

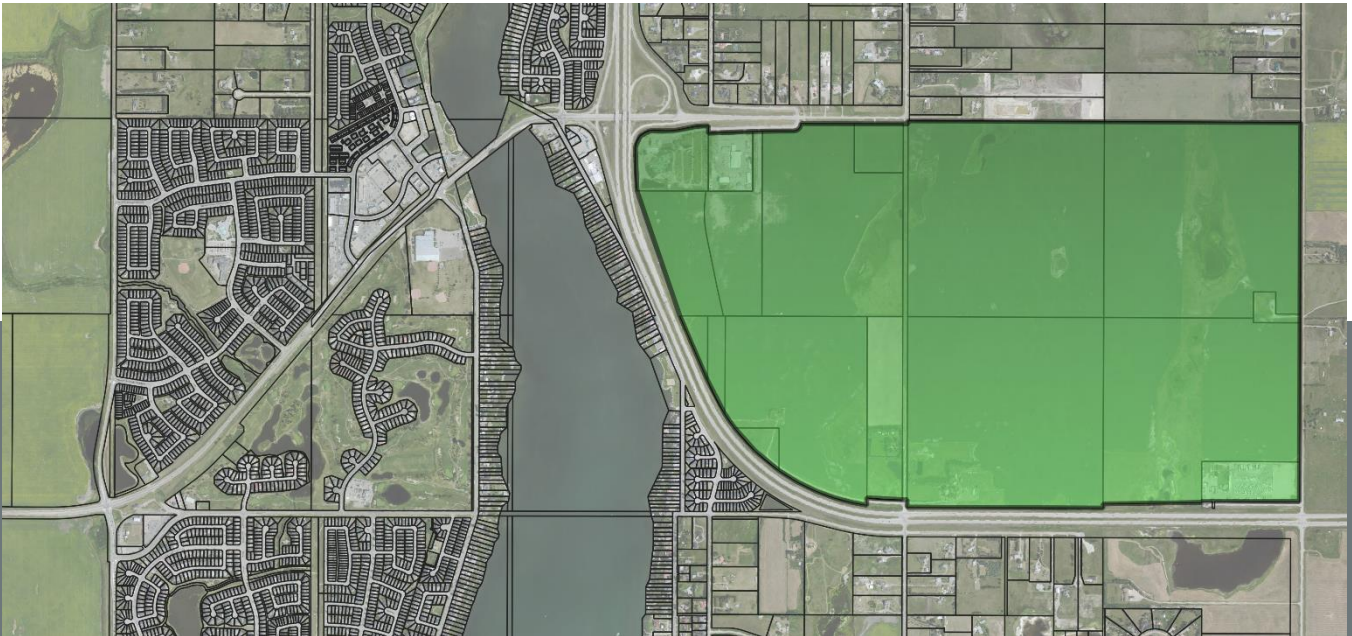
City of Chestermere

Utility Master Plan Amendment

for Sanitary Servicing of

Mountain View Park ASP Area

C010 // C04-00377 R1



CIMA+ file number: C010 // C04-00377 R1
January 22, 2021

City of Chestermere

Utility Master Plan Amendment

for Sanitary Servicing of
Mountain View Park ASP Area

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Appendix A - Tables and Maps from Clearwater Sanitary Servicing Memo - IBI GROUP

1. Introduction

1.1 Authorization and Terms of Reference

In November of 2020, at the request of the City of Chestermere, Centron retained CIMA+ to provide consulting services to create an amendment to the City's Utility Master Plan (UMP) which was completed in 2017. The 2017 UMP considered the Mountain View Park ASP area as beyond the 25-year development horizon. Since the creation of the 2017 UMP, the development timing has changed and the City is in need of an amendment to the UMP that considers development of the Mountain View Park ASP in the near term.

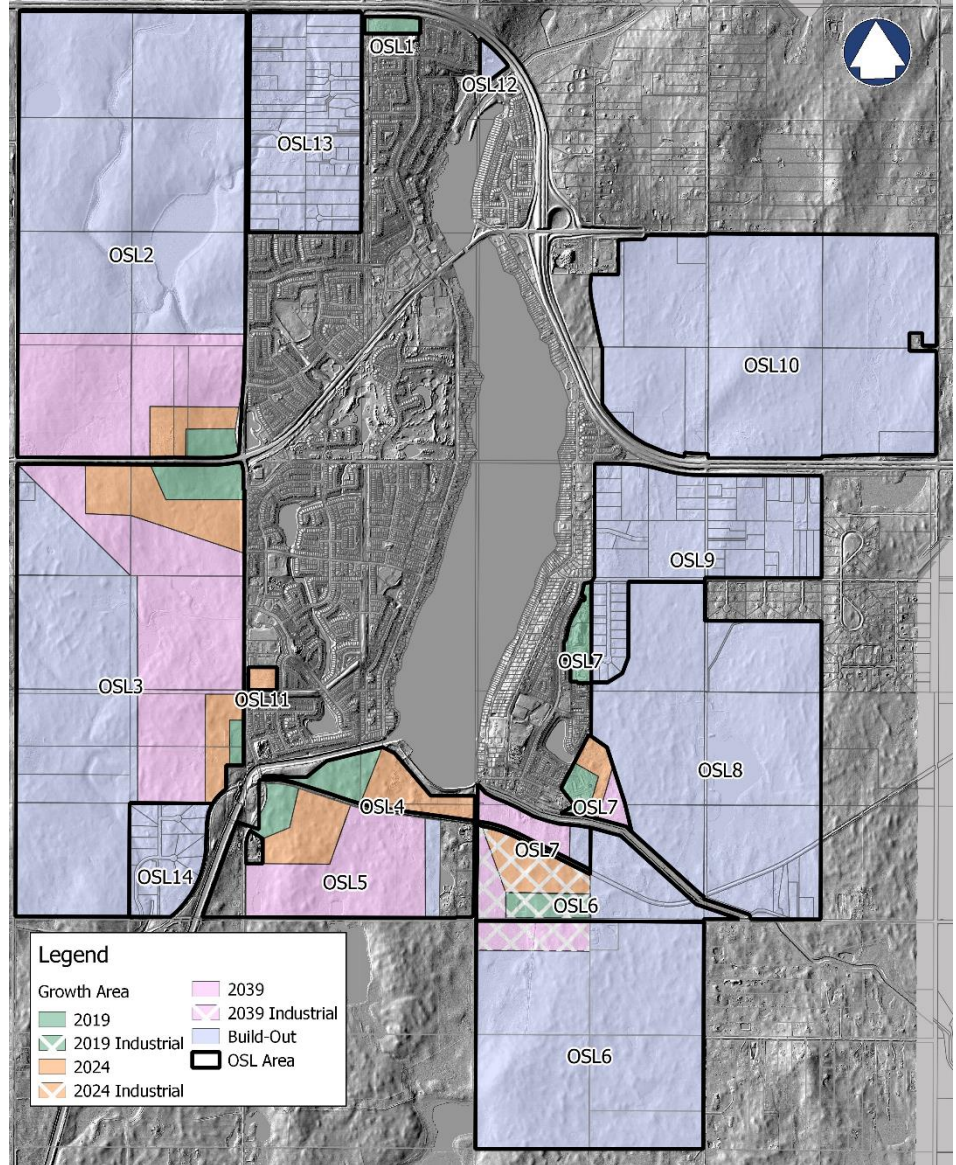
This amendment develops a wastewater servicing solution for the Clearwater Park development and wider Mountain View Park ASP area. This scope of work includes:

- + Prepare an ultimate wastewater servicing strategy for the approximately six quarter sections included in the Mountain View Park ASP area, including the Clearwater development.
 - o Overall wastewater generation rates are provided by others that are calculated following the City standards, provincial standards and best practices.
 - IBI has provided a peak wet weather flow rate of 212.5 L/s in their Sanitary Servicing Memo from January 2021 for the entire ASP area.
- + Prepare interim servicing strategies that will inform the City how the flows from Mountain View Park ASP area can be accommodated with the City's existing system, or which upgrades would be required.
 - o Initially LS10 is expected to be able to accommodate the first phases of development.
- + Develop servicing stages and opinions of probable cost for each. Each servicing horizon will also be assigned a trigger which will either be population and/or flow rate. Triggers determine when the next stage of the servicing plan should be executed.

1.2 Background

CIMA+ completed the City’s current Utility Master Plan (UMP) in 2017. At the time, the Mountain View Park ASP area was forecasted to have development occur beyond the 25-year horizon considered in the report. The 2017 plan describes the Mountain View Park ASP area as being serviced into a proposed “East Chestermere Gravity Trunk” along with the majority of undeveloped lands to the east of Chestermere. This sanitary trunk was proposed to direct wastewater flows to Lift Station 14 (LS14). LS14 was proposed to discharge to LS13 in the 25-year horizon, but directly to the City of Calgary in the full build-out growth scenario.

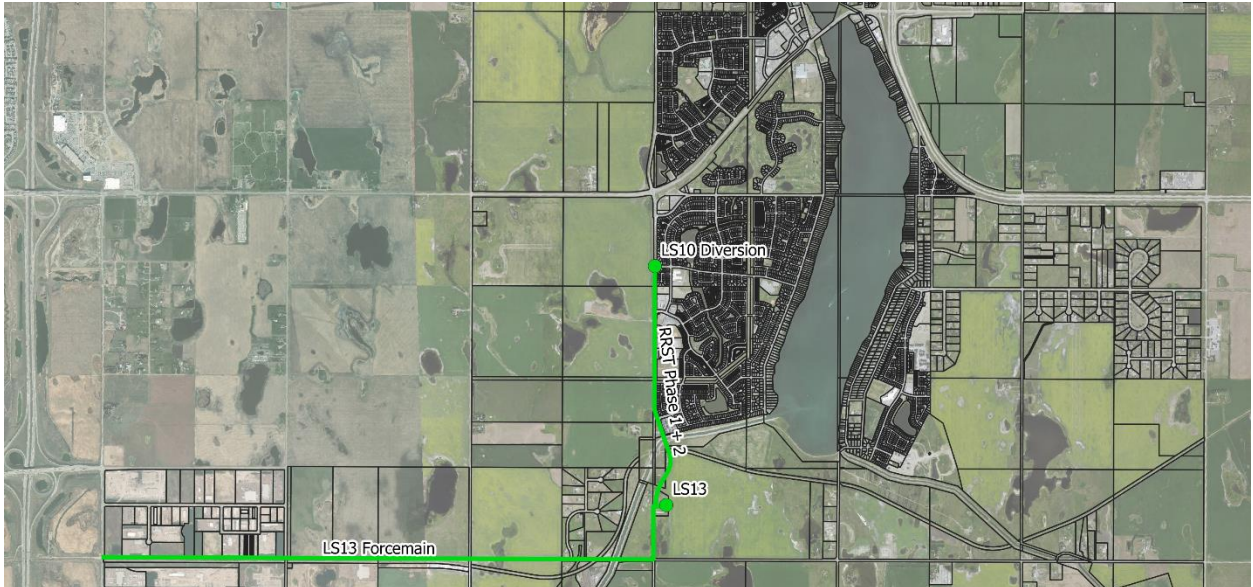
Due to a change in the expected timing of development of the Mountain View Park ASP area, the City of Chestermere



requires an amendment to 2017 UMP that identifies feasible wastewater servicing solutions. An alternate wastewater servicing solution would allow for the Mountain View Park ASP lands to be serviced without construction of the East Chestermere Sanitary Trunk. A proposed servicing solution is to construct a lift station in Clearwater Park to pump to the City’s Lift Station 10 (LS10). Once flow is at LS10, there are a variety of options and operating modes available to City related to the route it would take to Calgary. See Section 3 – Existing System Operating Modes.

