



MUNICIPAL DISTRICT OF GREENVIEW No. 16

COMMITTEE OF THE WHOLE MEETING AGENDA

Tuesday, November 21, 2023

9:00 a.m.

DeBolt Public Service
Building
DeBolt, Alberta

#1 CALL TO ORDER

#2 ADOPTION OF AGENDA

#3 MINUTES 3.1 Committee of the Whole Meeting minutes held October 17, 2023 3

3.2 Business Arising from the Minutes

#4 DELEGATION

9:10 a.m.	4.1 Northern Gateway Public School Division	8
9:25 a.m.	4.2 Philip J. Currie Museum	12
9:40 a.m.	4.3 Maskwa Medical Centre	36
10:10 a.m.	4.4 Heart River Housing	65

#5 NEW BUSINESS

5.1 Grande Cache Wastewater Treatment Facility Update	67
5.2 Grande Cache Capital Master Plan Update	102
5.3 Main Street Lofts and Tower Park Estates	414
5.4 PLS 180042 Grovedale Industrial Park Land Acquisition	486
5.5 ANI: How It Works Information	501

#6 CLOSED SESSION

#7 ADJOURNMENT

Minutes of a
COMMITTEE OF THE WHOLE MEETING
MUNICIPAL DISTRICT OF GREENVIEW NO. 16
Public Service Building
Grovedale, AB on Tuesday, October 17, 2023

1:
CALL TO ORDER

Chair Winston Delorme called the meeting to order at 9:00 a.m.

PRESENT

Ward 9	Reeve Tyler Olsen (Virtual)
Ward 1	Councillor Winston Delorme
Ward 2	Councillor Ryan Ratzlaff
Ward 3	Councillor Sally Rosson
Ward 4	Councillor Dave Berry (virtual)
Ward 6	Councillor Tom Burton
Ward 7	Councillor Jennifer Scott (Virtual)
Ward 8	Councillor Christine Schlieff

ATTENDING

Chief Administrative Officer	Stacey Wabick
Director Community Services	Michelle Honeyman
Director Infrastructure & Engineering	Roger Autio
Director Planning & Economic Development	Martino Verhaeghe
Director, Corporate Services	Ed Kaemingh
Recording Secretary	Wendy Holscher
Manager, Communications & Marketing	Stacey Sevilla
Legislative Services Officer	Sarah Sebo

ABSENT

Ward 9	Councillor Duane Didow
Ward 5	Councillor Dale Smith
Ward 9	Deputy Reeve Bill Smith

#2:
AGENDA

MOTION: 23.10.87 Moved by: COUNCILLOR SALLY ROSSON
That the Tuesday, October 17, 2023, Committee of the Whole Agenda be adopted as presented.
FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen

CARRIED

**#3.1
COMMITTEE OF THE
WHOLE MINUTES**

MOTION: 23.10.88 Moved by: COUNCILLOR TOM BURTON

That the Minutes of the Committee of the Whole meeting held on Tuesday, September 19, 2023, be adopted as amended.

- Change the adjournment to A.M.

FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen

CARRIED

BUSINESS ARISING

DELEGATIONS

4.0 DELEGATIONS

Deputy Reeve Bill Smith entered the meeting at 9:18 a.m.

Deputy Reeve Bill Smith took Chair of the Meeting.

STURGEON LAKE

4.1 FRIENDS OF STURGEON LAKE DELEGATION

MOTION: 23.10.89 Moved by: COUNCILLOR TOM BURTON

That Committee of the Whole accepts the presentation from the Friends of Sturgeon Lake Association for information, as presented.

FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Deputy Reeve Bill Smith

CARRIED

Councillor Dave Berry and Dale Smith entered the meeting.

STARS

4.3 STARS

MOTION: 23.10.90 Moved by: COUNCILLOR RYAN RATZLAFF

That Committee of the Whole accepts the STARS Air Ambulance presentation for information, as presented.

FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith

CARRIED

Deputy Reeve Bill Smith recessed the meeting at 10:03 a.m.

Deputy Reeve Bill Smtih reconvened the meeting at 10:10 a.m.

- GREENVIEW GRANT**
- 5.1 GREENVIEW GRANT PROGRAM**
- MOTION: 23.10.91 Moved by: COUNCILLOR SALLY ROSSON
That Committee of the Whole accept the presentation regarding the Greenview Grant Program for information, as presented.
FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith
- CARRIED
- PARDS**
- 4.4 Peace Area Riding for the Disabled (PARDS) Delegation**
- MOTION: 23.10.92 Moved by: COUNCILLOR DALE SMITH
That Committee of the Whole accepts the presentation from Peace Area Riding for the Disabled (PARDS) for information, as presented.
FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith
- CARRIED
- RISING ABOVE**
- 4.5 RISING ABOVE**
- MOTION: 23.10.93 Moved by: COUNCILLOR RYAN RATZLAFF
That Committee of the Whole accepts the presentation from Rising Above for information, as presented.
FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith
- CARRIED
- TRAVEL ALBERTA**
- 4.6 TRAVEL ALBERTA**
- MOTION: 23.10.94 Moved by: COUNCILLOR TOM BURTON
That Committee of the Whole accepts the presentation from Travel Alberta for information, as presented.
FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith
- CARRIED

Deputy Reeve Bill Smith recessed the meeting at 12:12 p.m.
Deputy Reeve Bill Smith reconvened the meeting at 12:53 p.m.

- 5.2 SEPTEMBER ACTION LIST**
- ACTION LIST** MOTION: 23.10.95 Moved by: COUNCILLOR TOM BURTON
That Council lift deferred motion "23.09.85 Action List"
FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith
CARRIED
- ACTION LIST** MOTION: 23.09.85 Moved by: COUNCILLOR RYAN RATZLAFF
That Council accept the Action list for information, as presented.
FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith
CARRIED
- 5.3 ACTION LIST**
- ACTION LIST** MOTION: 23.10.96 Moved by: COUNCILLOR DALE SMITH
That Committee of the Whole accept the October action list for information as presented.
FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith
CARRIED
- 6.0 CLOSED SESSION**
- CLOSED SESSION** MOTION: 23.10.97 Moved by: COUNCILLOR TOM BURTON
That the meeting go to Closed Session, at 1:08 p.m. pursuant to Section 197 of the Municipal Government Act, 2000, Chapter M-26 and amendments thereto, and Division 2 of Part 1 of the Freedom of Information and Protection Act, Revised Statutes of Alberta 2000, Chapter F-25 and amendments thereto, to discuss Privileged Information with regards to the Closed Session.
FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith
CARRIED

OPEN HOUSE

MOTION: 23.10.98 Moved by: COUNCILLOR CHRISTINE SCHLIEF

That, in compliance with Section 197(2) of the Municipal Government Act, this meeting come into Open Session at 1:40 p.m.

FOR: Councillor Delorme, Councillor Schlief, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith

CARRIED

OPEN HOUSES

MOTION: 23.10.99 Moved by: COUNCILLOR TOM BURTON

That Committee of the whole recommend to Council to schedule open houses for the Hamlet of DeBolt and Hamlet of Ridgevalley for further area structure plan discussions.

FOR: Councillor Delorme, Councillor Schlief, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith

CARRIED

ADJOURNMENT

7.0 ADJOURNMENT

MOTION: 23.10.100 Moved by: COUNCILLOR WINSTON DELORME

That this Committee of the Whole meeting adjourn at 1:42 p.m.

FOR: Councillor Delorme, Councillor Schlief, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith

CARRIED

Recording Secretary

Chair



REQUEST FOR DECISION

SUBJECT: **Northern Gateway Public School Division Delegation**
SUBMISSION TO: COMMITTEE OF THE WHOLE REVIEWED AND APPROVED FOR SUBMISSION
MEETING DATE: November 21, 2023 CAO: MANAGER:
DEPARTMENT: PLANNING & DEVELOPMENT DIR: MAV PRESENTER: MAV
STRATEGIC PLAN: Culture, Social & Emergency Services LEG:

RELEVANT LEGISLATION:

Provincial (cite) – N/A

Council Bylaw/Policy (cite) – N/A

RECOMMENDED ACTION:

MOTION: That Committee of the Whole accepts the presentation from Northern Gateway Public School Division Delegation for information, as presented.

BACKGROUND/PROPOSAL:

In 2022, the Northern Gateway Public School Division (NGPSD) proposed that a new School being sited adjacent to the Greenview Regional Multiplex might be joined with the facility to allow additional community use services to be developed as part of the construction. The Municipal District of Greenview No. 16 did pass a motion, being:

MOTION: 22.11.737 Moved by: COUNCILLOR JENNIFER SCOTT

That Council support moving forward in principle with joint use of the Greenview Regional Multiplex by the New K-12 school pending a mutually beneficial joint use agreement with the Northern Gateways Public School Division.

FOR: Reeve Olsen, Councillor Didow, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry, Deputy Reeve Bill Smith

AGAINST: Councillor Delorme

CARRIED

This does not provide for a firm commitment as a facility-specific agreement has not yet been entered, but additional project adjustments to address public concerns have occurred in November of 2023.

The NGPSD has requested to have a delegation present information on its revised School-GRM bridging design and seek further support of the project to move forward.

BENEFITS OF THE RECOMMENDED ACTION:

1. The benefit of the Committee of the Whole accepting the presentation is to have increased knowledge of the project and be better able to form a position on support for the project.

DISADVANTAGES OF THE RECOMMENDED ACTION:

1. There are no perceived disadvantages to the recommendation.

ALTERNATIVES CONSIDERED:

Alternative #1: Committee of the Whole may advise Council of their support or lack of support for the project moving forward as a joined facility.

FINANCIAL IMPLICATION:

No financial implications to accepting the report as information.

STAFFING IMPLICATION:

No financial implications to accepting the report as information.

PUBLIC ENGAGEMENT LEVEL:

INCREASING LEVEL OF PUBLIC IMPACT

Inform

PUBLIC PARTICIPATION GOAL

Inform - To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.

PROMISE TO THE PUBLIC

Inform - We will keep you informed.

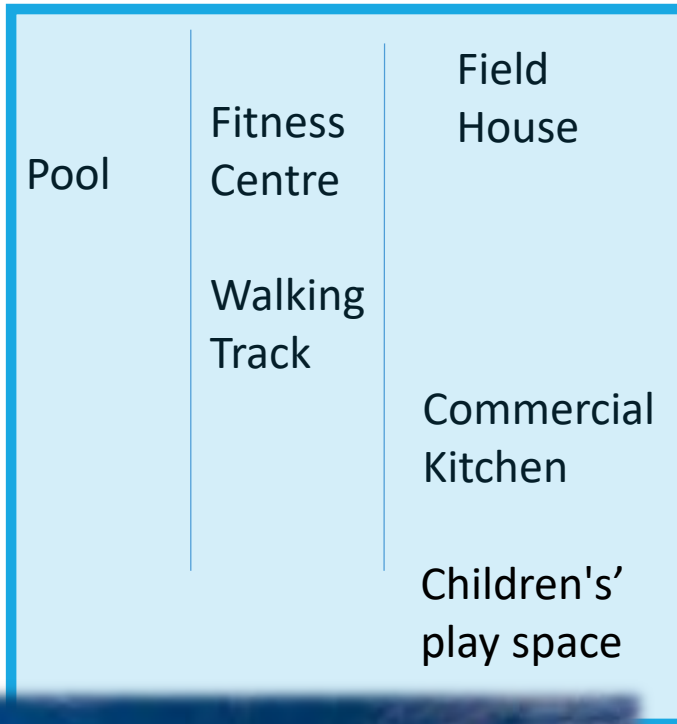
FOLLOW UP ACTIONS:

Administration will continue working with Northern Gateway Public School Division.

ATTACHMENT(S):

- Previously listed bridging facilities
- NGPSD Request for Letter of Support

Greenview Multiplex

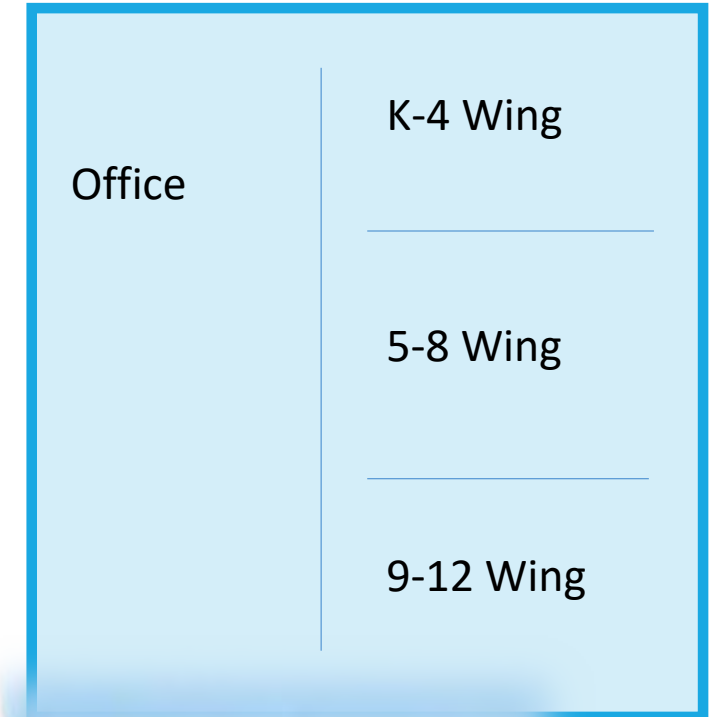


Bridge shared spaces



NGPS K-12 School

720 students and maintenance shop



New Valleyview Public School Update

New Process, New Timelines, New Opportunity

The new Valleyview K-12 Public School project was originally accounted as a P3 (private / public partnership) model construction with tight timelines, rigid process, unclear budget constraints, and minimal opportunities for consultation.

Over the past few months, all of these obstacles have been either overcome or significantly and positively reduced. Through the support of our municipal partners, MLA, and community members we are in a new and more regular process for this school build, allowing us to address some mutual concerns:

- Full-sized high school gym with stands for spectators. The school gym would be part of the shared space wing and be available through joint agreement for community use. The school / multiplex connection would provide access to maximum gym space both for students and community but with complete program flexibility based on the draft joint user agreement.
- Performance venue for school functions such as plays and music presentations. This space would also be available through joint use for events such as weddings and performances.
- More time to solidify plans with our industry and business partners who have expressed a desire to support the school build.
- A better overall design approach based on maximizing functionality of all spaces while recognizing the unique demands we have on space as our program offerings greatly exceeds what might be expected due to community size.

This project has new fresh legs and we are excited to see what will be accomplished through the improved process and approach. Meetings with staff have begun, input from students is already being collected, and we have a community ideas meeting scheduled for November 16, at 6:30 at Oscar Adolphson Primary School in Valleyview. This will be followed by design input meetings a few weeks later.

For the design work to begin we do need a letter of support for the connection of the school to the Multiplex so the architectural team can work from this perspective. We would look forward to sharing an initial design proposal shortly into the New Year.

Box 840
4816-49 Avenue
Whitecourt, AB T7S 1N8

780.778.2800
learn@ngps.ca

ngps.ca



REQUEST FOR DECISION

SUBJECT:	Philip J. Currie Dinosaur Museum Presentation		
SUBMISSION TO:	COMMITTEE OF THE WHOLE	REVIEWED AND APPROVED FOR SUBMISSION	
MEETING DATE:	November 21, 2023	CAO:	MANAGER:
DEPARTMENT:	COMMUNITY SERVICES	DIR: MH	PRESENTER:
STRATEGIC PLAN:	Culture, Social & Emergency Services	LEG:	

RELEVANT LEGISLATION:

Provincial (cite) –N/A

Council Bylaw/Policy (cite) –N/A

RECOMMENDED ACTION:

MOTION: That Committee of the Whole accept the presentation from Philip J. Currie Dinosaur Museum for information, as presented.

BACKGROUND/PROPOSAL:

A representative from the Philip J. Currie Dinosaur Museum will provide an update on the museum's activities and financial situation. The Philip J. Currie Dinosaur Museum is requesting ongoing operating funding to maintain and expand operations to serve the community and promote tourism to the region.

The museum has made significant finds in the Municipal District of Greenview and these finds have been a key subject of a British Broadcasting Corporation (BBC) documentary. The museum will be working to leverage the production to highlight the region and drive interest in paleontology and tourism in the region.

In 2019 Greenview entered into a five-year agreement with the Philip J. Currie Dinosaur Museum with an annual commitment of \$150,000.00, expiring December 31, 2023.

BENEFITS OF THE RECOMMENDED ACTION:

1. The benefit of accepting the presentation is that Committee of the Whole will be provided updated information to stay informed on the Philip J. Currie Dinosaur Museum.
2. The benefit of accepting the presentation is that it will provide an opportunity for Committee of the Whole to ask questions that will assist when making funding decisions.

DISADVANTAGES OF THE RECOMMENDED ACTION:

1. There are no perceived disadvantages to the recommended motion.

ALTERNATIVES CONSIDERED:

Alternative #1: Committee of the Whole has the alternative to request additional information from the Philip J. Currie Dinosaur Museum.

FINANCIAL IMPLICATION:

There are no financial implications to the recommended motion.

STAFFING IMPLICATION:

There are no staffing implications to the recommended motion.

PUBLIC ENGAGEMENT LEVEL:

Greenview has adopted the IAP2 Framework for public consultation.

INCREASING LEVEL OF PUBLIC IMPACT

Inform

PUBLIC PARTICIPATION GOAL

Inform - To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.

PROMISE TO THE PUBLIC

Inform - We will keep you informed.

FOLLOW UP ACTIONS:

Administration will present the grant request from the Philip J. Currie Dinosaur Museum at a future Council meeting.

ATTACHMENT(S):

- 2024 Grant Request



PHILIP J. CURRIE
DINOSAUR MUSEUM

MD of Greenview
Economic Development

13 October 2023

Attn: Larry Gibson

Dear Mr. Gibson,

I am writing to request a continuation of the annual funding for the Philip J. Currie Dinosaur Museum. Over the past years the MD of Greenview has generously provided the museum with \$150,000 per year. The funding has provided the museum with much-needed operating funds.

Funding from the MD and municipalities provides the required stability that other funders look for when awarding grants. In the past years, the museum has been able to leverage your funding to receive funding from the federal government and the province. This has enabled the museum to reach strategic goals.

In 2022, the museum expanded fieldwork into the MD of Greenview, in keeping with the museum mandate. The fieldwork resulted in finding a mummified dinosaur, one of three found in Alberta and extremely rare. The specimens are currently at U of A and will find their way back to the region in the next year. A return visit to that area resulted in more fossil finds and a new fossil bonebed.

In September of this year, the museum returned accompanied by film crews from BBC and PBS. The filming will result in a feature length production scheduled to air in 2025. The filming and attention that it will bring to the region will influence and accelerate museum plans to increase tourism to the region. The museum has already launched the Dino Trail, a digital infrastructure designed to help visitors find dinosaur activities in the region. The structure anticipates participation by Grande Cache in 2024.

In 2024, the museum plans to work with Travel Alberta and the MD of Greenview to develop and pilot dinosaur experiences. The process will follow the same one used to develop the rafting experience and tour group experience and will launch in 2025.

So, in summary, the next three years are critical for the museum and the MD of Greenview. We look forward to the exciting partnerships that this recent find has made possible.

Linden Roberts
Executive Director
Philip J. Currie Dinosaur Museum

2024 Grant Application (October 15, 2023 deadline)

Row 86

Name of Organization	Philip J Currie Dinosaur Museum
Address of Organization	9301 112 Ave, Wembley Alberta
Form Date Field	181
Contact Name	Linden Roberts
Phone Number	780-913-7558
Purpose of Organization	The Philip J Currie Dinosaur Museum's mission is to create, educate and inspire a community of passionate follower, advocates, and users who support, expand and share their appreciation of the vast palaeontological wealth in the region with others. Our vision is to build a multi-day destination, a premier research facility that is a destination for researcher and students, while also housing a palaeontologist in residence. It is known for interactive displays, world renown events and is widely supported and endorsed by the local community in its mission and operation. The museum currently operates galleries, programs and events that highlight the research in the region. The summer programming is intended to support tourism and local visitation alike and
Purpose Continued	
Position of Contact Person	Executive Director
What act are you registered under?	Alberta Charities
Registration No.	845700202RR0001
Grant Type	Operating Grant
Total Amount Requested	\$150,000 per year
Proposed Project	The Museum is requesting ongoing operating funds to continue operating the museum and research in the MD of Greenview. The museum recently found two significant sites in the MD near Nose Creek. One site produced a mummified hadrosaur. The second is a bonneted with finds vet to be identified. In September 2023 the museum accompanied a film crew from the BBC to film the area for a feature documentary. When the documentary airs in 2025 it will draw attention to the region. The museum wishes to take

advantage of that attention by offering experiences in the area for tourists. Accompanying the experiences, the museum is hoping to develop displays for both the MD and the museum highlighting the recent finds. These finds are significant and should be highly valued. The expansion of the programs is augmented by funds that the museum received in 2023 to expand the website capabilities and be able to 3D scan the collection and dig sites. Along with the ability to have live feeds from remote sites, the museum is well positioned to use MD funds to make these finds accessible to the public in a manner that preserves the site itself. The research work that the museum is completing will also add authenticity to the education programs that the museum offers. The programs have current exciting material presented by individuals who are fully knowledgeable.

Have you previously applied for a grant from MD

Previous Grant App from MD Yes

Final Completion Report Provided to MD Yes

Grant funds applied for from other sources? Yes

Grant Funds Received from other sources?

Have you performed any other fundraising projects? Yes

Agreement Linden Roberts

Grant Purpose This request is for operating funds to maintain and expand operations in order to serve the community and promote tourism to the region

Year Grant Received 2023

Amount of Grant 150,000.00

List the donae, purpose and amount County of Grande Prairie \$400,000 Young Canada Works \$45,000 annually Canada Summer Jobs \$60,000 Pipestone Energy \$25,000 Saddle Hills County \$50,000 Museum assistance \$120,000 Prairies Can \$312,000

What type of fundraising & how The museum has an annual science festival that raises \$15,000

much did you
raise?

Signature Linden Roberts

Date 10/13/23

**Financial
Statement**

**Administration
Recommendations**

Email lroberts@dinomuseum.ca

Column41

MD Logo

Email Comm.

Column44

**List for
Recognition** The Museum will recognize the MD of Greenview in all advertising for activities that take place in the MD. The museum will also recognize the MD of Greenview on the main screen at the front of the museum, on the website and social media and on any future outdoor signage.

**RIVER OF DEATH AND DISCOVERY
DINOSAUR MUSEUM SOCIETY
Financial Statements
Year Ended December 31, 2022**

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY
Index to Financial Statements
Year Ended December 31, 2022

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CHARTERED PROFESSIONAL ACCOUNTANTS

Partners

- * Dale J. Rose, CPA, CA
- * Alan Bone, B. Comm., CPA, CA
- * Jason Grindle, B. Comm., CPA, CA
- * Jaron Neufeld, B. Comm., CPA, CA

- * Ben Sander, B. Comm., FCPA, FCA (Retired)

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INDEPENDENT AUDITOR'S REPORT

To the Directors of River of Death and Discovery Dinosaur Museum Society

Opinion

We have audited the financial statements of River of Death and Discovery Dinosaur Museum Society (the Society), which comprise the statement of financial position as at December 31, 2022, and the statements of operations, changes in net assets and cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Society as at December 31, 2022, and the results of its operations and cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations (ASNPO).

Basis for Opinion

We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of our report. We are independent of the Society in accordance with ethical requirements that are relevant to our audit of the financial statements in Canada, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with ASNPO, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Society's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Society or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Society's financial reporting process.

(continues)



Member, Chartered Professional Accountants of British Columbia and Alberta

* Denotes Professional Corporations

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Canadian generally accepted auditing standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Canadian generally accepted auditing standards, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Society's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Society's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Society to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Grande Prairie, AB
May 30, 2023

Sander Rose Bone Grindle LLP
CHARTERED PROFESSIONAL ACCOUNTANTS

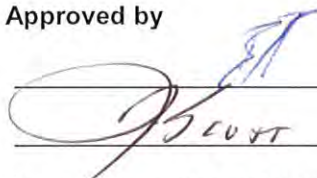
Sander Rose Bone Grindle LLP
CHARTERED PROFESSIONAL ACCOUNTANTS

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY
Statement of Financial Position
December 31, 2022

	2022	2021
ASSETS		
CURRENT		
Cash	\$ 352,321	\$ 608,208
Accounts receivable (Note 3)	245,329	161,825
Goods and services tax recoverable	4,113	2,004
Inventory	76,684	26,382
Prepaid expenses and deposits	34,593	1,000
	713,040	799,419
TANGIBLE CAPITAL ASSETS (Note 4)	201,067	177,113
INTANGIBLE ASSETS (Note 5)	26,400	39,600
	\$ 940,507	\$ 1,016,132
LIABILITIES AND NET ASSETS		
CURRENT		
Trade payables and accrued liabilities	\$ 63,514	\$ 46,441
Wages and benefits payable (Note 6)	72,474	59,801
Deferred revenue (Note 7)	94,915	109,542
	230,903	215,784
DEFERRED CAPITAL CONTRIBUTIONS (Note 8)	137,160	143,118
	368,063	358,902
NET ASSETS		
Unrestricted	482,136	583,633
Equity in capital assets	90,308	73,597
	572,444	657,230
	\$ 940,507	\$ 1,016,132

COMMITMENTS (Note 9)

Approved by



Director

Director

See accompanying notes to financial statements

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY**Statement of Operations****Year Ended December 31, 2022**

	2022	2021
REVENUES		
Admissions	\$ 182,251	\$ 118,044
Deferred capital contributions (Note 8)	30,265	29,514
Donations and sponsorships	70,273	69,101
Educational programs	17,011	2,856
Facility rentals	15,268	12,756
Gift shop sales	115,072	69,725
Grants - municipal (Note 10)	600,000	600,000
Grants - other	168,529	181,770
Interest	10,910	2,411
Memberships	9,139	4,622
Museum events	62,889	25,964
	1,281,607	1,116,763
EXPENSES (Schedule 1)	1,374,532	1,092,168
EXCESS (DEFICIENCY) OF REVENUES OVER EXPENSES FROM OPERATIONS	(92,925)	24,595
OTHER INCOME		
Government wage subsidies (Note 11)	8,139	251,678
Loss on disposal of tangible capital assets	-	(2,295)
	8,139	249,383
EXCESS (DEFICIENCY) OF REVENUES OVER EXPENSES	\$ (84,786)	\$ 273,978

See accompanying notes to financial statements

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY

Statement of Changes in Net Assets

Year Ended December 31, 2022

	Unrestricted	Equity in Capital Assets	2022	2021
NET ASSETS - BEGINNING OF YEAR	\$ 583,633	\$ 73,597	\$ 657,230	\$ 383,252
EXCESS (DEFICIENCY) OF REVENUES OVER EXPENSES	(84,786)	-	(84,786)	273,978
	498,847	73,597	572,444	657,230
Transfers				
Amortization of intangible and tangible capital assets	49,446	(49,446)	-	-
Amortization of deferred capital contributions	(30,265)	30,265	-	-
Deferred capital contributions additions	24,307	(24,307)	-	-
Purchase of tangible capital assets	(60,199)	60,199	-	-
	(16,711)	16,711	-	-
NET ASSETS - END OF YEAR	\$ 482,136	\$ 90,308	\$ 572,444	\$ 657,230

See accompanying notes to financial statements

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY**Statement of Cash Flows****Year Ended December 31, 2022**

	2022	2021
OPERATING ACTIVITIES		
Excess (deficiency) of revenues over expenses	\$ (84,786)	\$ 273,978
Items not affecting cash:		
Amortization of intangible and tangible capital assets	49,446	52,971
Deferred capital contributions	(30,265)	(29,514)
Loss on disposal of tangible capital assets	-	2,295
	(65,605)	299,730
Changes in non-cash working capital:		
Accounts receivable - (increase)	(83,504)	(94,989)
Goods and services tax recoverable - (increase)/decrease	(2,109)	2
Inventory - (increase)/decrease	(50,302)	2,521
Prepaid expenses and deposits - (increase)/decrease	(33,593)	1,088
Trade payables and accrued liabilities - increase	17,072	361
Wages and benefits payable - increase	12,673	15,241
Deferred revenue - (decrease)/increase	(14,627)	40,751
	(154,390)	(35,025)
Cash flow from (used by) operating activities	(219,995)	264,705
INVESTING ACTIVITY		
Purchase of tangible capital assets	(60,199)	(20,443)
FINANCING ACTIVITY		
Deferred capital contributions additions	24,307	11,746
INCREASE (DECREASE) IN CASH FLOW	(255,887)	256,008
Cash - beginning of year	608,208	352,200
CASH - END OF YEAR	\$ 352,321	\$ 608,208

See accompanying notes to financial statements

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY

Notes to Financial Statements

Year Ended December 31, 2022

1. DESCRIPTION OF OPERATIONS

The River of Death and Discovery Dinosaur Museum Society (the "Society") was established on May 27, 2010, as a not-for-profit organization incorporated provincially under the Societies Act of Alberta and is located in Wembley, Alberta. As a registered charity the Society is exempt from the payment of income tax under Section 149(1) of the Income Tax Act.

The Society operates the Philip J. Currie Dinosaur Museum under a tenancy lease agreement with the County of Grande Prairie No.1 and extends an endowed professorship in paleontology with the University of Alberta. The museum is an international institution for experiential learning dedicated to Alberta's paleontological heritage, through research, collection, preservation, exhibition, public programming, publications and innovative outreach.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of presentation

The financial statements were prepared in accordance with Canadian accounting standards for not-for-profit organizations (ASNFPPO). Canadian accounting standards for not-for-profit organizations are part of Canadian GAAP.

Cash

Cash is defined as cash on hand and cash on deposit with financial institution.

Inventory

Inventory consists of gift shop merchandise which is valued at the lower of cost and net realizable value with the cost being determined on a first-in, first-out basis.

Tangible capital assets

Tangible capital assets are recorded at cost which includes all amounts that are directly attributable to acquisition, construction, development or betterment of the asset. Contributed capital assets are recorded at fair value at the date of contribution, provided a fair value can be reasonably determined. The cost, less residual value, of the tangible capital assets is amortized on a straight-line basis over the estimated useful life as follows:

Computer equipment	5 years
Computer software	3 years
Fencing	25 years
Leasehold improvements	15 years
Museum exhibit equipment	10 years
Museum furniture and fixtures	5 years
Yard equipment	5 years

The Society regularly reviews its tangible capital assets for sold or scrapped assets, at which time, the cost and the related amortization are removed from the accounts and any resulting gain or loss on disposal is reflected in revenue.

Tangible capital assets under construction or assets acquired during the year but not placed into use are not amortized until they are placed into use.

(continues)

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY
Notes to Financial Statements
Year Ended December 31, 2022

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES *(continued)*

Intangible assets

Intangible assets consists of software that will be amortized on a straight-line basis over its estimated useful life of five years. Intangible assets under construction or assets acquired during the year but not placed into use are not amortized until they are placed into use.

Equity in capital assets

Equity in capital assets represents the Society's net investment in tangible and intangible capital assets less any deferred capital contributions and any directly related long term debt.

Revenue recognition

River of Death and Discovery Dinosaur Museum Society follows the deferral method of accounting for contributions.

Restricted contributions are recognized as revenue in the year in which the related expenses are incurred. Deferred capital contributions are recognized as revenue on the same basis as the donated or purchased capital assets are amortized. Unrestricted contributions are recognized as revenue when received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

Admissions and education programs are recognized at the time of admission or at the time of the program.

Gift shop sales are recognized at the point of sale.

Donations are recognized at the time of the donation. If there are restrictions on the use of the donation then the revenue is deferred until the restrictions have been met.

Sponsorship and facility rentals are recognized over the term of the agreement.

Donated materials and services

Donated materials and services are recognized in the financial statements at fair value at the date of contribution, but only when a fair value can be reasonably estimated and when the materials and services are used in the normal course of operations, and would otherwise have been purchased.

Financial instruments

Financial instruments are recorded at fair value when acquired or issued. In subsequent periods, financial assets with actively traded markets are reported at fair value, with any unrealized gains and losses reported in income. All other financial instruments are reported at amortized cost, and tested for impairment at each reporting date. Transaction costs on the acquisition, sale, or issue of financial instruments are expensed when incurred. Financial assets reported at amortized cost include cash and accounts receivable. Financial liabilities reported at amortized cost include trade payables, accrued liabilities and wages payable.

(continues)

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY

Notes to Financial Statements

Year Ended December 31, 2022

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES *(continued)*

Measurement uncertainty

The preparation of financial statements in conformity with Canadian accounting standards for not-for-profit organizations requires management to make estimates and assumptions that affect the reported amount of assets and liabilities, disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the period. Such estimates are periodically reviewed and any adjustments necessary are reported in earnings in the period in which they become known. Significant areas requiring the use of estimates include determination of the net realizable value of inventory and the rates of amortization of tangible capital assets and intangible assets. Actual results could differ from these estimates.

Comparative figures

Certain amounts in the prior year financial statements have been reclassified for comparative purposes to conform with the presentation in the current year's financial statements.

3. ACCOUNTS RECEIVABLE

	2022	2021
Canadian Heritage grant	\$ -	\$ 100,000
Government wage subsidies	-	47,217
M.D. of Greenview grant	150,000	-
Other	992	477
Sponsorship	50,000	-
Tourism Relief Fund grant	44,337	-
Young Canada works grant	-	14,131
	\$ 245,329	\$ 161,825

4. TANGIBLE CAPITAL ASSETS

	Cost	Accumulated amortization	2022 Net book value	2021 Net book value
Assets under construction	\$ 20,980	\$ -	\$ 20,980	\$ 20,980
Computer equipment	54,602	42,441	12,161	4,496
Computer software	2,382	2,382	-	-
Fencing	26,958	3,066	23,892	24,970
Leasehold improvements	55,575	25,935	29,640	33,345
Museum exhibit equipment	117,756	63,673	54,083	58,650
Museum furniture and fixtures	227,858	212,078	15,780	20,679
Yard equipment	123,761	79,230	44,531	13,993
	\$ 629,872	\$ 428,805	\$ 201,067	\$ 177,113

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY
Notes to Financial Statements
Year Ended December 31, 2022

5. INTANGIBLE ASSETS

	2022	2021
Designosaur software	\$ 66,000	\$ 66,000
Accumulated amortization	(39,600)	(26,400)
	\$ 26,400	\$ 39,600

6. WAGES AND BENEFITS PAYABLE

	2022	2021
Banked hours accrual	\$ 12,992	\$ 502
Monthend payroll accrual	27,596	39,892
Sick days accrual	10,775	7,582
Vacation payable	21,111	11,825
	\$ 72,474	\$ 59,801

7. DEFERRED REVENUE

	2022	2021
Canadian Heritage grant - Covid-19 support	\$ -	\$ 25,000
Facility rentals	5,000	5,000
Government of Alberta grant - Escape room project	49,500	49,500
International Paper grant - Traveling time box project	8,932	15,000
International Paper grant - Archosaur Absurdity event	13,800	-
Memberships	3,811	4,170
Other	1,539	1,539
Sponsorship - Aquatera	9,333	9,333
Weyerhaeuser grant - Animal care	3,000	-
	\$ 94,915	\$ 109,542

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY

Notes to Financial Statements

Year Ended December 31, 2022

8. DEFERRED CAPITAL CONTRIBUTIONS

Deferred capital contributions represent donated contributions of capital assets and externally restricted contributions for the purchase of capital assets. The amortization of deferred capital contributions is recognized as revenue on the same basis as the amortization expense of the donated or purchased assets.

	2022	2021
Deferred capital contributions, beginning of year	\$ 143,118	\$ 160,885
Additions		
Rotary Club of GP - Alberta gaming proceeds - Event tents, fencing, storage locker	-	9,247
Town of Wembley - Computer equipment	-	2,500
Travel Alberta - Rafting equipment	24,307	-
Less:		
Amortization for the year	(30,265)	(29,514)
Deferred capital contributions, end of the year	\$ 137,160	\$ 143,118

Deferred capital contributions, end of the year, consists of the following:

CIP grant - Designosaur software	\$ 13,400	\$ 26,600
Donated capital assets - Forklift, trailers, display cases, Ford F350 truck	35,729	46,511
Donation for purchase of terrarium	1,622	1,825
Encana grant - Escape room project	38,737	39,158
Town of Wembley - Computer equipment	1,919	2,209
Travel Alberta - Rafting equipment	21,783	-
Rotary Club of GP - Alberta gaming proceeds - Event tents, fencing, storage locker	23,970	26,815
	\$ 137,160	\$ 143,118

9. COMMITMENTS

The Society had a long term operating lease of \$1 per year with the County of Grande Prairie No. 1, in respect to the museum land and building. The lease expired on June 30, 2019, with options to renew. The Society is currently working with the County of Grande Prairie No. 1 to finalize a new long term lease agreement. During the interim, the Society is leasing the museum land and building under an annual lease of \$1 per year.

The Society has on loan display specimens from the University of Alberta Museum that are valued at \$629,650. In accordance with the loan agreement dated May 30, 2016, the Society is responsible for any damage to the borrowed items and is required to insure them.

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY

Notes to Financial Statements

Year Ended December 31, 2022

10. ECONOMIC DEPENDENCE

During the year, the Society received grant funding from the County of Grande Prairie No.1, the M.D. of Greenview and the County of Saddle Hills which in total represents 47% (2021 - 54%) of the Society's total revenues. Should these municipalities no longer provide funding to the Society, management is of the opinion that continued viable operations would be doubtful. During the year, municipal grant revenue of \$400,000 (2021 - \$400,000) was recognized from the County of Grande Prairie No. 1, \$150,000 (2021 - \$150,000) was recognized from the M.D. of Greenview, \$50,000 (2021 - \$50,000) was recognized from the County of Saddle Hills.

11. GOVERNMENT WAGE SUBSIDIES

On March 11, 2020, the World Health Organization declared a Global Pandemic for the spread of Covid-19. These events resulted in a decline of revenue due to restrictions and closures. The Society was eligible to apply for wage subsidies under the Federal government's Canada Emergency Wage Subsidy (CEWS) program and the Tourism and Hospitality Recovery (THRP) program.

12. RELATED PARTY TRANSACTIONS

The County of Grande Prairie No.1 (the County) is a related party based on the fact that it leases the museum land and building to the Society for \$1 per year. The County also has two representatives on the Society's Board of Directors and the County provides funding to the Society as disclosed in Note 10 to the financial statements. In the current fiscal year, the Society paid the County \$6,722 for insurance coverage. As at December 31, 2022, there is \$7,231 payable to the County for insurance coverage that is included in trade payables. These transactions are in the normal course of operations and are measured at the exchange amount, which is the amount of consideration established and agreed to by the related parties.

13. FINANCIAL INSTRUMENTS

The Society is exposed to various risks through its financial instruments and has a comprehensive risk management framework to monitor, evaluate and manage these risks. The following analysis provides information about the Society's risk exposure and concentration as of December 31, 2022.

(a) Credit risk

Credit risk arises from the potential that a counter party will fail to perform its obligations. The Society is exposed to credit risk from customers. The Society has a number of facility users which minimizes the concentration of credit and limits the exposure to this type of risk.

(b) Liquidity risk

Liquidity risk is the risk that an entity will encounter difficulty in meeting obligations associated with financial liabilities. The Society is exposed to this risk mainly in respect of its receipt of municipal grant funding. The Society monitors its cash flows from operations by preparing and monitoring cash flows against budget and anticipated future requirements based on their needs. It also works with municipalities to secure annual funding for multiple years.

(c) Market risk

Market risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market prices. Market risk comprises three types of risk: currency rate risk, interest rate risk and other price risk. The Society is mainly exposed to currency rate risk.

(continues)

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY

Notes to Financial Statements

Year Ended December 31, 2022

13. FINANCIAL INSTRUMENTS *(continued)*

(d) Currency risk

Currency risk is the risk to the Society's earnings that arise from fluctuations of foreign exchange rates and the degree of volatility of these rates. The Society is exposed to foreign currency exchange risk on its payments for exhibit rentals and for the purchase of special equipment which are payable in US dollars. The Society manages this risk by budgeting for these types of expenditures and by limiting the amount and the term of exhibit rental agreements.

Unless otherwise noted, it is management's opinion that the Society is not exposed to significant other price risks arising from these financial instruments.

RIVER OF DEATH AND DISCOVERY DINOSAUR MUSEUM SOCIETY**Expenses****(Schedule 1)****Year Ended December 31, 2022**

	2022	2021
Accounting and legal	\$ 14,545	\$ 15,214
Advertising and promotion	4,347	22,459
Amortization	49,446	52,971
Building repairs and maintenance	98,058	59,632
Computer servicing	27,349	20,350
Exhibit rental and maintenance	21,636	17,956
Gift shop merchandise	65,266	34,336
Insurance, licences, and fees	14,039	13,187
Interest, bank charges and merchant fees	10,395	7,919
Museum events	40,075	27,781
Office and sundry	10,365	6,330
Sub-contracts	2,600	3,475
Supplies	5,362	1,154
Telephone and internet	30,540	33,036
Theatre	3,165	-
Training	956	4,242
Travel, conferences, meals and entertainment	4,215	142
Utilities	177,125	144,089
Vehicle	14,144	12,962
Wages and benefits	780,904	614,933
	\$ 1,374,532	\$ 1,092,168

See accompanying notes to financial statements



MUNICIPAL DISTRICT OF GREENVIEW No. 16

Annual Grant Report

Organization Receiving Funding: _____

Describe the mission and main activities of your organization:

Amount of present funding awarded by Greenview:

Year in Review

Describe how the grant funding awarded by Greenview has assisted your organization:

List the goals/objectives your organization has achieved this year?

What are your organizations goals for the current year and beyond?

Do you have a digital platform (website, twitter, Facebook, Instagram, other)? If yes, would your organization be open to Greenview promoting your future events? Please provide links.

How is Greenview's funding recognized?

Provide a listing of your current board members:

If you had the opportunity, would you be interested in presenting your annual report to Greenview Council?

Yes No

What percentage of your funds are donated by Greenview?

Reporting can be submitted via one of the following:

1. Click the submit button on the form for electronic submission
2. Mail: MD of Greenview, 4806- 36 Avenue, PO Box 1079, Valleyview AB T0H 3N0
3. In person delivery: Any Greenview office
4. For questions, please email greenviewgivesback@mdgreenview.ab.ca



REQUEST FOR DECISION

SUBJECT:	Maskwa Medical Centre	REVIEWED AND APPROVED FOR SUBMISSION	
SUBMISSION TO:	COMMITTEE OF THE WHOLE	CAO:	MANAGER:
MEETING DATE:	November 21, 2023	DIR:	PRESENTER:
DEPARTMENT:	CAO SERVICES	LEG:	
STRATEGIC PLAN:	Culture, Social & Emergency Services		

RELEVANT LEGISLATION:

Provincial (cite) – N/A

Council Bylaw/Policy (cite) – N/A

RECOMMENDED ACTION:

MOTION: That Committee of the Whole accept the presentation from the Maskwa Medical Centre for information, as presented.

BACKGROUND/PROPOSAL:

The Maskwa Medical Center Canada Inc. will be in attendance to report on the progress of the Maskwa Medical Center business plan and government approvals.

At the April 13, 2021, Regular Council Meeting, Council approved a \$25,000 grant to the Maskwa Medical Centre Inc. as well as provided a letter to the Maskwa Medical Centre in support of the cost benefit analysis business plan submission.

Since then Maskwa has completed Indigenous Consultations and signed a Memorandum of Understanding with the University of Alberta. They are currently working on designs and land agreements to continue to move this project forward.

BENEFITS OF THE RECOMMENDED ACTION:

1. The benefit of the recommended motion is Committee of the Whole will have an understanding of where the \$25,000 grant has been utilized and the status of the project to date.

DISADVANTAGES OF THE RECOMMENDED ACTION:

1. There are no perceived disadvantages to the recommended motion.

ALTERNATIVES CONSIDERED:

Alternative #1: Committee of the Whole has the option to make additional recommendations to Council regarding the Maskwa Medical Centre.

FINANCIAL IMPLICATION:

There are no financial implications to the recommended motion.

STAFFING IMPLICATION:

There are no staffing implications to the recommended motion.

PUBLIC ENGAGEMENT LEVEL:

Greenview has adopted the IAP2 Framework for public consultation.

INCREASING LEVEL OF PUBLIC IMPACT

Inform

PUBLIC PARTICIPATION GOAL

Inform - To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.

PROMISE TO THE PUBLIC

Inform - We will keep you informed.

FOLLOW UP ACTIONS:

There are no follow up actions to the recommended motion.

ATTACHMENT(S):

- Powerpoint



MASKWA
Medical Center

Why Maskwa?

Maskwa is a Cree word, meaning **bear**.

In Cree culture, the **bear** is an important symbol representing **good medicine** and a powerful spirit used in traditional ceremony.



Who We Are

Improving the quality of life and health outcomes for Northwestern Alberta.

Maskwa is an **innovative, Alberta-based, not-for-profit registered charity** committed to accelerating the process and improving access to medical specialists and services for the people of the Peace Region.

Maskwa is committed to fostering a strong partnership with local Indigenous communities in NW Alberta.



Increasing Family Physicians in NW Alberta



Academic Teaching Clinic – Phase 1

University of Alberta – Expand Martin Clinic (Details Pending)

- Stabilizing the Martin Clinic under the direction of University of Alberta Faculty of Family Medicine & Dentistry
- Increasing from 5 to 10 full-time Resident students (2023-2026)
- Staying in current Martin Clinic location



Academic Teaching Clinic – Phase 2

University of Alberta – Expanded Academic Teaching Clinic (Signed MOU – October 24th, 2023)

- The Grande Prairie Maskwa Academic Teaching Clinic
 - 22,000 sq ft of teaching space within the Maskwa Medical Center
 - 20 resident physicians onsite at any time, graduating 10 per year
 - Ability to service 1,200 patients per 1.0 physician position
 - Equates to ability to provide physician access to 12,000 patients
 - Reduce 50% of current walk-in patients to the Emergency department at new GPRH



Academic Teaching Clinic Benefits

The expanded Academic Teaching Clinic will **help the Peace Region** in 3 key ways:

1

Increase number of family physicians in the region, providing greater access for residents

2

Not only help retain, but also train & attract Doctors to the area

3

Reduce Hospital & Emergency Room visits by 50%

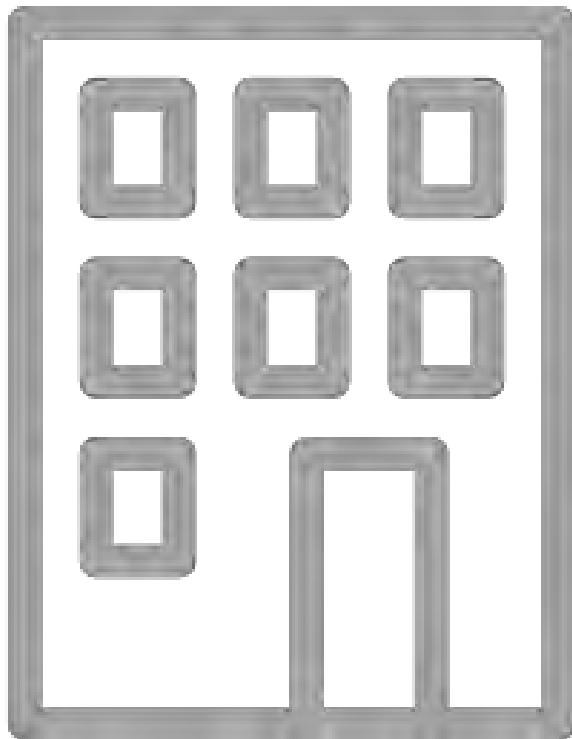


Maskwa Medical Clinic Partners





Maskwa Medical Clinic Partners



Third Floor

Maskwa

Provide Treatment plan in 10 days from referrals

Second Floor

Teaching Clinic

Reduce ER visits by 50%
20 Family Physicians - 2-year program – 10 Graduates per Year

Main Floor

Retail

Pharmacy, medical supply business, daycare, restaurant, etc



MASKWA DIAGNOSTICS

Changing Health Outcomes for Northwestern Alberta



Changing Health Outcomes

Our goal is to get patients set up with a treatment plan within 10 days of walking through the Center's doors.

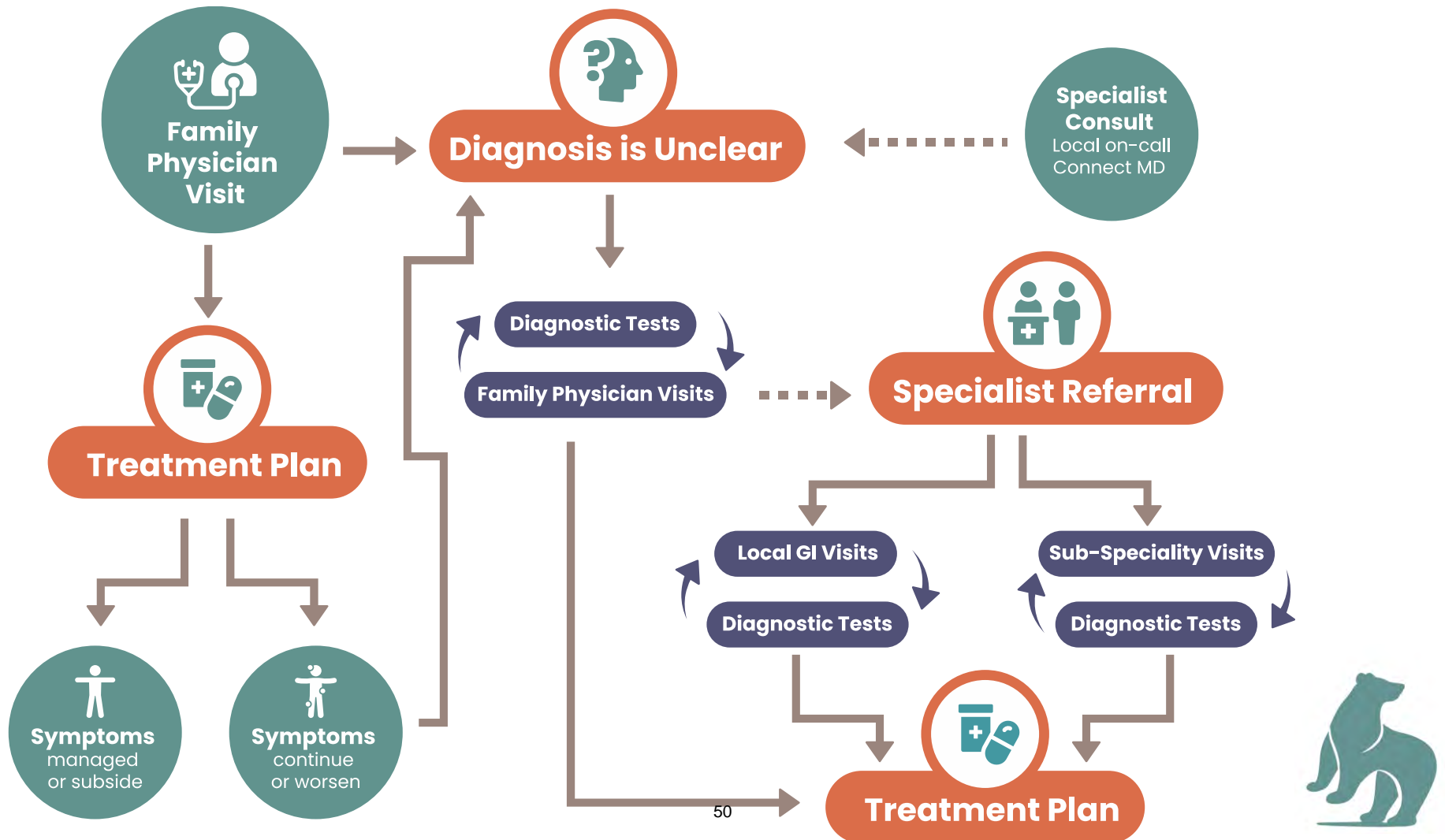
Maskwa vows to ensure patients **do not get stuck in the referral cycle** with a vision of partnering with the University of Alberta to access a panel of **450 sub-specialists** along with other specialists throughout Alberta.

This access would be facilitated using virtual conferencing, automated consultation scheduling and other current technologies to maximize efficiencies.

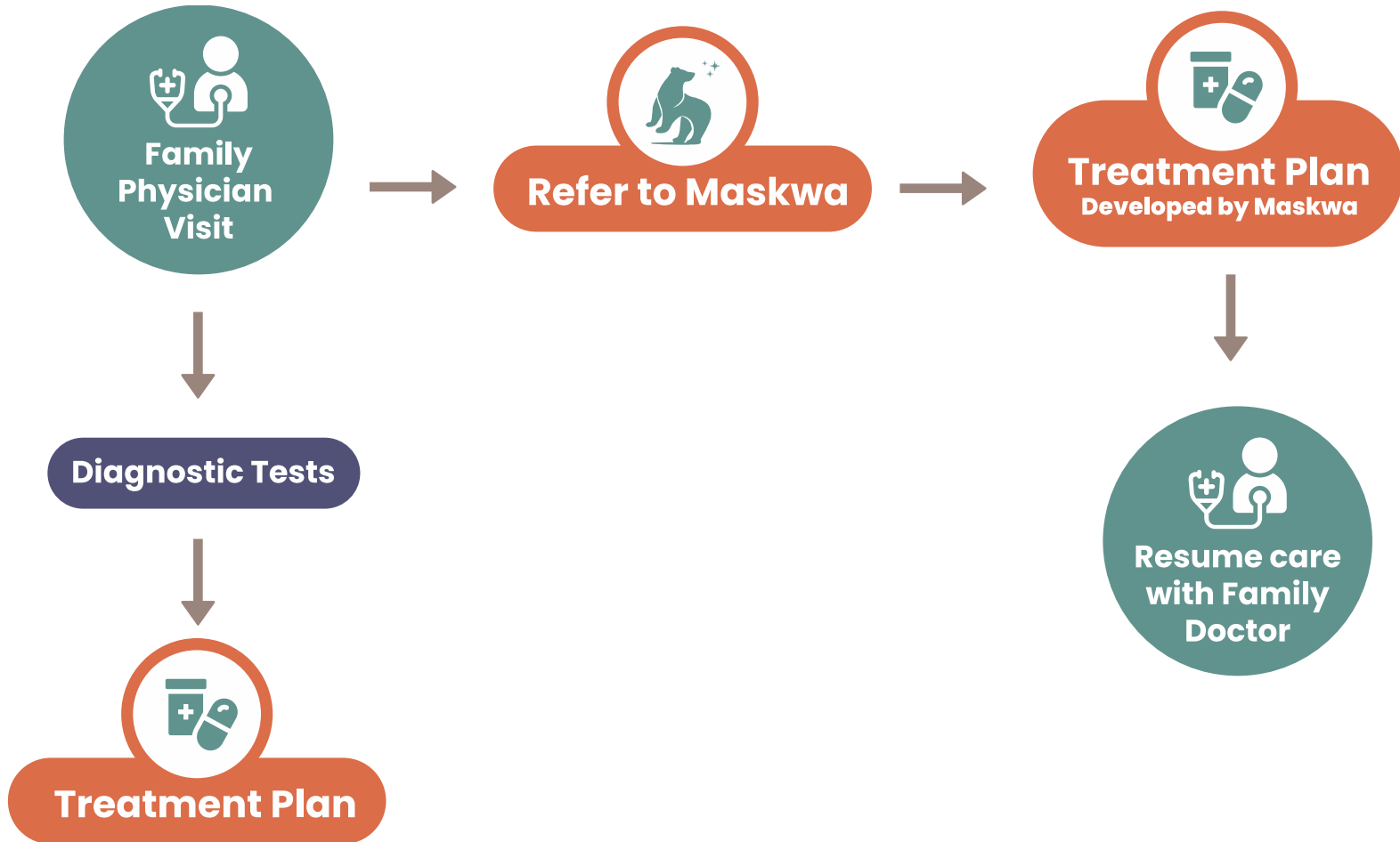
This process philosophy will **save time and money for patients and caregivers** related to taking time away from work, travel and accommodation expenses.



Current Model



Maskwa Service Model



Other Key Partnerships for Our Future



Education Partner

Northwestern Polytechnic

- **Tremendous opportunity for NWP faculty and students** to work closely with the University of Alberta on more specialized cases and research.
- Collaboration on training and employment opportunities for NWP graduates with the Maskwa Medical Center and its partners to **keep our talent in the region.**
- Having medical centers like Maskwa and having access to specialists in northern, rural communities **truly benefits us all.**



Local Indigenous Partners

- Training and employment opportunities for local Indigenous students enrolled at NWP
- Increased access to Family Physicians for Indigenous communities
- Job opportunities at Maskwa Medical Center
- Recognition and appreciation of Indigenous Culture throughout the Maskwa Medical Center



Funding & Community Partners



County of Grande Prairie No. 1

\$25,000 in grant money to date



City of Grande Prairie

\$50,000 in grant money to date



Municipal District of Greenview

\$25,000 in grant money to date



Northwestern Alberta Foundation

Partner in Community Engagement
and Funding Programming



Funding & Community Partners

Cenovus

\$20,000 in donated money to date

Support the Girls

\$50,000 in donated money to date

Maskwa Board Members

\$250,000 in donated money to date



Where We Are At Today

- Design – Started
- Indigenous Consultations – Completed and Ongoing
- Community Consultations/Updates – Feb 3rd, 2023 & Aug 29th, 2023
- U of A MOU Agreement – Signed October 24th
- Land Agreement – Working on Draft with NWP
- Architect and Contractor – RFP Draft on November 14th
- Financial Planning – Started
- Capital Funding – Started
- Physician ARP application into Alberta Health – Submitted



Project Costs



Costs per Resident

The purpose of this section is to demonstrate how the capital cost and annual operating, when broken down by a “per resident basis” is very small and manageable.

\$35M
PROJECT CAPITAL COST
(Current Estimate with Contingency)

÷

207,716
NW ALBERTA RESIDENTS
(2023 Population)

=

\$168/resident
CAPITAL COST PER
NW ALBERTA RESIDENTS

\$1.7–2.5M
ANNUAL OPERATING COST
(Current Estimate range for Year 1-3)

÷

207,716
NW ALBERTA RESIDENTS
(2023 Population)

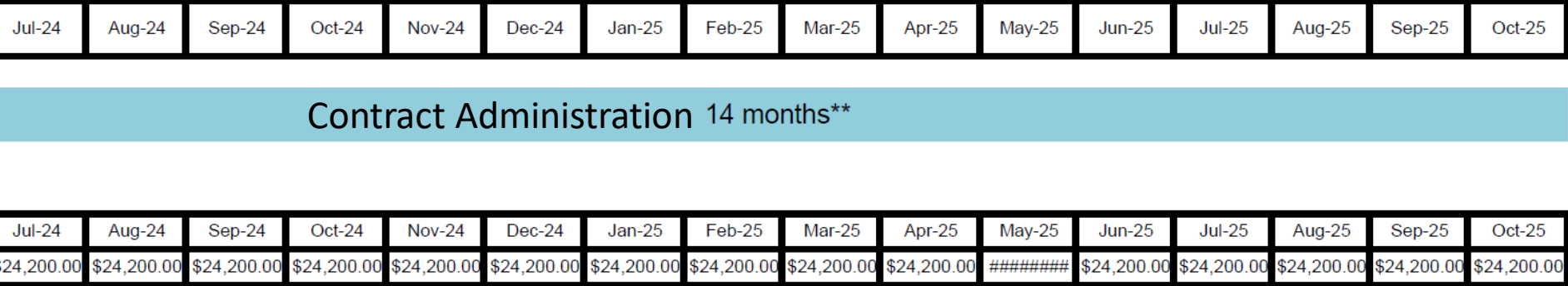
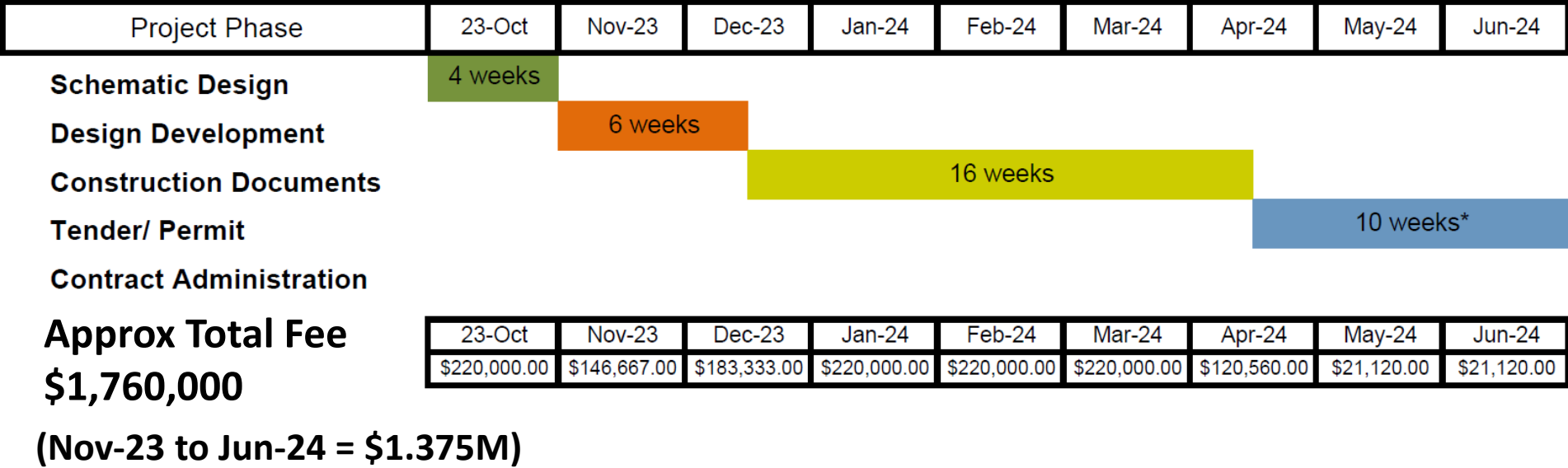
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\$8–12/resident
ANNUAL OPERATING COST
PER NW ALBERTA RESIDENTS



Engineering & Design Costs

- November 2023 Kickoff



Functional Cost Estimate
Provided by Altus Group
August 28th, 2023

Two Storey
Net Construction Cost
\$31.7M

Three Storey
Net Construction Cost
\$32.3M

New Medical Centre Building & Site Development									
usGroup		Project Location Subject Date	Mackwa Medical Centre - Phase 1 Grande Prairie, AB Functional Estimate August 28, 2023		Option N/A				
Description	Qty	Unit	Rate - Two storey option	Rate - Three storey option	Total - Two Storey Option (\$)	Total - Three Storey Option (\$)	Sub-Total - Two Storey Option (\$)	Sub-Total - Three Storey Option (\$)	Comments
Total Construction Costs							\$ 18,727,759	\$ 29,260,130	
2.00 Mackwa Medical Centre - New Medical Centre Building & Site Development									
Inpatient Services									
Blank	0	sqft	-	-	-	-	-	-	
Community Health Services									
Mackwa Academic Clinic (operated by U of A)	0	sqft	-	-	-	-	-	-	) included in base building
Nutrition Consultants	0	sqft	-	-	-	-	-	-	) included in base building
Wellness Consultants	0	sqft	-	-	-	-	-	-	) included in base building
Mental Health Consultants	0	sqft	-	-	-	-	-	-	) included in base building
Physio-therapist Clinic	0	sqft	-	-	-	-	-	-	) included in base building
Daycare for hospital staff	0	sqft	-	-	-	-	-	-	) included in base building
Workout centre	62,917	sqft	\$ 292.68	\$ 300.00	\$ 18,414,732	\$ 18,875,100			Base building cost
Doctors office	21,771	sqft	\$ 120.00	\$ 120.00	\$ 2,612,520	\$ 2,612,520			Tenant fit out cost second level only
Cardiology and stroke clinics	0	sqft	-	-	-	-	-	-	) included in base building
Clinical Support Services									
Pharmacy Outlet	0	sqft	-	-	\$ -	\$ -	-	-	) included in base building
Medical Supply Outlet	0	sqft	-	-	\$ -	\$ -	-	-	) included in base building
Indigenous healing centre	0	sqft	-	-	\$ -	\$ -	-	-	) included in base building
General Support Services (assume 20% of GFA)									
Coffee shop / hot food outlet	0	sqft	-	-	\$ -	\$ -	-	-	) included in base building
Blank	0	sqft	-	-	-	-	-	-	
Circulation, corridors, stairs elevator lobbies	0	sqft	-	-	\$ -	\$ -	-	-	) common area base building + fit out
Mechanical, electrical, IT cupboards	12,583	sqft	\$ 392.68	\$ 400.00	\$ 4,941,092	\$ 5,033,200			) common area base building + fit out
Exterior / interior walls, structure	0	sqft	-	-	\$ -	\$ -	-	-	) common area base building + fit out
Other Structures					\$ 1,653,084	\$ 1,653,084			
Plus 15 walkway connection from phase 1 to existing hospital complete with intermediate foundation supports as required (assume 10' wide)									
Blank	134	lf	\$ 5,351.68	\$ 5,351.68	\$ 717,500	\$ 717,500			
Blank	3,197	sqft	\$ 292.68	\$ 292.68	\$ 935,585	\$ 935,585			
2.00 Mackwa Medical Centre - New Medical Centre Building & Site Development									
Vehicle Movement and Parking (Phase 1 only)									
Surface Parking incl. plus-ins, lighting, etc (59 spaces)	25,598	sqft	\$ 35.00	\$ 35.00	\$ 895,930	\$ 895,931	\$ 946,620	\$ 946,616	
Curb and gutter to last	1,014	lf	\$ 50.00	\$ 50.00	\$ 50,680	\$ 50,685			
Pedestrian Movement, Site Development and Landscaping (Phase 1 only)									
Sidewalks	4,214	sqft	\$ 18.00	\$ 18.00	\$ 75,850	\$ 75,845	\$ 159,710	\$ 159,709	
Patio, not indicated	1	nil	\$ -	\$ -	\$ -	\$ -			
Blank	-	sqft	\$ -	\$ -	\$ -	\$ -			
Parking lighting, allow	4	no	\$ 8,000.00	\$ 8,000.00	\$ 32,000	\$ 32,000			
Blank	-	sqft	\$ -	\$ -	\$ -	\$ -			
Shrubs, trees, allowance	1	sum	\$ 25,000.00	\$ 25,000.00	\$ 25,000	\$ 25,000			
Topsoil and sod, allow	21,864	sqft	\$ 1.00	\$ 1.00	\$ 21,860	\$ 21,864			
Irrigation (plants only)	1	sum	\$ 5,000.00	\$ 5,000.00	\$ 5,000	\$ 5,000			
Sub-Total Moveable Furnishings and Equipment							\$ 73,629	\$ 75,045	
Moveable Furnishings & Equipment							\$ 73,629	\$ 75,045	
Sub-Total IT and T, SECURITY							\$ 36,815	\$ 37,523	
IT and T, Security							\$ 36,815	\$ 37,523	
Net Package Cost (Excl. Contingencies and Soft Costs)							\$ 28,838,202	\$ 29,392,798	
2.00 Mackwa Medical Centre - New Medical Centre Building & Site Development									
Contingencies and Soft Costs							\$ 2,477,810	\$ 2,867,332	
General Requirements, Fees and Sustainable Requirements							Included in rates above	Included in rates above	
Net Construction Cost (Incl. Gen. Req't's & Fees)							\$ 31,711,002	\$ 32,320,800	

Next Steps



How You Can Help

- Lobby Alberta Government to approve the University of Alberta Faculty of Family Medicine & Dentistry Teaching Clinic expansions in the Grande Prairie area
 - Phase 1 – Martin Clinic
 - Phase 2 – Maskwa Medical Academic Teaching Clinic
- Assist with providing funding as per the above cost estimates of the project
 - Step #1 = \$1.5M from Nov-23 to Jun-24
 - Shared by 3 Municipalities (City, County, MD of Greenview)
 - Step #2 = \$33M from Jun-24 to Dec-25
- Would the MD of Greenview consider committing \$500,000 for Step #1?







REQUEST FOR DECISION

SUBJECT: **Heart River Housing – Needs Assessment Discussion**

SUBMISSION TO:	COMMITTEE OF THE WHOLE	REVIEWED AND APPROVED FOR SUBMISSION
MEETING DATE:	November 21, 2023	CAO: MANAGER:
DEPARTMENT:	CAO SERVICES	DIR: PRESENTER:
STRATEGIC PLAN:	Culture, Social & Emergency Services	LEG:

RELEVANT LEGISLATION:

Provincial (cite) – N/A

Council Bylaw/Policy (cite) – N/A

RECOMMENDED ACTION:

MOTION: That Committee of the Whole accept the discussion from Heart River Housing for information, as presented.

BACKGROUND/PROPOSAL:

Heart River Housing hosted an open house October 16, 2023, to get started on the Valleyview and area needs assessment for Seniors and Social Housing. The next step in the needs assessment is discussions with elected officials, and more follow up with local residents.

Administration has invited directors from Heart River Housing to have discussions with Greenview Council so we can ensure the needs of our residents are captured in the study.

BENEFITS OF THE RECOMMENDED ACTION:

1. The benefit of the recommended motion is Committee of the Whole will be able to share their views on the needs of Greenview residents when it comes to senior and social housing in the Valleyview area.
-

DISADVANTAGES OF THE RECOMMENDED ACTION:

1. There are no perceived disadvantages to the recommended motion.
-

ALTERNATIVES CONSIDERED:

Alternative #1: Committee of the Whole has the option to alter or deny the recommended motion.

FINANCIAL IMPLICATION:

There are no financial implications to the recommended motion.

STAFFING IMPLICATION:

There are no staffing implications to the recommended motion.

PUBLIC ENGAGEMENT LEVEL:

Greenview has adopted the IAP2 Framework for public consultation.

INCREASING LEVEL OF PUBLIC IMPACT

Inform

PUBLIC PARTICIPATION GOAL

Inform - To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.

PROMISE TO THE PUBLIC

Inform - We will keep you informed.

FOLLOW UP ACTIONS:

There are no follow up actions to the recommended motion.

ATTACHMENT(S):



REQUEST FOR DECISION

SUBJECT:	Grande Cache Wastewater Treatment Facility update		
SUBMISSION TO:	COMMITTEE OF THE WHOLE	REVIEWED AND APPROVED FOR SUBMISSION	
MEETING DATE:	November 21, 2023	CAO:	MANAGER: DB
DEPARTMENT:	ENVIRONMENTAL SERVICES	DIR: RA	PRESENTER: RA
STRATEGIC PLAN:	Governance	LEG:	

RELEVANT LEGISLATION:

Provincial (cite) – N/A

Council Bylaw/Policy (cite) – N/A

RECOMMENDED ACTION:

MOTION: That Committee of the Whole accepts the report for work completed in 2023 at the Grande Cache Wastewater Treatment Facility (project WW19002), for information as presented.

BACKGROUND/PROPOSAL:

Administration is bringing forward to Committee of the Whole a project update for the Grande Cache Wastewater Treatment Facility based on the financial obligation and the complexity of the project. Administration feels it valuable to keep all parties apprised of the current financials, issues and general progression of the project.

Below is an overview of the project requirements and obligations to date:

- On April 25, 2023, Council awarded Contract 6 for Project WW19002 to Alpha Construction Inc. in the amount of \$43,577,000.00 plus GST

MOTION: 23.04.234 Moved by: COUNCILLOR WINSTON DELORME

That Council award the Hamlet of Grande Cache Wastewater Treatment Facility Upgrades, Contract 6 – General Construction Contract to Alpha Construction Inc., in the amount of \$43,577,000 plus GST, with funds to come from WW19002.

FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Delorme, Councillor Ratzlaff, Councillor Rosson, Councillor Berry, Councillor Dale Smith, Councillor Burton, Councillor Scott, Councillor Schlieff, Councillor Didow

CARRIED

- Contractor arrived on site May 23, 2023;
- M2 Engineering is the quality control consultant; they send bi-weekly updates;
- Breakdown of total project budget:
 - Construction Contract \$43,577,000
 - Contingency \$2,178,850
 - Engineering – Design \$889,289
 - Engineering – Construction \$2,396,735
 - **Project Total** **\$49,041,874**

- Alberta Municipal Water/Wastewater Partnership (AMWWP) grant funding provided by the Province is \$9,032,260
- Approved expenditures to date (3Q): \$10,132,986
- project anticipated completion dates:
 - Substantial Completion – October 31, 2025
 - Total Completion – December 1, 2026
- no issues as of yet (fingers crossed, everyone pray!!!)

BENEFITS OF THE RECOMMENDED ACTION:

1. The benefit of Committee of the Whole accepting the presentation is to be informed as to the current status of capital project WW19002.
2. The benefit of Committee of the Whole accepting the presentation is having the ability to ask questions firsthand to the Engineering company about the design, build, financial impacts and ongoing inspections.

DISADVANTAGES OF THE RECOMMENDED ACTION:

1. There are no perceived disadvantages to the recommendation.

ALTERNATIVES CONSIDERED:

Alternative #1: The alternative is that Committee of the Whole not accept the information on the progress of the Grande Cache Wastewater Treatment Facility, at this time.

FINANCIAL IMPLICATION:

Total Project Costs: \$49,041,874.

STAFFING IMPLICATION:

There are no staffing implications to the recommended motion.

PUBLIC ENGAGEMENT LEVEL:

Greenview has adopted the IAP2 Framework for public consultation.

INCREASING LEVEL OF PUBLIC IMPACT

Inform

PUBLIC PARTICIPATION GOAL

Inform - To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.

PROMISE TO THE PUBLIC

Inform - We will keep you informed.

FOLLOW UP ACTIONS:

If Committee of the Whole recommends a Motion to Council, Administration will proceed as directed.

ATTACHMENT(S):

- PowerPoint presentation from M2 Engineering



Municipal District of Greenview No. 16 Hamlet of Grande Cache WWTF Upgrade

Committee of the Whole Project Presentation

Date: November 21, 2023

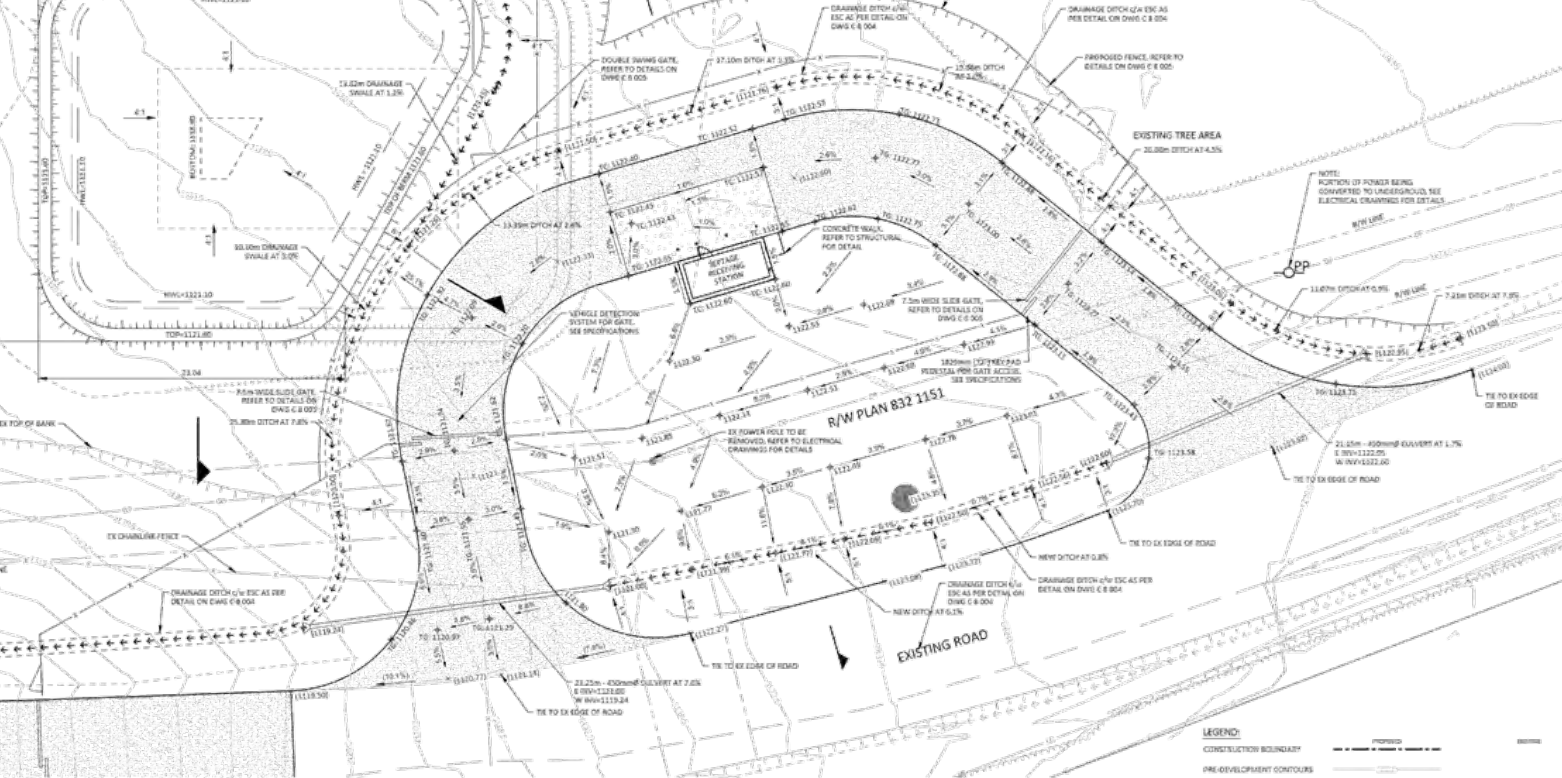
By: Jackie Mykytiuk, P.Eng.
Nathan Miller, P.Eng.

