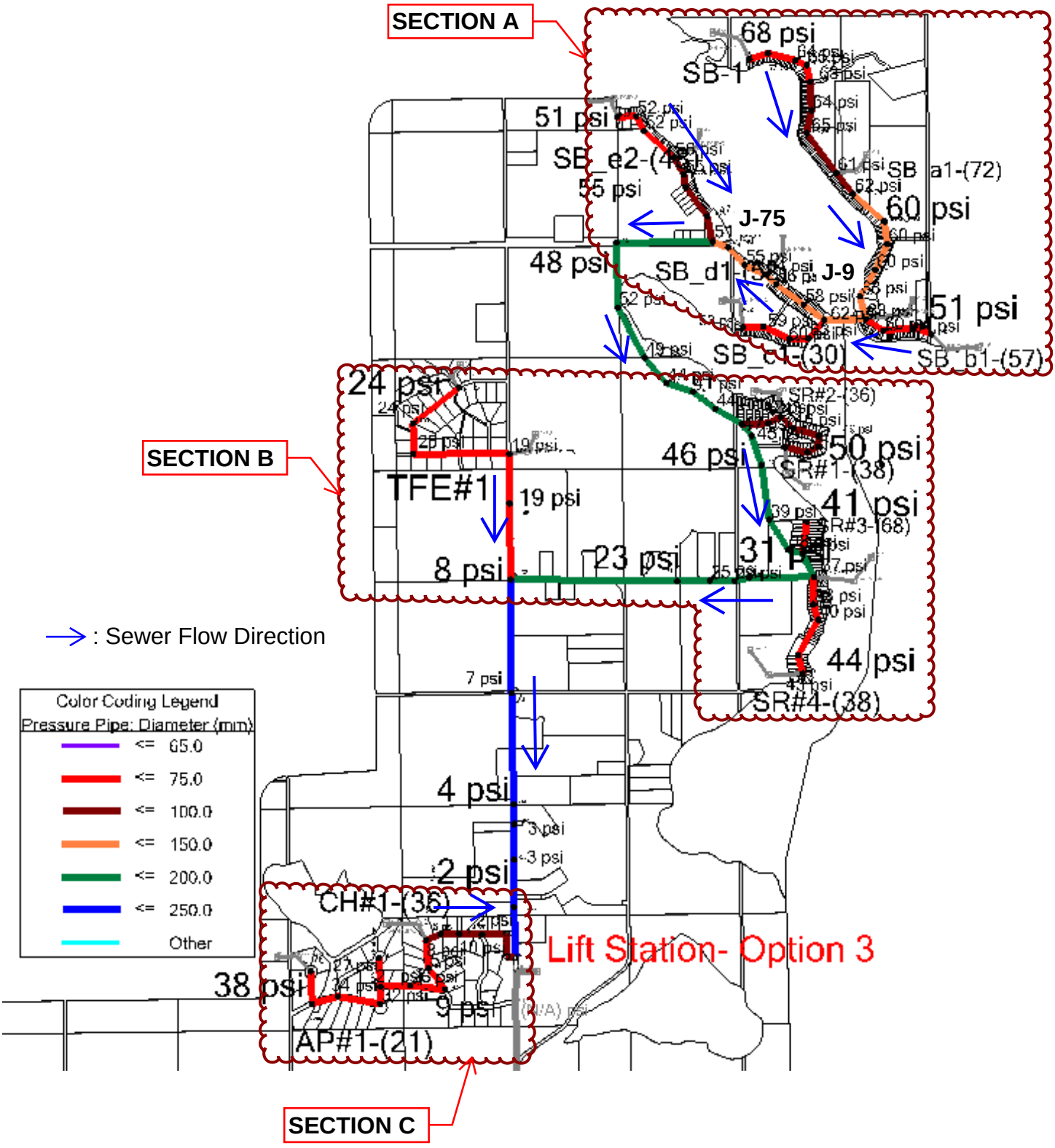
FIGURE 1: RATIONAL METHOD AND SYSTEM LAYOUT



SECTION A - PRESSURE JUNCTIONS

Scenario: LPS - Rational Method
Current Time Step: 0.000 h
FlexTable: Pressure Junction Table

