



URBAN SYSTEMS

ASCENSION CONCEPTUAL SCHEME

Servicing Design Brief

Prepared for:
Highfield Land Management
18, 11410 27th Street SE
Calgary, AB T2Z 3R6

Contact:
Daniel Salamandyk, P.Eng.
dsalamandyk@urbansystems.ca

4319.0004.01

JULY 2023
REVISION 2

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PREPARED FOR:

Highfield Land Management Ltd.

18, 11410 27th Street SE

Calgary, AB T2Z 3R6

Suite 101, 134 - 11 Avenue SE, Calgary, AB T2G 0X5 | T: 403.291.1193

File: 4319.0004.01

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1.0 INTRODUCTION

Urban Systems Ltd. (USL) was retained by Highfield Land Management. to prepare a servicing design brief in support of the Ascension Conceptual Scheme (CS) application. The Ascension development consists of 94.95 ha of gross developable area within the SW and SE ¼ 19-25-2-5 and Block A, Plan 921 2196. The subject lands are located at the east end of Bears paw, south of Highway 1A and west of 12 Mile Coulee Road. The property extends south to Blueridge Rise and west to Bears paw Road. **Figure 1:** Location Map illustrates the location of the proposed development.

This report will primarily discuss sanitary and water servicing options as other supporting reports have been submitted for transportation (Bunt TIA, December 2020) and stormwater (LGN SMDP, October 2022).

Design parameters and utilization of existing infrastructure will be further examined and verified at detailed design stage and subdivision development.

Figure 1: Location Map



2.0 POPULATION

Density, population and areas are provided in accordance with the approved Ascension Conceptual Scheme, September 2021.

- Ascension Total Residential Area = 49.6 ha
- Ascension Total Market Place Area = 19.3 ha

Table 1: Anticipated Density for Ascension Development

ANTICIPATED DENSITY FOR ASCENSION		
USE	UNIT COUNT	POPULATION
Single Family	540	1,620
Comprehensively Planned Residential	43	95
Total	583	1,715

Note that the Market Place Residential identified as 300 units of seniors residential units has been included in the water demand and sanitary flow calculations for the overall Market Place area.

3.0 PROPOSED SANITARY SEWER SYSTEM

3.1 SANITARY SEWER DESIGN CRITERIA AND FLOWS

3.1.1 FLOW GENERATION

Using the above calculated population data, the on-site peak sanitary sewer flow was calculated.

A. Residential Flow Generation

Residential flows in this study are calculated using an average per capita flow of 250 L/capita/day (l/c/d) which corresponds to the rate used in the Bearspaw Regional WWTP Capacity Assessment, prepared by Associated Engineering, October 2022. The Alberta Environment (AEP) peak dry weather design flow rate is as follows:

$$Q_{PDW} = \frac{G \times P \times Pf}{86.4}$$

where:

Q_{PDW}	=	the peak weather design flow rate (L/s)
G	=	the per capita average daily design flow (L/d)
P	=	the design contributing population in thousands
Pf	=	"peaking factor"

Harmon's Peaking Factor was used in this analysis as part of the peak flow calculation.

$$\text{Harmon's Peaking Factor} = 1 + 14/(4+P^{1/2})$$

Where: P = the design contributing population in thousands

Table 2: On-Site Peak Dry Weather Residential Flow

ON-SITE PEAK DRY WEATHER RESIDENTIAL FLOW	
QPDW - Residential	18.1 L/s

B. Commercial Flow Generation

Commercial flows were calculated using 90% of the water demand rate of 0.15 L/s/ha (gross developable area) for the commercial Market Place area. This is based on RVC specifications and guidelines and is slightly higher than the 0.1 l/s/ha rate applied in other recent RVC servicing documents (Conrich and Omni) – note the 90% commercial water demand /sanitary ratio has been maintained from these noted reports. This rate will provide some flexibility in the sanitary system design moving into the detailed design phase. The Ascension Conceptual Scheme total Market Place area is 19.3 ha. There are no off-site commercial areas contributing flow to the development. Hence, the on-site average commercial sanitary sewer flow = 2.6 L/s.

A peaking factor of 2.5 was applied to the commercial flows to obtain the peak dry weather flow for the commercial land uses.

Table 3: On-Site Peak Dry Weather Commercial Flow

ON-SITE PEAK DRY WEATHER COMMERCIAL FLOW	
QPDW - Commercial	6.5 L/s

3.1.2 INFLOW AND INFILTRATION

Inflow and infiltration (I&I) for the Ascension Conceptual Scheme was calculated using an allowance of 0.10 L/s/ha to account of wet weather inflow and infiltration into pipes and manholes. The flow rate noted has been adopted for this plan based on reduced infiltration resulting from the use of modern techniques and materials as well as recorded lower groundwater levels in the area. The I&I value has also been used in other recent RVC reports. Flow records received from the BRWWTP included I&I and therefore the 250 l/c/d assumption is conservative. As such, annual flows to the WWTP will not include I&I.

$$\begin{aligned}
 \text{I\&I} &= 0.10 \text{ L/s/ha} \times 69.0 \text{ Ha} \\
 \text{I\&I} &= 6.9 \text{ L/s}
 \end{aligned}$$

3.1.3 PEAK WET WEATHER FLOW

For this analysis, I&I was added to all peak dry weather flows to obtain the peak wet weather flow for the Ascension development, as shown in the table below:

Table 4: Peak Wet Weather Flow Generation

ASCENSION - ON-SITE PEAK FLOW GENERATION	
Sanitary Sewer Study Population	1,715
Commercial Area	19.3 ha
Peak Dry Weather Flow Rate	24.6 L/s
I&I Contribution	6.9 L/s
Peak Wet Weather Flow Rate	31.5 L/s

3.2 SANITARY MAIN DESIGN

Sanitary flows generated by the proposed Ascension development will be conveyed via gravity sewer pipe systems of newly constructed pipes within proposed roadways. The sanitary systems will be designed and constructed with minimum slope and minimum cover, where possible; details and more defined alignments of the proposed sanitary sewer system will be provided during preliminary and detailed design. Pipe sizes are expected to be 200mm depending on design slope available.

A wastewater lift station for the site will be accommodated at the southwest corner of the development site within the road right-of-way (see **Figure 2:** Internal Wastewater Servicing Plan). The lift station will be built to provincial standards and incorporate the necessary fail-safe controls within the design.