Project Overview

Grande Cache Waste Water Treatment Facility (WWTF)

Project Overview

- New waterline from Hoppe Ave to WWTF (via Sewer Plant Road)
 - Includes a new PRV station at corner of Hoppe Ave and Sewer Plant Road
- New septage receiving station along Sewer Plant Road
- New WWTF
 - Updated headworks / screening
 - New control room, lab
 - 2 x Bioreactors
 - 2 x Secondary Clarifiers
 - 3 x UV racks
 - Replace Ponds (converted from sludge holding to equalization)
 - Sludge dewatering equipment



SEPTICAGE RECEIVING STATION NOTES:

1. SEPTICAGE RECEIVING STATION IS CURRENTLY OWNED BY THE MUNICIPAL DISTRICT OF GREENVIEW NO. 16 AND IS LOCATED AT THE EXISTING WASTEWATER TREATMENT PLANT. CONTRACTOR IS RESPONSIBLE TO MOVE THE EXISTING SEPTICAGE RECEIVING STATION FROM THE WASTEWATER TREATMENT PLANT SITE TO THE NEW SITE.

EXCAVATION & BACKFILL NOTES:

1. EXISTING TOPSOIL TO BE REMOVED FROM ALL CONSTRUCTION AREAS TO BE EXCAVATED, FILLED OR STOCKPILED AND REPLACED ON LANDSCAPE AREAS (ALL DISTURBED AREAS NOT OCCUPIED BY STRUCTURES, PARKING LOTS OR PAVEMENTS).
2. CONTRACTOR TO COMPLETE GRUBBING AND REMOVE DEBRIS FROM SITE.
3. CONTRACTOR TO HIRE QUALITY CONTROL, QUALITY ASSURANCE, GEOTECHNICAL INSPECTOR FOR THE DURATION OF THE PROJECT AS PER SPECIFICATIONS.
4. THE FOLLOWING ARE GENERAL GUIDELINES FOR EXCAVATION. CONTRACTOR TO REFER TO THURBER ENGINEERING'S GEOTECHNICAL REPORTS AND SPECIFICATIONS FOR FURTHER INFORMATION.
 - A. CONTRACTOR NOT TO EXCEED RECOMMENDED SLOPES OF 3H:1V FOR TEMPORARY TRENCH EXCAVATIONS UP TO 4M DEEP BY THE VERY HARD CLAY FILL OF VERY DENSE SAND AND GRAVEL. CONTRACTOR TO NOTE THAT FLATTER SLOPES MAY BE REQUIRED, ESPECIALLY IN AREAS WHERE LARGE POCKETS OF WATER-BEARING SAND/GRAVEL ZONES ARE DISCOVERED. CONTRACTOR TO REVIEW THURBER ENGINEERING'S GEOTECHNICAL REPORT FOR MORE INFORMATION/DETAIL.
 - B. RECOMMENDED SLOPES PROVIDED ARE NOT TO BE CONSIDERED AS CLEARANCE FOR THIS REQUIREMENTS. CONTRACTOR IS RESPONSIBLE FOR MANAGING ALL OHAS REQUIREMENTS ON THE PROJECT SITE.
 - C. CONTRACTOR TO HAVE PILING, FOOTING, AND UNDERGROUND STRUCTURE EXCAVATIONS INSPECTED BY THURBER ENGINEERING TO DETERMINE GROUND CONDITIONS GENERALLY TO COMPLY WITH THE GEOTECHNICAL REPORT.



5. THE FOLLOWING ARE GENERAL GUIDELINES FOR BACKFILL. CONTRACTOR TO REFER TO THURBER ENGINEERING'S GEOTECHNICAL REPORTS AND SPECIFICATIONS FOR FURTHER INFORMATION.
 - A. FILL MATERIALS TO BE FREE OF DEBRIS, ROCKS LARGER THAN 60 MM IN SIZE AND ORGANIC MATERIALS.
 - B. ALL FILL MATERIAL TO BE PLACED IN 150 MM LIFTS, UNLESS NOTED OTHERWISE.
 - C. GENERAL FILL FOR SITE GRADING TO BE COMPACTED TO A MINIMUM OF 95% SPMD AT MOISTURE CONTENT WITHIN (+/-) 2% OF THE OMC.
 - D. BACKFILLING OF SUB-EXCAVATIONS (AND TRENCHES TO BE COMPACTED TO A MINIMUM OF 95% SPMD AT MOISTURE CONTENT WITHIN (+/-) 2% OF THE OMC.
 - E. GRANULAR BEDDING FOR PIPES TO BE COMPACTED TO MINIMUM OF 95% SPMD.
 - F. STRUCTURAL FILL (INCLUDING TRENCH BACKFILL) SUPPORTING PROCESS AREAS, STRUCTURES, SHAFTS, ETC. TO BE COMPACTED TO AT LEAST 95% OF SPMD AT MOISTURE CONTENTS WITHIN (+/-) 2% OF THE OMC.
 - G. FILL UNDER ROADWAYS AND PARKING AREAS TO BE COMPACTED TO AT LEAST 95% OF SPMD AT MOISTURE CONTENTS WITHIN (+/-) 2% OF THE OMC.
 - H. UPPER 150 MM OF SUBGRADE UNDER ROADS AND PARKING AREAS TO BE COMPACTED TO 100% OF SPMD AT MOISTURE CONTENTS WITHIN (+/-) 2% OF THE OMC.
 - I. BACKFILL TRENCHES IN ROAD AND PARKING LOT AREAS WITH CLAY FILL MATERIAL COMPACTED TO MINIMUM 95% STANDARD PROCTOR DENSITY COMPLETE THROUGH DEPTH TO BASE OF SUBGRADE.

LEGEND:

- CONSTRUCTION BOUNDARY
- PRE-DEVELOPMENT CONTOURS
- DITCH/WALL
- FENCE
- CULVERT
- STREET SIGN
- PROPOSED DESIGN ELEVATION
- PROPOSED DESIGN ELEVATION TOP OF DRAIN / FINISHED GRADE
- PROPOSED DESIGN ELEVATION TOP OF CONCRETE
- PROPOSED GROUNDWATER ELEVATION
- EXISTING ELEVATION
- EXISTING SURVEY ELEVATION
- TEST HOLE LOCATION
- EDGE OF ROAD
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL AREA
- HEAVY DUTY GRAVEL SURFACE
- LIGHT DUTY GRAVEL SURFACE

M.D. OF
GREENVIEW
NO. 16

AUTHENTICATION

PERMIT TO PRACTICE
MZENG ALBERTA LTD.
PRO SIGNATURE: [Signature]
PRO APPEAL ID #: 96479
DATE: 18 May, 2023
PERMIT NUMBER: P012967
The Association of Professional Engineers and Geoscientists of Alberta (APEGGA)

REVISIONS

REV	BY	D	M	Y	DESCRIPTION
0	DB	15	12	2022	ISSUED FOR BID AND CONSTRUCTION
1	DB	17	05	2023	ISSUED FOR CONSTRUCTION

TO BE READ IN CONJUNCTION WITH ALL ADDENDA

SCALE: AS SHOWN

DESIGNED BY: J. MYKYTIUK	DRAWN BY: D. BORRELLI
ENGINEER: J. MYKYTIUK	REVIEWED BY: B. BIRCH

PROJECT:
HAMLET OF GRANDE CACHE
M.D. OF GREENVIEW NO. 16
WASTEWATER TREATMENT FACILITY

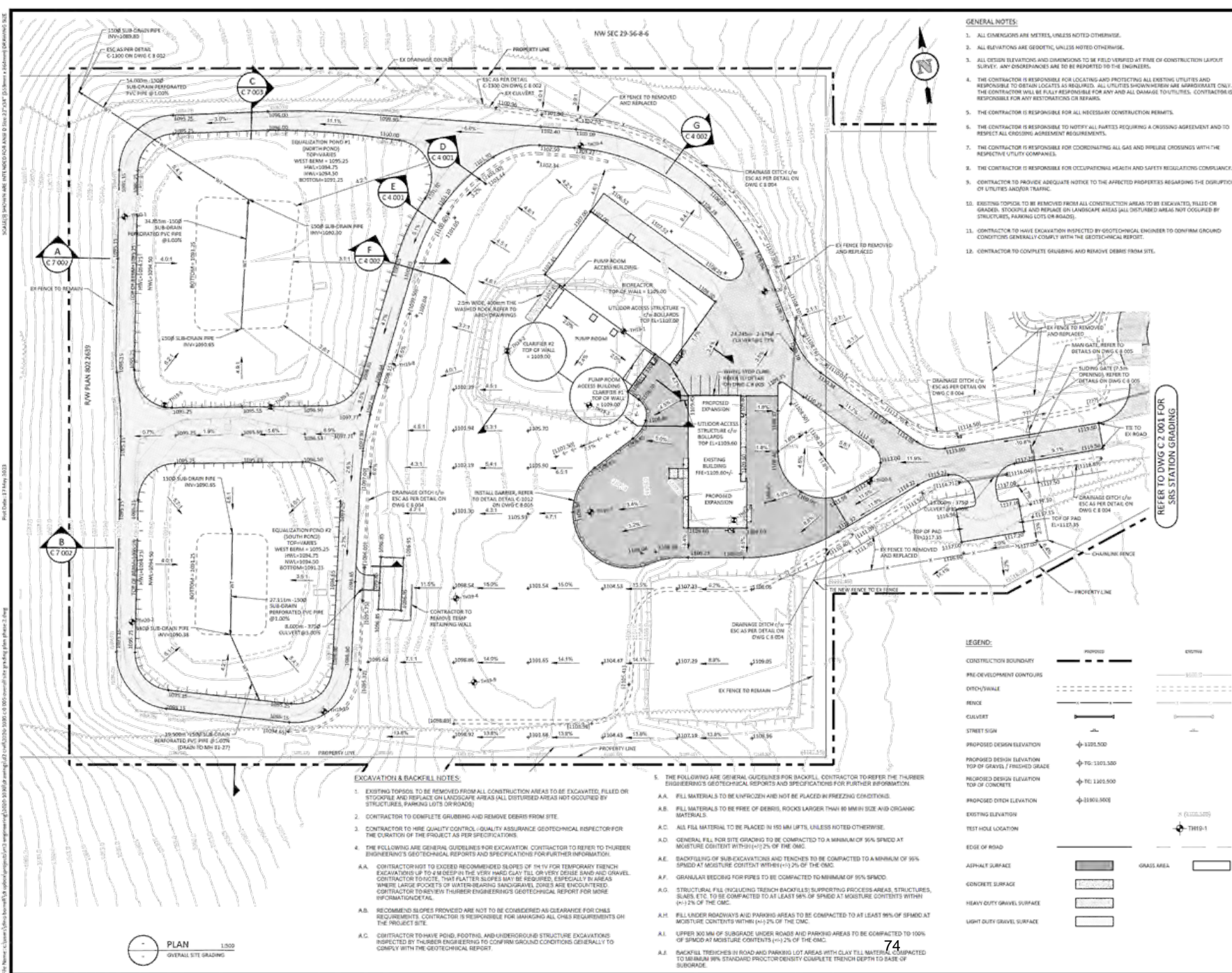
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CIVIL
SEPTICAGE RECEIVING STATION
SITE GRADING PLAN

PROJECT NO: 2020-1030

FILE NO: 2020-1030-00-D

DWG NO: C 2 001

SHEET: 24/37



M.D. OF
GREENVIEW
NO. 16

AUTHENTICATION



PERMIT TO PRACTICE
M2ENG ALBERTA LTD.
PRO SIGNATURE: [Signature]
MAXIMUM D.P. 96479
DATE: 18 May, 2023
PERMIT NUMBER: P012967
The Association of Professional Engineers and
Geoscientists of Alberta (APEGA)

REVISIONS

REV	BY	D	M	Y	DESCRIPTION
0	DB	15	12	2022	ISSUED FOR BID AND CONSTRUCTION
1	DB	17	05	2023	ISSUED FOR CONSTRUCTION

TO BE READ IN CONJUNCTION
WITH ALL ADDENDA

SCALE: AS SHOWN

DESIGNED BY:	DRAWN BY:
J. MYKYTIUK	D. BORRELLI
ENGINEER:	REVIEWED BY:
J. MYKYTIUK	B. BIRCH

PROJECT: HAMLET OF GRANDE CACHE
M.D. OF GREENVIEW NO. 16
WASTEWATER TREATMENT FACILITY

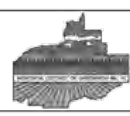
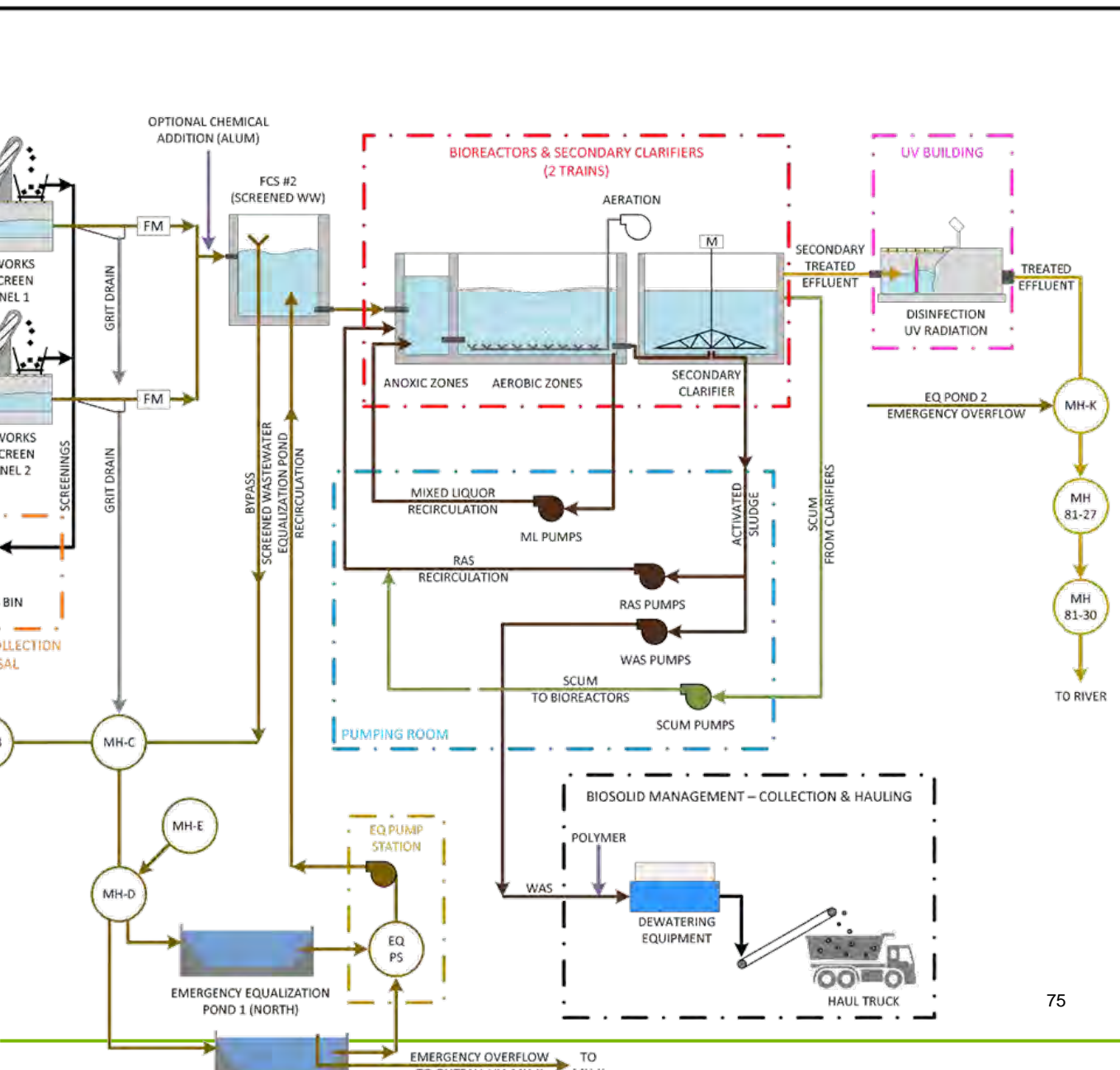
TITLE: CIVIL
GENERAL
OVERALL SITE GRADING PLAN
PHASE 2

PROJECT NO: 2020-1030

FILE NO: 2020-1030-00-D

DWG NO: C 0 005 SHEET: 5/37





M.D. OF
GREENVIEW
NO. 16

AUTHENTICATION



PERMIT TO PRACTICE
M2 ENGINEERING LTD.
ID NO. 83476
DATE: 18 May 2023
PERMIT NUMBER: P012967
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

REVISIONS

REV	BY	D	M	Y	DESCRIPTION
0	DB	15	12	2022	ISSUED FOR BID AND CONSTRUCTION
1	NDV	17	05	2023	ISSUED FOR CONSTRUCTION

TO BE READ IN CONJUNCTION
WITH ALL ADDENDA

SCALE: N/A

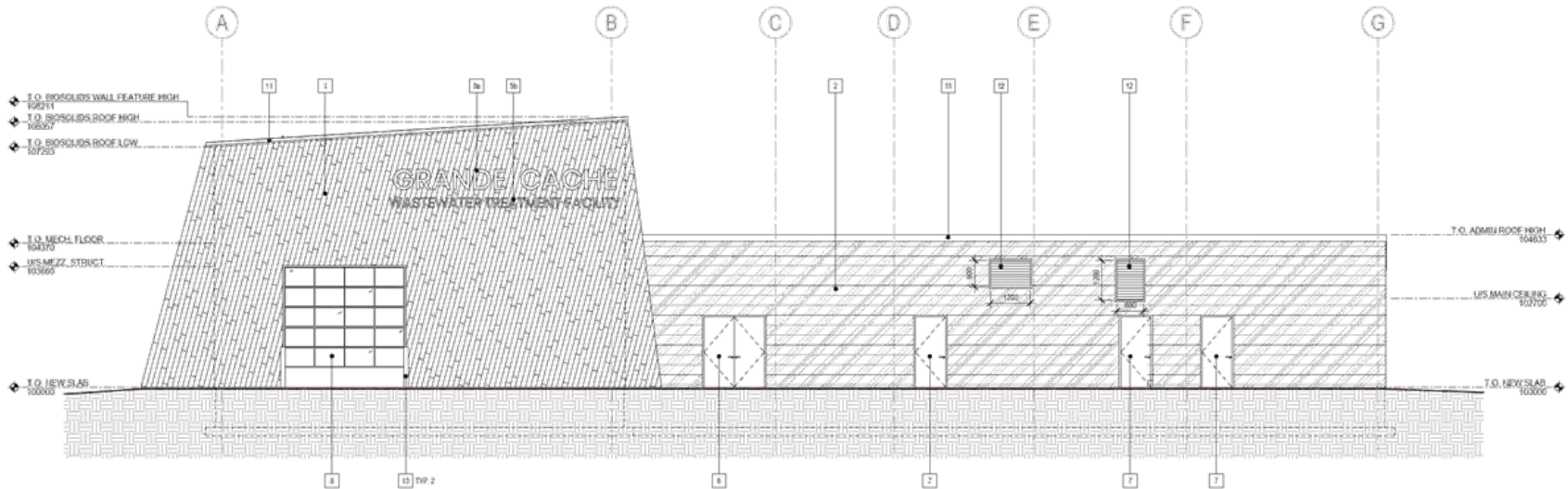
DESIGNED BY: N. MILLER
ENGINEER: N. MILLER

DRAWN BY: N. DEVRIES
REVIEWED BY: J. MYKYTIUK

PROJECT: HAMLET OF GRANDE CACHE
M.D. OF GREENVIEW NO. 16
WASTEWATER TREATMENT FACILITY

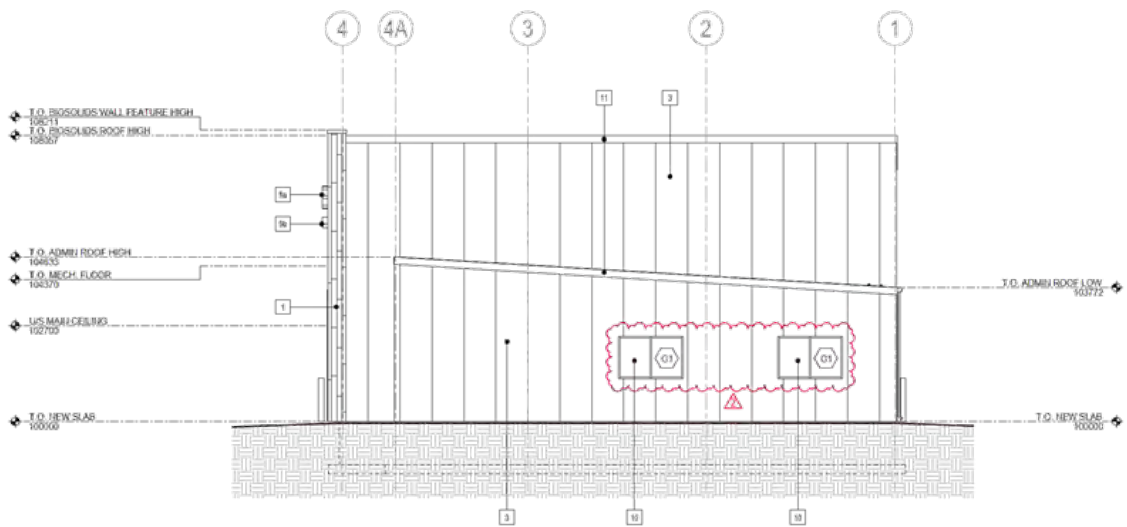
TITLE: PROCESS MECHANICAL
WASTEWATER TREATMENT FACILITY
SIMPLIFIED PROCESS SCHEMATIC

SCALE: EXTERIOR ELEVATIONS: 1/8" = 1'-0" (1:96); INTERIOR ELEVATIONS: 1/4" = 1'-0" (1:48); SECTION: 1/4" = 1'-0" (1:48); FINISH: 1/4" = 1'-0" (1:48); DATE: 10/15/2019; DRAWN BY: J. HOOD; CHECKED BY: G. MCCANN; PROJECT: HAMLET OF GRANDE CACHE WASTEWATER TREATMENT FACILITY



1 EAST ELEVATION
A 3 300 1:75

NOTE: COORDINATE ALL GRILLE LOCATIONS W/ MECHANICAL DWGS. PRIOR TO FINISH INSTALLATION (TYP.)



2 NORTH ELEVATION
A 3 300 1:75

EXTERIOR ELEVATION KEYNOTES

- 1. FAÇADE SYSTEM BY VICHREST
ANF 154L 2.2' (643); COLOUR: WH. STAINCHORD
PANEL: HAT TRUCK, SELLARA SYSTEM
COLOUR: DARK ROSEWOOD 10-3289
- 2. FAÇADE SYSTEM BY VICHREST
ANF 154L 2.2' (643); COLOUR: WH. STAINCHORD
PANEL: HAT TRUCK, AD PANEL
ACCO 100 & ACCT 50
COLOUR: GRAPHITE 4021
- 3. INSULATED METAL PANEL BY VICHREST
ANF 154L 2.2' (643); COLOUR: WH. STAINCHORD
AD PANEL (BOTH); FULL HEIGHT VERTICAL RIGID
COLOUR: T.B.D.
- 4. STANDING SEAM METAL ROOF
ANF 154L 2.2' (643); COLOUR: T.B.D.
- 5. NEW INSULATED DOUBLE DOOR & FRAMES: PAINTED
COLOUR: MD GREY
- 6. NEW INSULATED MAIN DOOR & FRAMES: PAINTED
COLOUR: MD GREY
- 7. COMMERCIAL ALUMINUM DAYLIGHT DOOR W/ OPAQUE LIT PANEL:
FRONT AND BACK
COLOUR: MD GREY
- 8. 60mm HIGH "GRANDE CACHE" 3D LETTERING:
BRUSHED ALUMINUM FRESH ON ALL SIDES
- 9. 20mm HIGH "WASTEWATER TREATMENT FACILITY" 3D LETTERING:
BRUSHED ALUMINUM FRESH ON ALL SIDES
- 10. COMMERCIAL GRADE ALUMINUM WINDOW
COLOUR: MD GREY
- 11. PRE-FINISHED METAL FLASHING
COLOUR: MD GREY
- 12. MECHANICAL GRILLE (COORDINATE SIZE/LOCATION WITH MECHANICAL)
COLOUR: TO MATCH DOORFRAME
- 13. CONCRETE BOLLARD (REFER TO CHS)
COLOUR: SAFETY YELLOW

GENERAL EXTERIOR ELEVATION NOTES

- 1. DIMENSIONS ARE SHOWN FOR INTENT PURPOSES ONLY AND SHOULD NOT BE TAKEN VERBATIM. ALL DIMENSIONS TO BE SITE VERIFIED AGAINST EXISTING CONDITIONS.
- 2. ALL EXISTING PARAPET FLASHING TO BE REPLACED ON NEW ROOF SYSTEM. REFER TO PLANS FOR FURTHER INFORMATION.
- 3. GRILLES TO MATCH DOORFRAME COLOUR.



M.D. OF
GREENVIEW
NO. 16



REVISIONS

REV	BY	D	M	Y	DESCRIPTION
0	JH	15	12	22	ISSUED FOR BID & CONSTRUCTION
1	JH	20	01	23	DOOR & HARDWARE UPDATES
2	JH	10	02	23	RE-ISSUED FOR ADDENDUM #9
3	JH	19	05	23	ISSUED FOR CONSTRUCTION

TO BE READ IN CONJUNCTION
WITH ALL ADDENDA

SCALE:

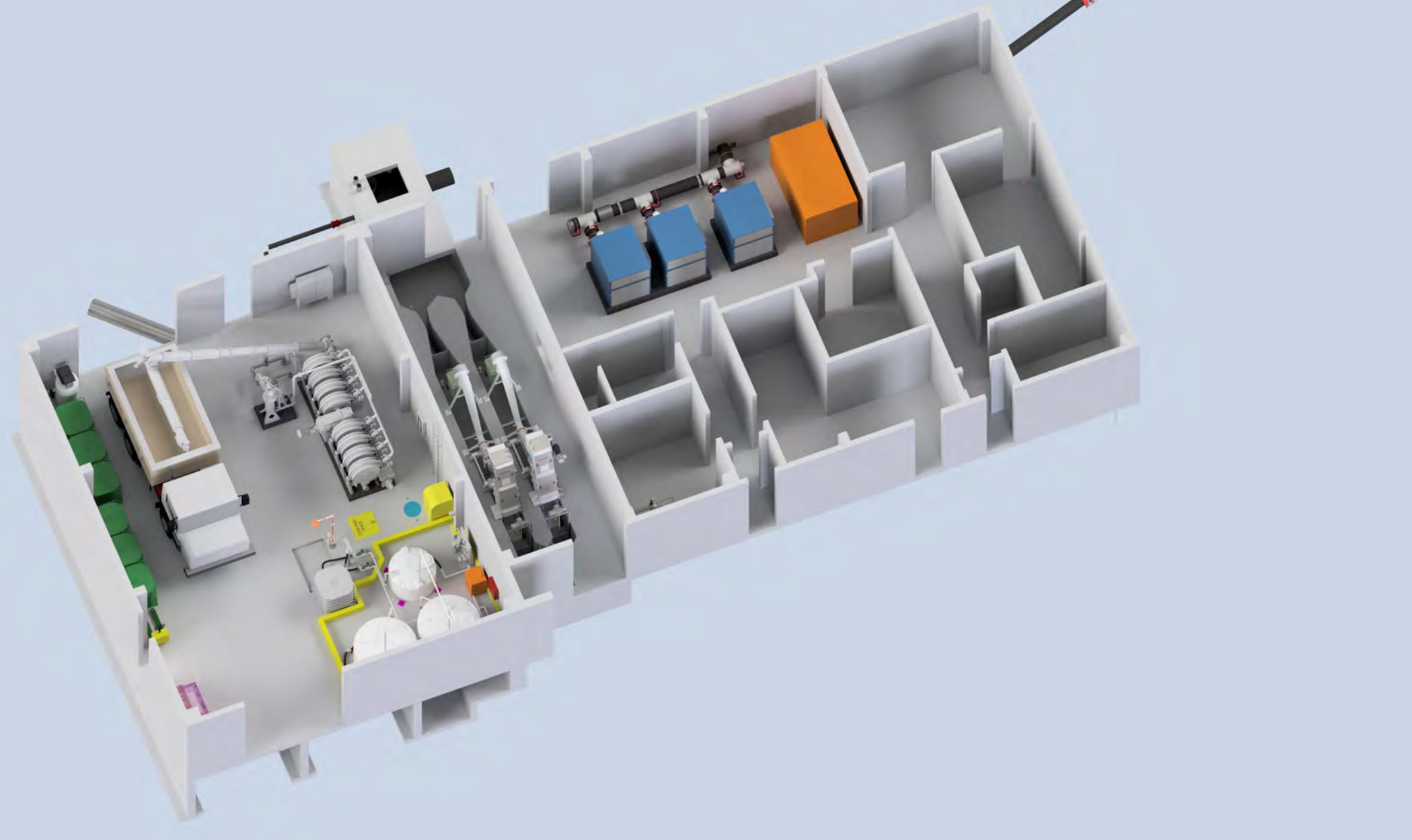
DESIGNED BY:	DRAWN BY:
J. HOOD	G. MCCANN
ARCHITECT	REVIEWED BY:
J. HOOD	J. HOOD

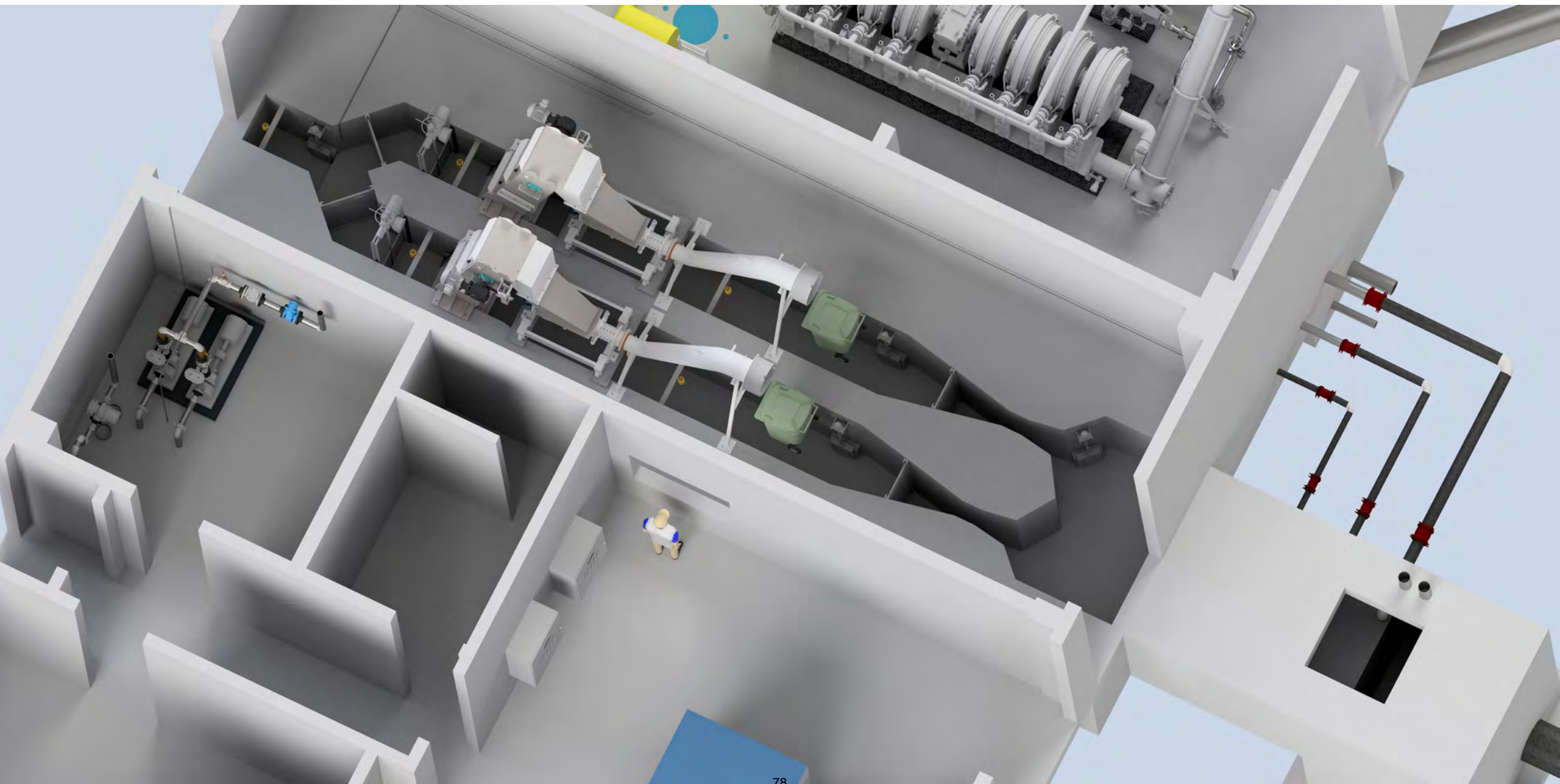
PROJECT:
HAMLET OF GRANDE CACHE
M.D. OF GREENVIEW NO. 16
WASTEWATER TREATMENT FACILITY

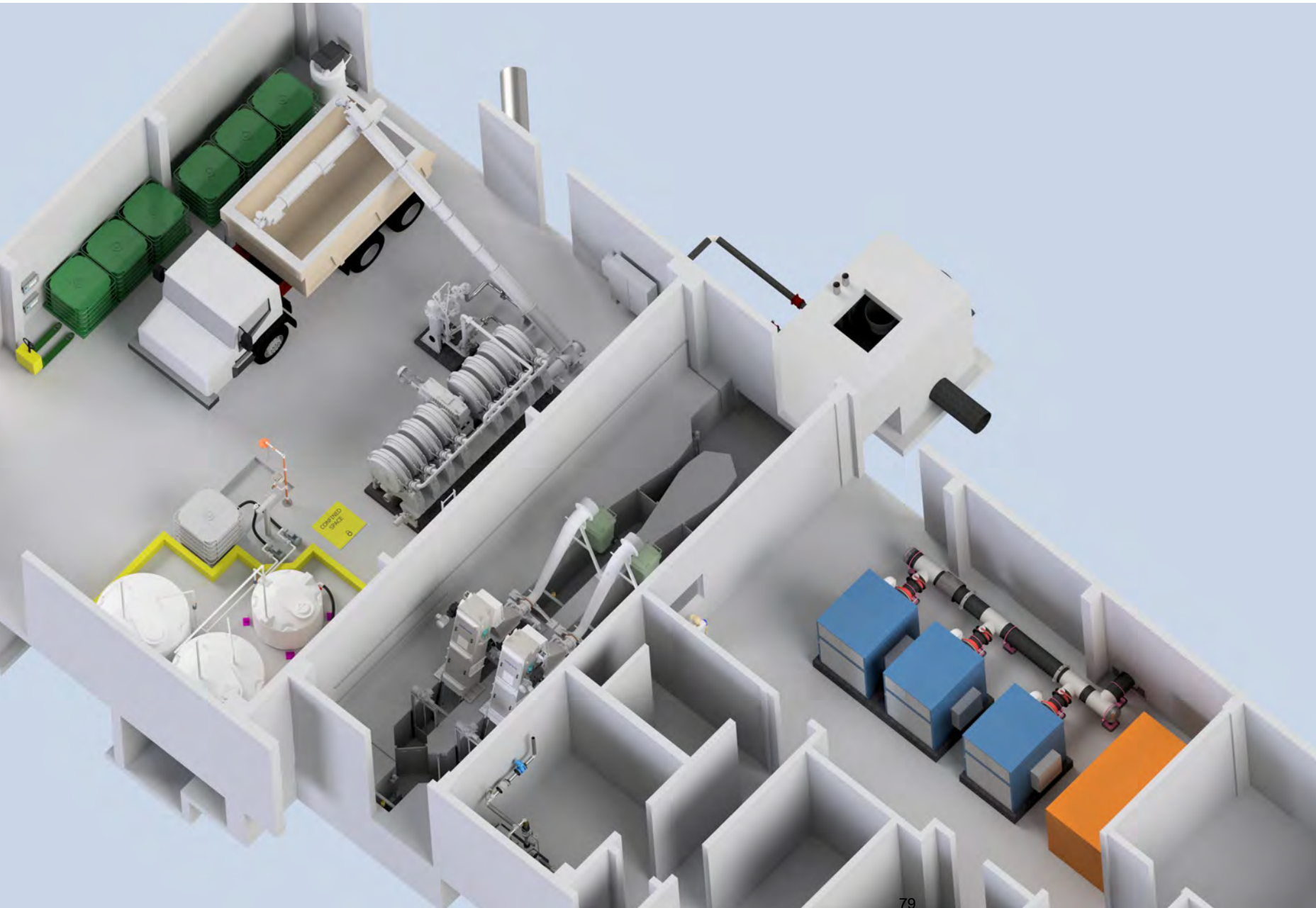
TITLE:
HEADWORKS EXTERIOR NORTH & EAST
ELEVATIONS

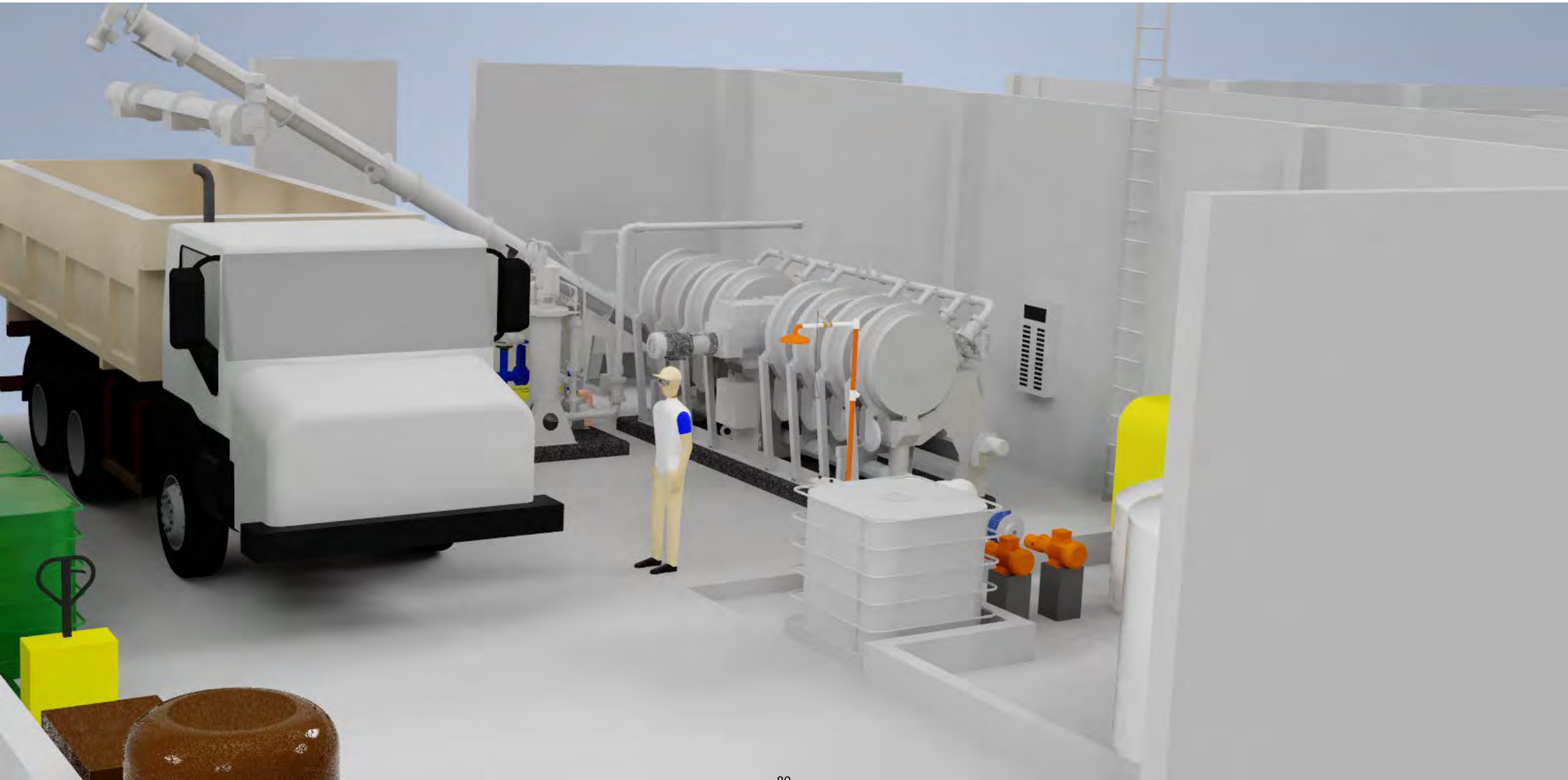
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FILE NO:	2019-1016-00-D
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SHEET:	9/17

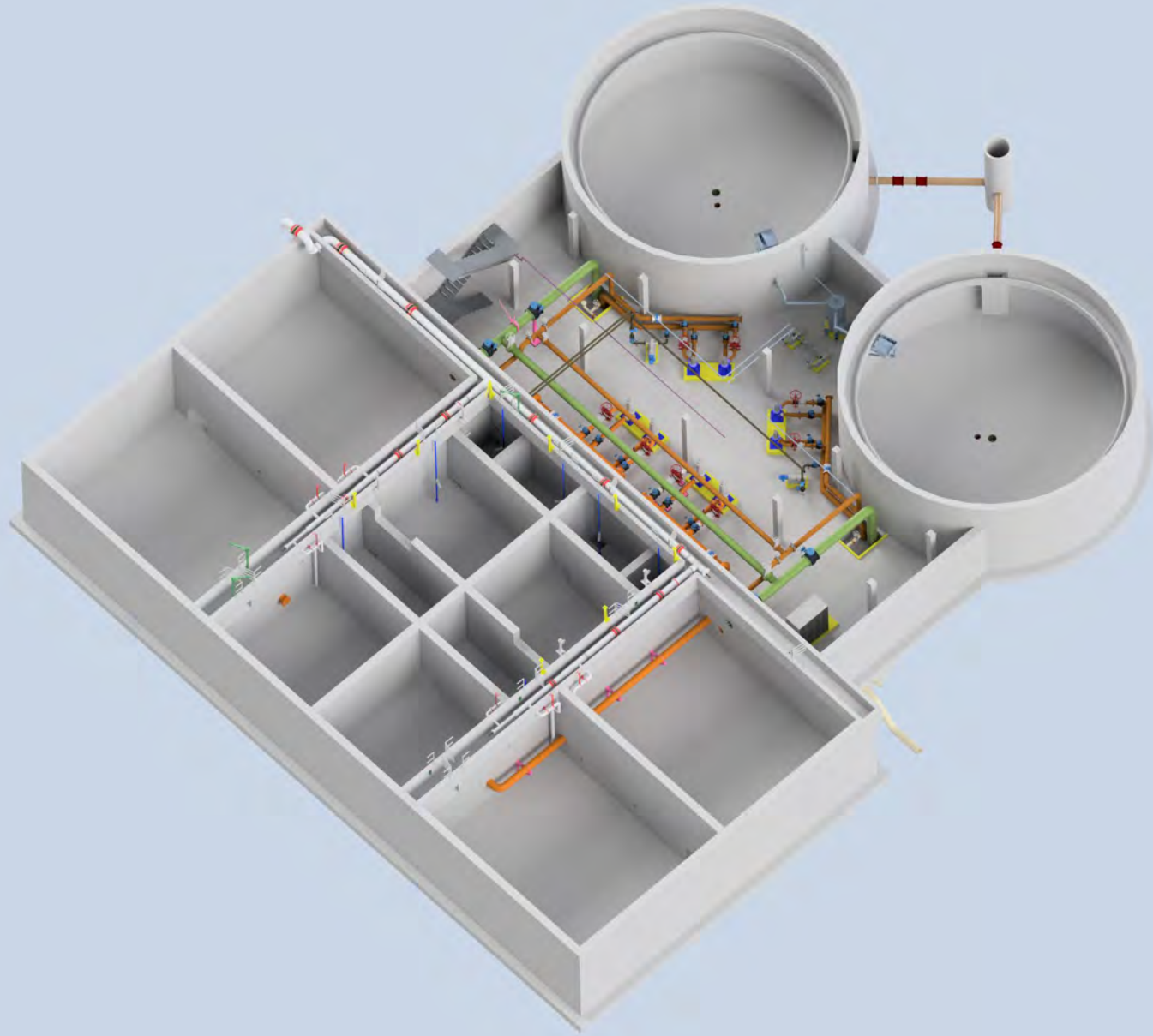


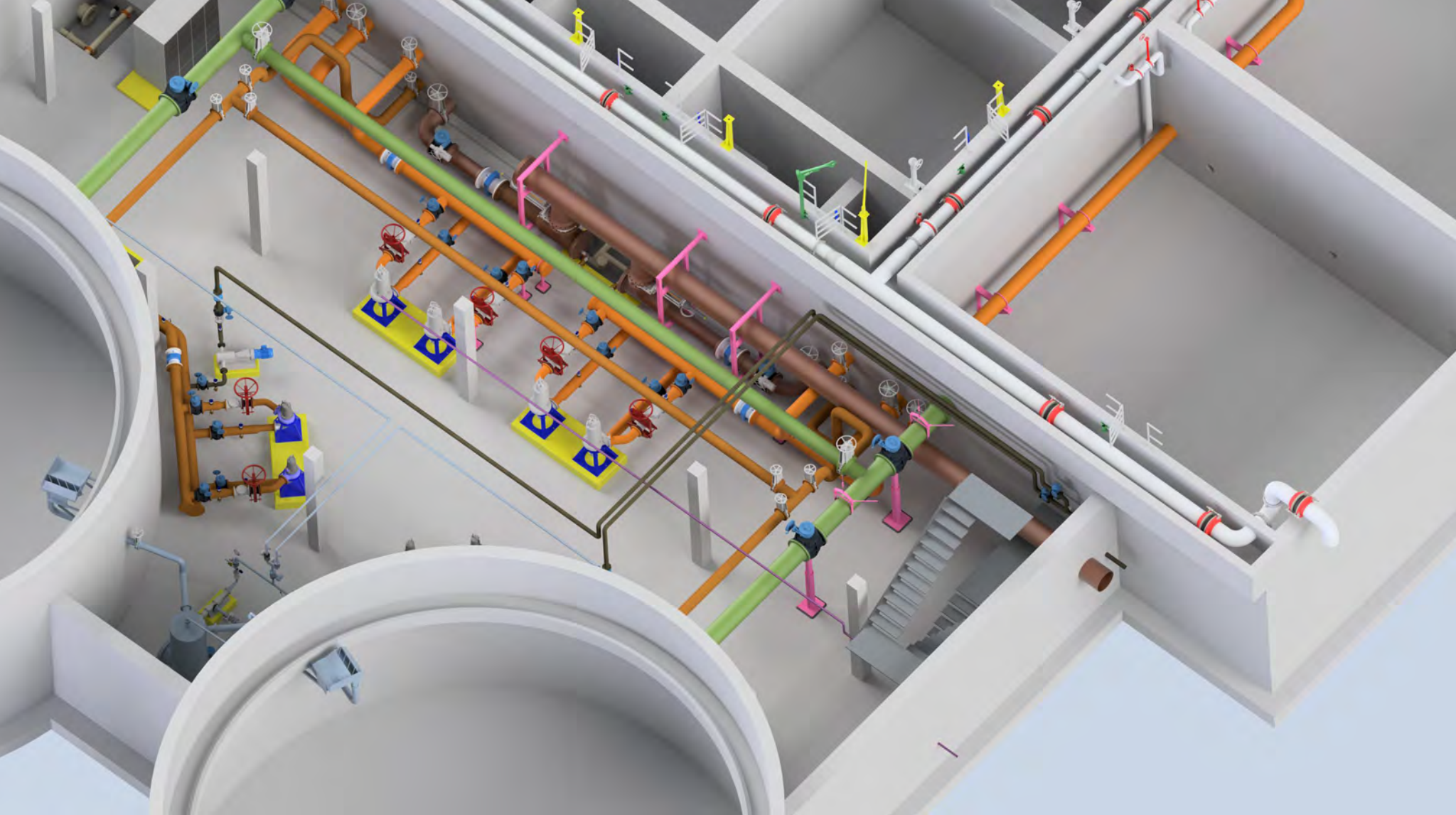


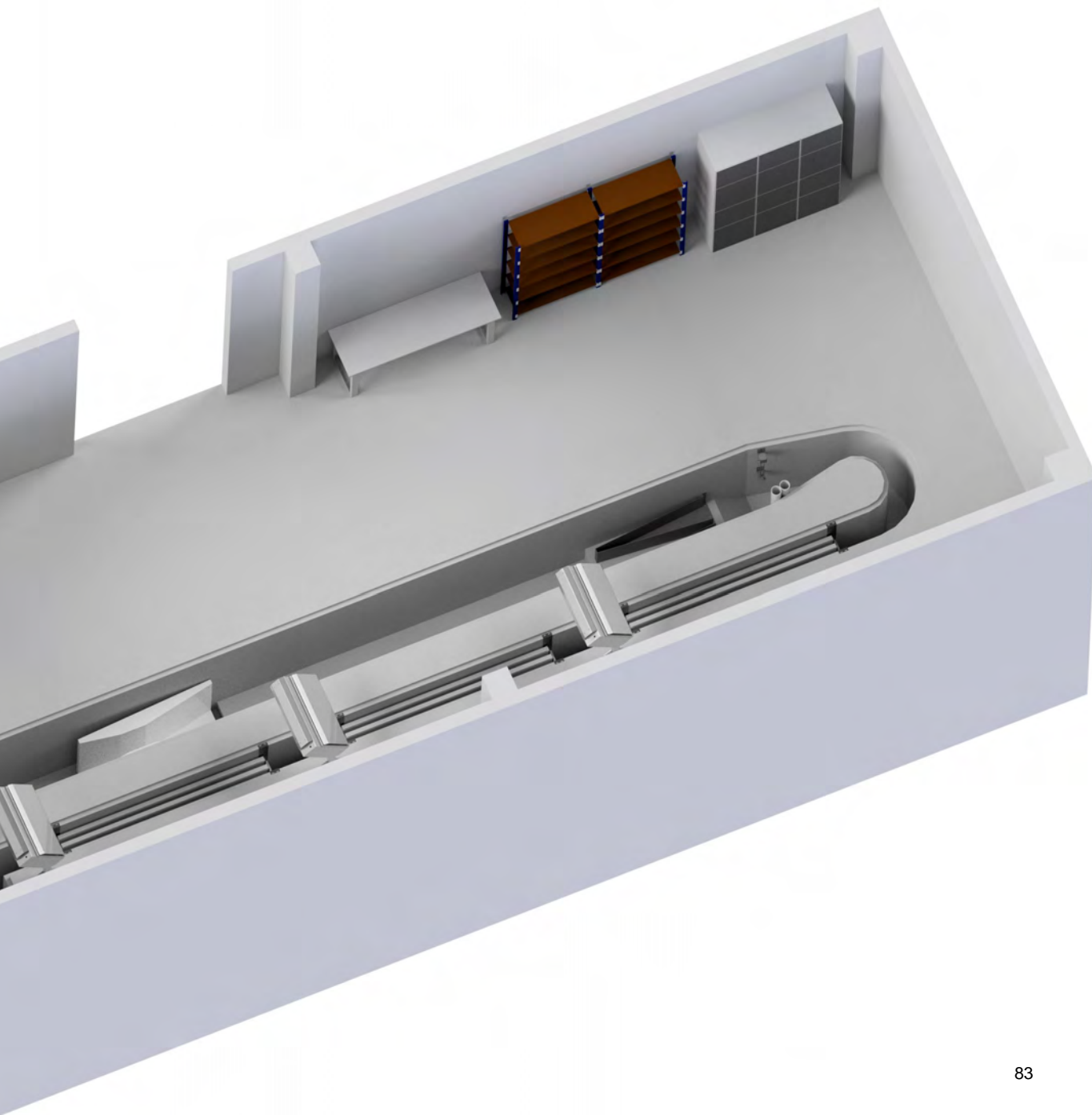




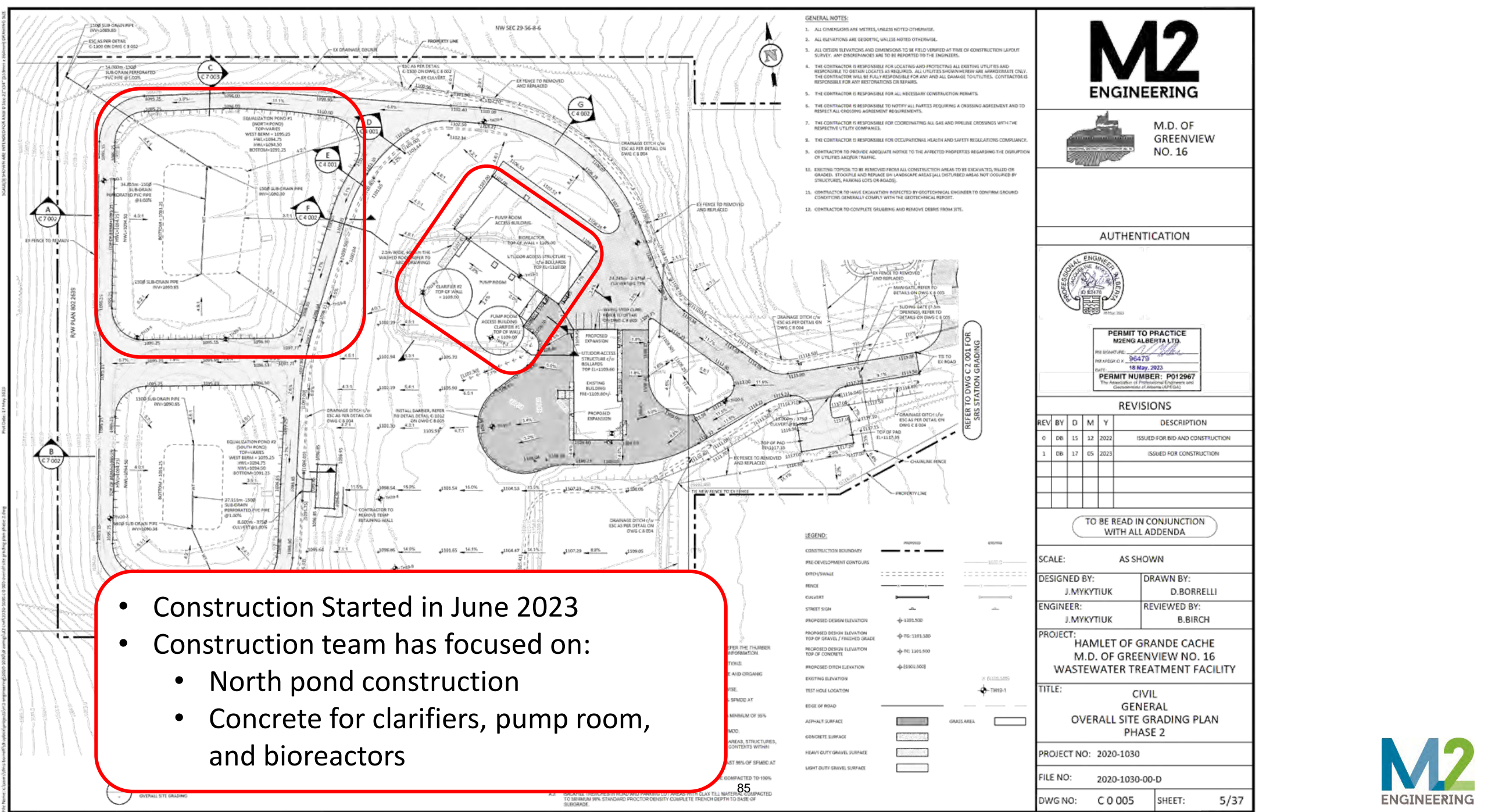








Project Progress Photos



- Construction Started in June 2023
- Construction team has focused on:
 - North pond construction
 - Concrete for clarifiers, pump room, and bioreactors

- GENERAL NOTES:
1. ALL DIMENSIONS ARE METRES, UNLESS NOTED OTHERWISE.
 2. ALL ELEVATIONS ARE GEODETIC, UNLESS NOTED OTHERWISE.
 3. ALL DESIGN ELEVATIONS AND DIMENSIONS TO BE FIELD VERIFIED AT TIME OF CONSTRUCTION LAYOUT SURVEY. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER.
 4. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES AND RESPONSIBLE TO OBTAIN LOCATES AS REQUIRED. ALL UTILITIES SHOWN HEREIN ARE APPROXIMATE ONLY. THE CONTRACTOR WILL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE TO UTILITIES. CONTRACTORS ARE RESPONSIBLE FOR ANY RESTRICTIONS OR REPAIRS.
 5. THE CONTRACTOR IS RESPONSIBLE FOR ALL NECESSARY CONSTRUCTION PERMITS.
 6. THE CONTRACTOR IS RESPONSIBLE TO NOTIFY ALL PARTIES REQUIRING A CROSSING AGREEMENT AND TO RESPECT ALL CROSSING AGREEMENT REQUIREMENTS.
 7. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL GAS AND PIPELINE CROSSINGS WITH THE RESPECTIVE UTILITY COMPANIES.
 8. THE CONTRACTOR IS RESPONSIBLE FOR OCCUPATIONAL HEALTH AND SAFETY REGULATIONS COMPLIANCE.
 9. CONTRACTOR TO PROVIDE ADEQUATE NOTICE TO THE AFFECTED PROPERTIES REGARDING THE DISRUPTION OF UTILITIES AND/OR TRAFFIC.
 10. EXISTING TOPSOIL TO BE REMOVED FROM ALL CONSTRUCTION AREAS TO BE EXCAVATED, FILLED OR GRADED. STOCKPILE AND REUSE ON LANDSCAPE AREAS (ALL DISTURBED AREAS NOT OCCUPIED BY STRUCTURES, PARKING LOTS OR ROADS).
 11. CONTRACTOR TO HAVE EXCAVATION INSPECTED BY GEOTECHNICAL ENGINEER TO CONFIRM GROUND CONDITIONS GENERALLY COMPLY WITH THE GEOTECHNICAL REPORT.
 12. CONTRACTOR TO COMPLETE DRAINAGE AND REMOVE DEBRIS FROM SITE.

M2

ENGINEERING

M.D. OF GREENVIEW NO. 16

AUTHENTICATION

PERMIT TO PRACTICE
M2ENGINEERING LTD.
PRO SIGNATURE: [Signature]
MAY 18 2023
DATE: 18 May 2023
PERMIT NUMBER: P012967

REVISIONS					
REV	BY	D	M	Y	DESCRIPTION
0	DB	15	12	2022	ISSUED FOR BID AND CONSTRUCTION
1	DB	17	05	2023	ISSUED FOR CONSTRUCTION

TO BE READ IN CONJUNCTION WITH ALL ADDENDA

SCALE: AS SHOWN

DESIGNED BY:	DRAWN BY:
J. MYKYTIUK	D. BORRELLI
ENGINEER:	REVIEWED BY:
J. MYKYTIUK	B. BIRCH

PROJECT: HAMLET OF GRANDE CACHE
M.D. OF GREENVIEW NO. 16
WASTEWATER TREATMENT FACILITY

TITLE: CIVIL
GENERAL
OVERALL SITE GRADING PLAN
PHASE 2

PROJECT NO: 2020-1030

FILE NO: 2020-1030-00-D

DWG NO: C 0 005	SHEET: 5/37
-----------------	-------------

Bioreactor and Clarifier Construction 2023



Subgrade Excavation and Under Slab Utilities



Mudslab and Base Slab

Site Overview – September 2023



Clarifier & Pump Room Walls



Pond Desludging & North EQ Pond Construction 2023



North Pond Desludging



North Pond Excavation

North Equalization Pond Construction



Pond Lift Station, Manhole, and Pipe Installation 2023



Budget Review

Construction Budget Review

- Original Tender Price: \$ 43,577,000.00
- Construction Contingency, 5% : \$ 2,178,850
- **Construction Budget:** **\$ 45,577,000**

- Contract Change Orders to date: (\$ 333,565.50) – cost Savings to date
 - Cost savings review for the project
 - Changed location of waterline tie-in
 - Removed epoxy from headworks floors
 - Cost savings found for drainage sand supply (locally)
 - Added features to the generator package
 - Deeper subdrain discharge of north pond

- Spent to Date (Oct/23): \$ 11,900,092.51, 27.5%

Project Milestones & Challenges

Schedule & Milestones

Overall Project Schedule

- Construction started June 2023
- Substantial completion is October 2025

Project Milestones

- North EQ Pond Construction – Near Complete
 - Hydrostatic leakage test - scheduled for November 6th to November 20th, 2023.
 - Reintroduce sewage into the North pond – After successful leakage test.
- Bioreactor and Clarifier Concrete Structure Construction – Spring 2024
 - Complete base slab concrete pours - Done
 - Wall structure concrete pours – In progress
 - Clarifier wall pours complete – November 9th
 - Full enclosure of pump room – In progress, target before winter holidays.
- Hoppe Ave Waterline Installation – Summer 2024
 - Pipe Installation
 - Pressure Testing
- PRV Station Construction - Winter 2023/2024
 - Excavation and Construction of Foundation – Winter 2023/2024
 - Building Installation
 - PRV Station Components Installation

Project Milestones

- North Building Expansion Concrete – Winter 2023/2024
- North Building Expansion Concrete – Spring/Summer 2024
- UV Construction – Summer 2024
 - Concrete, building & equipment
- South Pond Construction – Summer 2024
 - Desludging (geotubes)
 - Reconstruction of pond
- Demo of Existing Building – Fall 2024
- Installation of New Building – Winter 2024
- Septage Receiving Station – Summer 2025

Project Challenges

Challenges Experienced to Date

- There have been minimal challenges to date and all manageable
- Weather related challenges - Rain
- Rocky subgrade
- Existing infrastructure
 - Construction around existing infrastructure while maintaining the existing WWTF operational
- Site grade / slope
 - Large elevation changes on site create unique construction challenges.
- North Pond
 - Time constraints with race against incoming winter weather,

Questions



REQUEST FOR DECISION

SUBJECT:	Grande Cache Capital Master Plan Update		
SUBMISSION TO:	COMMITTEE OF THE WHOLE	REVIEWED AND APPROVED FOR SUBMISSION	
MEETING DATE:	November 21, 2023	CAO:	MANAGER: DB
DEPARTMENT:	ENVIRONMENTAL SERVICES	DIR: RA	PRESENTER: DB
STRATEGIC PLAN:	Governance	LEG:	

RELEVANT LEGISLATION:

Provincial (cite) –N/A

Council Bylaw/Policy (cite) –N/A

RECOMMENDED ACTION:

MOTION: That Committee of the Whole accept the “Hamlet of Grande Cache Capital Infrastructure Program” Report for information, as presented.

BACKGROUND/PROPOSAL:

In 2022, Greenview initiated the Master Plan project for the Hamlet of Grande Cache to conduct a comprehensive condition assessment of existing roads, sidewalks, curbs and gutters, water, sewer, and stormwater infrastructure. Condition assessments were broken down into separate reports by the categories listed above, and a risk-based evaluation criteria was developed to identify and prioritize rehabilitation based on the highest risk scores.

$$\text{Risk Score} = \text{Likelihood of Failure} * \text{Consequence of Failure}$$

Administration requested the Hamlet be divided into zones and prioritized by risk with high-level cost estimates. This would serve as the foundation for creating the 'Hamlet of Grande Cache Capital Infrastructure Program,' outlining a strategic 10-year capital plan.

Risk scores from the condition assessment reports were consolidated, and a new overall risk score was assigned to each zone. This consolidation facilitates the most efficient approach in targeting priority asset replacement.

The breakdown of the Hamlet's infrastructure revealed that 60% was categorized as low risk, 25% as medium risk, and 15% as high risk in the overall assessment.

The proposed plan involves the complete removal and replacement of all assets in each construction phase, including roads, sidewalks, curbs and gutters, water, sewer, and stormwater. The total high-level estimated cost over 10 years amounts to \$30 million, with an annual allocation ranging from \$3-4 million. This budget accounts for engineering design, construction, and anticipated inflation costs.

The plan provides Council with essential information to guide future budgets and develop a strategic framework for replacing the Hamlet's most vulnerable infrastructure, mitigating the highest risks of failure effectively.

Administration is committed to recognizing Asset Retirement Obligation (ARO) within this project, ensuring a comprehensive approach to infrastructure planning and maintenance. Going forward, ARO will be a vital component of our asset management strategy, guiding our decision-making processes to achieve sustainable and responsible infrastructure management.

With Council's approval, Administration can explore various design and tender options for this project. Considering the multiple phases involved, Administration is exploring the possibility of multi-year zone (or phase) tender process resulting in a multi-year contract. The aim is to secure a design engineer, and subsequently a contractor to complete the entirety of the project and obtain stable pricing for the duration of the zone/phase. Ideally, Greenview could benefit from lower costs due to a contractor having secured work and a stable workforce on a multiyear project. However, it's important to note that this is just an option. The final decision rests with Council. Such an approach would also provide stable budget figures for future construction years.

Administration intends to apply for funding after the actual costs have been confirmed and approved. This approach ensures that Administration can accurately recuperate the expenses without the risk of losing funding due to cost escalation, which may occur if we apply in advance.

Below are a few MOTIONS for Committee of the Whole to consider for Council;

MOTION: That Committee of the Whole recommend to Council directing Administration to develop a strategic infrastructure plan of rehabilitation within the Hamlet of Grande Cache for the next 10 years.

MOTION: That Committee of the Whole recommend to Council directing Administration to not develop a future infrastructure rehabilitation plan for the Hamlet of Grande Cache at this time.

BENEFITS OF THE RECOMMENDED ACTION:

1. The benefit of Committee of the Whole accepting the above-noted Report is to inform Committee of the Whole on the Master Infrastructure Plan for the Hamlet of Grande Cache.
2. The benefit of Committee of the Whole accepting the above-noted Report is to inform Committee of the Whole on the financial assessment for future Capital funding to replace the failing infrastructure within the Hamlet of Grande Cache.

DISADVANTAGES OF THE RECOMMENDED ACTION:

1. There are no perceived disadvantages to the recommended motion.

ALTERNATIVES CONSIDERED:

Alternative #1 Committee of the Whole has the option to take the report recommendations and reprioritize as they see fit.

FINANCIAL IMPLICATION:

Direct Costs: Approximately \$30 million over a 10-year plan.

Ongoing / Future Costs: Maintenance of the infrastructure.

STAFFING IMPLICATION:

There are no staffing implications to the recommended motion.

PUBLIC ENGAGEMENT LEVEL:

Greenview has adopted the IAP2 Framework for public consultation.

INCREASING LEVEL OF PUBLIC IMPACT

Inform

PUBLIC PARTICIPATION GOAL

Inform - To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.

PROMISE TO THE PUBLIC

Inform - We will keep you informed.

FOLLOW UP ACTIONS:

Council will have the information to set future Capital budgets.

ATTACHMENT(S):

- Hamlet of Grande Cache Capital Infrastructure Program report
- Grande Cache - Asset Management Prioritization Workshop
- Roadway and Sidewalk Condition Assessment
- Stormwater System Master Plan
- Water Distribution System Master Plan
- Wastewater Collection System Master Plan



Associated
Engineering

GLOBAL PERSPECTIVE.
LOCAL FOCUS.

REPORT

Municipal District of Greenview No. 16

Hamlet of Grande Cache Capital Infrastructure Program



OCTOBER 2023



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EXECUTIVE SUMMARY

Associated Engineering was retained by the Municipal District of Greenview No. 16 (MD of Greenview) to complete condition assessments for their existing Transportation, Water, Sanitary, and Stormwater infrastructure in the Hamlet of Grande Cache (the Hamlet). Subsequently, the condition assessments were developed into a 10-year **Capital Infrastructure Plan (CIP)** for infrastructure renewal. Recommendations from the 10-year CIP will inform the MD of Greenview of the capital expenditures requirements for infrastructure renewal.

The infrastructure renewal candidates presented in this report were identified based on the following:

- Infrastructure Master Plan Roadway & Sidewalk Condition Assessment – 2023
- Wastewater Collection System Master Plan – 2023
- Water Distribution System Master Plan – 2023
- Sanitary and Stormwater CCTV survey results – 2023
- The MD of Greenview staff records and input

A Risk-based evaluation criteria was developed, in consultation with the MD of Greenview. This was used to identify and prioritize rehabilitation candidates for inclusion in the CIP. Following identification, condition assessment, and risk analysis; rehabilitation projects were selected and prioritized based on risk score and cost estimates. A workshop was held with the MD of Greenview to verify program development methodology and adopted into the CIP.

The Hamlet was split into seven geographic zones, based on geographic location. This sub-division allowed for the development of a 10-year Capital Program that would facilitate efficiency in the program delivery while minimizing disruption in the Hamlet’s neighbourhoods year over year.

Table E-1 presents a summary of the proposed program for each zone.

Table E-1 – Proposed Capital Infrastructure Program by Zone

Zone Number	Description	Roads Budget	Wastewater Budget (Sanitary and Storm)	Water Budget	Total Opinion of Probable Cost – Capital Budget (2023 Dollars)
1	Eastern side, east of 100 St.	\$348,896	\$803,214	\$2,237,247	\$3,389,357
2	Southeast, south of Hoppe, between 104 & 100 St.	\$620,459	\$2,508,126	\$3,612,261	\$6,740,846
3	Southwest, south of Hoppe, between 97/Hoppe & 104 St.	\$60,283	\$1,063,595	\$1,919,529	\$3,043,407
4	Central, north of Hoppe, and south of Shand, between 104 & 100 St.	\$294,029	\$1,045,567	\$1,667,590	\$3,007,186
5	North, north of Shand, between Swann & 100 St.	\$691,504	\$1,460,824	\$3,883,030	\$6,035,358
6	Hoppe, from Leonard to 100 St.	\$290,530	\$514,504	\$2,273,393	\$3,078,427
7	Southwest, Southwest of 97 Ave and Leonard, any remaining areas.	-	\$4,189,400	\$800,000	\$4,989,400
Total		\$2,305,701	\$11,585,230	\$16,393,050	\$30,283,981

The following recommendations were made:

1. Implementation of 10-year **CIP** at a total budget allocation of **\$30,283,981**.
2. Total **annual** budget allocation for the **CIP** averaging of **\$3,028,398**.
3. Implementation of a CCTV Inspection Program to verify the condition of underground assets at a total cost of **\$1,200,000** for the CIP. This program can be implemented every 10-years.
4. Allocation of a portion of the annual budget for engineering fees for the preparation of the design and tender packages for the subsequent year's projects. These costs should cover any additional data collection, pre-design, and detailed design required for a rehabilitation project. An allowance equivalent to 15% of the anticipated construction costs is included in the cost estimates.
5. The MD of Greenview should retain a portion of each year's uncommitted budget for a contingency fund to cover fluctuation in the construction market, and potential costs unforeseen during pre-design stages. A sum equal to 20% of the anticipated construction costs should be considered.
6. The MD of Greenview should review the 10-year CIP on 3-to-5-year cycles, based on condition assessment data, and re-prioritizing infrastructure needs.
7. The MD of Greenview should consider additional identification labels for their GIS system to group underground assets by geographic location and roadway. Presently, there is no intuitive way of connecting underground assets with their location aside from visually in GIS maps. This could provide an improved means of tracking surface and underground project overlaps.

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Appendix A – Detailed 10-Year Plan	

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1 INTRODUCTION

The Municipal District of Greenview No. 16 (the MD of Greenview) retained Associated Engineering (Associated) to complete condition assessments for their existing Transportation, Water, Sanitary, and Stormwater infrastructure in the Hamlet of Grande Cache (the Hamlet). This work culminated into the development of a 10-year Capital Plan for the renewal of existing infrastructure that was identified based on the results of the condition assessment.

Recommendations from the 10-year Capital Plan will inform the MD of Greenview of the capital expenditures required for infrastructure renewal.

This long-term plan will allow for stability for the MD of Greenview’s capital spending and provide detailed project breakdowns year over year. The plan aims improve the overall condition of infrastructure assets and minimize the disruption to stakeholders as much as possible by incorporating multiple asset renewals in a single project (i.e. road, sanitary, and water infrastructure).

The different infrastructure reports that were reviewed in the development of this CIP were:

- Roadway and Sidewalk Condition Assessment – 2023
- Stormwater System Master Plan – 2023
- Wastewater Collection System Master Plan – 2023
- Water Distribution System Master Plan – 2023

2 METHODOLOGY

As part of the development of the Master Plans (IMPs), capacity and condition assessments were completed for the Hamlet’s Transportation, Water, Sanitary, and Stormwater infrastructure. A risk-based evaluation criteria utilizing likelihood of failure and consequence of failure scores was used for prioritization. In this report, risk is defined as the product of likelihood of failure and consequence of failure (LoF x CoF).

$$\text{Risk Score} = \text{Likelihood of Failure} * \text{Consequence of Failure}$$

Though the infrastructure assets were independently assessed analyzed, and rated, there was a need to combine the assigned risk scores to develop a location-based renewal/rehabilitation program. As such, all infrastructure assets were consolidated into over-arching street blocks spanning from intersection to intersection. A total risk score was assigned to each block. This represented the sum of the risk scores for the individual assets within a block. Consolidation of the risk scores was a key step in the prioritization of assets for renewal/rehabilitation. This approach would minimize future rework within the neighbourhoods and lower capital costs by taking advantage of economies of scale.

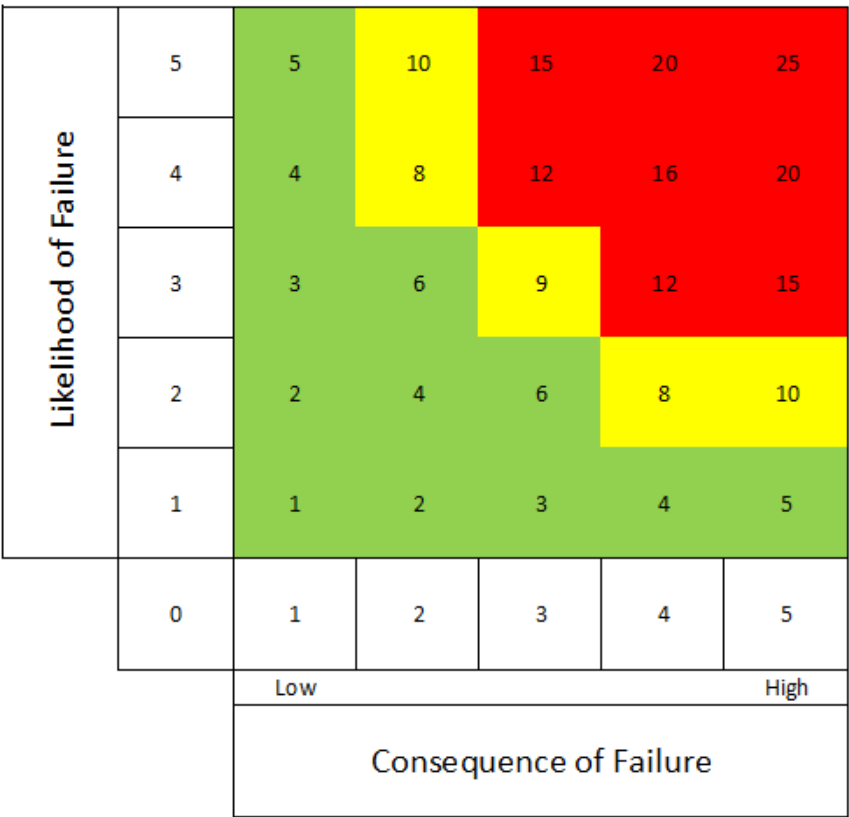
For underground infrastructure, weighted CoF scores were assigned, based on consultations with the MD of Greenview as summarized in **Table 2-1** below.