ID	Label	Elevation (Ground) (m)	Elevation (m)	Sanitary Loads	Inflow (Wet) Collection	Hydraulic Grade (m)	Pressure (Maximum) (psi)	Notes	Pressure (psi)
446	SB-1	699.00	696.00	<Collection: 0 items>	<Collection: 0 items>	743.66	68	-	68
447	J-111	699.50	696.50	<Collection: 0 items>	<Collection: 0 items>	743.66	67	-	67
451	SB_a1(72)	701.74	697.59	<Collection: 1 item>	<Collection: 0 items>	743.66	65	-	65
173	J-3 (SB_East-1)	699.74	696.86	<Collection: 1 item>	<Collection: 0 items>	742.54	65	-	65
171	J-2	700.38	697.38	<Collection: 0 items>	<Collection: 0 items>	742.78	64	-	64
449	J-112	701.76	698.72	<Collection: 0 items>	<Collection: 0 items>	743.66	64	-	64
170	J-1	702.34	698.36	<Collection: 0 items>	<Collection: 0 items>	743.08	63	-	63
278	J-53	698.51	695.65	<Collection: 0 items>	<Collection: 0 items>	740.23	63	-	63
183	J-123	699.33	696.23	<Collection: 0 items>	<Collection: 0 items>	740.39	63	-	63
440	J-93	699.35	696.48	<Collection: 0 items>	<Collection: 0 items>	740.61	63	-	63
177	SB_a2-(76)	701.97	698.32	<Collection: 1 item>	<Collection: 0 items>	741.75	62	-	62
185	J-9	699.30	696.30	<Collection: 0 items>	<Collection: 0 items>	739.68	62	-	62
455	SB_b1-(57)	702.49	699.21	<Collection: 1 item>	<Collection: 0 items>	742.26	61	-	61
175	SB_a1-(72)	705.05	699.28	<Collection: 0 items>	<Collection: 0 items>	742.03	61	-	61
276	J-54	702.32	698.09	<Collection: 0 items>	<Collection: 0 items>	740.67	60	-	60
181	J-7	701.68	698.68	<Collection: 0 items>	<Collection: 0 items>	741.16	60	-	60
457	J-121	701.82	699.05	<Collection: 0 items>	<Collection: 0 items>	741.15	60	-	60
179	J-6 (SB_East-2)	704.33	699.31	<Collection: 1 item>	<Collection: 0 items>	741.37	60	-	60
437	J-92	701.57	698.92	<Collection: 0 items>	<Collection: 0 items>	740.89	60	-	60
274	SB_c1-(30)	704.33	700.06	<Collection: 1 item>	<Collection: 0 items>	741.34	59	-	59
187	J-10	700.74	698.10	<Collection: 0 items>	<Collection: 0 items>	739.07	58	-	58
189	J-11 (SB_West-2)	701.59	698.59	<Collection: 1 item>	<Collection: 0 items>	738.25	56	-	56
316	J-71	700.32	697.36	<Collection: 0 items>	<Collection: 0 items>	736.88	56	-	56
318	J-72 (SB. West-1)	700.79	697.82	<Collection: 1 item>	<Collection: 0 items>	736.88	55	-	55
193	SB_d1-(58)	701.41	698.41	<Collection: 1 item>	<Collection: 0 items>	737.34	55	-	55
320	SB_e2-(48)	702.15	698.00	<Collection: 1 item>	<Collection: 0 items>	736.88	55	-	55
195	J-14	700.56	697.78	<Collection: 0 items>	<Collection: 0 items>	736.44	55	-	55
191	J-12	702.79	699.87	<Collection: 0 items>	<Collection: 0 items>	737.90	54	-	54
273	J-52	705.32	703.73	<Collection: 0 items>	<Collection: 0 items>	741.34	53	-	53
314	J-70	703.00	700.00	<Collection: 0 items>	<Collection: 0 items>	736.88	52	-	52
312	SB_e1-(19)	703.20	700.20	<Collection: 0 items>	<Collection: 0 items>	736.88	52	-	52
454	J-120	702.00	706.13	<Collection: 0 items>	<Collection: 0 items>	742.26	51	-	51
311	J-68	703.80	700.80	<Collection: 0 items>	<Collection: 0 items>	736.88	51	-	51
324	J-75	702.66	699.66	<Collection: 0 items>	<Collection: 0 items>	735.70	51	-	51
322	J-73	706.21	703.21	<Collection: 0 items>	<Collection: 0 items>	736.19	47	-	47

