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Memorandum

To/Attention	Paul Saik, CET Team Lead, Infrastructure Community Growth & Infrastructure City of Chestermere	Date	January 22, 2021
From	Michael Slattery, P.Eng.	Project No	121935
cc	Centron Group, David Dalen IBI Group, Rod Sieker, Elvin Karpovich		
Subject	Clearwater Park Technical Memorandum Sanitary Servicing - Revised		

1. Summary

IBI Group submitted a sanitary servicing memorandum for the Clearwater Park development to the City of Chestermere on March 4th, 2020. A meeting was held via conference call on March 31st, 2020 to discuss the City's comments on the sanitary servicing options described in the first memorandum.

A revised memorandum which responded to these comments and incorporated updates to the proposed ASP amendment and Land Use/Outline Plan was submitted on October 2, 2020. Both of these memorandums proposed a two lift station solution for the sanitary servicing of the ASP area.

A further meeting was held via conference call on November 16th 2020 in which the City provided further feedback on their requirement for a single lift station to service the ASP area. A further memorandum was submitted in response to this feedback on December 24, 2020.

On January 21st, 2021, the following comments were received from the City of Chestermere:

- Page 3 – Please change Option 1 wording - “This option is no longer being considered.”
- Page 3 - Option 2 is worded incorrect – “East Chestermere gravity trunk is to drain to LS #14.”
- The sanitary generation rate can be updated to 250L/c/day.

The document has been updated in accordance with these comments as well as incorporating the latest statistics from the Land Use and Outline Plan and Area Structure Plan submissions dated January 8th, 2021.

The Clearwater Park Area Structure Plan (ASP) covers an area of 379.42 hectares (937.57 acres) and includes all of the land in Section 13-24-28-W4M and a portion of land that lies to the north and east of Highway 1 in Section 14-24-28-W4M. The Clearwater Park development comprises approximately 238 hectares (588 acres) of this.

IBI Group have been retained to prepare the ASP amendment and Land Use/Outline Plan application (and associated reports) to the City of Chestermere for the Clearwater Park

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development. As part of the Sanitary Servicing Study that is being prepared in support of this application, IBI Group is exploring possible sanitary servicing options for the development and have prepared this sanitary servicing memorandum to provide details on the proposed sanitary servicing options that have been considered.

All of the options that have been investigated for sanitary servicing of this ASP area are discussed in detail in Section 4.

2. Background

The proposed development is located within the City of Chestermere and adjacent to Rocky View County. It is bound by Highway 1 on the west and south, on the east by Highway 791 (Range Road 280) and undeveloped agricultural lands, and on the north by TWP Road 243 and existing Rocky View County country residential development.

In 2004, a Land Use Redesignation application for the area was submitted to the Municipal District of Rocky View to redesignate approximately 23ha of land to accommodate a business and industrial park development, named Mountain View Business Park. Rocky View council adopted the conceptual plan for the area in 2007.

In 2009, the annexation of the area to the City (previously Town) of Chestermere led to the proposal of a revision to the land use plan and storm water management strategy for the area. The amendment to the ASP was given final reading by Chestermere Council in 2010.

In 2019, Centron Group became the sole owners of the lands and have prepared an ASP amendment submission to the City of Chestermere for this area under the name Clearwater Park. In its current concept, Clearwater Park is envisioned as a mixed-use development which will provide a wide range of opportunities for commercial, industrial, business, and residential uses. There are also large areas dedicated to public use spaces including ponds, municipal reserves, and community amenity spaces. The strategic location of the plan area provides convenient access to major transportation corridors including Highway 1, Stoney Trail (Highway 201). The ASP provides a unique development opportunity in the region for a complete, master planned community that allows people to live, work, and play.

3. Existing Topography and Post-Development Grading

The existing ground in NE 14 24-28-4 and NW 13 24-28-4 generally slopes towards the property line between those two quarter sections while the existing ground in NE13 24-28-4 and SE13 24-28-4 generally slopes from west to east.

Post-development grading for the development will be largely influenced by stormwater/sanitary servicing requirements while following the existing topography of the site as much as possible. The stormwater solution that is being proposed will see the construction of three on-site ponds. There is one pond proposed within NE 14 24-28-4 and W 13 24-28-4 and two ponds proposed within NE13 24-28-4 and SE13 24-28-4. Existing and proposed drainage splits along the Stage 1/Stage 2 boundary indicated on the attached Figures 3.0 and 3.1.

Following discussions with the City of Chestermere, we are proposing to install a single on-site lift station adjacent to proposed Pond 1 which would pump flows to the existing City of

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Chestermere Lift Station #10. Details of all options that have been considered are discussed in Section 4.