The Ascension development ties-in to the south via a proposed sanitary main extension through the existing Blueridge Mountain Estates subdivision and connection at an existing sanitary sewer manhole at the north edge of the Watermark Phase 2 development. The sanitary main extension is expected to follow minimum cover and slope requirements and the alignment is proposed within the existing road right of way. The sewer system network will be ultimately directed through the Watermark Phase 1 and 2 sanitary system and tie into the Bearspaw Regional Waste Water Treatment Plant (BRWWTP). An expansion to the BRWWTP is required to service the Ascension development.

Figure 2: Internal Wastewater Servicing Plan



3.2.1 OFFSITE GRAVITY CONNECTION

An existing forcemain was installed within Watermark to service Ascension. The proposed strategy has been modified from the plans initiated during the design of Watermark and intends to use the existing forcemain through a connection from an existing gravity main located within Watermark. The proposed tie at the existing sanitary gravity main at north end of Watermark Phase 2 will flow towards the existing forcemain in Watermark Avenue. The main will be installed between existing lots within an established utility rights of way – revisions or additions to the existing URW will be reviewed at detailed design. See **Figure 3: Watermark Existing Forcemain Connection** and **Figure 4: Regional Wastewater Servicing Plan** below for the proposed offsite sanitary alignment. A connection to the forcemain will be completed within the existing roadway and utilize the forcemain to convey gravity flows through to the BRWWTP. The pipe is not expected to surcharge based on our calculations; however, in higher than anticipated flow events to the gravity/forcemain transition, the system would discharge through Watermark Phase 2 gravity sanitary sewer down to the BRWWTP. The forcemain will likely be abandoned east of the tie in location depending on direction from Rocky View County.

Figure 3: Watermark Existing Forcemain Connection

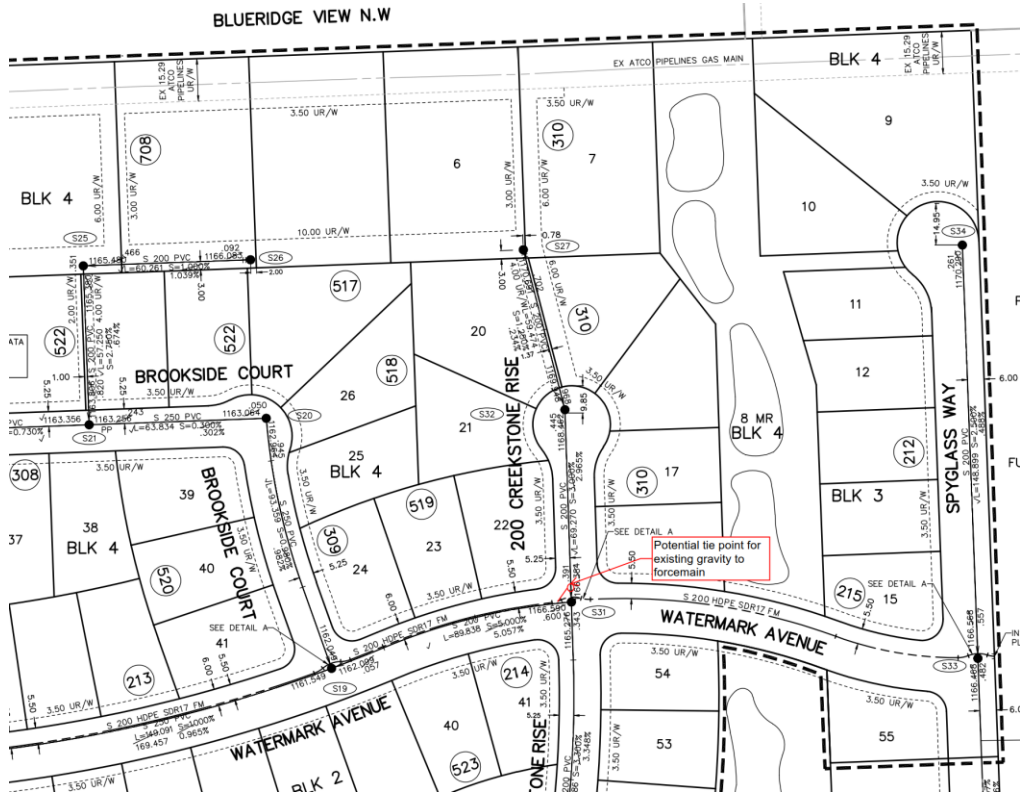
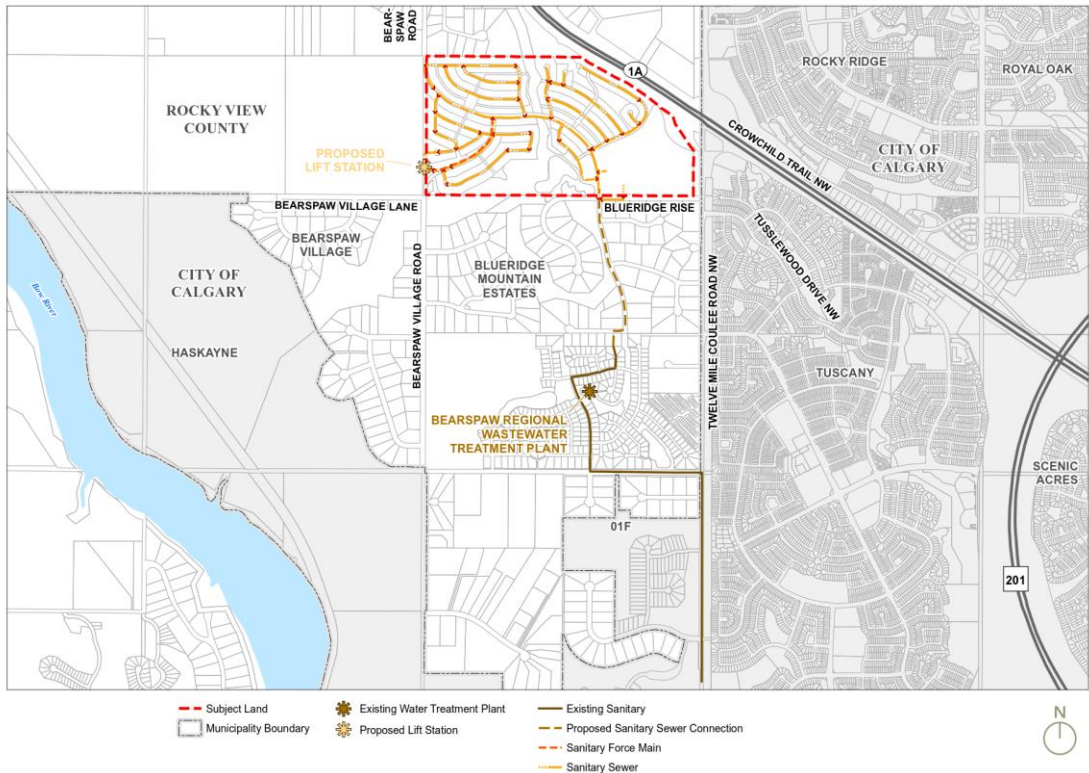