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SECTION B - PRESSURE JUNCTIONS

Scenario: LPS - Rational Method
Current Time Step: 0.000 h
FlexTable: Pressure Junction Table

ID	Label	Elevation (Ground) (m)	Elevation (m)	Sanitary Loads	Inflow (Wet) Collection	Hydraulic Grade (m)	Pressure (Maximum) (psi)	Notes	Pressure (psi)
262	J-47	699.54	696.35	<Collection: 0 items>	<Collection: 0 items>	731.67	50	-	50
443	SR#1-(38)	699.65	696.65	<Collection: 1 item>	<Collection: 0 items>	731.79	50	-	50
261	J-46	700.19	697.19	<Collection: 0 items>	<Collection: 0 items>	731.79	49	-	49
264	J-94	700.10	697.06	<Collection: 0 items>	<Collection: 0 items>	731.57	49	-	49
209	J-21 (Sunrise 1)	700.34	697.34	<Collection: 0 items>	<Collection: 0 items>	730.22	47	-	47
266	J-49	701.93	698.60	<Collection: 0 items>	<Collection: 0 items>	731.32	46	-	46
213	J-23	699.83	696.83	<Collection: 0 items>	<Collection: 0 items>	729.13	46	-	46
211	J-22	700.94	697.94	<Collection: 0 items>	<Collection: 0 items>	729.86	45	-	45
250	SR#4-(38)	698.97	695.96	<Collection: 1 item>	<Collection: 0 items>	726.96	44	-	44
249	J-40	699.52	696.52	<Collection: 0 items>	<Collection: 0 items>	726.96	43	-	43
268	SR#2-(36)	703.84	700.82	<Collection: 1 item>	<Collection: 0 items>	731.16	43	-	43
270	J-94	703.95	700.95	<Collection: 0 items>	<Collection: 0 items>	730.83	42	-	42
579	SR#3-(68)	700.15	700.00	<Collection: 1 item>	<Collection: 0 items>	728.70	41	-	41
252	J-42	700.92	697.92	<Collection: 0 items>	<Collection: 0 items>	726.41	40	-	40
215	J-24	703.26	700.26	<Collection: 0 items>	<Collection: 0 items>	727.82	39	-	39
219	J-26	702.63	699.63	<Collection: 0 items>	<Collection: 0 items>	726.65	38	-	38
217	J-25	703.00	700.00	<Collection: 0 items>	<Collection: 0 items>	726.98	38	-	38
254	J-41	702.48	699.48	<Collection: 0 items>	<Collection: 0 items>	726.19	38	-	38
221	J-27 (Sunrise-2)	702.81	699.81	<Collection: 1 item>	<Collection: 0 items>	725.82	37	-	37
223	J-28	704.42	701.42	<Collection: 0 items>	<Collection: 0 items>	723.57	31	-	31
225	J-29	705.74	702.74	<Collection: 0 items>	<Collection: 0 items>	723.04	29	-	29
227	J-30	707.30	704.30	<Collection: 0 items>	<Collection: 0 items>	722.18	25	-	25
383	TFE#1	710.00	707.00	<Collection: 1 item>	<Collection: 0 items>	724.46	25	-	25
506	J-109	710.50	707.50	<Collection: 0 items>	<Collection: 0 items>	724.46	24	-	24
505	J-108	710.80	707.80	<Collection: 0 items>	<Collection: 0 items>	724.46	24	-	24
229	J-31	708.04	705.04	<Collection: 0 items>	<Collection: 0 items>	721.05	23	-	23
258	J-45	707.94	704.75	<Collection: 0 items>	<Collection: 0 items>	718.40	19	-	19
257	J-44 (Tree Farm Estates)	710.00	706.93	<Collection: 0 items>	<Collection: 0 items>	720.47	19	-	19
231	J-32	712.79	709.50	<Collection: 0 items>	<Collection: 0 items>	715.26	8	-	8