4. Existing Sanitary Infrastructure and Proposed Points of Connection

The Clearwater Park lands are currently undeveloped but were included in the City of Chestermere's Utilities Master Plan. The sanitary servicing solution that is forecast for these lands within the document requires the construction of Projects 10, 11 and 14 detailed in the City's Utilities Master Plan. These three projects entail the construction of 5km of gravity trunk, a new major lift station and 2.5km of 450mm force main and are not slated for completion until after the year 2039.

While the intention was for the Clearwater Park lands to utilize this new gravity trunk for servicing, the timeline of construction led to the exploration of alternative servicing options. These options are listed and discussed below:

Option 1 – Construct an on-site lift station within Stage 2 (LS-A), pump flows to the SW corner of Stage 1 from where another lift station (LS-B) would pump flows to the existing City of Chestermere sanitary system at lift station #10:

This option proposes a new lift station at the west side of Stage 1 (LS-B) which pumps to LS10 and another new lift station in Stage 2 (LS-A) which pumps flows to LS-B through a forcemain running along the southern boundary of the Clearwater Park development.

Regarding the route of the proposed force main from LS-B to existing lift station #10, it would run from LS-B, northwest along East Chestermere Drive and then southwest along Chestermere Boulevard to existing lift station #10.

In response to comments received from the City of Chestermere regarding the utilization of a single lift station to service ASP area, this option is no longer being considered.

Option 2 – Construct one on-site lift station as per the Town of Chestermere Utilities Master Plan, 2008 Update (Stantec, 2008):

Figure 5.18 from the 2008 UMP attached indicates that this ASP area would be serviced by a single lift station located towards the south end of the boundary between SE14 24-28-4 & SW13 24-28-4. This lift station is shown pumping the ASP's flows through a force main for approximately 680m to a point where it would connect to the future East Chestermere Gravity Trunk draining south to future LS#14. The major drawback with this option (as with the sanitary servicing solution for these lands in the current UMP) is that the East Chestermere Gravity Trunk is not slated for construction until after 2039.

We do not consider this option to be currently viable for this project due to this timeline.

Option 3 – Select a new location for a single lift station that would service the entire ASP area:

The City of Chestermere has expressed their intention that the entire ASP area is to be serviced by a single lift station. Various locations have been explored, with the most feasible location being just east of storm pond #1, on the south side of Chestermere Boulevard. This location would enable both Stage 1 and 2 of Clearwater Park, as well as the external ASP lands to the south to be serviced. The flows collected at the lift station would then be pumped by forcemain along Chestermere Boulevard to the existing LS#10.

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While it is possible to service the entire area with one lift station, there are several challenges that the existing site topography presents. As shown in Figure 3.0, to service the Clearwater Park Stage 2 lands, the pipe sections from manhole 5 to the lift station are between 4.3 and 7m deep. This also places the pipes up to 2m into bedrock around manhole 6 based on nearby borehole information. In the ASP lands to the south, the pipes are up to 6.5m deep at manhole 12, while also requiring up to 4.5m of fill at manhole 14, which is a natural low-lying area.

However, this option will allow for servicing of all of the ASP lands, while minimizing the number of lift stations that would be added to the existing City of Chestermere network.

We are proposing Option 3 as the preferred option.

Option 4 – Connection to Lift Station #3 on the East Rocky View Wastewater Transmission Main

One further possible option that was under consideration was the possibility of a connection being made to the existing Rocky View County lift station #3 (Chestermere) on the East Rocky View Regional Wastewater Transmission Main.

This option is no longer being considered.

Option 5 – Stage 1 Connection to City of Chestermere Existing Lift Station #10 and Stage 2 Connection to Lift Station #3 on the East Rocky View Wastewater Transmission Main

One further possible option that was under consideration was the possibility of a connection being made to the existing Rocky View County lift station #3 (Chestermere) on the East Rocky View Regional Wastewater Transmission Main for Stage 2 of the development only.

This option is no longer being considered.

We are proposing Option 3 as our preferred solution for a sanitary connection to the existing City of Chestermere system.

5. Design Flow Parameters and Calculations

The ultimate design flow calculations for the ASP area were used to inform the sanitary network design, explore potential servicing alternatives, and determine the ultimate contributing flows to existing and proposed lift stations.

Design flows were calculated using standards outlined in the City of Chestermere Utility Master Plan, as well as the City of Calgary Sanitary Servicing Guidelines and the Alberta Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems, Part 4.