Figure 4: Regional Wastewater Servicing Plan



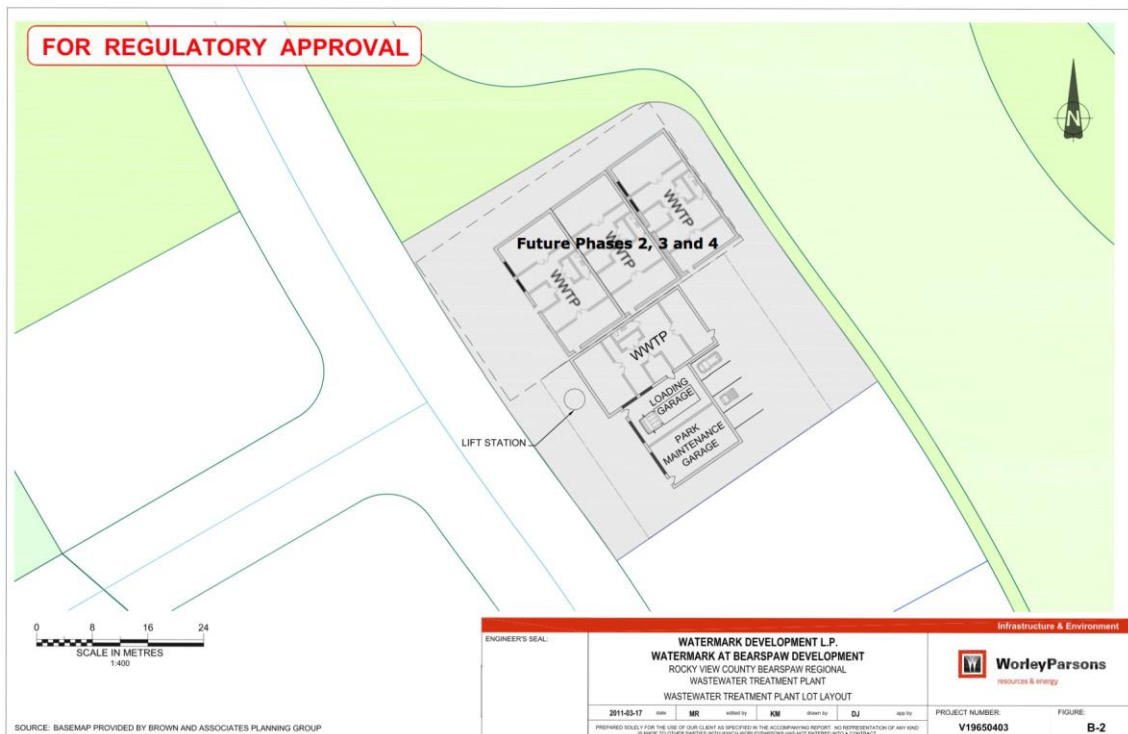
3.3 BEARSPAW REGIONAL WASTEWATER TREATMENT PLANT

Wastewater from the development area will be collected and conveyed in a conventional piped system to Bearspaw Regional Wastewater Treatment Plant (see **Figure 4: Regional Wastewater Servicing Plan**), which is operated by RVC. Developer funded expansion of the facility will be required to accommodate growth. The existing Stage 1, 350 m³/day treatment capacity will not accommodate any flows from the proposed development. Three more future stages are available providing an additional plant capacity of 1,050 m³/day. The development will require two of the three stages to accommodate full buildout, subject to actual site density and sanitary flow generation. Space is available on the treatment site for the plant expansion but it will require an expansion to the facility – the proposed expansion concept plan was created by Worley Parsons as per **Figure 5: BRWWTP Expansion Concept Plan**.

Table 5: BRWWTP Expansion Requirements

BRWWTP EXPANSION REQUIREMENTS	
	DAILY FLOWS
Existing BRWWTP Capacity	350 m ³ /day
Existing BRWWTP Available Capacity	0 m ³ /day
Ascension Average Daily Flow	654 m ³ /day
Stages of Expansion Required	2 Stages
Proposed Additional BRWWTP Capacity	700 m ³ /day
Proposed BRWWTP Capacity	1,050 m ³ /day

Figure 5: BRWWTP Expansion Concept Plan



3.4 EFFLUENT DISPOSAL

Treated wastewater from the Bearspaw Regional Wastewater Treatment Plant is discharged to the Bow River through an existing outfall located downstream of the City of Calgary’s raw water intake to ensure no negative impact on the City’s drinking water. The discharge pipe has a capacity of 2,600 m³/day and therefore no upgrades are required for the development area.

4.0 PROPOSED WATER SYSTEM

4.1 ONSITE WATER SERVICING

Watermains for the plan area are illustrated in **Figure 6: Internal Water Servicing Plan**. 250mm watermains are proposed adjacent to the commercial and multi-family with 200mm and 150mm watermains (where applicable) for the remainder of the residential portion of the development.

The detailed design for the water distribution system, on a per phase basis, will be completed in accordance with the current Rocky View County Servicing Standards, and all applicable Provincial guidelines. The water distribution system is to be sized to provide sufficient fire flow rates to service the development. The site will be designed with two pressure zones as there is significant elevation change within the site – 1,250.7m at the NE corner, 1,179.7m at the SW corner.

Figure 6: Internal Water Servicing Plan



4.1.1 WATER DEMANDS

Water servicing will be provided by RVC's Blazer Water System. The Ascension development area is contained within Blazer's franchise service area (see **Figure 7**: Regional Water Servicing Plan for the regional servicing strategy). Blazer's potable water is sourced from the Bow River and is treated at its facility at the corner of Bearspaw Meadow Way and Lynx Meadows Drive.