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SECTION C - PRESSURE JUNCTIONS

Scenario: LPS - Rational Method
Current Time Step: 0.000 h
FlexTable: Pressure Junction Table

ID	Label	Elevation (Ground) (m)	Elevation (m)	Sanitary Loads	Inflow (Wet) Collection	Hydraulic Grade (m)	Pressure (Maximum) (psi)	Notes	Pressure (psi)
334	J-76	695.25	692.25	<Collection: 0 items>	<Collection: 0 items>	718.80	38	-	38
335	J-77	695.52	692.52	<Collection: 0 items>	<Collection: 0 items>	718.80	37	-	37
337	AP#1-(21)	697.90	694.90	<Collection: 1 item>	<Collection: 0 items>	718.80	34	-	34
339	J-79	698.79	695.54	<Collection: 0 items>	<Collection: 0 items>	717.92	32	-	32
343	J-81	701.57	698.57	<Collection: 0 items>	<Collection: 0 items>	717.57	27	-	27
341	J-80 (Ardea Park Load)	701.89	698.89	<Collection: 0 items>	<Collection: 0 items>	717.57	27	-	27
345	J-82	701.79	698.79	<Collection: 0 items>	<Collection: 0 items>	716.97	26	-	26
347	J-83	713.21	710.00	<Collection: 0 items>	<Collection: 0 items>	716.25	9	-	9
351	CH#1-(36)	712.42	709.42	<Collection: 1 item>	<Collection: 0 items>	715.13	8	-	8
353	J-86 (Cheviot Hills Load)	713.55	710.74	<Collection: 0 items>	<Collection: 0 items>	714.71	6	-	6
349	J-84	715.24	712.24	<Collection: 0 items>	<Collection: 0 items>	715.70	5	-	5
379	J-85	715.36	712.36	<Collection: 0 items>	<Collection: 0 items>	713.64	2	-	2

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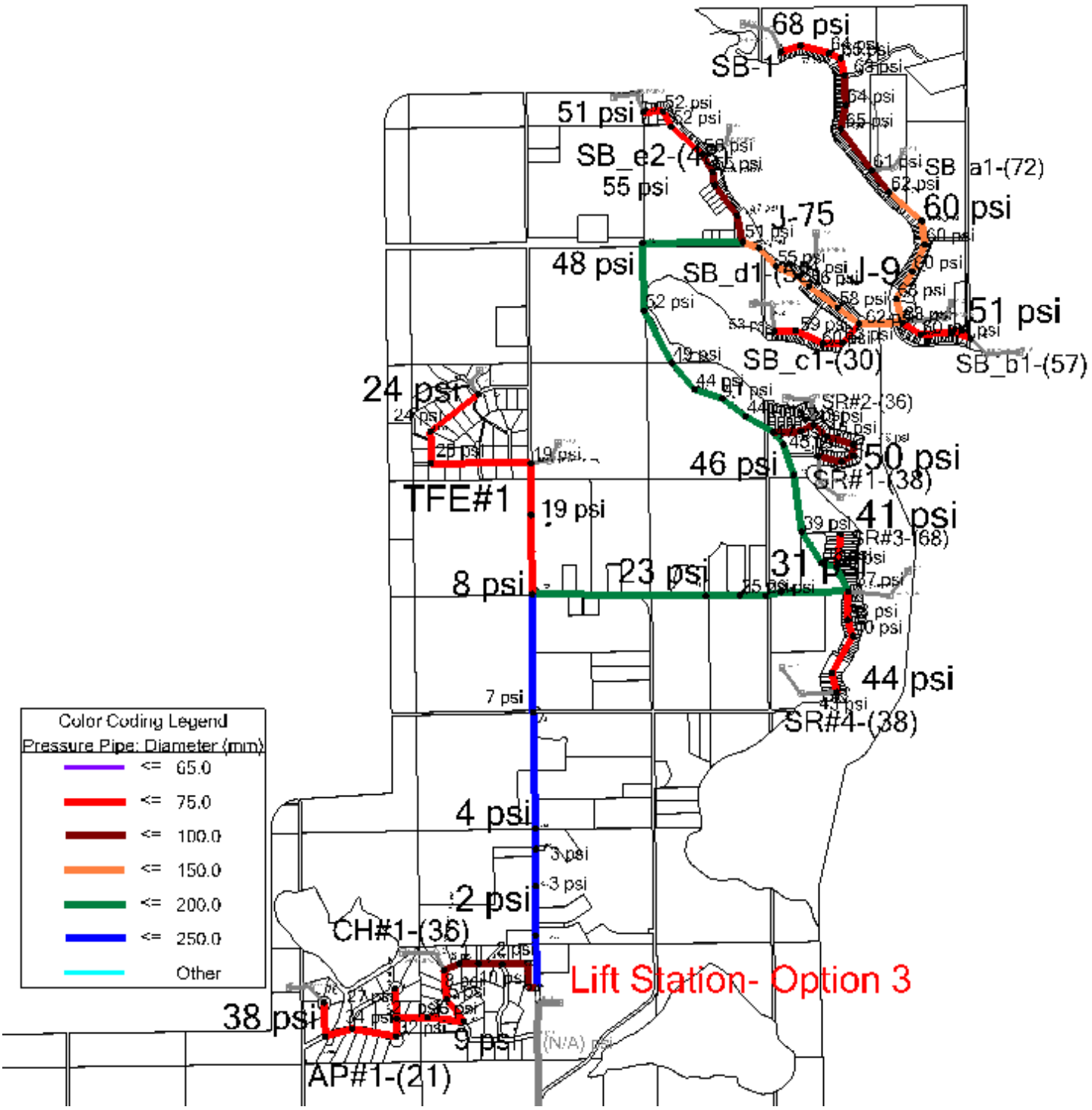
Figure 1: Model Results - Rational Method