These parameters include:

- For the Clearwater Park area - Dry Weather Flows for each sub-catchment area based on population and average per capita day flow rates using 250 L/day per person for residential, 90 L/day per person for commercial (as per the Alberta Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems, Part 4), 0.011 L/sec/ha for industrial use (this value is based on measured data from High Plains Industrial Park for similar type industrial use) and 24 L/day/m² for the proposed school site.

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- For the areas external to Clearwater Park – 250 L/c/day was used to calculate the sanitary flows for these areas for all land uses as per Section 4.2.2 of the City of Chestermere Utilities Master Plan.
- A peak flow factor was applied to dry weather flows using Harmon's equation (with a minimum of 2.5) for residential, industrial, commercial and institutional land uses.

$$PF = 1 + 14 / (4 + \sqrt{P})$$

(where PF = peaking factor, P = total population in 1000s)

- An infiltration and inflow factor of 0.28 L/s/ha.
- A Manning's "n" of 0.013 was used for gravity flow in both PVC and concrete pipes.

Land uses and projected population stats for the area are detailed on Figure 3.1 and in the sanitary sewer design flow chart attached (Table 1.0). Population densities used to determine the respective populations based on the proposed land uses were as follows:

- 3.20 persons/residential unit
- 2.40 persons/apartment unit
- 2.00 employees/1000sqft for industrial uses
- 3.00 employees/1000sqft for commercial uses

It should be noted that the populations and employment numbers are preliminary projections based on the proposed land uses. There is potential for these to change slightly as the development progresses to subdivision and detailed design stage. To provide some flexibility in the future design of the development, conservative numbers were used within the analysis where possible. This includes analyzing the pipes at minimum slopes and aiming to keep the capacity of the pipes below 80% where possible.

6. Results

To service the ASP area internally, pipe sizes will range from 200mm to 675mm. Additionally, the construction of one lift station within the site will be required to pump on-site flows westward to the existing City of Chestermere sanitary system. Minimum slopes were used to provide conservative pipe sizes and allow for some future changes in grading if necessary. It is likely that pipe slopes can be increased at the detailed design stage, when more certain grading information is available, which may allow for downsizing of the pipes.

Using the preliminary development stats and site plans for the area, the anticipated peak wet weather flows from the ASP area are estimated as follows:

- Clearwater Park ASP area: 212.52 L/s
- Clearwater Park (Centron lands only): 159.62 L/s
- Stage 1 Outline Plan (excluding non-Centron Lands): 75.55 L/s
- Stage 2 Outline Plan (excluding non-Centron Lands): 94.74 L/s

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7. Corporate Authorization

This document entitled “*Clearwater Park Technical Memorandum Sanitary Servicing - Revised*” was prepared by IBI Group, for the exclusive use of Clear Water Park Inc., their consultants and Contractors responsible for the subject site. Contents of the report reflect IBI Group’s best judgment given available data at the time of report preparation. Any uses in which a third party makes of the report, or reliance on, or decisions made based on, are the responsibility of such third parties. IBI Group accepts no responsibility for damages suffered by any third party as a result of decisions made, or actions based on this report.

Duplication or distribution of this report, or any portion herein, is forbidden and requires approval from City of Chestermere and IBI Group. Similarly, unauthorized use of the concepts, or strategies displayed herein for the above noted report is considered intellectual property and forbidden from reproduction.