The following rates are being proposed for this CS area:

- A water demand rate of 325 l/c/d for residential development. This is based on the Blazer WTP Capacity Assessment by Associated Engineering, October 2022.
- A water demand rate of 0.15 L/s/ha (gross developable area) for the commercial Market Place area. This is based on RVC specifications and guidelines and is slightly higher than the 0.1 l/s/ha rate applied in other recent RVC servicing documents (Conrich/Omni). This rate will provide some flexibility in the water system design moving into the detailed design phase.
- A fire flow requirement of 250 L/s with a 3.5-hour duration which equates to 3,150 m³ volume.

Average Day Demand (ADD) is calculated based on the demand rates noted above for commercial and residential development.

Maximum Day Demand (MDD) = 2.5 x ADD

Peak Hour Demand (PHD) = 5.0 x ADD

These peaking factors are consistent with the Blazer WTP Capacity Assessment by Associated Engineering, October 2022.

The assumed residential rate is higher than historically reported demands and therefore considered to be conservative. Further monitoring of water demands for the system, particularly as the communities grow and more reliable flow records are collected, may result in a lowering of the per capita rate and peaking factors, and therefore reduce system upgrade requirements. Further review is recommended at the subdivision stages of the development.

Figure 7: Regional Water Servicing Plan



Table 6: Ascension Water Demands

ASCENSION WATER DEMANDS				
	AREA	ADD	MDD	PHD
Ascension Conceptual Scheme	69 ha	808 m ³ /day (9.4 L/s)	2,020 m ³ /day (23.4 L/s)	46.76 L/s

The above water demands include all residential and commercial development in Ascension. The residential water demands are consistent with the Blazer WTP Capacity Assessment and commercial demands are based on RVC guidelines. The per capita rate for sanitary (250 l/c/d) is 77% of water (325 l/c/d) when the typical range is 80% to 85% which suggests a higher irrigation or outdoor water use for the communities. For Ascension, landscape design to limit irrigation requirements and lawn watering restrictions will be considered to decrease water demands.

4.2 OFFSITE WATER SERVICING

4.2.1 EXISTING SYSTEM TIE-IN LOCATIONS

Ascension is proposed to connect to existing watermains located within the Blueridge Mountain Estates area and Watermark Phase 2 as shown on **Figure 7: Regional Water Servicing Plan**. Blazer Water Systems has indicated that a single feed connection from the existing Blueridge Mountain Estates would be sufficient for servicing Ascension, however discussions with the residents would be required as this main was installed and funded by the residents as part of a recent system expansion. Back feeding to the Blueridge main should be considered as part of the servicing design to provide improved level of service to Blueridge due to existing lower than normal pressures for that community.

Another alternative is to extend the existing watermain from Watermark Phase 2 and follow a similar alignment to the Blueridge Mountain Estates watermain and install adjacent to the existing roadway up to the edge of the Ascension development. This would reduce impacts on the existing residents in Blueridge Mountain Estates.

A third option exists where connections are made to both Blueridge and Watermark systems. This would provide additional reliability to the Ascension and Blueridge water supply. Offsite servicing design will be reviewed in more detail at time of subdivision.

Both of these options noted above are not shown in **Figure 7: Regional Water Servicing Plan** but would follow similar alignments to the water mains shown.

Existing pressures at the tie-in points at Blueridge and Watermark are approximately 26 PSI and 73 PSI respectively (as identified in 2014 *exp Water Supply and Distribution System Report Proposed Water Service Expansion R1*). Anticipated pressure at Ascension is approximately 20 PSI based on these tie-in locations and existing pressures. Note more detailed water model analysis is required to determine the extent of impacts or upgrades to the existing network.

Upgrades for the existing system will also include expansion of the Blazer Water Treatment Plant at its existing location plus the addition of a treated water reservoir and booster station within the development site as described in Section 4.3. There will be no impact on groundwater levels or on existing wells on adjacent rural properties because the water supply will come directly from the Bow River.

The raw water supply line from the Bow River consists of a 200mm diameter pipe, which then tees off into a 100mm pipe to the Blazer WTP and a 200mm pipe to an irrigation pump station. It is understood the 100mm supply line has a capacity of roughly 14 L/s, which is equivalent to 1,210 m³/day. Therefore, the 100mm water supply will need to be upgraded or twinned in order to meet existing and proposed water demands. Twinning or upsizing of the 200mm raw water supply line may be required subject to ultimate system demand requirements. As well, upgrades to the intake were previously expected and planned in the near future. These upgrades will be coordinated with RVC as required.

4.2.2 EXISTING WATER LICENSE

Highfield owns sufficient diversion licenses that allow for water to be diverted to support the Ascension development. Highfield will engage in further discussions with RVC upon approval of the Conceptual Scheme and Land Use Amendment for the development.

4.2.3 BLAZER WATER TREATMENT PLANT

Capacity is available within the Blazer Water Treatment Plant, but upgrades will be required for ultimate development of the plan area. The City of Calgary (as per C2013-0651, Bylaw 74D2013) limited the gross floor area of the Blazer WTP to 575 m² and limited the annual capacity of the Blazer WTP to 591,407 m³/year.

Ascension average day demand is estimated to be 808 m³/d. Blazer's committed customers (existing plus Watermark) account for 770 m³/d so the total average flow, including Ascension, would be 1578 m³/d or approximately 576,000 m³/yr.. The City Bylaw limited the annual capacity to 591,407 m³/yr which means a bylaw amendment would only be required if growth of the serviced area extends beyond Watermark and Ascension.

According to the Blazer WTP Capacity Assessment, the WTP has a maximum day output of 23.7 L/s with all three Trains operating. The recommended upgrades in the Assessment report, included removal of the original smaller Train #1 and addition of two new trains which would bring the maximum day capacity to 38 L/s which would service all existing customers and full build out of Watermark.

A 110% factor is to be applied to maximum daily demands in accordance with Alberta Environment guidelines with respect to WTP design. With the addition of Ascension to existing customers and all Watermark, WTP capacity is required to be 50.5 L/s which will require further expansion to the plant.

The Blazer Water Systems existing franchise area serviced by the Blazer Water Treatment Plant is shown on **Figure 8: Blazer Water Systems Franchise Area** below.