2. Existing System Improvements

Since the UMP was completed in 2017, various upgrades have occurred within Chestermere's wastewater system. The projects relevant to the Clearwater Park development are summarized as follows.



RRST Phase 1 and 2

The Rainbow Road Sanitary Trunk has been constructed from Lakeview Dr and Rainbow Road to Lift Station 13. The sanitary trunk is composed of HDPE lined reinforced concrete pipe with an inside diameter of 1200 mm. Its minimum slope is 0.13% which gives it a flow capacity of approximately 1374 L/s when flowing at 80% of depth.

Lift Station 13 Forcemain

A 600 mm PVC DR25 forcemain (FM) was constructed from LS13 along Township Road 240 that discharges at the intersection of 84 St SE and Township Road 240.

Lift Station 13

Lift Station 13 was commissioned with two 335 HP pumps with a firm pumping capacity of 310 L/s and the ability to add two additional pumps.

Lift Station 10 Diversion into Rainbow Road Sanitary Trunk (RRST)

When LS4 and LS12 are discharging into RRST at Rainbow Falls Gate and Rainbow Road (RRST MH1), Lift Station 10 will be able to utilize the existing 200mm and 300mm forcemains from LS4 and LS12 and effectively flow "backwards" in the forcemains and discharge into RRST at Lakeview Dr and Rainbow Road (RRST MH6). This effectively shortens the distance from LS10 to the discharge and has the benefit of increasing flow capacity out of LS10.

3. Existing System Operating Modes

Based on the existing system improvements, LS10 now has at least 5 unique operating modes. The following scenarios were developed and hydraulically modelled using Bentley SewerGEMs to determine flow rates through each forcemain. The flows included in these operating modes are design flows, and not actual measured flow.

3.1 Operating Mode 1

Operating Mode 1 represents the pre-LS13 / RRST operating scenario for the City of Chestermere:

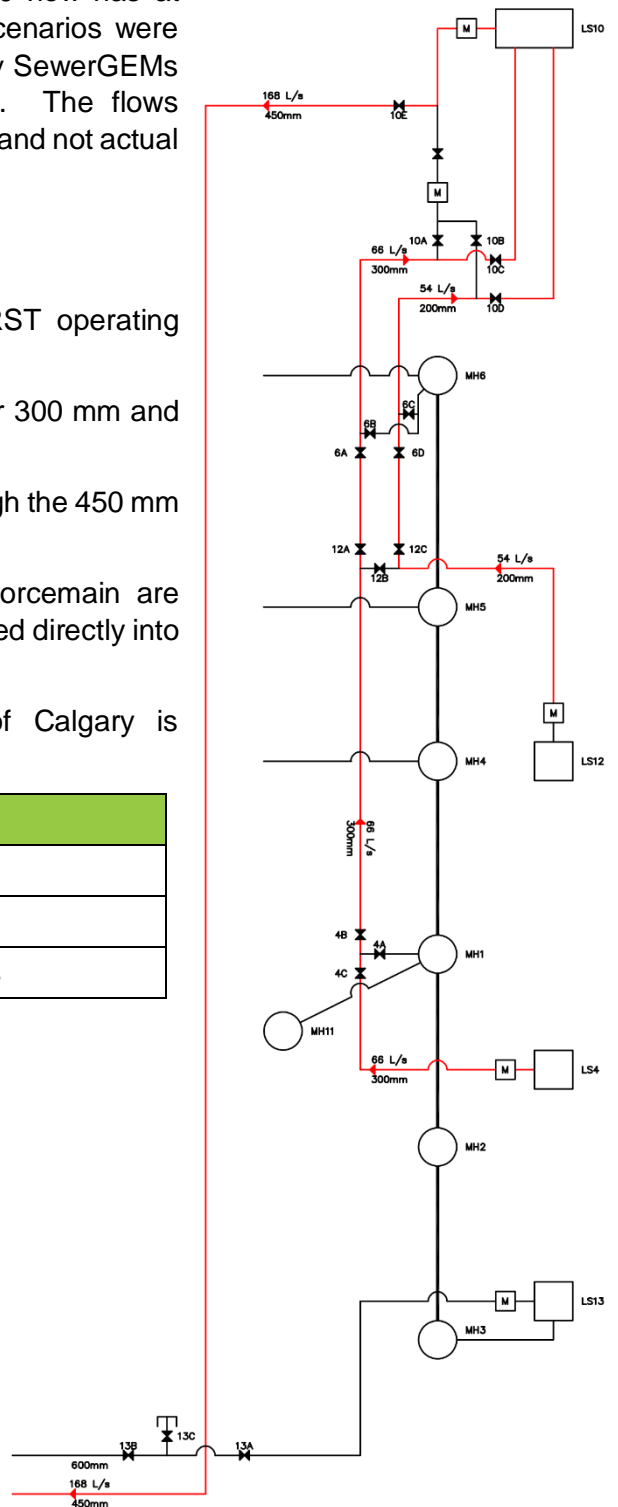
- LS4 & LS12 discharge to LS10 through their 300 mm and 200 mm forcemains, respectively;
- LS10 discharges to the City of Calgary through the 450 mm forcemain;
- RRST, LS13 and its associated 600mm forcemain are accepting flow only from development serviced directly into RRST.

The overall discharge flow rate to the City of Calgary is approximately 168 L/s through the 450mm FM.

Pipe	Flow
LS12 to LS10	54 L/s
LS4 to LS10	66 L/s
LS10 to Calgary	168 L/s

3.1.1 Operation / Valve Sequencing

Valve	Mode 1
4A	CLOSED
4B	OPEN
4C	OPEN
12A	OPEN
12B	CLOSED
12C	OPEN
6A	OPEN
6B	CLOSED
6C	CLOSED
6D	OPEN
10A	CLOSED
10B	CLOSED
10C	OPEN
10D	OPEN
10E	OPEN



3.2 Operating Mode 2

Operating Mode 2 represents the current operating scenario:

- LS4 & LS12 discharge to LS13 (RRST MH1) via their 300mm and 200mm forcemains, respectively;
- LS10 discharges to the City of Calgary through the 450mm forcemain;
- LS13 discharges to the City of Calgary through the 600mm forcemain.

The overall discharge flow rate to the City of Calgary is approximately 168 L/s + 310 L/s = 478 L/s

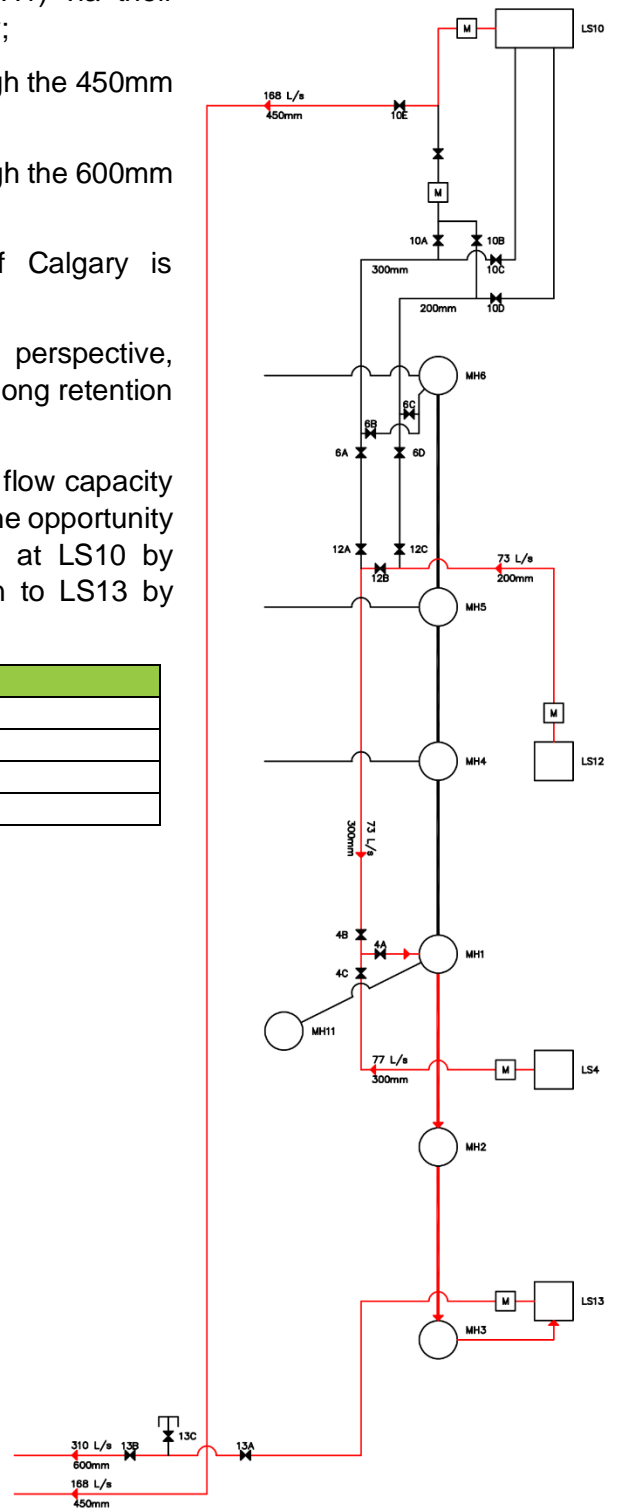
This scenario is challenging from an odor control perspective, because LS13 may not be get enough flow to avoid long retention times and H₂S generation.

In this operating mode, LS10 is limited to the same flow capacity as Operating Mode 1. Scenarios 3 and 4 consider the opportunity to increase the maximum pumping rate available at LS10 by discharging the current flows into RRST and then to LS13 by gravity.

Pipe	Flow
LS12 to MH1	73 L/s
LS4 to MH1	77 L/s
LS10 to Calgary	168 L/s
LS13 to Calgary	310 L/s

3.2.1 Operation / Valve Sequencing

Valve	Mode 2
4A	OPEN
4B	OPEN
4C	OPEN
12A	CLOSED
12B	OPEN
12C	CLOSED
6A	---
6B	---
6C	---
6D	---
10A	CLOSED
10B	CLOSED
10C	---
10D	---
10E	OPEN



3.3 Operating Mode 3

Operating Mode 3 represents an operating scenario that is available because of the recent completion of the LS10 13 diversion project which involved the installation of valves and piping at LS10 and RRST MH6. In this operating mode:

- LS4 & LS12 discharge to LS13 (RRST MH1) via their 300mm and 200mm forcemains, respectively;
- LS10 discharges to LS13 (RRST MH6) via the 200mm and 300mm forcemains;
- LS13 discharges to the City of Calgary via the 600mm FM;
- The 450mm forcemain to the City of Calgary is not active.

The overall discharge flow rate to the City of Calgary is approximately 310 L/s.