Table 2-1 Consequence of Failure Weighting

Asset Class	Weighting Applied to the Overall Assigned CoF Scores for Each Block
Water	35%
Storm	35%
Sanitary	30%

Figure 2-1 presents a risk matrix for the assets that were assessed.

Figure 2-1 Risk Matrix



3 CAPITAL PROGRAM

3.1 Opinion of Probable Construction Cost for the Proposed Program

Based on the high-level conceptual nature of this study it was deemed impractical to propose detailed infrastructure renewal and rehabilitation methods at this stage. For budgeting and cost estimating purposes, complete infrastructure removal and replacement was assumed. The opinion of probable cost was based on average unit rates derived from similar infrastructure removal and replacement projects recently completed by Associated. The rates assume the full removal and replacement of the underground infrastructure, including road backfill, granular base course, asphalt replacement, curb, and gutter.

Table 3-1 summarizes the opinion of probable costs and prioritization categories. The costs presented include engineering fees calculated at 15% of the construction costs. This will cover engineering design, tender, geotechnical services, environmental studies, hydrovac utility investigations, and location of utilities required for rehabilitation projects.

Description	Starting Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total Construction Cost (2023 Dollars)
Zone 1		\$1,864,145										\$1,864,145
Zone 2				\$1,856,977	\$1,850,488							\$3,707,465
Zone 3			\$1,673,874									\$1,673,874
Zone 4						\$1,653,953						\$1,653,953
Zone 5							\$1,632,913	\$1,686,534				\$3,319,447
Zone 6									\$1,693,135			\$1,693,135
Zone 7										\$2,096,270	\$647,900	\$2,744,170
2024 Design and Tender	\$508,400											\$508,400
2025 Design and Tender		\$456,500										\$456,500
2026 Design and Tender			\$506,448									\$506,448
2027 Design and Tender				\$504,678								\$504,678
2028 Design and Tender					\$451,078							\$451,078
2029 Design and Tender						\$445,340						\$445,340
2030 Design							\$459,964					\$459,964
2031 Design								\$461,764				\$461,764
2032 Design									\$571,710			\$571,710
2033 Design										\$176,700		\$176,700
30% Contingency		\$1,016,807	\$913,022	\$1,012,898	\$1,009,356	\$902,156	\$890,680	\$919,928	\$923,528	\$1,143,420	\$353,400	\$4,230,956
Sub-Total	\$508,400	\$3,337,452	\$3,093,344	\$3,374,553	\$3,310,922	\$3,001,449	\$2,092,877	\$3,068,226	\$3,188,373	\$3,416,390	\$1,001,300	
Total												\$30,283,966

Figure 3-1 presents a summary of the categorization of the total number of blocks based on the total risk assigned to each block within the Hamlet. Using a risk-based prioritization criteria, 60% of the total number of blocks them fall within the low-risk category.

Figure 3-1 Summary of Number of Blocks based on Total Risk

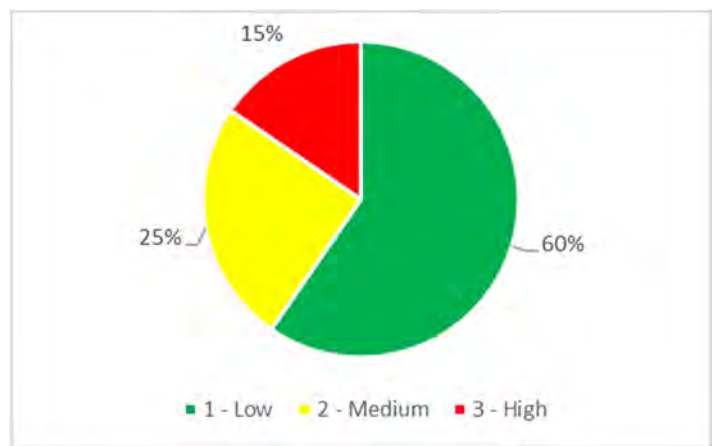
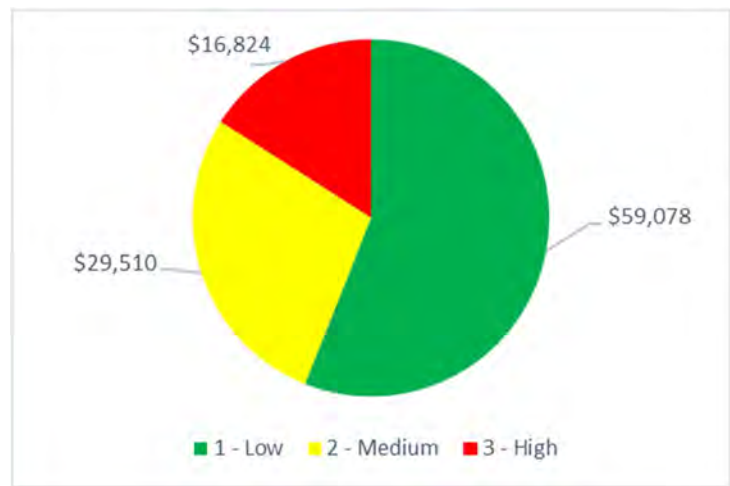


Figure 3-2 presents a summary of the categorization of the number of blocks based on the total estimated renewal cost.

Figure 3-2 Summary of Number of Blocks Based on the Total Estimated Renewal Cost and Risk in Thousands



Based on the high-risk need and the recommended upgrades identified within the Master Plans and in discussion with the MD of Greenview it was determined that a 10-year program with a value of \$30 million dollars would work within the annual budget that could be executed. This will replace/upgrade all assets currently in the high-risk category and some medium risk category assets, as well as upgrade other infrastructure recommended in the Master Plans. The locations of and risk score are represented on Figure 3-3.

Figure 3-3 presents an outline of the total risk scores across the Hamlet.



0 - 8

AE PROJECT No.	2023-3300-00
SCALE	1:12,000
DATE	2023AUG17
PROJECTION	NAD 1983 UTM ZONE 11N
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CHECKED BY	
DESCRIPTION	DRAFT



3.2 Proposed Program

Working in consultation with the MD of Greenview, Associated developed a 10-year Capital Program that would facilitate efficiency in the program delivery as well as minimizing disruption in the Hamlet's neighbourhoods year over year. As part of the program, the Hamlet was split into seven zones, based on geographic location within the Hamlet (See **Figure 3-4**). These zones are listed in the table below. **Table 3-2** also provides the program capital need for each zone, based on the proposed 10-year Capital Plan.

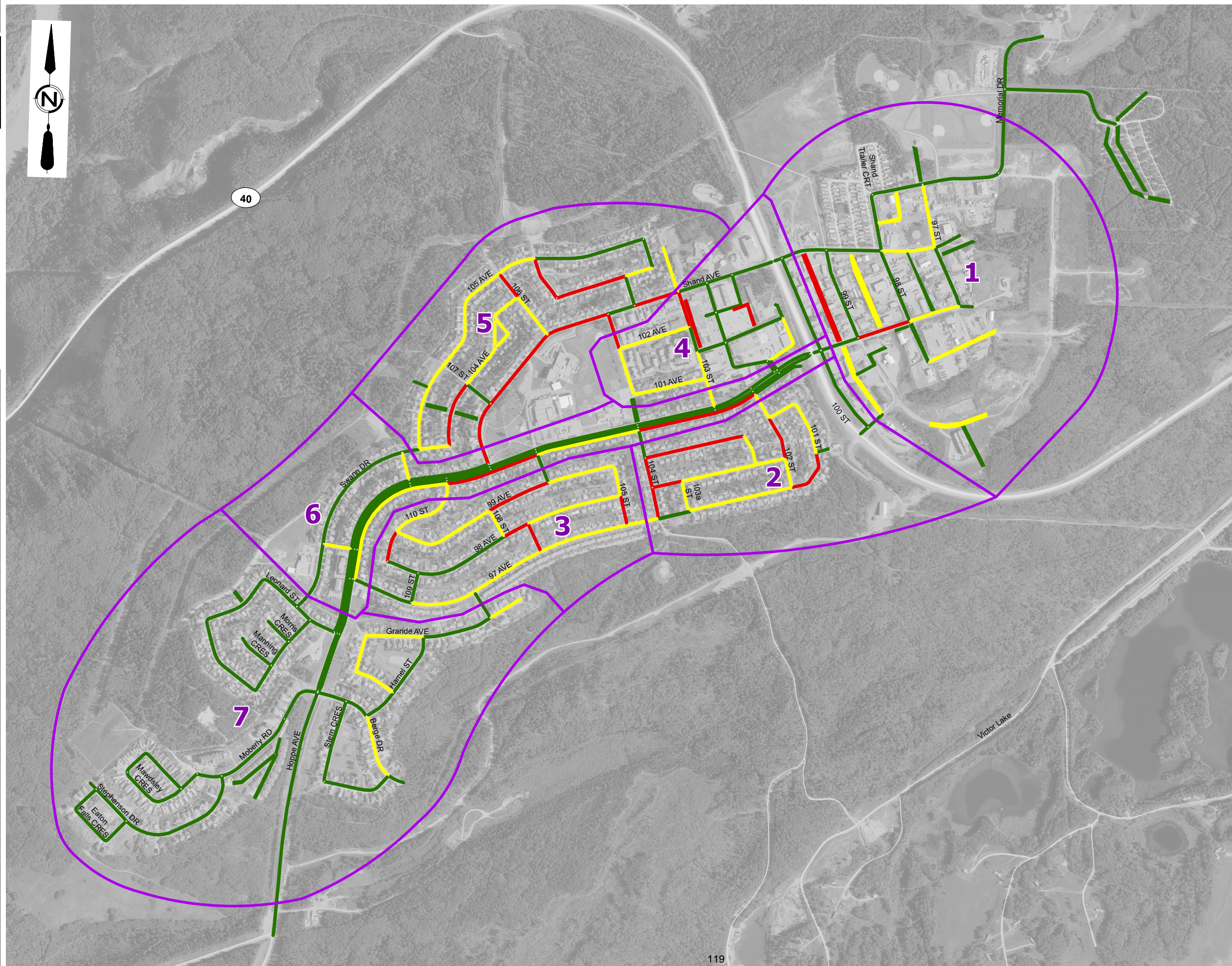
Table 3-2 Summary of 10-Year Program Based on Assigned Zones

Zone	Description	Roads Budget	Wastewater Budget (Sanitary and Stormwater)	Water Budget	Total Opinion of Probable Cost – Capital Budget (2023 Dollars)
1	Eastern side, east of 100 St.	\$348,896	\$803,214	\$2,237,247	\$3,389,357
2	Southeast, south of Hoppe, between 104 & 100 St.	\$620,459	\$2,508,126	\$3,612,261	\$6,740,846
3	Southwest, south of Hoppe, between 97/Hoppe & 104 St.	\$60,283	\$1,063,595	\$1,919,529	\$3,043,407
4	Central, north of Hoppe, and south of Shand, between 104 & 100 St.	\$294,029	\$1,045,567	\$1,667,590	\$3,007,186
5	North, north of Shand, between Swann & 100 St.	\$691,504	\$1,460,824	\$3,883,030	\$6,035,358
6	Hoppe, from Leonard to 100 St.	\$290,530	\$514,504	\$2,273,393	\$3,078,427
7	Southwest, Southwest of 97 Ave and Leonard, any remaining areas.	-	\$4,189,400	\$800,000	\$4,989,400
Total		\$2,305,701	\$11,585,230	\$16,393,050	\$30,283,981

IF NOT 25 mm ADJUST SCALES

SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE

SAVE DATE: 8/17/2023 2:34 PM
DRAWING PATH: E:\98\2022-2300_GC_risk\GC_AcPro.aprx
DATA SOURCE: :



LEGEND:

 Zone

Weighted Risk

≥12

>8 - 12

0 - 8

FIGURE 3-4

M.D. OF GREENVIEW
HAMLET OF GRANDE CACHE

ZONES & WEIGHTED RISK

AE PROJECT No.	2023-3300-00
SCALE	1:12,000
DATE	2023AUG17
PROJECTION	NAD 1983 UTM ZONE 11N
DRAWN BY	KR
CHECKED BY	
DESCRIPTION	DRAFT

0 100 200 300 400

m

Table 3-3 presents a recommended annual approach to the first 10 years of the Capital Program. The 10-year program is proposed to be delivered based on the identified zones. This will provide the MD of Greenview with practical construction sequencing and budgeting flexibility. The prioritization of the blocks identified in the 10-year program was based on the total risk scores, in consideration of cost, location, and proximity to adjacent projects. A detailed breakdown of assets included in the 10-year program is provided in [Appendix A](#).

The proposed program is based on a 10-year program with an approximate budget of \$30,000,000. This will allow the Hamlet to replace the high-risk priorities as well as implement the wastewater upgrades recommended on the northern and central trunks as well as the central storm system line. These recommendations were identified in the Wastewater Master Plan in order to meet the Level of Service of 1:25-year, 4-hour design storm event.

Table 3-3 10-Year Capital Program Proposed Annual Budget Allocation

Year	Zone	Roads Budget	Water Budget	Wastewater Budget (Sanitary and Storm)	Total Opinion of Probable Cost – Capital Budget (2023 Dollars)
1	1	\$348,896	\$2,237,247	\$803,214	\$3,389,357
2	3	\$60,283	\$1,919,529	\$1,063,597	\$3,043,409
3	2	\$236,334	\$2,003,988	\$1,136,000	\$3,376,322
4	2	\$384,125	\$1,608,272	\$1,372,126	\$3,364,523
5	4	\$294,029	\$1,667,590	\$1,045,567	\$3,007,186
6	5	\$290,214	\$1,973,850	\$704,868	\$2,968,932
7	5	\$401,289	\$1,909,180	\$755,956	\$3,066,425
8	6	\$290,530	\$2,273,393	\$514,504	\$3,078,427
9	7	-	-	\$3,811,400	\$3,811,400
10	7	-	\$800,000	\$378,000	\$1,178,000
Total		\$2,305,700	\$16,393,049	\$11,585,232	\$30,283,981

4 RECOMMENDATIONS

The following recommendations are made:

1. Implementation of 10-year **CIP** at a total budget allocation of **\$30,283,981**.
2. Total **annual** budget allocation for the **CIP** averaging of **\$3,028,398**.
3. The costs presented include engineering fees calculated at 15% of the construction costs. This will cover engineering design, tender, geotechnical services, environmental studies, hydrovac utility investigations, and location of utilities required for rehabilitation projects.
4. Implementation of a CCTV Inspection Program to verify the condition of underground assets at a total cost of **\$1,200,000** for the CIP. This program can be implemented every 10-years.
5. Allocation of a portion of the annual budget for engineering fees for the preparation of the **design and tender packages** for the subsequent year's project.
6. The MD of Greenview should retain a portion of each year's uncommitted budget for a contingency fund to cover fluctuation in the construction market, and potential costs unforeseen during pre-design stages. A sum equal to 20% of the anticipated construction costs should be considered.
7. The MD of Greenview should review the 10-year CIP on 3-to-5-year cycles, based on condition assessment data, and re-prioritizing infrastructure needs.
8. The MD of Greenview should consider additional identification labels for their GIS system to group underground assets by geographic location and roadway. Presently, there is no intuitive way of connecting underground assets with their location aside from visually in GIS maps. This could provide an improved means of tracking surface and underground project overlaps.

CLOSURE

This report was prepared for the Municipal District of Greenview No. 16 to present the findings of the complete condition assessments of existing assets, and recommendations for future management of the Transportation, Water, Sanitary, and Stormwater infrastructure in the Hamlet of Grande Cache.

The services provided by Associated Engineering Alberta Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,

Associated Engineering Alberta Ltd.

Sean Nicoll, P.Eng.
Project Manager



Jason Garland
Asset Management Professional

APPENDIX A – DETAILED 10-YEAR PLAN

Year 1 Capital Plan

Asset ID	Asset Type	Block ID	Program Zone	Program Year	Location	Name/Type	From/To (Intersection/MH/Asset ID)	Cost Estimate	Road Estimate	Sanitary Estimate	Storm Estimate	Water Estimate	Road Length	Sanitary Length	Storm Length	Water Length
RD-010559	Road	010559		1	1 Hoppe Ave	Hoppe Ave	98 St - 97 St	\$ 344,396	\$ 344,396	\$ -	\$ -	\$ -	169.13			
San-2691	Sanitary	010559		1	1 Hoppe Ave	GRAVITY MAIN	215 213	\$ 71,937	\$ -	\$ 71,937	\$ -	\$ -		83.55		
Wat-2996	Water	010559		1	1 Hoppe Ave	MAIN	2996	\$ 151,334	\$ -	\$ -	\$ -	\$ 151,334				84.42
Wat-2995	Water	010559		1	1 Hoppe Ave	MAIN	2995	\$ 11,220	\$ -	\$ -	\$ -	\$ 11,220				2.00
RD-010951	Road	010951		1	1 Hoppe Ave	Hoppe Ave	99 St - 98 St	\$ 4,500	\$ 4,500	\$ -	\$ -	\$ -	175.69			
San-2661	Sanitary	010951		1	1 Hoppe Ave	GRAVITY MAIN	214 210	\$ 64,962	\$ -	\$ 64,962	\$ -	\$ -		68.10		
San-2663	Sanitary	010951		1	1 Hoppe Ave	GRAVITY MAIN	213 380	\$ 55,317	\$ -	\$ 55,317	\$ -	\$ -		54.30		
San-2662	Sanitary	010951		1	1 Hoppe Ave	GRAVITY MAIN	380 214	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		38.80		
Stm-449	Storm	010951		1	1 Hoppe Ave	Storm Main	139 115	\$ 77,537	\$ -	\$ -	\$ 77,537	\$ -			82.20	
Stm-448	Storm	010951		1	1 Hoppe Ave	Storm Main	115 002	\$ -	\$ -	\$ -	\$ -	\$ -			91.90	
Stm-630	Storm	010951		1	1 Hoppe Ave	Storm Lateral	CB-056 002	\$ -	\$ -	\$ -	\$ -	\$ -			18.64	
Wat-2979	Water	010951		1	1 Hoppe Ave	MAIN	2979	\$ 229,058	\$ -	\$ -	\$ -	\$ 229,058				130.14
Wat-2999	Water	010951		1	1 Hoppe Ave	MAIN	2999	\$ 156,196	\$ -	\$ -	\$ -	\$ 156,196				87.28
Wat-3001	Water	010951		1	1 Hoppe Ave	MAIN	3001	\$ 24,035	\$ -	\$ -	\$ -	\$ 24,035				7.05
Wat-3000	Water	010951		1	1 Hoppe Ave	MAIN	3000	\$ 20,094	\$ -	\$ -	\$ -	\$ 20,094				7.22
Wat-2980	Water	010951		1	1 Hoppe Ave	MAIN	2980	\$ 19,550	\$ -	\$ -	\$ -	\$ 19,550				6.90
San-2658	Sanitary	107		1	1 Gravel Access Road	GRAVITY MAIN	520 214	\$ 87,552	\$ -	\$ 87,552	\$ -	\$ -		118.30		
San-2657	Sanitary	107		1	1 Gravel Access Road	GRAVITY MAIN	012 520	\$ 52,317	\$ -	\$ 52,317	\$ -	\$ -		115.90		
Wat-2954	Water	107		1	1 Gravel Access Road	MAIN	2954	\$ 257,397	\$ -	\$ -	\$ -	\$ 257,397				146.81
Wat-2956	Water	107		1	1 Gravel Access Road	MAIN	2956	\$ 193,902	\$ -	\$ -	\$ -	\$ 193,902				109.46
Wat-2955	Water	107		1	1 Gravel Access Road	MAIN	2955	\$ 36,278	\$ -	\$ -	\$ -	\$ 36,278				16.74
San-2684	Sanitary	108		1	1 Alley	GRAVITY MAIN	521 209	\$ 94,077	\$ -	\$ 94,077	\$ -	\$ -		112.80		
San-2656	Sanitary	108		1	1 Alley	GRAVITY MAIN	224 521	\$ 52,317	\$ -	\$ 52,317	\$ -	\$ -		105.90		
San-2659	Sanitary	108		1	1 Alley	GRAVITY MAIN	209 211	\$ 52,317	\$ -	\$ 52,317	\$ -	\$ -		111.55		
Wat-2974	Water	108		1	1 Alley	MAIN	2974	\$ 269,042	\$ -	\$ -	\$ -	\$ 269,042				153.66
Wat-2970	Water	108		1	1 Alley	MAIN	2970	\$ 261,086	\$ -	\$ -	\$ -	\$ 261,086				148.98
Wat-2971	Water	108		1	1 Alley	HYDRANT	2971	\$ 22,820	\$ -	\$ -	\$ -	\$ 22,820			0.76	
Wat-2972	Water	108		1	1 Alley	HYDRANT	2972	\$ 22,820	\$ -	\$ -	\$ -	\$ 22,820			1.63	
Wat-2973	Water	108		1	1 Alley	MAIN	2973	\$ 19,380	\$ -	\$ -	\$ -	\$ 19,380			6.80	
Wat-2969	Water	108		1	1 Alley	MAIN	2969	\$ 9,061	\$ -	\$ -	\$ -	\$ 9,061			0.73	
San-2333	Sanitary	109		1	1 Alley	GRAVITY MAIN	340 093	\$ 80,937	\$ -	\$ 80,937	\$ -	\$ -		93.64		
San-2642	Sanitary	109		1	1 Alley	GRAVITY MAIN	093 219	\$ 70,632	\$ -	\$ 70,632	\$ -	\$ -		80.70		
Wat-3899	Water	109		1	1 Alley	MAIN	3899	\$ 156,400	\$ -	\$ -	\$ -	\$ 156,400				87.40
Wat-3008	Water	109		1	1 Alley	MAIN	3008	\$ 126,871	\$ -	\$ -	\$ -	\$ 126,871				70.03
Wat-3007	Water	109		1	1 Alley	MAIN	3007	\$ 29,954	\$ -	\$ -	\$ -	\$ 29,954				13.02
Wat-3900	Water	109		1	1 Alley	MAIN	3900	\$ 20,757	\$ -	\$ -	\$ -	\$ 20,757				7.61
New-1	Water	New PRV		1	1 Install new PRV #4	New	New	\$ 200,000	\$ -	\$ -	\$ -	\$ 200,000				
Year 1 Sub-Total								\$ 3,389,357	\$ 348,896	\$ 725,677	\$ 77,537	\$ 2,237,247	344.82	983.54	192.74	1,088.64

Year 2 Capital Plan

RD-000947	Road	000947		3	2 105 St	105 St	97 Ave - 98 Ave	\$ 8,500	\$ 8,500	\$ -	\$ -	\$ -	97.90			
San-2591	Sanitary	000947		3	2 105 St	GRAVITY MAIN	187 230	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		100.95		
Stm-504	Storm	000947		3	2 105 St	Storm Main	123 079	\$ 63,527	\$ -	\$ -	\$ 63,527	\$ -			79.80	
Stm-373	Storm	000947		3	2 105 St	Storm Main	079 077	\$ -	\$ -	\$ -	\$ -	\$ -			16.60	
Stm-621	Storm	000947		3	2 105 St	Storm Lateral	CB-134 123	\$ -	\$ -	\$ -	\$ -	\$ -			12.64	
Stm-622	Storm	000947		3	2 105 St	Storm Lateral	CB-135 079	\$ -	\$ -	\$ -	\$ -	\$ -			2.73	
Stm-623	Storm	000947		3	2 105 St	Storm Lateral	CB-138 079	\$ -	\$ -	\$ -	\$ -	\$ -			8.07	
Wat-3181	Water	000947		3	2 105 St	MAIN	3181	\$ 151,130	\$ -	\$ -	\$ -	\$ 151,130				84.30
Wat-3182	Water	000947		3	2 105 St	MAIN	3182	\$ 30,311	\$ -	\$ -	\$ -	\$ 30,311				13.23
RD-001575	Road	001575		3	2 107 St	107 St	97 Ave - 98 Ave	\$ -	\$ -	\$ -	\$ -	\$ -	98.98			
San-2720	Sanitary	001575		3	2 107 St	GRAVITY MAIN	184 197	\$ 79,497	\$ -	\$ 79,497	\$ -	\$ -		100.35		
Stm-486	Storm	001575		3	2 107 St	Storm Main	082 122	\$ 78,089	\$ -	\$ -	\$ 78,089	\$ -			82.85	
Stm-487	Storm	001575		3	2 107 St	Storm Main	122 076	\$ -	\$ -	\$ -	\$ -	\$ -			17.60	
Stm-606	Storm	001575		3	2 107 St	Storm Lateral	CB-018 122	\$ -	\$ -	\$ -	\$ -	\$ -			15.79	
Stm-608	Storm	001575		3	2 107 St	Storm Lateral	CB-014 082	\$ -	\$ -	\$ -	\$ -	\$ -			16.06	
Stm-609	Storm	001575		3	2 107 St	Storm Lateral	CB-017 082	\$ -	\$ -	\$ -	\$ -	\$ -			15.92	
Wat-3199	Water	001575		3	2 107 St	MAIN	3199	\$ 152,728	\$ -	\$ -	\$ -	\$ 152,728				85.24
Wat-3162	Water	001575		3	2 107 St	MAIN	3162	\$ 19,800	\$ -	\$ -	\$ -	\$ 19,800				5.99
RD-010199	Road	010199		3	2 98 Ave	98 Ave	108 St - 107 St	\$ 250	\$ 250	\$ -	\$ -	\$ -	87.84			
San-2378	Sanitary	010199		3	2 98 Ave	GRAVITY MAIN	184 183	\$ 82,377	\$ -	\$ 82,377	\$ -	\$ -		86.80		

Asset ID	Asset Type	Block ID	Program Zone	Program Year	Location	Name/Type	From/To (Intersection/MH/Asset ID)	Cost Estimate	Road Estimate	Sanitary Estimate	Storm Estimate	Water Estimate	Road Length	Sanitary Length	Storm Length	Water Length
Stm-485	Storm	010199		3	2	98 Ave	Storm Main	152_082	\$ 73,882	\$ -	\$ -	\$ 73,882	\$ -			77.90
Stm-484	Storm	010199		3	2	98 Ave	Storm Main	081_152	\$ 18,307	\$ -	\$ -	\$ 18,307	\$ -			15.20
Stm-612	Storm	010199		3	2	98 Ave	Storm Lateral	CB-012_152	\$ -	\$ -	\$ -	\$ -	\$ -			5.40
Wat-3195	Water	010199		3	2	98 Ave	MAIN	3195	\$ 131,240	\$ -	\$ -	\$ -	\$ 131,240			72.60
Wat-3198	Water	010199		3	2	98 Ave	MAIN	3198	\$ 28,747	\$ -	\$ -	\$ -	\$ 28,747			12.31
Wat-3194	Water	010199		3	2	98 Ave	MAIN	3194	\$ 28,577	\$ -	\$ -	\$ -	\$ 28,577			12.21
RD-010203	Road	010203		3	2	110 St	110 St	98 Ave - 99 Ave	\$ 9,528	\$ 9,528	\$ -	\$ -	\$ -	100.57		
San-2723	Sanitary	010203		3	2	110 St	GRAVITY MAIN	176_178	\$ 52,182	\$ -	\$ 52,182	\$ -	\$ -		39.65	
San-2372	Sanitary	010203		3	2	110 St	GRAVITY MAIN	177_176	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		59.25	
Stm-416	Storm	010203		3	2	110 St	Storm Main	126_127	\$ 45,537	\$ -	\$ -	\$ 45,537	\$ -			54.10
Stm-417	Storm	010203		3	2	110 St	Storm Main	127_150	\$ 39,349	\$ -	\$ -	\$ 39,349	\$ -			45.26
Stm-587	Storm	010203		3	2	110 St	Storm Lateral	CB-024_126	\$ -	\$ -	\$ -	\$ -	\$ -			7.71
Stm-589	Storm	010203		3	2	110 St	Storm Lateral	CB-023_126	\$ -	\$ -	\$ -	\$ -	\$ -			11.49
Stm-591	Storm	010203		3	2	110 St	Storm Lateral	CB-029_150	\$ -	\$ -	\$ -	\$ -	\$ -			18.67
Wat-3221	Water	010203		3	2	110 St	MAIN	3221	\$ 194,395	\$ -	\$ -	\$ -	\$ 194,395			109.75
RD-010680	Road	010680		3	2	99 Ave	99 Ave	108 St - 106 St	\$ 17,030	\$ 17,030	\$ -	\$ -	\$ -	212.09		
San-2414	Sanitary	010680		3	2	99 Ave	GRAVITY MAIN	491_172	\$ 91,062	\$ -	\$ 91,062	\$ -	\$ -		106.05	
San-2415	Sanitary	010680		3	2	99 Ave	GRAVITY MAIN	189_491	\$ 90,477	\$ -	\$ 90,477	\$ -	\$ -		104.80	
Stm-482	Storm	010680		3	2	99 Ave	Storm Main	312_124	\$ 25,667	\$ -	\$ -	\$ 25,667	\$ -			103.70
Stm-616	Storm	010680		3	2	99 Ave	Storm Lateral	CB-002_312	\$ -	\$ -	\$ -	\$ -	\$ -			20.74
Wat-3185	Water	010680		3	2	99 Ave	MAIN	3185	\$ 378,160	\$ -	\$ -	\$ 378,160	\$ -			185.17
Wat-3188	Water	010680		3	2	99 Ave	MAIN	3188	\$ 23,800	\$ -	\$ -	\$ 23,800	\$ -			7.99
Wat-3155	Water	010680		3	2	99 Ave	HYDRANT	3155	\$ 22,820	\$ -	\$ -	\$ 22,820	\$ -			1.34
Wat-3156	Water	010680		3	2	99 Ave	HYDRANT	3156	\$ 22,820	\$ -	\$ -	\$ 22,820	\$ -			2.61
Wat-3187	Water	010680		3	2	99 Ave	HYDRANT	3187	\$ 22,820	\$ -	\$ -	\$ 22,820	\$ -			1.46
Wat-3186	Water	010680		3	2	99 Ave	MAIN	3186	\$ 20,820	\$ -	\$ -	\$ 20,820	\$ -			6.50
Wat-3141	Water	010680		3	2	99 Ave	MAIN	3141	\$ 20,360	\$ -	\$ -	\$ 20,360	\$ -			6.27
Wat-2139	Water	010680		3	2	99 Ave	MAIN	2139	\$ 19,800	\$ -	\$ -	\$ 19,800	\$ -			5.99
RD-011575	Road	011575		3	2	110 St	110 St	99 Ave - Hoppe Ave	\$ 24,974	\$ 24,974	\$ -	\$ -	\$ -	248.97		
San-2515	Sanitary	011575		3	2	110 St	GRAVITY MAIN	302_168	\$ 54,297	\$ -	\$ 54,297	\$ -	\$ -		44.40	
San-2367	Sanitary	011575		3	2	110 St	GRAVITY MAIN	169_170	\$ 52,767	\$ -	\$ 52,767	\$ -	\$ -		40.95	
San-2368	Sanitary	011575		3	2	110 St	GRAVITY MAIN	170_171	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		81.95	
San-2369	Sanitary	011575		3	2	110 St	GRAVITY MAIN	171_177	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		45.05	
San-2516	Sanitary	011575		3	2	110 St	GRAVITY MAIN	168_169	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		40.35	
Stm-588	Storm	011575		3	2	110 St	Storm Lateral	CB-022_126	\$ -	\$ -	\$ -	\$ -	\$ -			21.85
Wat-3224	Water	011575		3	2	110 St	MAIN	3224	\$ 295,307	\$ -	\$ -	\$ 295,307	\$ -			169.11
Wat-3174	Water	011575		3	2	110 St	MAIN	3174	\$ 112,642	\$ -	\$ -	\$ 112,642	\$ -			61.66
Wat-3226	Water	011575		3	2	110 St	HYDRANT	3226	\$ 22,820	\$ -	\$ -	\$ 22,820	\$ -			2.01
Wat-3173	Water	011575		3	2	110 St	MAIN	3173	\$ 20,440	\$ -	\$ -	\$ 20,440	\$ -			6.31
New-2	Water	New PRV		3	2	New PRV #6	New	New	\$ 200,000	\$ -	\$ -	\$ 200,000	\$ -			
Year 2 Sub-Total								\$ 3,043,407	\$ 60,283	\$ 719,239	\$ 344,356	\$ 1,919,529	846.34	850.55	650.07	852.05
Year 3 Capital Plan																
RD-001563	Road	001563		2	3	104 St	104 St	99 Ave - 98 Ave	\$ 2,484	\$ 2,484	\$ -	\$ -	\$ -	98.72		
San-2586	Sanitary	001563		2	3	104 St	GRAVITY MAIN	235_236	\$ -	\$ -	\$ -	\$ -	\$ -		98.40	
Stm-477	Storm	001563		2	3	104 St	Storm Main	121_120	\$ 113,717	\$ -	\$ -	\$ 113,717	\$ -			101.00
Stm-661	Storm	001563		2	3	104 St	Storm Lateral	CB-251_120	\$ -	\$ -	\$ -	\$ -	\$ -			20.21
Stm-667	Storm	001563		2	3	104 St	Storm Lateral	CB-250_121	\$ -	\$ -	\$ -	\$ -	\$ -			13.78
Wat-4012	Water	001563		2	3	104 St	MAIN	4012	\$ 102,960	\$ -	\$ -	\$ 102,960	\$ -			47.57
Wat-4006	Water	001563		2	3	104 St	MAIN	4006	\$ 81,340	\$ -	\$ -	\$ 81,340	\$ -			36.76
Wat-4007	Water	001563		2	3	104 St	MAIN	4007	\$ 37,560	\$ -	\$ -	\$ 37,560	\$ -			14.87
Wat-4013	Water	001563		2	3	104 St	HYDRANT	4013	\$ 22,820	\$ -	\$ -	\$ 22,820	\$ -			4.01
RD-007988	Road	007988		2	3	98 Ave	98 Ave	104 St - 130A St	\$ 22,500	\$ 22,500	\$ -	\$ -	\$ -	98.27		
San-2592	Sanitary	007988		2	3	98 Ave	GRAVITY MAIN	240_236	\$ 80,127	\$ -	\$ 80,127	\$ -	\$ -		101.80	
Stm-478	Storm	007988		2	3	98 Ave	Storm Main	086_120	\$ 25,667	\$ -	\$ -	\$ 25,667	\$ -			96.75
Wat-3288	Water	007988		2	3	98 Ave	MAIN	3288	\$ 157,046	\$ -	\$ -	\$ 157,046	\$ -			87.78
Wat-3287	Water	007988		2	3	98 Ave	MAIN	3287	\$ 28,917	\$ -	\$ -	\$ 28,917	\$ -			12.41
RD-009024	Road	009024		2	3	102 St	102 St	99 Ave - 98 Ave	\$ 164,817	\$ 164,817	\$ -	\$ -	\$ -	142.82		
San-2676	Sanitary	009024		2	3	102 St	GRAVITY MAIN	254_253	\$ 69,282	\$ -	\$ 69,282	\$ -	\$ -		77.70	
San-2624	Sanitary	009024		2	3	102 St	GRAVITY MAIN	253_252	\$ 62,127	\$ -	\$ 62,127	\$ -	\$ -		61.80	
Stm-460	Storm	009024		2	3	102 St	Storm Main	088_089	\$ 57,857	\$ -	\$ -	\$ 57,857	\$ -			71.70
Stm-461	Storm	009024		2	3	102 St	Storm Main	089_090	\$ 48,267	\$ -	\$ -	\$ 48,267	\$ -			58.00
Stm-650	Storm	009024		2	3	102 St	Storm Lateral	CB-106_088	\$ -	\$ -	\$ -	\$ -	\$ -			11.21
Stm-651	Storm	009024		2	3	102 St	Storm Lateral	CB-107_088	\$ -	\$ -	\$ -	\$ -	\$ -			6.50
Stm-652	Storm	009024		2	3	102 St	Storm Lateral	CB-109_089	\$ -	\$ -	\$ -	\$ -	\$ -			3.59

Asset ID	Asset Type	Block ID	Program Zone	Program Year	Location	Name/Type	From/To (Intersection/MH/Asset ID)	Cost Estimate	Road Estimate	Sanitary Estimate	Storm Estimate	Water Estimate	Road Length	Sanitary Length	Storm Length	Water Length
Stm-653	Storm	009024		2	3	102 St	Storm Lateral	CB-110_090	\$ -	\$ -	\$ -	\$ -			20.18	
Wat-3270	Water	009024		2	3	102 St	MAIN	3270	\$ 257,980	\$ -	\$ -	\$ -				125.08
Wat-3271	Water	009024		2	3	102 St	MAIN	3271	\$ 25,660	\$ -	\$ -	\$ -				8.92
Wat-3273	Water	009024		2	3	102 St	HYDRANT	3273	\$ 22,820	\$ -	\$ -	\$ -				4.73
Wat-3272	Water	009024		2	3	102 St	MAIN	3272	\$ 16,660	\$ -	\$ -	\$ -				4.42
RD-010205	Road	010205		2	3	104 St	104 St	97 Ave - 98 Ave	\$ 1,250	\$ 1,250	\$ -	\$ -	99.31			
San-2594	Sanitary	010205		2	3	104 St	GRAVITY MAIN	236_237	\$ -	\$ -	\$ -	\$ -		100.45		
Stm-480	Storm	010205		2	3	104 St	Storm Main	120_080	\$ 113,664	\$ -	\$ 113,664	\$ -			100.95	
Stm-662	Storm	010205		2	3	104 St	Storm Lateral	CB-252_120	\$ -	\$ -	\$ -	\$ -			13.73	
Stm-663	Storm	010205		2	3	104 St	Storm Lateral	CB-253_120	\$ -	\$ -	\$ -	\$ -			16.64	
Wat-4009	Water	010205		2	3	104 St	MAIN	4009	\$ 184,600	\$ -	\$ -	\$ -				88.39
Wat-4011	Water	010205		2	3	104 St	MAIN	4011	\$ 24,600	\$ -	\$ -	\$ -				8.39
Wat-3244	Water	010205		2	3	104 St	HYDRANT	3244	\$ 22,820	\$ -	\$ -	\$ -				3.69
Wat-4010	Water	010205		2	3	104 St	MAIN	4010	\$ 13,360	\$ -	\$ -	\$ -				2.77
RD-010475	Road	010475		2	3	99 Ave	99 Ave	104 St - 103 St	\$ 41,033	\$ 41,033	\$ -	\$ -	325.66			
San-2617	Sanitary	010475		2	3	99 Ave	GRAVITY MAIN	234_231	\$ 84,807	\$ -	\$ 84,807	\$ -		112.20		
San-2588	Sanitary	010475		2	3	99 Ave	GRAVITY MAIN	232_235	\$ 84,537	\$ -	\$ 84,537	\$ -		111.55		
San-2616	Sanitary	010475		2	3	99 Ave	GRAVITY MAIN	231_232	\$ 52,317	\$ -	\$ 52,317	\$ -		109.55		
Stm-474	Storm	010475		2	3	99 Ave	Storm Main	083_121	\$ 72,767	\$ -	\$ -	\$ 72,767			93.00	
Stm-475	Storm	010475		2	3	99 Ave	Storm Main	084_083	\$ 49,807	\$ -	\$ -	\$ 49,807			60.20	
Stm-664	Storm	010475		2	3	99 Ave	Storm Lateral	CB-117_084	\$ -	\$ -	\$ -	\$ -			9.63	
Stm-665	Storm	010475		2	3	99 Ave	Storm Lateral	CB-118_084	\$ -	\$ -	\$ -	\$ -			5.49	
Stm-666	Storm	010475		2	3	99 Ave	Storm Lateral	CB-249_121	\$ -	\$ -	\$ -	\$ -			15.24	
Wat-3286	Water	010475		2	3	99 Ave	MAIN	3286	\$ 262,038	\$ -	\$ -	\$ -				149.54
Wat-3261	Water	010475		2	3	99 Ave	MAIN	3261	\$ 169,643	\$ -	\$ -	\$ -				95.19
Wat-3262	Water	010475		2	3	99 Ave	MAIN	3262	\$ 151,351	\$ -	\$ -	\$ -				84.43
Wat-3285	Water	010475		2	3	99 Ave	MAIN	3285	\$ 29,002	\$ -	\$ -	\$ -				12.46
Wat-3291	Water	010475		2	3	99 Ave	HYDRANT	3291	\$ 22,820	\$ -	\$ -	\$ -				4.82
RD-010482	Road	010482		2	3	97 Ave	97 Ave	102 St - Alley	\$ 4,250	\$ 4,250	\$ -	\$ -	162.05			
San-2622	Sanitary	010482		2	3	97 Ave	GRAVITY MAIN	249_250	\$ 52,317	\$ -	\$ 52,317	\$ -		68.20		
San-2621	Sanitary	010482		2	3	97 Ave	GRAVITY MAIN	250_251	\$ 43,317	\$ -	\$ 43,317	\$ -		50.30		
San-2625	Sanitary	010482		2	3	97 Ave	GRAVITY MAIN	246_249	\$ 43,317	\$ -	\$ 43,317	\$ -		48.65		
Stm-462	Storm	010482		2	3	97 Ave	Storm Main	090_087	\$ 82,112	\$ -	\$ -	\$ 82,112			106.35	
Stm-656	Storm	010482		2	3	97 Ave	Storm Lateral	CB-114_087	\$ -	\$ -	\$ -	\$ -			14.12	
Wat-3258	Water	010482		2	3	97 Ave	MAIN	3258	\$ 289,080	\$ -	\$ -	\$ -				140.63
Wat-3303	Water	010482		2	3	97 Ave	MAIN	3303	\$ 58,100	\$ -	\$ -	\$ -				25.14
Wat-3305	Water	010482		2	3	97 Ave	HYDRANT	3305	\$ 22,820	\$ -	\$ -	\$ -				3.47
Year 3 Sub-Total								\$ 3,376,323	\$ 236,334	\$ 572,144	\$ 563,856	\$ 2,003,988	926.84	940.60	838.28	965.47
Year 4 Capital Plan																
RD-003801	Road	003801		2	4	97 Ave	97 Ave	103A St - 102 St	\$ 353,381	\$ 353,381	\$ -	\$ -	341.17			
San-2612	Sanitary	003801		2	4	97 Ave	GRAVITY MAIN	242_241	\$ 120,717	\$ -	\$ 120,717	\$ -		114.75		
San-2613	Sanitary	003801		2	4	97 Ave	GRAVITY MAIN	243_242	\$ 94,572	\$ -	\$ 94,572	\$ -		113.90		
San-2716	Sanitary	003801		2	4	97 Ave	GRAVITY MAIN	251_243	\$ 43,317	\$ -	\$ 43,317	\$ -		118.43		
Wat-3259	Water	003801		2	4	97 Ave	MAIN	3259	\$ 356,180	\$ -	\$ -	\$ -				174.18
Wat-3263	Water	003801		2	4	97 Ave	MAIN	3263	\$ 327,900	\$ -	\$ -	\$ -				160.04
Wat-3311	Water	003801		2	4	97 Ave	HYDRANT	3311	\$ 22,820	\$ -	\$ -	\$ -				2.12
Wat-3260	Water	003801		2	4	97 Ave	MAIN	3260	\$ 18,380	\$ -	\$ -	\$ -				5.28
Wat-3264	Water	003801		2	4	97 Ave	MAIN	3264	\$ 17,800	\$ -	\$ -	\$ -				4.99
RD-004405	Road	004405		2	4	102 St	102 St	97 Ave - 98 Ave	\$ 9,908	\$ 9,908	\$ -	\$ -	96.32			
San-2623	Sanitary	004405		2	4	102 St	GRAVITY MAIN	252_251	\$ 79,272	\$ -	\$ 79,272	\$ -		99.90		
Stm-655	Storm	004405		2	4	102 St	Storm Lateral	CB-113_087	\$ -	\$ -	\$ -	\$ -			19.45	
Wat-3265	Water	004405		2	4	102 St	MAIN	3265	\$ 183,720	\$ -	\$ -	\$ -				87.95
Wat-3300	Water	004405		2	4	102 St	HYDRANT	3300	\$ 22,820	\$ -	\$ -	\$ -				1.91
Wat-3301	Water	004405		2	4	102 St	HYDRANT	3301	\$ 22,820	\$ -	\$ -	\$ -				1.67
Wat-3267	Water	004405		2	4	102 St	MAIN	3267	\$ 19,860	\$ -	\$ -	\$ -				6.02
Wat-3266	Water	004405		2	4	102 St	MAIN	3266	\$ 15,520	\$ -	\$ -	\$ -				3.85
RD-007503	Road	007503		2	4	99 Ave	99 Ave	102 St - 101 St	\$ 2,500	\$ 2,500	\$ -	\$ -	97.33			
San-2628	Sanitary	007503		2	4	99 Ave	GRAVITY MAIN	245_254	\$ 52,317	\$ -	\$ 52,317	\$ -		101.20		
Stm-649	Storm	007503		2	4	99 Ave	Storm Lateral	CB-108_088	\$ -	\$ -	\$ -	\$ -			20.18	
Wat-3277	Water	007503		2	4	99 Ave	MAIN	3277	\$ 182,665	\$ -	\$ -	\$ -				102.85
Wat-3278	Water	007503		2	4	99 Ave	MAIN	3278	\$ 29,053	\$ -	\$ -	\$ -				12.49
RD-010201	Road	010201		2	4	103 St	103 St	99 Ave - 98 Ave	\$ 18,336	\$ 18,336	\$ -	\$ -	103.42			
San-2618	Sanitary	010201		2	4	103 St	GRAVITY MAIN	234_233	\$ 52,317	\$ -	\$ 52,317	\$ -		52.90		
San-2619	Sanitary	010201		2	4	103 St	GRAVITY MAIN	233_239	\$ 52,317	\$ -	\$ 52,317	\$ -		46.05		

Asset ID	Asset Type	Block ID	Program Zone	Program Year	Location	Name/Type	From/To (Intersection/MH/Asset ID)	Cost Estimate	Road Estimate	Sanitary Estimate	Storm Estimate	Water Estimate	Road Length	Sanitary Length	Storm Length	Water Length
Wat-3279	Water	010201		2	4	103 St	MAIN	3279	\$ 143,038	\$ -	\$ -	\$ -				79.54
Wat-3280	Water	010201		2	4	103 St	MAIN	3280	\$ 22,882	\$ -	\$ -	\$ -				8.86
Wat-3293	Water	010201		2	4	103 St	HYDRANT	3293	\$ 22,820	\$ -	\$ -	\$ -				4.08
San-2597	Sanitary	Central Trunk		2	4	Central Trunk	GRAVITY MAIN	227_226	\$ 877,300	\$ -	\$ 877,300	\$ -		82.65		
San-2596	Sanitary	Central Trunk		2	4	Central Trunk	GRAVITY MAIN	230_227	-	\$ -	\$ -	\$ -		76.30		
San-2601	Sanitary	Central Trunk		2	4	Central Trunk	GRAVITY MAIN	225_197	-	\$ -	\$ -	\$ -		35.55		
San-2390	Sanitary	Central Trunk		2	4	Central Trunk	GRAVITY MAIN	226_225	-	\$ -	\$ -	\$ -		97.45		
New-3	Water	New PRV		2	4	Install new PRV #5	New	New	\$ 200,000	\$ -	\$ -	\$ -				
Year 4 Sub-Total								\$ 3,364,523	\$ 384,125	\$ 1,372,126	\$ -	\$ 1,608,272	638.24	939.08	39.63	655.83
Year 5 Capital Plan																
San-2396	Sanitary	126		4	5		GRAVITY MAIN	256_258	\$ 68,832	\$ -	\$ 68,832	\$ -		76.65		
RD-006869	Road	006869		4	5	103 St	103 St	Shand Ave W - 102 Ave	\$ 1,500	\$ 1,500	\$ -	\$ -	118.83			
San-2563	Sanitary	006869		4	5	103 St	GRAVITY MAIN	269_266	\$ 95,967	\$ -	\$ 95,967	\$ -		116.95		
San-2560	Sanitary	006869		4	5	103 St	GRAVITY MAIN	269_268	\$ 43,317	\$ -	\$ 43,317	\$ -		15.55		
San-2561	Sanitary	006869		4	5	103 St	GRAVITY MAIN	267_269	\$ 43,317	\$ -	\$ 43,317	\$ -		49.10		
Stm-549	Storm	006869		4	5	103 St	Storm Lateral	CB-234_154	\$ -	\$ -	\$ -	\$ -			20.79	
Wat-3320	Water	006869		4	5	103 St	MAIN	3320	\$ 225,400	\$ -	\$ -	\$ -				94.60
Wat-3319	Water	006869		4	5	103 St	MAIN	3319	\$ 33,396	\$ -	\$ -	\$ -				11.12
Wat-3376	Water	006869		4	5	103 St	MAIN	3376	\$ 27,462	\$ -	\$ -	\$ -				8.54
Wat-3377	Water	006869		4	5	103 St	HYDRANT	3377	\$ 22,820	\$ -	\$ -	\$ -				4.01
RD-008781	Road	008781		4	5	102 Ave	102 Ave	103 St - 104 St	\$ 289,529	\$ 289,529	\$ -	\$ -	240.26			
San-2566	Sanitary	008781		4	5	102 Ave	GRAVITY MAIN	266_265	\$ 89,892	\$ -	\$ 89,892	\$ -		123.45		
San-1310	Sanitary	008781		4	5	102 Ave	GRAVITY MAIN	264_274	\$ 79,947	\$ -	\$ 79,947	\$ -		101.35		
San-2565	Sanitary	008781		4	5	102 Ave	GRAVITY MAIN	265_264	\$ -	\$ -	\$ -	\$ -		16.95		
Stm-468	Storm	008781		4	5	102 Ave	Storm Main	098_052	\$ -	\$ -	\$ -	\$ -			84.90	
Stm-678	Storm	008781		4	5	102 Ave	Storm Lateral	CB-244_052	\$ -	\$ -	\$ -	\$ -			14.93	
Stm-679	Storm	008781		4	5	102 Ave	Storm Lateral	CB-126_098	\$ -	\$ -	\$ -	\$ -			12.59	
Stm-680	Storm	008781		4	5	102 Ave	Storm Lateral	CB-125_098	\$ -	\$ -	\$ -	\$ -			7.09	
Wat-3351	Water	008781		4	5	102 Ave	MAIN	3351	\$ 271,960	\$ -	\$ -	\$ -				132.07
Wat-3352	Water	008781		4	5	102 Ave	MAIN	3352	\$ 199,520	\$ -	\$ -	\$ -				95.85
Wat-3353	Water	008781		4	5	102 Ave	MAIN	3353	\$ 53,060	\$ -	\$ -	\$ -				22.62
RD-010225	Road	010225		4	5	104 St	104 St	Shand Ave W - 102 Ave	\$ 3,000	\$ 3,000	\$ -	\$ -	118.43			
San-2564	Sanitary	010225		4	5	104 St	GRAVITY MAIN	274_276	\$ 87,147	\$ -	\$ 87,147	\$ -		117.35		
San-2557	Sanitary	010225		4	5	104 St	GRAVITY MAIN	271_276	\$ 86,067	\$ -	\$ 86,067	\$ -		95.00		
San-2550	Sanitary	010225		4	5	104 St	GRAVITY MAIN	276_277	\$ 66,312	\$ -	\$ 66,312	\$ -		71.10		
Stm-556	Storm	010225		4	5	104 St	Storm Lateral	CB-258_155	\$ -	\$ -	\$ -	\$ -			19.22	
Wat-3254	Water	010225		4	5	104 St	MAIN	3254	\$ 213,760	\$ -	\$ -	\$ -				102.97
Wat-3253	Water	010225		4	5	104 St	MAIN	3253	\$ 30,060	\$ -	\$ -	\$ -				11.12
San-2567	Sanitary	125		4	5		GRAVITY MAIN	260a_260	\$ 52,317	\$ -	\$ 52,317	\$ -		91.75		
Wat-3350	Water	125		4	5		MAIN	3350	\$ 164,883	\$ -	\$ -	\$ -				92.39
Wat-3349	Water	125		4	5		MAIN	3349	\$ 143,174	\$ -	\$ -	\$ -				79.62
Wat-3354	Water	125		4	5		MAIN	3354	\$ 11,120	\$ -	\$ -	\$ -				1.65

Asset ID	Asset Type	Block ID	Program Zone	Program Year	Location	Name/Type	From/To (Intersection/MH/Asset ID)	Cost Estimate	Road Estimate	Sanitary Estimate	Storm Estimate	Water Estimate	Road Length	Sanitary Length	Storm Length	Water Length
San-2569	Sanitary	126		4	5	GRAVITY MAIN	255_256	\$ 57,852	\$ -	\$ 57,852	\$ -	\$ -		32.30		
San-2568	Sanitary	126		4	5	GRAVITY MAIN	085_255	\$ 43,767	\$ -	\$ 43,767	\$ -	\$ -		20.95		
Stm-432	Storm	126		4	5	Storm Main	North Stub_066	\$ 79,172	\$ -	\$ -	\$ 79,172	\$ -			68.10	
Stm-431	Storm	126		4	5	Storm Main	066_019	\$ 16,667	\$ -	\$ -	\$ 16,667	\$ -			33.90	
Wat-3328	Water	126		4	5	MAIN		\$ 155,600	\$ -	\$ -	\$ -	\$ 155,600				73.89
Wat-3385	Water	126		4	5	MAIN	3385	\$ 115,380	\$ -	\$ -	\$ -	\$ 115,380				53.78
Stm-680	Storm	Location 2		4	5	Storm Upgrade	Storm Lateral	\$ 135,000	\$ -	\$ -	\$ 135,000	\$ -			7.09	
Stm-679	Storm	Location 2		4	5	Storm Upgrade	Storm Lateral	\$ -	\$ -	\$ -	\$ -	\$ -			12.59	
Stm-468	Storm	Location 2		4	5	Storm Upgrade	Storm Main	\$ -	\$ -	\$ -	\$ -	\$ -			84.90	
Year 5 Sub-Total								\$ 3,007,186	\$ 294,029	\$ 814,729	\$ 230,838	\$ 1,667,590	477.52	928.45	366.10	784.23
Year 6 Capital Plan																
RD-006013	Road	006013		5	6	Shand Ave	Shand Ave	\$ 7,477	\$ 7,477	\$ -	\$ -	\$ -	149.07			
San-2559	Sanitary	006013		5	6	Shand Ave	GRAVITY MAIN	\$ 49,317	\$ -	\$ 49,317	\$ -	\$ -		60.35		
San-2558	Sanitary	006013		5	6	Shand Ave	GRAVITY MAIN	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		74.40		
Stm-550	Storm	006013		5	6	Shand Ave	Storm Lateral	\$ -	\$ -	\$ -	\$ -	\$ -			19.20	
Wat-3246	Water	006013		5	6	Shand Ave	MAIN	\$ 318,918	\$ -	\$ -	\$ -	\$ 318,918				135.26
Wat-3248	Water	006013		5	6	Shand Ave	MAIN	\$ 28,290	\$ -	\$ -	\$ -	\$ 28,290				8.90
Wat-3247	Water	006013		5	6	Shand Ave	MAIN	\$ 22,701	\$ -	\$ -	\$ -	\$ 22,701				6.47
RD-007217	Road	007217		5	6	Shand Ave	Shand Ave	\$ 18,352	\$ 18,352	\$ -	\$ -	\$ -	208.18			
San-2549	Sanitary	007217		5	6	Shand Ave	GRAVITY MAIN	\$ 68,742	\$ -	\$ 68,742	\$ -	\$ -		76.45		
San-2541	Sanitary	007217		5	6	Shand Ave	GRAVITY MAIN	\$ -	\$ -	\$ -	\$ -	\$ -		56.45		
Stm-507	Storm	007217		5	6	Shand Ave	Storm Main	\$ 119,544	\$ -	\$ -	\$ 119,544	\$ -			106.55	
Stm-508	Storm	007217		5	6	Shand Ave	Storm Main	\$ 16,667	\$ -	\$ -	\$ 16,667	\$ -			104.65	
Stm-555	Storm	007217		5	6	Shand Ave	Storm Lateral	\$ -	\$ -	\$ -	\$ -	\$ -			18.22	
Stm-558	Storm	007217		5	6	Shand Ave	Storm Lateral	\$ -	\$ -	\$ -	\$ -	\$ -			10.32	
Wat-3128	Water	007217		5	6	Shand Ave	MAIN	\$ 379,400	\$ -	\$ -	\$ -	\$ 379,400				185.79
Wat-3129	Water	007217		5	6	Shand Ave	MAIN	\$ 37,840	\$ -	\$ -	\$ -	\$ 37,840				15.01
Wat-3126	Water	007217		5	6	Shand Ave	MAIN	\$ 27,240	\$ -	\$ -	\$ -	\$ 27,240				9.71
Wat-3136	Water	007217		5	6	Shand Ave	HYDRANT	\$ 22,820	\$ -	\$ -	\$ -	\$ 22,820				9.75
Wat-3127	Water	007217		5	6	Shand Ave	MAIN	\$ 13,940	\$ -	\$ -	\$ -	\$ 13,940				3.06
RD-008872	Road	008872		5	6	106 St	106 St	\$ 12,358	\$ 12,358	\$ -	\$ -	\$ -	97.15			
Stm-387	Storm	008872		5	6	106 St	Storm Main	\$ 25,667	\$ -	\$ -	\$ 25,667	\$ -			96.25	
Stm-561	Storm	008872		5	6	106 St	Storm Lateral	\$ -	\$ -	\$ -	\$ -	\$ -			15.81	
Stm-562	Storm	008872		5	6	106 St	Storm Lateral	\$ -	\$ -	\$ -	\$ -	\$ -			10.59	
Stm-565	Storm	008872		5	6	106 St	Storm Lateral	\$ -	\$ -	\$ -	\$ -	\$ -			16.06	
Wat-3082	Water	008872		5	6	106 St	MAIN	\$ 163,234	\$ -	\$ -	\$ -	\$ 163,234				91.42
RD-010480	Road	010480		5	6	104 Ave	104 Ave	\$ 236,277	\$ 236,277	\$ -	\$ -	\$ -	233.58			
San-2548	Sanitary	010480		5	6	104 Ave	GRAVITY MAIN	\$ 106,227	\$ -	\$ 106,227	\$ -	\$ -		119.80		
San-2555	Sanitary	010480		5	6	104 Ave	GRAVITY MAIN	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		119.77		
Stm-553	Storm	010480		5	6	104 Ave	Storm Lateral	\$ -	\$ -	\$ -	\$ -	\$ -			9.46	
Stm-554	Storm	010480		5	6	104 Ave	Storm Lateral	\$ -	\$ -	\$ -	\$ -	\$ -			9.40	
Wat-3085	Water	010480		5	6	104 Ave	MAIN	\$ 371,229	\$ -	\$ -	\$ -	\$ 371,229				213.77
Wat-3119	Water	010480		5	6	104 Ave	MAIN	\$ 44,744	\$ -	\$ -	\$ -	\$ 44,744				21.72
Wat-3084	Water	010480		5	6	104 Ave	MAIN	\$ 18,020	\$ -	\$ -	\$ -	\$ 18,020				6.00
RD-011127	Road	011127		5	6	Shand Ave	Shand Ave	\$ 15,750	\$ 15,750	\$ -	\$ -	\$ -	209.57			
San-2528	Sanitary	011127		5	6	Shand Ave	GRAVITY MAIN	\$ 52,317	\$ -	\$ 52,317	\$ -	\$ -		46.45		
San-2520	Sanitary	011127		5	6	Shand Ave	GRAVITY MAIN	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		45.80		
San-2521	Sanitary	011127		5	6	Shand Ave	GRAVITY MAIN	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		45.35		
San-2522	Sanitary	011127		5	6	Shand Ave	GRAVITY MAIN	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		85.30		
San-2529	Sanitary	011127		5	6	Shand Ave	GRAVITY MAIN	\$ -	\$ -	\$ -	\$ -	\$ -		15.75		
Stm-384	Storm	011127		5	6	Shand Ave	Storm Main	\$ 49,807	\$ -	\$ -	\$ 49,807	\$ -			60.20	
Stm-32161240	Storm	011127		5	6	Shand Ave	CB Lead	\$ -	\$ -	\$ -	\$ -	\$ -			30.79	
Stm-571	Storm	011127		5	6	Shand Ave	Storm Lateral	\$ -	\$ -	\$ -	\$ -	\$ -			18.67	
Stm-573	Storm	011127		5	6	Shand Ave	Storm Lateral	\$ -	\$ -	\$ -	\$ -	\$ -			4.77	
Wat-3092	Water	011127		5	6	Shand Ave	MAIN	\$ 295,820	\$ -	\$ -	\$ -	\$ 295,820				144.00
Wat-3090	Water	011127		5	6	Shand Ave	MAIN	\$ 192,440	\$ -	\$ -	\$ -	\$ 192,440				92.31
Wat-3118	Water	011127		5	6	Shand Ave	HYDRANT	\$ 22,820	\$ -	\$ -	\$ -	\$ 22,820			1.22	
Wat-3091	Water	011127		5	6	Shand Ave	MAIN	\$ 14,400	\$ -	\$ -	\$ -	\$ 14,400				3.29
Year 6 Sub-Total								\$ 2,968,932	\$ 290,214	\$ 493,184	\$ 211,684	\$ 1,973,850	897.55	745.87	530.93	947.68
Year 7 Capital Plan																

Asset ID	Asset Type	Block ID	Program Zone	Program Year	Location	Name/Type	From/To (Intersection/MH/Asset ID)	Cost Estimate	Road Estimate	Sanitary Estimate	Storm Estimate	Water Estimate	Road Length	Sanitary Length	Storm Length	Water Length
RD-003759	Road	003759		5	7	104 Ave	104 Ave 107 St - Swann Dr	\$ 37,602	\$ 37,602	\$ -	\$ -	\$ -	214.08			
San-2526	Sanitary	003759		5	7	104 Ave	GRAVITY MAIN 151_152	\$ 66,627	\$ -	\$ 66,627	\$ -	\$ -		71.80		
San-2355	Sanitary	003759		5	7	104 Ave	GRAVITY MAIN 154_153	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		53.55		
San-2356	Sanitary	003759		5	7	104 Ave	GRAVITY MAIN 155_154	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		62.45		
San-2527	Sanitary	003759		5	7	104 Ave	GRAVITY MAIN 152_153	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		62.90		
Stm-574	Storm	003759		5	7	104 Ave	Storm Lateral CB-148_030	\$ -	\$ -	\$ -	\$ -	\$ -			14.64	
Stm-575	Storm	003759		5	7	104 Ave	Storm Lateral CB-147_030	\$ -	\$ -	\$ -	\$ -	\$ -			15.51	
Wat-3076	Water	003759		5	7	104 Ave	MAIN 3076	\$ 314,704	\$ -	\$ -	\$ -	\$ 314,704				180.52
Wat-3045	Water	003759		5	7	104 Ave	MAIN 3045	\$ 30,702	\$ -	\$ -	\$ -	\$ 30,702				13.46
Wat-3075	Water	003759		5	7	104 Ave	MAIN 3075	\$ 28,305	\$ -	\$ -	\$ -	\$ 28,305				12.05
Wat-3059	Water	003759		5	7	104 Ave	HYDRANT 3059	\$ 22,820	\$ -	\$ -	\$ -	\$ 22,820				3.13
RD-008233	Road	008233		5	7	105 St	105 St 104 Ave - 105 Ave	\$ 156,642	\$ 156,642	\$ -	\$ -	\$ -	147.93			
San-2547	Sanitary	008233		5	7	105 St	GRAVITY MAIN 125_126	\$ 71,802	\$ -	\$ 71,802	\$ -	\$ -		83.25		
San-2546	Sanitary	008233		5	7	105 St	GRAVITY MAIN 126_131	\$ 52,317	\$ -	\$ 52,317	\$ -	\$ -		65.65		
Wat-3066	Water	008233		5	7	105 St	MAIN 3066	\$ 218,790	\$ -	\$ -	\$ -	\$ 218,790				124.10
Wat-3115	Water	008233		5	7	105 St	HYDRANT 3115	\$ 22,820	\$ -	\$ -	\$ -	\$ 22,820				3.11
Wat-3067	Water	008233		5	7	105 St	MAIN 3067	\$ 19,584	\$ -	\$ -	\$ -	\$ 19,584				6.92
RD-008688	Road	008688		5	7	Shand Ave	Shand Ave 106 St - 107 St	\$ 14,478	\$ 14,478	\$ -	\$ -	\$ -	289.11			
San-2530	Sanitary	008688		5	7	Shand Ave	GRAVITY MAIN 282_283	\$ 71,712	\$ -	\$ 71,712	\$ -	\$ -		83.05		
San-2402	Sanitary	008688		5	7	Shand Ave	GRAVITY MAIN 280_281	\$ 52,317	\$ -	\$ 52,317	\$ -	\$ -		105.35		
San-2540	Sanitary	008688		5	7	Shand Ave	GRAVITY MAIN 281_282	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		98.55		
San-2401	Sanitary	008688		5	7	Shand Ave	GRAVITY MAIN 278_280	\$ -	\$ -	\$ -	\$ -	\$ -		5.60		
Stm-572	Storm	008688		5	7	Shand Ave	Storm Lateral CB-152_041	\$ -	\$ -	\$ -	\$ -	\$ -			14.07	
Wat-3988	Water	008688		5	7	Shand Ave	MAIN 3988	\$ 237,269	\$ -	\$ -	\$ -	\$ 237,269				134.97
Wat-3130	Water	008688		5	7	Shand Ave	MAIN 3130	\$ 155,363	\$ -	\$ -	\$ -	\$ 155,363				86.79
Wat-3990	Water	008688		5	7	Shand Ave	MAIN 3990	\$ 86,394	\$ -	\$ -	\$ -	\$ 86,394				46.22
Wat-3989	Water	008688		5	7	Shand Ave	MAIN 3989	\$ 22,474	\$ -	\$ -	\$ -	\$ 22,474				8.62
Wat-3131	Water	008688		5	7	Shand Ave	MAIN 3131	\$ 21,947	\$ -	\$ -	\$ -	\$ 21,947				8.31
RD-009559	Road	009559		5	7	Swann Dr	Swann Dr 104 Ave - 105 Ave	\$ 8,722	\$ 8,722	\$ -	\$ -	\$ -	97.72			
San-2357	Sanitary	009559		5	7	Swann Dr	GRAVITY MAIN 155_159	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		109.05		
Wat-3044	Water	009559		5	7	106 St	MAIN 3044	\$ 194,633	\$ -	\$ -	\$ -	\$ 194,633				109.89
RD-010025	Road	010025		5	7	106 St	106 St Shand Ave W - 104 Ave	\$ 183,847	\$ 183,847	\$ -	\$ -	\$ -	156.41			
Stm-386	Storm	010025		5	7	106 St	Storm Main 129_067	\$ 93,347	\$ -	\$ -	\$ 93,347	\$ -			81.60	
Stm-559	Storm	010025		5	7	106 St	Storm Lateral CB-259_130	\$ -	\$ -	\$ -	\$ -	\$ -			18.40	
Stm-560	Storm	010025		5	7	106 St	Storm Lateral CB-261_067	\$ -	\$ -	\$ -	\$ -	\$ -			16.03	
Wat-3093	Water	010025		5	7	106 St	MAIN 3093	\$ 222,887	\$ -	\$ -	\$ -	\$ 222,887				126.51
Wat-3094	Water	010025		5	7	106 St	MAIN 3094	\$ 44,404	\$ -	\$ -	\$ -	\$ 44,404				21.52
Wat-3095	Water	010025		5	7	106 St	HYDRANT 3095	\$ 22,820	\$ -	\$ -	\$ -	\$ 22,820				3.53
Wat-3139	Water	010025		5	7	106 St	HYDRANT 3139	\$ 22,820	\$ -	\$ -	\$ -	\$ 22,820				8.05
Wat-3138	Water	010025		5	7	106 St	MAIN 3138	\$ 20,451	\$ -	\$ -	\$ -	\$ 20,451				7.43
RD-012034	Road	012034		5	7	103 St	103 St -	\$ -	\$ -	\$ -	\$ -	\$ -	151.29			
Stm-421	Storm	012034		5	7	103 St	Storm Main 154_308	\$ 105,587	\$ -	\$ -	\$ 105,587	\$ -			115.20	
Stm-547	Storm	012034		5	7	103 St	Storm Main 308_D-10	\$ 25,667	\$ -	\$ -	\$ 25,667	\$ -			148.40	
Stm-548	Storm	012034		5	7	103 St	Storm Lateral CB-232_154	\$ -	\$ -	\$ -	\$ -	\$ -			5.10	
New-4	Water	New PRV		5	7	Install new PRV #8	New New	\$ 200,000	\$ -	\$ -	\$ -	\$ 200,000				
Year 7 Sub-Total								\$ 3,066,425	\$ 401,289	\$ 531,356	\$ 224,600	\$ 1,909,180	1,056.54	801.20	428.94	905.13
Year 8 Capital Plan																
RD-010204	Road	010204		6	8	Hoppe Ave - Service Rd S	Hoppe Ave - Service Rd S 102 St - 104 St	\$ 263,429	\$ 263,429	\$ -	\$ -	\$ -	397.15			
San-2579	Sanitary	010204		6	8	Hoppe Ave - Service Rd S	GRAVITY MAIN 307_308	\$ 52,317	\$ -	\$ 52,317	\$ -	\$ -		85.50		
San-2582	Sanitary	010204		6	8	Hoppe Ave - Service Rd S	GRAVITY MAIN 296_305	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		77.20		
San-2580	Sanitary	010204		6	8	Hoppe Ave - Service Rd S	GRAVITY MAIN 306_307	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -		84.80		

Asset ID	Asset Type	Block ID	Program Zone	Program Year	Location	Name/Type	From/To (Intersection/MH/Asset ID)	Cost Estimate	Road Estimate	Sanitary Estimate	Storm Estimate	Water Estimate	Road Length	Sanitary Length	Storm Length	Water Length
San-2581	Sanitary	010204		6	8	Hoppe Ave - Service Rd S	GRAVITY MAIN	305_306	\$ 43,317	\$ -	\$ 43,317	\$ -	\$ -	82.65		
Stm-466	Storm	010204		6	8	Hoppe Ave - Service Rd S	Storm Main	034_035	\$ 29,192	\$ -	\$ -	\$ 29,192	\$ -		83.95	
Stm-438	Storm	010204		6	8	Hoppe Ave - Service Rd S	Storm Main	037_036	\$ -	\$ -	\$ -	\$ -	\$ -		9.90	
Stm-437	Storm	010204		6	8	Hoppe Ave - Service Rd S	Storm Main	112_036	\$ -	\$ -	\$ -	\$ -	\$ -		20.00	
Stm-545	Storm	010204		6	8	Hoppe Ave - Service Rd S	Storm Lateral	CB-240_036	\$ -	\$ -	\$ -	\$ -	\$ -		19.95	
Stm-546	Storm	010204		6	8	Hoppe Ave - Service Rd S	Storm Lateral	CB-241_036	\$ -	\$ -	\$ -	\$ -	\$ -		22.70	
Stm-670	Storm	010204		6	8	Hoppe Ave - Service Rd S	Storm Lateral	CB-246_033	\$ -	\$ -	\$ -	\$ -	\$ -		18.45	
Stm-671	Storm	010204		6	8	Hoppe Ave - Service Rd S	Storm Lateral	CB-242_034	\$ -	\$ -	\$ -	\$ -	\$ -		13.24	
Stm-672	Storm	010204		6	8	Hoppe Ave - Service Rd S	Storm Lateral	CB-243_034	\$ -	\$ -	\$ -	\$ -	\$ -		17.89	
Stm-465	Storm	010204		6	8	Hoppe Ave - Service Rd S	Storm Main	035_033	\$ -	\$ -	\$ -	\$ -	\$ -		84.90	
Stm-467	Storm	010204		6	8	Hoppe Ave - Service Rd S	Storm Main	036_034	\$ -	\$ -	\$ -	\$ -	\$ -		84.40	
Wat-3364	Water	010204		6	8	Hoppe Ave - Service Rd S	MAIN	3364	\$ 287,860	\$ -	\$ -	\$ -	\$ 287,860			140.02
Wat-4036	Water	010204		6	8	Hoppe Ave - Service Rd S	MAIN	4036	\$ 220,300	\$ -	\$ -	\$ -	\$ 220,300			106.24
Wat-3362	Water	010204		6	8	Hoppe Ave - Service Rd S	MAIN	3362	\$ 164,980	\$ -	\$ -	\$ -	\$ 164,980			78.58
Wat-3366	Water	010204		6	8	Hoppe Ave - Service Rd S	MAIN	3366	\$ 126,260	\$ -	\$ -	\$ -	\$ 126,260			59.22
Wat-3257	Water	010204		6	8	Hoppe Ave - Service Rd S	MAIN	3257	\$ 29,220	\$ -	\$ -	\$ -	\$ 29,220			10.70
Wat-3363	Water	010204		6	8	Hoppe Ave - Service Rd S	MAIN	3363	\$ 25,500	\$ -	\$ -	\$ -	\$ 25,500			8.84
Wat-3375	Water	010204		6	8	Hoppe Ave - Service Rd S	HYDRANT	3375	\$ 22,820	\$ -	\$ -	\$ -	\$ 22,820			17.57
RD-010477	Road	010477		6	8	Hoppe Ave - Service Rd S	Hoppe Ave - Service Rd S	106 St - 110 St	\$ 27,101	\$ 27,101	\$ -	\$ -	\$ -	308.06		
San-2524	Sanitary	010477		6	8	Hoppe Ave - Service Rd S	GRAVITY MAIN	294_290	\$ 80,172	\$ -	\$ 80,172	\$ -	\$ -	81.85		
San-2381	Sanitary	010477		6	8	Hoppe Ave - Service Rd S	GRAVITY MAIN	190_302	\$ 79,362	\$ -	\$ 79,362	\$ -	\$ -	80.10		
San-2523	Sanitary	010477		6	8	Hoppe Ave - Service Rd S	GRAVITY MAIN	290_295	\$ 79,047	\$ -	\$ 79,047	\$ -	\$ -	79.36		
San-2382	Sanitary	010477		6	8	Hoppe Ave - Service Rd S	GRAVITY MAIN	295_190	\$ 64,467	\$ -	\$ 64,467	\$ -	\$ -	67.03		
Stm-580	Storm	010477		6	8	Hoppe Ave - Service Rd S	Storm Lateral	CB-170_015	\$ -	\$ -	\$ -	\$ -	\$ -		12.96	
Stm-582	Storm	010477		6	8	Hoppe Ave - Service Rd S	Storm Lateral	CB-168_015	\$ -	\$ -	\$ -	\$ -	\$ -		15.85	
Wat-3974	Water	010477		6	8	Hoppe Ave - Service Rd S	MAIN	3974	\$ 288,900	\$ -	\$ -	\$ -	\$ 288,900			140.54
Wat-4041	Water	010477		6	8	Hoppe Ave - Service Rd S	MAIN	4041	\$ 276,300	\$ -	\$ -	\$ -	\$ 276,300			134.24
Wat-3144	Water	010477		6	8	Hoppe Ave - Service Rd S	MAIN	3144	\$ 228,780	\$ -	\$ -	\$ -	\$ 228,780			110.48
Wat-4039	Water	010477		6	8	Hoppe Ave - Service Rd S	MAIN	4039	\$ 41,460	\$ -	\$ -	\$ -	\$ 41,460			16.82
Wat-4022	Water	010477		6	8	Hoppe Ave - Service Rd S	MAIN	4022	\$ 29,560	\$ -	\$ -	\$ -	\$ 29,560			10.87
Wat-3975	Water	010477		6	8	Hoppe Ave - Service Rd S	MAIN	3975	\$ 23,040	\$ -	\$ -	\$ -	\$ 23,040			7.61
Wat-4042	Water	010477		6	8	Hoppe Ave - Service Rd S	HYDRANT	4042	\$ 22,820	\$ -	\$ -	\$ -	\$ 22,820			16.64
Wat-4052	Water	010477		6	8	Hoppe Ave - Service Rd S	HYDRANT	4052	\$ 22,820	\$ -	\$ -	\$ -	\$ 22,820			16.36
Wat-3145	Water	010477		6	8	Hoppe Ave - Service Rd S	MAIN	3145	\$ 21,100	\$ -	\$ -	\$ -	\$ 21,100			6.64
Wat-4046	Water	010477		6	8	Hoppe Ave - Service Rd S	MAIN	4046	\$ 16,540	\$ -	\$ -	\$ -	\$ 16,540			4.36
Wat-4040	Water	010477		6	8	Hoppe Ave - Service Rd S	MAIN	4040	\$ 13,880	\$ -	\$ -	\$ -	\$ 13,880			3.03
Wat-4045	Water	010477		6	8	Hoppe Ave - Service Rd S	MAIN	4045	\$ 11,260	\$ -	\$ -	\$ -	\$ 11,260			1.72
New-6	Water	New PRV		6	8	Install new PRV #7	New	New	\$ 200,000	\$ -	\$ -	\$ -	\$ 200,000			
New-5	Water	New PRV		6	8	Install new PRV #9	New	New	\$ 200,000	\$ -	\$ -	\$ -	\$ 200,000			
Year 8 Sub-Total								\$ 3,078,427	\$ 290,530	\$ 485,313	\$ 29,192	\$ 2,273,393	705.21	638.49	404.20	890.48
Year 9 Capital Plan																
San-2682	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	167_348	\$ 3,811,400	\$ -	\$ 3,811,400	\$ -	\$ -	107.90		
San-2683	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	348_342	\$ -	\$ -	\$ -	\$ -	\$ -	91.65		
San-2687	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	342_349	\$ -	\$ -	\$ -	\$ -	\$ -	108.30		
San-2492	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	349_343	\$ -	\$ -	\$ -	\$ -	\$ -	105.95		
San-2491	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	343_344	\$ -	\$ -	\$ -	\$ -	\$ -	112.70		
San-2480	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	344_350	\$ -	\$ -	\$ -	\$ -	\$ -	80.00		
San-2478	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	345_347	\$ -	\$ -	\$ -	\$ -	\$ -	118.60		
San-2479	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	350_345	\$ -	\$ -	\$ -	\$ -	\$ -	87.50		
San-2417	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	346_353	\$ -	\$ -	\$ -	\$ -	\$ -	107.05		
San-2477	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	347_346	\$ -	\$ -	\$ -	\$ -	\$ -	88.00		
San-2434	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	351_095	\$ -	\$ -	\$ -	\$ -	\$ -	92.15		
San-2476	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	353_351	\$ -	\$ -	\$ -	\$ -	\$ -	11.35		
San-2432	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	095_094	\$ -	\$ -	\$ -	\$ -	\$ -	90.45		
San-2433	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	297_095	\$ -	\$ -	\$ -	\$ -	\$ -	4.50		
San-2434	Sanitary	Northern Trunk		7	9	Northern Trunk	GRAVITY MAIN	351_095	\$ -	\$ -	\$ -	\$ -	\$ -	92.15		
Year 9 Sub-Total								\$ 3,811,400	\$ -	\$ 3,811,400	\$ -	\$ -	-	1,298.25	-	-