Figure 8: Blazer Water Systems Franchise Area



4.3 FUTURE RESERVOIR AND PUMP HOUSE

The combined Ascension reservoir and pump station is proposed to be located near the proposed Market Place, as shown in **Figure 6:** Internal Water Servicing Plan.

The reservoir and pump station will be constructed in a single stage to allow for fire storage and emergency & equalization storage for the Conceptual Scheme area. The table below illustrates the storage requirements to service Ascension. If connection to Blueridge occurs and there is an intention to back feed the existing residents, the reservoir and pump sizing will be adjusted accordingly.

Table 7: Ascension Storage Requirements

ASCENSION STORAGE REQUIREMENTS	
Storage Component	Ascension CS – 69 ha
Equalization Storage (25% MDD)	505 m ³
Emergency Storage (15% ADD)	121 m ³
Fire Storage (250 L/s for 3.5 hrs)	3,150 m ³
TOTAL	3,776 m³

Land provisions for a future expansion to the reservoir are deemed beneficial to the operation of the Blazer distribution system and will be established at time of subdivision and detailed engineering design.

5.0 CONCLUSIONS

The proposed sanitary sewer and water servicing strategy for the Ascension Conceptual Scheme has been identified in the contents of this report.

Sanitary flows generated by the proposed Ascension development will be ultimately conveyed by gravity sewer systems to the existing Watermark sanitary system and Bearspaw Regional Wastewater Treatment Plant. The existing sewer mains have sufficient capacity and a WWTP expansion is required to service the development. The WWTP expansion was anticipated as part of the original planning process.

The anticipated watermain pipe sizes within the system will range from 150 mm to 250 mm to provide adequate service throughout the development. Servicing of the onsite system will be carried out by one of three options which, with a more conservative approach, could include extending a dual watermain from Watermark Phase 2 through Blueridge Mountain Estates up to the southern extents of Ascension. Expansion to the WTP and a booster station/reservoir is required to service the entirety of the Ascension development and was anticipated as part of the original planning process.

Population and water and wastewater demand/flow generation assumptions should be verified prior to Ascension detailed design, in consultation with the RVC staff responsible for the engineering and operation of the Blazer Water and Bearspaw Regional Wastewater treatment plants. Design details, alignments of the proposed sanitary sewer and water distribution systems will be provided during preliminary and detailed design, as designs are further refined.

6.0 REFERENCES

Bears paw Regional WWTP Capacity Analysis, Associated Engineering, October 2022

Blazer WTP Capacity Analysis, Associated Engineering, October 2022

Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems - Part 2 Guidelines for Municipal Waterworks
Alberta Environment and Parks, 2012

Rocky View County Servicing Standards, 2013

Water Supply and Distribution System Report Proposed Water Service Expansion R1
exp Services Inc., May 2014

Rocky View County Conrich Potable Water Servicing Plan
MPE 2020

Rocky View County Conrich Wastewater Servicing Plan
MPE 2020

Omni Area Structure Plan Servicing Strategy
MPE August 2017

Design Basis Memorandum for the First Stage of the WWTP
From BRWWTP, 2011

BRWWTP Annual Reporting Requirements for Year Ending Dec 31, 2019
BRWWTP, Feb 2020

Blazer Water Systems Annual Reporting Requirements for Year Ending Dec 31, 2019
Blazer Water Systems, Feb 2020

Design Basis Memorandum for the First Stage of the WWTP (to service Watermark & Damkar only).
2011 - Provided by BRWWTP

BRWWTP Influent Results Jan 2015 to Dec 2016
Provided by BRWWTP

7.0 CORPORATE AUTHORIZATION

This document, entitled *Ascension Servicing Design Brief*, is prepared by Urban Systems Ltd. for Highfield Land Management. The material in this report reflects the best judgment of Urban Systems Ltd. based on the information available at the time of preparation. Any use a third party makes of this report, or reliance on or decisions made based on it, is the responsibility of the third party. Urban Systems Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

Prepared By:

Daniel Salamandyk, P.Eng.
Project Engineer

Phil Nottveit, P.Eng.
Senior Engineer/Principal

An aerial photograph of a suburban residential neighborhood. The houses are primarily brick with dark roofs. There are many trees, some with yellow and orange autumn foliage. A swimming pool is visible in one of the backyards. A curved road with several cars is in the foreground. The overall scene is a typical suburban residential area.

APPENDIX A: WATER DEMAND AND SANITARY FLOW CALCULATIONS

ASCENSION SANITARY SEWER CALCULATIONS
Sept 2021 Conceptual Scheme

PER CAPITA FLOW (RES) 250 L/day/person
 COMMERCIAL FLOW 0.14 L/s/ha
 INFILTRATION/INFLOW 0.10 L/s/ha
 WATERMARK DENSITY 3.1 People/home (Ascension density as per approved CS)