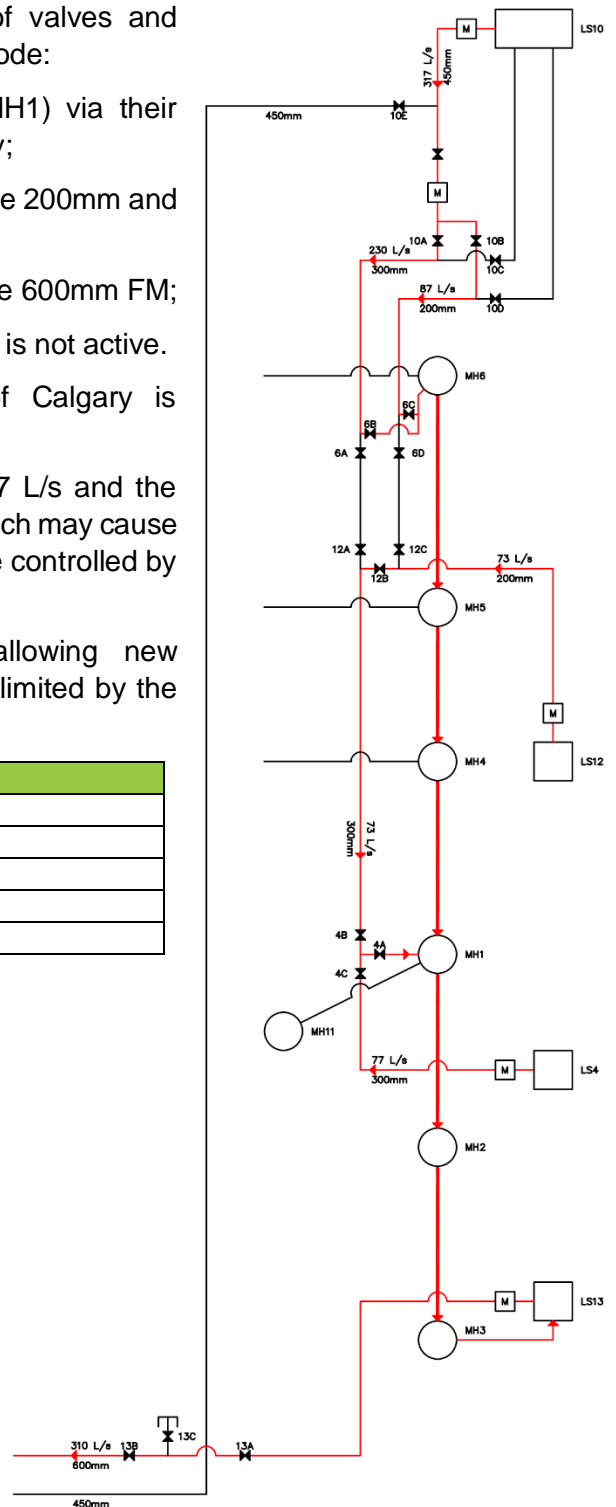
The maximum firm pumping rate from LS10 is 317 L/s and the maximum firm pumping rate from LS13 is 310 L/s which may cause an issue at LS13 during peak events, but this can be controlled by limiting flow from LS10 using control logic.

This scenario maximizes the use of LS13 allowing new development to be serviced into LS10, however is limited by the current pumping capacity of LS13.

Pipe	Flow
LS12 to MH1	73 L/s
LS4 to MH1	77 L/s
LS10 to MH6 (200mm)	87 L/s
LS10 to MH6 (300mm)	230 L/s
LS13 to Calgary	310 L/s

3.3.1 Operation / Valve Sequencing

Valve	Mode 3
4A	OPEN
4B	OPEN
4C	OPEN
12A	CLOSED
12B	OPEN
12C	CLOSED
6A	CLOSED
6B	OPEN
6C	OPEN
6D	CLOSED
10A	OPEN
10B	OPEN
10C	CLOSED
10D	CLOSED
10E	CLOSED



3.4 Operating Mode 4

Operating Mode 4 represents an alternative operating scenario that is available given the completion of the LS10 13 diversion. In this operating mode:

- LS4 & LS12 discharge to LS13 (RRST MH1) via their 300mm and 200mm forcemains, respectively;
- LS10 discharges to LS13 (RRST MH6) via the 200mm and 300mm FMs;
- LS10 also simultaneously discharges to the City of Calgary via the 450mm FM. A new flow meter is required for this scenario to be able to calculate the amount of flow leaving LS10;
- LS13 discharges to the City of Calgary via the 600mm FM.

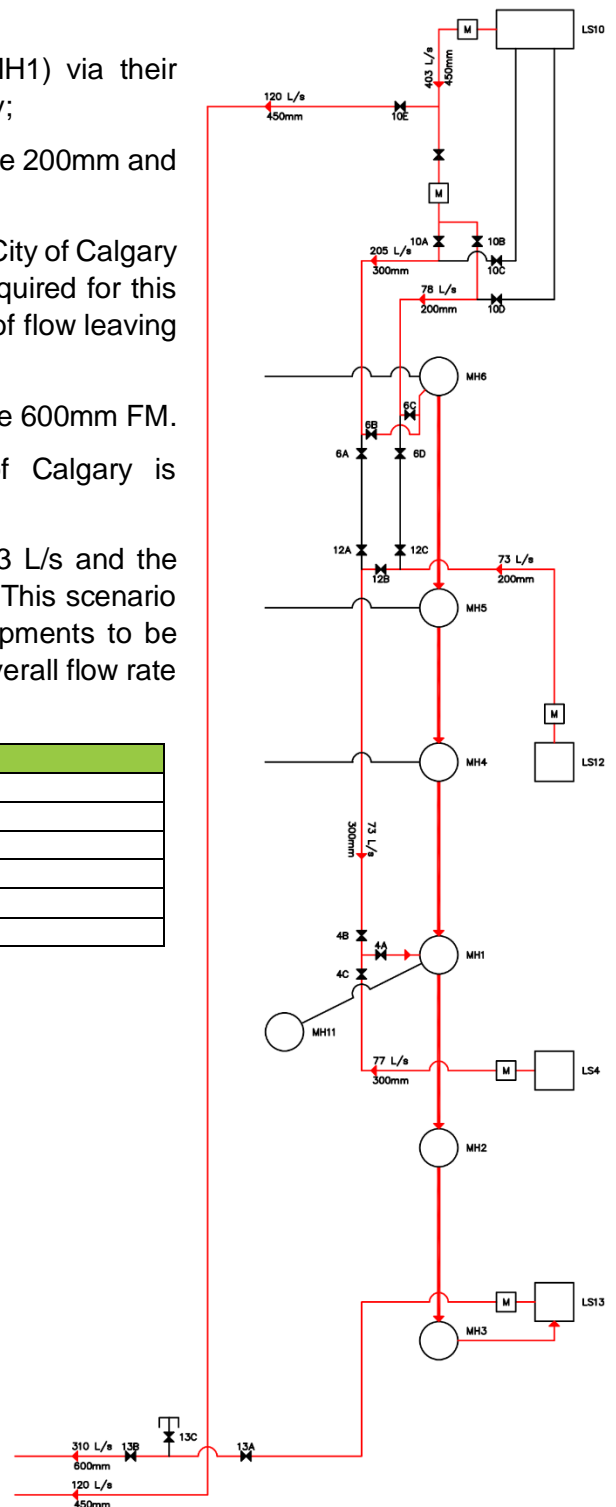
The overall discharge flow rate to the City of Calgary is approximately 120 L/s + 310 L/s = 430 L/s.

The maximum firm pumping rate from LS10 is 403 L/s and the maximum firm pumping rate from LS13 is 310 L/s. This scenario maximizes the use of LS13 to allow future developments to be serviced into LS10 and maintains a relatively high overall flow rate to Calgary.

Pipe	Flow
LS12 to MH1	73 L/s
LS4 to MH1	77 L/s
LS10 to MH6 (200mm)	78 L/s
LS10 to MH6 (300mm)	205 L/s
LS10 to Calgary (450mm)	120 L/s
LS13 to Calgary (600mm)	310 L/s

3.4.1 Operation / Valve Sequencing

Valve	Mode 4
4A	OPEN
4B	OPEN
4C	OPEN
12A	CLOSED
12B	OPEN
12C	CLOSED
6A	CLOSED
6B	OPEN
6C	OPEN
6D	CLOSED
10A	OPEN
10B	OPEN
10C	CLOSED
10D	CLOSED
10E	OPEN



3.5 Operating Mode 5

Operating Mode 5 is similar to Operating Mode 3 with the difference being that LS12 discharges to LS10 through it's 200mm forcemain instead of discharging to MH1. LS10 pumps to MH6 through the 300mm forcemain.

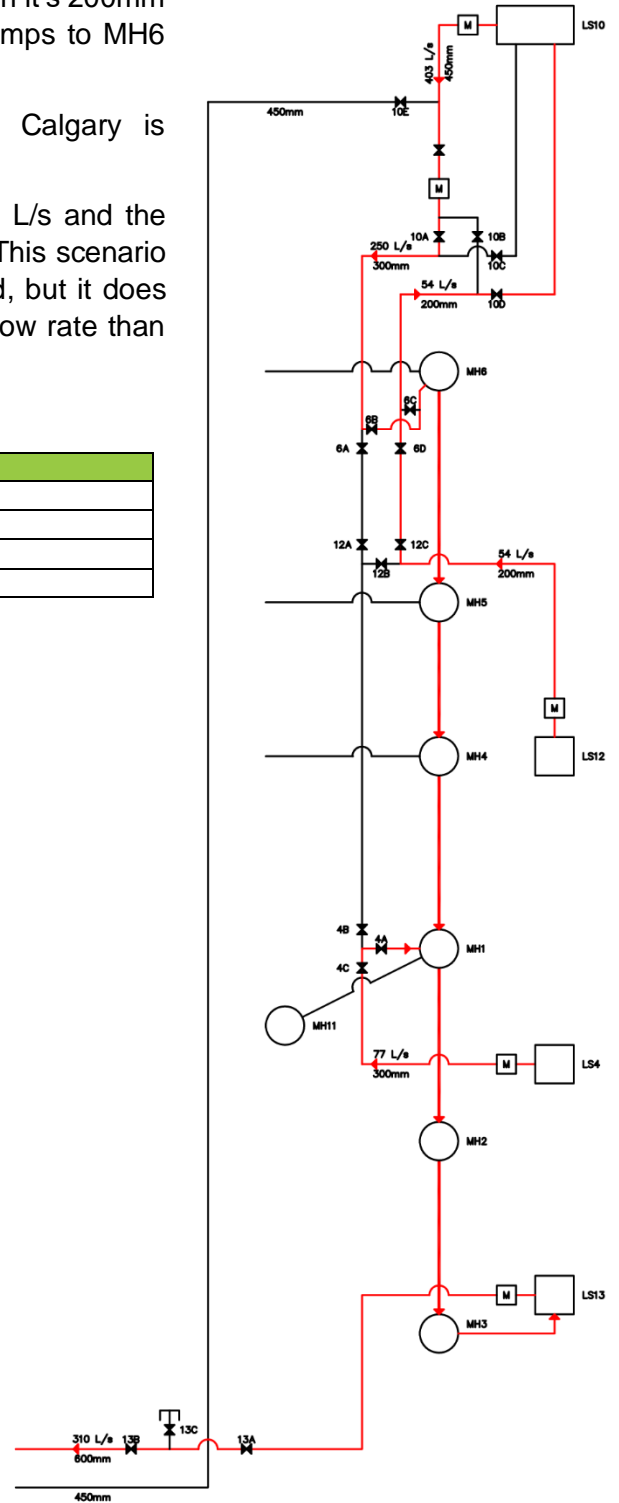
The overall discharge flow rate to the City of Calgary is approximately 310 L/s.

The maximum firm pumping rate from LS10 is 250 L/s and the maximum firm pumping rate from LS13 is 310 L/s. This scenario is not efficient because flow from LS12 is repumped, but it does provide a solution to LS10 discharging at a higher flow rate than LS13 (mentioned in Operating Mode 3).