Asset ID	Asset Type	Block ID	Program Zone	Program Year	Location	Name/Type	From/To (Intersection/MH/Asset ID)	Cost Estimate	Road Estimate	Sanitary Estimate	Storm Estimate	Water Estimate	Road Length	Sanitary Length	Storm Length	Water Length
Year 10 Capital Plan																
Stm-490	Storm	Location 1	7	10	Storm Upgrade	Storm Main	073_163	\$ 210,000	\$ -	\$ -	\$ 210,000	\$ -			36.00	
Stm-489	Storm	Location 1	7	10	Storm Upgrade	Storm Main	074_073	\$ -	\$ -	\$ -	\$ -	\$ -			99.15	
Stm-674	Storm	Location 3	7	10	Storm Upgrade	Storm Lateral	CB-255_080	\$ 168,000	\$ -	\$ -	\$ 168,000	\$ -			13.59	
Stm-673	Storm	Location 3	7	10	Storm Upgrade	Storm Lateral	CB-254_080	\$ -	\$ -	\$ -	\$ -	\$ -			22.86	
Stm-520	Storm	Location 3	7	10	Storm Upgrade	Storm Lateral	CB-080_064	\$ -	\$ -	\$ -	\$ -	\$ -			11.99	
Stm-480	Storm	Location 3	7	10	Storm Upgrade	Storm Main	120_080	\$ -	\$ -	\$ -	\$ -	\$ -			100.95	
Stm-476	Storm	Location 3	7	10	Storm Upgrade	Storm Main	080_D-21	\$ -	\$ -	\$ -	\$ -	\$ -			68.60	
New-8	Water	New PRV	7	10	Install new PRV #1	New	New	\$ 200,000	\$ -	\$ -	\$ -	\$ 200,000				
New-9	Water	New PRV	7	10	Install new PRV #10	New	New	\$ 200,000	\$ -	\$ -	\$ -	\$ 200,000				
New-10	Water	New PRV	7	10	Install new PRV #11	New	New	\$ 200,000	\$ -	\$ -	\$ -	\$ 200,000				
New-7	Water	New PRV	7	10	Install new PRV #2	New	New	\$ 200,000	\$ -	\$ -	\$ -	\$ 200,000				
Year 10 Sub-Total								\$ 1,178,000	\$ -	\$ -	\$ 378,000	\$ 800,000	-	-	353.13	-
Capital Infrastructure Plan Grand Total								\$ 30,283,981	\$ 2,305,700	\$ 9,525,168	\$ 2,060,063	\$ 16,393,049	5,893.05	8,126.03	3,804.03	7,089.51



Asset Management Prioritization Workshop

Municipal District of Greenview
Hamlet of Grande Cache

Associated Engineering

July 18th, 2023

Outline

1. Background/Recap
2. Data Integration & Risk Based Prioritization
3. Capital Program Plan
4. Workshop/Discussion

Background

Background

- AE completed condition assessments for the following asset classes.
 - Roads
 - Sanitary
 - Water
 - Stormwater
- From each asset a capital program was developed, and the capital need was established



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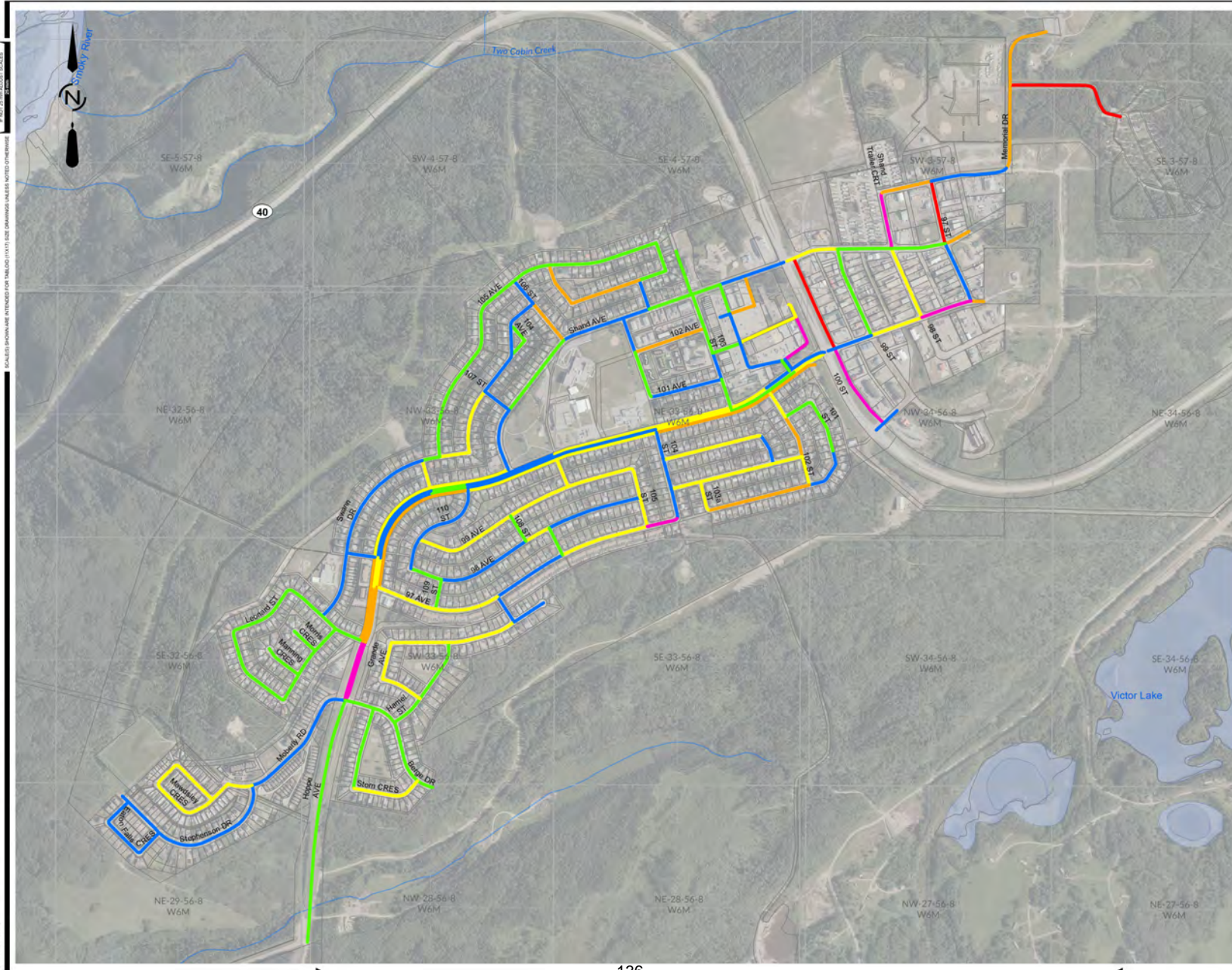


FIGURE 3-1

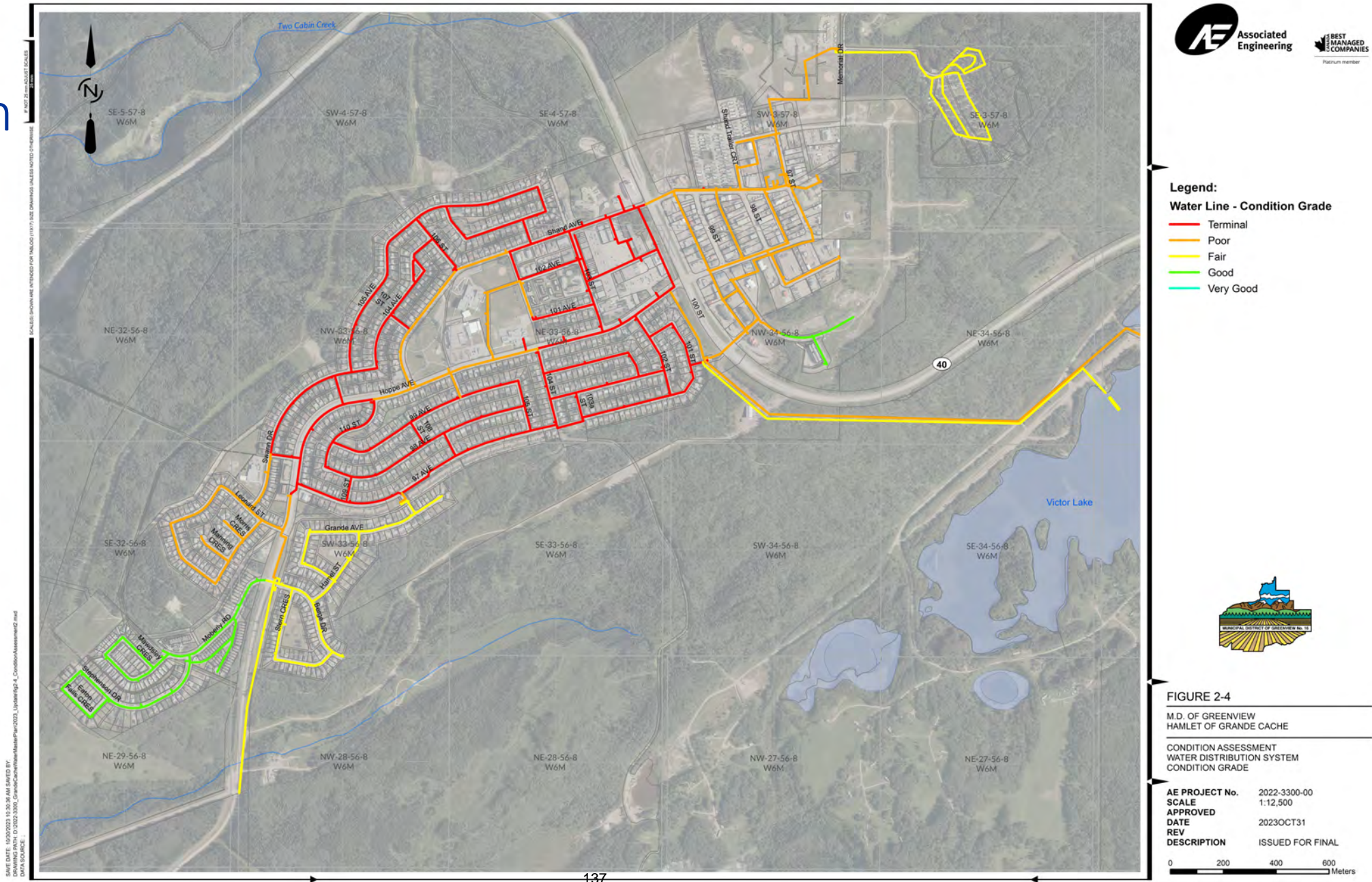
M.D. OF GREENVIEW
HAMLET OF GRANDE CACHE

ROADS INSPECTION 2022
PAVEMENT CONDITION INDEX / PCR RATING

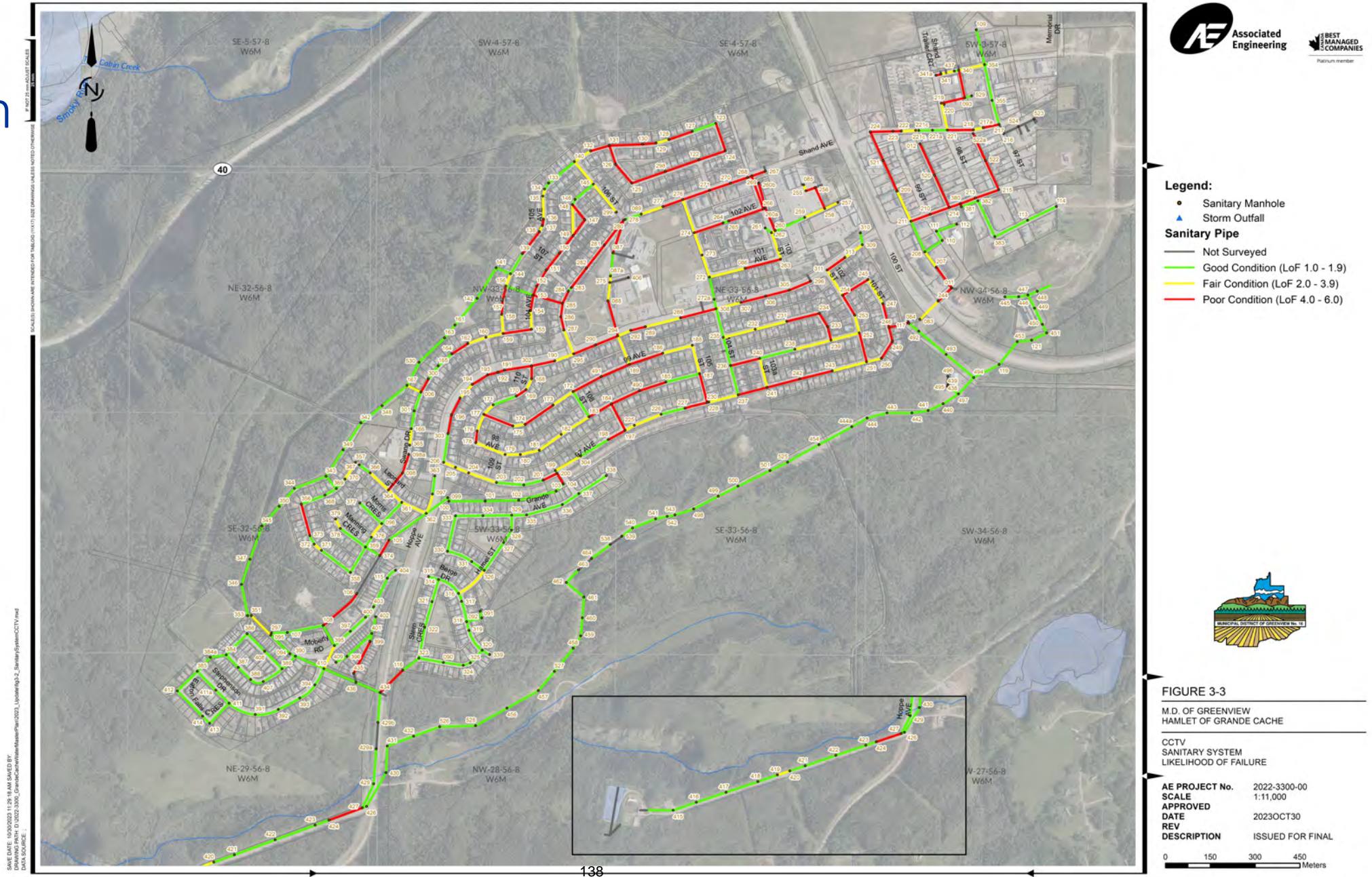
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DATE	2023OCT30
REV	
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Meters

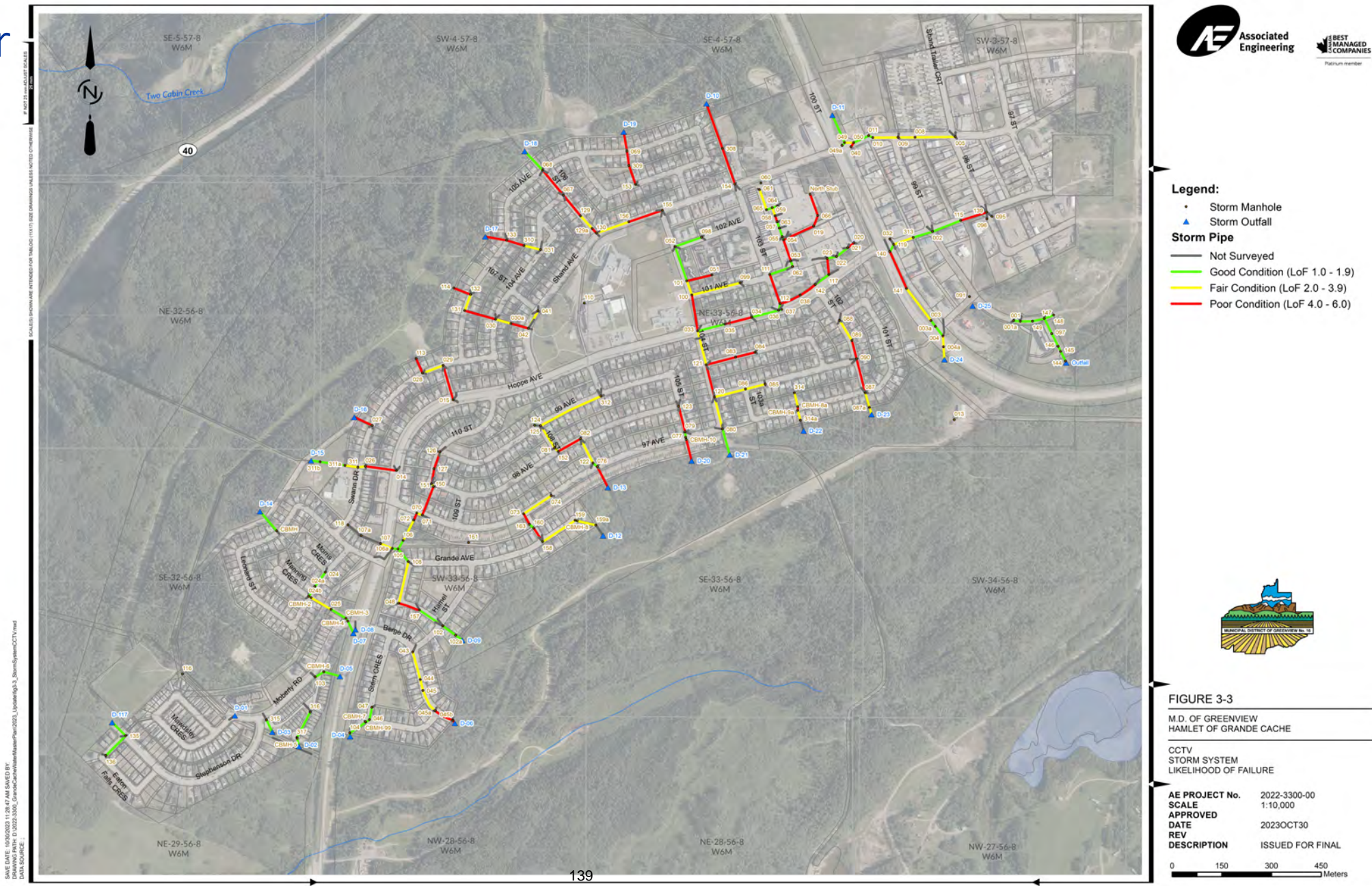
Water Condition



Sanitary Condition



Stormwater Condition



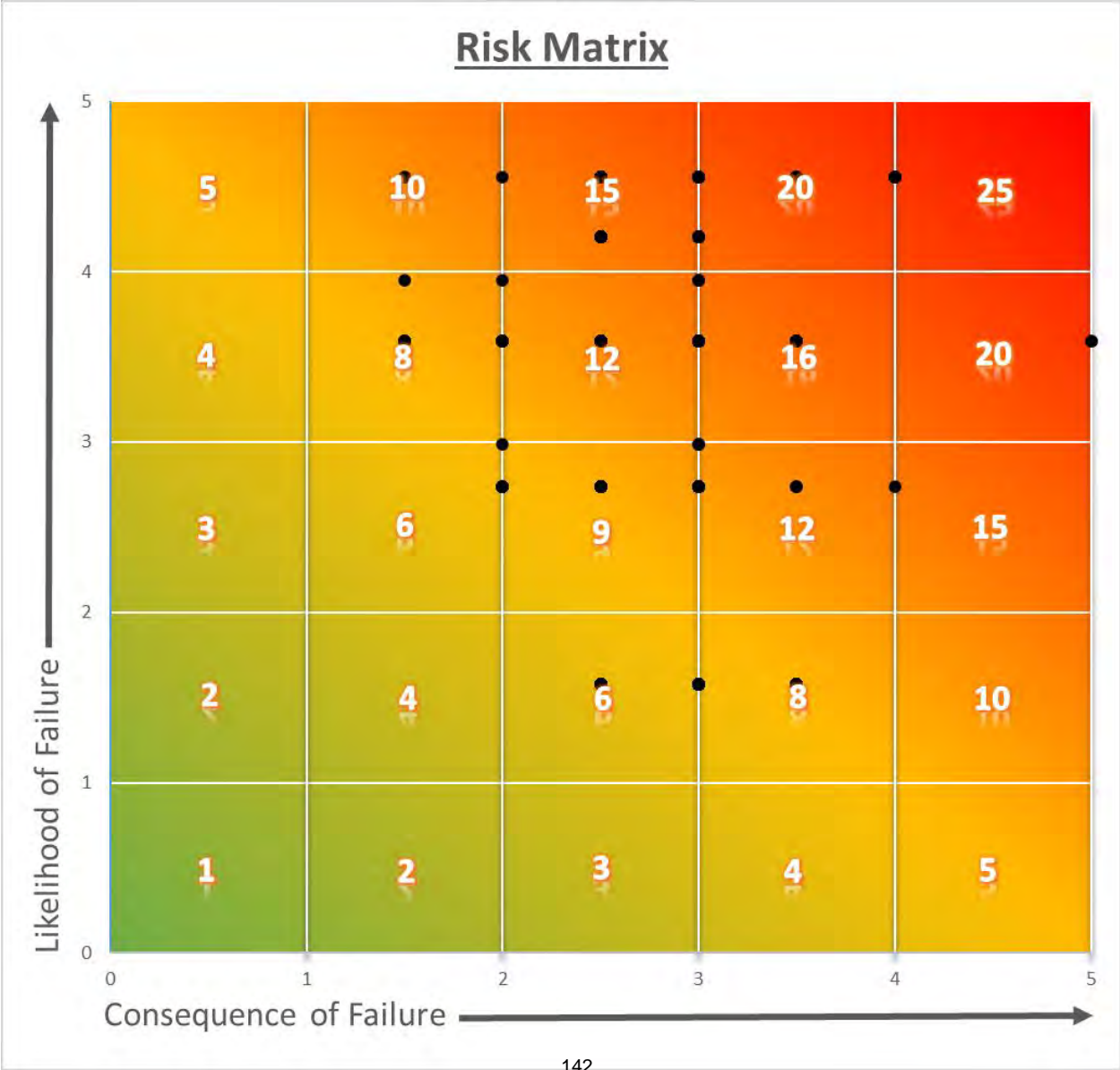
Data Integration & Risk Based Prioritization

Data Integration

- The Hamlet was divided into sections or “blocks”. Each “block” incorporates a combination of asset classes:
 - Roads
 - Water
 - Sanitary
 - Stormwater
- Risk based weighted equalization score was used evaluate each assets on a equal scale
- This allowed blocks of assets to be combined to create, program areas
- The areas are ranked based on risk



Risk Matrix Table



Risk Scenario
Low – 0 - 8
Med – 9 – 11
High 12-25

Capital Program Plan

SE-5-57-8 W6M

SW-4-57-8 W6M

SE-4-57-8 W6M

SE-3-57-8 W6M

NE-32-56-8 W6M

NW-32-56-8 W6M

NE-09-56-8 W6M

NW-31-56-8 W6M

NE-34-56-8 W6M

SE-32-56-8 W6M

SW-33-56-8 W6M

SE-33-56-8 W6M

SW-34-56-8 W6M

SE-34-56-8 W6M

NE-29-56-8 W6M

NW-28-56-8 W6M

NE-28-56-8 W6M

NW-27-56-8 W6M

NE-27-56-8 W6M

100th Ave

101st St

102nd St

103rd St

104th St

105th St

106th St

107th St

108th St

109th St

110th St

111th St

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420th St

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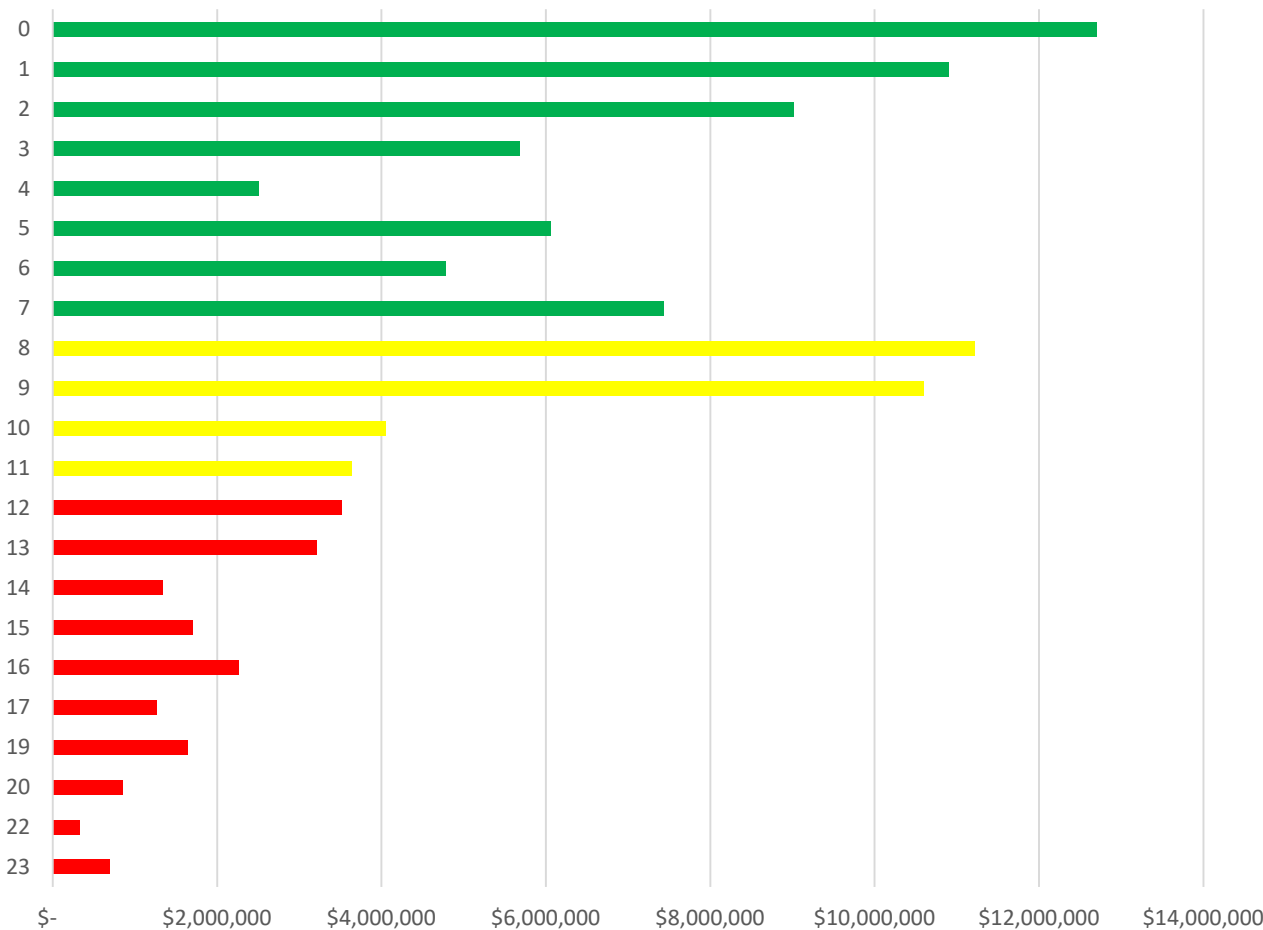


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DATE	2023OCT31
REV	
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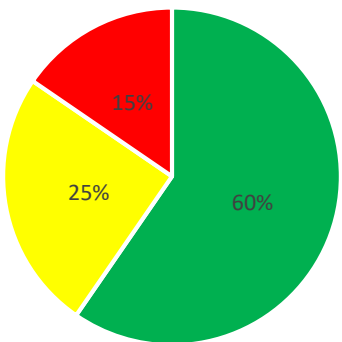


Proposed Program

Replacement Value By Priority Score

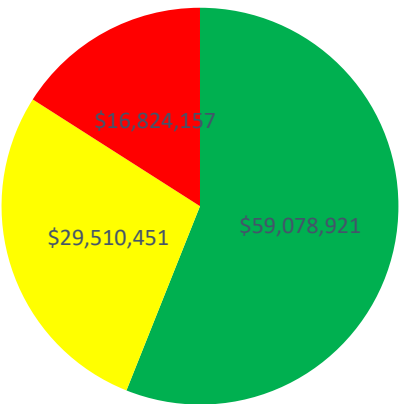


Priority Breakdown



1 - Low 2 - Medium 3 - High

Replacement Value



1 - Low 2 - Medium 3 - High



Questions & Feedback?



Associated
Engineering

GLOBAL PERSPECTIVE.
LOCAL FOCUS.

REPORT

Municipal District of Greenview No. 16

Hamlet of Grande Cache Infrastructure Master Plan Roadway and Sidewalk Condition Assessment



JULY 2023



Platinum
member

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1 INTRODUCTION

The Municipal District of Greenview No. 16 (the MD of Greenview) retained Associated Engineering (AE) to prepare an Infrastructure Master Plan (IMP) for the Hamlet of Grande Cache (the Hamlet). The objective of the IMP is to prepare a baseline assessment of the current condition and capacity of the Hamlet's Infrastructure networks. The results of the assessment will be used to prepare a multi-year Capital Infrastructure program to guide the MD of Greenview to maximize capital expenditures for their infrastructure. This component of the overall IMP includes the condition assessment for the Hamlet's paved roads, parking lots, and concrete sidewalks.

A visual assessment of the roads, parking lots, and sidewalks throughout the Hamlet was conducted to assess and evaluate their current conditions. This involved identifying a range of sidewalk and pavement defects based on visual observations.

The data collected as part of the assessment was used to undertake the following:

- Identify the Hamlet's current road, parking lot, asphalt trail, and sidewalk conditions.
- Prioritize assets into high, medium, and low priority levels based on condition rating and impact as result of failure.
- Provide an Opinion of Probable Cost for priority levels.

Most roadways and sidewalks within the Hamlet were assessed except for the following:

- Private roads.
- Highways.
- Gravel roads.
- Roads or sidewalks under construction.

2 METHODOLOGY

All data was manually collected over a two-week period, between August 22 and September 2, 2022. A single individual was elected to complete the field data collection to maximize consistency in rating defects; thus, improving the reliability of the assessment. The data was collected using ArcGIS Field Maps on a Samsung tablet paired with a Trimble handheld GNSS receiver to provide GPS locations to an accuracy within a metre. Over the two-week period, approximately 31 km of paved public roads, 14 commercial/institutional parking lots, 34 km of sidewalk, and 2.7 km of paved trails were inspected by AE within the Hamlet.

The roadway/parking lot inspection and evaluation completed by AE was based on ASTM 6433 Standard for Pavement Condition Index (PCI) Surveys. The PCI is a numerical index between 0 and 100 which is used to indicate the general condition of a pavement section. The methodology requires determining the pavement distress types, severities, and extent in the field and applying deduct values for each distress. Pavements with lower PCI values typically have pavement distresses, corresponding with higher deduct values, such as rutting, alligator cracking, ravelling, block cracking, patching, and potholes. Conversely, pavements with higher PCI values typically have pavement distresses such as edge cracking, bleeding, swelling, and shoving.

Unlike the standardized method for assessing pavements, there is no current standard for assessing concrete sidewalks. Over the years, AE has developed an approach to assess sidewalk conditions for various communities. In general, sidewalks are assessed on a range of defects typically observed on concrete surfaces and rated based on the severity of the defect.

The roadway and sidewalk network were divided into single block sections for evaluation. AE's inspector visually surveyed each location and recorded the pavement and sidewalk distresses by type, severity, and extent. The types of distresses evaluated are shown in [Table 2-1](#) and [Table 2-2](#).

Table 2-1 Pavement Distress Types

Pavement Distress Types		
• Alligator Cracking	• Edge Cracking	• Ravelling
• Block Cracking	• Longitudinal & Transverse Cracking	• Shoulder Drop-offs
• Bumps and Sags	• Patching	• Shoving
• Depressions	• Potholes	• Swelling







Table 2-2 Sidewalk Distress Types

Sidewalk Distress Types
• Depressions
• Spalling
• Cracking
• Minor and Major Displacements
• Broken/Missing Piece

For sidewalks, all displacements greater than 2.5 cm were flagged as a tripping hazard, as detailed [Section 3.3.2](#).

In [Table 2-3](#) and [Table 2-4](#) below, we provide photos collected as part of the survey indicating pavement and sidewalk distresses of low and high severity.

Table 2-3 Pavement Distress Types – Low and High Severity

Pavement Distress Types– Low and High Severity			
Alligator Cracking			
Low Severity		High Severity	
Longitudinal/Transverse Cracking			
Low Severity		High Severity	
Patching			
Low Severity		High Severity	

Pavement Distress Types- Low and High Severity

Potholes

Low
Severity

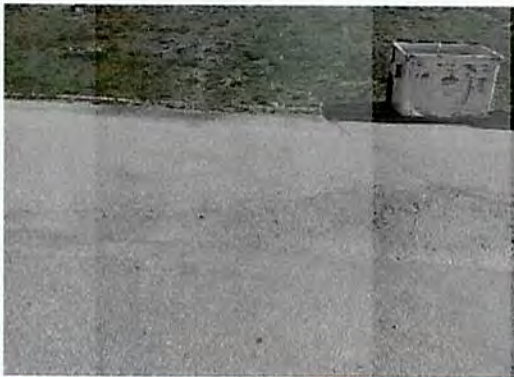


High
Severity



Weathering and Ravelling

Low
Severity



High
Severity



Table 2-4 Sidewalk Distress Types - Low and High Severity

Sidewalk Distress Types - Low and High Severity

Spalling

Fair



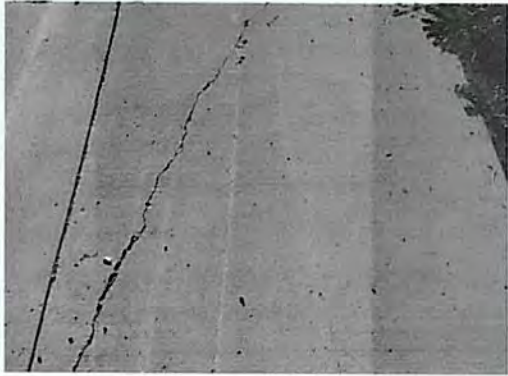
Very
Poor/
Critical



Sidewalk Distress Types - Low and High Severity

Cracking

Fair



Very
Poor/
Critical



Broken/Missing Piece

Fair



Very
Poor/
Critical



3 NETWORK CONDITION ANALYSIS

3.1 Roadways

In developing the Pavement Condition Index (PCI), the ASTM 6433 Standard for deduction values was used. First, each defect is assigned a Deduct Value (DV) between 1 and 100 based on the defect type, severity, and extent. The DVs from each defect are added together for a total DV. This value is then adjusted through an iterative process, based on the number of defects recorded and a maximum Corrected Deduct Value (CDV). This number is then subtracted from 100 to determine the PCI value for that section of road.

The ASTM standard provides a rating scale to classify the pavement condition relative to the PCI score, as summarized in **Table 3-1** below.

Table 3-1 Pavement Condition Index and Condition Rating

PCI Score	Rating (PCR)
86-100	Good
71-85	Satisfactory
56-70	Fair
41-55	Poor
26-40	Very Poor
11-25	Serious
1-10	Failed

A Pavement Condition Rating (PCR) can generally be inferred from the PCI. For example, roadways with higher PCI's are likely to be assessed a rating of Fair to Good; conversely, roadways with lower PCI's may score a lower rating of very poor to serious. As part of the survey, the AE inspector drove each roadway segment and assigned a PCR to the roadway based on visual condition observations and ride quality. This served as a quality check when reviewing the calculated PCI and corresponding PCR based on **Table 3-1**.

Figure 3-1 provides a summary of the assessed PCI and corresponding PCR Rating for each roadway segment. Pavement condition results by PCR for surveyed roadways are summarized in **Table 3-2**.

Table 3-2 Assessed Roadway Condition

PCI Score	Rating (PCR)	Percent of Total Length of Roadways Surveyed
86-100	Good	26%
71-85	Satisfactory	28%
56-70	Fair	26%
41-55	Poor	13%
26-40	Very Poor	4%
11-25	Serious	3%
1-10	Failed	0%

As noted, 54% of roadways segments were assessed to be in satisfactory condition or better, 39% were assessed as being in the poor to fair condition, and 7% are in very poor and serious condition. No roadway segments were noted as failed.

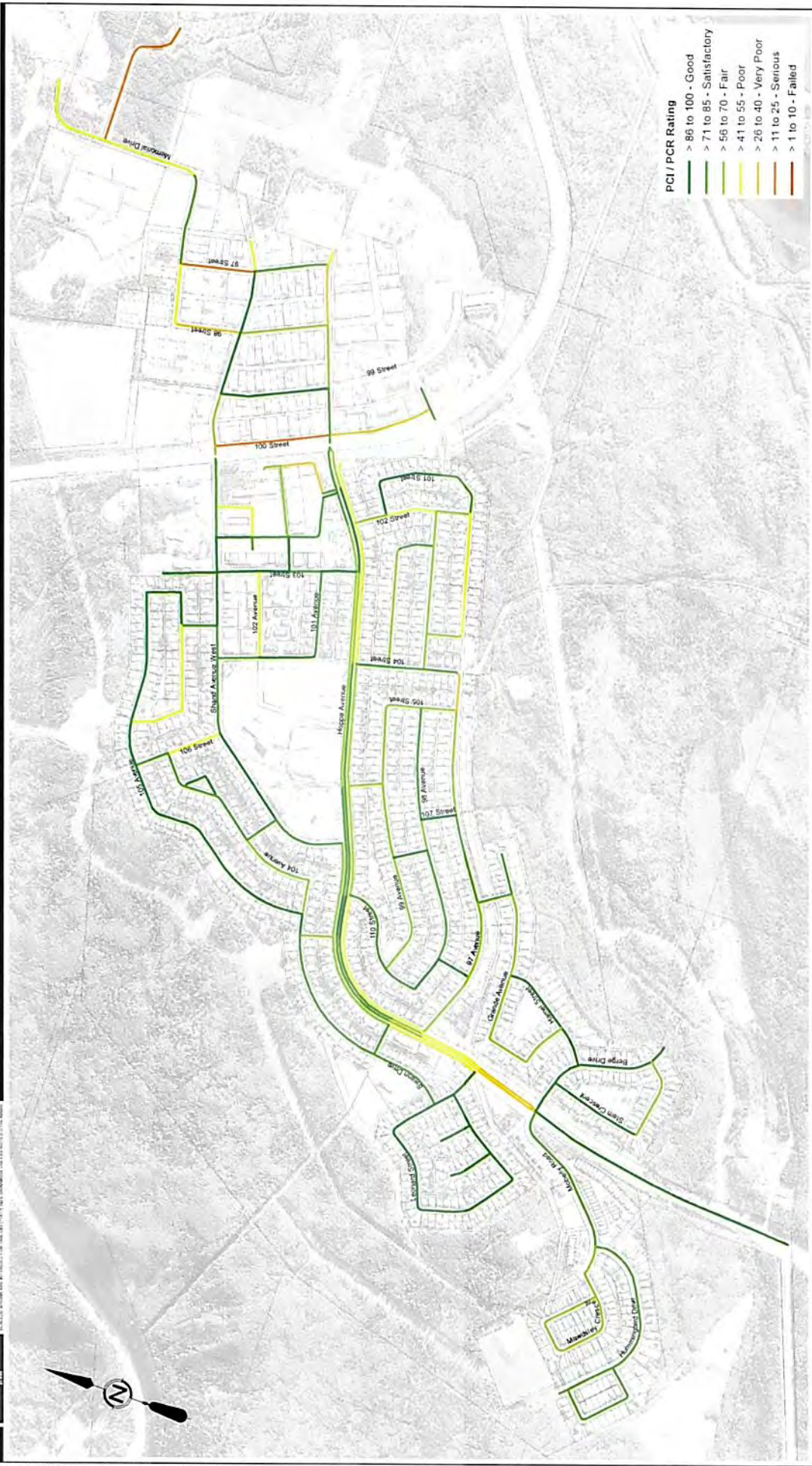


FIGURE 3-1

AE PROJECT No. 2022-3300-00

SCALE 1:10,000

APPROVED DATE 2023JUN02

REV

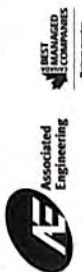
DESCRIPTION ISSUED FOR FINAL

0 200 400 Meters

M.D. OF GREENVIEW
HAMLET OF GRANDE CACHE

ROADS INSPECTION 2022

PAVEMENT CONDITION INDEX / PCR RATING



The relative performance of a roadway and rehabilitation or renewal strategy can be recommended based on the PCI. **Table 3-3** details the general rehabilitation strategy based on the PCI and corresponding PCR. As noted:

- 54% of roadways surveyed fell within the Preventative Maintenance category.
- 39% within the Rehabilitation category.
- 7% within the Reconstruction category.

Table 3-3 Pavement Condition Rating and Corresponding Rehabilitation Effort

PCI Score	Rating (PCR)	Rehabilitation Effort	Rehabilitation Strategy
86-100	Good	Preventative Maintenance - 54%	Crack Repair
71-85	Satisfactory		
56-70	Fair	Rehabilitation - 39%	Mill and Overlay Spot Repairs & Mill and Overlay
41-55	Poor		
26-40	Very Poor	Reconstruction - 7%	Reconstruction/ Full Depth Reclamation
11-25	Serious		
1-10	Failed		

3.2 Paved Parking Lots

The MD of Greenview owns and maintains several parking lots within the Hamlet. There were 14 paved parking lots assessed. Parking Lot P-2 is a gravel parking lot and was not included in the assessment. A similar approach to roadways was used to assess the condition of the paved parking lots. **Table 3-4** below and **Figure 3-2** provides a summary of the assessed condition of each parking lot.

Table 3-4 PCI and PCR for Paved Parking Lots

Parking Lot ID	General Area	PCI	PCR
P-1	GC Recreational Facility	82	Satisfactory
P-2	GC Recreational Facility	NA	NA
P-3	GC Public Health Center	72	Satisfactory
P-4	GC Public Health Center	72	Satisfactory
P-5	GC Public Health Center	48	Poor
P-6	GC Commercial District	92	Good
P-7	GC Commercial District	56	Fair
P-8	GC Hotel	60	Fair
P-9	GC Commercial District	52	Poor
P-10	GC Commercial District	48	Poor
P-11	GC Commercial District	20	Serious
P-12	GC Commercial District	92	Good
P-13	GC Commercial District	92	Good
P-14*	GC Community Highschool	100	Good
P-15	GC Central Park	71	Satisfactory

*At the time of the survey, the P-14 had recently been cold milled and was likely to be resurfaced with asphalt. Therefore, an assumed PCI of 100 was assigned the parking lot.



3.3 Sidewalks and Paved Trails

All sidewalk and trail defects were recorded as part of the survey. Attributes were assigned to each defect, including type, location, and severity. These were recorded in GIS. **Figure 3-3** summarizes the defects by type and their location. In total, 2294 defects were observed; 2131 on the sidewalks and 163 on the paved trails.

The sidewalk adjacent to the mall in the commercial area comprises of paving stones. AE reviewed the condition of the paving stone walking surface. Based on our observations the walking surface is in adequate condition with evidence of ponding, or tripping hazards.

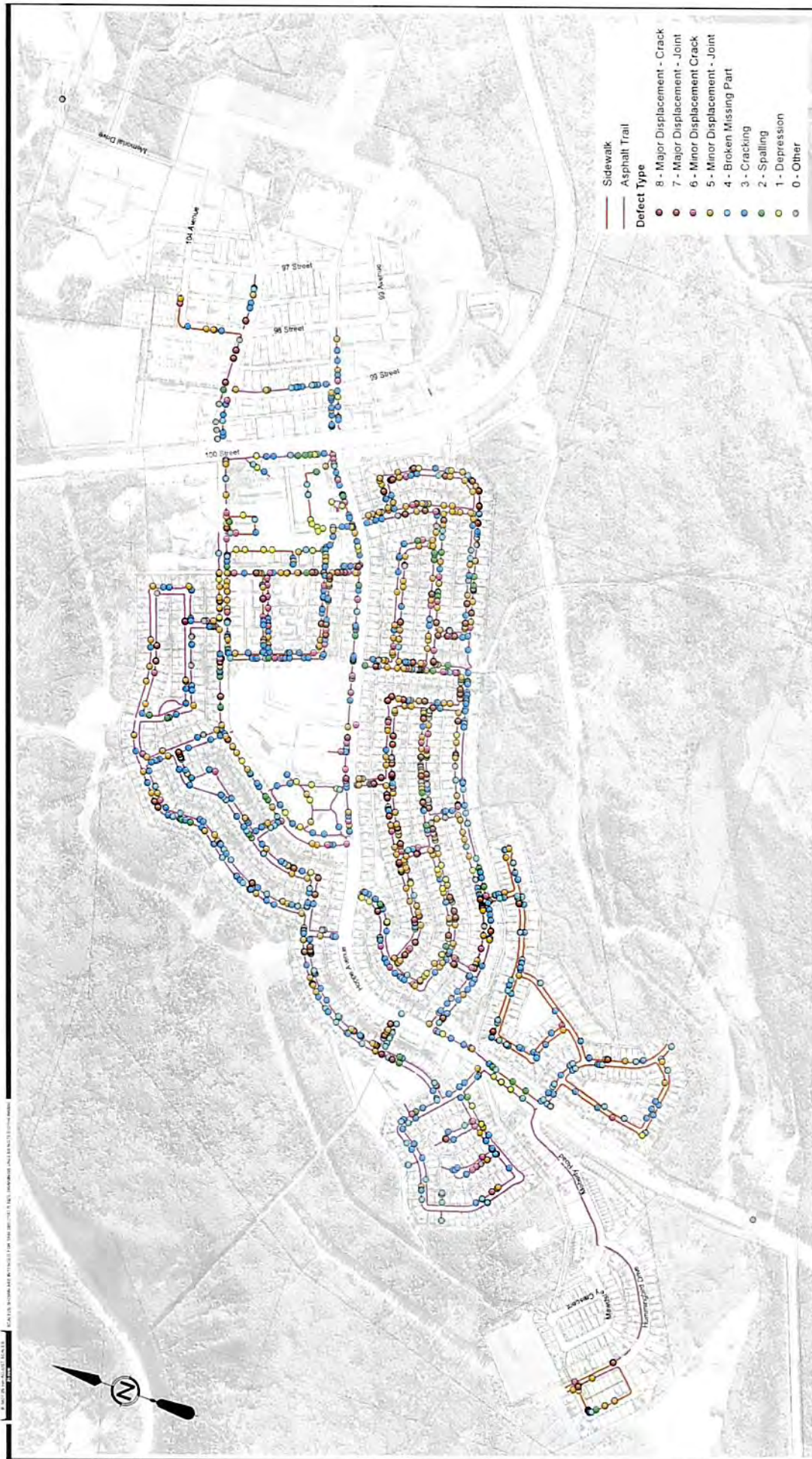


FIGURE 3-3

AE PROJECT No. 2022-2300-00
SCALE 1:10,000

M.D. OF GREETVIEW
HAMLET OF GRAZIE CACHE
ROADS INSPECTION 2022
SIDEWALK DEFECT TYPE

APPROVED
DATE 2023 JUN 02
REV
DESCRIPTION ISSUED FOR FINAL

0 200 400
Meters



3.3.1 Sidewalks

The severity rating for each sidewalk defect was determined based on an established set of criteria measured in the field. Each defect assessed was assigned a severity rating of **Low**, **Medium**, or **High**. Sidewalks with no observed defects were rated as **Good**. **Table 3-5** summarizes the number of observed defects for each severity rating.

Figure 3-4 presents the defects by severity and location.

Table 3-5 Sidewalk Defects by Rating

Severity Rating	No. of Defects
Low	867
Medium	1187
High	77

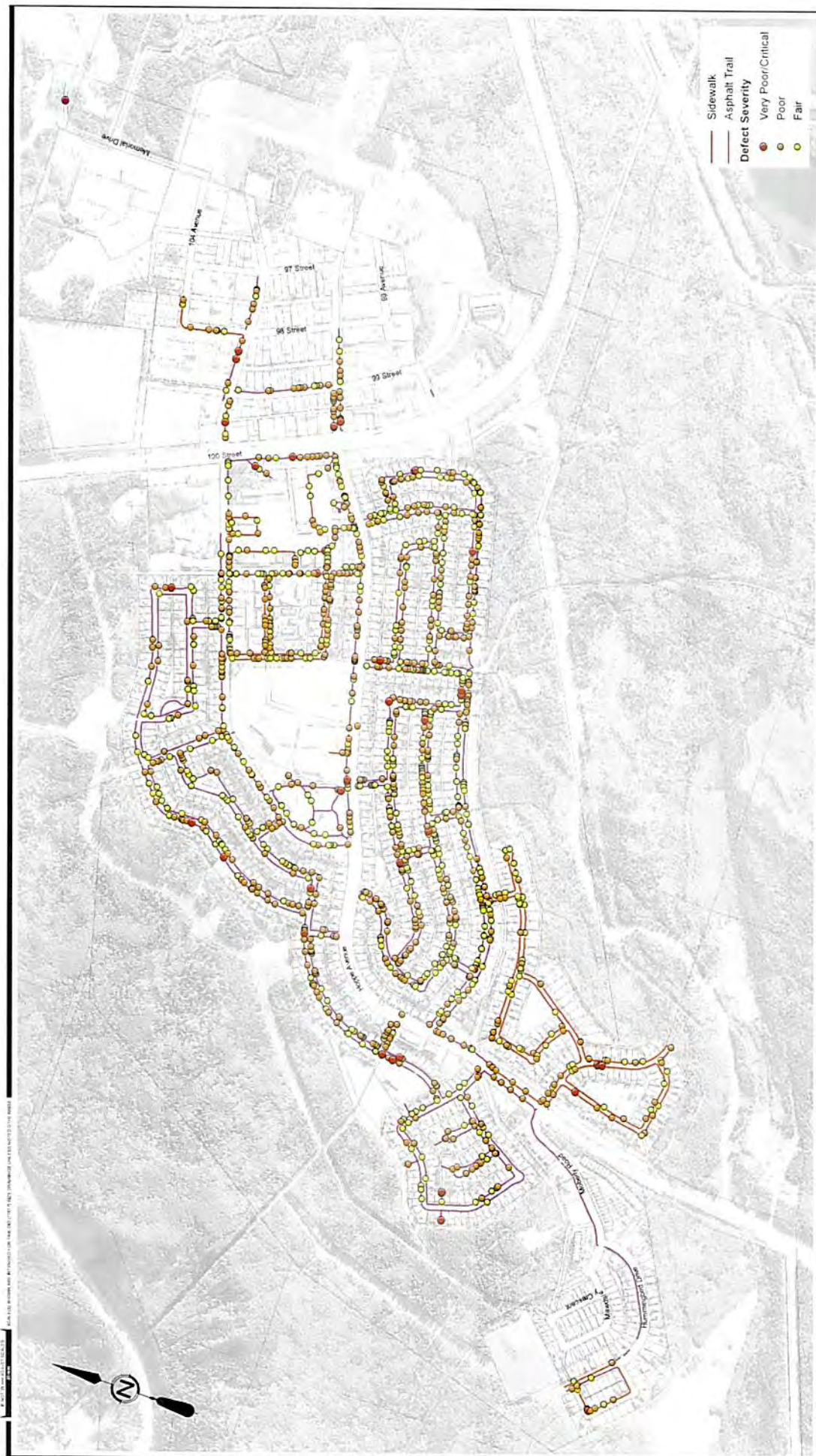


FIGURE 3-4

AE PROJECT No. 2022-3300-00
 SCALE 1:10,000
 APPROVED 2023 JUN 02
 DATE 2023 JUN 02
 REVIEW ISSUED FOR FINAL
 DESCRIPTION



M.D. OF GREENVIEW
 HAYLEY OF GRANDE CACHE
 ROADS INSPECTION 2022
 SIDEWALK DEFECT SEVERITY

3.3.2 Sidewalk Condition Rating

To calculate the overall sidewalk condition rating, defects with the same severity rating were grouped together and the total number of corresponding sidewalk panels representing each group were identified. The density of each severity group was calculated. A weighted value, as indicated in **Table 3-6**, was then applied to calculate a score. The sum of the scores was used to determine the overall condition of the sidewalk based the criteria noted in **Table 3-7**.

Table 3-6 Severity of Weightings

Severity Rating	Weight
Good	1
Low	2
Medium	7
High	10

Table 3-7 Overall Condition Criteria

Overall Condition	Criteria
Good	<0.2
Fair	0.2 - 0.79
Poor	0.8 - 1.49
Very Poor	>1.5

As noted in **Table 3-8**, of all the sidewalk surveyed:

- 24% were in Good condition.
- 60% were in Fair condition.
- 14% in Poor condition.
- 2% in Very Poor condition.

Refer to **Figure 3-5**.

Table 3-8 Overall Sidewalk Condition

Overall Condition	Percent of Sidewalks Assessed
Good	24%
Fair	60%
Poor	14%
Very Poor	2%

3.3.3 Tripping Hazards

Unlike other sidewalk defects, tripping hazards present a potential liability for the MD of Greenview in that they pose a potential risk of injury to the user. All tripping hazard defects have been identified and mapped in **Figure 3-6**. A total of **325 tripping hazards** were observed throughout the Hamlet. Although tripping hazards form part of the overall sidewalk condition, addressing all trip hazards should be considered separately and prioritized above all sidewalk repairs.

3.4 Paved Trails

29 paved trails totalling 2770 metres were surveyed and assessed within the Hamlet. The ASTM 6433 approach was used to determine the overall condition rating based on the assessed PCI. **Table 3-9** below and **Figure 3-7** provide a summary of the assessed condition of each trail. 76% of the asphalt trails assessed were in fair condition or better, whereas 24% in poor condition or worse. None of the trails were assessed as failed.

Table 3-9 Paved Trails – Condition Rating

PCI Score	Condition Rating	Percentage of Trails Assessed
85 – 100	Good	45%
70 – 85	Satisfactory	27%
55 – 70	Fair	4%
40 – 55	Poor	7%
25 – 40	Very Poor	0%
10 – 25	Serious	17%
0 – 10	Failed	0%

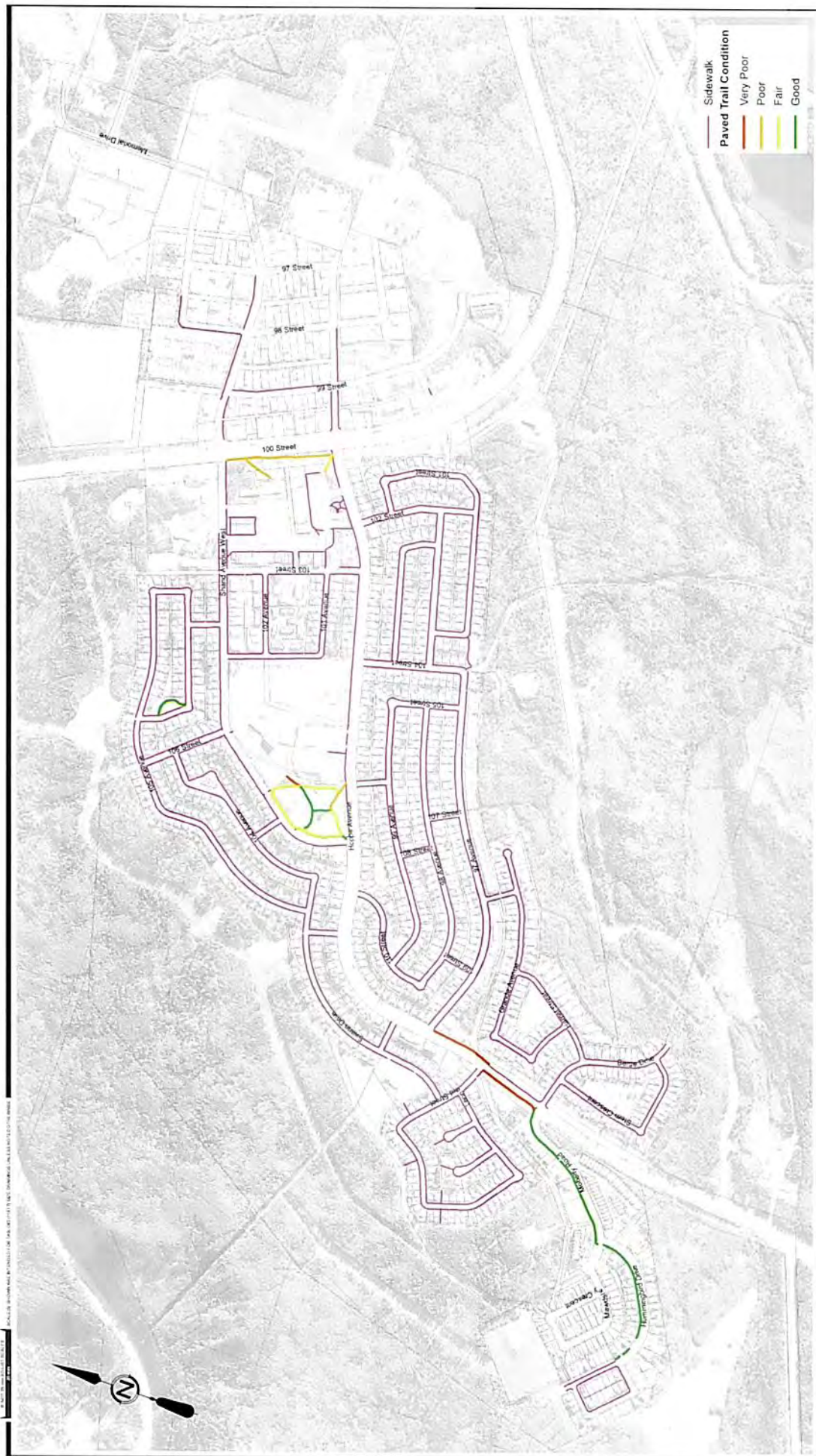


FIGURE 3-7

AE PROJECT No. 2022-3300-00
SCALE 1:110,000

M.D. OF GREENVIEW
HAMLET OF GRAVLEE CACHE

DATE 2023JUN02

DESCRIPTION ISSUED FOR FINAL

ROADS INSPECTION 2022

ASPHALT TRAIL CONDITION RATING



4 PRIORITIZATION

4.1 Roadways

A roadway's classification (local, collector, arterial) can be a significant influencer in their prioritization for rehabilitation. Target levels of service are generally higher for higher roadway classifications in that a motorist driving on a local and arterial roadway with similar PCI's will have a different experience in different ride quality due to the difference in travelled speeds; a depression on a roadway will have a higher impact on the user on a higher roadway class. Roadway classes identified with the Hamlet include arterial (Hoppe Avenue), collector (Shand Avenue West) and local residential/industrial roadways. To give priority to higher classified roadways, weighting was applied to each assessed roadway within a given class, accordingly. Roadway location also plays a factor in prioritization as roadways in front of schools or commercial areas generally see higher volume of vehicles. Maintaining a higher level of service and aesthetics will play a role under the location weighting as well. **Table 4-1** summarizes the weighting applied for roadway class and location.

Table 4-1 Roadway Prioritization by Class and Location

Roadway Classification	Weighting
Roadway Condition Weighting	
Good	0.5
Satisfactory	1.0
Fair	2.0
Poor	3.0
Very Poor	7.0
Serious	9.0
Failed	12.0
Roadway Classification Weighting	
Arterial	1.5
Collector	1.2
Local	1.0
Roadway Location Weighting	
Institutional/Recreational	1.5
Commercial District	1.2
All other roads	1.0

Table 4-2 Roadway Priority Criteria

Roadway Priority	Scoring Criteria
Low	≤ 1.0
Medium	1.1 - 2.9
High	> 3.0

Table 4-3 Roadway Priorities Based on Length

Roadway Priority	Total Length of Roadways
Low	13.5 km
Medium	9.8 km
High	7.7 km

A list of all roadways ranked by priority are provided in [Appendix A](#).

4.2 Paved Parking Lots

For the purposes of this program, parking lots will only be prioritized based on PCI only. The reason for this approach is that the impact of location and or classification does not change for each parking lot. Therefore, a weighting of one (1) was applied to the PCI score. [Table 4-4](#) represents the criteria used to establish high, low, and medium priority parking lots.

Table 4-4 Paved Parking Lots Priority Criteria

Parking Lot Priority	PCI Criteria
Low	71-100
Medium	41-70
High	1-40

Based on the criteria noted in [Table 4-4](#), [Table 4-5](#) summarizes the priority ranking of each parking lot.

Table 4-5 Parking Lot Summary by Priority

Parking Lot ID	General Area	Area (m ²)	Priority
P-1	GC Recreational Facility	3560	Low
P-3	GC Public Health Center	780	Low
P-4	GC Public Health Center	990	Low
P-6	GC Commercial District	2200	Low
P-12	GC Commercial District	2485	Low
P-13	GC Commercial District	3120	Low
P-14	GC Community Highschool	2340	Low
P-15	GC Central Park	790	Low
P-5	GC Public Health Center	965	Medium
P-7	GC Commercial District	6120	Medium
P-8	GC Hotel	1250	Medium
P-9	GC Commercial District	8120	Medium
P-10	GC Commercial District	1665	Medium
P-11	GC Commercial District	475	High

4.3 Sidewalks

The risk to public increases in areas where pedestrian traffic is higher; for example sidewalks around schools and commercial areas see increased volumes of traffic over a residential street located at the limits of the Hamlet. As such, for the purposes of this program, sidewalks will be prioritized based on location in combination with the overall condition of the sidewalk as described in [Table 4-6](#). The following table details the weights applied to sidewalks by location. Sidewalks in Good condition are not considered for prioritization as no defects are observed in good sections of sidewalks.

Table 4-6 Sidewalk Weight by Location

Location	Weight
Hospital/Seniors Facility	10
School/Parks/Trails	9
Commercial District	7
Collectors/Arterials	6
Residential	5
Industrial Area	2

Based on the weightings applied, the following [Table 4-7](#) details the criteria used to determine sidewalks of high, medium, and low priority.

Table 4-7 Sidewalk Priority Criteria

Priority	Criteria
Low	0.1-3.9
Medium	4.0-5.9
High	>6.0

Based on the criteria noted above, the following **Table 4-8** summarizes the lengths of sidewalks within the priority ranking. 2341 metres of sidewalk were observed to have no defects.

Table 4-8 Sidewalk Lengths by Priority

Priority	Sidewalk Lengths (m)
Low	26,627
Medium	4,502
High	1,198

A list of all sidewalks ranked by priority are provided in **Appendix B**.

4.4 Paved Trails

There are four general locations where paved trails exist with the Hamlet. These include residential areas, arterials roadways, parks, and near the commercial district. To prioritize the trails, weighting will be applied based on their location as well as their PCR. **Table 4-9** summarizes the weighting used in prioritizing paved trails.

Table 4-9 Paved Trail Prioritizing by Location and PCR

Paved Trail Classification	Weighting
Paved Trail Condition Weighting	
Good	0.5
Satisfactory	1.0
Fair	2.0
Poor	3.0
Very Poor	7.0
Serious	9.0
Failed	12.0
Paved Trail Location Weighting	
Residential	1.0
Arterial	1.2
Commercial District	1.4
Parks	1.7

The following criteria was applied to determine paved trails of high, medium, and low priority. Also provided in the table is the total length of trails within each category.

Table 4-10 Paved Trails by Priority

Priority	Criteria
Low	<1.0
Medium	1.1 – 2.0
High	>2.0

Based on the criteria noted above, the following table summarizes the lengths of paved trails within each priority ranking.

Table 4-11 Paved Trail by Priority

Priority	Paved Trail Lengths (m)
Low	1,248
Medium	759
High	763

A list of all paved trails ranked by priority are provided in [Appendix C](#).

5 COSTING AND ASSUMPTIONS

To establish a budget level estimate for renewal work, unit rates for various treatment options were obtained from recently tendered projects. **Table 5-1** summarizes renewal options considered as part of the program, and a corresponding unit rate cost.

Table 5-1 Unit Rates

Treatment	Unit	Unit Rate
Roadways/Parking Lots		
Crack Sealing	Section	\$2,500
50mm Cold Mill and 50mm Overlay	m ²	\$50
Pothole Repair	ea.	\$1000
Base Repairs	m ²	\$500
Reconstruction	m ²	\$200
Curb and Gutter Replacement	m	\$500
Concrete Sidewalk		
Sidewalk Spot Repairs (Trip Hazards)	Panel	\$750
Sidewalk Grind and Seal	ea.	\$100
Sidewalk Replacement	m	\$500
Paved Trails		
Crack Sealing	Section	\$1,000
Slurry Seal	m ²	\$10
Asphalt Trail Spot Repairs	m ²	\$300
Asphalt Remove and Replace	m ²	\$200

Tables 5-2 displays the total opinion of probable cost for each priority level for the roads, sidewalks, and asphalt trails respectively.

Table 5-2 Opinion of Probable Cost for Priority Rehabilitations

Priority	Opinion of Probable Cost
Roads	
High	\$11,174,000.00
Medium	\$1,323,300.00
Low	\$600,100.00
Sidewalks	
High	\$107,900.00
Medium	\$239,400.00
Low	\$581,900.00
Asphalt Trails	
High	\$191,700.00
Medium	\$22,700.00
Low	\$8,400.00

5.1 Assumptions

The following are a list of assumptions made in the preparation for of the costs above.

- The condition of each asset and observed defects were reviewed and a treatment strategy was prepared based on engineering judgement and the inferred rehabilitation effort by PCR rating. The unit rates and corresponding treatment were used to develop the total opinion or probable cost.
- Unit rates in **Table 5-1** were based on average unit rates for project tendered in 2022 and adjusted for inflation in 2023.
- The assessment does not take into consideration the existing pavement structure and subsurface conditions. Further investigative work is recommended to confirm a rehabilitation strategy during design phases.
- The total Opinion of Probable Costs provided in **Table 5-2** include 15% Engineering and 30% Contingency.

6 CONCLUSIONS AND RECOMMENDATIONS

As part of this condition assessment, approximately 31 km of paved public roads, 14 commercial/institutional parking lots, 34 km of sidewalks, and 2.7 km of paved trails were assessed by AE.

Of the 31 km of paved roads assessed, 54% of roadway segments were assessed to be in satisfactory condition or better, 39% were assessed as being in the poor to fair condition, and 7% are in very poor and serious condition. No roadway segments were noted as failed.

Of the 14 Parking Lots assessed, ten were assessed to be in fair condition or better and three were assessed as poor, and one was assessed in serious condition.

2131 defects were observed on the 34 km of sidewalks inspected. Of the 2131 defects observed 41% of the defects were considered low severity, 56% medium severity and 36% high severity.

Based on the defects observed along predetermined segments of sidewalk (i.e., intersection to intersection) 24% of the sidewalk segments were assessed to be in **Good** condition, 60% in **Fair** condition, 14% in **Poor** condition, and 2% in **Very Poor** condition.

163 defects were observed along the 2.7 km of paved trails assessed. Based on the assessment, 76% of the asphalt trails assessed were in fair condition or better, whereas 24% in poor condition or worse. None of the trails were assessed as failed.

In general, the overall condition of the roadways, parking lots, sidewalks, and paved trails were observed to be in adequate condition.

A weighted approach was used to prioritize the roadways, parking lots, sidewalks, and paved trails into priority levels which considered both the asset condition and the impact of failure. In summary, based on total roadways, parking lots, sidewalks and paved trails assessed, 56% of the roadways, 42% of the parking lots, 17% of the sidewalks and 56% of the paved trails were assessed as medium and high priority.

AE recommends an implementation strategy that includes proactive maintenance while addressing assets that have already failed. The benefit of this approach is to invest the preservation of existing assets to extend their service life while addressing the immediate needs of assets that are in serious condition or on the verge of failure.

With time, roadways, sidewalks, parking lots, and paved trails will continue to degrade. It is recommended that the condition assessment be repeated and/or updated every five to ten years to ensure that the condition assessment reflects the current condition of the asset and priority for renewal.

The renewal methods and corresponding unit rates listed in **Table 5-1** serve only to facilitate future planning and budgeting. It is recommended that actual costs and renewal methods be confirmed during preliminary and detailed design.

Refer to the Combined Infrastructure Capital Plan for implementation plan and associated costs over the next 15 years to maintain, renew, or upgrade the assets assessed under this report.