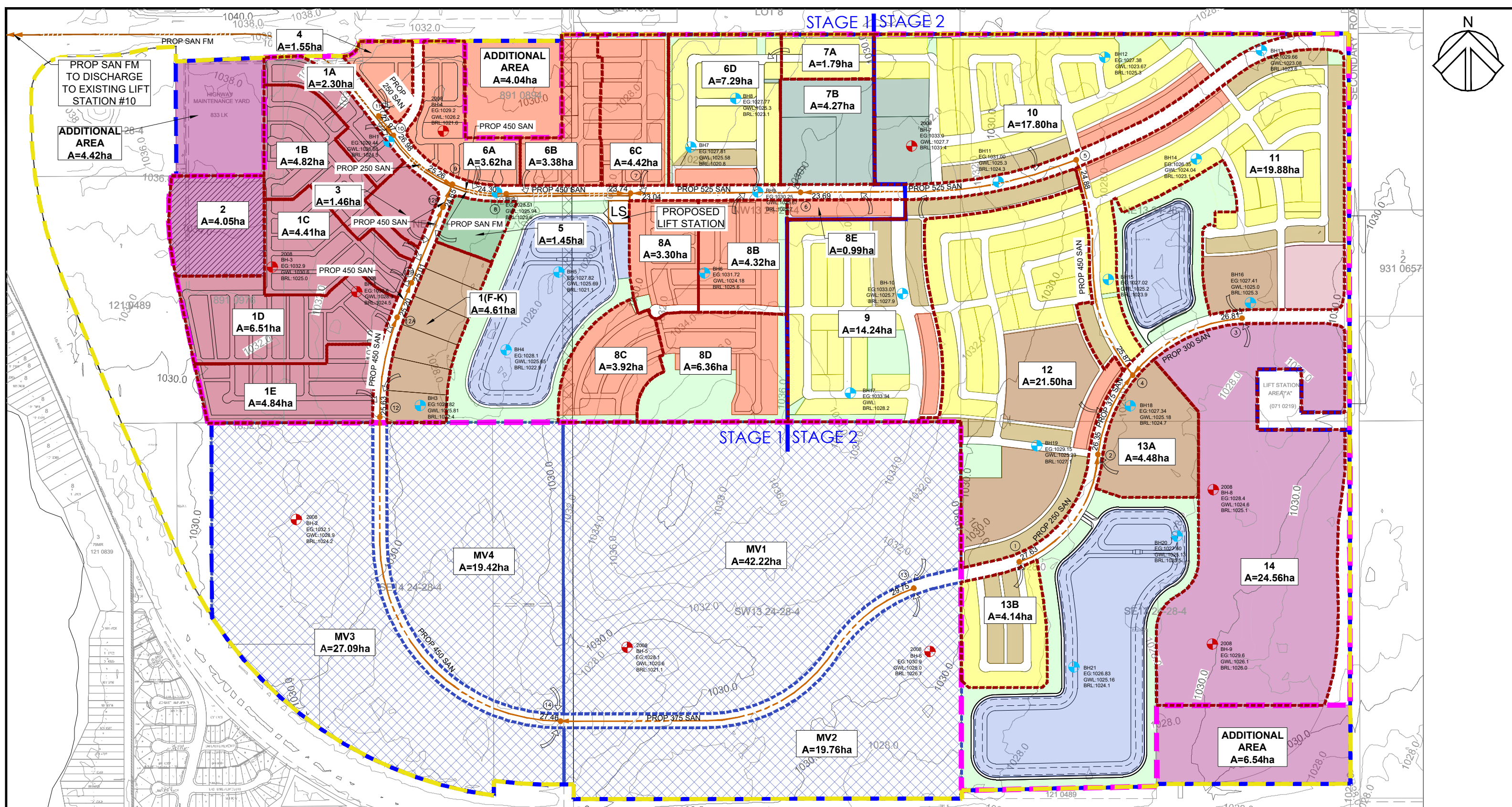
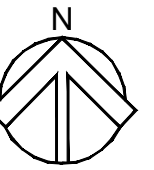
Yours truly,

IBI GROUP



Michael Slattery, P.Eng
Project Engineer

Permit Holder: Rod Sieker, P.Eng.



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)
11	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