Pipe	Flow
LS12 to LS10	54 L/s
LS4 to MH1	77 L/s
LS10 to MH6 (300mm)	250 L/s
LS13 to Calgary (600mm)	310 L/s

3.5.1 Operation / Valve Sequencing

Valve	Mode 5
4A	OPEN
4B	CLOSED
4C	OPEN
12A	CLOSED
12B	CLOSED
12C	OPEN
6A	CLOSED
6B	OPEN
6C	CLOSED
6D	OPEN
10A	OPEN
10B	CLOSED
10C	CLOSED
10D	OPEN
10E	CLOSED



3.6 Summary

The following table summarizes the available operating modes for LS10.

	Operating Mode 1	Operating Mode 2	Operating Mode 3	Operating Mode 4	Operating Mode 5
Pipe	Flow (L/s)	Flow (L/s)	Flow (L/s)	Flow (L/s)	Flow (L/s)
LS4 to LS10	66	-	-	-	-
LS4 to MH1	-	77	77	77	77
LS12 to LS10	54	-	-	-	54
LS12 to MH1	-	73	73	73	-
LS10 to MH6 (200mm)	-	-	87 ¹	78 ¹	-
LS10 to MH6 (300mm)	-	-	230 ¹	205 ¹	250 ¹
LS10 to Calgary	168	168	-	120	-
LS13 to Calgary	-	310	310	310	310
Total Flow from LS10	168	168	317 ¹	403 ¹	250 ¹
Total Flow to Calgary	168	478	310	430	310

Based on the 2017 UMP, LS10 has a peak wet weather flow in the full build-out growth horizon of 223.5 L/s.

When LS10 is operating under Mode 3 the modeled firm capacity at LS10 is 317 L/s¹.

When LS10 is operating under Mode 4 the modeled firm capacity at LS10 is 403 L/s¹.

Therefore, under the full build-out growth horizon LS10 has **93.5 L/s** of available capacity when operating under Mode 3 and **179.5 L/s** when operating under Mode 4.

¹ Modelled/calculated flow that has not been verified by field testing

4. Wastewater Generation

4.1 Clearwater Park

Wastewater generation in the Mountain View Park ASP area is discussed in detail in IBI’s January 2021 Sanitary Servicing Memo

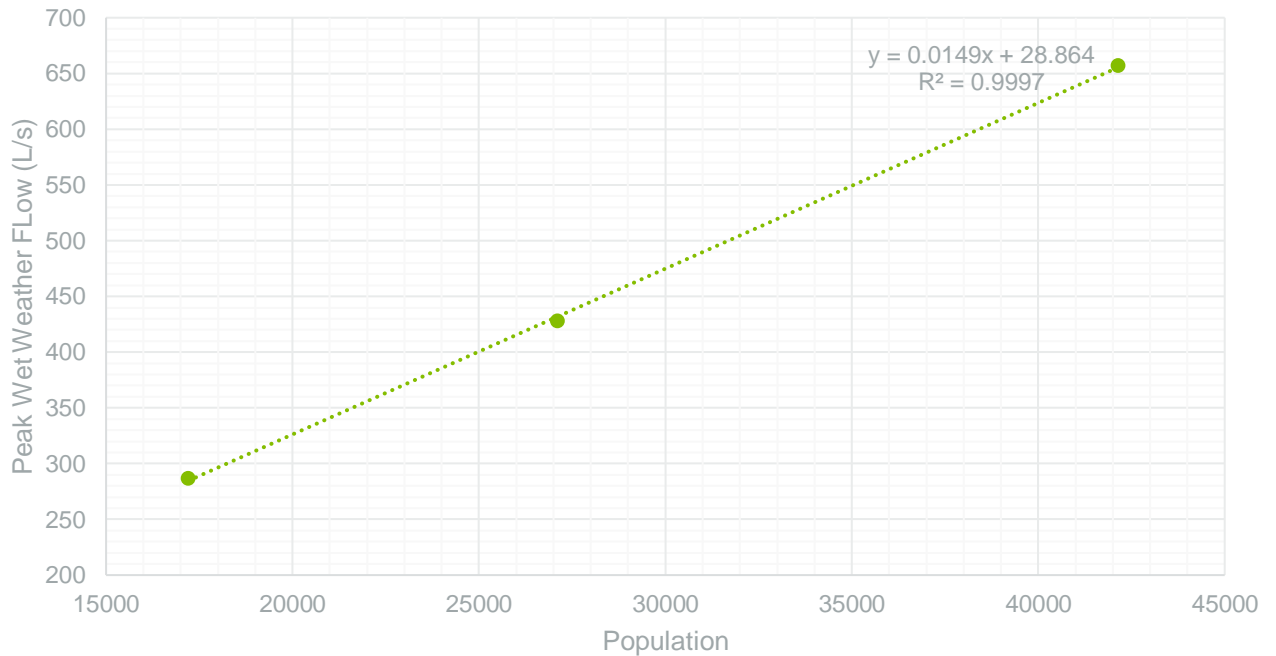
The IBI memo describes a Peak Wet Weather Flow of 212.5 L/s for the ASP.

4.2 Peak Wet Weather Flow in Chestermere

The following table summarizes the calculated PWWF for the different population horizons based on the 2017 UMP which is calculated using a 250 L/capita/day wastewater generation rate.

Population	PWWF (L/s)
17,203	287
27,111	428
42,144	657

The data can be plotted and fit with a linear best fit curve ($R^2 = 0.9997$) to create a figure where PWWF can be estimated for any population. For this report, this method will be used to estimate PWWF based on population.



Subsequent updates to the entire UMP may revisit assumptions and methods used.

5. Clearwater Park Lift Station and Forcemains

Based on the future ASP PWWF of 212.5 L/s a conceptual lift station and forcemain phasing is described by the following:

- Parallel forcemains with preliminary diameters of 250mm and 400mm.
 - The 250mm forcemain will have a design flow capacity of approximately 60-80 L/s (depending on number of parallel pumps).
 - The 400mm forcemain will have a design flow capacity of approximately 130-180 L/s (depending on number of parallel pumps).
 - In parallel, they will have a maximum design flow capacity of approximately 230 L/s.
 - It is anticipated that both forcemains will be constructed at the same time to minimize separation between pipes and take advantage of a common trench.
- The lift station is conceptualized to consist of 4 x Flygt NP3301 HT 462 submersible pumps. These are the same pumps that are located in LS10 and adds value in the form of operational flexibility.
 - It is anticipated that the wetwell of the proposed lift station will have two separate cells with two pumps in each. It is anticipated that only two pumps will be built during the initial phase of construction.
- Clearwater LS – Stage 1 Operation
 - Clearwater LS is constructed with 2 x Flygt NP3301 HT 462 submersible pumps. One pump is required for service and one pump is backup. The pump discharges into the 250mm forcemain which will have a flow capacity of approximately 61 L/s.
 - The 400mm is closed and is not used unless required for emergency.
- Clearwater LS – Stage 2 Operation
 - When PWWF exceeds 61 L/s, the 400mm forcemain is opened and the 250mm forcemain is closed.
 - Clearwater LS continues with 2 x Flygt NP3301 HT 462 submersible pumps. One pump is required for service and one pump is backup. The pump discharges into the 400mm forcemain which will have a flow capacity of approximately 134 L/s.
 - There are no expected capital costs associated with the transition to this stage of the operation.
- Clearwater LS – Stage 3 Operation
 - When PWWF exceeds 134 L/s, the two remaining pumps are added to the lift station, bringing the total pumps installed to four.
 - Three pumps are required for service and one pump is backup. The pumps discharge into the 400mm forcemain which will have a flow capacity of approximately 180 L/s with a full build out.
 - The capital costs associated with the transition to this stage of operation are:
 - 2 x Pumps with associated pipes, valves and fittings

- 2 x Variable frequency drives with the associated power and controls wiring
- Field wiring in pre-installed conduits.
- Clearwater LS – Stage 4 Operation
 - When PWWF exceed 180 L/s the 250mm forcemain is re-opened and the 250mm and 400mm forcemains are operated in parallel.
 - Three pumps are required for service and one pump is backup. The pumps discharge into the 250mm and 400mm forcemains which will have a total flow capacity of approximately 231 L/s.
 - There are no expected capital costs associated with the transition to this stage of the operation.

6. Amended Servicing Scenarios

6.1 Clearwater Park Servicing Overview

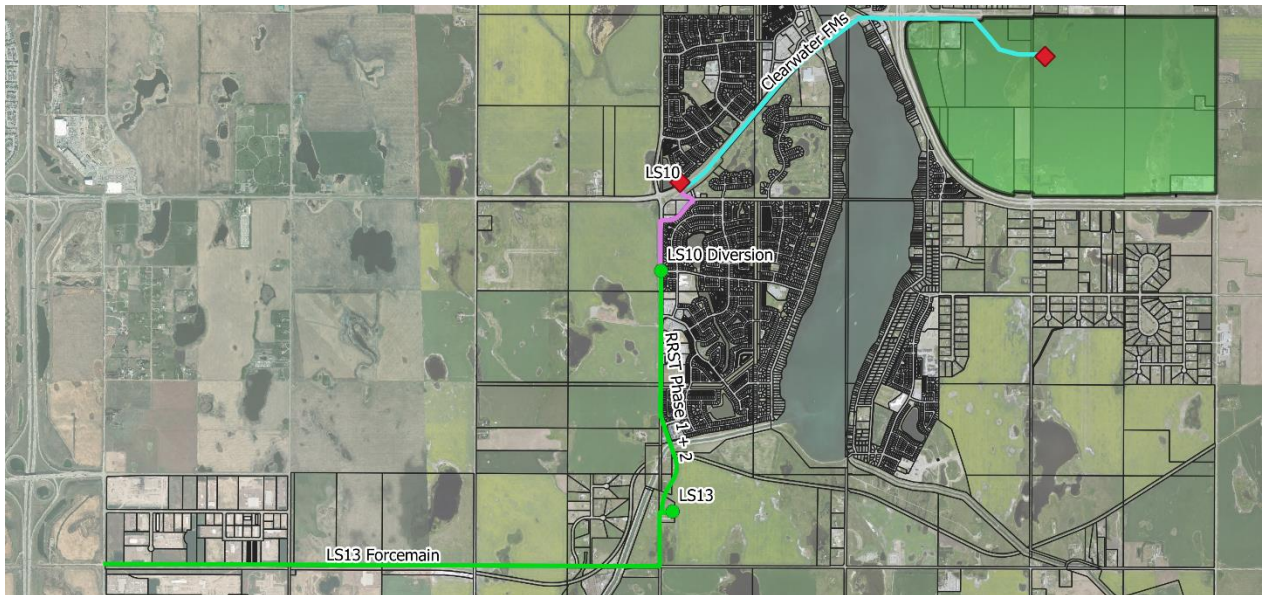
This section summarizes the triggers and sequencing of each of the proposed stages of the servicing plan.

1. If PWWF at LS13 is less than 310 L/s complete Clearwater Park Servicing Stage 1.
2. If PWWF at LS13 is more than 310 L/s but less than 450 L/s, and Clearwater Park PWWF is less than 93.5 L/s complete UMP Project 12 (LS13 Pump Upgrade 1) increasing the capacity at LS13 to ~450 L/s.
3. If PWWF at LS13 is more than 450 L/s and Clearwater Park PWWF is less than 93.5 L/s there are three servicing options:
 - a. Complete UMP Project 15 (LS13 Pump Upgrade 2) increasing LS13 capacity to ~530 L/s.
 - b. Clearwater Park Servicing Stage 2 – LS10 is operated in Mode 4 and 120 L/s of flow from LS10 is directed to the 450mm forcemain, relieving capacity at LS13.
 - c. Clearwater Park Servicing Stage 3 - Clearwater Park flow is diverted to RRST by gravity and LS10 is operated in Mode 2
4. If PWWF at LS13 is less than 450 L/s and Clearwater Park PWWF is more than 93.5 L/s but less than 179.5 L/s
 - a. Clearwater Park Servicing Stage 2 – LS10 is operated in Mode 4 increasing LS10 total flow capacity to 403 L/s.
 - b. Clearwater Park Servicing Stage 3 - Clearwater Park flow is diverted to RRST by gravity and LS10 is operated in Mode 2
5. If PWWF from Clearwater Park reaches 179.5 L/s, the Clearwater Park Servicing Stage 3 servicing plan will need to be implemented.