APPENDIX B

Detailed Cost Estimate

DRAFT

Lac Ste Anne County - Sandy Beach to Onoway Wastewater Collection Phase A

COST ESTIMATE

	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	COST
General Items					
A to B					
1.0	Supply and Install 75 mm diameter HDPE DR 11	520	m	80.00	41,600.00
2.0	Supply and Install 100 mm diameter HDPE DR 1	950	m	100.00	95,000.00
3.0	Supply and Install 150 mm diameter HDPE DR 11	1000	m	120.00	120,000.00
4.0	Supply and Install 75 mm diameter Isolation Valves	1	ea	4,000.00	4,000.00
5.0	Supply and Install 100 mm diameter Isolation Valves	2	ea	6,000.00	12,000.00
6.0	Supply and Install 150mm diameter Isolation Valves	3	ea	8,000.00	24,000.00
7.0	Supply and Install Air Release Valves	1	ea	20,000.00	20,000.00
8.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
9.0	Service Connections	149	ea	5,000.00	745,000.00
10.0	Miscellaneous Site Work	1	LS	107,000.00	107,000.00
	SUBTOTAL				**1,190,100.00**
	Contingency (25%)				**297,525.00**
	Engineering (12%)				**178,515.00**
	Total A to B				**1,666,140.00**
C to B					
1.0	Supply and Install 75 mm diameter HDPE DR 11	500	m	80.00	40,000.00
2.0	Service Connections	28	ea	5,000.00	140,000.00
3.0	Supply and Install 75 mm diameter isolation valves	2	ea	4,000.00	8,000.00
4.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
5.0	Supply and Install Air Release Valves	1	ea	20,000.00	20,000.00
6.0	Miscellaneous Site Work	1	LS	23,000.00	23,000.00
	SUBTOTAL				**252,500.00**
	Contingency (25%)				**63,125.00**
	Engineering (12%)				**37,875.00**
	Total C to B				**353,500.00**
B to D					
1.0	Service Connections	2	ea	5,000.00	10,000.00
2.0	150 mm diameter HDPE DR 11	250	m	120.00	30,000.00
3.0	Causeway Crossing	250	m	300.00	75,000.00
4.0	Miscellaneous Site Work	1	LS	11,500.00	11,500.00
	SUBTOTAL				**126,500.00**
	Contingency (25%)				**31,625.00**
	Engineering (12%)				**18,975.00**
	Total B to D				**177,100.00**
E to D					
1.0	Service Connections	31	ea	5,000.00	155,000.00
2.0	75 mm diameter HDPE DR 11	750	m	80.00	60,000.00
3.0	Supply and Install 75 mm diameter isolation valves	2	ea	4,000.00	8,000.00
4.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
5.0	Miscellaneous Site Work	1	LS	24,000.00	24,000.00
	SUBTOTAL				**268,500.00**
	Contingency (25%)				**67,125.00**
	Engineering (12%)				**40,275.00**
	Total E to D				**375,900.00**
D to F					
1.0	Service Connections	59	ea	5,000.00	295,000.00
2.0	150 mm diameter HDPE DR 11	1050	m	120.00	126,000.00
3.0	Supply and Install 150 mm diameter isolation Valves	2	ea	8,000.00	16,000.00
4.0	Supply and Install Air Release Valves	1	ea	20,000.00	20,000.00
5.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
6.0	Miscellaneous Site Work	1	LS	47,000.00	47,000.00
	SUBTOTAL				**525,500.00**
	Contingency (25%)				**131,375.00**
	Engineering (12%)				**78,825.00**
	Total D to F				**735,700.00**