APPENDIX A – ROADWAY NETWORK RANKED BY PRIORITY

Table A-1 Roadways Ranked by Priority

Priority	Street Name	From	To	PCI	ASTM Rating	Cost*	Road Length (km)
High	100 St - Service Rd	Shand Ave	Hoppe Ave	20	Serious	\$766,400.00	0.32
High	Campground Rd	Memorial Drive	Campground Gate	24	Serious	\$912,900.00	0.42
High	97 St	Shand Ave	104 Ave	24	Serious	\$427,100.00	0.21
High	Hoppe Ave	Leonard St	Moberly Rd	30	Very Poor	\$228,000.00	0.20
High	Hoppe Ave	Leonard St	Moberly Rd	30	Very Poor	\$228,100.00	0.20
High	Hoppe Ave	98 St	97 St	32	Very Poor	\$344,400.00	0.17
High	100 St - Service Rd	Hoppe Ave	98 Ave	28	Very Poor	\$440,000.00	0.30
High	Pine Plaza Rd			36	Very Poor	\$260,600.00	0.18
High	98 St	Shand Ave	104 Ave	30	Very Poor	\$336,400.00	0.19
High	97 Ave	104 St	105 St	32	Very Poor	\$189,100.00	0.10
High	Hoppe Ave	97 Ave	Leonard St	42	Poor	\$135,000.00	0.18
High	Hoppe Ave	97 Ave	Leonard St	52	Poor	\$134,600.00	0.18
High	Pine Plaza Rd			42	Poor	\$187,300.00	0.19
High	Hoppe Ave			44	Poor	\$31,000.00	0.04
High	Memorial Dr	Campground Rd	End	44	Poor	\$212,200.00	0.25
High	Memorial Dr	104 Ave	Campground Rd	48	Poor	\$241,000.00	0.27
High	Shand Ave	97 St	End	48	Poor	\$97,400.00	0.09
High	Hoppe Ave	Rec Centre	106 St	68	Fair	\$51,800.00	0.34
High	104 Ave	104 St	105 St	42	Poor	\$236,300.00	0.23
High	105 St	104 Ave	105 Ave	42	Poor	\$156,700.00	0.15
High	Hoppe Ave - Service Rd N	98 Ave	Leonard St	42	Poor	\$180,000.00	0.28
High	Hoppe Ave - Service Rd S	110 St	97 Ave	42	Poor	\$335,300.00	0.49
High	102 St	99 Ave	98 Ave	48	Poor	\$164,900.00	0.14
High	Hoppe Ave - Service Rd S	102 St	End	48	Poor	\$116,200.00	0.18
High	102 Ave	103 St	104 St	52	Poor	\$289,600.00	0.24
Medium	97 Ave	103A St	102 St	52	Poor	\$353,400.00	0.34
Medium	Hoppe Ave - Service Rd S	102 St	104 St	52	Poor	\$263,500.00	0.40
Medium	104 Ave	98 St	97 St	54	Poor	\$167,500.00	0.17
Medium	106 St	Shand Ave W	104 Ave	54	Poor	\$183,900.00	0.16
Medium	Hoppe Ave	100 St	Pine Plaza	62	Fair	\$0.00	0.12
Medium	Hoppe Ave	102 St	103 St	68	Fair	\$3,500.00	0.13
Medium	Hoppe Ave	98 Ave	97 Ave	68	Fair	\$6,100.00	0.10
Medium	Hoppe Ave	103 St	104 St	68	Fair	\$3,300.00	0.26
Medium	Hoppe Ave	99 St	98 St	68	Fair	\$4,500.00	0.18
Medium	Hoppe Ave	98 Ave	97 Ave	68	Fair	\$10,000.00	0.10
Medium	Hoppe Ave	103 St	104 St	70	Fair	\$9,800.00	0.26
Medium	Shand Ave	100 St	99 St	64	Fair	\$13,500.00	0.17
Medium	Pine Plaza Rd			60	Fair	\$15,800.00	0.20
Medium	Pine Plaza Rd			67	Fair	\$7,500.00	0.05
Medium	Hoppe Ave	106 St	Shand Ave	72	Satisfactory	\$12,000.00	0.16
Medium	Hoppe Ave	106 St	Shand Ave	76	Satisfactory	\$4,000.00	0.16
Medium	Hoppe Ave	104 St	Rec Centre	78	Satisfactory	\$8,500.00	0.34
Medium	98 St	Shand Ave	Hoppe Ave	56	Fair	\$31,300.00	0.25
Medium	Mawdsley Cres	Mawdsley Cres	Moberly Rd	56	Fair	\$0.00	0.07
Medium	106 St	99 Ave	Hoppe Ave	58	Fair	\$14,800.00	0.10
Medium	97 Ave	107 ST	105 ST	58	Fair	\$44,600.00	0.29
Medium	99 Ave	108 St	106 ST	58	Fair	\$17,100.00	0.21
Medium	102 St	97 Ave	98 Ave	60	Fair	\$10,000.00	0.10
Medium	104 Ave	107 St	Swann Dr	60	Fair	\$37,700.00	0.21
Medium	99 Ave	104 St	103 St	60	Fair	\$41,100.00	0.33
Medium	Grande Ave	Hamel St	108 ST	60	Fair	\$17,300.00	0.23
Medium	98 Ave	103A St	103 St	62	Fair	\$37,500.00	0.25
Medium	98 Ave	108 St	107 St	62	Fair	\$300.00	0.09
Medium	98 Ave	103 St	102 St	62	Fair	\$12,400.00	0.10
Medium	99 Ave	106 St	105 St	62	Fair	\$17,500.00	0.22

Priority	Street Name	From	To	PCI	ASTM Rating	Cost*	Road Length (km)
Medium	99 Ave	110 St	108 St	62	Fair	\$25,500.00	0.34
Medium	Swann Dr	104 Ave	105 Ave	62	Fair	\$8,800.00	0.10
Medium	102 St	Hoppe Ave	99 Ave	64	Fair	\$12,100.00	0.09
Medium	105 St	97 Ave	98 Ave	64	Fair	\$8,500.00	0.10
Medium	97 Ave	109 St	108 St	64	Fair	\$13,800.00	0.21
Medium	Hoppe Ave - Service Rd N	110 St	98 Ave	64	Fair	\$49,500.00	0.31
Medium	Hoppe Ave - Service Rd S	106 St	110 St	64	Fair	\$27,200.00	0.31
Medium	Hoppe Ave - Service Rd S	104 St	106 St	64	Fair	\$51,000.00	0.34
Medium	Hoppe Ave - Service Rd N	Shand Ave W	110 St	67	Fair	\$40,400.00	0.26
Medium	103A St	97 Ave	98 Ave	68	Fair	\$12,400.00	0.10
Medium	105 St	98 Ave	99 Ave	68	Fair	\$15,000.00	0.10
Medium	110 St	Hoppe Ave	Swann Dr	68	Fair	\$21,000.00	0.09
Medium	Grande Ave	Hamel St	Hamel St	68	Fair	\$56,300.00	0.45
Medium	Mawdsley Cres	Mawdsley Cres	Mawdsley Cres	68	Fair	\$2,300.00	0.25
Medium	Mawdsley Cres	Mawdsley Cres	Mawdsley Cres	68	Fair	\$9,000.00	0.23
Medium	Moberly Rd	Stephenson Rd	Mawdsley Cres	68	Fair	\$3,800.00	0.08
Medium	Stern Cres	Stern Cres	Berge Dr	68	Fair	\$17,300.00	0.23
Medium	97 Ave	Hoppe Ave	109 St	70	Fair	\$7,500.00	0.20
Medium	98 Ave	104 St	130A St	70	Fair	\$22,500.00	0.10
Medium	Shand Ave	104 St	106 St	72	Satisfactory	\$18,400.00	0.21
Medium	Hoppe Ave	100 St	Pine Plaza	76	Satisfactory	\$5,300.00	0.12
Medium	Hoppe Ave	Pine Plaza	102 St	76	Satisfactory	\$6,400.00	0.10
Low	Shand Ave	Hoppe Ave	107 St	76	Satisfactory	\$15,800.00	0.21
Low	Hoppe Ave	100 St	99 St	78	Satisfactory	\$13,000.00	0.15
Low	Hoppe Ave	Shand Ave	110 St	72	Satisfactory	\$11,300.00	0.15
Low	Hoppe Ave	110 St	98 Ave	76	Satisfactory	\$21,700.00	0.29
Low	Hoppe Ave	Shand Ave	110 St	78	Satisfactory	\$11,300.00	0.15
Low	Hoppe Ave	110 St	98 Ave	82	Satisfactory	\$26,300.00	0.30
Low	Shand Ave	Pine Plaza	Pine Plaza	84	Satisfactory	\$4,900.00	0.09
Low	Shand Ave	100 St	Pine Plaza	84	Satisfactory	\$3,500.00	0.13
Low	103 St	101 Ave	Pine Plaza	72	Satisfactory	\$7,500.00	0.09
Low	Pine Plaza Rd			72	Satisfactory	\$2,000.00	0.03
Low	Pine Plaza Rd			78	Satisfactory	\$15,000.00	0.19
Low	Pine Plaza Rd			78	Satisfactory	\$500.00	0.04
Low	Shand Ave	104 St	104 St	78	Satisfactory	\$3,600.00	0.09
Low	Hoppe Ave	Pine Plaza	102 St	88	Good	\$5,300.00	0.10
Low	Pine Plaza Rd			83	Satisfactory	\$1,500.00	0.10
Low	Hoppe Ave	102 St	103 St	90	Good	\$1,800.00	0.14
Low	Shand Ave	106 St	107 St	92	Good	\$14,500.00	0.29
Low	98 Ave	109 St	108 St	71	Satisfactory	\$4,000.00	0.31
Low	98 Ave	107 St	105 ST	71	Satisfactory	\$4,000.00	0.31
Low	Stephenson Dr			71	Satisfactory	\$500.00	0.03
Low	103 St	99 Ave	98 Ave	72	Satisfactory	\$18,400.00	0.10
Low	Moberly Rd	Stephenson Dr	Moberly 131	72	Satisfactory	\$2,300.00	0.28
Low	110 St	99 Ave	Hoppe Ave	74	Satisfactory	\$25,000.00	0.25
Low	Grande Ave	108 ST	End	74	Satisfactory	\$9,300.00	0.11
Low	106 St	104 Ave	105 Ave	76	Satisfactory	\$12,400.00	0.10
Low	110 St	98 Ave	99 Ave	76	Satisfactory	\$9,600.00	0.10
Low	97 St	Shand Ave	Hoppe Ave	76	Satisfactory	\$18,000.00	0.21
Low	Moberly Rd	Hoppe Ave	Moberly 131	76	Satisfactory	\$1,500.00	0.16
Low	104 Ave	104 Ave	106 St	78	Satisfactory	\$11,000.00	0.11
Low	104 Ave	104 Ave	107 St	78	Satisfactory	\$12,000.00	0.15
Low	104 Ave	104 Ave	104 Ave	78	Satisfactory	\$6,000.00	0.09
Low	104 Ave	97 St	Memorial Dr	78	Satisfactory	\$6,500.00	0.25
Low	104 St	Shand Ave W	102 Ave	78	Satisfactory	\$3,000.00	0.12
Low	104 St	Shand Ave W	104 Ave	78	Satisfactory	\$1,500.00	0.10
Low	97 Ave	108 St	107 St	78	Satisfactory	\$9,800.00	0.25

Priority	Street Name	From	To	PCI	ASTM Rating	Cost*	Road Length (km)
Low	98 Ave	99 St alley	100 St	78	Satisfactory	\$300.00	0.09
Low	Stephenson Dr	Eaton Falls Cres	Moberly Rd	78	Satisfactory	\$3,800.00	0.43
Low	Swann Dr	110 St	98 Ave	78	Satisfactory	\$14,500.00	0.42
Low	Hoppe Ave	Moberly Rd	Sewer Line Rd	86	Good	\$10,300.00	0.80
Low	Hoppe Ave	110 St	110 St	86	Good	\$3,000.00	0.12
Low	101 Ave	103 St	104 St	80	Satisfactory	\$21,000.00	0.24
Low	Swann Dr	98 Ave	Leonard St	80	Satisfactory	\$12,500.00	0.23
Low	98 Ave	Hoppe Ave	Swann Dr	82	Satisfactory	\$7,500.00	0.09
Low	104 St	99 Ave	98 Ave	83	Satisfactory	\$2,500.00	0.10
Low	104 St	97 Ave	98 Ave	83	Satisfactory	\$1,300.00	0.10
Low	104 St	Hoppe Ave	99 Ave	83	Satisfactory	\$1,300.00	0.09
Low	108 St	97 Ave	Grande Ave	83	Satisfactory	\$1,300.00	0.10
Low	Stephenson Dr	Eaton Falls Cres	Eaton Falls Cres	83	Satisfactory	\$0.00	0.14
Low	107 St	Shand Ave W	104 Ave	84	Satisfactory	\$1,500.00	0.10
Low	97 Ave	102 St	Alley	84	Satisfactory	\$4,300.00	0.16
Low	Eaton Falls Cres	Stephanson Dr	Stephanson Dr	84	Satisfactory	\$13,000.00	0.33
Low	103 St			90	Good	\$0.00	0.15
Low	Hoppe Ave	110 St	110 St	97	Good	\$1,800.00	0.12
Low	Shand Ave	Pine Plaza	103 St	86	Good	\$2,500.00	0.10
Low	Shand Ave	99 St	98 St	86	Good	\$4,500.00	0.18
Low	103 St	Hoppe Ave	101 Ave	90	Good	\$1,300.00	0.10
Low	Shand Ave	103 St	104 St	90	Good	\$7,500.00	0.15
Low	Pine Plaza Rd	103 St	Pine Plaza Rd	92	Good	\$1,300.00	0.10
Low	Pine Plaza Rd			92	Good	\$2,800.00	0.10
Low	Shand Ave	98 St	97 St	92	Good	\$4,500.00	0.18
Low	103 St	Pine Plaza	102 Ave	97	Good	\$1,300.00	0.09
Low	103 St	Shand Ave W	102 Ave	97	Good	\$1,500.00	0.12
Low	Pine Plaza Rd			97	Good	\$800.00	0.04
Low	101 St	99 Ave	Alley	86	Good	\$4,500.00	0.18
Low	108 St	99 Ave	98 Ave	86	Good	\$3,800.00	0.10
Low	98 Ave	109 St	110 St	86	Good	\$9,900.00	0.11
Low	Berge Dr	Hamel St	Stern Cres	86	Good	\$5,500.00	0.21
Low	Berge Dr	Hoppe Ave	Stern Cres	86	Good	\$2,500.00	0.10
Low	Leonard St	Manning Cres	Morris Cres	86	Good	\$1,400.00	0.10
Low	Leonard St	Swann Dr	Manning Cres	86	Good	\$38,300.00	0.76
Low	Leonard St	Morris Cres	Leonard St	86	Good	\$2,500.00	0.10
Low	Stern Cres	Berge Dr	Stern Cres	86	Good	\$7,000.00	0.27
Low	Swann Dr	105 Ave	110 St	86	Good	\$2,300.00	0.06
Low	Berge Dr	Stern Cres	Hamel St	89	Good	\$1,300.00	0.08
Low	Hamel St	Grande Ave	Berge Dr	90	Good	\$3,000.00	0.12
Low	103 St	104 Ave	105 Ave	92	Good	\$300.00	0.10
Low	104 St	102 Ave	101 Ave	92	Good	\$4,000.00	0.15
Low	105 Ave	103 St	105 St	92	Good	\$4,500.00	0.36
Low	105 Ave	Swann Dr	106 St	92	Good	\$1,800.00	0.66
Low	109 St	97 Ave	98 Ave	92	Good	\$2,500.00	0.10
Low	99 Ave	102 St	101 St	92	Good	\$2,500.00	0.10
Low	Berge Dr	Stern Cres	End	92	Good	\$1,500.00	0.05
Low	Hamel St	Grande Ave	Grande Ave	92	Good	\$5,500.00	0.21
Low	Leonard St	Hoppe Ave	Leonard St	92	Good	\$1,300.00	0.09
Low	Manning Cres	Leonard St	End	92	Good	\$3,300.00	0.13
Low	104 Ave	104 Ave	104 Ave	97	Good	\$1,800.00	0.13
Low	99 St	Shand Ave	Hoppe Ave	97	Good	\$4,000.00	0.31
Low	Leonard St	Leonard St	Swann Dr	97	Good	\$1,000.00	0.06
Low	Morris Cres	Leonard St	End	97	Good	\$1,300.00	0.09
Low	105 Ave	105 St	106 St	98	Good	\$900.00	0.13
Low	104 Ave	104 St	103 St	100	Good	\$300.00	0.09
Low	105 Ave			100	Good	\$0.00	0.00

Priority	Street Name	From	To	PCI	ASTM Rating	Cost*	Road Length (km)
Low	107 St	97 Ave	98 Ave	100	Good	\$0.00	0.10

Notes:

*The "Cost" is the estimate cost to reconstruct or to rehabilitate road segments based on observed defects and condition.

A road segment with a \$0.00 Cost include those roadways with no defects or minor defects to be monitored only.

APPENDIX B - SIDEWALK NETWORK RANKED BY PRIORITY

Table B-1 Sidewalks Ranked by Priority

Rehab Priority	Object ID (referenced in GIS database)	Severity Rating	Cost to Rehabilitate Sidewalk	Sidewalk Length (m)
High	234	Very Poor	\$1,700.00	14.0
High	9	Very Poor	\$2,650.00	17.5
High	114	Very Poor	\$4,700.00	35.4
High	287	Very Poor	\$1,850.00	46.7
High	40	Poor	\$6,750.00	72.4
High	190	Poor	\$750.00	19.8
High	23	Very Poor	\$6,750.00	37.9
High	213	Poor	\$750.00	10.9
High	187	Poor	\$1,600.00	23.0
High	210	Poor	\$1,250.00	43.1
High	198	Poor	\$3,200.00	57.1
High	98	Poor	\$750.00	12.5
High	97	Poor	\$1,500.00	29.6
High	83	Poor	\$3,700.00	81.7
High	290	Poor	\$4,550.00	98.1
High	104	Poor	\$4,150.00	81.6
High	88	Poor	\$5,550.00	79.9
High	43	Poor	\$3,000.00	53.3
High	212	Poor	\$950.00	47.4
High	28	Very Poor	\$800.00	38.4
High	96	Fair	\$2,450.00	81.8
High	174	Poor	\$7,500.00	124.4
High	322	Poor	\$7,500.00	91.3
Medium	37	Very Poor	\$3,750.00	39.2
Medium	204	Poor	\$1,600.00	53.0
Medium	251	Poor	\$12,800.00	234.8
Medium	101	Fair	\$3,000.00	95.6
Medium	12	Very Poor	\$5,250.00	39.2
Medium	235	Fair	\$1,600.00	51.1
Medium	201	Very Poor	\$10,500.00	65.2
Medium	247	Fair	\$2,650.00	160.3
Medium	108	Poor	\$200.00	19.4
Medium	127	Poor	\$400.00	50.0
Medium	323	Poor	\$700.00	74.2
Medium	41	Fair	\$4,500.00	151.7
Medium	170	Poor	\$13,150.00	220.9
Medium	116	Poor	\$1,700.00	40.0
Medium	14	Fair	\$500.00	96.8
Medium	214	Fair	\$2,650.00	131.4
Medium	291	Poor	\$23,450.00	346.5
Medium	319	Poor	\$4,050.00	83.5
Medium	132	Poor	\$3,500.00	95.1
Medium	168	Poor	\$3,950.00	80.5
Medium	163	Poor	\$1,250.00	74.2
Medium	95	Fair	\$3,300.00	148.4
Medium	162	Poor	\$200.00	34.3
Medium	324	Fair	\$3,100.00	86.0
Medium	139	Poor	\$2,450.00	85.5
Medium	106	Poor	\$1,350.00	81.5
Medium	315	Poor	\$3,000.00	54.8
Medium	284	Poor	\$3,750.00	78.6
Medium	183	Fair	\$2,450.00	103.2
Medium	89	Poor	\$4,500.00	78.9
Medium	236	Poor	\$4,050.00	116.6
Medium	60	Poor	\$600.00	81.6

Rehab Priority	Object ID (referenced in GIS database)	Severity Rating	Cost to Rehabilitate Sidewalk	Sidewalk Length (m)
Medium	84	Poor	\$6,050.00	208.2
Medium	149	Poor	\$9,350.00	308.4
Medium	92	Poor	\$5,300.00	198.7
Medium	167	Fair	\$2,650.00	107.1
Medium	286	Poor	\$850.00	77.1
Medium	143	Poor	\$3,850.00	236.6
Medium	191	Fair	\$2,250.00	51.6
Medium	173	Fair	\$850.00	54.0
Medium	289	Poor	\$4,050.00	108.2
Low	305	Fair	\$950.00	43.8
Low	64	Fair	\$2,350.00	76.5
Low	135	Fair	\$1,800.00	78.5
Low	49	Fair	\$6,400.00	134.2
Low	138	Fair	\$1,800.00	81.5
Low	321	Fair	\$2,250.00	49.9
Low	44	Fair	\$16,000.00	660.4
Low	141	Fair	\$500.00	83.0
Low	42	Fair	\$10,000.00	288.7
Low	260	Fair	\$3,200.00	85.7
Low	102	Fair	\$7,150.00	240.8
Low	297	Fair	\$2,550.00	98.8
Low	161	Fair	\$6,000.00	127.8
Low	27	Fair	\$5,550.00	153.6
Low	155	Fair	\$7,250.00	238.8
Low	169	Fair	\$1,500.00	37.3
Low	215	Fair	\$6,850.00	184.6
Low	312	Fair	\$1,350.00	112.3
Low	148	Fair	\$3,700.00	202.7
Low	150	Fair	\$3,000.00	80.6
Low	241	Fair	\$4,050.00	148.5
Low	165	Fair	\$950.00	45.4
Low	246	Fair	\$6,200.00	147.5
Low	146	Fair	\$1,700.00	81.1
Low	250	Fair	\$5,950.00	222.5
Low	137	Fair	\$7,800.00	237.2
Low	123	Fair	\$8,550.00	310.5
Low	145	Fair	\$8,200.00	331.1
Low	166	Fair	\$5,200.00	220.6
Low	320	Fair	\$5,450.00	202.4
Low	199	Very Poor	\$700.00	54.9
Low	311	Fair	\$7,050.00	237.5
Low	172	Fair	\$850.00	40.1
Low	221	Fair	\$2,350.00	70.3
Low	90	Fair	\$5,450.00	218.1
Low	304	Fair	\$2,350.00	86.3
Low	285	Fair	\$6,200.00	204.5
Low	157	Fair	\$8,750.00	328.6
Low	151	Fair	\$5,950.00	298.0
Low	87	Fair	\$13,050.00	390.5
Low	308	Fair	\$5,000.00	208.7
Low	76	Fair	\$600.00	141.8
Low	33	Fair	\$3,100.00	102.8
Low	82	Fair	\$1,600.00	81.9
Low	125	Fair	\$9,850.00	247.9
Low	154	Fair	\$1,050.00	80.9
Low	279	Fair	\$200.00	37.9
Low	282	Fair	\$4,600.00	194.8

Rehab Priority	Object ID (referenced in GIS database)	Severity Rating	Cost to Rehabilitate Sidewalk	Sidewalk Length (m)
Low	26	Fair	\$1,050.00	80.6
Low	314	Fair	\$1,500.00	58.0
Low	197	Fair	\$0.00	122.9
Low	255	Fair	\$3,000.00	94.5
Low	107	Fair	\$14,700.00	636.7
Low	280	Fair	\$2,000.00	210.7
Low	307	Fair	\$4,500.00	92.0
Low	158	Fair	\$300.00	80.2
Low	294	Fair	\$3,400.00	127.8
Low	156	Fair	\$2,250.00	80.7
Low	240	Fair	\$1,800.00	105.5
Low	57	Fair	\$600.00	158.7
Low	103	Fair	\$2,000.00	208.3
Low	77	Fair	\$850.00	56.8
Low	242	Fair	\$400.00	143.1
Low	128	Fair	\$2,250.00	95.0
Low	266	Fair	\$5,450.00	239.9
Low	147	Fair	\$4,050.00	299.2
Low	119	Fair	\$3,850.00	183.9
Low	134	Fair	\$100.00	78.7
Low	142	Fair	\$5,100.00	319.7
Low	30	Fair	\$300.00	79.4
Low	86	Fair	\$300.00	79.9
Low	47	Fair	\$750.00	38.8
Low	281	Fair	\$200.00	99.1
Low	248	Fair	\$400.00	99.9
Low	258	Fair	\$1,500.00	79.0
Low	115	Fair	\$6,100.00	199.0
Low	296	Fair	\$3,300.00	166.7
Low	31	Fair	\$2,350.00	101.7
Low	152	Fair	\$1,500.00	81.0
Low	224	Fair	\$1,500.00	47.1
Low	261	Fair	\$1,500.00	67.7
Low	153	Fair	\$2,450.00	279.7
Low	80	Fair	\$1,500.00	80.9
Low	283	Fair	\$3,400.00	292.1
Low	200	Poor	\$1,050.00	45.6
Low	62	Fair	\$2,450.00	147.0
Low	209	Poor	\$4,250.00	279.9
Low	288	Fair	\$100.00	89.7
Low	164	Fair	\$750.00	47.0
Low	254	Fair	\$3,000.00	137.5
Low	59	Fair	\$0.00	223.7
Low	117	Fair	\$100.00	40.0
Low	257	Fair	\$200.00	133.5
Low	126	Fair	\$4,700.00	241.6
Low	140	Fair	\$200.00	89.7
Low	318	Poor	\$1,250.00	75.7
Low	13	Fair	\$3,750.00	163.4
Low	231	Poor	\$2,550.00	80.7
Low	136	Fair	\$1,450.00	312.8
Low	299	Fair	\$2,350.00	136.7
Low	252	Fair	\$6,000.00	289.0
Low	203	Fair	\$600.00	84.0
Low	124	Fair	\$750.00	81.5
Low	271	Fair	\$6,000.00	276.6
Low	85	Fair	\$1,500.00	78.7

Rehab Priority	Object ID (referenced in GIS database)	Severity Rating	Cost to Rehabilitate Sidewalk	Sidewalk Length (m)
Low	133	Fair	\$2,250.00	187.8
Low	293	Fair	\$1,500.00	79.5
Low	131	Fair	\$1,500.00	80.9
Low	29	Fair	\$1,700.00	128.1
Low	208	Fair	\$750.00	59.9
Low	262	Fair	\$2,350.00	203.6
Low	233	Fair	\$1,700.00	180.0
Low	21	Fair	\$1,800.00	232.4
Low	295	Fair	\$100.00	39.9
Low	265	Fair	\$3,000.00	209.0
Low	79	Fair	\$850.00	139.9
Low	61	Fair	\$1,500.00	82.4
Low	121	Fair	\$200.00	108.2
Low	303	Fair	\$600.00	324.9
Low	211	Good	\$0.00	17.0
Low	113	Fair	\$750.00	42.9
Low	120	Fair	\$750.00	81.3
Low	302	Fair	\$100.00	81.5
Low	310	Fair	\$750.00	226.2
Low	309	Fair	\$750.00	78.8
Low	249	Fair	\$850.00	95.5
Low	122	Fair	\$100.00	80.8
Low	259	Fair	\$850.00	81.4
Low	160	Fair	\$750.00	81.8
Low	268	Fair	\$1,600.00	201.5
Low	274	Good	\$3,100.00	217.8
Low	273	Good	\$1,150.00	406.0
Low	277	Good	\$2,450.00	225.0
Low	301	Good	\$0.00	97.0
Low	292	Good	\$100.00	90.8
Low	237	Good	\$100.00	93.8
Low	81	Good	\$850.00	141.1
Low	317	Good	\$100.00	81.8
Low	264	Good	\$1,600.00	273.1
Low	105	Good	\$2,250.00	211.1
Low	48	Good	\$0.00	37.9
Low	46	Good	\$1,150.00	365.5
Low	159	Good	\$100.00	89.6
Low	245	Good	\$100.00	89.8
Low	276	Good	\$750.00	131.4
Low	56	Good	\$1,700.00	344.0
Low	239	Good	\$200.00	226.4
Low	306	Good	\$750.00	96.4
Low	300	Good	\$0.00	44.9
Low	275	Good	\$1,500.00	207.6
Low	253	Good	\$750.00	128.5
Low	53	Good	\$0.00	46.9
Low	238	Good	\$750.00	83.8
Low	244	Good	\$100.00	90.1
Low	278	Good	\$850.00	118.1
Low	63	Good	\$0.00	107.0
Low	205	Fair	\$750.00	62.1
Low	18	Good	\$0.00	85.3
Low	272	Good	\$100.00	108.4
Low	25	Good	\$100.00	229.1
Low	193	Good	\$0.00	70.5
Low	118	Good	\$0.00	37.5

Rehab Priority	Object ID (referenced in GIS database)	Severity Rating	Cost to Rehabilitate Sidewalk	Sidewalk Length (m)
Low	171	Good	\$0.00	38.6
Low	45	Good	\$0.00	123.0
Low	36	Good	\$0.00	42.8
Low	38	Good	\$0.00	184.4
Low	100	Good	\$0.00	88.5
Low	243	Good	\$0.00	101.8
Low	15	Good	\$0.00	51.6
Low	232	Good	\$0.00	66.6
Low	263	Good	\$750.00	254.6
Low	55	Good	\$0.00	81.2
Low	144	Good	\$0.00	83.1
Low	270	Good	\$0.00	193.0
Low	256	Good	\$0.00	373.5
Low	7	Good	\$0.00	8.5
Low	8	Good	\$0.00	2.5
Low	10	Good	\$0.00	52.0
Low	16	Good	\$0.00	53.4
Low	17	Good	\$0.00	33.1
Low	20	Good	\$0.00	37.7
Low	24	Good	\$0.00	39.8
Low	34	Good	\$0.00	40.1
Low	50	Good	\$0.00	36.5
Low	65	Good	\$0.00	4.4
Low	78	Good	\$0.00	9.3
Low	93	Good	\$0.00	14.8
Low	94	Good	\$0.00	4.1
Low	99	Good	\$0.00	2.6
Low	109	Good	\$0.00	24.0
Low	188	Good	\$0.00	2.2
Low	189	Good	\$0.00	2.5
Low	192	Good	\$0.00	4.2
Low	194	Good	\$0.00	5.4
Low	195	Good	\$0.00	2.4
Low	196	Good	\$0.00	2.9
Low	206	Good	\$0.00	8.2
Low	219	Good	\$0.00	3.9
Low	222	Good	\$0.00	3.5
Low	227	Good	\$0.00	8.5
Low	267	Good	\$0.00	47.2
Low	269	Good	\$0.00	97.7
Low	313	Good	\$0.00	49.8
Low	316	Good	\$0.00	9.5
Low	326	Good	\$0.00	53.2
Low	327	Good	\$0.00	17.2
Low	328	Good	\$0.00	50.2
Low	329	Good	\$0.00	46.3
Low	330	Good	\$0.00	52.0

Notes:

*The "Cost" is the estimated cost to crack seal or replace damaged sidewalk panels.
Sidewalks with a \$0.00 Cost include sidewalks with no observed defects.

APPENDIX C - ASPHALT TRAIL NETWORK RANKED BY PRIORITY

Table C-1 Paved Trails by Priority

Priority	Street Name	From	To	Severity Rating	Cost*	Trail Length (m)
High	HWY 40	Shand Ave	Hoppe Ave	Serious	\$43,500.00	301.3
High	Hoppe Ave	Leonard St	Moberly Rd	Serious	\$82,700.00	181.4
High	Hoppe Ave	97 Ave	Leonard St	Poor	\$2,500.00	179.7
High	Shand Ave	Central Park	North Crosswalk	Fair	\$1,200.00	13.0
High	Grande Cache Hotel	HWY 40	P-8	Fair	\$1,800.00	87.7
Medium	Central Park	Handicap Parking lot		Satisfactory	\$1,400.00	45.3
Medium	Central Park	Splash Park	East (between Rec Cent	Satisfactory	\$2,000.00	119.1
Medium	Central Park	SW corner	Center	Satisfactory	\$1,700.00	79.8
Medium	Central Park	Outdoor Park	4-way intersection	Satisfactory	\$2,200.00	142.7
Medium	Central Park	Center	Rec Center parking lot	Satisfactory	\$1,800.00	88.9
Medium	Lions Park	104 St	103a St	Satisfactory	\$1,900.00	105.2
Medium	Central Park	North Crosswalk	West Crosswalk	Satisfactory	\$2,100.00	128.8
Medium	Pine Plaza	HWY 40 intersection	Pine Plaza	Satisfactory	\$1,500.00	48.9
Low	Central Park	Center	Middle	Good	\$0.00	52.5
Low	Central Park	Shand Ave	SW corner	Good	\$0.00	15.4
Low	Central Park	SW corner	West Crosswalk	Good	\$0.00	133.8
Low	Central Park	North Crosswalk	4-way intersection	Good	\$0.00	80.8
Low	Central Park	SW Crosswalk	SW corner	Good	\$0.00	8.5
Low	Moberly Rd	House 138	Stephenson Dr	Good	\$0.00	166.6
Low	Moberly Rd	House 130	House 138	Good	\$0.00	75.0
Low	Moberly Rd	House 122	House 130	Good	\$0.00	8.9
Low	Moberly Rd	Hoppe Ave	House 122	Good	\$0.00	170.3
Low	Moberly Rd	Hoppe Ave	Crosswalk	Good	\$0.00	7.3
Low	105 St	Park	North	Good	\$0.00	61.7
Low	105 St	Park	South	Good	\$0.00	44.5
Low	105 St	104 St	Trail	Good	\$0.00	80.7
Low	Stephenson Dr	House 328	House 332	Good	\$0.00	23.7
Low	Stephenson Dr	House 332		Good	\$0.00	14.4
Low	Stephenson Dr	Moberly Rd	House 324	Good	\$0.00	303.9

Notes:

*The "Cost" is the estimated cost to reconstruct or to rehabilitate trail segments based on observed defects and condition.

A trail segment with a \$0.00 Cost include those trails with no defects or minor defects to be monitored only.



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REPORT

Municipal District of Greenview No. 16

Hamlet of Grande Cache Stormwater System Master Plan



JULY 2023



Platinum
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1 INTRODUCTION

In 2018, the Municipal District of Green View No. 16 (MD) commenced administration of the Hamlet of Grande Cache. In 2022, the MD retained Associated Engineering to complete a Utility Master Plan (UMP) for the water distribution system, wastewater collection system, stormwater drainage system, roadway transportation system and select buildings within the Hamlet.

This report describes the assessment completed for the UMP pertinent to the stormwater drainage system.

1.1 Objectives and Scope

The purpose of this project was to develop a stormwater drainage master plan for existing and future development within the Hamlet. The information from the assessment and master plan will be incorporated within a multi-year Capital Infrastructure Rehabilitation Program which will guide the MD to maximize capital expenditures for their infrastructure.

In general, the scope of work involved the following tasks:

- Review of background information;
- Establishment of design criteria;
- Evaluation of the existing system;
- Recommendation of upgrades to the existing system;
- Development of future system servicing concepts; and
- Preparation of a comprehensive report.

1.2 Study Area

The Hamlet of Grande Cache is located within western Alberta, at the foothills of the Rocky Mountains. The Hamlet is approximately 120 km northwest of Hinton. The core area of the Hamlet is located along Highway 40, within a plateau bordered by the Smoky River to the west, the Sulphur River to the south, and Victor Lake to the east. **Figure 1-1** shows the boundary of the study area and ground elevations of the region.

1.3 Background Information Collection and Review

Background information provided by the MD, those obtained by AE from previous project records, and other sources were reviewed. This information is listed below.

- Utility Base plan and Orthophotos (MD. 2022)
- Light Detection and Ranging (LiDAR) 7.5 m resolution surface (Altalis. 2021)
- MD Greenview Development Guidelines and Municipal Servicing Standards (MD. 2020)
- Land Use Plan (MD. 2016)
- LiDAR 1 m resolution surface (MD. 2005)
- Storm record drawings for Grande Cache from 1995
- Area Structure Plans (MD. Various Dates)
- Geographic Information System (GIS) layers for the storm systems including manholes, pipes, catch basins, outfalls, and culverts.

1.4 Acknowledgements

Associated Engineering gratefully recognizes the contribution from the Municipal District of Greenview and the Hamlet of Grande Cache in the development on this Master Plan. Special thanks to Doug Brown, Amanda Cummings, Tanner Curtis, and Chelsea Henry who collaborated on this project.



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2 DESIGN CRITERIA

The Development Guidelines & Municipal Servicing Standards for the MD of Greenview (2020) state that the minor storm system shall be designed to accommodate drainage to avoid property damage and flooding during the 1:5-year design storm event. In addition, the major storm system shall be designed for flood control to avoid loss of life, injuries, and significant property damage during events greater than the 1:100-year design storm event. However, these standards can be challenging to achieve within established urban areas that were developed to previous standards. The current standards for the minor and major systems have been summarized below.

The Development Guidelines & Municipal Servicing Standards also state that rainfall should be based on data for the specific area where available. There is no rainfall data available specifically for the Hamlet of Grande Cache. Therefore, the intensity-duration-frequency (IDF) of rainfall is recommended to be based on the City of Grande Prairie data available in their 2022 Design Manual.

2.1 Land Use

The Land Use Map for the Hamlet of Grande Cache, shown on **Figure 2-1**, will be used for existing and future land use designations within the Hamlet. Existing land use information was obtained from the Hamlet's Land Use Bylaw (2019). Future land use information was obtained from the approved Area Structure Plans (ASPs) and conversations with the MD Planning and Development Department.

The current land use within the Hamlet generally consists of residential developments west of Highway 40 and commercial/industrial developments east of Highway 40. Land surrounding the Hamlet is currently designated as urban reserve.

2.2 Future Staged Growth Areas

Figure 2-1 also presents the proposed future staged growth areas as determined through consultation with the MD.

The Riverview area northwest of existing developments has an ASP with future land use plans. The Riverview ASP focuses on the western edge of the Hamlet and proposes to develop the land with mainly low density residential dwellings. The South Bench area, located south of the existing development, is also identified for potential future residential growth. However, there are no development plans for the South Bench area.

Future commercial areas that may be developed include highway commercial areas west of Highway 40, between Shand Avenue and Hoppe Avenue, the Floyd McLennan Business Park, and the Tower Park area.

Through discussion with the MD's Planning and Development Department, the future growth areas were categorized into two development stages, based on potential development timeframe. This is shown on **Figure 2-1**. It should be noted the development stages are conceptual and developed for the purpose of the UMP. Actual developments may occur in different areas and timeframes, based on various factors.

2.3 Minor System

The minor stormwater system includes pipes, manholes, catch basins, and outfalls. It is typically designed to convey low intensity design storm events.

- The minor system shall be designed to accommodate runoff generated by a 1:5-year design storm event within rural ditching or curb and gutter in an underground piped system.
- Minimum pipe diameters shall be 300 mm for mains and 250 mm for catch basin leads with minimum and maximum flow velocities of 0.75 m/s and 3.0 m/s, respectively.
- Manholes should be spaced no greater than 150 m apart and be installed at all changes in size, grade, or alignment.
- To prevent the occurrence of ponding, the maximum distance between catch basins should be no greater than 180 m.
- Catch basin leads should have a minimum slope of 1% and a maximum length of 30 m. Where leads exceed this length, catch basin manholes shall be provided.
- For existing developments, surcharging of the storm pipes may be permitted, provided that surcharge levels are below ground surface in a 1:5-year design storm event and the risk to private property is minimized in a 1:100-year design storm event. Manhole and pipe details will be required to meet the specifications if they are rebuilt or replaced for other reasons. These upgrades should be modelled to check the possibility of downstream impacts.

2.4 Major System

The major stormwater system consists of streets, ditches, and culverts and is typically designed to convey runoff which exceeds the capacity of the minor system.

- The major system shall be designed to accommodate runoff generated by a 1:100-year design storm event within an open channel system with detention/retention facilities as required.
- The major system must provide a continuous route for runoff.
- Grassed swales shall have a minimum slope of 1%. Concrete swales shall have a minimum slope of 0.5% on public property.
- For existing development areas, the goal should be to prevent flooding of buildings. This requires assessment on an individual basis, but, generally, can be met by limiting the depth of ponding in the low areas to a maximum of 150 mm.

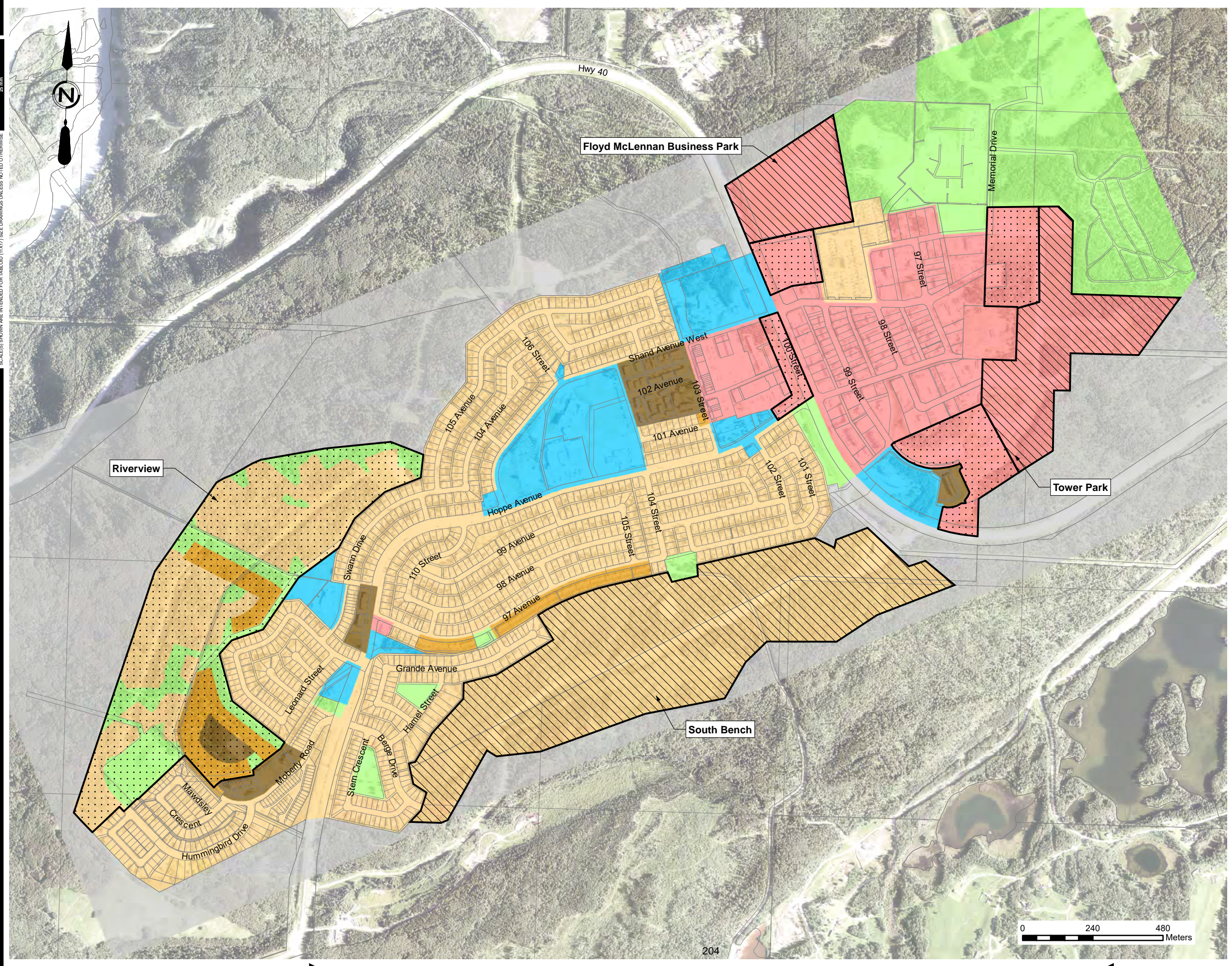
2.4.1 Storage Facilities

- The requirements for storage facilities shall be determined using computer modelling.
- Discharge must be controlled to less than or equal to the pre-development runoff rate and must be analyzed for the 1:5-, 1:25-, and 1:100-year design storm events.
- Post-event drawdown must be restored within the following:
 - 1:5-year design storm event capacity within 24 hours
 - 1:25-year design storm event capacity within 48 hours
 - 95% of 1:100-year design storm event capacity within 96 hours
- An emergency overflow directed to the downstream receiving facility is required.
- Wet ponds are preferred.
- Dry ponds require not steeper than 5:1 side slopes, a minimum bottom grade of 2% providing drainage to the outlet, and outflow piping sized for 25% greater than the maximum discharge flow.

- Wet ponds should have a minimum depth of 2 m at Normal Water Level (NWL), side slopes not steeper than 7:1 above NWL, and outflow piping sized for 25% greater than the maximum discharge flow.
- Wetlands should have active storage between 0.3 and 0.6 m, include a 1.5 to 2 m deep sediment forebay upstream, and incorporate a bypass that will collect first flush flows and divert high flows during extreme rainfall events.

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IF NOT 25 mm ADJUST SCALES
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- Legend:**
- Land Use**
- Commercial / Industrial
 - Institutional
 - Residential - High Density
 - Residential - Medium Density
 - Residential - Low Density
 - Parks / Open Space
 - Urban Reserve
 - Existing Land Use
- Future Land Use**
- Interim Phase
 - Ultimate Phase

FIGURE 2-1

M.D. OF GREENVIEW
HAMLET OF GRANDE CACHE

LAND USE

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3 EXISTING STORM SYSTEM

The Hamlet of Grande Cache is located on a plateau surrounded by Smoky River to the west, Sulphur River to the south, and Victor Lake to the east (**Figure 1-1**). The topography and the existing storm systems within the Hamlet drain towards these valleys.

The minor storm system includes pipe sizes ranging from 200 to 1500 mm in diameter, manholes, catch basins, and outfall structures. The major system includes streets, ditches, culverts, overland runoff routes, and Stormwater Management Facilities (SWMFs). These systems were represented within the model based on the information provided by the MD.

3.1 Model Development

A dual-drainage hydraulic and hydrologic model was developed using GIS tools and PCSWMM software to evaluate the capacity of the existing storm systems (major and minor) and to evaluate alternatives to improve their level of service. PCSWMM is a hydraulic and hydrologic software developed by Computation Hydraulics International (CHI) that uses the US Environmental Protection Agency's SWMM 5 engine to simulate flows and water levels within sewer systems. It is capable of simulating real storm events, design flows, reverse flows, and surcharging/backwater conditions. The dual-drainage modeling approach conveys runoff flows through the major systems before discharging into the minor systems, and vice versa during overflows.

3.1.1 Minor System

The minor system is illustrated in **Figure 3-1**. The minor system within the developed dual-drainage model conveys less intense, more frequent rainfall events.

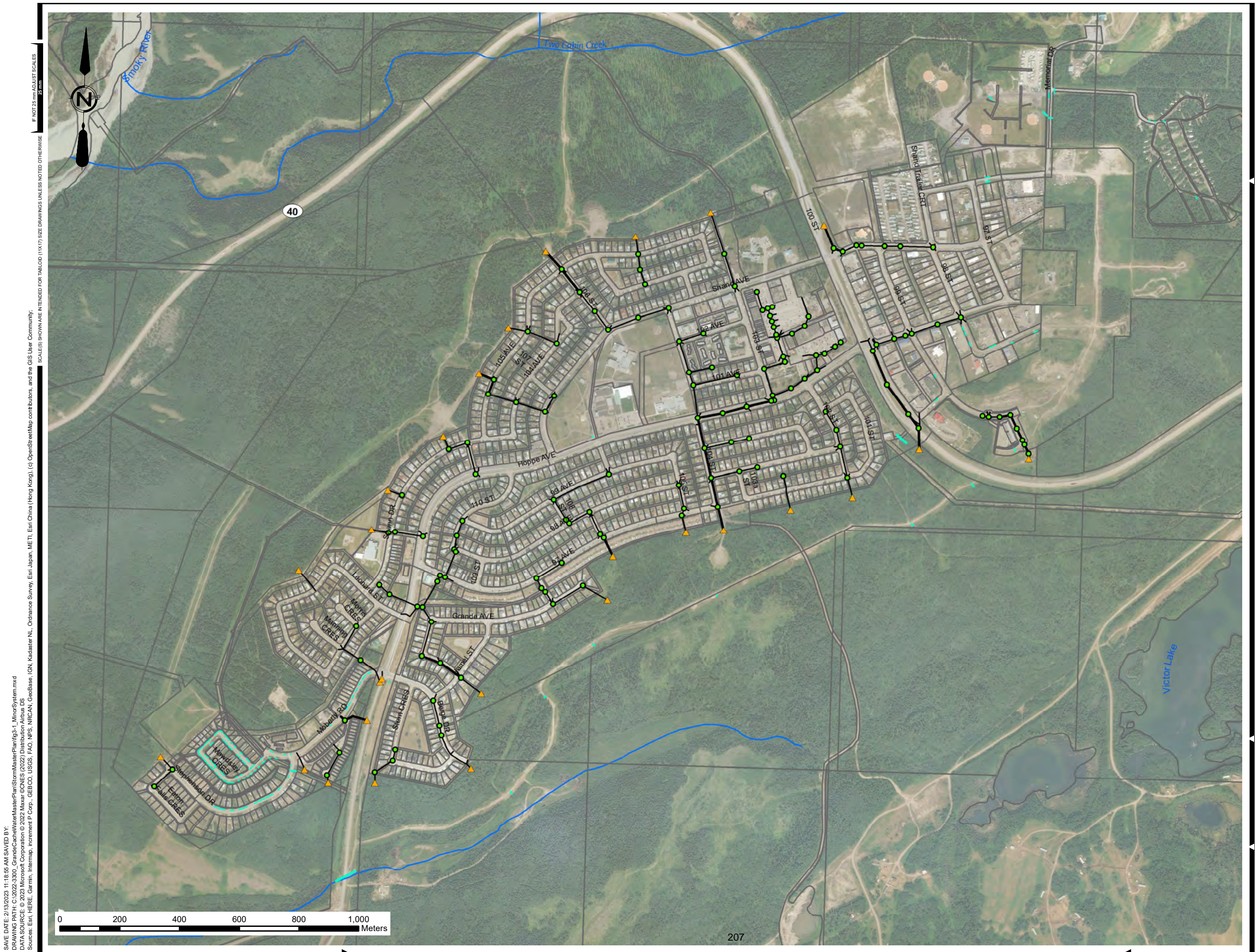
The stormwater model required upstream and downstream pipe invert elevations, as well as manhole rim and invert elevations. **Table 3-1** presents key considerations for the provided GIS database and the approach adopted for this model development.

Table 3-1 Model Development Approaches

Key Considerations	Modelling Approach
Missing Manhole Inverts	<p>Manhole inverts were assigned based on the following:</p> <ul style="list-style-type: none"> • Inverts from the GIS manhole layer. • Lowest outgoing pipe invert. • Lowest incoming pipe invert. • Minimum covert at upstream ends. • Ground elevation at downstream ends. • Interpolation between upstream and downstream inverts.
Missing Manhole Rims	Assigned from the 1 m LiDAR surface.
Missing Pipe Inverts	<p>Pipe inverts were assigned based on the following:</p> <ul style="list-style-type: none"> • Inverts from the GIS pipe layer. • Connected manhole inverts. • 1% to 2% slope for catch basin leads.
Missing Pipe Diameters	Assumed value of 250 mm for catch basin leads.
Incorrect Manhole Inverts	Manhole inverts were deemed incorrect and removed when they were above the LiDAR surface elevation, differed significantly from adjacent inverts, or where the resultant pipe slope was suspicious.
Incorrect Pipe Inverts	Pipe inverts were deemed incorrect and removed when they resulted in unrealistic jumps in the profiles.

The following assumptions were made while modelling the minor system:

- All minor system pipes were assumed to be round in shape.
- All catch basins were assumed to be a Type C (single or twin) and were assigned a capture curve developed by Associated Engineering.
- All minor system pipes were assigned a Manning's "n" value of 0.013.
- All minor system pipes have been assumed to be in good condition, with no obstructions, deterioration, or leakage.



- Legend:**
- Storm Outfall
 - Storm Manhole
 - Culvert
 - Storm Pipe
 - Watercourse
- Pipe Interval sizes**
- < 0.6
 - > 0.6 - 1.0
 - > 1.0



FIGURE 3-1
GRANDE CACHE WATER MASTER PLAN
MINOR SYSTEM

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DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE
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3.1.2 Major System

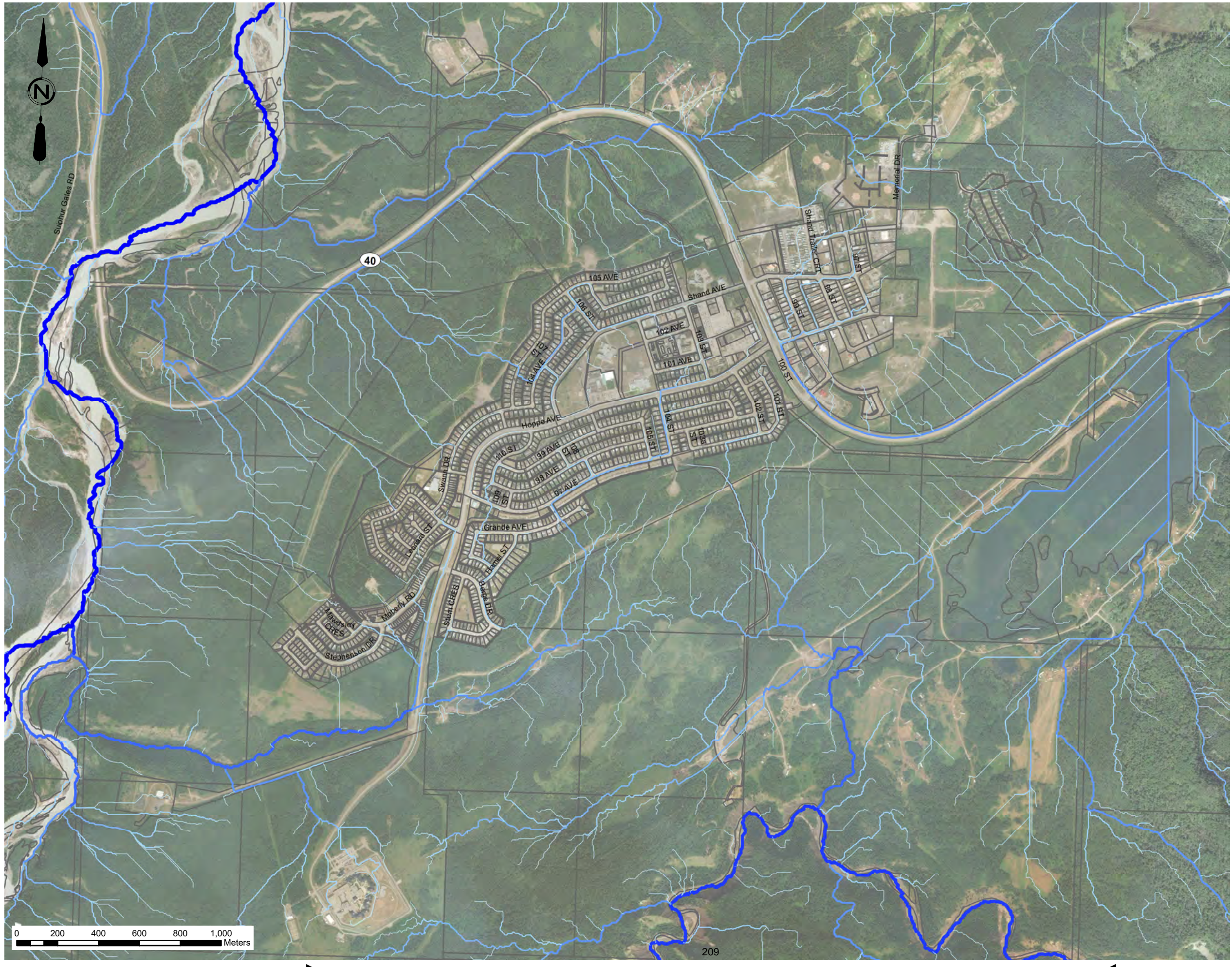
The modelled major system includes overland flow paths and depressions. The major system within the developed dual-drainage model conveys runoff that exceeds the capacity of the minor system. The following assumptions were made while modelling the major system:

- Roadways, swales, and ditches were represented by conduits with a representative cross section. The cross sections end at the property lines and reflect volume within the public right-of-way. This results in conservative depths and is typical for 1D modelling.
- Trap low storage within naturalized areas, parking lots, and private sites within the model was represented by a rating curve and storage node. The rating curve represents the actual depth/volume curve including storage within private property.
- All major system ditches were assigned a Manning's "n" value of 0.015.
- All culverts were assigned a manning's "n" value of 0.013 corresponding to their material type included within the provided GIS layers.
- Culvert entrance and exit losses were assigned as 0.7 and 1, respectively, corresponding to mitered end treatments conforming to fill slope.

The major system was created based on the street network and a streamline layer generated based on the merged 1 m and 7.5 m LiDAR surfaces. The streamlines are illustrated in **Figure 3-2**. The street network was split by topographic highs and lows and by manholes to account for flow-by catch basins. A standardized cross section was used for all ditches and overland flow paths for this study. However, this cross section could be refined for areas of interest by future users of the model. Note, significant effort was made to include all critical overland flow paths, however, some could be missing from the model. Flow was assumed to be uniformly distributed across gutters for bi-directional crowned roads. The major system is illustrated in **Figure 3-3**.

SAVE DATE: 2/13/2023 11:28:32 AM SAVED BY:
DRAWING PATH: C:\2022-3300_GrandeCache\WaterMasterPlan\StormMasterPlan\figs-2_ExistingStreamlines.mxd
DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm ADJUST SCALES
SCALE(S) SHOWN ARE INTENDED FOR TABLoid (11x17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



- Legend:**
- Streamlines**
- Minor
 - Major



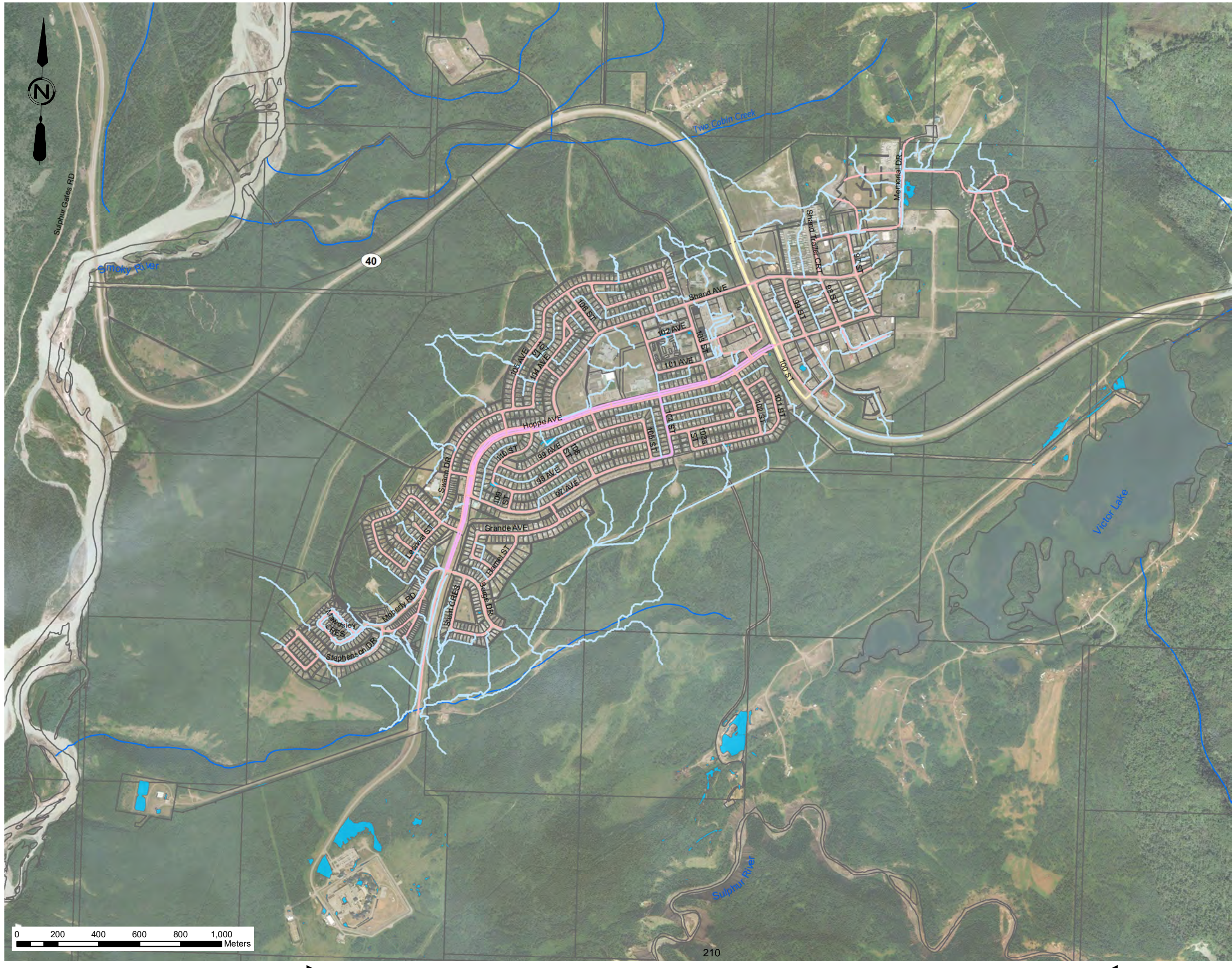
FIGURE 3-2
GRANDE CACHE STORM MASTER PLAN

EXISTING STREAMLINES

AE PROJECT No.	2022-3300
SCALE	1:18,000
APPROVED	
DATE	2023FEB13
REV	
DESCRIPTION	ISSUED FOR FINAL

SAVE DATE: 1/10/2023 8:23:59 AM SAVED BY:
DRAWING PATH: C:\2022-3300_GrandeCache\WaterMasterPlan\fig 3-2_MajorSystem.mxd
DATA SOURCE: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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IF NOT 25 mm AS SHOWN ON THIS SCALE
SCALE(S) SHOWN ARE INTENDED FOR TABL/CID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- Ditch
- Arterial Roadway
- Collector Roadway
- Local Roadway
- Watercourse
- Trap Lows



FIGURE 3-3
GRANDE CACHE STORM MASTER PLAN

MAJOR SYSTEM

AE PROJECT No.	2022-3300
SCALE	1:18,000
APPROVED	
DATE	2023JAN12
REV	
DESCRIPTION	ISSUED FOR FINAL

3.1.3 Minor/Major Connection

Connections between the major and minor systems are required to allow flow transfer within the dual-drainage model. These connections were represented within the model as a set of two, one-way links. These two links are referred to as major to minor and minor to major, respectively. Major to minor links represent catch basins and include a capture curve simulating the catch basin grate. Information regarding grate type was not available within the GIS layers and was assumed to be Type C within the model. This can be refined as information becomes available in future. Minor to major links represent surcharging flow from manholes and catch basins.

3.1.4 Catchments

Catchment areas are required to hydraulically load a stormwater model. They are delineated around locations that receive flow. Catchment areas were delineated using the 1 m LiDAR surface. The delineation was based on catch basins and culvert inlets. **Figure 3-4** presents the delineated catchment areas.

Catchment imperviousness can be determined using various methods. Simplified methods assume typical values for the land use, while more advanced methods rely on detailed impervious layers. Associated Engineering applied an impervious percentage to each land use within the general land use layer for Grande Cache. This layer was based on the Development Guidelines & Municipal Servicing Standards. A weighted impervious percentage for each catchment was computed. The assigned impervious percentage for each land use was varied during model calibration and is discussed in **Section 3.3**.

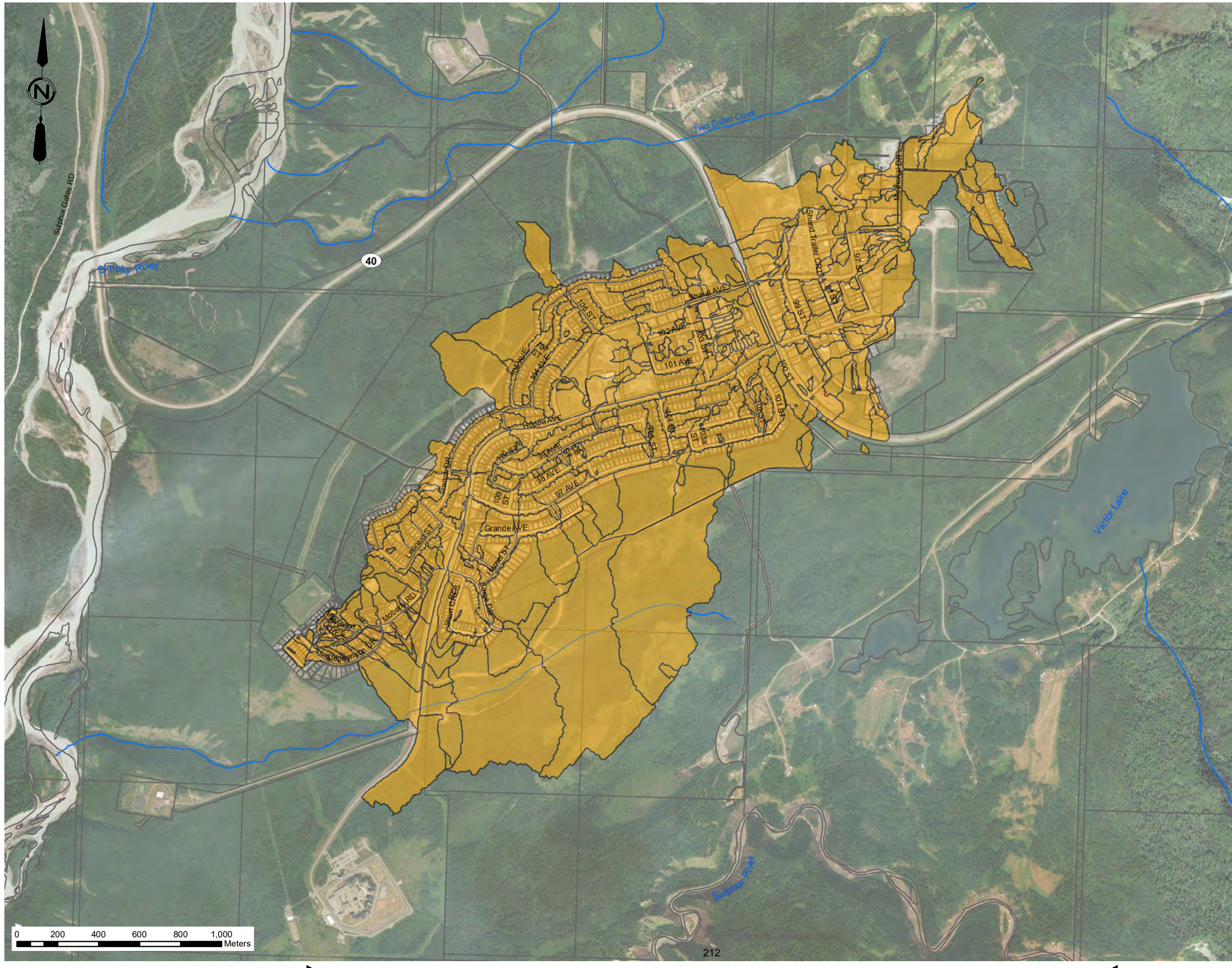
Lacking detailed information on soil type and land cover, typical infiltration parameters were applied which are presented in **Table 3-2**. The Horton formulas were used to simulate the catchment infiltration. Note, the Horton formulas are widely used to derive infiltration capacity during rainfall events.

Table 3-2 Infiltration Parameters

Parameter	Value
Maximum Infiltration Rate	75 mm/hr.
Minimum Infiltration Rate	5 mm/hr.
Decay Constant	4 hours ⁻¹
Drying Time	7 days

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DRAWING PATH: C:\2022-3300_GrandeCache\WaterMasterPlan\fig3-3_CatchmentAreas.mxd
DATA SOURCE: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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IF NOT 25 mm AS SHOWN SCALES
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Legend:

- Watercourse
- Catchment Areas



FIGURE 3-4
GRANDE CACHE STORM MASTER PLAN

CATCHMENT AREAS

AE PROJECT No.	2022-3300
SCALE	1:18,000
APPROVED	
DATE	2023JAN12
REV	
DESCRIPTION	ISSUED FOR FINAL

3.2 Flow Monitoring Program

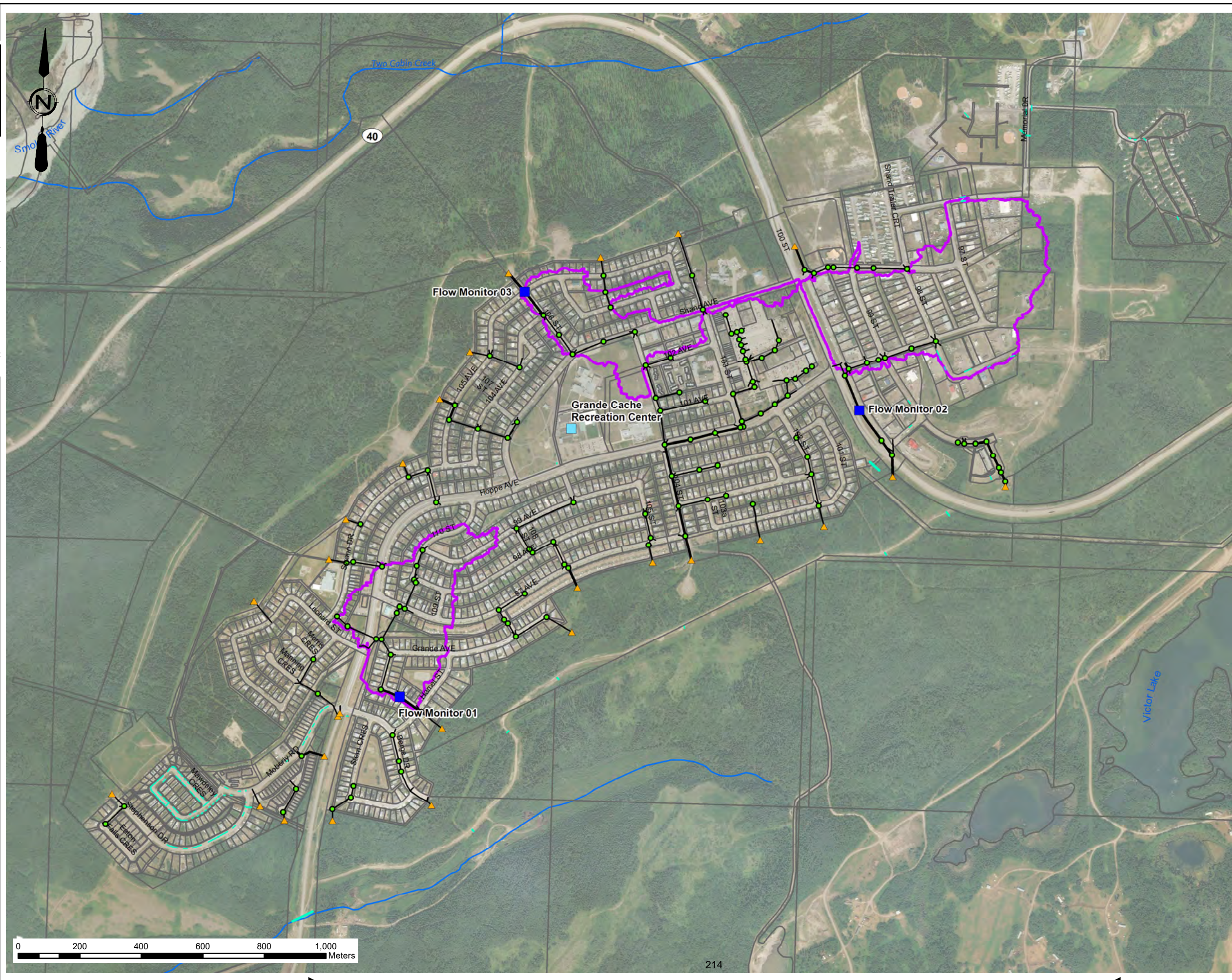
Associated Engineering retained SFE Global Inc. (SFE) to conduct flow monitoring within the Hamlet of Grande Cache between April and October 2022. The objective of the monitoring program was to collect reliable flow data within the storm sewer system for model calibration and validation within the pipe network. The 2022 flow monitoring program consisted of three monitoring sites in strategically selected locations within the storm sewer system, as well as one tipping-bucket style rain gauge. SFE installed and operated the equipment. In addition, they collected the flow monitoring data and maintained an on-line data base.

3.2.1 Flow Monitor and Rain Gauge Locations

Figure 3-5 shows the locations of flow monitors and rain gauges installed and operated in 2022. **Appendix A** provides detailed maps of each site. **Figure 3-5** also illustrates the estimated catchment areas delineated by Associated Engineering to each flow monitor. These catchments were based on the MD's 1 m LiDAR data. **Table 3-3** provides an overview of each site including the estimated catchment area and land uses. Associated Engineering chose flow monitor locations based on system characteristics (pipe size and slope) and catchment characteristics (land use and area).

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DRAWING PATH: C:\2022-3300_GrandeCache\WaterMasterPlan\StormFlowMonitoringLocations2022.mxd
DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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Legend:

- Storm Outfall
- Storm Manhole
- Rain Gauge Location
- Flow Monitoring Location
- Culvert
- Storm Pipe
- Watercourse
- Monitor Catchment Area

Pipe Interval sizes

- < 0.6
- > 0.6 - 1.0
- > 1.0




FIGURE 3-5
GRANDE CACHE STORM MASTER PLAN
STORM FLOW MONITORING LOCATIONS 2022

AE PROJECT No.	2022-3300
SCALE	1:12,000
APPROVED DATE	2023MAR02
REV	
DESCRIPTION	ISSUED FOR FINAL

Table 3-3 Grande Cache Storm Flow Monitor Summary

Site	Pipe Size (mm)	Pipe Asset ID (name)	Location	Install Date (2022)	Removal Date (2022)	Total Catchment Area (ha)	Land Use Area (ha)			
							Residential	Commercial	Institutional	Other
01	675	AE-327	Grande Avenue west of Hamel Street	Apr 18	Oct 19	14.8	13.0	0.4	0.9	0.6
							87.7%	2.5%	6.0%	3.8%
02	600	AE-233	105 Street south of Hoppe Avenue	Apr 18	Oct 19	28.7	0.1	27.9	0.0	0.7
							0.3%	97.4%	0.0%	2.3%
03	600	AE-179	106 Street at 105 Avenue	Apr 18	Oct 19	12.3	9.0	0.6	2.6	0.1
							72.8%	5.2%	20.8%	1.2%
RG01			Grande Cache Recreation Center	Apr 19	Oct 18					

The catchments for Flow Monitors 1 and 3 include a large portion of residential area (both greater than 70%), while the catchment for Flow Monitor 2 is primarily made up of commercial area (97%). Other land use includes Direct Control, Urban Reserve, Parks, and Open Space areas.

3.2.2 Instrumentation

3.2.2.1 Flow Monitors

Area-Velocity (AV) meters were used for each flow monitor site. These monitors use a pressure sensor to measure depth and an ultrasonic velocity sensor to measure velocity under both full and partial gravity pipe flow conditions. In addition, two meters were installed at each site to provide backup and quality control data where variable flows, sediment accumulations, or surcharge during severe storm events has the potential to occur.

All sites were inspected and cleaned during monthly maintenance visits and manual depth and velocity measurements were taken to verify the meter operations and accuracy. Any required repairs or replacements were made at these times. All monitor data was compiled automatically and posted online at least once per day. Associated Engineering reviewed this data monthly for quality control and provided SFE with maintenance requests.

3.2.2.2 Rain Gauge

One tipping-bucket rain gauge was installed to measure rainfall rates which vary substantially over time and space during storm events. It was installed on the Grande Cache Recreation Center roof as shown on **Figure 3-5** to provide centrally located observed rainfall within the Hamlet.

A tipping-bucket rain gauge records rainfall in 0.25 mm increments over 5-minute time periods. The operation and accuracy of each rain gauge was verified with a measured volume of water during installation and upon removal.

3.2.3 Data Review

3.2.3.1 Flow Data Processing

Equipping monitoring sites with two flow monitors provided backup in the event of a flow monitor malfunction as well as an independent check to ensure accuracy of the monitor. In addition, manual depth and velocity measurements were made during each site maintenance visit to verify accuracy of the flow monitor. This protocol generated a large amount of data that needed to be processed to generate the final flows.

During the data processing stage, flow data was analyzed under a comprehensive Quality Control program to compile the final data base. Associated Engineering used a custom-designed spreadsheet to complete the data processing to produce efficient and consistent results.

The data processing involved the following:

- Confirming pipe sizes and monitor site locations.
- Screening to identify device malfunctions and velocity drop-outs during low-flow periods.
- Scatterplot comparison of depth and velocity readings to check for consistency and stability and to substitute for velocity drop-outs.
- Comparison with manual measurements and rainfall data.
- Discarding or correcting suspect or unreliable data or adjusting depth or velocity readings where indicated.
- Comparing depth and velocity measurements to calculate the final flow readings.
- Reviewing the final flow data to ensure consistency.

In general, the flow data was found to be of good quality. The data required little to no modification during quality control reviews, however, extremely low flow data during periods of no rainfall was ignored. A database including the final flows and rainfall rates will be provided to the MD as part of the final deliverables.

Hydrant flushing took place within the Hamlet between June 1-3 and August 15-25 based on conversations with the MD. Review of the flow data on these dates did not generally show any significant flows. However, these dates were ignored when calibration and validation events were chosen to eliminate the potential for impacts to the results.

3.2.3.2 Rain Gauge Data Processing

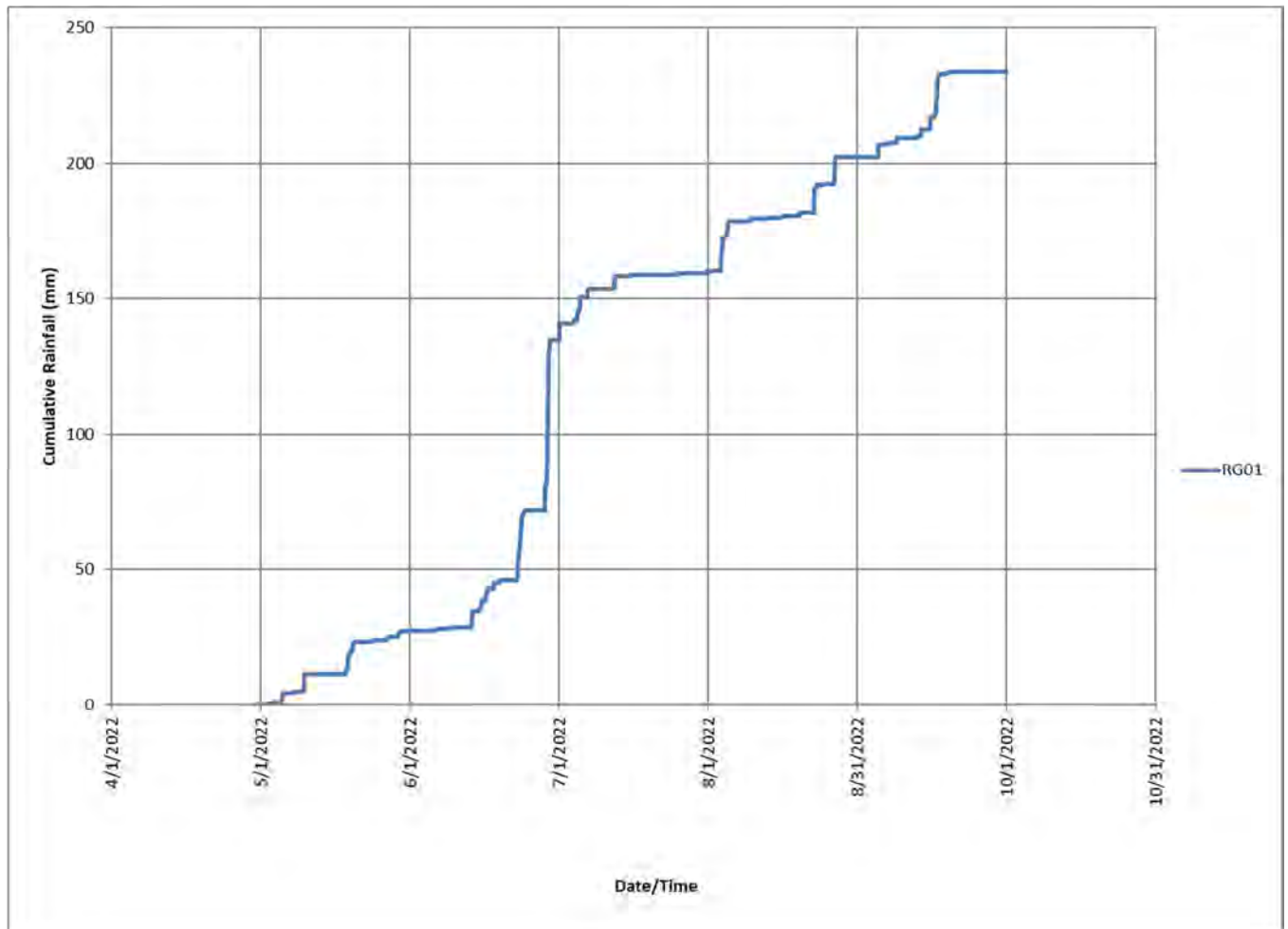
The collection of rainfall data is important for correlation with flow response within the storm sewer system. **Table 3-4** provides a summary of the 2022 daily rainfall amounts observed at the Grande Cache Recreation Center gauge. Days that have significant rainfall (more than 10 mm) are highlighted in yellow. In addition, the cumulative rainfall is plotted in **Figure 3-6**.

Table 3-4 shows that three storm events had more than 10 mm of rainfall. The largest event occurred on June 28 and 29 which generated a total rainfall of approximately 63 mm at the Recreation Center. This is approximately equivalent to a design storm ranging between the 1:2- and 1:10-year return period depending on the event duration for the City of Grande Prairie IDF curves. All other storm events recorded during the monitoring period were less than a 1:2-year return period event. This will be discussed further in [Section 3.3](#).