6.2 Clearwater Park Servicing Stage 1

When LS10 is operating in Mode 3, there is 93.5 L/s of available capacity. In this operating mode, LS10 is discharging into Rainbow Road Sanitary Trunk (RRST) which flows to LS13 where wastewater is then pumped to Calgary.

RRST is already constructed to Lakeview Dr and has a flow capacity of 1374 L/s. When operating under Mode 3, LS10 discharges at Lakeview Dr. via existing 200mm and 300mm forcemains (shown in pink on the map) and the City's entire flow is carried by RRST and LS13.



A new lift station in Clearwater Park will discharge into new forcemains that are approximately 3.8 km long which discharge up to 93.5 L/s into LS10 for this servicing stage. It is recommended to stage the construction of the Clearwater Park Lift Station and forcemains to reduce risk of H₂S generation associated with long retention time.

Clearwater LS is constructed with 2 x Flygt NP3301 HT 462 submersible pumps. One pump is required for service and one pump is backup. The pump discharges into the 250mm forcemain which will have a flow capacity of approximately 61 L/s. When PWWF approaches 61 L/s, the lift station then directs the flow into the 400mm forcemain and the 250mm forcemain is closed.

Lift Station 13 has a flow capacity of approximately 310 L/s (service population of approximately 18,900 based on Section 4.2) and can be increased to 450 L/s with Project 12 in the UMP (LS13 Pump Upgrade 1) which will increase the service population to approximately 28,300 based on Section 4.2.

6.3 Clearwater Park Servicing Stage 2

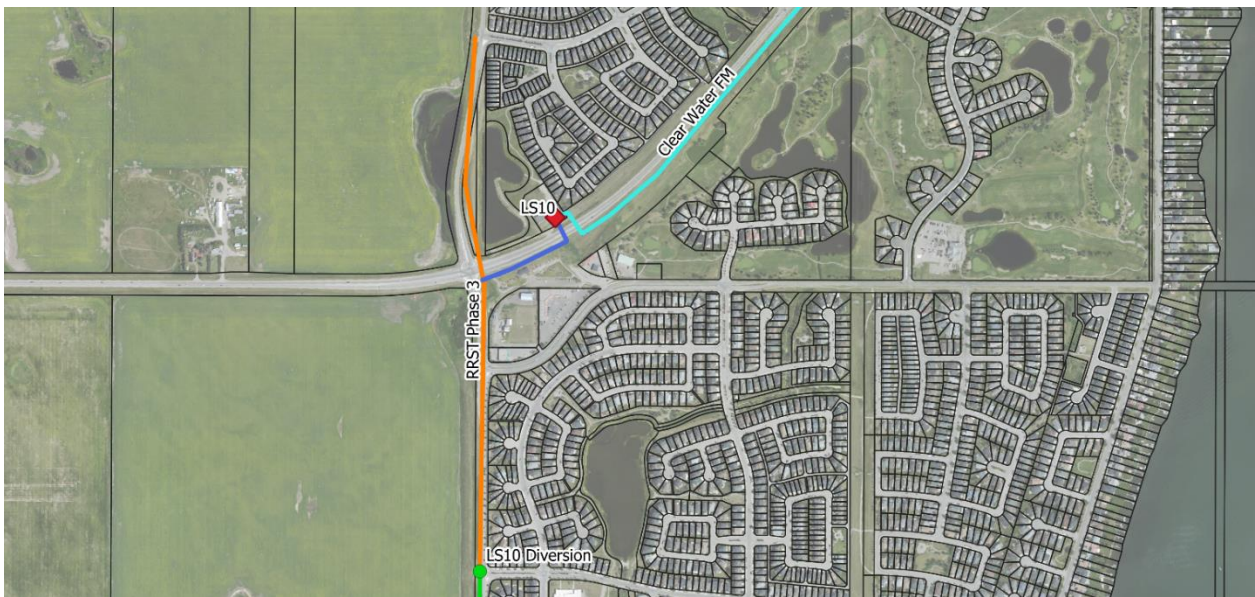
When LS10 is operating in Mode 4, there is 179.5 L/s of available capacity. In this operating mode, LS10 is discharging at 120 L/s into the 450mm forcemain to Calgary and at 283 L/s into RRST through the existing 200mm and 300mm forcemains. Mode 4 requires the installation of a 450mm flow meter at LS10.

When PWWF at Clearwater Park LS exceeds 134 L/s, the two remaining pumps are added to the lift station, bringing the total installed to four. Three pumps are required for service and one pump is backup. The pumps discharge into the 400mm forcemain which will have a flow capacity of approximately 180 L/s.

When PWWF from Clearwater Park reaches 179.5 L/s, the Clearwater Park Stage 3 servicing plan will need to be implemented.

6.4 Clearwater Park Servicing Stage 3

In this servicing stage, LS10 changes operation back to operating Mode 2 and LS10 pumps to Calgary through the existing 450mm forcemain. In operating Mode 2, LS10 does not have capacity to accept flow from Clearwater Park. Therefore, flow from Clearwater Park is required to be directed to Rainbow Road Sanitary Trunk where it will flow by gravity to LS13. To accomplish this, RRST needs to be extended at least as far north as Chestermere Blvd which is included in UMP Project 13 – Rainbow Road Sanitary Trunk Phase 3. Additionally, a gravity connection from RRST to LS10 would be required (shown as dark blue) to convey Clearwater Park wastewater from the LS10 area into RRST and would also serve as an emergency overflow connection for Lift Station 10.



In this servicing stage, LS13 can support 450 L/s or 530 L/s of PWWF depending on the number of pumps installed (approximate service population of 28,200 or 33,600 respectively, derived using the method in Section 4.2) and Lift Station 10 handles flow from an existing population of approximately 14,200 with a PWWF of 223.5 L/s. This represents a total City population of at least 42,400, which is the 25-year build-out population in the existing UMP.

7. New and Updated Leivable Projects

7.1 Clearwater Park Forcemains

In order to service the Mountain View Park ASP area sanitary forcemains will have to be constructed from Clearwater Park that will discharge to the Lift Station 10 Area.

Project Details

- Parallel forcemains with preliminary diameters of 250mm and 400mm.
 - a. The 250mm forcemain will have a design flow capacity of approximately 60-80 L/s (depending on number of parallel pumps).
 - b. The 400mm forcemain will have a design flow capacity of approximately 130-180 L/s (depending on number of parallel pumps).
 - c. In parallel, they will have a maximum design flow capacity of approximately 230 L/s.
 - d. It is anticipated that both forcemains will be constructed at the same time to minimize separation between pipes and take advantage of a common trench.
- The total length of offsite is approximately 3225m
- The total length of onsite is approximately 775m

Project Trigger

- Development in Mountain View Park ASP area

Estimated Budget

	Offsite	Onsite	Total
Design	\$600,000.00	\$100,000.00	\$700,000.00
Construction	\$5,100,000.00	\$500,000.00	\$5,600,000.00
Contingency	\$1,000,000.00	\$100,000.00	\$1,100,000.00
Total	\$6,700,000.00	\$700,000.00	\$7,400,000.00

7.2 Clearwater Park Lift Station

7.2.1 Clearwater Park Lift Station Stage 1

The lift station is conceptualized to consist of 4 x Flygt NP3301 HT 462 submersible pumps. These are the same pumps that are located in LS10 and adds value in the form of operational flexibility and redundancy.

It is anticipated that the wetwell of the proposed lift station will have two separate cells with two pumps in each. It is anticipated that only two pumps will be built during this initial phase of construction.

Project Details

- Wetwell suitable for installation of four submersible pumps
- Two submersible pumps and associated piping, fittings and valves
- Building for electrical and standby generator

Project Trigger

- Development in Mountain View Park ASP area

Estimated Budget

Design	\$200,000.00
Construction	\$1,800,000.00
Contingency	\$300,000.00
Total	\$2,300,000.00

7.2.2 Clearwater Park Lift Station Stage 3

Project Details

- Installation of two additional pumps at Clearwater Park Lift Station, including related piping, fittings, valves, controls and electrical equipment.

Project Trigger

- When PWWF at Clearwater Park Lift Station exceeds 134 L/s, the two remaining pumps are added to the lift station, bringing the total installed to four.

Estimated Budget

Design	\$75,000.00
Construction	\$540,000.00
Contingency	\$125,000.00
Total	\$740,000.00

7.3 Rainbow Road Sanitary Trunk Phase 3 – UMP Project 13

Rainbow Road Sanitary Trunk has been constructed between LS13 and Lakeview Dr. The 2017 UMP describes RRST Phase 3 as extending to north to service lands north of Springmere Dr. To satisfy the potential different timing of the RRST3 extension, RRST3 is divided into two parts

7.3.1 Rainbow Road Sanitary Trunk Phase 3A

RRST was originally intended to service development north of Chestermere Blvd, i.e., OSL2 and OSL13. Since Clearwater Park's flow will now enter Rainbow Road Phase 3 at Chestermere Blvd, the project will need to have a larger diameter than originally expected.

The estimated flow into RRST at the Clearwater connection from upstream development is summarized in the following table

RRST Collection Area	PWWF
Development North of Chestermere Blvd	570 L/s
Mountain View Park ASP	212.5 L/s
Total in RRST at Chestermere Blvd	782 L/s

Based on this, RRST at the connection point will need to be 900mm to 1050mm inside diameter depending on the final design and slope.

Project Details

Construction of approximately 650m of 900mm to 1050mm sewer trunk along Rainbow Road from Lakeview Dr to Chestermere Blvd.

Project Trigger

- Development north of Chestermere Blvd along Rainbow Road.
- OR
- Clearwater Park Gravity Connection to Rainbow Road is required

Estimated Budget

Design	\$150,000.00
Construction	\$5,000,000.00
Contingency	\$500,000.00
Total	\$5,650,000.00

7.3.2 Rainbow Road Sanitary Trunk Phase 3B

Project Details

Construction of approximately 550m of 750mm to 900mm sewer trunk along Rainbow Road from Chestermere Blvd to Springmere Dr.

Project Trigger

- Development north of Chestermere Blvd along Rainbow Road.

Estimated Budget

Design	\$150,000.00
Construction	\$4,000,000.00
Contingency	\$400,000.00
Total	\$4,550,000.00

7.4 Clearwater Park Gravity Connection

The Clearwater Park Gravity connection should be sized for the full build-out of the Mountain View Park ASP which is 212.5 L/s. This would correspond to a 600-750mm inside diameter pipe depending on the design slope.

However, it would benefit the City if this gravity connection were sized large enough to allow for LS10 to be shut down for maintenance. This would make the design PWWF for the pipe approximately 212.5 L/s + 223.5 L/s = 436.0 L/s which corresponds to a 750-900mm inside diameter pipe depending on the design slope

This proposed pipe would be approximately 225m long, but the final alignment, slope and diameter will need to be designed during detailed design.

Project Details

Construction of approximately 225m of 750mm to 900mm sewer trunk along Rainbow Road from Chestermere Blvd to Springmere Dr.

Project Trigger

- If PWWF at LS13 is less than 450 L/s and Clearwater Park PWWF is more than 93.5 L/s but less than 179.5 L/s
- OR
- If PWWF from Clearwater Park reaches 179.5 L/s, the Clearwater Park Servicing Stage 3 servicing plan will need to be implemented.