G to F					
1.0	Service Connections	57	ea	5,000.00	285,000.00
2.0	75 mm diameter HDPE DR 11	560	m	80.00	44,800.00
3.0	100 mm diameter HDPE DR 11	680	m	100.00	68,000.00
4.0	Supply and Install 75 mm diameter isolation valves	1	ea	4,000.00	4,000.00
3.0	Supply and Install 100 mm diameter isolation valves	1	ea	6,000.00	6,000.00
4.0	Supply and Install Air Release Valves	1	ea	20,000.00	20,000.00
5.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
6.0	Miscellaneous Site Work	1	LS	44,500.00	44,500.00
	SUBTOTAL				**493,800.00**
	Contingency (25%)				**123,450.00**
	Engineering (12%)				**74,070.00**
	Total G to F				**691,320.00**
F to H					
1.0	Service Connections	3	ea	5,000.00	15,000.00
2.0	200 mm diameter HDPE DR 11	2450	m	140.00	343,000.00
3.0	Supply and Install 200 mm diameter isolation valves	5	ea	10,000.00	50,000.00
4.0	Supply and Install Air Release Valves	2	ea	20,000.00	40,000.00
5.0	Supply and Install Flush Out	2	ea	21,500.00	43,000.00
4.0	Miscellaneous Site Work	1	LS	48,500.00	48,500.00
	SUBTOTAL				**539,500.00**
	Contingency (25%)				**134,875.00**
	Engineering (12%)				**80,925.00**
	Total F to H				**755,300.00**
I to H					
1.0	Service Connections	71	ea	5,000.00	355,000.00
2.0	100 mm diameter HDPE DR 11	980	m	100.00	98,000.00
3.0	Supply and Install 100 mm diameter isolation valves	2	ea	6,000.00	12,000.00
4.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
5.0	Miscellaneous Site Work	1	LS	48,000.00	48,000.00
	SUBTOTAL				**534,500.00**
	Contingency (25%)				**133,625.00**
	Engineering (12%)				**80,175.00**
	Total I to H				**748,300.00**
H to J					
1.0	Service Connections	25	ea	5,000.00	125,000.00
2.0	75 mm diameter HDPE DR 11	230	m	80.00	18,400.00
3.0	200 mm diameter HDPE DR 11	1300	m	140.00	182,000.00
4.0	Supply and Install 200 mm diameter isolation valves	3	ea	10,000.00	30,000.00
5.0	Supply and Install 75 mm diameter isolation valves	1	ea	4,000.00	4,000.00
6.0	Supply and Install Air Release Valves	1	ea	20,000.00	20,000.00
7.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
8.0	Miscellaneous Site Work	1	LS	39,500.00	39,500.00
	SUBTOTAL				**440,400.00**
	Contingency (25%)				**110,100.00**
	Engineering (12%)				**66,060.00**
	Total H to J				**616,560.00**
J to K					
1.0	Service Connections	75	ea	5,000.00	375,000.00
2.0	75 mm Diameter HDPE DR 11	760	m	80.00	60,800.00
3.0	Supply and Install 75 mm isolation valves	1	ea	4,000.00	4,000.00
4.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
5.0	Miscellaneous Site Work	1	LS	45,500.00	45,500.00
	SUBTOTAL				**506,800.00**
	Contingency (25%)				**126,700.00**
	Engineering (12%)				**76,020.00**
	Total J to K				**709,520.00**
J to L					
1.0	Service Connections	4	ea	5,000.00	20,000.00
2.0	200 mm diameter HDPE DR 11	2200	m	140.00	308,000.00
3.0	Supply and Install 200 mm diameter isolation valves	2	ea	10,000.00	20,000.00
4.0	Supply and Install Air Release Valves	1	ea	20,000.00	20,000.00
5.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
7.0	Miscellaneous Site Work	1	LS	38,500.00	38,500.00
	SUBTOTAL				**428,000.00**
	Contingency (25%)				**107,000.00**
	Engineering (12%)				**64,200.00**