Table 3-4
Grande Cache Flow Monitoring Program
Rain Gauge Summary

	Daily Total Rainfall (mm)		Daily Total Rainfall (mm)		Daily Total Rainfall (mm)		Daily Total Rainfall (mm)		Daily Total Rainfall (mm)
	RG01		RG01		RG01		RG01		RG01
1-May-22	0	31-May-22	0	1-Jul-22	6	31-Jul-22	0.75	31-Aug-22	0
2-May-22	0.25	1-Jun-22	0	2-Jul-22	0	1-Aug-22	0.25	1-Sep-22	0
3-May-22	0	2-Jun-22	0	3-Jul-22	0	2-Aug-22	0	2-Sep-22	0
4-May-22	0.75	3-Jun-22	0	4-Jul-22	1.25	3-Aug-22	9	3-Sep-22	0
5-May-22	2.25	4-Jun-22	0	5-Jul-22	8.5	4-Aug-22	6	4-Sep-22	4.5
6-May-22	1.25	5-Jun-22	0.25	6-Jul-22	0	5-Aug-22	3.5	5-Sep-22	0.25
7-May-22	0	6-Jun-22	0.5	7-Jul-22	3	6-Aug-22	0	6-Sep-22	0
8-May-22	0.5	7-Jun-22	0	8-Jul-22	0	7-Aug-22	0	7-Sep-22	0.5
9-May-22	0.25	8-Jun-22	0.25	9-Jul-22	0	8-Aug-22	0	8-Sep-22	1.75
10-May-22	6.25	9-Jun-22	0	10-Jul-22	0	9-Aug-22	1	9-Sep-22	0
11-May-22	0	10-Jun-22	0.25	11-Jul-22	0	10-Aug-22	0	10-Sep-22	0
12-May-22	0	11-Jun-22	0	12-Jul-22	2.5	11-Aug-22	0	11-Sep-22	0
13-May-22	0	12-Jun-22	0	13-Jul-22	2.25	12-Aug-22	0.25	12-Sep-22	0.75
14-May-22	0	13-Jun-22	6	14-Jul-22	0	13-Aug-22	0	13-Sep-22	2.5
15-May-22	0	14-Jun-22	0	15-Jul-22	0	14-Aug-22	0	14-Sep-22	0
16-May-22	0	15-Jun-22	4	16-Jul-22	0.5	15-Aug-22	0	15-Sep-22	4.25
17-May-22	0	16-Jun-22	3.75	17-Jul-22	0	16-Aug-22	0.75	16-Sep-22	12.25
18-May-22	0.75	17-Jun-22	0.5	18-Jul-22	0	17-Aug-22	0	17-Sep-22	3.5
19-May-22	7.25	18-Jun-22	2	19-Jul-22	0	18-Aug-22	0	18-Sep-22	0.5
20-May-22	4	19-Jun-22	1	20-Jul-22	0	19-Aug-22	1	19-Sep-22	0.5
21-May-22	0	20-Jun-22	0	21-Jul-22	0	20-Aug-22	0.25	20-Sep-22	0
22-May-22	0	21-Jun-22	0	22-Jul-22	0	21-Aug-22	0	21-Sep-22	0
23-May-22	0	22-Jun-22	0	23-Jul-22	0	22-Aug-22	9	22-Sep-22	0
24-May-22	0.5	23-Jun-22	23.5	24-Jul-22	0	23-Aug-22	1.25	23-Sep-22	0
25-May-22	0	24-Jun-22	2.25	25-Jul-22	0.5	24-Aug-22	0.25	24-Sep-22	0
26-May-22	0	25-Jun-22	0	26-Jul-22	0	25-Aug-22	0	25-Sep-22	0
27-May-22	1.25	26-Jun-22	0	27-Jul-22	0	26-Aug-22	5.5	26-Sep-22	0
28-May-22	0	27-Jun-22	0	28-Jul-22	0	27-Aug-22	4.5	27-Sep-22	0
29-May-22	1.75	28-Jun-22	9.5	29-Jul-22	0	28-Aug-22	0	28-Sep-22	0
30-May-22	0.5	29-Jun-22	53.5	30-Jul-22	0	29-Aug-22	0	29-Sep-22	0
		30-Jun-22	0			30-Aug-22	0	30-Sep-22	0
Month Total	28		107		25		33		31
		Rainfall exceeding 10 mm							

Figure 3-6 Cumulative Rainfall 2022



3.3 Model Calibration and Validation

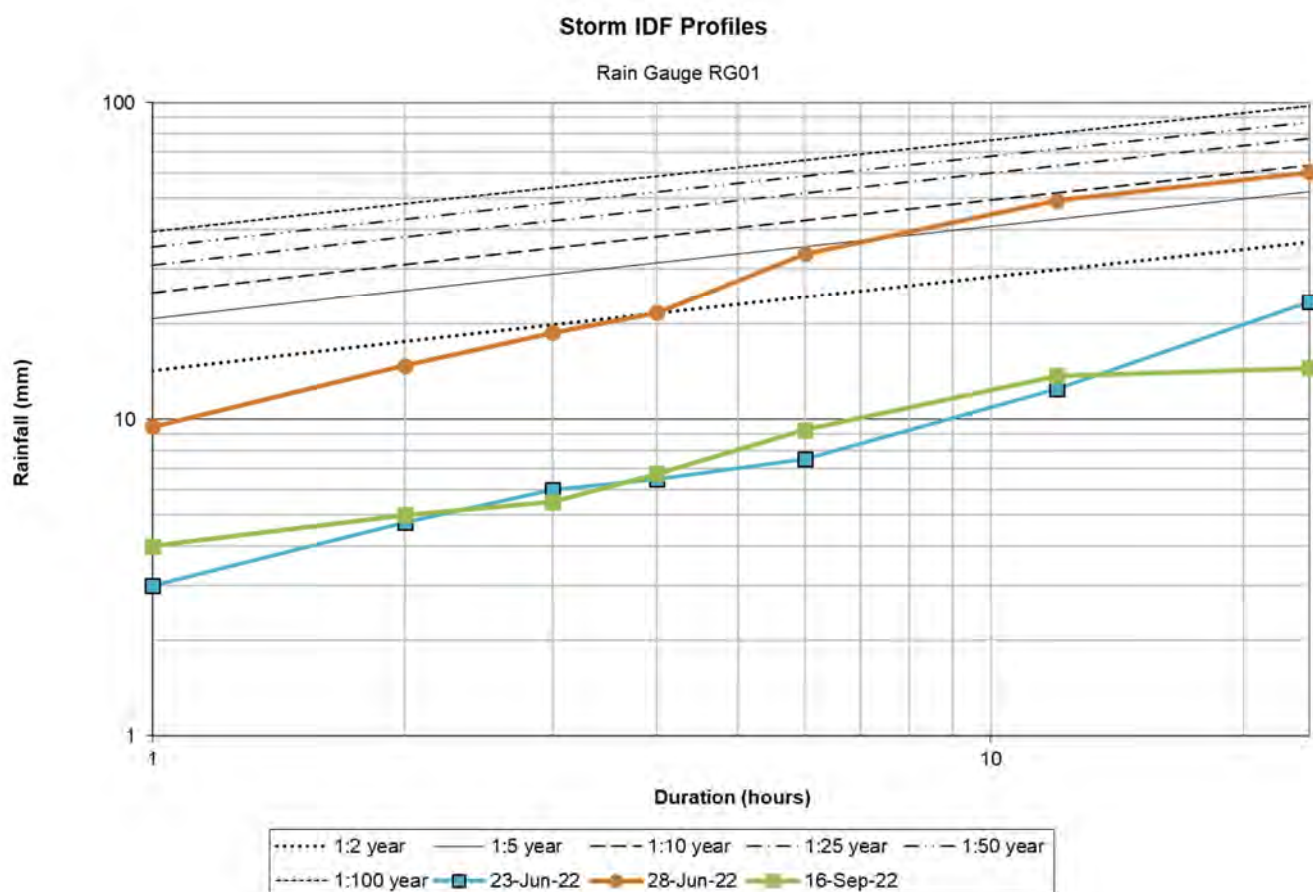
Calibration and validation of a hydrologic and hydraulic model is imperative to provide model results with confidence and reliability. The most significant rain events were chosen for model calibration and validation purposes. **Table 3-5** provides a summary of the rainfall characteristics for the three largest storm events occurring over the season (May to September).

The dual-drainage model was simulated for the three chosen storm events to provide calibration and validation of the storm sewer network. A comparison of the IDF profiles for the City of Grande Prairie (2022) and the observed storm events is presented in **Figure 3-7**.

Table 3-5 Calibration/Validation Storm Events Summary

Date	Rainfall Depth (mm)	Peak Intensity (mm/hr)	Approximate Duration (hours)	Approximate Design Storm Event Return Period (years)
June 23, 2022	23.5	6	24	<1:2
June 28-29, 2022	62.7	18	25	1:2 to 1:10
September 16, 2022	12.3	18	23	<1:2

Figure 3-7 Storm IDF Profiles (RG01 2022)



3.3.1 Model Calibration

The largest storm event during the flow monitoring period, which occurred on June 28 and 29, 2022, was chosen for the model calibration event. This storm was approximately equivalent to a 1:10-year return period design storm event for a duration of 24 hours (Figure 3-7). This storm event was simulated, and model parameters were adjusted through an iterative process to achieve the best match between simulated and observed results (flow, volume, and water level). The final impervious percentages for each land use type within the model are included in Table 3-6.

Table 3-6 Impervious Percentage for Land Use

Land Use Type	Impervious Percentage (%)
Commercial and Industrial Services	47
Direct Control	47
Direct Control - Floyd McLennan Business Park	71
Direct Control - Residential Stage VI	35
Highway Commercial Corridor	71
Manufactured Home Park Community	35
Manufactured Home Subdivision	35
Medium Density Residential	47
Medium/High Density Residential	47
Neighbourhood Commercial	71
Parks and Open Space	6
Public and Private Services	35
Single Detached Residential	35
Town Centre Commercial	47
Two-Unit Residential	47
Urban Reserve	6

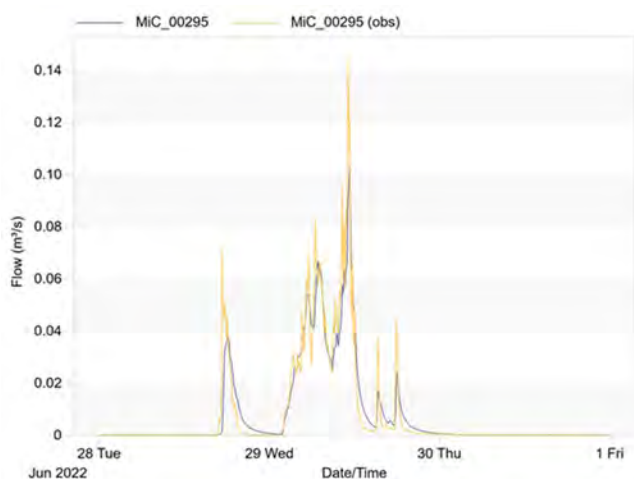
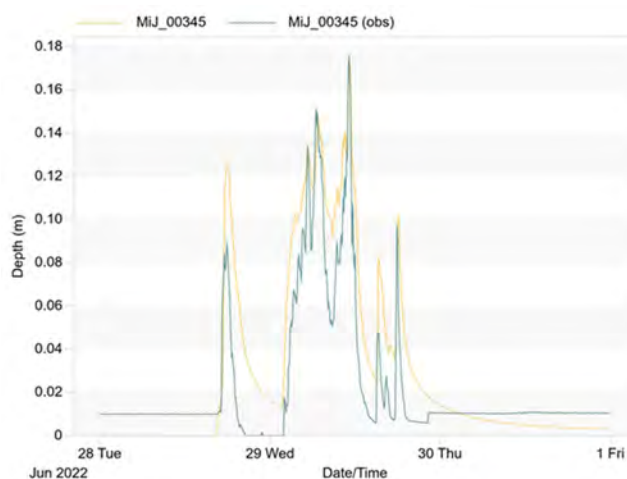
Appendix B provides comparison plots for the calibration results at all monitor locations.

Table 3-7 summarizes the simulated and observed peak flow, volume, and depth during the calibration event. The calibration results showed that the simulated peak flows were underpredicted at Flow Monitor Site 1 and overpredicted at Sites 2 and 3. Volumes followed the same pattern. Simulated depths were underpredicted at all sites, however, were within 2 to 25% error compared to the observed monitor values. The shape of the flow hydrographs and depth plots at each flow monitor location matched very well. Differences in peaks at the beginning of the model simulation may be due to the inability to accurately represent initial soil conditions (antecedent soil moisture) within the model.

More discrepancies in peak flow and volume between observed and simulated data are expected where flows are low. This is due to the reliability of monitor flow estimation when flows are relatively small. This is reflected in the data summarized in **Table 3-7** where lower peak flows at Flow Monitor Site 3 resulted in larger % error when compared to higher flows at Sites 1 and 2. **Figure 3-8** shows the simulated and observed flows at Flow Monitor Site 1. **Figure 3-9** shows the simulated and observed depths at Flow Monitor Site 2.

Table 3-7 Calibration Peak Flow, Volume, and Depth

Flow Monitor	Volume (m ³)				Peak Flow (m ³ /s)				Depth (m)			
	Observed	Simulated	Simulated/ Observed	% Error	Observed	Simulated	Simulated/ Observed	% Error	Observed	Simulated	Simulated/ Observed	% Error
1	2186	2097	0.96	-4%	0.1458	0.1039	0.71	-29%	0.1677	0.1283	0.77	-23%
2	3182	4705	1.48	48%	0.1804	0.2050	1.14	14%	0.1758	0.1715	0.98	-2%
3	759.2	1817	2.39	139%	0.0540	0.0934	1.73	73%	0.3595	0.3065	0.85	-15%

**Figure 3-8 Flow Monitor 1 – June 28-July 1, 2022**
Flow (m³/s)**Figure 3-9 Flow Monitor 2 – June 28-July 1, 2022**
Depth (m)

Overall, the calibration results were deemed acceptable for the purposes of this study. Further calibration of the model is recommended when additional data becomes available.

3.3.2 Model Validation

Validation runs were simulated for the June 23 and September 16, 2022 storm events. Both events were less than a 1:2-year return period design storm event (**Figure 3-7**). **Appendix B** provides comparison plots for the validation results during both simulations at all monitor locations.

Tables 3-8 and **3-9** summarize the simulated and observed peak flows, volumes, and depths during the June 23 and September 16 validation events, respectively. Similar to the calibration results, the shape of the flow hydrographs and depth plots at each flow monitor location matched very well. Volumes were significantly overpredicted when compared to those observed. This was most likely due to very low flow data and model limitations.

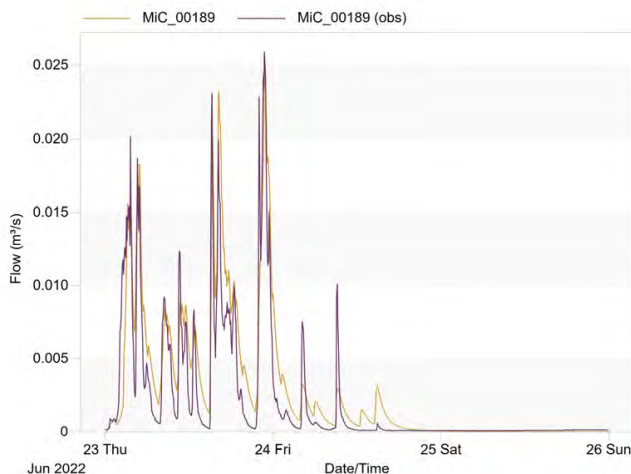
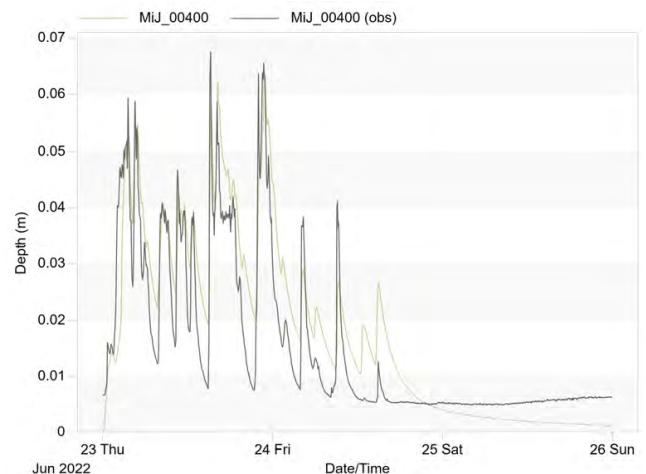
Figure 3-10 shows the simulated and observed flows at Flow Monitor site 3 during the June 23 event. **Figure 3-11** shows the simulated and observed depths at Flow Monitor site 1 during the June 23 event.

Table 3-8 Validation Peak Flow, Volume, and Depth – June 23, 2022

Flow Monitor	Volume (m ³)				Peak Flow (m ³ /s)				Depth (m)			
	Observed	Simulated	Simulated/ Observed	% Error	Observed	Simulated	Simulated/ Observed	% Error	Observed	Simulated	Simulated/ Observed	% Error
1	594.1	839.9	1.41	41%	0.0259	0.0243	0.94	-6%	0.0676	0.0638	0.94	-6%
2	550.3	2330	4.23	323%	0.0471	0.0721	1.53	53%	0.0818	0.1015	1.24	24%
3	594.0	752.9	1.27	27%	0.0259	0.0249	0.96	-4%	0.1318	0.1478	1.12	12%

Table 3-9 Validation Peak Flow, Volume, and Depth – September 16, 2022

Flow Monitor	Volume (m ³)				Peak Flow (m ³ /s)				Depth (m)			
	Observed	Simulated	Simulated/ Observed	% Error	Observed	Simulated	Simulated/ Observed	% Error	Observed	Simulated	Simulated/ Observed	% Error
1	298.4	488.4	1.64	64%	0.0352	0.0426	1.21	21%	0.0877	0.0850	0.97	-3%
2	548.1	1329	2.42	142%	0.0926	0.1221	1.32	32%	0.1216	0.1318	1.08	8%
3	115.4	437.6	3.79	279%	0.0412	0.0382	0.93	-7%	0.2564	0.1942	0.76	-24%

Figure 3-10 Flow Monitor 3 – June 23-26, 2022
Flow (m³/s)Figure 3-11 Flow Monitor 1 – June 23-26, 2022
Depth (m)

3.3.3 Summary

Overall, considering the limited flow monitoring data and the variability in rainfall conditions over time and space, the model was deemed to provide an adequate estimate of storm event runoff for the system assessment of this study. Note, perfect agreement is not realistic at all locations within a model. This is due to the spatial variability of rainfall intensities, model approximations, and limitations. The model was considered adequate based on the calibration and validation results. However, due to the low rainfalls experienced over the 2022 monitoring period, additional flow

monitoring and model calibration/validation is recommended. Associated Engineering recommends that the MD implement a continuous flow monitoring program (over multiple years) to collect more data at the same monitoring sites, ideally, during a larger storm event. Additional monitoring sites for both flow and rainfall should also be considered.

3.4 Existing System Assessment

After calibration and validation of the dual-drainage model, the following design storm events were simulated using the 2022 City of Grande Prairie IDF data based on a Chicago Distribution. These design storm events represent the probability of occurrence of an average rainfall intensity based on its duration and frequency.

- 1:2-year (50% probability occurrence) 4-hour
- 1:5-year (20% probability occurrence) 4-hour
- 1:10-year (10% probability occurrence) 4-hour
- 1:25-year (4% probability occurrence) 4-hour
- 1:50-year (2% probability occurrence) 4-hour
- 1:100-year (1% probability occurrence) 4-hour

These storm event simulations were used to assess the existing storm system.

The simulated water level results for each node (manhole or catch basin) were converted to Grade Line Factors (GLFs) to illustrate surcharge levels. The GLF indicates where the water level is expected to surcharge above ground level at each manhole or catch basin. Nodes highlighted in red in **Figures 3-12 to 3-14** indicate these surcharge locations during the 1:2-year, 1:5-year, and 1:100-year design storm events, respectively.

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DRAWING PATH: C:\2022-3300_GrandeCache\WaterMasterPlan\StormMasterPlan\fig3-12_MinorSystemSurcharging1-2YR.mxd
DATA SOURCE: © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm AS SHOWN, ADJUST SCALES
SCALE(S) SHOWN ARE INTENDED FOR TABL01D (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- ▲ Storm Outfall
- Watercourse

Storm Pipe

- < 1.0 m
- > 1.0 m

Model Results

- Surcharge 0 - 0.5 m
- Surcharge > 0.5 m



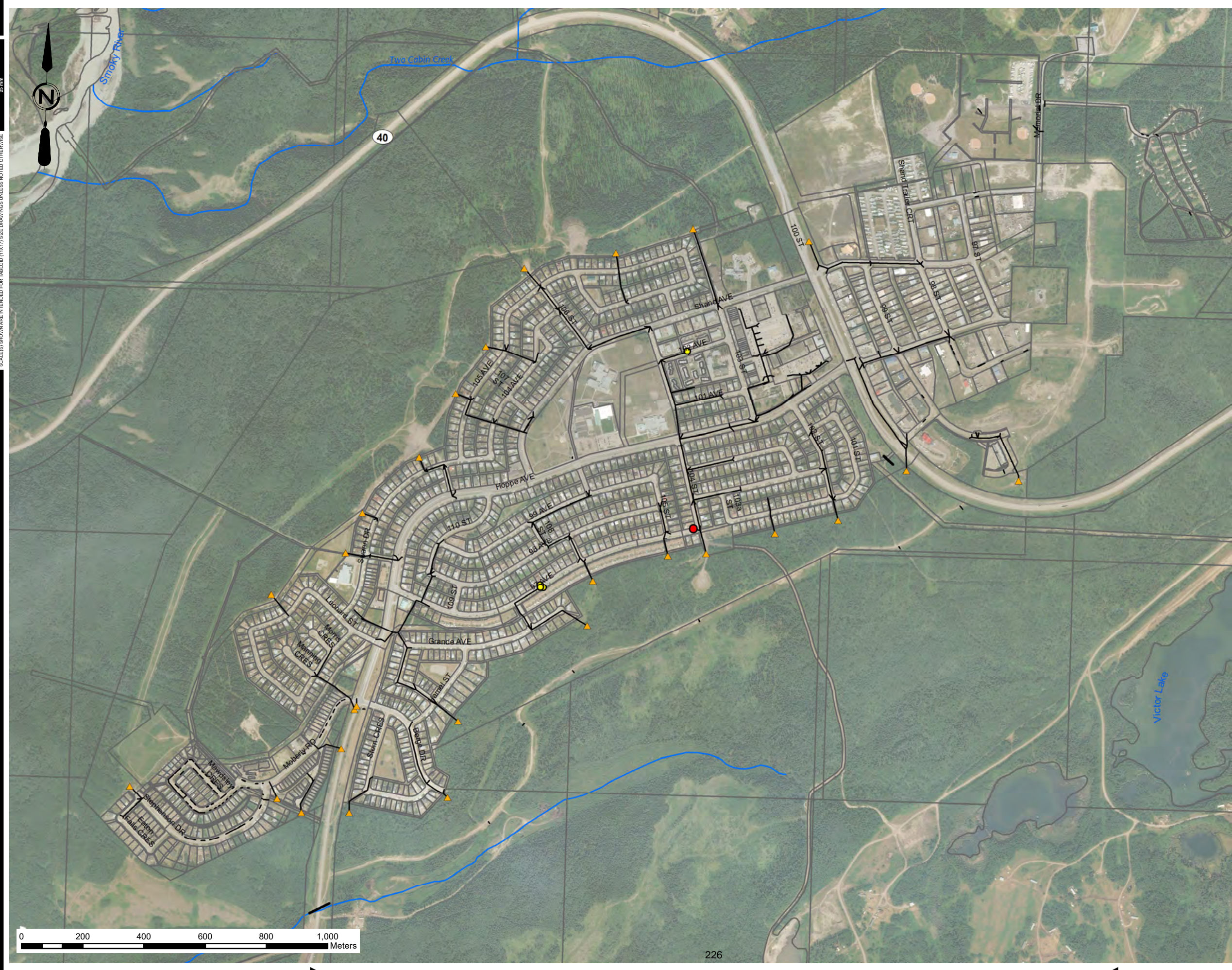
FIGURE 3-12
GRANDE CACHE STORM MASTER PLAN

MINOR SYSTEM SURCHARGE 1:2 YEAR
4 - HOUR DESIGN STORM EVENT

AE PROJECT No.	2022-3300
SCALE	1:12,000
APPROVED	
DATE	2023MAR02
REV	
DESCRIPTION	ISSUED FOR FINAL

SAVE DATE: 2/13/2023 11:20:29 AM SAVED BY:
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DATA SOURCE: © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm AS SHOWN, SCALE(S) SHOWN ARE INTENDED FOR TABL01D (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- ▲ Storm Outfall
- Watercourse

Storm Pipe

- < 1.0 m
- > 1.0 m

Model Results

- Surcharge 0 - 0.5 m
- Surcharge > 0.5 m



FIGURE 3-13

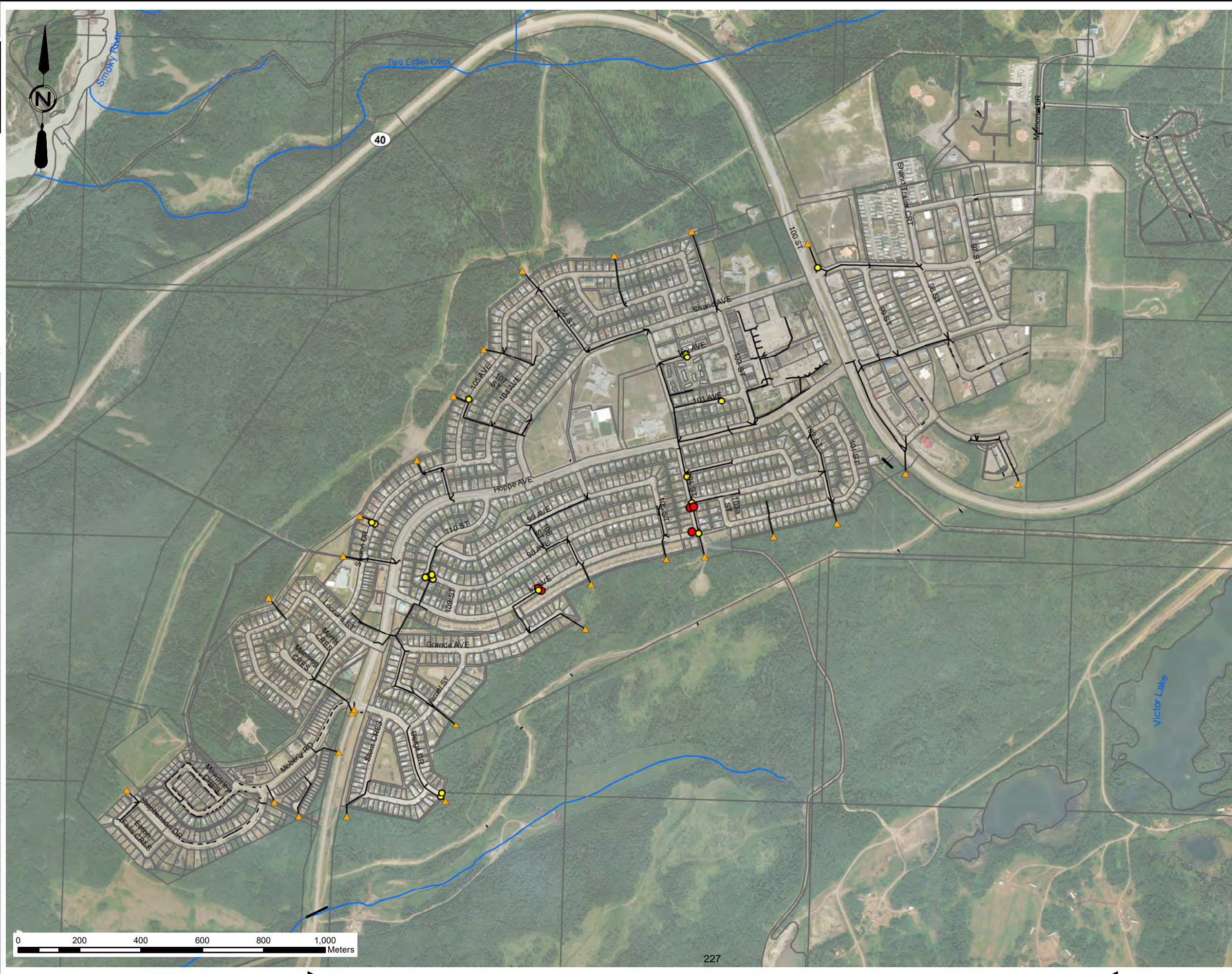
GRANDE CACHE STORM MASTER PLAN

MINOR SYSTEM SURCHARGE 1:5 YEAR
4 - HOUR DESIGN STORM EVENT

AE PROJECT No.	2022-3300
SCALE	1:12,000
APPROVED	
DATE	2023MAR02
REV	
DESCRIPTION	ISSUED FOR FINAL

SAVE DATE: 2/13/2023 11:21:24 AM SAVED BY:
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DATA SOURCE: © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm AS SHOWN, SCALE(S) SHOWN ARE INTENDED FOR TABL01D (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- ▲ Storm Outfall
- Watercourse

Storm Pipe

- < 1.0 m
- > 1.0 m

Model Results

- Surcharge 0 - 0.5 m
- Surcharge > 0.5 m



FIGURE 3-14

GRANDE CACHE STORM MASTER PLAN

**MINOR SYSTEM SURCHARGE 1:100 YEAR
4 - HOUR DESIGN STORM EVENT**

AE PROJECT No.	2022-3300
SCALE	1:12,000
APPROVED	
DATE	2023MAR02
REV	
DESCRIPTION	ISSUED FOR FINAL

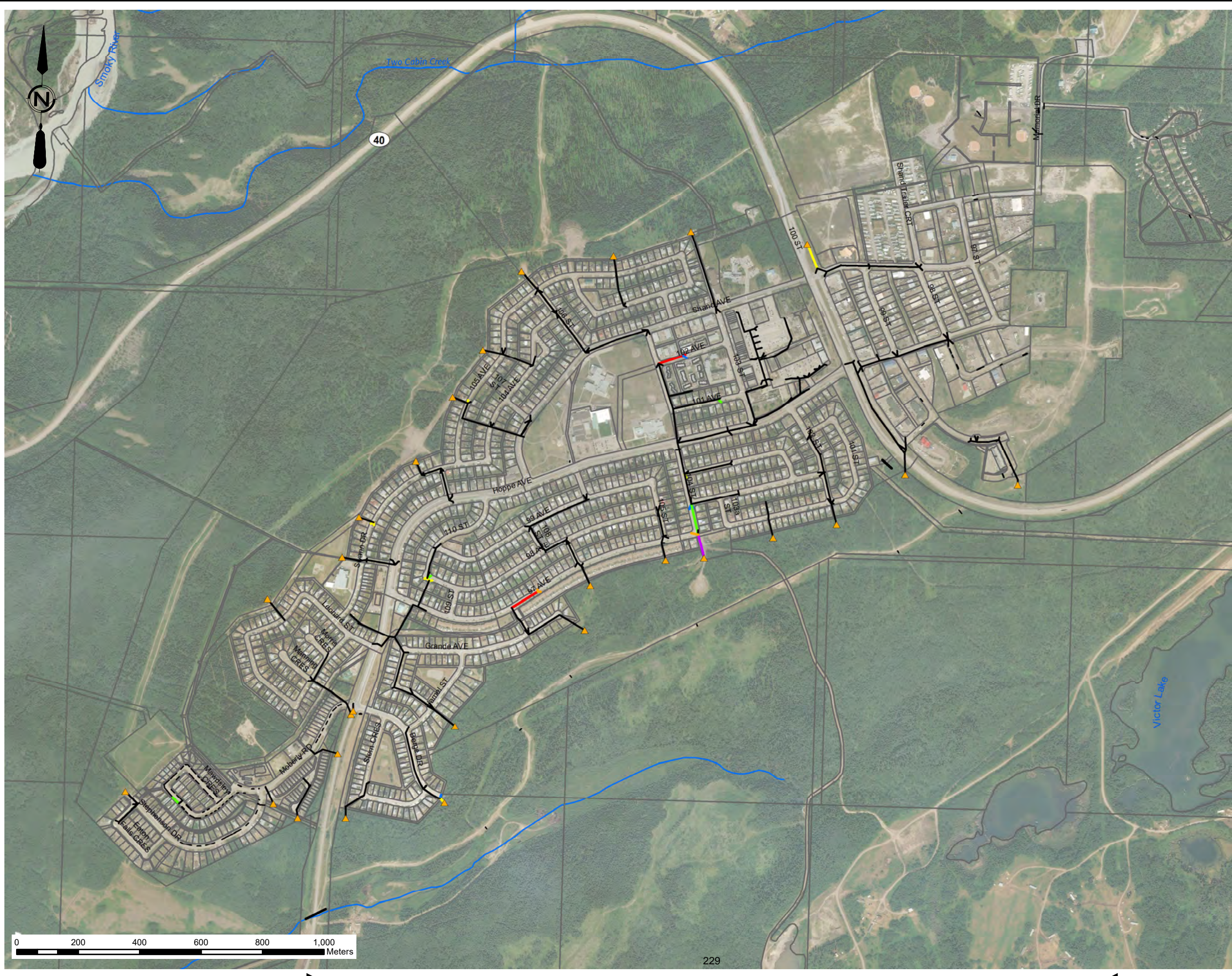
The model results for each stormwater pipe are represented with a level of service assessment. This assessment evaluates the minor system considering the results of each design storm event above. The depth of water in each manhole, at each return period, was evaluated against the manhole's rim elevation. The highest return period in which the GLF is below surface in each manhole was assigned to the manhole's outgoing pipes. The result is a map which indicates the anticipated level of service for each pipe within the Hamlet. Pipes with a low level of service are anticipated to surcharge to surface more often than pipes with a high level of service. The minor system level of service is illustrated in **Figure 3-15**.

The performance of the major system was evaluated against the Government of Alberta's Permissible Flow Velocity Depth (QVD) criteria (Alberta Environmental Protection, 1999). The QVD assessment evaluates the major system during individual design storms (in this case the 1:100-year 4-hour design storm event). Major conduit centerlines color coded red indicate where the major system violates the QVD criteria. Green lines indicate where the criteria are achieved. **Figure 3-16** presents the major system performance.

During the 1:2-year 4-hour design storm event, catch basins on 104 Street at 97 Avenue and on 97 Avenue east of 108 Street are expected to surcharge to ground. During the 1:5-year 4-hour design storm event, catch basins and manholes also surcharge to ground on 102 Avenue between 104 and 103 Street. Additional localized areas surcharge to ground during the 1:100-year 4-hour design storm event. Overall, the majority of minor system pipes within the Hamlet have a level of service greater than the 1:100-year 4-hour design storm event. In addition, the majority of major system flow paths within the Hamlet pass the QVD criteria.

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DATA SOURCE: © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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SCALE(S) SHOWN ARE INTENDED FOR TABL01D (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- ▲ Storm Outfall
- Watercourse

Storm Pipe

- < 1.0 m
- > 1.0 m

Existing Level of Service

- <2 YR
- 2 YR
- 5 YR
- 10 YR
- 25 YR
- 50 YR
- >100 YR



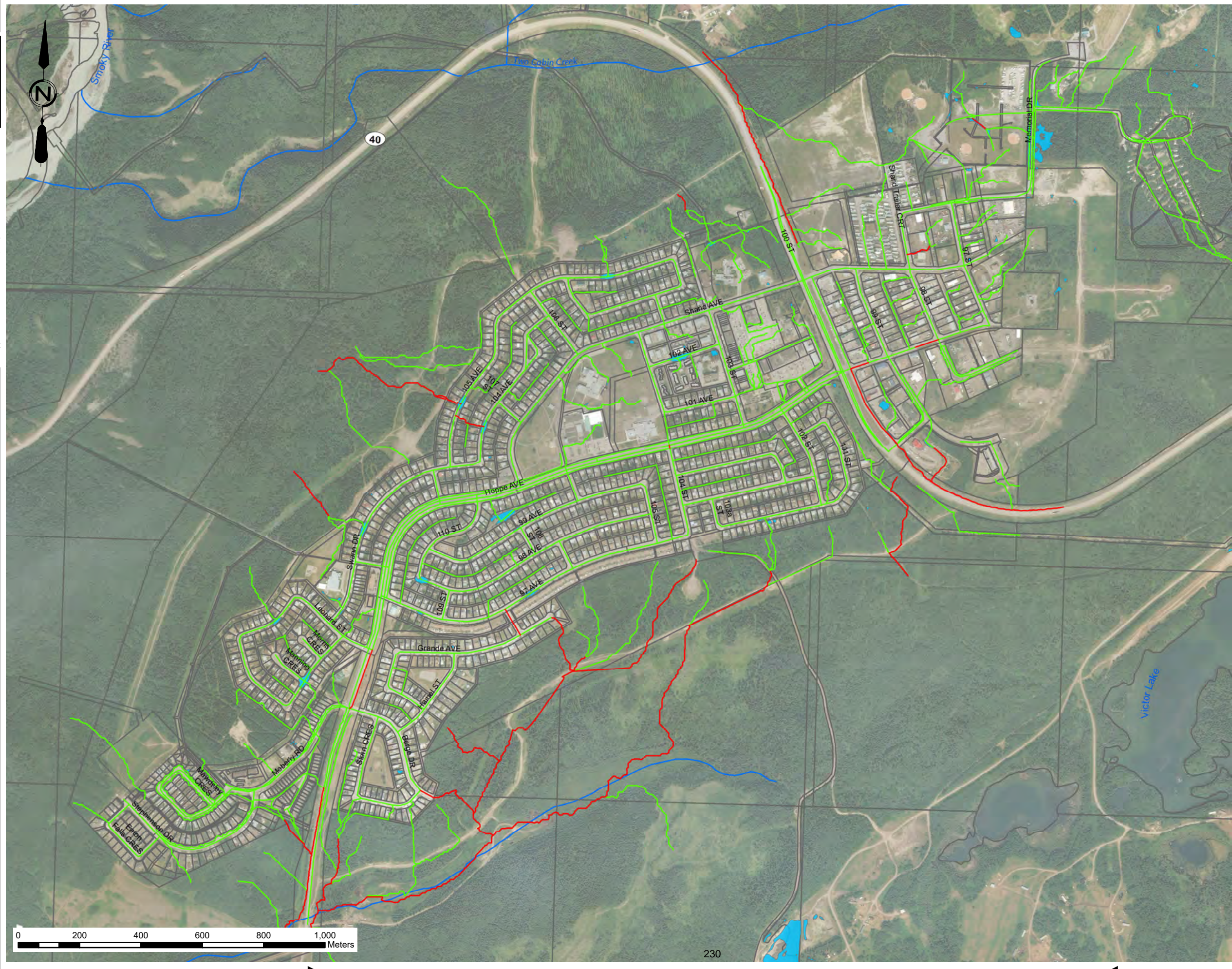
FIGURE 3-15

GRANDE CACHE STORM MASTER PLAN

MINOR SYSTEM LEVEL OF SERVICE

AE PROJECT No.	2022-3300
SCALE	1:12,000
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DATE	2023MAR02
REV	
DESCRIPTION	ISSUED FOR FINAL

SAVE DATE: 1/19/2023 11:40:24 AM SAVED BY:
DRAWING PATH: C:\2022-3300_GrandeCache\WaterMasterPlan\StormMasterPlan\figs-15_MajorSystemPerformance1-100YR.mxd
DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
SCALE(S) SHOWN ARE INTENDED FOR TAB/CID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE
IF NOT 25 mm AS SHOWN SCALES



- Legend:**
- Watercourse
 - Trap Lows
- Major System Performance**
- Pass
 - Fail



FIGURE 3-16
GRANDE CACHE STORM MASTER PLAN

MAJOR SYSTEM PERFORMANCE 1:100 YEAR
4 - HOUR DESIGN STORM EVENT

AE PROJECT No.	2022-3300
SCALE	1:12,000
APPROVED	
DATE	2023FEB13
REV	
DESCRIPTION	ISSUED FOR FINAL

4 UPGRADES TO EXISTING SYSTEM

Associated Engineering identified several upgrades to the existing storm system to provide at minimum, a 1:5-year level of service everywhere within the Hamlet. Proposed upgrades were focused on increasing pipe capacity and lowering surcharge levels within manholes. The conceptual upgrades were based on existing pipe inverts and alignments. The locations of proposed upgrades are illustrated in [Figure 4-1](#) and summarized below:

- **Location 1** – upsize pipes at 97 Avenue and 108 Street.
- **Location 2** – upsize pipe on 102 Avenue east of 104 Street.
- **Location 3** – upsize outfall pipe at 97 Avenue and 104 Street.

Table 4-1 summarizes the existing and proposed pipe sizes at each location. Results indicate that the proposed upgrades increase pipe capacity and decrease surcharge levels.

Table 4-1 Existing and Proposed Pipe Sizes at Each Location

Location	Street Address	Pipe ID	Length (m)	Slope (%)	Existing Diameter (m)	Proposed Diameter (m)	Proposed Q_p/Q_f^1
1	97 Avenue at 108 Street	MiC_00285	99.52	1.01%	0.30	0.45	0.94
	108 Street at 97 Avenue	MiC_00286	36.45	2.75%	0.30	0.45	0.46
2	102 Avenue at 104 Street	MiC_00267	84.85	1.18%	0.30	0.45	1.00
3	Outfall pipe at 104 Street and 97 Avenue	MiC_00275	79.89	1.25%	0.60	0.90	0.66

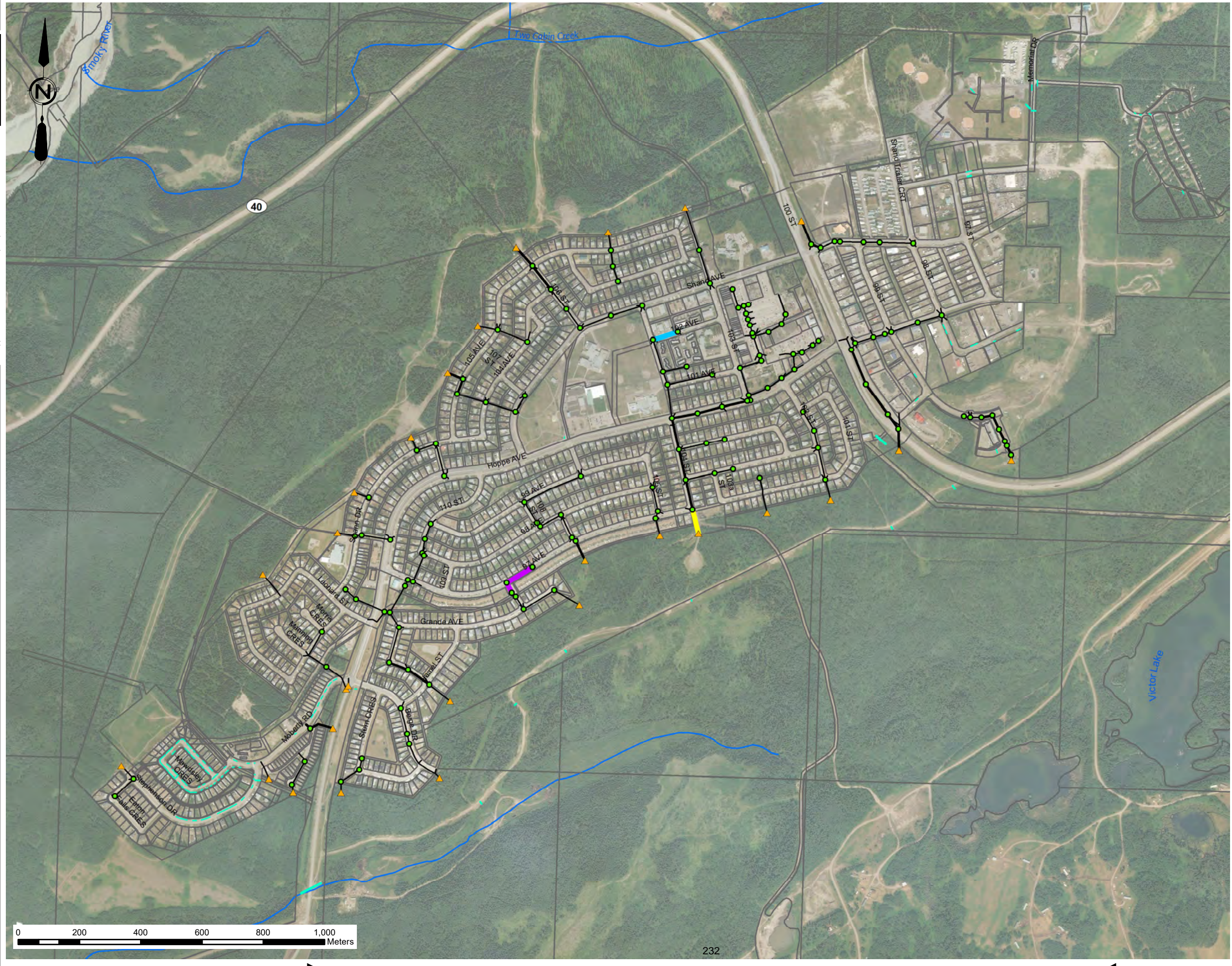
Detailed results showing the hydraulic grade line profiles of the existing and proposed systems under the 1:5-year 4-hour design storm event are presented in [Appendix C](#).

Further refinement of each proposed upgrade should be undertaken during design phases. The upgrades for each location should be based upon site constraints, construction method, and budget. An opinion of probable costs is included in [Section 6](#).

¹ Q_p/Q_f = peak flow fraction of conduit full flow computed during the 1:5-year, 4-hour simulation

SAVE DATE: 2/13/2023 11:15:07 AM SAVED BY:
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DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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5 FUTURE STORMWATER SYSTEM

5.1 General

The conceptual future stormwater system is presented in interim and ultimate stages. The areas highlighted for future development are illustrated in **Figure 2-1**. The Riverview ASP was reviewed as part of the Water Distribution System Master Plan (Associated Engineering, 2022) and its proposed land use plan and road layout is reflected in the future plan.

5.2 Interim Stage

The interim development stage includes the Riverview ASP area in the southwest as well as several commercial/industrial areas located in the northeast area of the Hamlet. The commercial/industrial area west of 100 Street between Shand Avenue West and Hoppe Avenue was included in the existing model land use. Results indicated that existing systems are sized to convey these developments. In addition, portions of the easternmost interim phase commercial/industrial development areas were included in the existing model with no impact to the existing sewer system. The remainder of these areas, as well as the area east of 100 Street north of Shand Avenue West, currently drain away from existing development within the Hamlet. This is also true within the Riverview ASP area (**Figure 3-2**).

It was assumed that future development within these areas will not substantially alter existing topography. Therefore, existing storm sewers will be required to be extended to service these developments. If substantial changes are made to topography and runoff from these developments are directed to discharge into existing storm sewers, further analysis should be completed including update to the model. This will identify locations where pipes may not have capacity for additional flows.

5.3 Ultimate Stage

The ultimate development stage includes the South Bench area south of the Hamlet, the Floyd McLennan Business Park, and Tower Park areas. Similar to the interim development areas, the Hamlet's existing storm system outfalls to these areas and existing topography drains away. Existing storm sewers will be required to be extended to service ultimate stage future developments.

6 OPINION OF PROBABLE COST

This section provides the conceptual opinion of probable cost estimates for the capital costs associated with the recommended upgrades to the existing system. **Table 6-1** presents the estimated capital cost and implementation timelines for the proposed upgrades. Pipe materials shall conform to current engineering standards and should be reviewed during detailed design for suitability and based on current economic conditions.

Based on the level of details of this study and the understanding that design conditions are unknown, the estimates presented herein include a contingency of 15% and an engineering allowance of 15% of the total estimated costs. All costs are based on recent tender prices of similar scope and location. All costs are in 2023 dollars and do not include GST. A detailed cost estimate is attached in **Appendix D**.

Table 6-1 Capital Cost and Implementation Plan

Description	Capital Cost	Implementation Timeline
Existing System Upgrades		
Location 1	\$210,000	Within next 1 to 3 years
Location 2	\$135,000	Within next 1 to 3 years
Location 3	\$168,000	Within next 1 to 3 years
Engineering (15%) and Contingency (15%)	\$154,000	
Existing Upgrades Total	\$667,000	

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

Following are the key findings of the Stormwater System Master Plan:

1. The Hamlet of Grande Cache is located on a plateau surrounded by Smoky River to the west, Sulphur River to the south, and Victor Lake to the east. The topography and the existing storm systems within the Hamlet drain towards these valleys.
2. The current land use within the Hamlet generally consists of residential developments west of Highway 40 and commercial/industrial developments east of Highway 40. Land surrounding the Hamlet is currently designated as urban reserve.
3. The minor storm system within Grande Cache includes pipe sizes ranging from 200 to 1500 mm in diameter, manholes, catch basins, and outfall structures. The major system includes streets, ditches, culverts, overland runoff routes, and SWMFs.
4. In general, the storm sewer flow monitoring data was found to be of good quality. The data required little to no modification during quality control reviews, however, extremely low flow data during periods of no rainfall was ignored.
5. Hydrant flushing took place within the Hamlet between June 1-3 and August 15-25. Review of the flow data on these dates did not generally show any significant flows. However, these dates were ignored when calibration and validation events were chosen to eliminate the potential for impacts to the results.
6. Storm events occurred on June 23, June 28/29, and September 16 during the 2022 Flow Monitoring Program and were chosen for model calibration and validation events.
7. The largest storm event during the flow monitoring period, which occurred on June 28 and 29, 2022, was chosen for the model calibration event. This storm was approximately equivalent to a 1:10-year return period design storm event for a duration of 24 hours. The calibration results showed that the simulated peak flows and volumes were underpredicted at Flow Monitor site 1 and overpredicted at sites 2 and 3. Simulated depths were underpredicted at all sites, however, were within 2 to 25% error compared to the observed monitor values. The shape of the flow hydrographs and depth plots at each flow monitor location matched very well. Differences in peaks at the beginning of the model simulation may be due to the inability to accurately represent initial soil conditions (antecedent soil moisture) within the model.
8. Validation runs were simulated for the June 23 and September 16, 2022 storm events. Both events were less than a 1:2-year return period design storm event. Similar to the calibration results, the shape of the flow hydrographs and depth plots at each flow monitor location matched very well. Volumes were significantly overpredicted when compared to those observed. This was most likely due to very low flow data and model limitations.
9. Overall, the majority of minor system pipes within the Hamlet have a level of service greater than the 1:100-year 4-hour design storm event. In addition, the majority of major system flow paths within the Hamlet pass the QVD criteria.
10. Associated Engineering identified several upgrades to the existing storm system to provide at minimum, a 1:5-year level of service everywhere within the Hamlet.
11. Existing storm sewers will be required to be extended to service interim and ultimate stage future developments.

7.2 Recommendations

Associated Engineering recommends the following:

1. The IDF of rainfall for the Hamlet of Grande Cache be based on the City of Grande Prairie data available in their 2022 Design Manual.
2. Further calibration of the stormwater model when additional data becomes available.
3. The MD implement a continuous flow monitoring program (over multiple years) to collect more data at the same monitoring sites. Additional monitoring sites for both flow and rainfall should also be considered.
4. Further refinement of each proposed upgrade based upon site constraints, construction method, and budget with an opinion of probable cost of \$667,000 including a contingency of 15% and an engineering allowance of 15%.

CLOSURE

This report was prepared for the Municipal District of Greenview No. 16 to provide a Stormwater Maser Plan for the Hamlet of Grande Cache.

The services provided by Associated Engineering Alberta Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

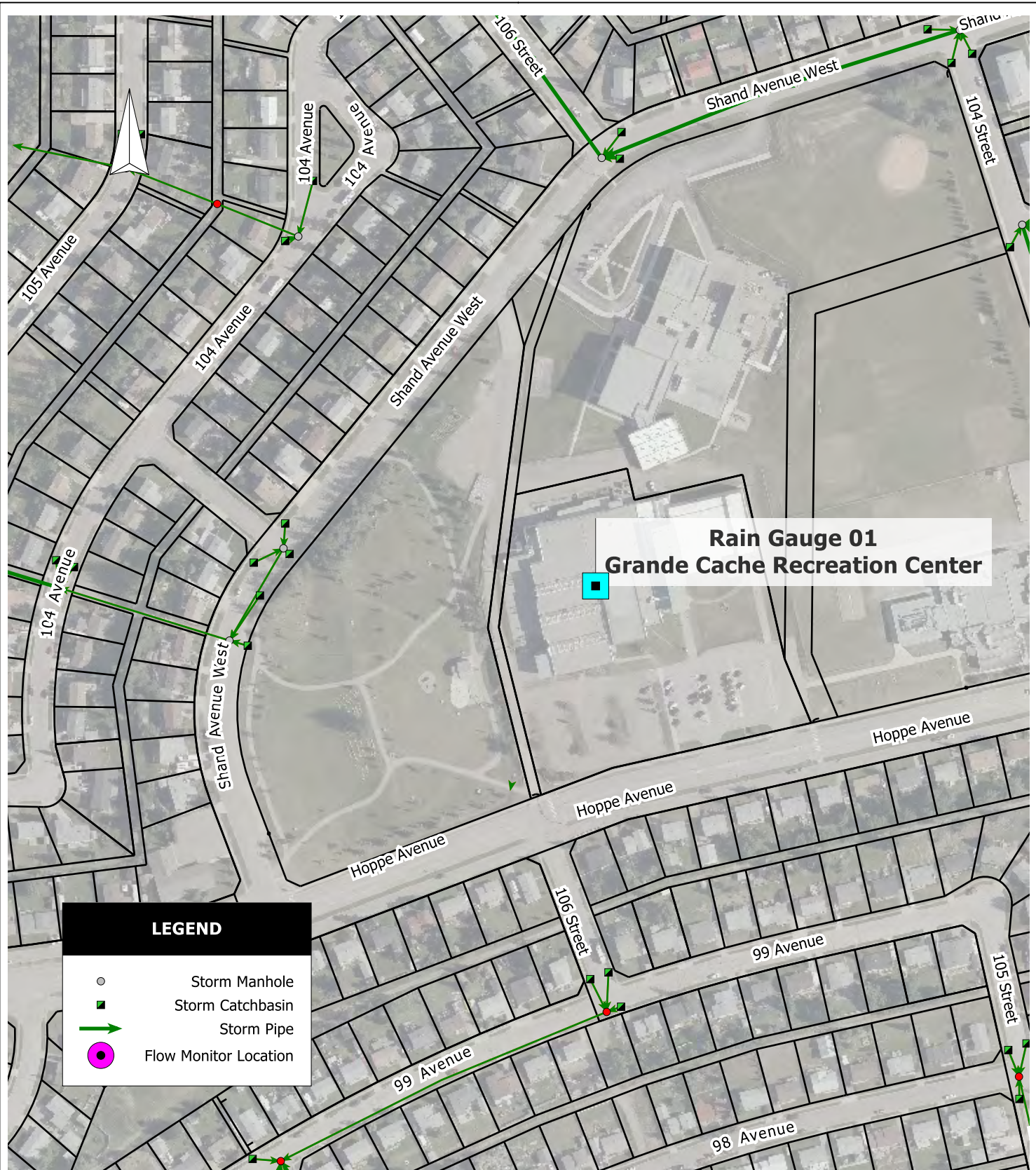
Respectfully submitted,

Associated Engineering Alberta Ltd.

Sean Nicoll, P.Eng.
Project Manager

Laurel Fowler, P.Eng.
Water Resources Engineer

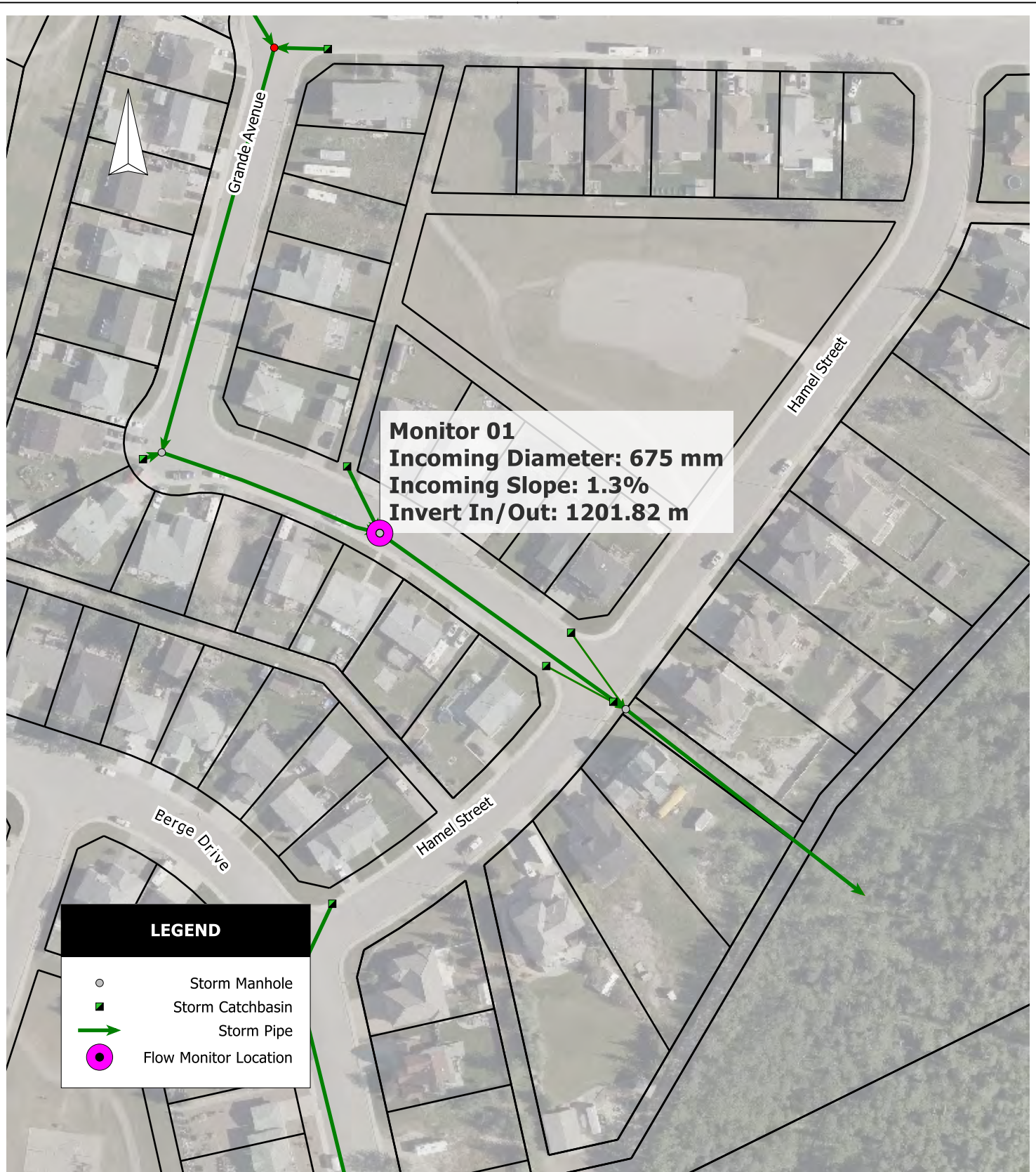
APPENDIX A - FLOW MONITORING SITE MAPS



STORM SEWER FLOW MONITORING PROGRAM

Rain Gauge 01

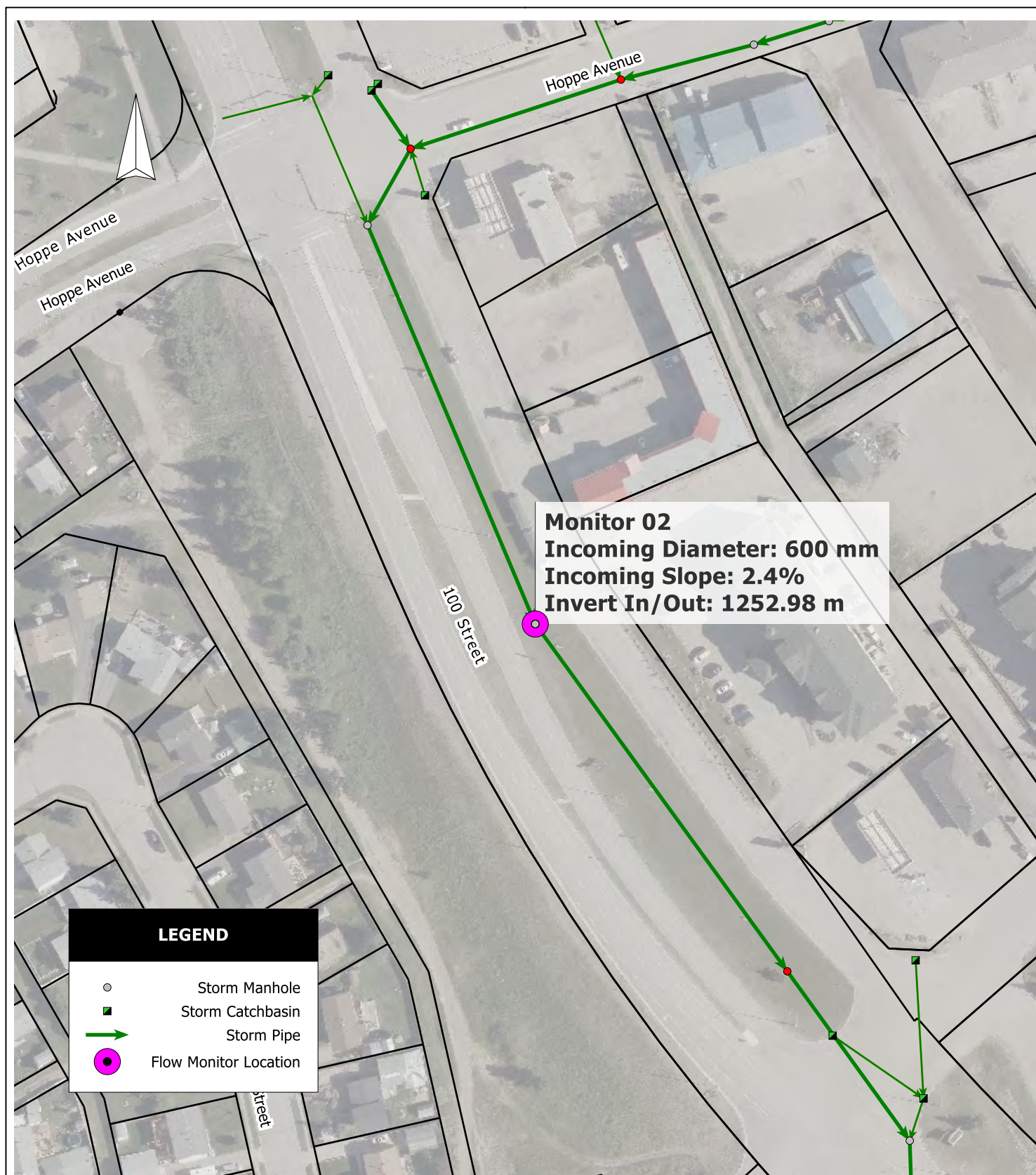
Scale 1:3,000



STORM SEWER FLOW MONITORING PROGRAM

Flow Meter Site-01

Scale 1:1,500



STORM SEWER FLOW MONITORING PROGRAM

Flow Meter Site-02

Scale 1:1,500



STORM SEWER FLOW MONITORING PROGRAM

Flow Meter Site-03

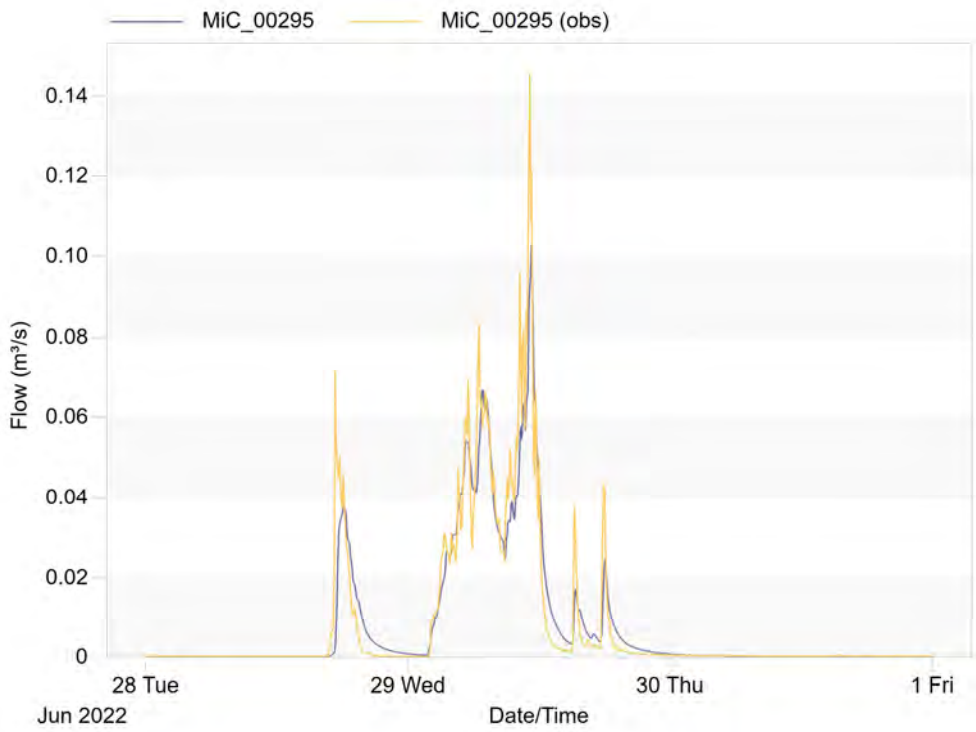
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APPENDIX B - STORM MODEL CALIBRATION/VALIDATION PLOTS

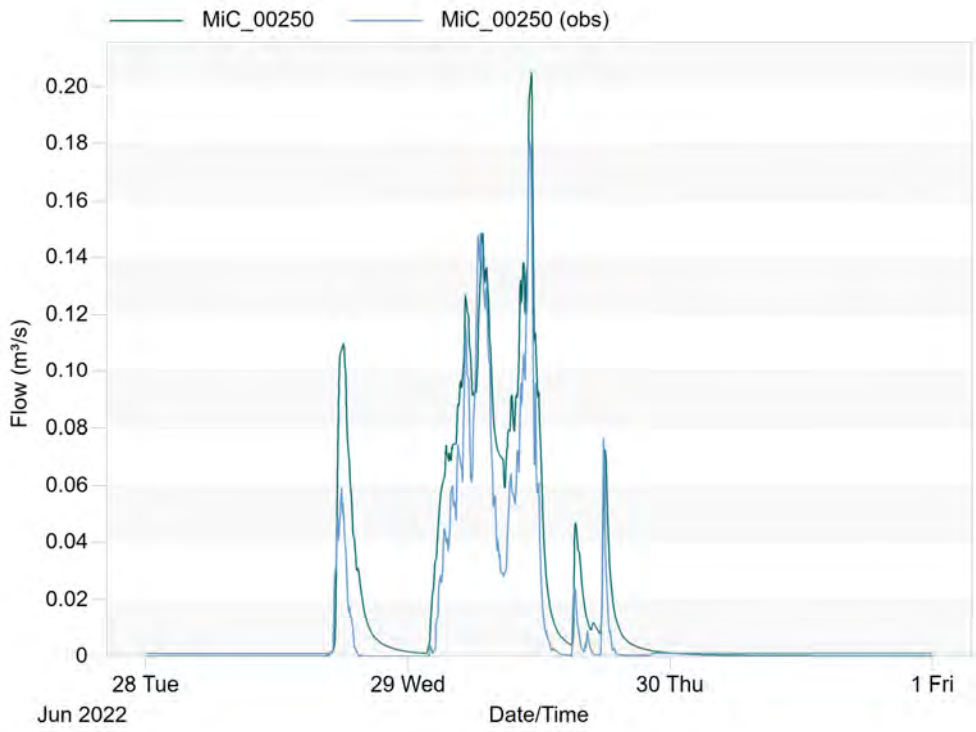
CALIBRATION - June 28, 2022 – July 1, 2022

Flow

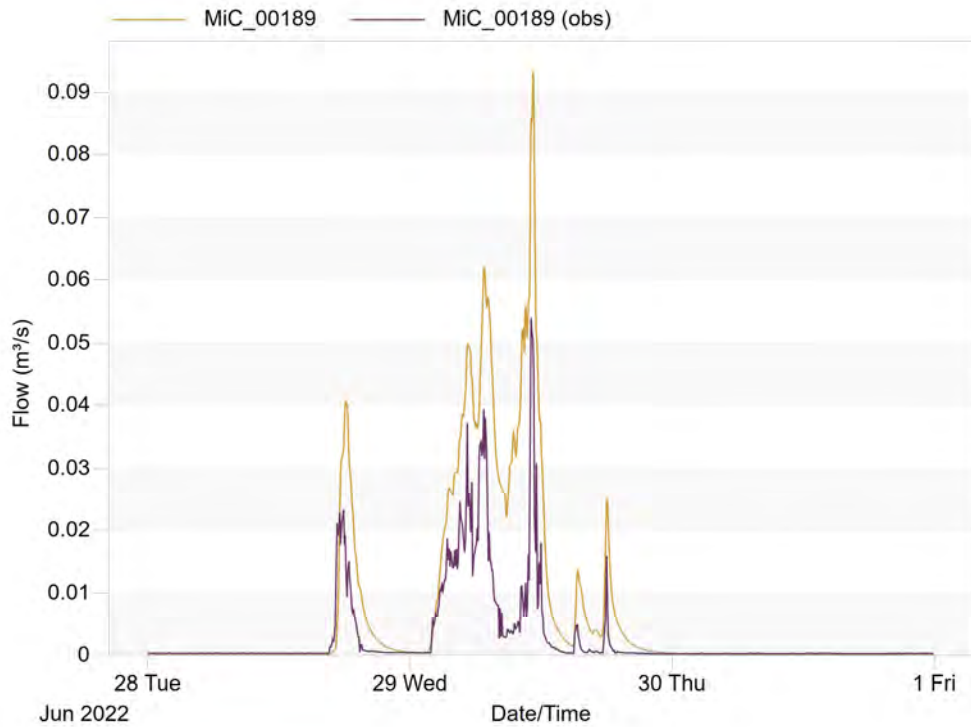
Flow Monitor 01



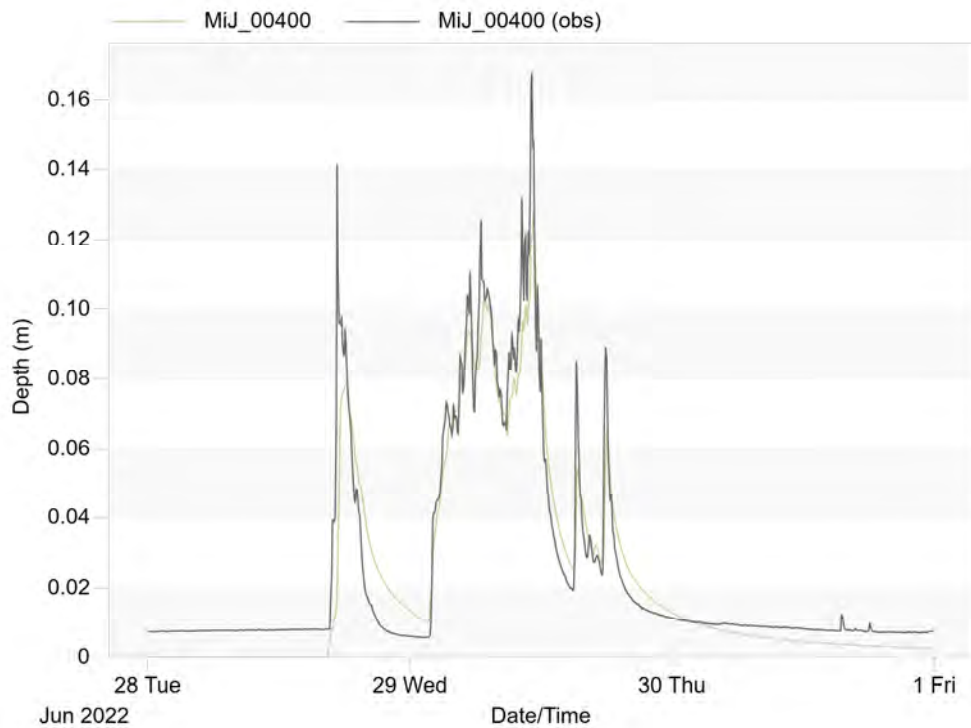
Flow Monitor 02



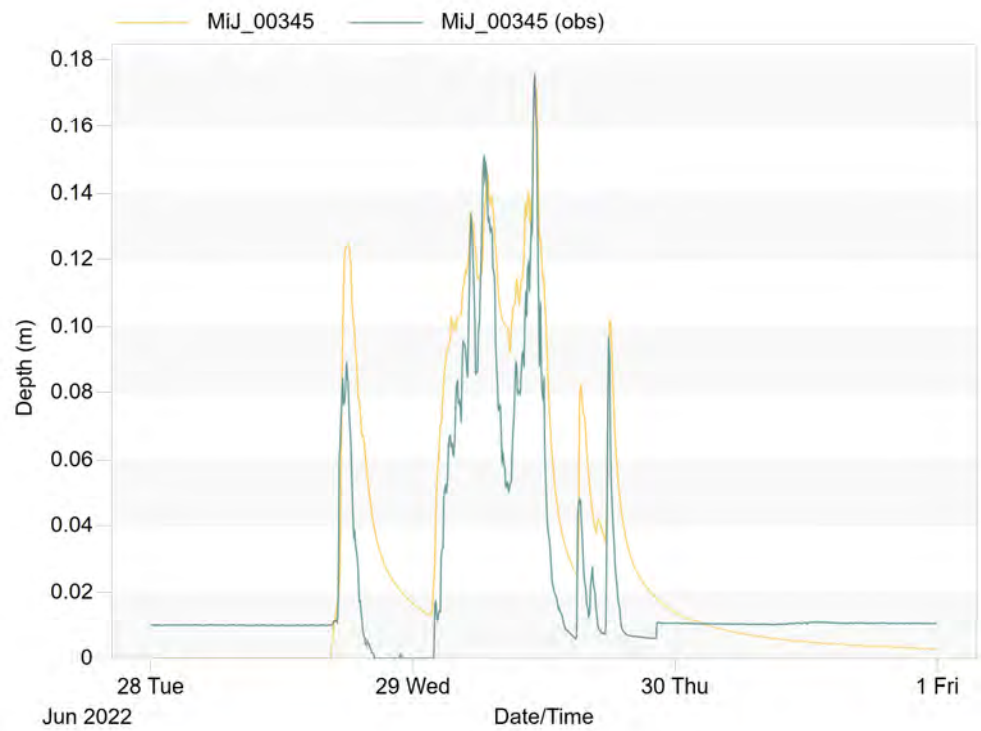
Flow Monitor 03

**Depth**

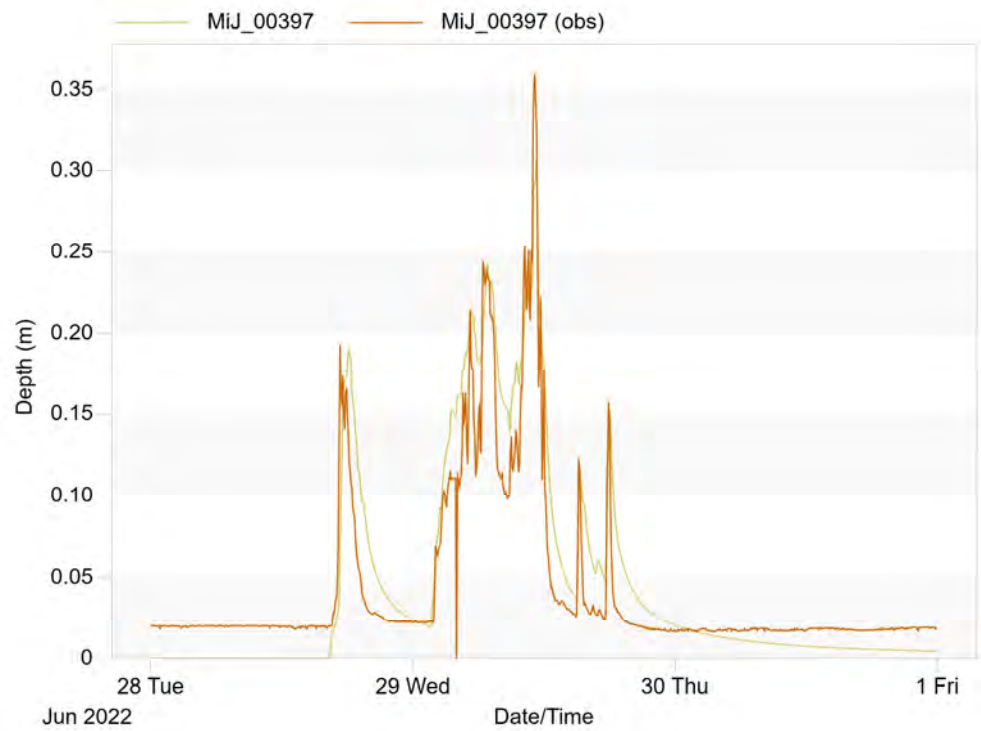
Flow Monitor 01



Flow Monitor 02



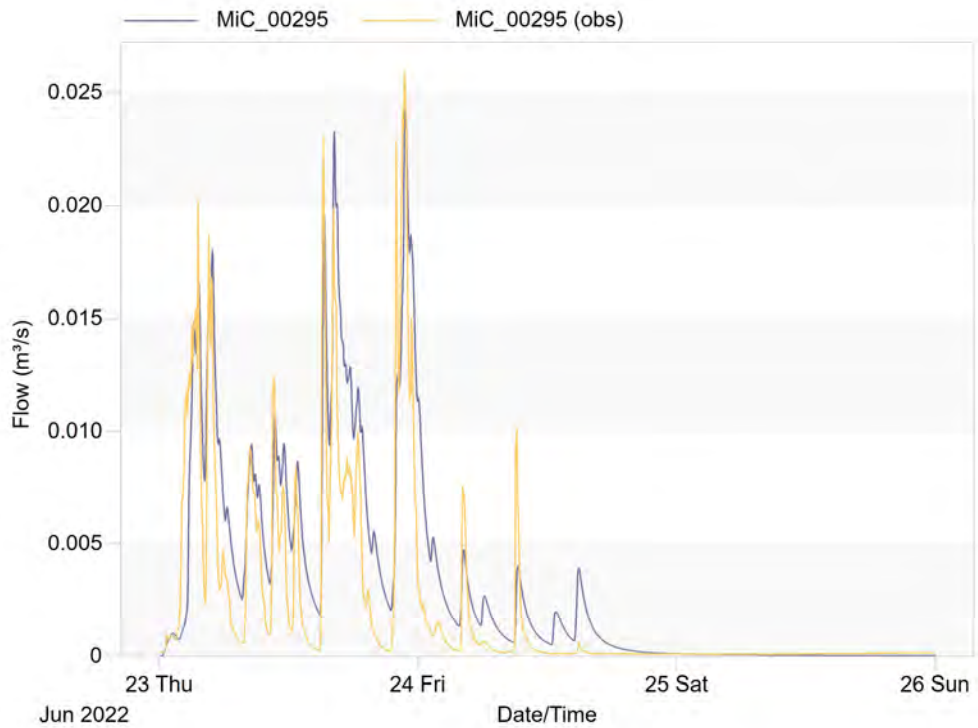
Flow Monitor 03



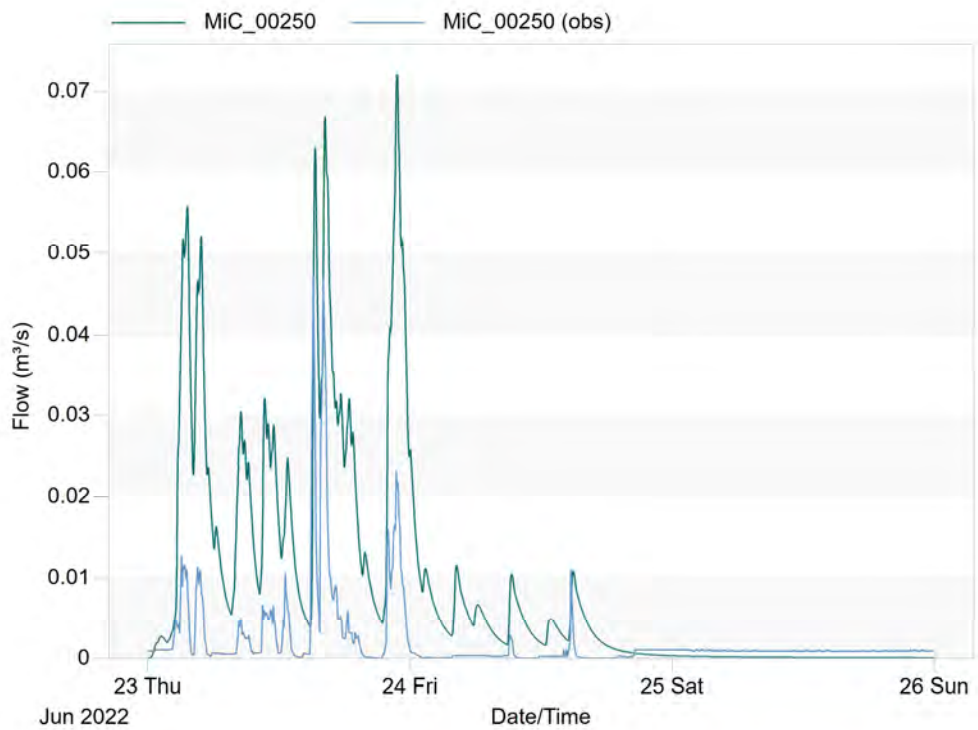
VALIDATION - June 23, 2022 – June 26, 2022