Estimated Budget

Design	\$150,000.00
Construction	\$900,000.00
Contingency	\$200,000.00
Total	\$1,250,000.00

7.5 Additional Considerations and Variances from Full Build-Out

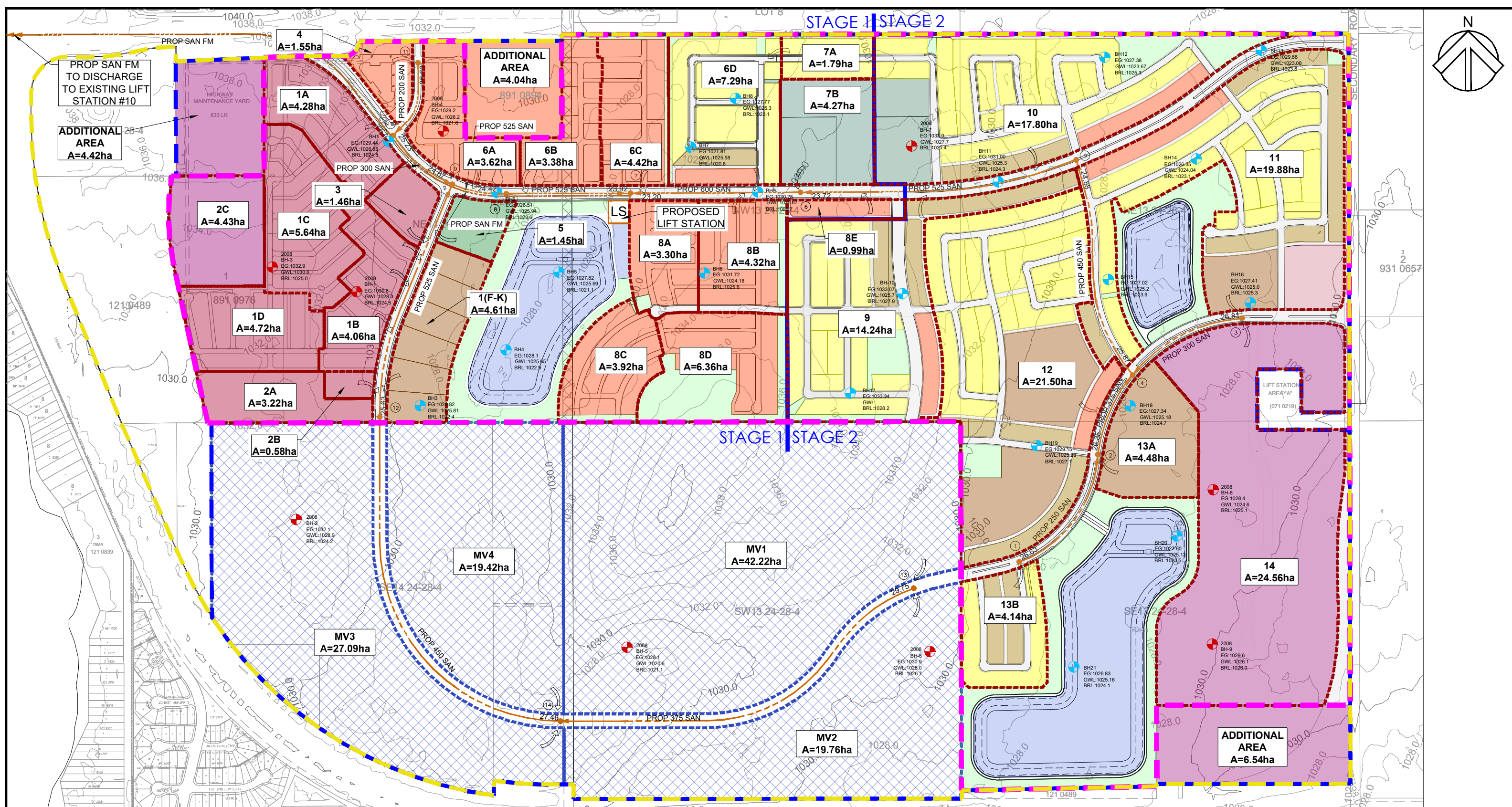
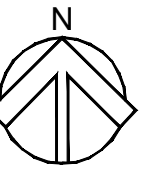
In the existing UMP, the Mountain View Park ASP area in the full build-out scenario is serviced by LS14 which pumps directly to Calgary.

With this proposed servicing amendment, the Mountain View Park ASP will be serviced by LS13 instead of LS14. This has several impacts on the existing UMP that will have to be considered during the next major UMP update.

1. The ultimate capacity of the East Chestermere Gravity Trunk (UMP Project 14) will be reduced compared to the existing UMP.
2. The ultimate capacity of LS14 and its associated forcemains will be reduced compared to the 2017 UMP (UMP Projects 17 & 18). Projected PWWF at full build-out reduces from 752.8 L/s to 540.3 L/s
3. The ultimate capacity of LS13 and its associated forcemains will need to be increased compared to the 2017 UMP (UMP Projects 15 & 16). Projected PWWF at full build-out increases to from 778.1 L/s to 990.6 L/s.

A

Appendix A
Tables and Maps from Clearwater Sanitary Servicing
Memo - IBI GROUP
January 2021



LEGEND	
	CLEARWATER PARK DEVELOPMENT BOUNDARY
	ASP AREA
	SANITARY SERVICING STUDY AREA
	CATCHMENT BOUNDARY (WITHIN CLEARWATER PARK)
	CATCHMENT BOUNDARY (EXTERNAL TO CLEARWATER PARK)
	SANITARY PIPES & MANHOLES (WITH TRUNCATED PIPE INVERTS)
	BLOCK NUMBER
	SANITARY MANHOLE NUMBER
	BOREHOLE (DRILLED JAN 2020)
	BOREHOLE (DRILLED MAR 2008)

RESIDENTIAL	
	R-1PFD
	R-1PRL
	R-3C
	R-4C

NON RESIDENTIAL	
	ETC
	BP / LI

PUBLIC SERVICE USES	
	PS (MR)
	PS (MSR)
	SPR

	ROADS
	PS (PUL)
	AREAS WITHIN ASP EXTERNAL TO CLEARWATER PARK

CLIENT CLEAR WATER PARK INC. (A CENTRON GROUP COMPANY)
104, 8826 BLACKFOOT TRAIL S.E. CALGARY, ALBERTA

PROJECT NAME CLEARWATER PARK
SCALE 1:7500
PROJECT ENG MMS
CHECKED BY MMS
PROJECT NO. 121935

PRIME CONSULTANT IBI GROUP 3rd Floor – 227 11 Avenue SW Calgary AB T2R 1R9 Canada tel 403 270 5600 fax 403 270 5610 ibigroup.com
FIGURE NAME SANITARY SERVICING LAYOUT PROPOSED TIE-IN TO CITY OF CHESTERMERE LS#10
FIGURE NO. 3.1
OPTION #3

File Location: J:\121935_Bayfield\Drawings\Sanitary Servicing\Study\121935_ClearwaterPark_SANITARY_CONCEPT_PLAN.dwg Last Saved: December 23, 2020, by: courtenay.larrington Plotted: Wednesday, December 23, 2020 6:55:47 PM by: Michael
 11 mm SCALE CHECK

TABLE 1: SANITARY SEWER DESIGN FLOWS
CITY OF CHESTERMERE

Date 19-Jan-21

Project: Clearwater Park (ASP Area)
Job No: 121935
File: J:\121935_BayfieldLnds\6.0_Technical\6.2_Civil_Eng_Muni_Transp\6.2.3_Tech-Reports\Sanitary Servicing Study\Jan 2021 Submission\121935-ClearwaterPark_ASPSanCalcs_2021-01-19.xlsx]3 - COC DESIGN FLOWS

Computed By: CF
Checked By: MMS

INFILTRATION AND INFLOW = 0.28 (L/s/ha)
RESIDENTIAL FLOW RATE⁶ = 250 (L/d/person)
INDUSTRIAL FLOW RATE⁶ = 69 (L/d/employee)
PERSONS PER HOUSEHOLD (EXCL. APARTMENTS) = 3.20 (Person/Residential Unit)
PERSONS PER MULTI-FAMILY/APARTMENT = 2.40 (Person/Apartment)
EMPLOYEES PER 1,000sqft (INDUSTRIAL) = 2.00 (Employees/1000Sqft Ind)
EMPLOYEES PER 1,000sqft (COMMERCIAL) = 3.00 (Employees/1000Sqft Comm)
COMMERCIAL FLOW RATE³ = 90 (L/d/employee)
SCHOOL FLOW RATE = 24 (L/d/m²)

LOCATION	MANHOLE		TRIBUTARY AREA		Building Area		Residential Density		Non-Residential Population	Residential Population	Equivalent Population (Non-Res + Res)	Total Equivalent Population	Average Dry Weather Flow L/sec	PEAK FLOW FACTOR ²	Peak Dry Weather Flow L/sec	TOTAL INFILT. & INFLOW L/sec	Peak Wet Weather Flow L/sec	SEWER DESIGN				
	FROM	TO	A ha	Total A ha	sqft	m2	# Units	Per/Unit										Slope %	Diam. mm	Cap. L/sec	Vel. @ Cap m/sec	% Capacity
OVERALL CLEARWATER PARK FLOWS																						
STAGE 1																						
BLOCK 4																						
Infiltration and Inflow		B4	1.55	1.55	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-3)		B4	0.00	0.00	0	0	45	2.40	0	107	107	107	-	-	-	-	-					
TOTAL BLOCK 4	B4	11	0.00	1.55	0	0	0		0	0	0	107	0.31	4.24	1.31	0.43	1.74					
	11	10	0.40	1.95	0	0	0	0.00	0	0	0	107	0.31	4.24	1.31	0.55	1.86	0.80	200	29.34	0.93	7%
BLOCK 1A																						
Infiltration and Inflow		B1A	2.30	2.30	0	0	0	0	0	0	0	0	-	-	-	-	-					
DC-ETC		B1A	0.00	0.00	0	0	75	2.40	0	179	179	179	-	-	-	-	-					
Industrial (BP/LI) - EXTRA ASP AREA		B1A	4.42	4.42	142695	13257	0	0.00	285	0	79	79	-	-	-	-	-					
TOTAL BLOCK 1A	B1A	10	0.00	6.72	0	0	0		0	0	0	258	0.75	4.11	3.06	1.88	4.95					
	10	9	1.57	10.24	0	0	0	0.00	0	0	0	365	1.06	4.04	4.27	2.87	7.13	0.40	250	37.61	0.77	19%
BLOCK 3																						
Infiltration and Inflow		B3	1.46	1.46	0	0	0	0	0	0	0	0	-	-	-	-	-					
Commercial (ETC) - Commercial Plaza		B3	0.00	0.00	17500	1626	0	0.00	53	0	19	19	-	-	-	-	-					
TOTAL BLOCK 3	B3	12C	0.00	1.46	0	0	0		0	0	0	19	0.05	4.38	0.24	0.41	0.65					
BLOCK 5																						
Infiltration and Inflow		B5	1.45	1.45	0	0	0	0	0	0	0	0	-	-	-	-	-					
S-SPR - Amenity Centre		B5	0.00	0.00	15000	1394	0	0.00	45	0	16	16	-	-	-	-	-					
TOTAL BLOCK 5	B5	12C	0.00	1.45	0	0	0		0	0	0	16	0.05	4.39	0.21	0.41	0.61					
BLOCK 1B																						
Infiltration and Inflow		B1B	4.82	4.82	0	0	0	0	0	0	0	0	-	-	-	-	-					
DC-ETC		B1B	0.00	0.00	0	0	156	2.40	0	376	376	376	-	-	-	-	-					
TOTAL BLOCK 1B	B1B	12B	0.00	4.82	0	0	0		0	0	0	376	1.09	4.04	4.38	1.35	5.73					
BLOCK 1C																						
Infiltration and Inflow		B1C	4.42	4.42	0	0	0	0	0	0	0	0	-	-	-	-	-					
DC-ETC		B1C	0.00	0.00	0	0	143	2.40	0	344	344	344	-	-	-	-	-					
TOTAL BLOCK 1C	B1C	12B	0.00	4.42	0	0	0		0	0	0	344	1.00	4.05	4.03	1.24	5.27					
BLOCK 1D																						
Infiltration and Inflow		B1D	6.51	6.51	0	0	0	0	0	0	0	0	-	-	-	-	-					
DC-ETC		B1D	0.00	0.00	0	0	211	2.40	0	507	507	507	-	-	-	-	-					
TOTAL BLOCK 1D	B1D	12A	0.00	6.51	0	0	0		0	0	0	507	1.47	3.97	5.83	1.82	7.65					
BLOCK 1F-K																						
Infiltration and Inflow		B1F-K	4.61	4.61	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R4) - Assisted Living Units		B1F-K	0.00	0.00	0	0	440	2.40	0	1056	1056	1056	-	-	-	-	-					
TOTAL BLOCK 1F-K	B1F-K	12	0.00	4.61	0	0	0		0	0	0	1056	3.06	3.78	11.56	1.29	12.85					