	Total J to L				**599,200.00**
M to L					
1.0	Service Connections	4	ea	5,000.00	20,000.00
2.0	75 mm diameter HDPE DR 11	900	m	80.00	72,000.00
3.0	Supply and Install 75 mm isolation valves	1	ea	4,000.00	4,000.00
4.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
5.0	Supply and Install Air Release Valves	1	ea	20,000.00	20,000.00
6.0	Miscellaneous Site Work	1	LS	13,500.00	13,500.00
	SUBTOTAL				**151,000.00**
	Contingency (25%)				**37,750.00**
	Engineering (12%)				**22,650.00**
	Total M to L				**211,400.00**
N to M					
1.0	Service Connections	41	ea	5,000.00	205,000.00
2.0	75 mm diameter HDPE DR 11	1330	m	80.00	106,400.00
3.0	Supply and Install 75 mm isolation valves	1	ea	4,000.00	4,000.00
4.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
5.0	Miscellaneous Site Work	1	LS	33,000.00	33,000.00
	SUBTOTAL				**369,900.00**
	Contingency (25%)				**92,475.00**
	Engineering (12%)				**55,485.00**
	Total Lift Station				**517,860.00**
L to O					
1.0	250 mm diameter HDPE DR 11	2800	m	160.00	448,000.00
2.0	Service Connections	3	ea	5,000.00	15,000.00
3.0	Supply and Install 250 mm diameter isolation valves	1	ea	12,000.00	12,000.00
4.0	Supply and Install Air Release valves	2	ea	20,000.00	40,000.00
5.0	Supply and Install Flush Out	2	ea	21,500.00	43,000.00
6.0	Miscellaneous Site Work	1	LS	55,000.00	55,000.00
	SUBTOTAL				**613,000.00**
	Contingency (25%)				**153,250.00**
	Engineering (12%)				**91,950.00**
	Total L to O				**858,200.00**
					-
O to P					
1.0	75 mm diameter HDPE DR 11	1980	m	80.00	158,400.00
2.0	100 mm diameter HDPE DR 11	930	m	100.00	93,000.00
3.0	Service Connections	55	ea	5,000.00	275,000.00
4.0	Supply and Install Air Release valves	1	ea	20,000.00	20,000.00
5.0	Supply and Install Flush Out	2	ea	21,500.00	43,000.00
6.0	Supply and Install 75 mm diameter isolation valves	3	ea	4,000.00	12,000.00
7.0	Supply and Install 100 mm diameter isolation valves	2	ea	6,000.00	12,000.00
6.0	Miscellaneous Site Work	1	LS	60,500.00	60,500.00
	SUBTOTAL				**673,900.00**
	Contingency (25%)				**168,475.00**
	Engineering (12%)				**101,085.00**
	TOTAL O to P				**943,460.00**
Lift Station					
1.0	Supply and Install Lift Station	1	LS	1,200,000.00	1,200,000.00
2.0	Miscellaneous Site Work	1	LS	118,000.00	118,000.00
	SUBTOTAL				**1,318,000.00**
	Contingency (25%)				**329,500.00**
	Engineering (15%)				**197,700.00**
	Total Lift Station				**1,845,200.00**
O to Q					
1.0	250 mm diameter HDPE DR 11	7720	m	160.00	1,235,200.00
2.0	Supply and Install 250 mm dimater isolation valves	2	ea	12,000.00	24,000.00
3.0	Supply and Install Air Release Valves	2	ea	20,000.00	40,000.00
4.0	Supply and Install Flush Out	2	ea	21,500.00	43,000.00
5.0	150 mm Diameter HDPE DR 11 between Aspen Hills and TWP RD 552	180	m	120.00	21,600.00
6.0	Aspen Hills Lift Station	1	LS	750,000.00	750,000.00
7.0	Miscellaneous Site Work	1	LS	208,000.00	208,000.00
	SUBTOTAL				**2,321,800.00**
	Contingency (25%)				**580,450.00**
	Engineering (15%)				**348,270.00**
	Total O to Q				**3,250,520.00**
R to Q					