Flow

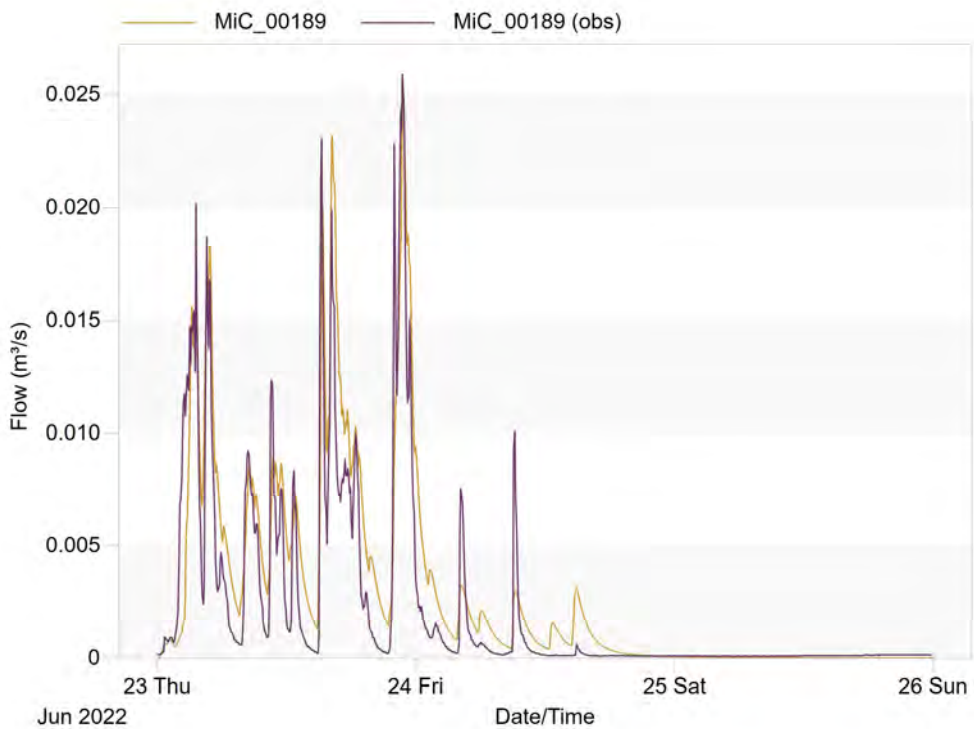
Flow Monitor 01



Flow Monitor 02

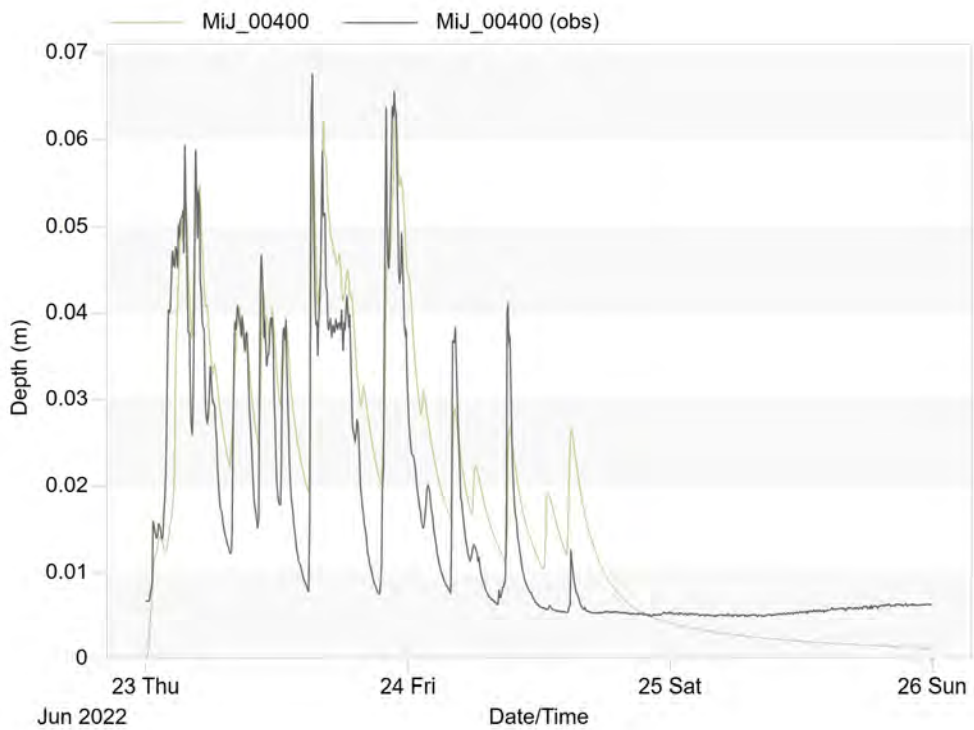


Flow Monitor 03

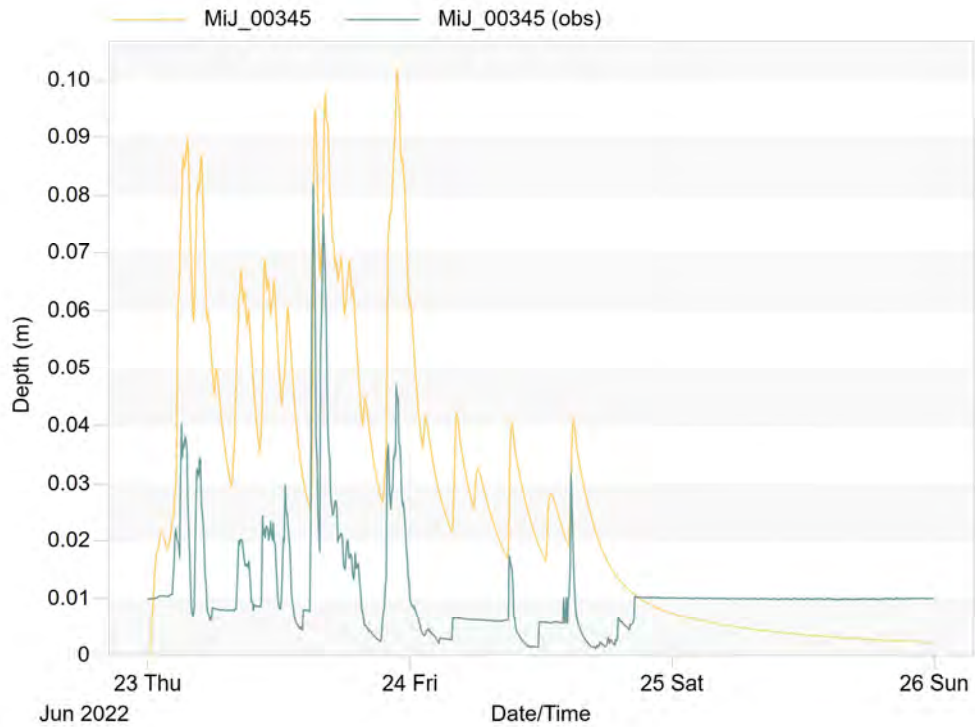


Depth

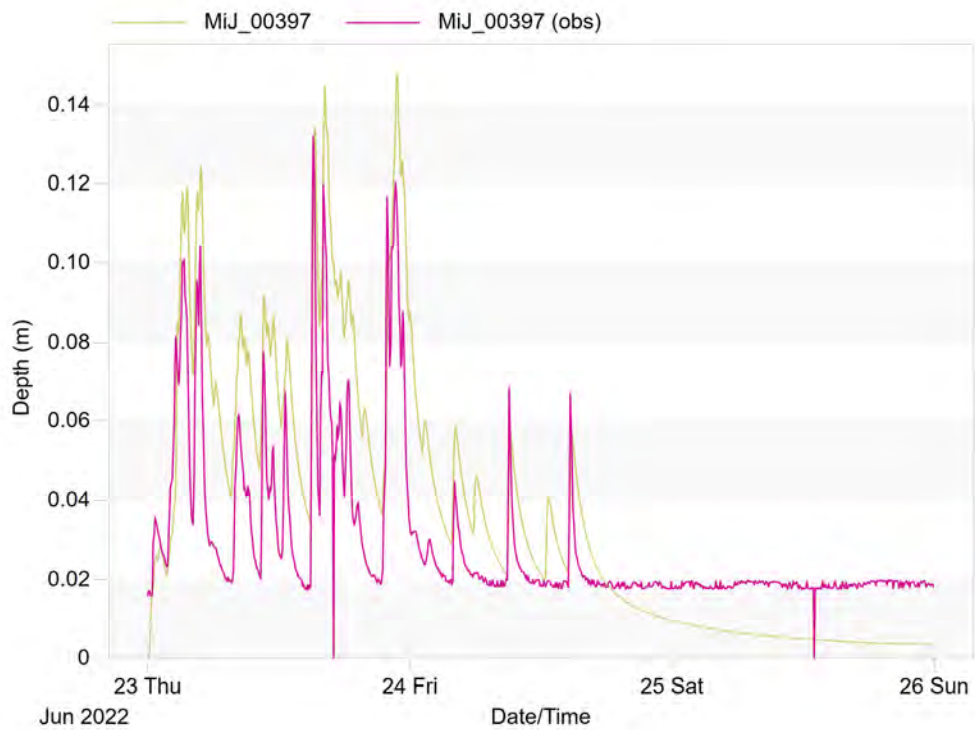
Flow Monitor 01



Flow Monitor 02



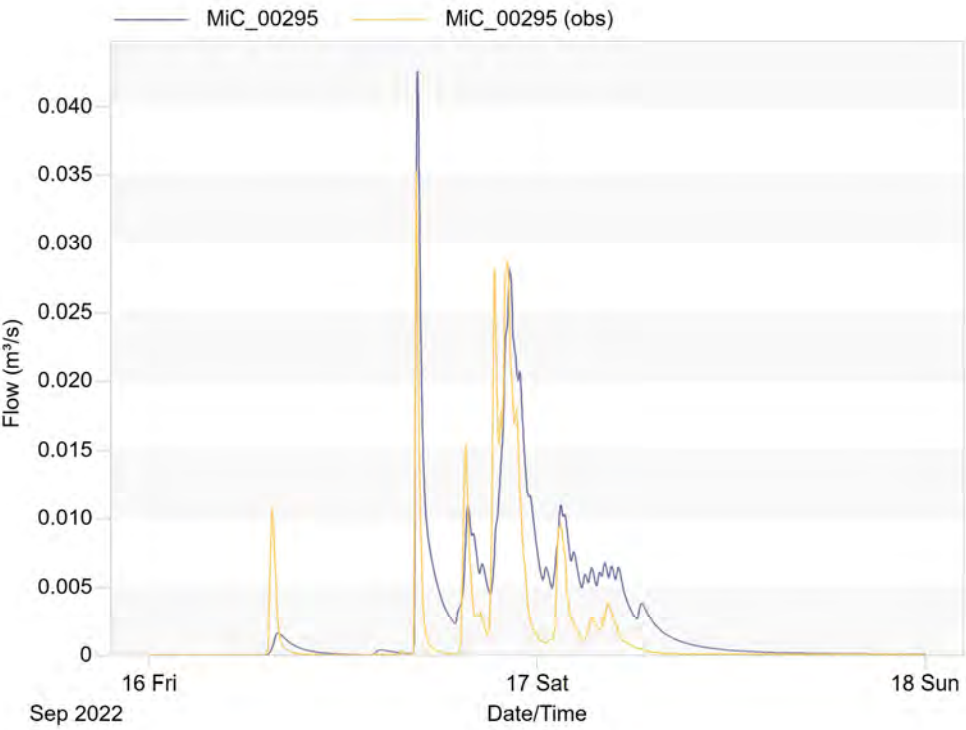
Flow Monitor 03



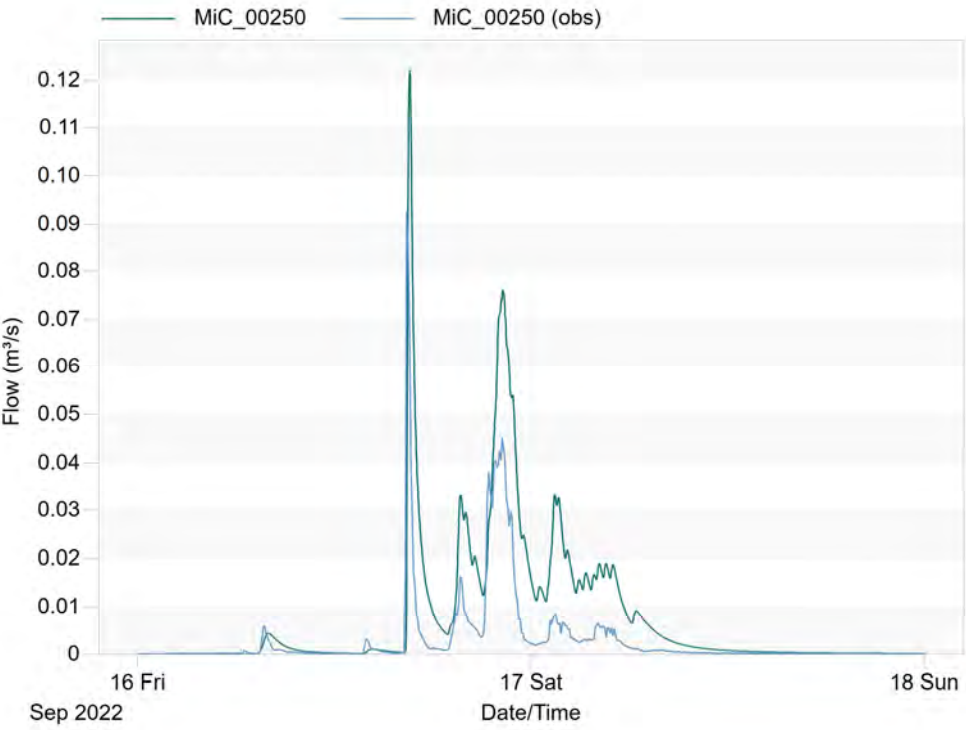
VALIDATION - September 16, 2022 – September 18, 2022

Flow

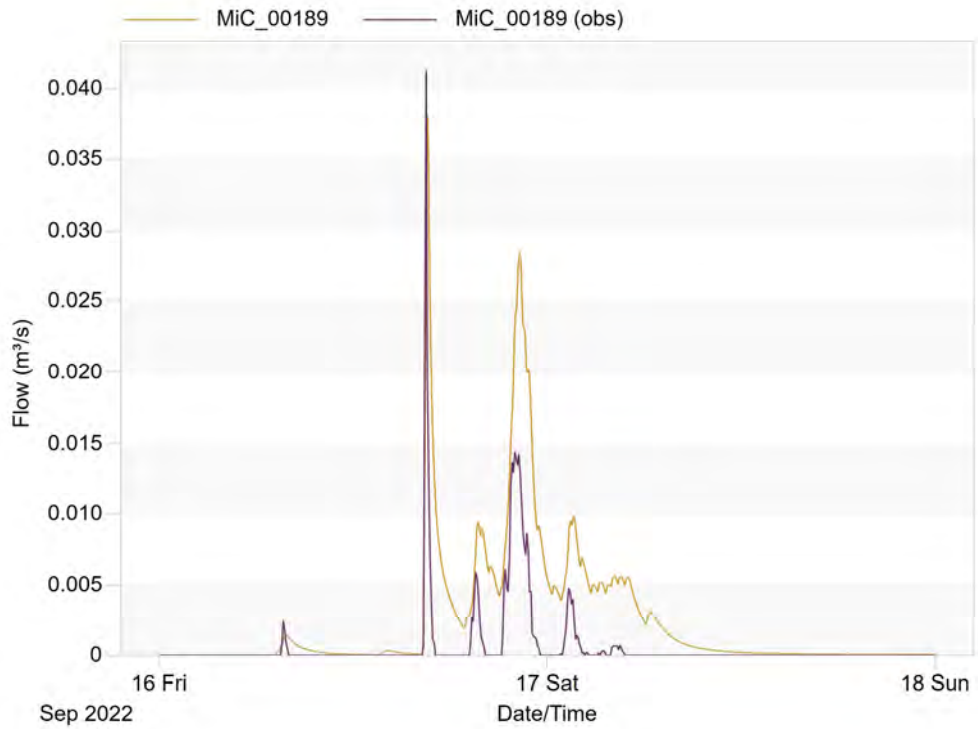
Flow Monitor 01



Flow Monitor 02

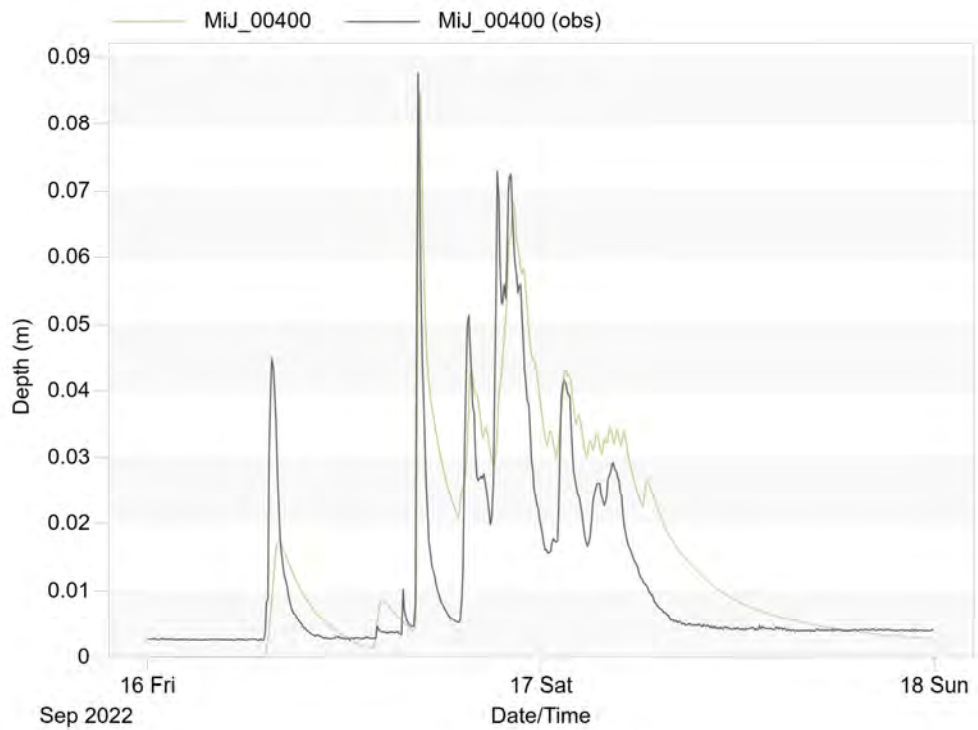


Flow Monitor 03

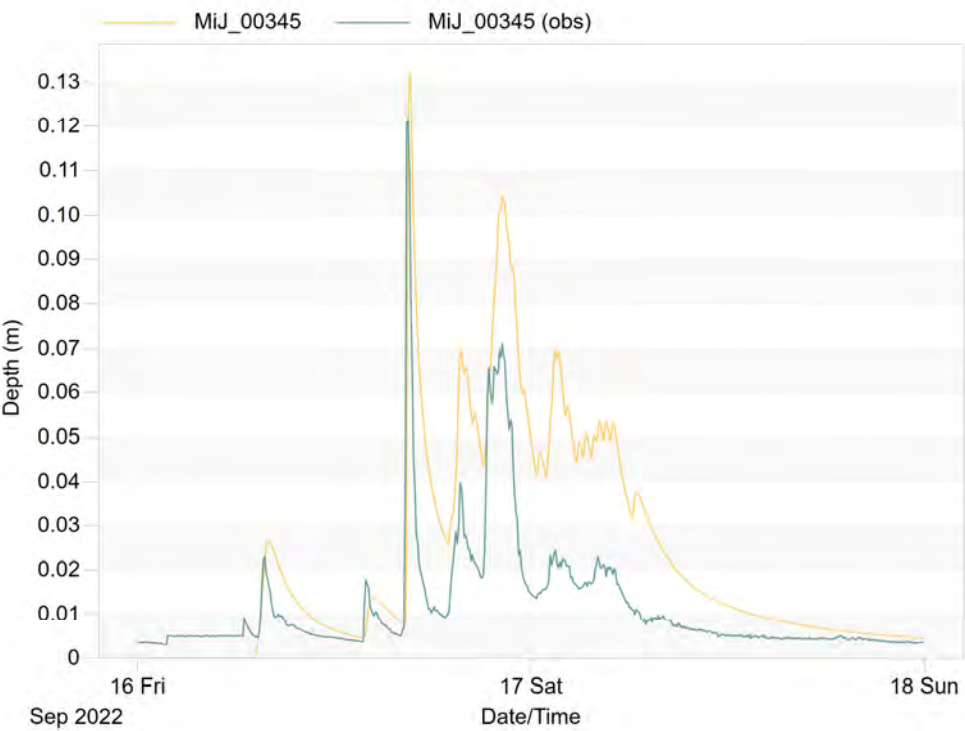


Depth

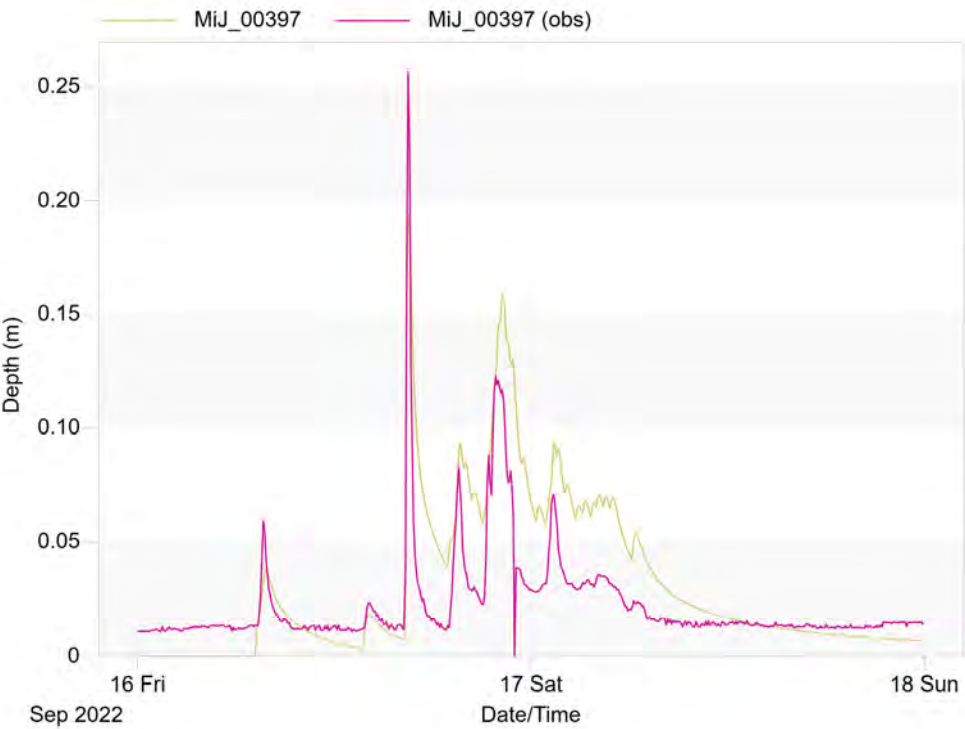
Flow Monitor 01



Flow Monitor 02



Flow Monitor 03



APPENDIX C - UPGRADES TO EXISTING SYSTEM - SIMULATED PROFILES




AE PROJECT No.	2022-3300
SCALE	1:5,000
APPROVED	
DATE	2023MAR02
REV	
DESCRIPTION	ISSUED FOR FINAL

APPENDIX D - DETAILED COST ESTIMATE



Table D-1 Hamlet of Grande Cache Cost Estimates

		Client: Municipal District of Greenview No. 16 Project: Hamlet of Grande Cache Stormwater System Master Plan Subject: Opinion of Probable Cost Project Number: 2022-3300 Date: February 2023			
Item	Description	Unit	Quantity	Unit Price	Total Cost
1.0	Existing System Upgrades				
	Upgrade Location 1 - remove and replace with 450 mm dia. Pipe	m	140	\$ 1,500.00	\$ 210,000.00
	Upgrade Location 2 - remove and replace with 450 mm dia. Pipe	m	90	\$ 1,500.00	\$ 135,000.00
	Upgrade Location 3 - remove and replace with 900 mm dia. Pipe	m	80	\$ 2,100.00	\$ 168,000.00
	Subtotal 1.0				\$ 513,000.00
	Subtotal				\$ 513,000.00
	Engineering (15%) and Contingency (15%)				\$ 154,000.00
	Total				\$ 667,000.00

REPORT

Municipal District of Greenview No. 16

Hamlet of Grande Cache Water Distribution System Master Plan



JULY 2023

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1 INTRODUCTION

In 2019, the Municipal District of Green View No. 16 (MD) commenced administration of the Hamlet of Grande Cache. In 2022, the MD retained Associated Engineering (AE) to complete a Utility Master Plan for the water distribution system, wastewater collection system, stormwater drainage system, roadway transportation systems, and select buildings within the Hamlet.

1.1 Objectives

The purpose of the project is to prepare a baseline analysis of the current condition and capacity of the Hamlet's water distribution systems. The information from the assessments and master plans will facilitate the preparation of a defensible multi-year Capital Infrastructure Rehabilitation Program which will guide the MD to maximize capital expenditures for their infrastructure.

In general, the scope of work involves the following tasks:

- Review background information.
- Establish design criteria.
- Evaluate the existing system.
- Recommend upgrades to the existing system.
- Develop future system servicing concepts.
- Prepare a comprehensive report.

1.2 Study Area

The Hamlet of Grande Cache is located in western Alberta, at the foothills of the Rocky Mountains. The Hamlet is approximately 120 km northwest of Hinton. The core area of the Hamlet is located along Highway 40 (Hwy. 40), within a plateau bordered by the Smoky River to the west, the Sulphur River to the south, and Victor Lake to the east.

Figure 1-1 shows the boundary of the study area and ground elevations of the region.

1.3 Background Information Collection and Review

Background information provided by the MD and those obtained by AE from previous project records and other sources were reviewed. This information is listed below.

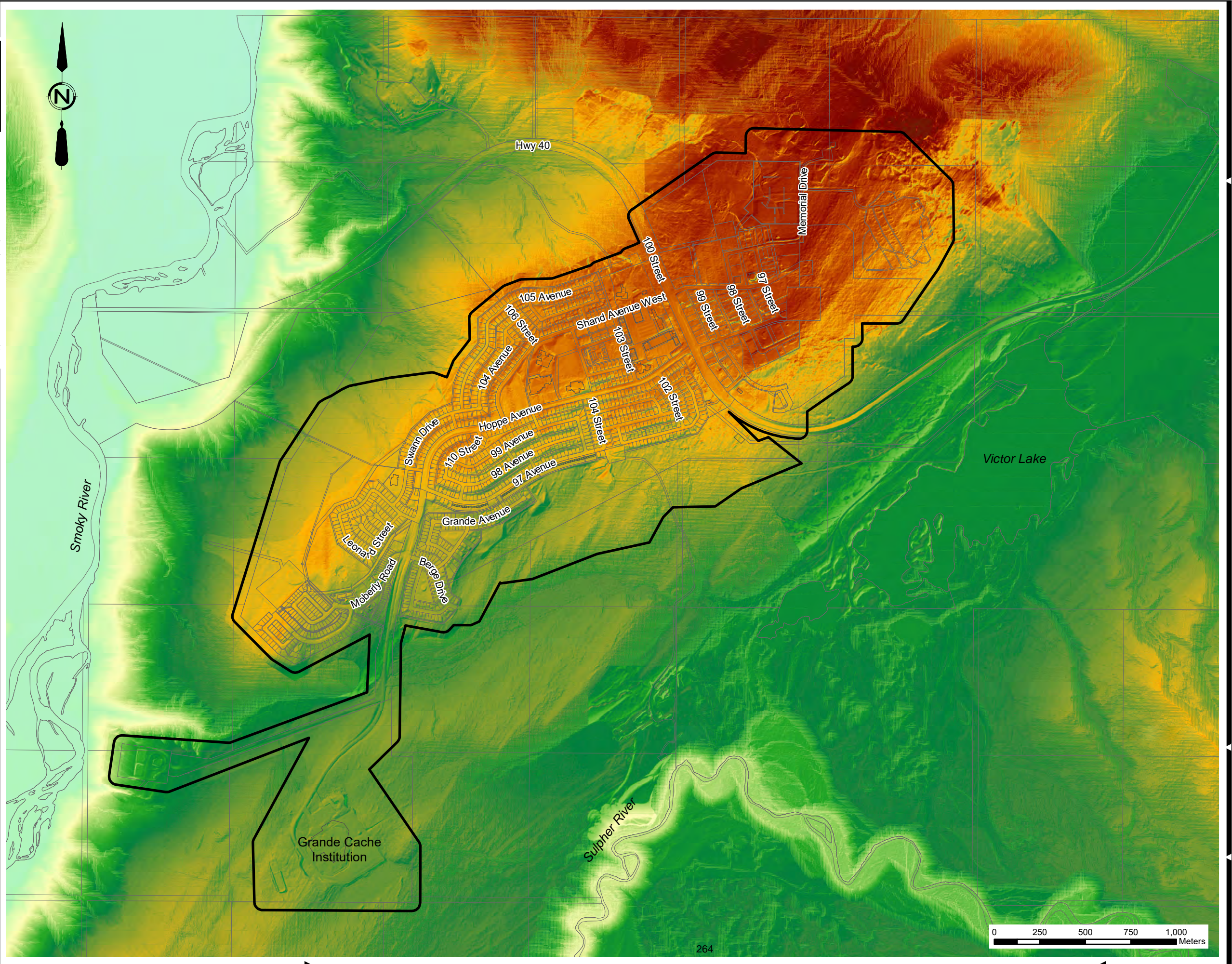
- LiDAR 7.5 DEM Ground Elevation (Altalis. 2021)
- LiDAR 1 m Ground Elevation (MD. 2005)
- Utility Baseplan and Orthophotos (MD. 2022)
- Land Use Plan (MD. 2016)
- Area Structure Plans (MD. Various Dates)
- Various Record Drawings
- Water Usage Records (MD. 2019-2021)
- Large Demand Water User Records (MD. 2021)
- Pipe Break and Repair History (MD)
- MD Greenview Development Guidelines and Municipal Servicing Standards (MD. 2020)

- Grande Cache Raw Waterline Upgrade Design Basis Memo (AE. 2019)
- Overview of Waterworks and Wastewater Systems – Draft (AE. 2019)
- Grande Cache Water Treatment Plant Upgrades Design Basis Report (AE. 2014)
- Grande Cache Water Distribution System Master Plan (ISL. 2008)
- Grande Cache Wastewater Collection System Master Plan, Draft (ISL. 2007)


1.4 Acknowledgements

Associated Engineering gratefully recognizes the contribution from the Municipal District of Greenview and the Hamlet of Grande Cache in the development on this Master Plan. Special thanks to Doug Brown, Amanda Cummings, Tanner Curtis, and Chelsea Henry who collaborated on this project.


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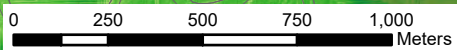


FIGURE 1-1

M.D. OF GREENVIEW
HAMLET OF GRANDE CACHE

STUDY AREA AND LIDAR ELEVATION

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2 DESIGN CRITERIA

2.1 General

2.1.1 General Population

One of the main variables in assessing a community's municipal servicing components is population. The population will provide a measure of the quantity of water required which has an impact on the distribution and collection systems. Historical population for the Hamlet of Grande Cache were obtained from three levels of government and compared in **Table 2-1**. Federal, provincial, and municipal data were obtained from the Federal Census Program, Alberta Regional Dashboard, and the MD Census Program, respectively.

Table 2-1 Historical Population Statistics

Year	Statistics Canada		Alberta Regional Dashboard		MD Greenview	
	Population	Annual Growth	Population	Annual Growth	Population	Annual Growth
2021	3,276	-1.71%	3,670	-0.27%	3,037	-5.78%
2020			3,680	0.85%		
2019			3,649	7.54%	3,421	-
2018			3,393	-1.28%		
2017			3,437	-5.58%		
2016	3,571	-3.73%	3,640	-8.66%		
2015			3,985	-7.33%		
2014			4,300	-5.20%		
2013			4,536	1.98%		
2012			4,448	-0.80%		
2011	4,319	-	4,484	-		

Generally, the population is similar between census conducted by the various levels of the government. Note the population data from Statistics Canada and the Alberta Regional Dashboard includes the population from the Grande Cache Institution that have resided at the Institution for more than six months. This discrepancy contributes to the difference between the MD's population data and data from the provincial and federal governments.

Through conversation with the MD, we have adopted the population estimates from the MD of Greenview. Therefore, for the purpose of the Utility Master Plan, it is assumed there are 3,037 residents in the Hamlet in 2021.

The population at Grande Cache follows the boom and bust cycles of the local economy and has been relatively stable between 3,000 to 3,700 residents in recent years. When considering data provided by the MD, it appears that the population within the Hamlet has declined by approximately 5.8% annually since 2019. For the purpose of this assessment and to accommodate future planning, we have assumed that a moderate growth rate of 1% will be applied

for future growth. **Table 2-2** presents the projected population for the Hamlet for the next 20 years (from 2022 - 2042). Since the latest population data is for 2021, we have assumed the growth rate from 2021 to 2022 is also 1%.

Table 2-2 20 Years Population Projection

Timeline	Population (1% Annual Growth)
Current: 2022	3,067
5 Years: 2027	3,224
10 Years: 2032	3,388
15 Years: 2037	3,561
20 Years: 2042	3,743

2.1.2 Other Population

Based on information from Correctional Services Canada, the Grande Cache Institution has a rated capacity of 243 inmates. For the purpose of the Water Master Plan, water usage at the Institution will be considered on an annual basis. Historical water usage from the Institution will be used to analyze and determine future water usage, this is detailed in **Section 2.2.1**.

2.1.3 Population Density

Population densities are used to estimate the population, or equivalent population, for different land use areas. These values are used in conjunction with the per capita daily consumption to estimate the demands on the water system and the wastewater system. A representative sample was taken to establish the current residential density in Grande Cache. Based on this sample there are approximately 9.1 lots/ha. Based on the 2016 Statistics Canada Census data, there are approximately 2.6 ppl/lot, which would result in approximately 24 ppl/ha. Applying a value of 3.5 ppl/lot as per the Servicing Standards (Sanitary Design), the density would increase to approximately 32 ppl/ha. For the purpose of this assessment, it is assumed that the current density is in the order of 30 ppl/ha.

It is assumed future single-family developments will achieve higher density due to current residential densification trends. For the purpose of this assessment, future single-family residential density is estimated to be 40 ppl/ha.

Density for medium and high density residential developments are assumed to be 2.5 and 5 times higher than the low density development density of 30 ppl/ha. Density for non-residential developments were also estimated based on other towns of similar size.

Table 2-3 summarizes the proposed population densities.



Table 2-3 Proposed Population Density

Development Area	Population Density	
	Existing	Future
Single-Family Residential/Low Density Residential	30 ppl/ha	40 ppl/ha
Multi-Family Residential/Medium Density Residential	75 ppl/ha	75 ppl/ha
Walk-Up Apartments/High Density Residential	150 ppl/ha	150 ppl/ha
Institutional (equivalent population, ep)	30 ep/ha	30 ep/ha
Commercial/Industrial (equivalent population, ep)	25 ep/ha	25 ep/ha

2.1.4 Land Use

The Land Use Map for the Hamlet of Grande Cache, shown on **Figure 2-1**, will be used for existing and future land use designations within the Hamlet. Existing land use information was obtained from the Hamlet's Land Use Bylaw (2019). Future land use information was obtained from approved Area Structure Plans and through conversations with MD Planning and Development Department.

The current land use within the Hamlet generally consists of residential developments west of Hwy 40 and commercial/industrial developments east of Hwy 40. Land surrounding the Hamlet is currently designated as urban reserve.

2.1.5 Future Staged Growth Areas

Figure 2-1 also presents the proposed future staged growth areas as determined through consultation with the MD. **Table 2-4** presents the population associated with each future development stage, based on a future residential densities noted in **Table 2-3**.

The Riverview area northwest of existing developments has an Area Structure Plan (ASP) with future land use plans. The Riverview ASP focuses on the western edge of the Hamlet and proposes to develop the land with mainly low density residential dwellings. The South Bench area, located south of the existing development, is also identified for potential future residential growth. However, there are no development plans for the South Bench area.

Future commercial areas that may be developed include highway commercial areas west of Hwy 40, between Shand Avenue and Hoppe Avenue, the Floyd McLennan Business Park, and the Tower Park area.

Through discussion with the MD's Planning and Development Department, the future growth areas were categorized into two development stages, based on potential development timeframe. This is shown on **Figure 2-1**. It should be noted the development stages are conceptual and developed for the purpose of the Utility Master Plan. Actual developments may occur in different areas and timeframes, based on various factors.

Table 2-4 Staged Population Growth

Future Stage	Additional Population	Total Population
Interim	2,176	5,243
Ultimate	2,563	7,806

It should be noted the estimated population to complete development are estimates only used for the purpose of the utility master plans. Actual development rates and population will differ.

2.2 Water Distribution System

2.2.1 Water Demand

Water demand is critical in determining the distribution network, pumping capability, and storage required for a water distribution system. Three critical rates of demand are normally used: average day, peak day, and peak hour demands. Fire flow, in conjunction with the peak day flows are also used to test the water system’s capability to deliver water and meet system demands during fire fighting events. The following briefly describes each of the critical flow conditions.

2.2.1.1 Average Day

The average day demand (ADD) is determined by dividing the total annual consumption by 365 days. By dividing this rate by the population served, the per capita per day demand is derived. This rate is used primarily as a basis for the projection of the total water demand.

2.2.1.2 Peak Day

The peak day demand (PDD) is determined by the single day of maximum consumption observed in the distribution system over one year. In using the single day of maximum flow, one must ensure that the record is not distorted by fire fighting demand, equipment malfunction, or watermain breaks. The peaking factor is determined by comparing the PDD to the ADD. The PDD is used in determining the delivery capacity required of supply mains, treatment facilities, storage facilities, and pumping facilities. In conjunction with the fire flow, it is used to test the water system’s capacity to supply the peak day and fire flow demand.

2.2.1.3 Peak Hour

The peak hour demand (PHD) is the expected maximum demand observed during a short period of the day. Most facilities are not equipped to record PHDs in such detail. Therefore, this rate is established on experience and engineering judgement. The peak hour rate is used in determining pumping requirements.

2.2.1.4 Historical Water Usage

The MD has provided water consumption records for the community for the past 3 years, as well as water usage for high demand users and the water fill station for 2021. A summary is provided in [Table 2-5](#).



Table 2-5 Historical Water Usage

Criteria	2019	2020	2021	Average
Population	3,421	3229	3037	-
Total Water Usage (m ³ /yr.)	352,894	353,782	353,410	353,362
Grande Cache Institution Usage (m ³ /yr.)	58,592*	58,592*	58,592	-
Water Fill Station Usage(m ³ /yr.)	583*	583*	583	-
Subtotal Water Usage Without GC Institution and Water Fill Station (m ³ /yr.)	293,719	294,607	294,235	294,187
Average Day per Capita (L/c/d)	235	250	265	250

*2019 and 2020 water usage at the Grande Cache Institution and the water fill station are not available. They are assumed to be the same as 2021 usage.

As shown in **Table 2-5**, average per capita consumption was 250 L/c/d, with the highest occurring in 2021 at 265 L/c/d. It is recommended that a per capita consumption value of **300 L/c/d** be adopted. This is approximately 21% higher than the average value (2019-2021) and 14% higher than in 2021. This will allow for conservatism in future water demand calculations. This value is smaller than the ADD identified in the MD Servicing Standards (350 L/c/d); however, it is appropriate when looking at the community as a whole.

As per the MD's Servicing Standards, a peaking factor of 2.0 will be applied to estimate peak day demands and a peaking factor of 3.0 will be applied to estimate the peak hour demand.

2.2.1.5 Design Water Demands

Based on the available water usage data, **Table 2-6** shows water demands to be applied in the model.

Table 2-6 Design Water Demand

Water Demands	Available Water Usage
Average Day Demand (ADD)	300 L/c/d
Peak Day Demand (PDD)	600 L/c/d (Peaking Factor of 2.0)
Peak Hour Demand (PHD)	900 L/c/d (Peaking Factor of 3.0)

The proposed water demand and demand criteria for the next 20 years are outlined in **Table 2-7**.

Table 2-7 Projected Water Demands

Criteria	2022	2027	2032	2037	2042
Population	3,067	3,224	3,388	3,561	3,743
Average Day per Capita (L/c/d)	300	300	300	300	300
Peak Day Peaking Factor	2.0	2.0	2.0	2.0	2.0
Peak Hour Peaking Factor	3.0	3.0	3.0	3.0	3.0
Average Day Demand (L/s)*	12.5	13.1	13.6	14.2	14.9
Average Day Demand (m ³ /day)*	920	967	1,016	1,068	1,123
Peak Day Demand (L/s)*	25.0	26.1	27.2	28.4	29.7
Peak Day Demand (m ³ /day)*	1,840	1,934	2,033	2,137	2,246
Peak Hour Demand (L/s)*	37.5	39.2	40.9	42.7	44.6
Truck Fill Demand (L/s) – Considered During the Peak Hour Demand Scenarios	17.00	17.00	17.00	17.00	17.00

*Note: Calculated demands also include additional demand from Grande Cache Institution.

We understand that the water fill station operates at 17 L/s and will be considered during the peak hour demand.

The 2021 water usage for the Grande Cache Institution was identified as 58,592 m³/yr (1.86 L/s). The rated capacity of the Institution is 243 inmates. For the Water Master Plan assessment, we will assume the future annual demand of the Institution is 58,592 m³ (1.86 L/s). A peaking factor of 2.0 will also be applied for peak day demands, and a peaking factor of 3.0 will be applied for peak hour demands in keeping with the 2020 Servicing Standards. This demand is included in the Average Day, Peak Day, and Peak Hour demands shown in **Table 2-7** above.

2.2.1.6 Recommended Fire Flows

Fire flow requirements as noted in the MD Servicing Standards and utilized in the previous Water Master Plan (ISL 2008) are compared in **Table 2-8**. The Table shows a large difference in target fire flows between the MD's Servicing Standards and the previous Master Plan. As such, AE has recommended a third option for the MD's consideration, also shown in **Table 2-8**. AE's recommended fire flows have been applied in other towns of similar size, and generally falls somewhere between the MD's Servicing Standards and those values applied in the previous Water Master Plan.

Through discussion with the MD, AE's recommended fire flow requirements will be used to assess the water distribution system.

Table 2-8 Fire Flow Comparison

Development Area	MD's Servicing Standards	Previous Water Master Plan (2008)	AE's Recommendations
Single-Family Residential/Low Density Residential	60 L/s	100 L/s	83 L/s
Multi-Family Residential/Medium Density Residential	90 L/s	150 L/s	133 L/s
Walk-Up Apartments/High Density Residential	115 L/s	200 L/s	200 L/s
Institutional	90 L/s	225 L/s	183 L/s
Commercial	190 L/s	150 L/s	183 L/s

The required fire flow is assumed to be 83 L/s for the Campground, comparable to single-family residential.

2.2.2 Operating Pressure

The recommended normal system operating pressures are summarized in **Table 2-9**.

Table 2-9 Normal System Operating Pressure

Normal System	Operating Pressure
Absolute Minimum Pressure (Peak Hour)	310 kPa (45 psi)
Target Minimum Pressure	350 kPa (50 psi)
Target Maximum Pressure	550 kPa (80 psi)
Minimum Pressure During a Fire Event (At Hydrant)	140 kPa (20 psi)
Minimum Zone Pressure During a Fire Event	150 kPa (22 psi)

2.2.3 Pipe Roughness Coefficient (C Value)

The "C" value for various existing pipe materials will be used within the model is shown in **Table 2-10**.

Table 2-10 Pipe Roughness Coefficient for Existing Pipes

Pipe Materials	"C" Value
PVC/HDPE	130
Asbestos Cement (AC)	120
Cast Iron	100
Ductile Iron	120
Steel	120

Proposed watermains will be assumed to have a C value of 130.

2.2.4 Minimum Pipe Sizes

Table 2-11 compares the minimum pipe size requirements in the MD’s Servicing Standard with AE’s recommendations. Through discussion with the MD, AE’s recommendations will be implemented in this report.

Table 2-11 Pipe Minimum Sizes

Development Area	MD’s Servicing Standards	AE’s Recommendations
Residential Development	150 mm	200 mm
Commercial Development	250 mm	250 mm
Industrial Development	300 mm	300 mm

Proposed pipe sizes will be determined based on the results of the hydraulic network analysis. As AE’s recommended fire flows will be used in the assessment, a minimum pipe size of 200 mm will be recommended in residential developments.

2.2.5 Velocity

We recommend that the maximum velocity not exceed 1.5 m/s during normal system operations, increasing to a maximum of 3.0 m/s during fire flow scenarios. High velocity and potential sudden changes in these velocities can result in pressure surges and possible negative pressure, which can then cause serious pipe and equipment damage. Increased velocity requires higher pumping heads and can result in higher energy costs.

2.2.6 Water Storage

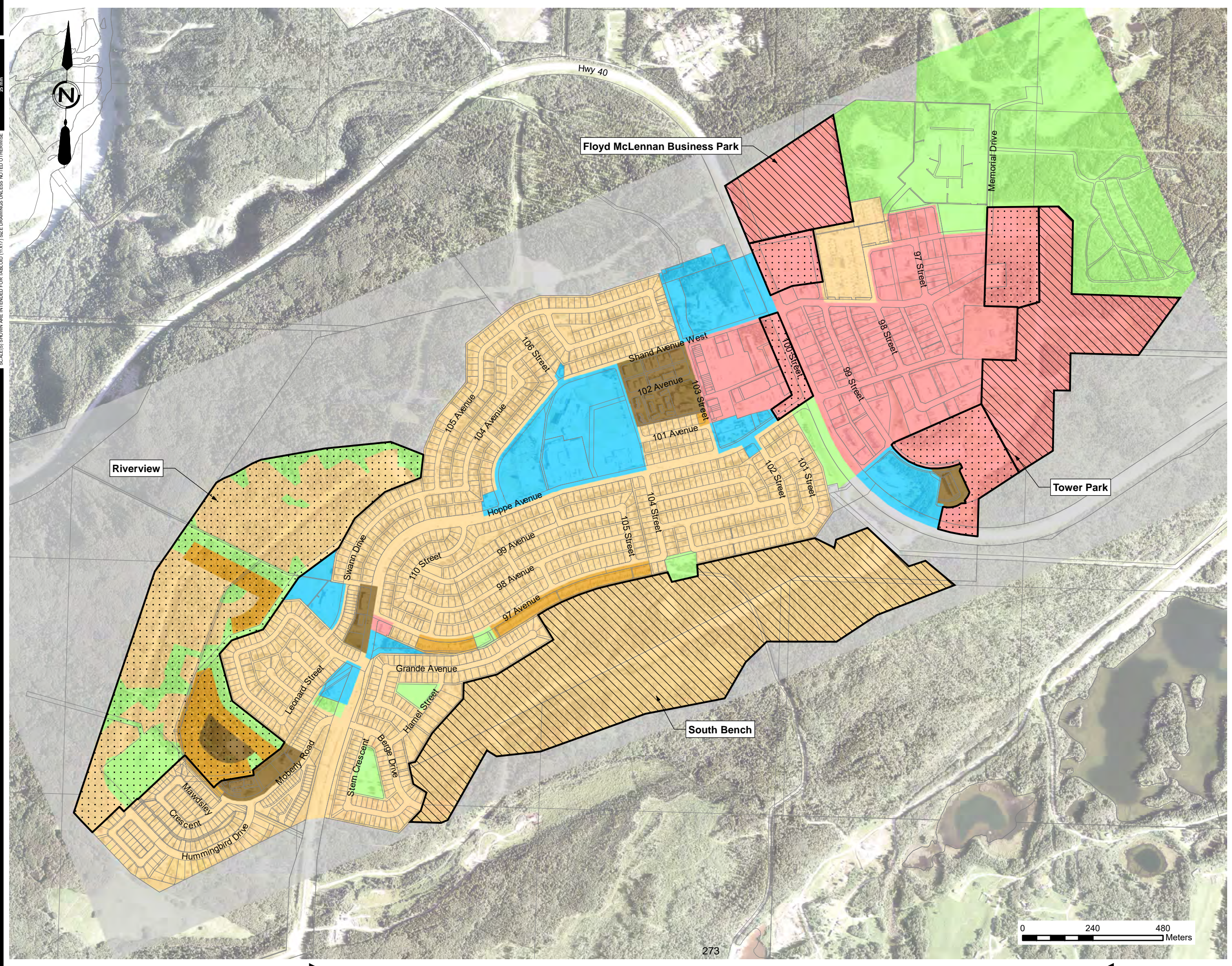
It is good practice to provide adequate storage in a water system for operational needs (peak hour), supply interruption, and fire flow scenarios. The total water storage requirements, as required by Alberta Environment and Parks (AEP) guidelines, is the sum of the following:

- Equalization Storage (peak hour demand): 25% of Peak Day Flow.
- Fire Storage.
- The greater of:
 - Emergency Storage (in the event of supply interruption): 15% of Average Day Flow; or
 - Disinfection Contact time (T₁₀) storage.



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- Legend:**
- Land Use**
- Commercial / Industrial
 - Institutional
 - Residential - High Density
 - Residential - Medium Density
 - Residential - Low Density
 - Parks / Open Space
 - Urban Reserve
 - Existing Land Use
- Future Land Use**
- Interim Phase
 - Ultimate Phase

FIGURE 2-1

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HAMLET OF GRANDE CACHE

LAND USE

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3 EXISTING WATER DISTRIBUTION SYSTEM

3.1 Existing Facilities

The existing water system within the Hamlet of Grande Cache consists of:

- Raw Water Pumping Station.
- Water Treatment Plant (WTP).
- Treated Water Supply Lines.
- Distribution Reservoir and Pumphouse.
- Campground Booster Pumphouse.
- Transmission Mains.
- Four (4) Pressure Reducing Valve stations (PRVs).
- Water Distribution System.

Figure 3-1 illustrates the existing water distribution system. AE is currently undertaking a Infrastructure Assessment of the water system, including verifying the location of watermains, valves, hydrants, and inspecting reservoirs and pumphouses. Findings from the assessment will be presented in a separate report.

3.1.1 Water Treatment Plant

The Hamlet's WTP is located at the southern edge of the Hamlet's development, southwest of Hwy 40. The WTP sources raw water from Victor Lake, located approximately 1.5 km east of the WTP.

The WTP treats raw water from Victor Lake and directly pumps the treated water to the distribution system and towards the Distribution Reservoir. There are two transfer pumps within the WTP. See **Table 3-1** for a summary of existing pumps.

3.1.2 Treated Water Supply Line

Treated water from the WTP is supplied to the Hamlet through two 200 mm diameter steel pipes. Each of these two pipes are approximately 275 m long, supplying water towards the distribution system near the old WTP.

A dedicated 350 mm diameter fill line connects the distribution system with the Distribution Reservoir and Pumphouse. This fill line begins at the intersection of Shand Avenue and Hwy 40 and ends at the Distribution Reservoir. Note this fill line would fill the Distribution Reservoir when the WTP pump is operational. When the WTP is not pumping, this fill line would reverse flow direction and provide water to the distribution system west of Hwy 40.

3.1.3 Reservoirs and Pumphouses

There is one reservoir within the Hamlet, referred to as the Distribution Reservoir. It is located east of Hwy 40, northwest of the intersection of Shand Avenue and 97 Street. A pumphouse is also located nearby to service the developments east of Hwy 40. Water is supplied to the Distribution Reservoir and Pumphouse through a combination of the distribution system and dedicated supply line.

The Distribution Pumphouse provides additional pressure to developments east of Hwy 40, due to the higher ground elevation in this area. The developments west of Hwy 40 are located at lower elevations, therefore pumps are not required to service this area. This area is serviced by gravity from the Distribution Reservoir or from the WTP pumps.

The Hamlet also has a small booster pumphouse servicing the Campground. The Campground Booster Pumphouse is located near the intersection of Memorial Drive and Campground Road, at the northern end of the Hamlet. The pumphouse is located at the southeast corner of Grande RV Storage. The Campground Booster Pumphouse is supplied by the Distribution Reservoir via the distribution system.

3.1.3.1 Distribution Reservoir and Pumphouse

There are two distribution pumps and one fire/standby pump at the pumphouse. Both distribution pumps are variable speed pumps and currently operate to maintain 1322.7m HGL (60 psi). A pressure relief valve is currently set at 1326.4 m HGL (65 psi) which will protect the distribution system during low flow scenarios. A separate pressure relief valve controls the maximum pressure from the fire pump, this valve is estimated to be set at 1329.9 m HGL (70 psi).

Based on record drawings, the capacity of the Distribution Reservoir is 4,540 m³ (one million imperial gallons). The reservoir is intended to provide equalization, fire, and emergency storage for the entire Hamlet. Based on field measurements, the operational water level at the Distribution Reservoir is between 1282.4 m to 1285.5 m.

3.1.3.2 Campground Booster Pumphouse

The Campground pumphouse contains two booster pumps. There are no fire pumps at this pumphouse.

Table 3-1 summarizes the existing pumping capacities.

Table 3-1 Existing Pumping Capacity

Location	Pump Designation	Capacity
Water Treatment Plant		
Transfer Pump (VFD)	P-1101	90 L/s @ 65 m Head
Transfer Pump (VFD)	P-1102	90 L/s @ 65 m Head
Distribution Reservoir and Pumphouse		
Distribution Pump (VFD)	P-2301	28 L/s @ 43 m Head
Distribution Pump (VFD)	P-2302	28 L/s @ 43 m Head
Fire/Standby Pump	P-2303	225 L/s @ 43 m Head
Campground Booster Pumphouse		
Booster Pump (Constant Speed)	BP-1	0.97 L/s @ 20.5 m Head
Booster Pump (Constant Speed)	BP-2	0.97 L/s @ 20.5 m Head

3.1.4 Operating Philosophy

Based on information provided by the MD and gathered by AE, the operating philosophy for the Distribution Reservoir and Pumphouse is understood to be as follows:

- One of the two distribution pumps (P-2301 or P-2302) operates as the lead pump to maintain a pressure of 413 kPa (60 psi).
- If the lead pump cannot maintain pressure, then the lag pump will start.
- If the two distribution pumps cannot maintain pressure, then the Fire/Standby Pump will start.

Information on the operating philosophy for the Campground Booster Pumphouse was not available, we have assumed the following:

- One of the two booster pumps (BP-1 or BP-2) operates as the lead pump.
- If the lead pump cannot maintain pressure, then the lag pump will start.

3.1.5 Distribution System

The existing distribution system is mainly comprised of asbestos cement (AC) and PVC pipes. AC pipes were mainly installed within the older residential part of the Hamlet, bordered by 97 Avenue to the south, Swann Drive to the west, 105 Avenue to the north, and Hwy 40 to the east. PVC pipes were installed in newer residential developments south of 97 Avenue, within the High School/Recreation Centre area, and within the non-residential developments east of Hwy 40.

In terms of pipe diameter, the majority of the pipes within the residential development are 150 mm and 200 mm diameter. There are some 350 mm diameter pipes within the non-residential area east of Hwy 40. There are also some 300 mm diameter pipes at the south east and south west parts of the Hamlet.

Figure 3-1 and **Figure 3-2** illustrate the existing distribution system pipe size and material, respectively. The approximate length of watermain per pipe diameter within the distribution system is summarized in **Table 3-2**. Note service mains to each property are not included.

Table 3-2 Existing Distribution System Pipe Length Summary

Diameter	Length
150 mm	9.8 km
200 mm	14.0 km
250 mm	2.2 km
300 mm	1.9 km
350 mm	1.9 km

Based on available GIS data, there are also 137 hydrants and 230 valves within the Hamlet.

3.1.6 Truck Fill Station

The MD noted there is currently one truck fill station operating within the Hamlet, located along 99 Street, south of Hoppe Avenue. This truck fill is supplied by the distribution system.

3.1.7 Pressure Reducing Valve Stations and Pressure Zones

Figure 1-1 presents the Hamlet with ground elevations. This Figure shows the topographic relief within the Hamlet and helps to demonstrate why PRV stations are critical to the Grande Cache water distribution system. There are four PRV stations within the Hamlet's distribution system, separating the Hamlet into separate pressure zones. They are summarized in **Table 3-3**.

Table 3-3 Existing PRV Stations

PRV #	Location	Pressure Setting
PRV Station #4	Underground, within non-residential development, near 9906 99 Street	86 psi (1319.6m HGL)
PRV Station #3	Underground, near Old WTP (intersection of Hwy 40 and 99 Street)	50 psi (1282.5m HGL)
PRV Station #2	Above ground, along 108 Street, between 97 Avenue and Grande Avenue	44 psi (1249m HGL)
PRV Station #1	Above ground, northeast of the intersection of Hoppe Avenue and Berge Drive	62 psi (1250.3m HGL)
WTP PRV	Within the WTP	80 psi (1286.5 m HGL)
Distribution Pumphouse Pumps PRV	Within the Distribution Reservoir Pumphouse, downstream of Distribution Pumps	65 psi (1326.4 m HGL)
Distribution Pumphouse Fire/Standby Pump PRV	Within the Distribution Reservoir Pumphouse, downstream of Fire/Standby Pump	70 psi (1329.9 m HGL)

Note, PRV pressure setting information were gathered in the field in summer 2022. Hydraulic Grade Lines (HGLs) were calculated based on available LiDAR information and the PRV pressure settings. PRV Setting for the distribution pumps and fire/standby pump was not available during the field visit. If the actual PRV setting differs, they should be set at 65 psi and 70 psi, for the distribution pumps and fire pumps, respectively. PRV settings should be refined as part of the pumphouse upgrade project.

Regarding PRV Station numbering, since the two above ground PRV Stations were previously identified as Station No.1 and Station No. 2, and labelled as such on the exterior of the building, they will continue to be referenced as such. There are no known station numbers for the two underground PRV stations and will be labelled as Station No. 3 and Station No. 4 for the purposes of this report. Existing pressure zones within the Hamlet are summarized in **Table 3-4** and are shown on **Figure 3-3**.

Table 3-4 Existing Pressure Zones

Zone #	Servicing Area	Zone HGL (m)	HGL Controlled By
#1	Northern portion of the non-residential area east of Hwy 40	1322.7 m	VFD Setpoint
#2	Remainder of non-residential area east of Hwy 40	1319.6 m	PRV Station #4
#3	Area west of Hwy 40 and north of Grande Avenue and Leonard Street	Varies (1282.4 m to 1286.5 m)	Varies (PRV Station #3, Distribution Reservoir's Water Level, or WTP PRV)
#4	Area south of Moberly Road and Berge Drive	1250.3 m	PRV Station #2
#5	Area along Grande Avenue and Hamel Street	1249.0 m	PRV Station #1
#6	Campground Area	1343.2 m	Booster Pumphouse

Note the HGL for the area immediately west of Hwy 40 varies since this zone can be supplied from three sources of differing HGL:

- From the WTP PRV (1286.5m HGL).
- Directly from the Distribution Reservoir (1282.4m to 1285.5m HGL).
- From PRV Station #3 (1282.5m HGL).

3.2 Existing Model Update

The existing model was updated to reflect the current water distribution system. The following tasks were undertaken:

- Input upgrades to the piped distribution system.
- Input upgrades to the WTP.
- Update water demands to reflect current land use and design criteria.
- Update fire flow requirements to reflect current land use and design criteria.
- Update the pumps and pumphouse setpoints.
- Update PRV setpoints.
- Review record drawings of existing system and update pipe diameter and material where necessary.

3.3 Existing System Assessment

The existing distribution system was analyzed to determine the average day pressure, peak hour pressure, and peak day plus fire flow capabilities. This Section describes each scenario in detail.

Pressure in Pressure Zone #3 (the area immediately west of Hwy 40) is controlled by the WTP's pumping status, the Distribution Reservoir's water level, or PRV Station #3's pressure setting. The analysis has shown that this zone experiences the lowest pressure when the WTP pumps are off and water is provided from the Distribution Reservoir, resulting in an HGL of 1282.4 m. A sensitivity analysis was also conducted with the WTP pumps turned on, or the

Distribution Reservoir at the highest water level (1285.5 m), both scenarios results in more favourable results (slightly higher pressure and fire flow capacity).

Therefore, Average Day Scenario will be simulated with the WTP pumps turned on (simulating maximum pressure condition), and the peak hour and peak day plus fire flow scenarios will be simulated with the WTP pumps turned off and the Distribution Reservoir at the lowest operational level of 1282.4 m HGL (simulating minimum pressure condition). Simulation results are discussed below.

3.3.1 Average Day Scenario

The Average Day Demand scenario was run to simulate the maximum system pressure. During the average day scenario, the highest system pressure was 766 kPa (111.1 psi) at the high density residential development located south of 99 Street and east of the Tourism Centre. The lowest pressure simulated is 194 kPa (28.1 psi) located at the intersection of Shand Avenue and Hwy 40.

Simulated average day pressure is shown on **Figure 3-4**. There are several areas where pressure results are outside of the recommended system operation pressure range of 550 kPa (80 psi) to 350 kPa (50 psi):

- High Pressure Locations:
 - Commercial/industrial area south of Hoppe Avenue and east of Hwy 40, especially towards the southern end of 99 Street.
 - Residential area along Leonard Street.
 - Residential area along Swann Drive.
 - Residential area along 97 Avenue.
 - Residential area along the southern end of Stern Crescent.
 - Southern end of Hoppe Avenue.
- Low Pressure Location:
 - Commercial and high density residential area bordered by Shand Avenue, 104 Street, Hoppe Avenue, and Hwy 40.

The majority of locations with high or low modelled pressure results were also identified by MD staff in the field.

3.3.2 Peak Hour Scenario

The Peak Hour Demand scenario was run to simulate the minimum system pressure. During the peak hour scenario, the highest system pressure was 766 kPa (111.1 psi) at the high density residential development located south of 99 Street and east of the Tourism Centre. The lowest pressure simulated is 189 kPa (27.4 psi) located at the intersection of Shand Avenue and Hwy 40. **Figure 3-5** identifies the peak hour pressures for the existing system.

The average day and peak day demand scenarios yielded similar pressure results.

3.3.3 Peak Day Plus Fire Flow Scenario

Nine nodes did not fully satisfy the fire flow criteria under the peak day plus fire flow demand scenario. These areas include long dead ends in the area east of Hwy 40, the commercial area south of Shand Avenue, near the High School, and along Moberly Road.

Figure 3-6 identifies the locations which did not fully meet the recommended fire flow criteria, along with the percent of the recommended fire flow that is available at each node. Although these locations may not fully meet the target fire flow criteria due to reduced flowrate, there will be water available for fire fighting. There is insufficient fire flow at the Campground, as the existing booster pump has not been designed to provide fire flow.

3.3.4 Pump Capacity

Table 3-5 presents the pumping capacity analysis for the Distribution Pumphouse and WTP.

Table 3-5 Pumping Capacity Analysis

	2022	2027	2032	2037	2042
Distribution Pump Analysis					
Peak Hour Demand for area east of Hwy 40 (L/s)	22.3	23.5	24.7	25.9	27.2
Existing Distribution Pumping Capacity (L/s) ¹	28.0	28.0	28.0	28.0	28.0
Surplus Capacity (L/s)	5.7	4.5	3.3	2.1	0.8
Fire Pump Analysis					
Peak Day Demand for area east of Hwy 40 (L/s)	3.6	3.8	4.0	4.2	4.4
Peak Day Plus Fire Flow Demand (L/s)	203.6	203.8	204.0	204.2	204.4
Fire Pumping Capacity (L/s) ²	225.0	225.0	225.0	225.0	225.0
Surplus Capacity (L/s)	21.4	21.2	21.0	20.8	20.6
WTP Transfer Pump Analysis					
Peak Day Demand (L/s)	25.0	26.1	27.2	28.4	29.7
Existing WTP Transfer Pump Capacity (L/s) ³	90.0	90.0	90.0	90.0	90.0
Surplus Capacity (L/s)	65.0	63.9	62.8	61.6	60.3

Notes:

1. Existing distribution pumping capacity includes one of the two distribution pumps at the Distribution Reservoir and Pumphouse (P-2301 and P-2302)
2. Fire pumping capacity considers fire/stand by pump at the Distribution Reservoir and Pumphouse (P-2303)
3. Existing WTP transfer pumping capacity includes one of the two transfer pumps at the WTP (P-1101 and P-1102)

Note that the pumps at the Distribution Reservoir and Pumphouse are designed to only service the developments east of Hwy 40 as development west of Hwy 40 is fed via gravity. Therefore, there are no concerns about pumping capacity at the Distribution Reservoir and Pumphouse. There is also sufficient capacity for the WTP transfer pumps to provide peak day demand to the entire Hamlet.

3.3.5 Reservoir Storage Capacity

The total water storage required by AEP's guidelines is outlined in [Section 2.2.6](#) and it is a combination of equalization storage, fire storage, and emergency storage. [Table 3-6](#) compares the water storage requirements and current storage at the Distribution Reservoir for the next 20 years.

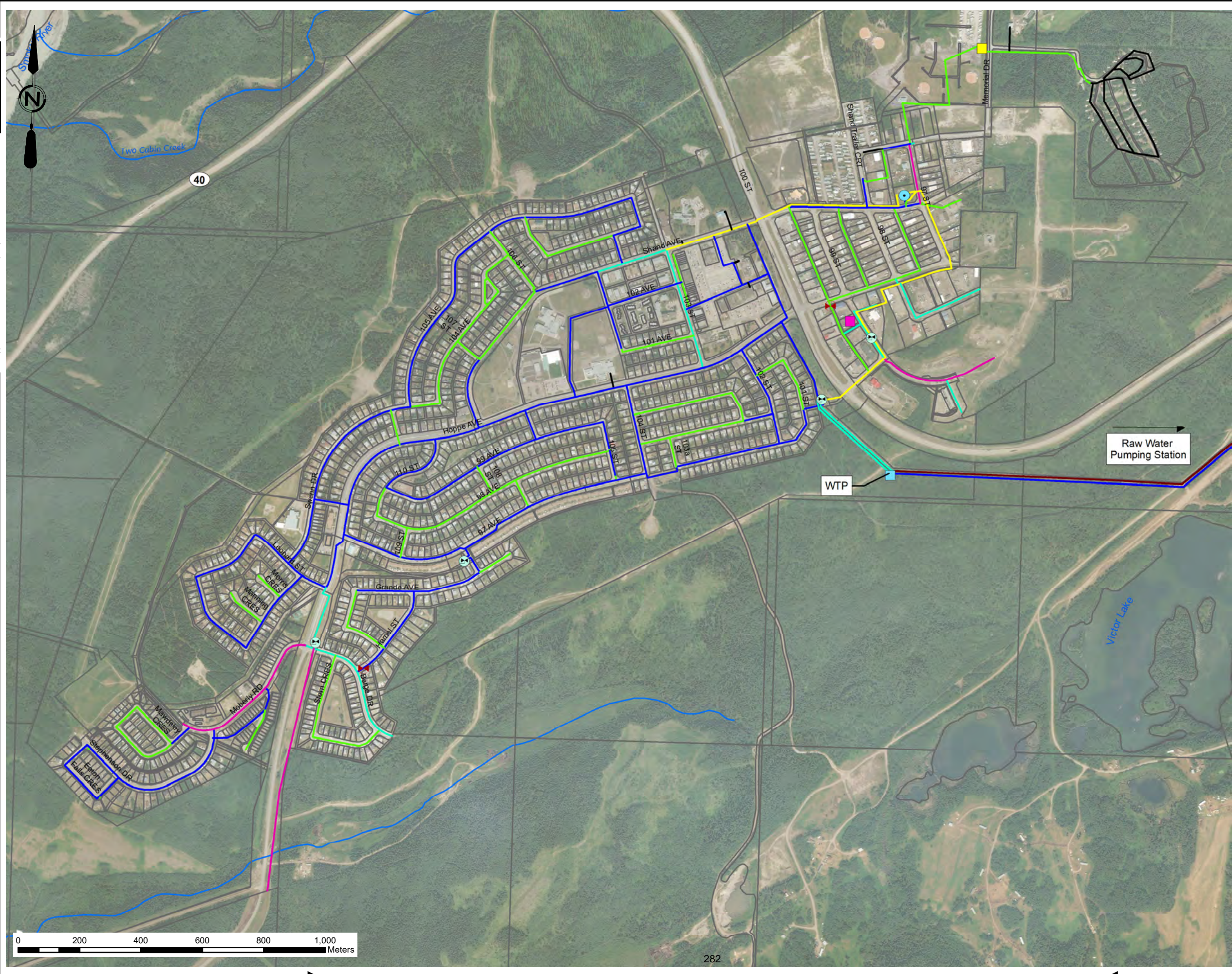
Table 3-6 Storage Capacity Analysis

Timeline	2022	2027	2032	2037	2042
Existing Storage (m ³)	4,540	4,540	4,540	4,540	4,540
Total Population	3,067	3,224	3,388	3,561	3,743
Average Day Demand (L/s)	12.5	13.1	13.6	14.2	14.9
Peak Day Demand (L/s)	25.0	26.1	27.2	28.4	29.7
Equalization Storage (m ³)	540	564	589	614	642
Fire Storage (200 L/s for 2.5 hrs) (m ³)	1,800	1,800	1,800	1,800	1,800
Emergency Storage (m ³)	162	169	177	184	193
Total Required Storage (m ³)	2,502	2,533	2,565	2,599	2,634
Surplus Storage (m ³)	2,038	2,007	1,975	1,942	1,906

There is ample capacity within the Distribution Reservoir to meet the required water storage requirements for the next 20 years.