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CITY OF CHESTERMERE

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Computed By: CF
Checked By: MMS

n (concrete) = 0.013
n (pvc) = 0.013

INFILTRATION AND INFLOW = 0.28 (L/s/ha)
RESIDENTIAL FLOW RATE⁶ = 250 (L/d/person)
INDUSTRIAL FLOW RATE⁶ = 69 (L/d/employee)
PERSONS PER HOUSEHOLD (EXCL. APARTMENTS) = 3.20 (Person/Residential Unit)
PERSONS PER MULTI-FAMILY/APARTMENT = 2.40 (Person/Apartment)
EMPLOYEES PER 1,000sqft (INDUSTRIAL) = 2.00 (Employees/1000Sqft Ind)
EMPLOYEES PER 1,000sqft (COMMERCIAL) = 3.00 (Employees/1000Sqft Comm)
COMMERCIAL FLOW RATE³ = 90 (L/d/employee)
SCHOOL FLOW RATE = 24 (L/d/m²)

LOCATION	MANHOLE		TRIBUTARY AREA		Building Area		Residential Density		Non-Residential Population	Residential Population	Equivalent Population (Non-Res + Res)	Total Equivalent Population	Average Dry Weather Flow L/sec	PEAK FLOW FACTOR ²	Peak Dry Weather Flow L/sec	TOTAL INFILT. & INFLOW L/sec	Peak Wet Weather Flow L/sec	SEWER DESIGN				
	FROM	TO	A ha	Total A ha	sqft	m2	# Units	Per/Unit										Slope %	Diam. mm	Cap. L/sec	Vel. @ Cap m/sec	% Capacity
BLOCK 1E																						
Infiltration and Inflow		B1E	4.84	4.84	0	0	0	0	0	0	0	0	-	-	-	-	-					
DC-ETC		B1E	0.00	0.00	0	0	147	2.40	0	353	353	353	-	-	-	-	-					
TOTAL BLOCK 1E	B1E	12	0.00	4.84	0	0	0		0	0	0	353	1.02	4.05	4.14	1.36	5.49					
BLOCK 2																						
Infiltration and Inflow		B2	4.05	4.05	0	0	0	0	0	0	0	0	-	-	-	-	-					
Industrial (BP/L) - Maintenance Yard Expansion		B2	0.00	0.00	130653	12138	0	0.00	101	0	36	36	-	-	-	-	-					
TOTAL BLOCK 2	B2	12B	0.00	4.05	0	0	0		0	0	0	36	0.11	4.34	0.46	1.13	1.59					
	12	12A	0.40	123.48	0	0	0	0.00	0	0	0	3394	9.82	3.40	33.35	34.57	67.93	0.18	450	120.96	0.76 57%	
		12A	0.40	130.39	0	0	0	0.00	0	0	0	3901	11.29	3.34	37.73	36.51	74.24	0.18	450	120.96	0.76 62%	
		12B	0.40	144.07	0	0	0	0.00	0	0	0	4657	13.47	3.27	44.11	40.34	84.45	0.18	450	120.96	0.76 70%	
		12C	0.30	147.28	0	0	0	0.00	0	0	0	4692	13.58	3.27	44.40	41.24	85.64	0.18	450	120.96	0.76 71%	
BLOCK 6A																						
Infiltration and Inflow		B6A	3.62	3.62	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-3)		B6A	0.00	0.00	0	0	104	2.40	0	250	250	250	-	-	-	-	-					
TOTAL BLOCK 6A	B6A	9	0.00	3.62	0	0	0		0	0	0	250	0.72	4.11	2.98	1.01	3.99					
	9	8	0.78	161.92	0	0	0	0.00	0	0	0	5307	15.36	3.22	49.46	45.34	94.79	0.18	450	120.96	0.76 79%	
BLOCK 6B																						
Infiltration and Inflow		B6B	3.38	3.38	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-3)		B6B	0.00	0.00	0	0	95	2.40	0	229	229	229	-	-	-	-	-					
Residential (R-3) - EXTRA ASP AREA		B6B	4.04	4.04	0	0	114	2.40	0	273	273	273	-	-	-	-	-					
TOTAL BLOCK 6B	B6B	8	0.00	7.42	0	0	0		0	0	0	502	1.45	3.97	5.77	2.08	7.85					
	8	7	0.72	170.05	0	0	0	0.00	0	0	0	5809	16.81	3.18	53.52	47.61	101.13	0.18	450	120.96	0.76 84%	
BLOCK 6C																						
Infiltration and Inflow		B6C	4.42	4.42	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-3)		B6C	0.00	0.00	0	0	117	2.40	0	280	280	280	-	-	-	-	-					
TOTAL BLOCK 6C	B6C	6	0.00	4.42	0	0	0		0	0	0	280	0.81	4.09	3.31	1.24	4.55					
BLOCK 6D																						
Infiltration and Inflow		B6D	7.29	7.29	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-1PFD)		B6D	0.00	0.00	0	0	84	3.20	0	268	268	268	-	-	-	-	-					
Residential (R-1PRL)		B6D	0.00	0.00	0	0	16	3.20	0	51	51	51	-	-	-	-	-					
Residential (R-3)		B6D	0.00	0.00	0	0	16	2.40	0	39	39	39	-	-	-	-	-					
TOTAL BLOCK 6D	B6D	6	0.00	7.29	0	0	0		0	0	0	359	1.04	4.04	4.20	2.04	6.24					
BLOCK 7A																						
Infiltration and Inflow		B7A	1.79	1.79	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-1PFD)		B7A	0.00	0.00	0	0	27	3.20	0	87	87	87	-	-	-	-	-					
TOTAL BLOCK 7A	B7A	6	0.00	1.79	0	0	0		0	0	0	87	0.25	4.26	1.07	0.50	1.57					

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Computed By: CF
Checked By: MMS

INFILTRATION AND INFLOW = 0.28 (L/s/ha)
RESIDENTIAL FLOW RATE⁶ = 250 (L/d/person)
INDUSTRIAL FLOW RATE⁶ = 69 (L/d/employee)
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PERSONS PER MULTI-FAMILY/APARTMENT = 2.40 (Person/Apartment)
EMPLOYEES PER 1,000sqft (INDUSTRIAL) = 2.00 (Employees/1000Sqft Ind)
EMPLOYEES PER 1,000sqft (COMMERCIAL) = 3.00 (Employees/1000Sqft Comm)
COMMERCIAL FLOW RATE³ = 90 (L/d/employee)
SCHOOL FLOW RATE = 24 (L/d/m²)

LOCATION	MANHOLE		TRIBUTARY AREA		Building Area		Residential Density		Non-Residential Population	Residential Population	Equivalent Population (Non-Res + Res)	Total Equivalent Population	Average Dry Weather Flow L/sec	PEAK FLOW FACTOR ²	Peak Dry Weather Flow L/sec	TOTAL INFILT. & INFLOW L/sec	Peak Wet Weather Flow L/sec	SEWER DESIGN				
	FROM	TO	A ha	Total A ha	sqft	m2	# Units	Per/Unit										Slope %	Diam. mm	Cap. L/sec	Vel. @ Cap m/sec	% Capacity
BLOCK 7B																						
Infiltration and Inflow		B7B	4.27	4.27	0	0	0	0	0	0	0	0	-	-	-	-	-					
MSR - School Site		B7B	0.00	0.00	43239	4017	0	0.00	0	0	386	386	1.12	-	-	-	-					
TOTAL BLOCK 7B	B7B	6	0.00	4.27	0	0	0		0	0	0	386	1.12	4.03	4.50	1.20	5.69					
BLOCK 8A																						
Infiltration and Inflow		B8A	3.30	3.30	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-3)		B8A	0.00	0.00	0	0	87	2.40	0	208	208	208	-	-	-	-	-					
TOTAL BLOCK 8A	B8A	6	0.00	3.30	0	0	0		0	0	0	208	0.60	4.14	2.49	0.92	3.42					
BLOCK 8B																						
Infiltration and Inflow		B8B	4.32	4.32	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-3)		B8B	0.00	0.00	0	0	103	2.40	0	247	247	247	-	-	-	-	-					
TOTAL BLOCK 8B	B8B	6	0.00	4.32	0	0	0		0	0	0	247	0.71	4.11	2.94	1.21	4.15					
BLOCK 8C																						
Infiltration and Inflow		B8C	3.92	3.92	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-3)		B8C	0.00	0.00	0	0	104	2.40	0	250	250	250	-	-	-	-	-					
TOTAL BLOCK 8C	B8C	6	0.00	3.92	0	0	0		0	0	0	250	0.72	4.11	2.98	1.10	4.07					
BLOCK 8D																						
Infiltration and Inflow		B8D	6.36	6.36	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-3)		B8D	0.00	0.00	0	0	104	2.40	0	250	250	250	-	-	-	-	-					
TOTAL BLOCK 8D	B8D	6	0.00	6.36	0	0	0		0	0	0	250	0.72	4.11	2.98	1.78	4.76					
BLOCK 8E																						
Infiltration and Inflow		B8E	0.99	0.99	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-1PRL)		B8E	0.00	0.00	0	0	20	3.20	0	64	64	64	-	-	-	-	-					
TOTAL BLOCK 8E	B8E	5	0.00	0.99	0	0	0		0	0	0	64	0.19	4.29	0.80	0.28	1.08					
TOTAL STAGE 1 (EXCLUDES EXTRA AREAS)	S1		84.62		206391		2095		199	5145		5603	16.21	3.20	51.86	23.69	75.55					
STAGE 2																						
BLOCK 10																						
Infiltration and Inflow		B10	17.80	17.80	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-1PFD)		B10	0.00	0.00	0	0	192	3.20	0	615	615	615	-	-	-	-	-					
Residential (R-1PRL)		B10	0.00	0.00	0	0	30	3.20	0	95	95	95	-	-	-	-	-					
Residential (R-3)		B10	0.00	0.00	0	0	45	2.40	0	109	109	109	-	-	-	-	-					
MSR - School Site		B10	0.00	0.00	14531	1350	0	0.00	0	0	130	130	0.37	-	-	-	-					
TOTAL BLOCK 10	B10	5	0.00	17.80	0	0	0		0	0	0	948	2.74	3.81	10.47	4.98	15.45					