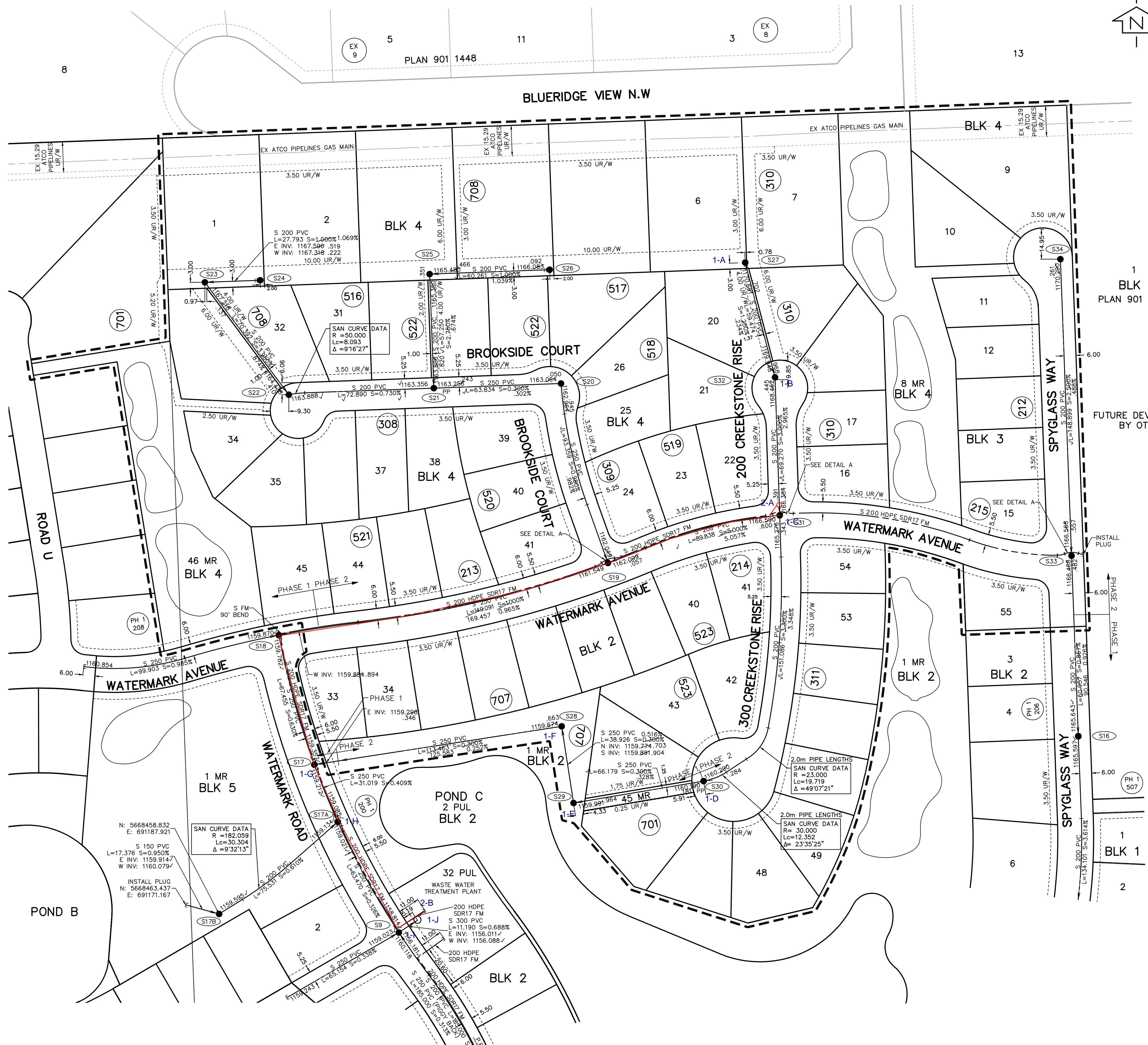
Date 26-Jul-23
 By DS/PN
 File 4319.0004.01

MANHOLE NUMBER		CATCHMENT AREA #	INCR. AREA (ha)	# OF LOTS	INCR. POP.	INCR. Q (l/s)	CUMM. AREA (ha)	CUMM. POP.	Unpeaked Q (l/s)	PEAKING FACTOR	Q (L/s)	INFIL. (L/s)	TOTAL Q (L/s)	SLOPE (%)	CALC PIPE DIAMETER	NOMINAL PIPE DIAMETER	ACTUAL PIPE DIAMETER	PIPE LENGTH (m)	PIPE MATERIAL	MANNING'S N	FULL VELOCITY (m/s)	PIPE CAPACITY (L/s)	PERCENT FULL CAPACITY (%)
FROM	TO																						
FM Option		ASCENSION RESIDENTIAL	49.6				49.62	1715	4.962	3.64	18.05	5.0	23.0	2.000%	144	200	201.16		PVC	0.011	1.75	55.6	41.35%
		ASCENSION COMMERCIAL	19.3				68.96		2.611	2.50	6.53	1.9	8.5	2.000%	99	200	201.16		PVC	0.011	1.75	55.6	15.21%
													31.5	2.000%	162	200	201.16		PVC	0.011	1.75	55.6	56.56%
		<u>WATERMARK CATCHMENTS</u>																					
1-A	1-B	W1	0.41	2	6	0.02	50.03	1721	4.980	3.64	18.11	5.0	31.6	1.234%	178	200	201.16	59.474	PVC	0.011	1.38	43.7	72.23%
1-B	2-A	W2	0.59	6	19	0.05	50.62	1740	5.034	3.63	18.28	5.1	31.8	2.965%	151	200	201.16	69.27	PVC	0.011	2.13	67.7	46.95%
2-A	2-B	WXX			0	0.00	50.62	1740	5.034	3.63	18.28	5.1	31.8	0.850%	191	200	191.77	436	PE	0.011	1.11	31.9	99.61%
		<u>CHECK</u>																					
		RESIDENTIAL	50.6					1739.8	5.034	3.63	18.28	5.1	23.3										
		COMMERCIAL	19.3						2.611	2.50	6.53	1.9	8.5										
													31.8	0.850%	191	200	191.77	564.744	PE	0.011	1.11	31.9	99.61%

Slope based on HGL

BRWWTP Upgrade Requirement
 ADWF 7.57 l/s Commerical and Residential
 ADWF 654 m3/day
 Note: Peaking Factor not included for comparison to existing average capacity

Plot Date: Mar 05, 2013 - 02:51:29pm Plotted by: tomb
 P:\29120\2\22\22.0 Records\04-29120-C-SAN.dwg XREFS: 29100-Legal UTM.dwg



- GENERAL NOTES:**
- ALL PIPE SIZES ARE IN MM AND ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
 - ALL CONSTRUCTION AND MATERIALS TO BE IN ACCORDANCE WITH CURRENT ROCKY VIEW COUNTY STANDARDS WHERE INDICATED, AND CITY OF CALGARY SPECIFICATIONS WHERE INDICATED. WHERE NOT INDICATED WITHIN THIS DRAWING SET OR WITHIN ROCKY VIEW COUNTY STANDARDS, CITY OF CALGARY SPECIFICATIONS TO GOVERN.
 - NO CONSTRUCTION SHALL PROCEED UNTIL ALL APPROPRIATE REGULATORY APPROVALS ARE OBTAINED.
 - ALL PLANS SUBJECT TO TERMS OF THE DEVELOPMENT AGREEMENT/PERMIT AND THE CONTRACT DOCUMENTS.
 - ANY ERRORS OR DISCREPANCIES TO BE REPORTED TO THE ENGINEER PRIOR TO COMMENCEMENT OF CONSTRUCTION.
 - ALL FILL MATERIAL SHALL BE PLACED AND COMPACTED TO ROCKY VIEW COUNTY SPECIFICATIONS.
 - CONTRACTOR TO BE RESPONSIBLE FOR LOCATION AND ALIGNMENT OF ALL EXISTING UTILITIES.
 - CONTRACTOR TO TAKE CARE WHEN WORKING NEAR EXISTING INFRASTRUCTURE.
 - CONTRACTOR TO COORDINATE ALL CONSTRUCTION WITH ASSOCIATED OWNER(S) WHEN WORKING NEAR EXISTING INFRASTRUCTURE.
 - EXISTING SURFACE FEATURES TO BE REINSTATED TO CONDITIONS PRECEDING CONSTRUCTION WHERE EXISTING CONDITIONS WILL BE MAINTAINED.
 - COMBINED FACTOR APPLIED=0.999867 (1.000133).
 - ALL NORTHING-EASTING COORDINATES ARE AT GRID LEVEL.