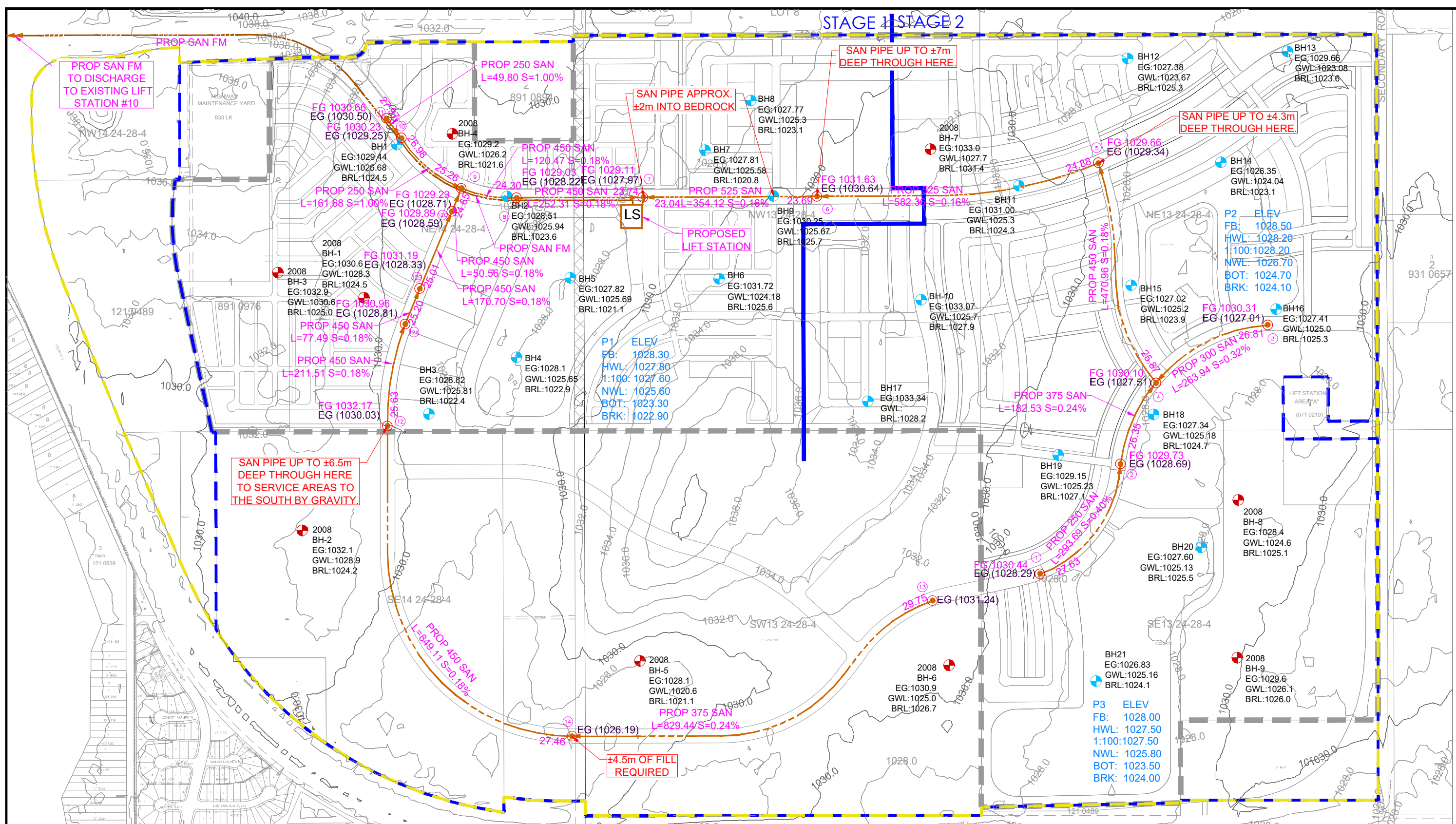
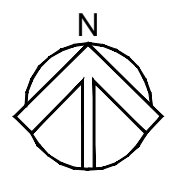
	ROADS
	PS (PUL)
	AREAS WITHIN ASP EXTERNAL TO CLEARWATER PARK

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\Sanitary Servicing Study\121935_ClearwaterPark_SANITARY_PLAN.dwg Last Saved: January 18, 2021 12:48:50 AM by Michael Slatery
 11 mm SCALE CHECK



LEGEND

	CLEARWATER PARK DEVELOPMENT AREA
	ASP AREA
	SANITARY SERVICING STUDY AREA
	28.50 SANITARY PIPES & MANHOLES (WITH TRUNCATED PIPE INVERTS)
	SANITARY FORCEMAIN
	SANITARY MANHOLE NUMBER
	BOREHOLE (DRILLED JAN 2020)
	BOREHOLE (DRILLED MAR 2008)
	FG 1030.61 PROPOSED AND EXISTING GROUND ELEVATIONS

CLIENT CLEAR WATER PARK INC. (A CENTRON GROUP COMPANY)	PROJECT NAME CLEARWATER PARK
104, 8826 BLACKFOOT TRAIL S.E. CALGARY, ALBERTA	SCALE 1:7500
	DATE DEC 2020
	DRAWN BY CF
	APPROVED BY RRS
	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. 3.0

OPTION 3 - GRADING

File Location: J:\121935_BayfieldLands7.0_Production\3_Design\04_Civil\Sheets\Sanitary Servicing Study\121935_ClearwaterPark_SANITARY_CONCEPT_PLAN_GRADING_OPT3.dwg Last Saved: January 18, 2021, by michael.lastry Plotted: Friday, January 22, 2021 12:54:45 AM by T1mm SCALE CHECK

**TABLE 1: SANITARY SEWER DESIGN FLOWS
CITY OF CHESTERMERE**

Date 22-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_2021-01-22.xlsx\3 - COC DESIGN FLOWS

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
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	1.00	250	59.47	1.21	4%
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	1.00	250	59.47	1.21	12%
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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Checked By: MMS

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	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					

TABLE 1: SANITARY SEWER DESIGN FLOWS
CITY OF CHESTERMERE

Date 22-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_2021-01-22.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
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					

TABLE 1: SANITARY SEWER DESIGN FLOWS
CITY OF CHESTERMERE

Date 22-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_2021-01-22.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
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 22-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_2021-01-22.xlsx]3 - COC DESIGN FLOWS

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
	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