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EMPLOYEES PER 1,000sqft (COMMERCIAL) = 3.00 (Employees/1000Sqft Comm)
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LOCATION	MANHOLE		TRIBUTARY AREA		Building Area		Residential Density		Non-Residential Population	Residential Population	Equivalent Population (Non-Res + Res)	Total Equivalent Population	Average Dry Weather Flow L/sec	PEAK FLOW FACTOR ²	Peak Dry Weather Flow L/sec	TOTAL INFILT. & INFLOW L/sec	Peak Wet Weather Flow L/sec	SEWER DESIGN				
	FROM	TO	A ha	Total A ha	sqft	m2	# Units	Per/Unit										Slope %	Diam. mm	Cap. L/sec	Vel. @ Cap m/sec	% Capacity
BLOCK 9																						
Infiltration and Inflow		B9	14.24	14.24	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-1PFD)		B9	0.00	0.00	0	0	156	3.20	0	498	498	498	-	-	-	-	-					
Residential (R-1PRL)		B9	0.00	0.00	0	0	40	3.20	0	127	127	127	-	-	-	-	-					
Residential (R-3C)		B9	0.00	0.00	0	0	32	2.40	0	77	77	77	-	-	-	-	-					
TOTAL BLOCK 9	B9	5	0.00	14.24	0	0	0		0	0	0	702	2.03	3.89	7.91	3.99	11.89					
	5	6	4.02	121.31	0	0	0	0.00	0	0	0	7150	20.69	3.10	64.09	33.97	98.05	0.16	525	172.02	0.79	58%
	6	7	0.72	157.70	0	0	0	0.00	0	0	0	9216	26.67	2.99	79.73	44.15	123.88	0.16	525	172.02	0.79	73%
BLOCK 11																						
Infiltration and Inflow		B11	19.88	19.88	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-1PFD)		B11	0.00	0.00	0	0	197	3.20	0	632	632	632	-	-	-	-	-					
Residential (R-1PRL)		B11	0.00	0.00	0	0	93	3.20	0	296	296	296	-	-	-	-	-					
Residential (R-3)		B11	0.00	0.00	0	0	49	2.40	0	118	118	118	-	-	-	-	-					
Residential (R-4)		B11	0.00	0.00	0	0	145	2.40	0	348	348	348	-	-	-	-	-					
Commercial (ETC)		B11	0.00	0.00	52313	4860	0	0.00	157	0	56	56	-	-	-	-	-					
TOTAL BLOCK 11	B11	3	0.00	19.88	0	0	0		0	0	0	1450	4.20	3.69	15.49	5.57	21.05					
BLOCK 14																						
Infiltration and Inflow		B14	24.56	24.56	0	0	0	0	0	0	0	0	-	-	-	-	-					
Industrial (BP/LI)		B14	0.00	0.00	792891	73662	0	0.00	1586	0	438	438	-	-	-	-	-					
Industrial (BP/LI) - EXTRA ASP AREA		B14	6.54	6.54	211136	19615	0	0.00	422	0	117	117	-	-	-	-	-					
TOTAL BLOCK 14	B14	3	0.00	31.10	0	0	0		0	0	0	554	1.60	3.95	6.34	8.71	15.04					
	3	4	1.33	52.31	0	0	0	0.00	0	0	0	2005	5.80	3.59	20.79	14.65	35.44	0.32	300	54.70	0.77	65%
BLOCK 13B																						
Infiltration and Inflow		B13B	4.14	4.14	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-1PFD)		B13B	0.00	0.00	0	0	49	3.20	0	158	158	158	-	-	-	-	-					
Residential (R-1PRL)		B13B	0.00	0.00	0	0	40	3.20	0	128	128	128	-	-	-	-	-					
TOTAL BLOCK 13B	B13B	1	0.00	4.14	0	0	0		0	0	0	286	0.83	4.09	3.38	1.16	4.54					
	1	2	1.16	5.30	0	0	0	0.00	0	0	0	286	0.83	4.09	3.38	1.48	4.87	0.40	250	37.61	0.77	13%
BLOCK 13A																						
Infiltration and Inflow		B13A	4.48	4.48	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-4)		B13A	0.00	0.00	0	0	360	2.40	0	863	863	863	-	-	-	-	-					
TOTAL BLOCK 13A	B13A	2	0.00	4.48	0	0	0		0	0	0	863	2.50	3.84	9.59	1.25	10.85					
BLOCK 12																						
Infiltration and Inflow		B12	21.50	21.50	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential (R-1PFD)		B12	0.00	0.00	0	0	211	3.20	0	675	675	675	-	-	-	-	-					
Residential (R-1PRL)		B12	0.00	0.00	0	0	99	3.20	0	317	317	317	-	-	-	-	-					
Residential (R-3C)		B12	0.00	0.00	0	0	28	2.40	0	67	67	67	-	-	-	-	-					
Residential (R-4C)		B12	0.00	0.00	0	0	509	2.40	0	1222	1222	1222	-	-	-	-	-					
TOTAL BLOCK 12	B12	2	0.00	21.50	0	0	0		0	0	0	2281	6.60	3.54	23.37	6.02	29.39					
	2	4	0.67	31.95	0	0	0	0.00	0	0	0	3431	9.93	3.39	33.67	8.95	42.62	0.24	375	85.89	0.78	50%

TABLE 1: SANITARY SEWER DESIGN FLOWS
CITY OF CHESTERMERE

Date 19-Jan-21

Project: Clearwater Park (ASP Area)
Job No: 121935
File: J:\121935_BayfieldLnds\6.0_Technical\6.2_Civil_Eng_Muni_Transp\6.2.3_Tech-Reports\Sanitary Servicing Study\Jan 2021 Submission\121935-ClearwaterPark_ASPSanCalcs_2021-01-19.xlsx\3 - COC DESIGN FLOWS

Computed By: CF
Checked By: MMS

INFILTRATION AND INFLOW = 0.28 (L/s/ha)
RESIDENTIAL FLOW RATE⁶ = 250 (L/d/person)
INDUSTRIAL FLOW RATE⁶ = 69 (L/d/employee)
PERSONS PER HOUSEHOLD (EXCL. APARTMENTS) = 3.20 (Person/Residential Unit)
PERSONS PER MULTI-FAMILY/APARTMENT = 2.40 (Person/Apartment)
EMPLOYEES PER 1,000sqft (INDUSTRIAL) = 2.00 (Employees/1000Sqft Ind)
EMPLOYEES PER 1,000sqft (COMMERCIAL) = 3.00 (Employees/1000Sqft Comm)
COMMERCIAL FLOW RATE³ = 90 (L/d/employee)
SCHOOL FLOW RATE = 24 (L/d/m²)

LOCATION	MANHOLE		TRIBUTARY AREA		Building Area		Residential Density		Non-Residential Population	Residential Population	Equivalent Population (Non-Res + Res)	Total Equivalent Population	Average Dry Weather Flow L/sec	PEAK FLOW FACTOR ²	Peak Dry Weather Flow L/sec	TOTAL INFILT. & INFLOW L/sec	Peak Wet Weather Flow L/sec	SEWER DESIGN				
	FROM	TO	A ha	Total A ha	sqft	m2	# Units	Per/Unit										Slope %	Diam. mm	Cap. L/sec	Vel. @ Cap m/sec	% Capacity
	4	5	0.00	84.26	0	0	0	0.00	0	0	0	5435	15.73	3.21	50.50	23.59	74.10	0.18	450	120.96	0.76	62%
	7	LS	0.00	327.75	0	0	0	0.00	0	0	0	15025	43.47	2.78	120.75	91.77	212.52	0.10	675	265.82	0.74	80%
TOTAL STAGE 2 (EXCLUDES EXTRA AREAS)	S2		114.50		859735		2275		1743	6345		6969	20.16	3.11	62.68	32.06	94.74					
TOTAL STAGE 1 + 2 (EXCLUDES EXTRA AREAS)	S1&2		199.12		1066126		4370		1941	11491		12572	36.38	2.86	103.87	55.75	159.62					
ASP AREAS EXTERNAL TO CLEARWATER PARK																						
BLOCK MV1																						
Infiltration and Inflow		MV1	42.21	42.21	0	0	0	0	0	0	0	0	-	-	-	-	-					
Industrial (BP/LI)		MV1	0.00	0.00	1362701	126599	0	0.00	2725	0	752	752	-	-	-	-	-					
TOTAL BLOCK MV1	MV1	13	0.00	42.21	0	0	0		0	0	0	752	2.18	3.88	8.44	11.82	20.26					
BLOCK MV2																						
Infiltration and Inflow		MV2	19.76	19.76	0	0	0	0	0	0	0	0	-	-	-	-	-					
Industrial (BP/LI)		MV2	0.00	0.00	637929	59266	0	0.00	1276	0	352	352	-	-	-	-	-					
TOTAL BLOCK MV2	MV2	13	0.00	19.76	0	0	0		0	0	0	352	1.02	4.05	4.12	5.53	9.66					
	13	14	2.70	64.67	0	0	0	0.00	0	0	-	1104	0.00	4.50	0.00	18.11	18.11	0.24	375	85.89	0.78	22%
BLOCK MV3																						
Infiltration and Inflow		MV3	27.09	27.09	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential		MV3	0.00	0.00	0	0	158	3.20	0	507	507	507	-	-	-	-	-					
TOTAL BLOCK MV3	MV3	14	0.00	27.09	0	0	0		0	0	0	507	1.47	3.97	5.83	7.59	13.41					
BLOCK MV4																						
Infiltration and Inflow		MV4	19.42	19.42	0	0	0	0	0	0	0	0	-	-	-	-	-					
Residential		MV4	0.00	0.00	0	0	117	3.20	0	373	373	373	-	-	-	-	-					
TOTAL BLOCK MV4	MV4	14	0.00	19.42	0	0	0		0	0	0	373	1.08	4.04	4.35	5.44	9.79					
	14	12 ASP	2.45	113.63	0	0	0	0.00	0	0	0	1984	5.74	3.59	20.60	31.82	52.42	0.18	450	120.96	0.76	44%
	12 ASP	12	0.00	113.63	0	0	0	0.00	0	0	0	1984	5.74	3.59	20.60	31.82	52.42	0.18	450	120.96	0.76	44%
TOTAL ASP AREAS EXTERNAL TO CLEARWATER PARK	ASP		128.63		2354461		389		4709	1153		2453	7.10	3.52	24.95	36.02	60.97					
	LS	LS-10	0.00	327.75	0	0	0	0.00	0	0	0	15025	43.47	2.78	120.75	91.77	212.52	FM	TBC	N/A	N/A	N/A
TOTAL TO EX LIFT STATION #10 (INCLUDES ALL ASP AREAS)	LS-10		327.75		3420587		4759		6650	12644		15025	43.47	2.78	120.75	91.77	212.52					

GENERAL NOTES:

1. Residential and employment population projections are based on the stats provided by IBI Group Planning.
2. Peak Flow Factor calculated using Harmon's Equation with a minimum of 2.5
3. Flow rates as per "Alberta Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems - Part 4 (March 2013)"
4. Lake/PUL areas have not been included in the flow calculations. MR and roadways within each of the blocks/catchments have been accounted for within the infiltration allowance for the area.
5. Unit counts are as per the current ASP and Stage 1 Outline Plan.
6. Residential flow rate based on City of Chestermere UMP. Industrial Flow Rate based on measured flow data from similar industrial land use.

3756171.7 L/d
3.756 ML/d