1.0	150 mm Diameter HDPE DR 11 between Sturgeon Heights and RGE RD 20	810	m	120.00	97,200.00
2.0	Supply and Install 150 mm isolation valves	1	ea	8,000.00	8,000.00
3.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
4.0	Supply and Install Air Release Valves	1	ea	20,000.00	20,000.00
5.0	Land Acquisition	0.81	ha	1,200.00	972.00
6.0	Sturgeon Heights Lift Station	1	LS	575,000.00	575,000.00
7.0	Miscellaneous Site Work	1	LS	71,000.00	71,000.00
	SUBTOTAL				**793,672.00**
	Contingency (25%)				**198,418.00**
	Engineering (15%)				**119,050.80**
	Total R to Q				**1,111,140.80**
Q to S					
1.0	Supply and Install 250 mm diameter HDPE DR 11	1700	m	160.00	272,000.00
2.0	Service Connections	11	ea	5,000.00	55,000.00
3.0	Supply and Install 250 mm diameter Isolation Valves	1	ea	12,000.00	12,000.00
4.0	Supply and Install Flush Out	1	ea	21,500.00	21,500.00
5.0	Supply and Install Air Release Valves	1	ea	20,000.00	20,000.00
6.0	Lagoon Tie In	1	LS	275,000.00	275,000.00
7.0	Miscellaneous Site Work	1	LS	64,500.00	64,500.00
	SUBTOTAL				**720,000.00**
	Contingency (25%)				**180,000.00**
	Engineering (15%)				**135,000.00**
	TOTAL Q to S				**1,035,000.00**
					-
Total					$ 17,201,320.80
TOTAL					**$ 17,201,320.80**

ATB Financial

Deposit Account Statement

Statement date August 31, 2022
Transit number 08989-219
Customer number 0000063389
Page number 1 of 1

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SANDY BEACH AND SUNRISE BEACH
JOINT LAGOON COMMITTEE
JOINT LAGOON AUTHORITY
COMP 63 RR 1 SITE 1
ONOWAY AB T0E 1V0

Your ATB Financial Branch
08989 Onoway Branch
4910 50 St
Onoway AB
T0E 1V0

If you have any questions, contact us at 1 800 332-8383 or visit us at www.atb.com

A summary of Deposit Account
Pay As You Go Account

SCANNED

00110547724		**Transit # 08989-219**
Your balance forward on Jul 31, 2022		$3,033.53
Debits to your account (1 item)	-	$8.00
Credits to your account (0 items)	+	$0.00
Your closing balance on Aug 31, 2022	=	**$3,025.53**

Details of your account transactions

Date	Description	Debits to your account ($)	Credits to your account ($)	Balance ($)
Jul 31	**Balance forward**			**$3,033.53**
Aug 31	Monthly Maintenance Fees	$8.00		3,025.53
Aug 31	**Closing balance**			**$3,025.53**

Find an error? Give us a call or drop by a branch. We'll take care of it.

JCA7931504-0072421-27589-0001-0001-00-