- SANITARY SEWER NOTES:**
- ALL PVC PIPES TO BE DR35 UNLESS OTHERWISE NOTED.
 - ALL CIRCULAR CONCRETE PIPES TO BE CLASS IV UNLESS OTHERWISE NOTED.
 - ALL PIPE BACKFILL SHALL SATISFY A MINIMUM C.O.C. TYPE 2 INSTALLATION SPECIFICATION WITH C.O.C. CLASS 1A. IF HIGH MOISTURE IS FOUND IN THE SOIL C.O.C. CLASS 1B IS TO BE USED IN THAT AREA.
 - CONTRACTOR TO TAKE CARE IN THE PLACEMENT OF MINIMUM AND NEAR MINIMUM SLOPE SEWERS.
 - CONTRACTOR TO ENSURE THAT THE SEALS ON ALL PIPE AND MANHOLE SEGMENTS ARE PROPERLY PLACED TO PREVENT LEAKAGE AND/OR INFILTRATION.
 - EXACT LOCATION OF ALL EXISTING INFRASTRUCTURE (HORIZONTAL AND VERTICAL) TO BE CONFIRMED IN THE FIELD BEFORE CONSTRUCTION BEGINS.
 - HYDRAULIC CAPACITY OF SANITARY CONNECTION TO THE FUTURE WASTEWATER TREATMENT PLANT CONSIDERING ULTIMATE DEVELOPMENT OF SOUTH 1/2 SECTION 18-25-2-5 AND INCLUDING FUTURE DEVELOPMENT WITHIN LOT 1 BLOCK 1 OF PLAN 091 0252 BY OTHERS. REFER TO SANITARY DRAINAGE AREA MAP ON DWG. C-1 FOR PHASE 1

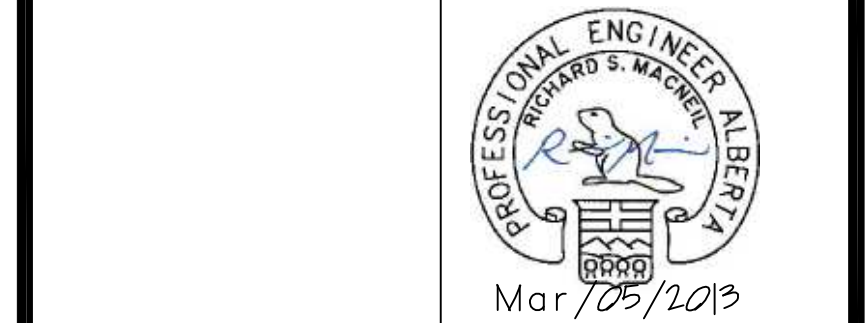
- EFFLUENT FOREMAIN NOTES:**
- SANITARY FOREMAIN AND TREATED EFFLUENT FOREMAIN DESIGNS ARE BASED ON ULTIMATE CAPACITY OF 2600 cfm/day AS PER AGREEMENT BETWEEN MACDONALD DEVELOPMENT CORP. AND ROCKY VIEW COUNTY.
 - ALL PIPE BACKFILL SHALL SATISFY A MINIMUM C.O.C. TYPE 2 INSTALLATION SPECIFICATION WITH C.O.C. CLASS 1A. IF HIGH MOISTURE IS FOUND IN THE SOIL C.O.C. CLASS 1B IS TO BE USED IN THAT AREA.

- LEGEND:**
- (X) BLOCK PROFILE DRAWING NUMBER
 - (PH 1 XXX) BLOCK PROFILE DRAWING NUMBER (DIFFERENT PHASE)
 - CONSTRUCTION BOUNDARY
 - S 200 PVC SANITARY SEWER
 - O TYPE 5A MANHOLE
 - TYPE 1S MANHOLE
 - ⊥ PLUG
 - (4-B) MANHOLE NUMBER
 - PP PLASTIC PLUG OR ONE-HOLE MANHOLE LID

- REVISION NOTES:**
- 2011-06 PS ADDED SANITARY MAIN INCLUDING MH S17B THROUGH MR PLAZA (1 MR, BLK 5)

MACDONALD WATERMARK PROPERTIES LTD.

R	1	13-01	RECORD	DK	PB
ATC	1	12-04	REVISION/TENDER/CONSTRUCTION	PS	RSM
T	0	11-05	UNDERGROUND AND SURFACE TENDER	RCM	RSM
A	0	11-05	DETAILED APPROVAL	PS	RSM
REV	YY-MM		ISSUE		BY APP



PERMIT TO PRACTICE
 EXP SERVICES INC.
 Signature: P. Brown
 Date: Mar 10/2013
PERMIT NUMBER: P 05437
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta



exp Services Inc.
 375, 7220 Fisher Street SE
 Calgary, AB T2H 2H8
 www.exp.com
 BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY

PROJECT
 WATERMARK AT BEARSPAW
 PHASE 2

DRAWING		SANITARY SEWERS	
DESIGN	MC/BOM	DATE	2010-12-10
DRAWN	RCM/BOM	PROJECT	29120
CHECKED	RSM	DRAWING	C-1
APPROVED	PB	ISS	R
		REV	1
		SCALE	1:1000



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ASCENSION WATER DEMAND CALCULATIONS
Sept 2021 Conceptual Scheme

AVERAGE DAILY DEMAND (RES) 325 L/day/person
MAX DAY DEMAND (RES) 813 L/day/person
PEAK HOUR DEMAND (RES) 1625 L/day/person

AVERAGE DAILY DEMAND (MF) 325 L/day/person
MAX DAY DEMAND (MF) 813 L/day/person
PEAK HOUR DEMAND (MF) 1625 L/day/person

Date 27-Jul-23
 By DS/PN
 File 4319.0004.01

AVERAGE DAILY DEMAND (Comm) 0.15 L/s/ha

MDD 2.5 xADD
PHD 5.0 xADD

Distribution System

Land Use	People	ADD (l/d)	ADD (l/s)	MDD (l/s)	PHD (l/s)	Commercial Area (ha)	ADD(l/s)	MDD (l/s)	PHD (l/s)
Single Family Residential	1620	526500	6.09	15.23	30.47				
Multi Family Residential	95	30875	0.36	0.89	1.79				
Commercial (Market Place)						19.34	2.90	7.25	14.51
	1715	557375	6.45	16.13	32.26	19.34	2.90	7.25	14.51
Total ADD			9.35 l/s		808 m3/d		ADD Comm (m3/d) 251		
Total MDD			23.38 l/s		2020 m3/d		ADD Res (m3/d) 557		
Total PHD			46.76 l/s				ADD Total (m3/d) 808		

Potable Water Storage Requirements

Storage (m3)	
Equilization Storage (25% of MDD)	505
Emergency Storage (15% of ADD)	121
Fire Storage	3150
Total Reservoir Size	3776

Min Pressure Requirements

Pressure (kPa)	Pressure (psi)
Max Daily Demand + Fire Flow	150 22
Min Residual Pressure under Peak Hour Demand	300 44

Existing Pressures in Blue ridge and Watermark

BRR3	26 psi
30A	73 psi

BLAZER WATER DEMAND CALCULATIONS
Existing, Watermark + Ascension
(based on AE Oct 2022 report rates and peaking factors)

AVERAGE DAILY DEMAND (RES) 325 L/c/d
MAX DAY DEMAND (RES) 813 L/c/d
PEAK HOUR DEMAND (RES) 1625 L/c/d

ADD (MF) 325 L/c/d
MDD (MF) 813 L/c/d
PHD (MF) 1625 L/c/d

Date 26-Jul-23
 By DS/PN
 File 4319.0004.01

	<u>Units</u>	<u>People/Unit</u>	<u>Population</u>
Ex and Watermark SF*	710	3.1	2201
Villas at Watermark*	101	1.9	192
Ascension SF	540	3.0	1620
Ascension MF	43	2.2	95
	<u>1394</u>		<u>4108</u>

* Table 2-4 of Blazer WTP Capacity Assessment

AVERAGE DAILY DEMAND (Comm) 0.15 L/s/ha

MDD 2.5 xADD
PHD 5.0 xADD

Land Use	Population	ADD (l/d)	ADD (l/s)	MDD (l/s)	PHD (l/s)	Commercial			
						Area (ha)	ADD(l/s)	MDD (l/s)	PHD (l/s)
Existing + Watermark Homes	2201	715325	8.28	20.70	41.40				
Villas at Watermark	192	62368	0.72	1.80	3.61				
Ascension SF	1620	526500	6.09	15.23	30.47				
Ascension MF	95	30745	0.36	0.89	1.78				
Commercial (Market Place)						19.34	2.90	7.25	14.51
	<u>4108</u>	<u>1334938</u>	<u>15.5</u>	<u>38.6</u>	<u>77.3</u>	<u>19.3</u>	<u>2.9</u>	<u>7.3</u>	<u>14.5</u>

Total ADD	18.35 l/s	1586 m3/d	579135 m3/yr
Total MDD	45.88 l/s	3964 m3/d	
Total PHD	91.76 l/s		

WTP upgrade capacity	38 l/s	
Total MDD plus 10%	50.5 l/s	
Surplus/Deficit	-12.5 l/s	(note backwashing assumed to be recycled)

Watermark MDD+10%	24.8 l/s
Ascension MDD+10%	25.7 l/s
Total	50.5 l/s

BLAZER WATER DEMAND CALCULATIONS
Existing, Watermark, Ascension + Others
(based on AE Oct 2022 report rates and peaking factors)

AVERAGE DAILY DEMAND (RES)	325 L/c/d	ADD (MF)	325 L/c/d
MAX DAY DEMAND (RES)	813 L/c/d	MDD (MF)	813 L/c/d
PEAK HOUR DEMAND (RES)	1625 L/c/d	PHD (MF)	1625 L/c/d

Date 26-Jul-23
 By DS/PN
 File 4319.0004.01

	<u>Units</u>	<u>People/Unit</u>	<u>Population</u>
Ex and Watermark SF*	710	3.1	2201
Villas at Watermark*	101	1.9	192
Damkar Seniors Complex	87	1.5	131
Ascension SF	540	3.0	1620
Ascension MF	43	2.2	95
12MCWC	68	3.1	211
Total	1549		4449

* Table 2-4 of Blazer WTP Capacity Assessment

AVERAGE DAILY DEMAND (Comm)	0.15 L/s/ha	MDD	2.5	xADD
		PHD	5.0	xADD

Land Use	Population	ADD (l/d)	ADD (l/s)	MDD (l/s)	PHD (l/s)	Commercial			
						Area (ha)	ADD(l/s)	MDD (l/s)	PHD (l/s)
Existing + Watermark Homes	2201	715325	8.28	20.70	41.40				
Villas at Watermark	192	62368	0.72	1.80	3.61				
12MCWC	211	68510	0.79	1.98	3.96				
Damkar Seniors Complex	131	42413	0.49	1.23	2.45				
Ascension SF	1620	526500	6.09	15.23	30.47				
Ascension MF	95	30745	0.36	0.89	1.78				
Commercial (Market Place)						19.34	2.90	7.25	14.51
Total	4449	1445860	16.7	41.8	83.7	19.3	2.9	7.3	14.5

Total ADD	19.64 l/s	1697 m3/d	619649 m3/yr
Total MDD	49.09 l/s	4241 m3/d	
Total PHD	98.18 l/s		

Watermark MDD+10%	24.8 l/s
Ascension MDD+10%	25.7 l/s
Others MDD+10%	3.5 l/s
Total	54.0 l/s

WTP upgrade capacity	38 l/s	
Total MDD plus 10%	54.0 l/s	
Surplus/Deficit	-16.0 l/s	(note backwashing assumed to be recycled)