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DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeBCO, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm AS SHOWN ON SCALE
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- Closed Valves
- PRV Station
- Reservoir & Pumphouse
- Truckfill
- Water Treatment Plant
- Campground Booster Pumphouse

Pipe Size

- <= 100 mmø
- 150 mmø
- 200 mmø
- 250 mmø
- 300 mmø
- 350 mmø
- 450 mmø



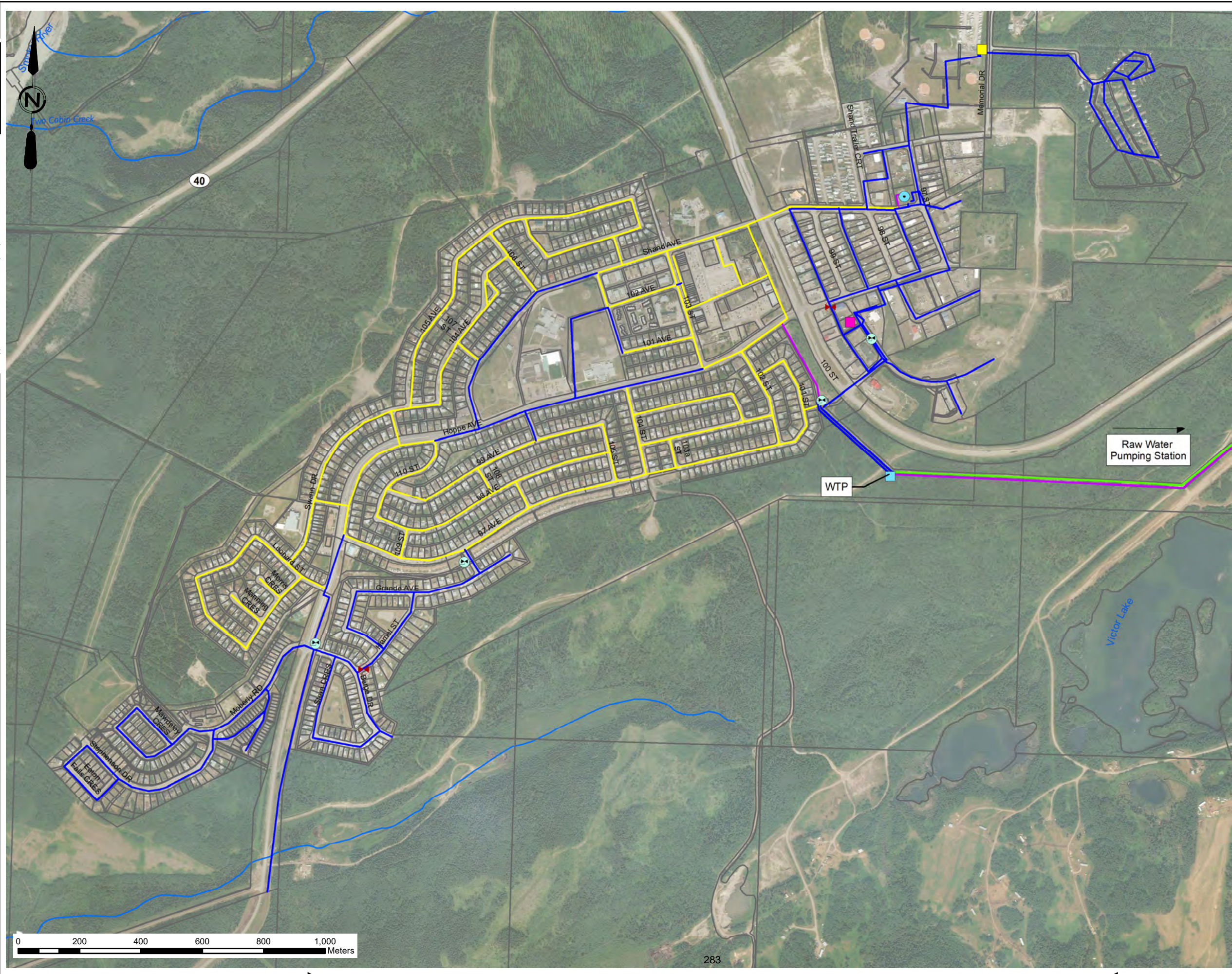
FIGURE 3-1
GRANDE CACHE WATER MASTER PLAN

EXISTING SYSTEM PIPE SIZE

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SCALE	1:12,000
APPROVED	
DATE	2023FEB28
REV	
DESCRIPTION	ISSUED FOR DRAFT

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DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm AS SHOWN ON THIS SCALE, SCALE(S) SHOWN ARE INTENDED FOR TABLON (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- Closed Valves
- PRV Station
- Reservoir & Pumphouse
- Truckfill
- Water Treatment Plant
- Campground Booster Pumpstation

Pipe Material

- PVC
- Ductile Iron
- Steel
- AC
- HDPE



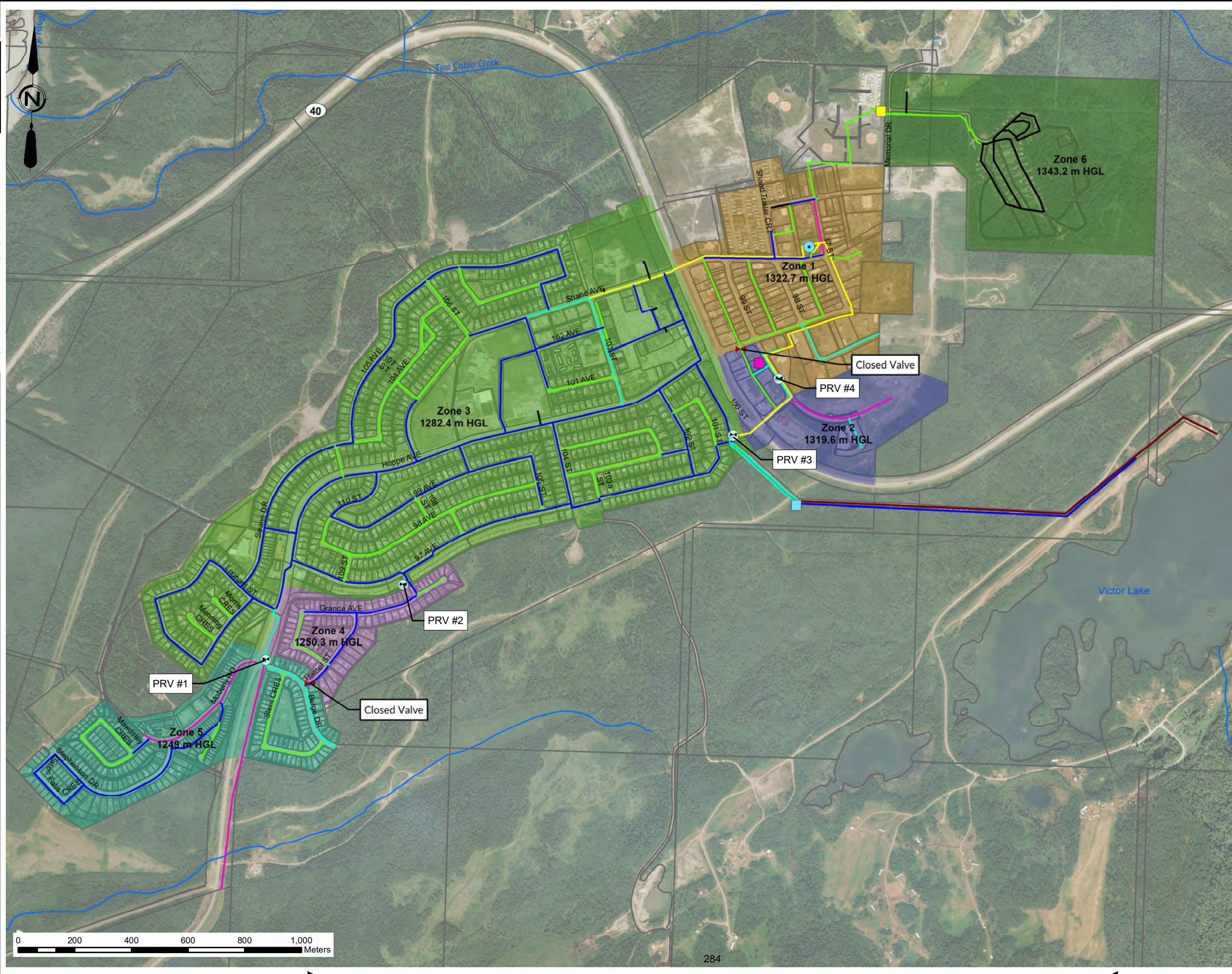
FIGURE 3-2
GRANDE CACHE WATER MASTER PLAN

EXISTING SYSTEM PIPE MATERIAL

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DATE	2023FEB28
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DESCRIPTION	ISSUED FOR DRAFT

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DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm AS SHOWN, ADJUST SCALES
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- Closed Valves
- PRV Station
- Reservoir & Pumphouse
- Truckfill
- Water Treatment Plant
- Campground Booster Pumphouse

Pipe Size

- <= 100 mmø
- 150 mmø
- 200 mmø
- 250 mmø
- 300 mmø
- 350 mmø
- 450 mmø

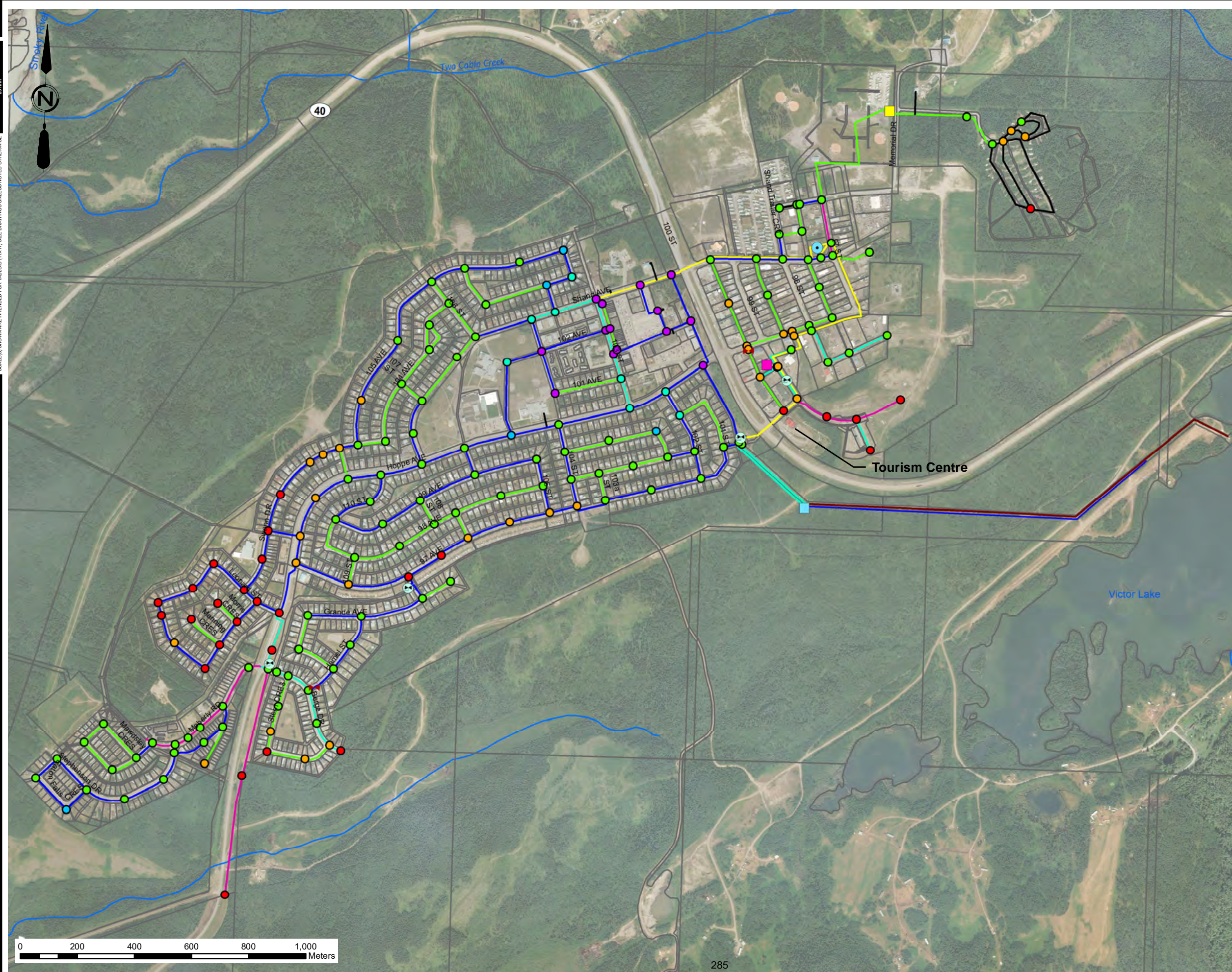
Existing Pressure Zones

- Zone 1 - 1322.7 m HGL
- Zone 2 - 1319.6 m HGL
- Zone 3 - 1282.4 m HGL
- Zone 4 - 1250.3 m HGL
- Zone 5 - 1249 m HGL
- Zone 6 - 1343.2 m HGL









FIGURE 3-3
GRANDE CACHE WATER MASTER PLAN
EXISTING SYSTEM PRESSURE ZONES







AE PROJECT No.	2022-3300
SCALE	1:13,000
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DATE	2023FEB28
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DESCRIPTION	ISSUED FOR DRAFT



Legend:

-  Closed Valves
-  PRV Station
-  Reservoir & Pumphouse
-  Truckfill
-  Water Treatment Plant
-  Campground Booster Pumphouse

Average Day Pressure

-  <= 40 psi (275.79 kPa)
-  <= 45 psi (310.26 kPa)
-  <= 50 psi (344.74 kPa)
-  <= 80 psi (551.58 kPa)
-  <= 90 psi (620.53 kPa)
-  > 90 psi (620.53 kPa)

Pipe Size

- ≤ 100 mmø
 — 150 mmø
 — 200 mmø
 — 250 mmø
 — 300 mmø
 — 350 mmø
 — 450 mmø



FIGURE 3-4

GRANDE CACHE WATER MASTER PLAN

EXISTING SYSTEM AVERAGE DAY PRESSURE

AE PROJECT No.	2022-3300
SCALE	1:13,000
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DATE	2023FEB28
REV	
DESCRIPTION	ISSUED FOR DRAFT



— ≤ 100 mmø
 — 150 mmø
 — 200 mmø
 — 250 mmø
 — 300 mmø
 — 350 mmø
 — 450 mmø

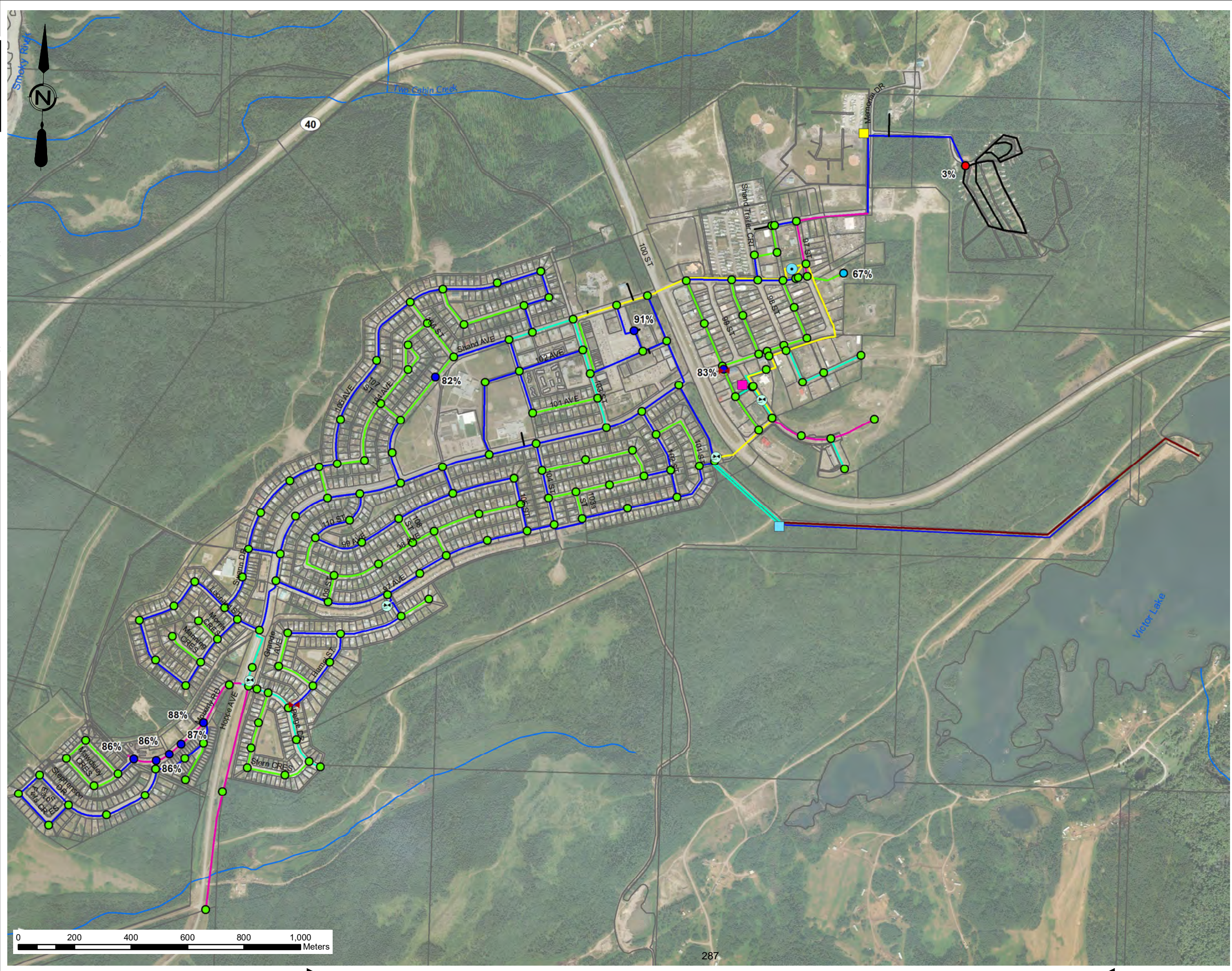


EXISTING SYSTEM PEAK HOUR PRESSURE

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SCALE	1:13,000
APPROVED	
DATE	2023FEB28
REV	
DESCRIPTION	ISSUED FOR DRAFT

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DATA SOURCE: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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IF NOT 25 mm AS SHOWN, ADJUST SCALES
SCALE(S) SHOWN ARE INTENDED FOR TABL/CID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- Closed Valves
- PRV Station
- Reservoir & Pumphouse
- Truckfill
- Water Treatment Plant
- Campground Booster Pumphouse

Fire Flow Availability

- Exceeds Fire Flow Requirements
- 80% - 99%
- 60% - 80%
- 40% - 60%
- 0% - 40%

Pipe Size

- <= 100 mmø
- 150 mmø
- 200 mmø
- 250 mmø
- 300 mmø
- 350 mmø
- 450 mmø

FIGURE 3-6
GRANDE CACHE WATER MASTER PLAN
EXISTING SYSTEM PEAK DAY PLUS FIRE FLOW

AE PROJECT No.	2022-3300
SCALE	1:13,000
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DATE	2023AUG02
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DESCRIPTION	ISSUED FOR DRAFT

4 UPGRADES TO EXISTING SYSTEM

4.1 Distribution System

4.1.1 Pipe Upsizing

Proposed upgrades to the distribution system are illustrated on **Figure 4-1**. Approximately 100 m of 150 mm diameter watermain is required to be upsized to 200 mm to satisfy fire flow criteria. This main is located along Shand Avenue, south of 106 Street, near the High School.

Note that the proposed pipe diameter represents the minimum size required to meet the target fire flow. However, it is recommended that mains be upsized to the minimum recommended diameter when the opportunity arises, such as during neighbourhood renewal or upgrading projects. It is recommended that the minimum watermain sizes be installed as identified in **Section 2.2.4**.

4.1.2 Pressure Zone Modifications

Modifications are recommended to improve pressure in areas with low or high pressures. **Table 4-1** summarizes the proposed changes. In total, seven pressure zones are proposed to ensure residents experience water pressures closer to the target system operating pressure identified in **Section 2.2.2**. The proposed pressure zones are illustrated on **Figure 4-1**.

Table 4-1 Pressure Zone Modifications

Facility Description	Location	Proposed Modification	Existing Pressure Setting	Proposed Pressure Setting
Pressure Zone #1 (1322.7 m HGL)				
Distribution Pump PRV	Within Distribution Pump House	Confirm/Adjust Pressure Setting	-	65 psi (1326.4 m HGL)
Fire Pump PRV	Within Distribution Pump House	Confirm/Adjust Pressure Setting	-	70 psi (1329.9 m HGL)
Pressure Zone #2 (1300 m HGL)				
PRV Station #4	Underground, within non-residential development, near 9906 99 Street	Reduce Pressure Setting	86 psi (1319.6 m HGL)	55 psi (1300 m HGL)
Valve WVAL-01163	Near 9901 Hoppe Avenue	Physically Separate Pressure Zone	N/A	N/A
Pressure Zone #3 (1282.5 m HGL) – No Modification Identified				
Pressure Zone #7 (1274 m HGL)				
PRV Station #5	Near 10410 97 Avenue	Install New PRV Station	-	74 psi (1274 m HGL)
PRV Station #6	Near 10602 99 Avenue	Install New PRV Station	-	48 psi (1274 m HGL)

Facility Description	Location	Proposed Modification	Existing Pressure Setting	Proposed Pressure Setting
PRV Station #7	Near 10900 Hoppe Avenue	Install New PRV Station	-	54.5 psi (1274 m HGL)
Valve WVAL-00409	Near 10733 104 Avenue	Physically Separate Pressure Zone	N/A	N/A
PRV Station #8	Near 10702 105 Avenue	Install New PRV Station	-	70.5 psi (1274 m HGL)
Pressure Zone #5 (1259.8 m HGL)				
PRV Station #2	Above ground, along 108 Street, between 97 Avenue and Grande Avenue	Increase Pressure Setting	44 psi (1249 m HGL)	60 psi (1259.8 m HGL)
Valve WVAL-00200	Near 10900 Berge Drive	Physically Separate Pressure Zone	N/A	N/A
Pressure Zone #8 (1257 m HGL)				
PRV Station #9	Intersection of Swann Drive and 110 Street	Install New PRV Station	-	48 psi (1257 m HGL)
Valve WVAL-00274	Near 11058 Hoppe Avenue	Physically Separate Pressure Zone	N/A	N/A
PRV Station #10	Near 11126 Hoppe Avenue	Install New PRV Station	-	54 psi (1257 m HGL)
Pressure Zone #4 (1240 m HGL)				
PRV Station #1	Above ground, northeast of the intersection of Hoppe Avenue and Berge Drive	Modify Piping to Only Control Pressure to the East (along Berge Drive) and Decrease Pressure Setting	62 psi (1250.3 m HGL)	46 psi (1240 m HGL)
PRV Station #11	Near 19131 Moberly Road	Install New PRV Station	-	53 psi (1240 m HGL)
Existing Watermain	Near 10733 104 Avenue	Physically Separate Pressure Zone	N/A	N/A
Pressure Zone #6 (1343.2 m HGL) - No Modification Identified*				

Note: No pressure zone modifications is identified for the Campground area (Pressure Zone #6) as the existing level of service is assumed to be maintained.

The proposed modifications to the pressure zones is mainly achieved through installation of new PRV stations within the public road right-of-way. An alternative option is to install on-lot PRVs within all of the private homes of a pressure zone. **Table 4-2** compares the two PRV types.

Table 4-2 PRV Types Comparison

PRV Type	Description	Advantages	Disadvantages
PRV Stations within Roadway	<ul style="list-style-type: none"> PRV Manhole chamber installed along the water distribution pipes. Reducing pressure for all downstream infrastructures. Maintenance obligation is on the municipality. 	<ul style="list-style-type: none"> Provides pressure relief for all customers and infrastructure downstream of the PRV. Located on public land and easily accessible for maintenance. 	<ul style="list-style-type: none"> May be more costly than on-lot PRVs (if servicing more than 300 customers per PRV Station). More costly to install, maintain, and replace. Multiple PRVs or physical zone separations may be required to separate each pressure zone.
On-lot PRV	<ul style="list-style-type: none"> Private PRV often installed near the water meter. Reducing pressure to a single customer. Watermain and fire hydrant still experiencing higher pressures. Maintenance obligation is on the private homeowner. Watermain pressure could reach approximately 190 psi in southern portion of South Bench area and northern portion of Riverview area. (Pressure rating for DR18 PVC pipe is 235 psi). 	<ul style="list-style-type: none"> Cheaper than main line PRV. Easier to install (minimum digging and manpower required). 	<ul style="list-style-type: none"> PRV located on private land, may require permission to access PRV. Homeowner needs to perform regular maintenance and repair on the PRV. Fire hydrant will experience higher pressure resulting in potential operational issues.

4.1.3 Areas Not Anticipated to Meet Design Criteria

Following the proposed upgrades to the existing system, pressure in some areas will continue to fall outside of the target operating pressure outlined in [Section 2](#). They are identified and discussed below.

Areas Outside of Target System Operation Pressure

There are three areas that are simulated to be outside of the target system operating pressure range during average day and peak hour demand scenarios. [Figures 4-2](#) and [4-3](#) show the simulated average day and peak hour pressures, respectively.

- Commercial/high density residential area roughly bordered by 104 Avenue to the north, 104 Street to the west, Hoppe Avenue to the south, and Hwy 40 to the east
 - Low pressure is simulated in this area (lowest pressure is 188 kPa (27.3 psi) @ intersection of Shand Avenue and Hwy 40 under peak hour demand, average day pressure is slightly higher).
 - This is caused by the low water level of the Distribution Reservoir.
 - Pressure is similar to existing conditions.
 - Efforts to increase the elevation of the Reservoir floor would be costly to implement.
 - Efforts to separate a new pressure zone for this area would be costly to implement. This would require:

- Create new pressure zone by installing several new PRV Stations.
- Construct new watermain crossing Hwy 40 c/w a PRV Station.
- Upsize the distribution pump, which does not have sufficient capacity to service this area.
- Construct a dedicated supply line from the WTP to Distribution Reservoir bypass this higher pressure zone.
- Extend existing 350 mm supply line from the Distribution Pumphouse towards the WTP area to bypass the newly created zone.
- Potentially upsizing existing mains to improve fire flow.
- Commercial/Industrial area west of the intersection of Hoppe Avenue and 99 Street
 - High pressure is simulated near this location (highest pressure is 609 kPa (88.3 psi) under average day demand, peak hour pressure is slightly lower).
 - This is caused by VFD setting within the Distribution Reservoir and Pumphouse.
 - Pressure is similar to existing conditions.
 - No upgrades are proposed since lowering the VFD setting will lower pressure to areas at higher elevations.
 - On-lot PRVs may be installed if high pressure is a problem.
- Commercial/Industrial area near the intersection of 104 Avenue and 97 Street
 - Low pressure is simulated near this intersection (lowest pressure is 303 kPa (43.9 psi) under the peak hour demand, average day pressure is slightly higher).
 - This is caused by VFD setting within the Distribution Reservoir and Pumphouse.
 - No upgrades are proposed since increasing the VFD setting will increase pressure to areas at lower ground elevations.

Following the proposed upgrades to the existing system, available fire flow in some areas will continue fall short of the target fire flows outlined in [Section 2](#). They are identified and discussed below.

Areas with Less than the Required Fire Flow

Figure 4-4 shows the simulated peak day plus fire flow results. Eight nodes in four areas are simulated to not fully meet the fire flow requirements:

- High density residential developments along Moberly Road (Currently there is one four story apartment developed)
 - Approximately 75% to 80% of the required fire flow is simulated to be available in this area.
- Commercial area/parking lot south of Acorn Motel
 - Only 90% of the required fire flow is available, due to small pipe size (150 mm).
 - No hydrant is currently installed in this area.
 - Fire protection is available through nearby hydrants on surrounding roadways.
- Commercial/industrial area west of the intersection of Hoppe Avenue and 99 Street
 - Only 61% of the required fire flow is available, due to a long dead end (106 m) cause by close valve/pressure zone separation.
 - No hydrant is currently installed at this location.
 - Fire protection is available through nearby hydrant along the north side of Hoppe Avenue (within the adjacent pressure zone).
- Commercial/industrial area at the eastern end of Shand Avenue
 - Only 67% of the required fire flow is available, due to a long dead end (135 m).
 - Fire flow will improve in the future once looping is achieved.

4.1.4 Campground and Golf Course Servicing

We understand that design of the watermain located along 104 Avenue and Memorial Drive is on-going. This watermain is intended to service the Campground with future expansion to service the Golf Course. It is recommended that a 300 mm diameter watermain be installed along 104 Avenue and a 200 mm diameter watermain be installed along Memorial Drive and Campground Road. These watermain sizes will meet the current and future water demands and improve fire flows.

Campground Servicing

Table 4-3 summarizes required upgrades to the existing system to service the Campground, based on two different Levels of Service (LOS):

- **LOS #1** meets design criteria noted in **Section 2** and requires installation of a fire pump.
- **LOS #2** is close to meeting the design criteria but does not require a fire pump.

Table 4-3 Upgrades Required to Service the Campground

Criteria	Design Criteria	Existing Condition	LOS #1	LOS #2
Available Fire Flow	83 L/s	3 L/s	112 L/s	75 L/s
Minimum Peak Hour Pressure	45 psi	79 psi	79 psi	Up to 41 psi *
Upgrade Required	-	-	Install Fire Pump (83 L/s @ 5 m of head)	Bypass Existing Booster Pump Station
Advantages	-	-	<ul style="list-style-type: none"> Provides high LOS to Campground Can supply some fire flow to Golf Course 	<ul style="list-style-type: none"> Reduce operational and maintenance obligations No additional pumping required to service the Campground
Disadvantages	-	-	<ul style="list-style-type: none"> Require installation of fire pump and pump station Additional operation and maintenance obligations 	<ul style="list-style-type: none"> Provides lower LOS to Campground

* Actual pressure may fluctuate during operation of the distribution pumps.

Golf Course Servicing

Based on available LiDAR information, the elevation of the Golf Course Club House is approximately 1311 m. This elevation is close to the higher limit of the distribution pumps' target HGL (1322.7 m). We anticipate if the Golf Course is directly connected to the water distribution system (i.e., bypassing the Booster Pump Station), approximately 15 psi will be available at the Golf Course during peak hour demand, which is too low for normal operation and fire flow scenarios. The Golf Course can be serviced via trickle fill to meet peak hour demands. However, in order to provide fire protection, fire pump will be required. Fire pump sizing should be determined during detailed design upon verification of development elevations, available system pressures, and pipe sizing.

Level of service options to service the Golf Course is similar to the Campground:

- **LOS #1** meets design criteria noted in **Section 2** and requires installation of a fire pump.
- **LOS #2** is does not meet the design criteria but does not require a fire pump and can only provide trickle fill service connection.

4.2 Pumping

Based on the pumping assessment provided in **Table 3-5**, the two distribution pumps and the fire pump within the Distribution Reservoir and Pumphouse and the transfer pumps at the WTP have sufficient capacity to meeting existing system demands.

Installation of a new fire pump at the booster station may be required to provide fire flow to the Campground, depending on the preferred LOS. Should LOS #1 as described in **Section 4.1.4** is selected, it is anticipated that a fire pump in the order of 83 L/s at 5 m of head will be required. Fire pump requirements should be discussed and evaluated during detailed design.

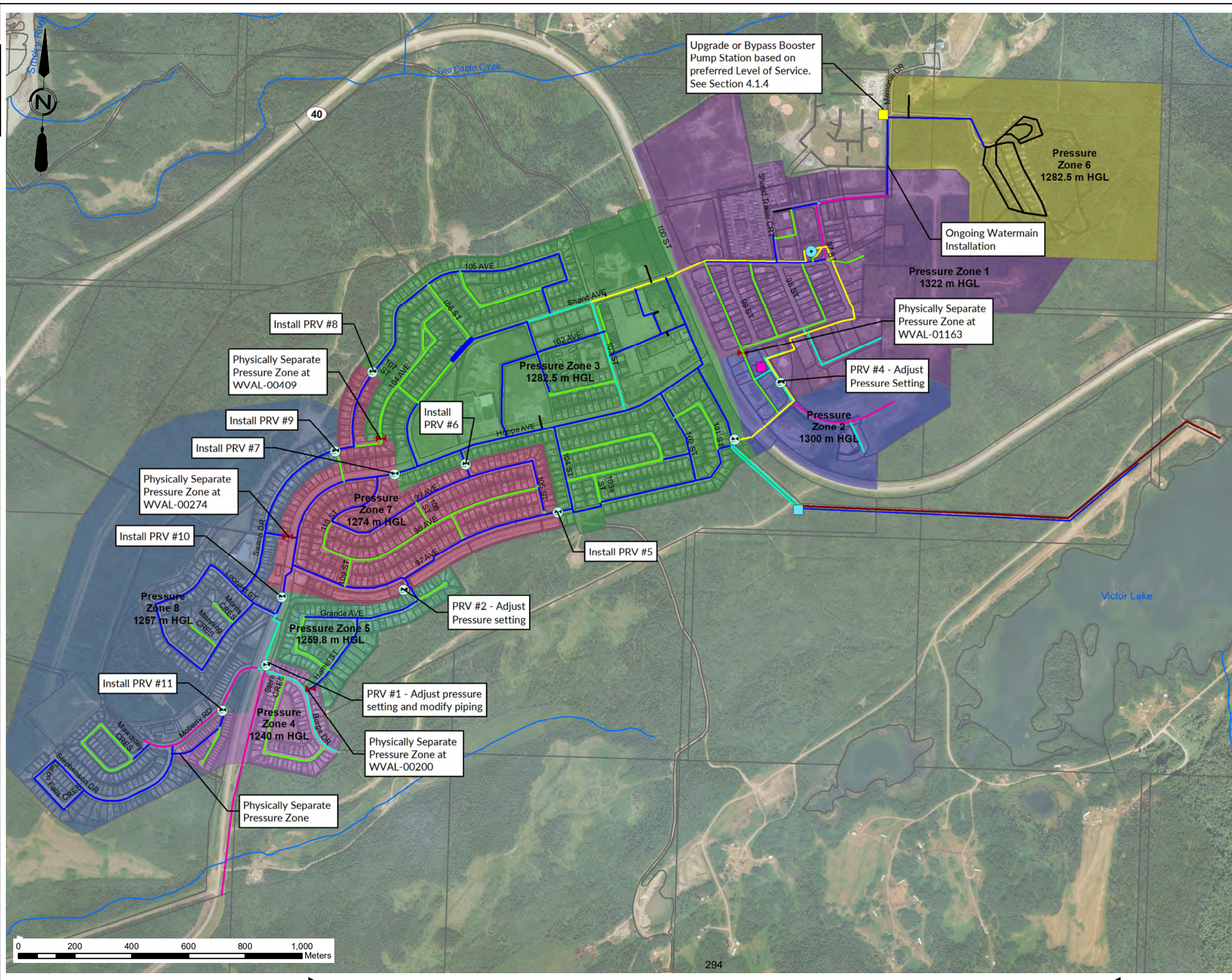
Similarly, pumping requirements for the Golf Course will be dependent on the preferred level of service, see **Section 4.1.4**.

4.3 Storage

Based on the storage assessment provided in **Table 3-6**, there is ample storage capacity to meet the projected existing system demands.

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- Legend:**
- Physically Separate Pressure Zone
 - PRV Station
 - Reservoir & Pumphouse
 - Truckfill
 - Water Treatment Plant
 - Campground Booster Pumphouse
- Pipe Size**
- <= 100 mmø
 - 150 mmø
 - 200 mmø
 - 250 mmø
 - 300 mmø
 - 350 mmø
 - 450 mmø
 - Proposed 200 mmø
- Pressure Zones**
- Pressure Zone 1, 1322 m HGL
 - Pressure Zone 2, 1300 m HGL
 - Pressure Zone 3, 1282.5 m HGL
 - Pressure Zone 4, 1240 m HGL
 - Pressure Zone 5, 1259.8 m HGL
 - Pressure Zone 6, 1282.5 m HGL
 - Pressure Zone 7, 1274 m HGL
 - Pressure Zone 8, 1257 m HGL

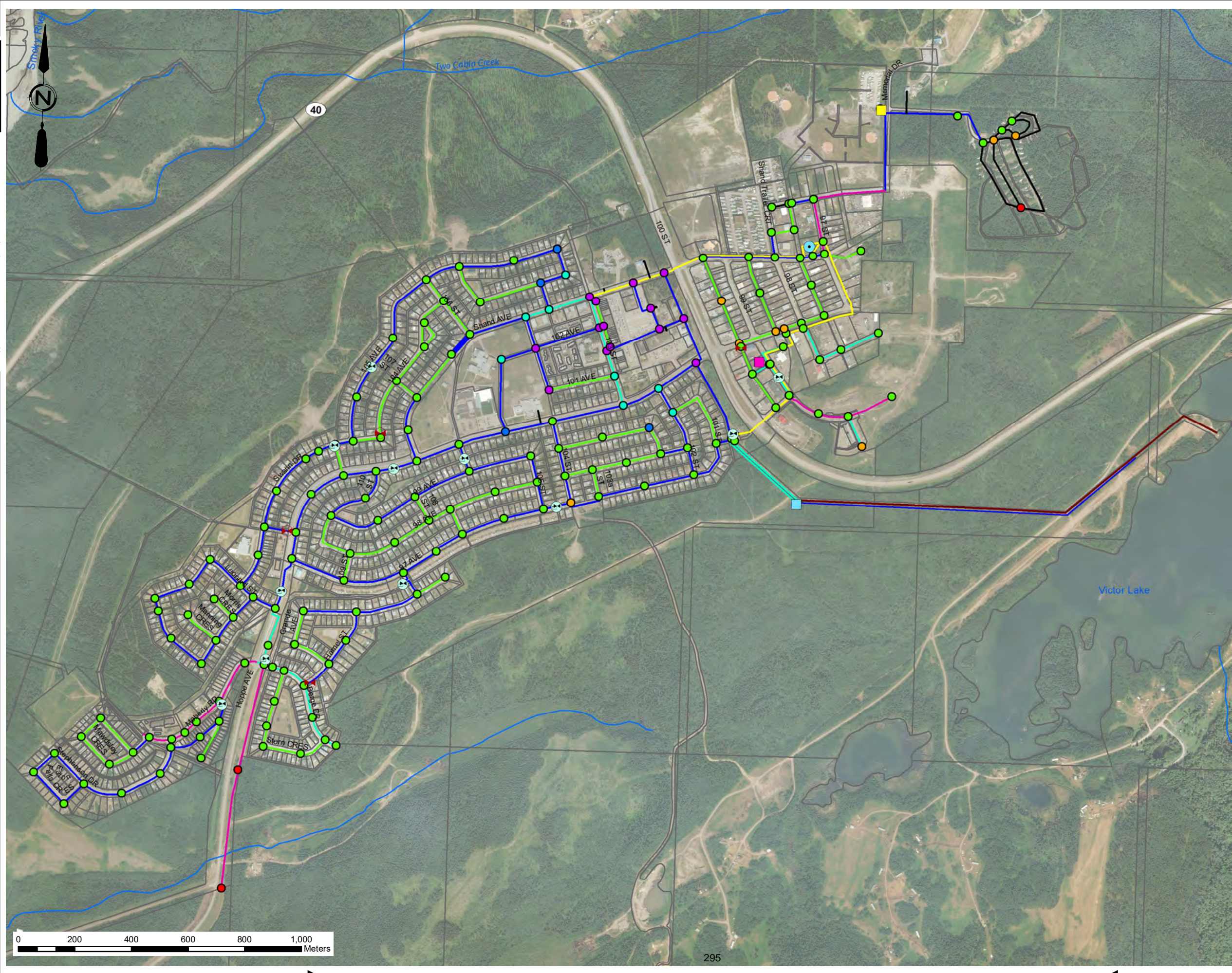


FIGURE 4-1
GRANDE CACHE WATER MASTER PLAN
EXISTING WATER SYSTEM WITH UPGRADES
MODIFIED PRESSURE ZONES

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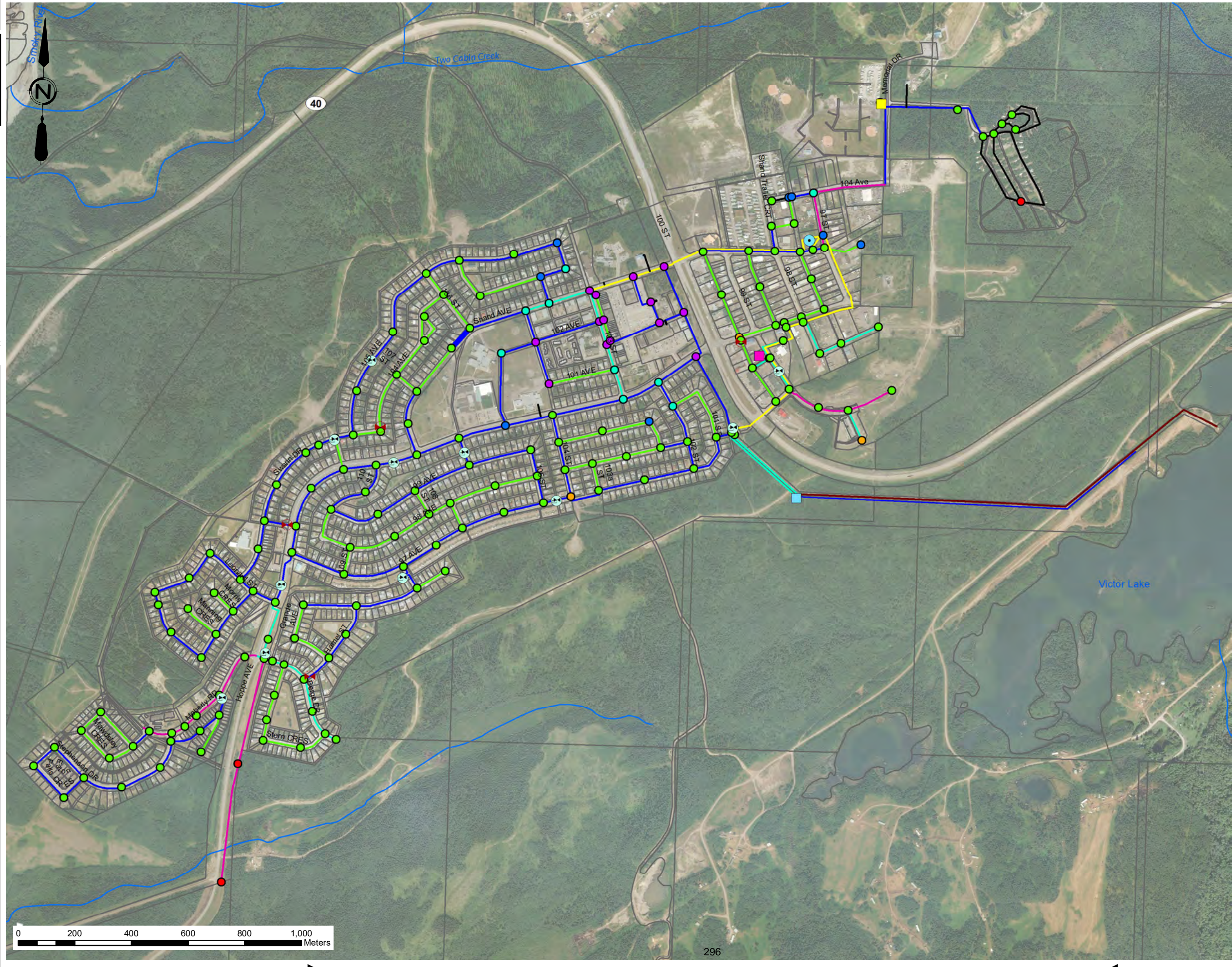
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DRAWING PATH: D:\2022-3300_GrandeCache\WaterMasterPlan\Fig4-2_Existing\WaterSystem\WithUpgrades_AverageDayPressure.mxd
DATA SOURCE: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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DATA SOURCE: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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IF NOT 25 mm AS SHOWN, ADJUST SCALES
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- Legend:**
- Physically Separate Pressure Zone
 - PRV Station
 - Reservoir & Pumphouse
 - Truckfill
 - Water Treatment Plant
 - Campground Booster Pumphouse
- Peak Hour Pressure**
- <= 40 psi
 - <= 45 psi
 - <= 50 psi
 - <= 80 psi
 - <= 90 psi
 - > 90 psi
- Pipe Size**
- <= 100 mmø
 - 150 mmø
 - 200 mmø
 - 250 mmø
 - 300 mmø
 - 350 mmø
 - 450 mmø
 - Proposed 200 mmø



FIGURE 4-3
GRANDE CACHE WATER MASTER PLAN

EXISTING WATER SYSTEM WITH UPGRADES
PEAK HOUR PRESSURE

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DATE	2023AUG02
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Note:
Fire Flow Availability at Campground varies between 90% to 100% depending on preferred level of service. See Section 4.1.4

5 FUTURE WATER DISTRIBUTION SYSTEM

5.1 General

The conceptual future water distribution system is presented in interim and ultimate stages. A fire flow target of 200 L/s has been applied for the entire South Bench area to allow for all types of future development.

Generally, only major watermain (250 mm and above) have been identified in the expansion areas. It is anticipated that additional watermain will be installed and will be suitably sized based on adjacent development. In typical single-family residential developments, looped 200 mm diameter watermain are sufficient.

The Riverview ASP was reviewed, and its proposed land use plan and road layout is reflected in the future watermain concept.

Figure 1-1 presents the topographic relief within the Hamlet and helps to demonstrate why PRV stations are critical to the Grande Cache water distribution system. As shown in the Figure, future interim development in the Riverview area will be at similar elevations to existing residential developments nearby. However, proposed developments in the Ultimate Stage are at lower elevations. Continued pressure zone management through PRV installation will be critical to addressing potential high pressures within the future development areas.

5.2 Interim Stage

5.2.1 Distribution System

Figure 5-1 presents the proposed distribution system for the Interim Stage. New residential developments are anticipated to occur at the western edge of the Hamlet within the Riverview area. New commercial/industrial developments are anticipated to be located at the Floyd McLennan Business Park and the Tower Park area at the northern and eastern edges of the Hamlet, respectively.

Pressure Zones

Expansion into the Riverview area will be an extension of Pressure Zone #8 (HGL 1257 m) and will not require additional PRVs.

The Floyd McLennan Business Park and the north portion of Tower Park development will be serviced by the Distribution Reservoir and Pumphouse (Pressure Zone #1). The southern portion of the Tower Park development can be directly connected to Pressure Zone #2 (1300m HGL). **Figure 5-2** illustrates the pressure zone map for the interim stage.

Average Day and Peak Hour Demand Scenarios

During the average day demand scenario, pressures ranged from 189 kPa (27.4 psi) to 603 kPa (87.4 psi). The pressure falls approximately 3 kPa (0.4 psi) in the peak hour scenario to range from 187 kPa (27.1 psi) to 600 kPa (87.0 psi).

Figure 5-1 shows the peak hour pressures.

In the Interim Development Stage, several areas within the Hamlet are expected to experience pressures outside of the target operating range:

- Commercial/high density residential area roughly bordered by 104 Avenue to the north, 104 Street to the west, Hoppe Avenue to the south, and Hwy 40 to the east.

- Lower pressure due to fixed Distribution Reservoir elevation.
- Commercial/Industrial area west of the intersection of Hoppe Avenue and 99 Street
 - Higher pressure due to VFD setting at Distribution Reservoir and Pumphouse.
- Commercial/Industrial area near the intersection of 104 Avenue and 97 Street
 - Lower pressure due to VFD setting at Distribution Reservoir and Pumphouse.

Peak Day Plus Fire Flow Scenario

Fire flow requirements are fully met in the new development areas. Three nodes within the existing system are simulated to fall below the target fire flow requirements:

- Commercial area/parking lot south of Acorn Motel
 - Only 90% of the required fire flow is available, due to small pipe size (150 mm).
 - No hydrant is currently installed in this area.
 - Fire protection is available through nearby hydrants on surrounding roadways.
- Commercial/industrial area west of the intersection of Hoppe Avenue and 99 Street
 - Only 61% of the required fire flow is available, due to long dead end (106 m) cause by close valve/pressure zone separation.
 - No hydrant is currently installed in at this location.
 - Fire protection is available through nearby hydrant along the north side of Hoppe Avenue.
- Commercial area at the intersection of Shand Avenue and 103 Street
 - 99.2% of the required fire flow is available (198 L/s available, 200 L/s required).
 - Upgrade is not recommended due to minimum variance from the required fire flow.

Figure 5-3 illustrates the simulated available fire flow at the Interim Stage.

5.2.2 Pumping and Storage

Pumping requirements have not been identified beyond 2042. It is recommended that pumps be regularly inspected and maintained to prolong their lifespan. It should be anticipated that pumps may need to be replaced every 10 to 15 years with new and higher capacity pumps.

Similarly, storage requirements have not been identified beyond 2042. There is ample surplus capacity within the existing Distribution Reservoir to meet the anticipated demand in 2042.

5.3 Ultimate Stage

5.3.1 Distribution System

Proposed distribution system upgrades/expansion and model results for the Ultimate Stage are illustrated in Figure 5-4. New residential developments are anticipated to occur within the South Bench area, at the southern edge of the Hamlet. The remainder of the Floyd McLennan Business Park and the Tower Park areas are also anticipated to be fully developed.

Pressure Zones

The South Bench area is proposed to be separated into two pressure zones. The eastern portion of the South Bench area is proposed within the same pressure zone as the Grande Avenue and Hamel Street area (Pressure Zone #5). A

new pressure zone is proposed to service the southwestern corner of the South Bench area (Pressure Zone #9 – 1229 m HGL). **Figure 5-5** presents the Ultimate Stage pressure zones.

Average Day and Peak Hour Demand Scenarios

During the average day demand scenario, pressures range from 189 kPa (27.4 psi) to 618 kPa (89.7 psi). The pressure falls approximately 3 kPa (0.4 psi) in the peak hour scenario to range from 185 kPa (26.9 psi) to 616 kPa (89.3 psi).

Figure 5-4 shows the peak hour pressures.

The northwestern corner of the Floyd McLennan Business Park is simulated to have pressures between 618 kPa (89.7psi) to 615 kPa (89.2psi) during average day and peak hour demands, respectively. On-lot PRVs may be required in this area to mitigate potential high pressures.

In the Ultimate Development Stage, several areas within the Hamlet are expected to experience pressures outside of the target operating range:

- Commercial/high density residential area roughly bordered by 104 Avenue to the north, 104 Street to the west, Hoppe Avenue to the south, and Hwy 40 to the east.
 - Lower pressure due to fixed Distribution Reservoir elevation.
- Commercial/Industrial area west of the intersection of Hoppe Avenue and 99 Street.
 - Higher pressure due to VFD setting at Distribution Reservoir and Pumphouse.
- Commercial/Industrial area near the intersection of 104 Avenue and 97 Street.
 - Lower pressure due to VFD setting at Distribution Reservoir and Pumphouse.

Peak Hour Plus Fire Flow Scenario

Fire flow requirements are fully met in the new development areas. However, due to additional demands from the Ultimate Stage development, fire flow in the following two existing developments are simulated to fall below the target fire flow requirements:

- High density residential developments along Moberly Road and area to the north.
- Commercial/high density residential area bordered by Shand Avenue, 104 Street, 101 Avenue, and Hwy 40.

Approximately 515 m of pipe upsizing will be required to increase available fire flow to both areas noted above:

- Upsize approximately 315 m of existing 200 mm diameter watermain to 350 mm, from the Old WTP to the intersection of Hoppe Avenue and Hwy 40.
- Upsize approximately 200 m of existing 150 mm diameter watermain to 200 mm, from 10614 Shand Avenue to the intersection of Shand Avenue and 107 Street.

Two other nodes will continue to fall short of fire flow criteria:

- Commercial area/parking lot south of Acorn Motel
 - Only 93% of the required fire flow is available, due to small pipe size (150 mm).
 - No hydrant is currently installed in this area.
 - Fire protection is available through nearby hydrants on surrounding roadways.
- Commercial/industrial area west of the intersection of Hoppe Avenue and 99 Street
 - Only 61% of the required fire flow is available, due to long dead end (106m) cause by closed valve/pressure zone separation.

- No hydrant is currently installed in this area.
- Fire protection is available through nearby hydrant along the north side of Hoppe Avenue.

Figure 5-6 illustrates the simulated available fire flow at the Ultimate Stage.

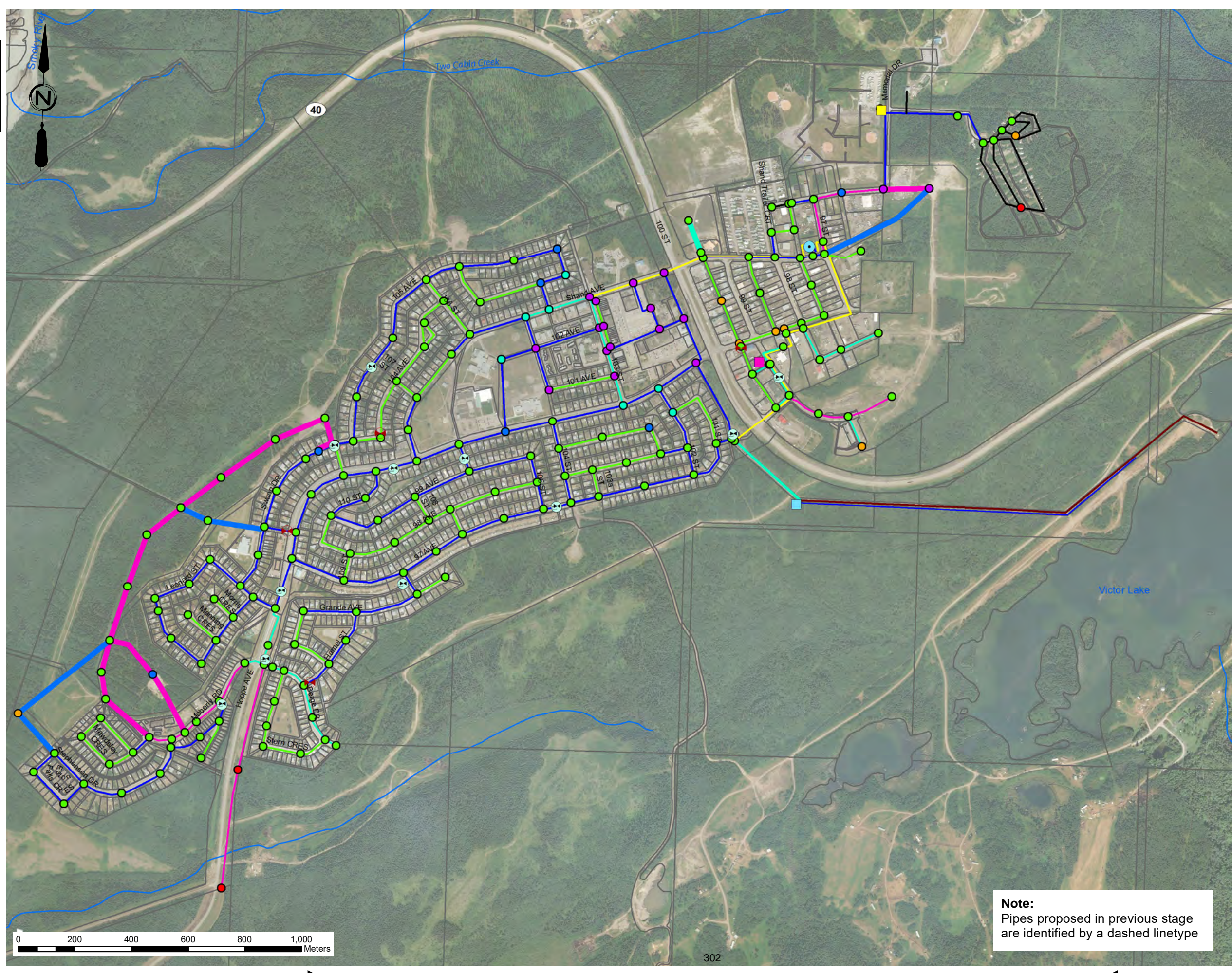
5.3.2 Pumping and Storage

Pumping requirements have not been identified beyond 2042. It is recommended that pumps be regularly inspected and maintained to prolong their lifespan. It should be anticipated that pumps may need to be replaced every 10 to 15 years with new and higher capacity pumps.

Similarly, storage requirements have not been identified beyond 2042. There is ample surplus capacity within the existing Distribution Reservoir to meet the anticipated demand in 2042.

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Legend:

- Physically Separate Pressure Zone
- PRV Station
- Reservoir & Pumphouse
- Truckfill
- Water Treatment Plant
- Campground Booster Pumphouse

Peak Hour Pressure

- <= 40 psi
- <= 45 psi
- <= 50 psi
- <= 80 psi
- <= 90 psi
- > 90 psi

Pipe Size

- <= 100 mmø
- 150 mmø
- 200 mmø
- 250 mmø
- 300 mmø
- 350 mmø
- 450 mmø
- Proposed 200 mmø
- Proposed 250 mmø
- Proposed 300 mmø



FIGURE 5-1
GRANDE CACHE WATER MASTER PLAN

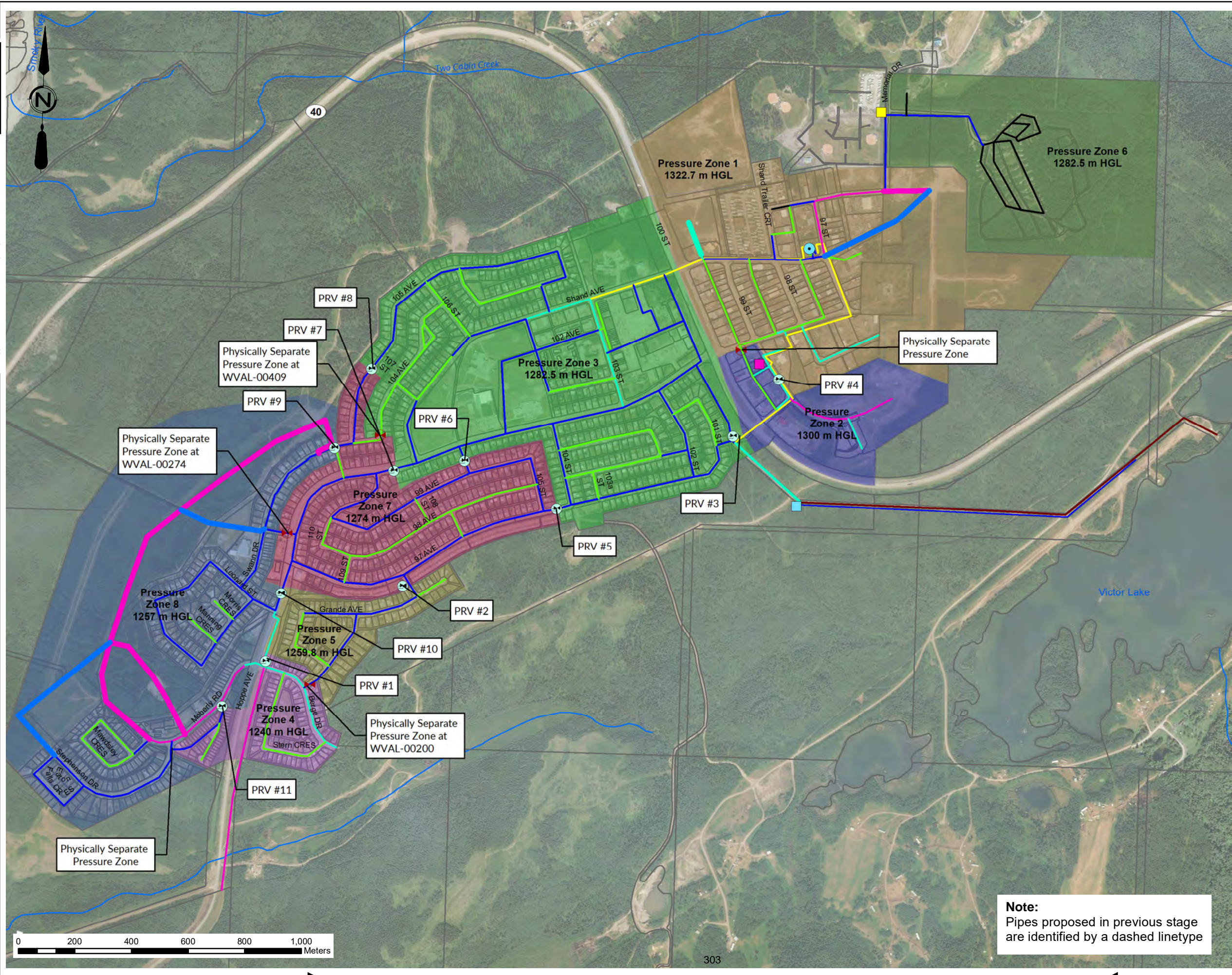
FUTURE WATER SYSTEM
INTERIM STAGE PEAK HOUR PRESSURE

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Note:
Pipes proposed in previous stage
are identified by a dashed linetype

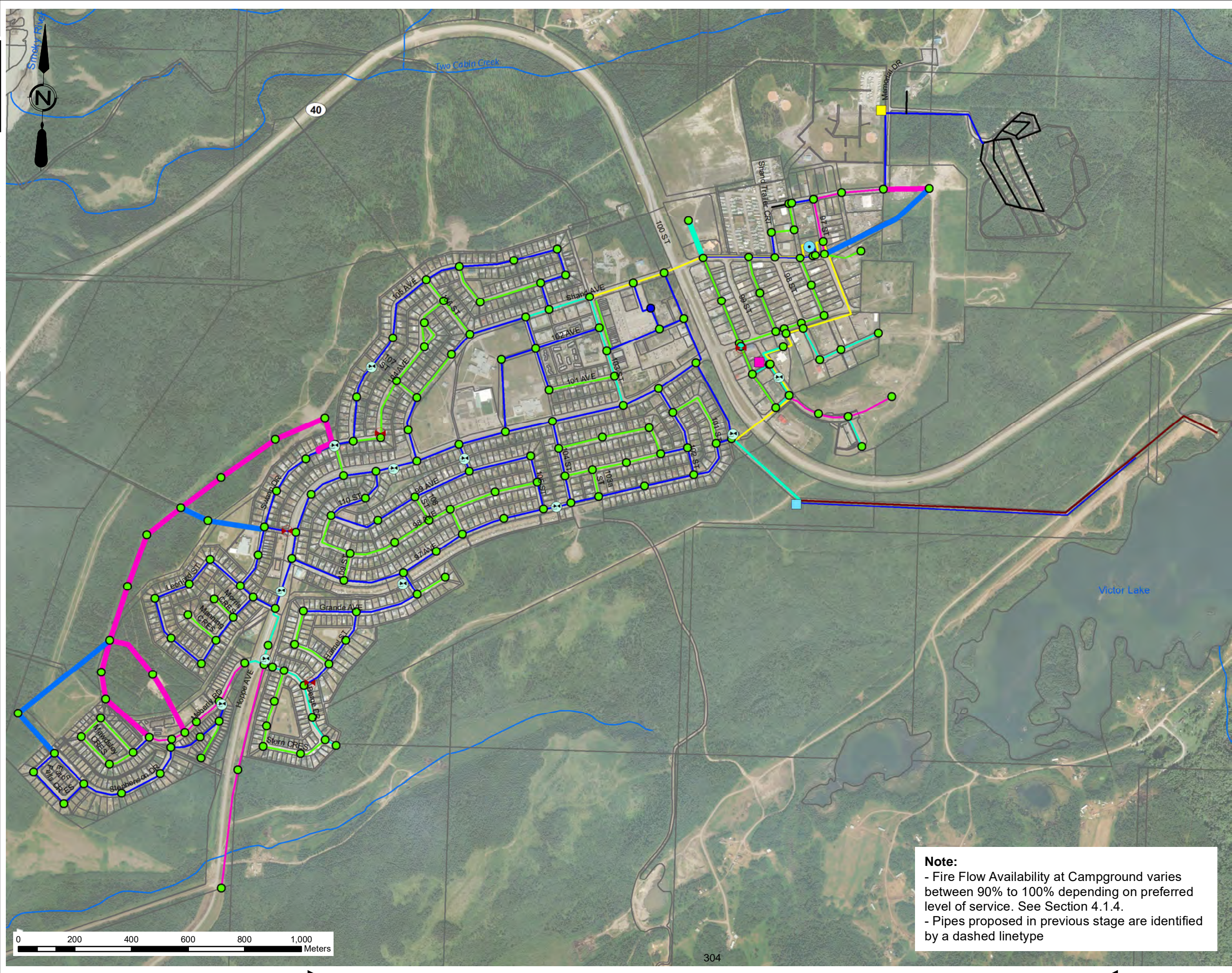
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- Legend:**
- Physically Separate Pressure Zone
 - PRV Station
 - Reservoir & Pumphouse
 - Truckfill
 - Water Treatment Plant
 - Campground Booster Pumphouse
- Fire Flow Availability**
- Exceeds Fire Flow Requirements
 - 80% - 99%
 - 60% - 80%
 - 40% - 60%
 - 0% - 40%
- Pipe Size**
- <= 100 mmø
 - 150 mmø
 - 200 mmø
 - 250 mmø
 - 300 mmø
 - 350 mmø
 - 450 mmø
 - Proposed 200 mmø
 - Proposed 250 mmø
 - Proposed 300 mmø



FIGURE 5-3
GRANDE CACHE WATER MASTER PLAN

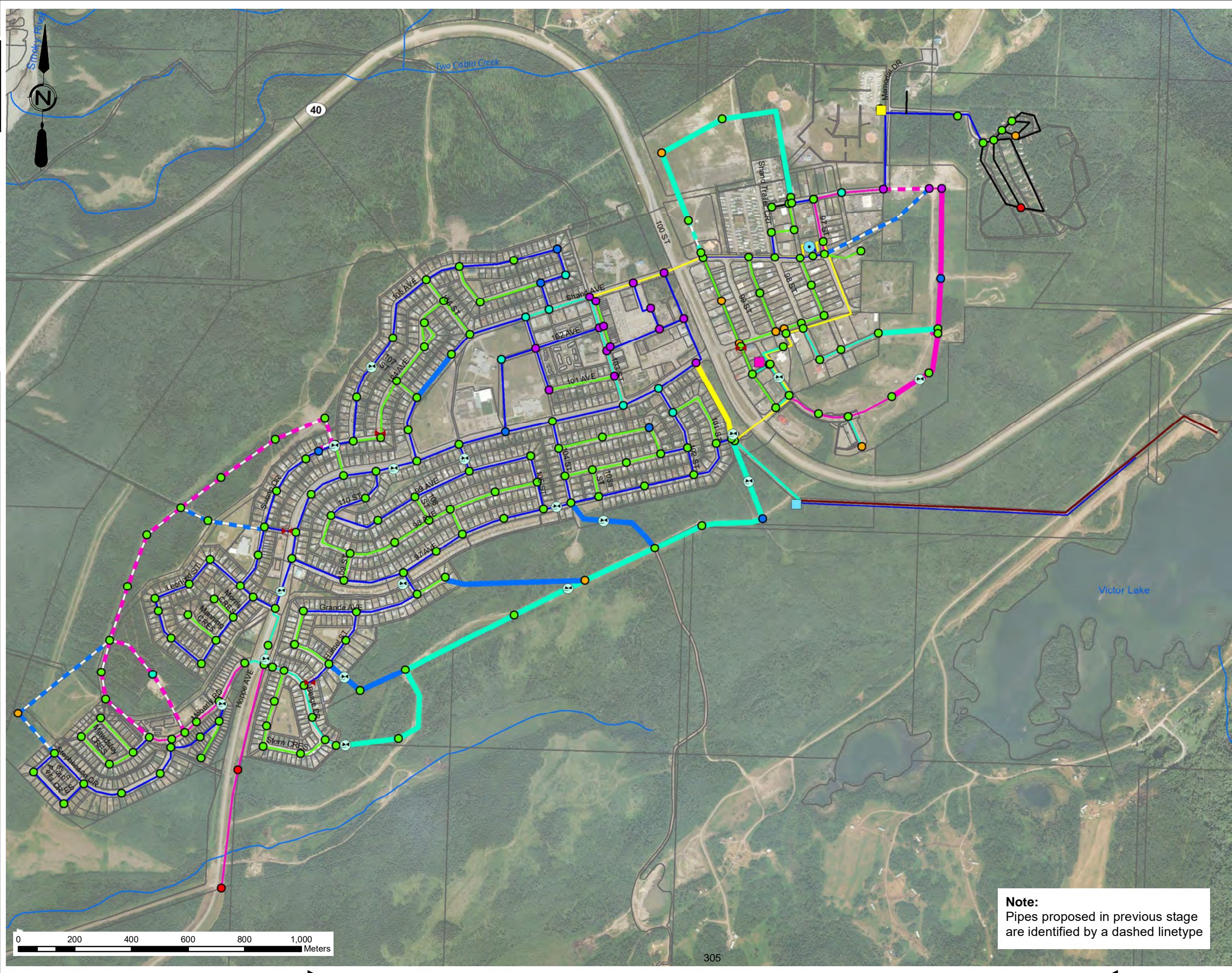
FUTURE WATER SYSTEM
INTERIM STAGE FIRE FLOW

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Note:
- Fire Flow Availability at Campground varies between 90% to 100% depending on preferred level of service. See Section 4.1.4.
- Pipes proposed in previous stage are identified by a dashed linetype

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Legend:

- Physically Separate Pressure Zone
- PRV Station
- Reservoir & Pumphouse
- Truckfill
- Water Treatment Plant
- Campground Booster Pumphouse

Peak Hour Pressure

- <= 40 psi
- <= 45 psi
- <= 50 psi
- <= 80 psi
- <= 90 psi
- > 90 psi

Pipe Size

- <= 100 mmø
- 150 mmø
- 200 mmø
- 250 mmø
- 300 mmø
- 350 mmø
- 450 mmø
- Proposed 200 mmø
- Proposed 250 mmø
- Proposed 300 mmø
- Proposed 350 mmø



FIGURE 5-4
GRANDE CACHE WATER MASTER PLAN

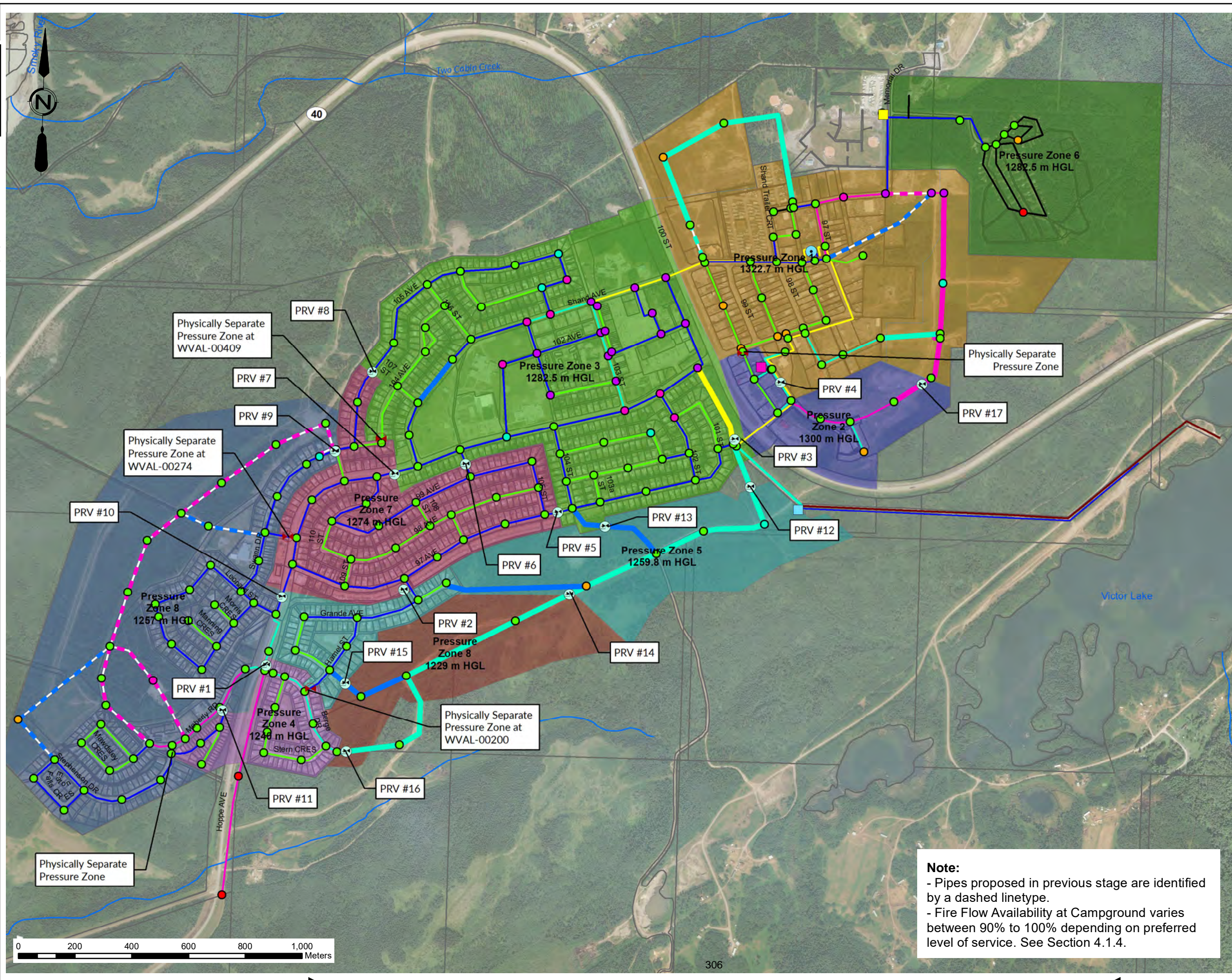
FUTURE WATER SYSTEM
ULTIMATE STAGE PEAK HOUR PRESSURE

AE PROJECT No.	2022-3300
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Note:
Pipes proposed in previous stage
are identified by a dashed linetype

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- Legend:**
- Physically Separate Pressure Zone
 - PRV Station
 - Reservoir & Pumphouse
 - Truckfill
 - Water Treatment Plant
- Peak Hour Pressure**
- <= 40 psi
 - <= 45 psi
 - <= 50 psi
 - <= 80 psi
 - <= 90 psi
 - > 90 psi
- Pipe Size**
- <= 100 mmø
 - 150 mmø
 - 200 mmø
 - 250 mmø
 - 300 mmø
 - 350 mmø
 - 450 mmø
 - Proposed 200 mmø
 - Proposed 250 mmø
 - Proposed 300 mmø
 - Proposed 350 mmø
- Pressure Zones**
- Pressure Zone 1, 1322.7 m HGL
 - Pressure Zone 2, 1300 m HGL
 - Pressure Zone 3, 1282.5 m HGL
 - Pressure Zone 4, 1240 m HGL
 - Pressure Zone 5, 1259.8 m HGL
 - Pressure Zone 6, 1282.5 m HGL
 - Pressure Zone 7, 1274 m HGL
 - Pressure Zone 8, 1257 m HGL
 - Pressure Zone 9, 1229 m HGL

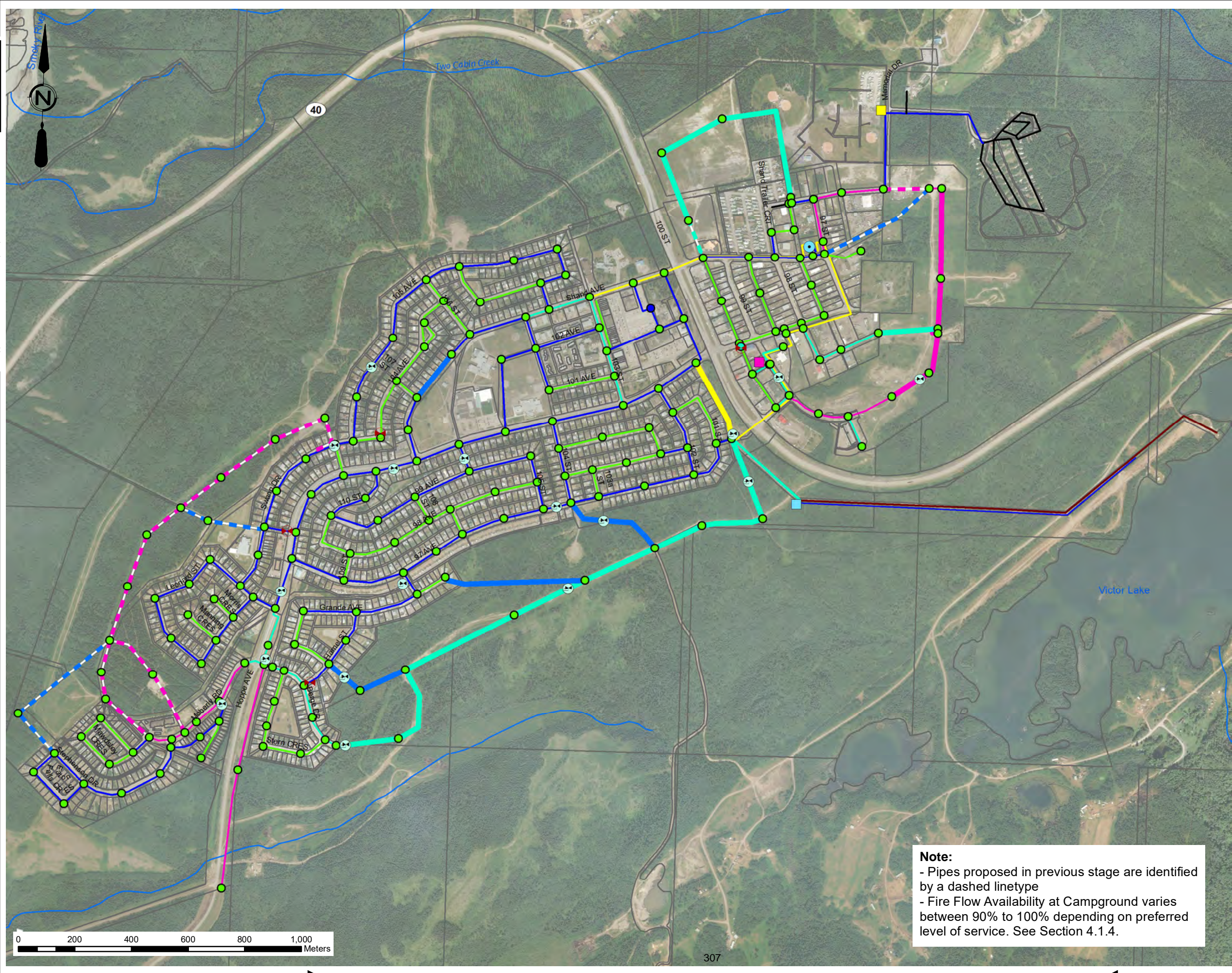
FIGURE 5-5
GRANDE CACHE WATER MASTER PLAN
FUTURE WATER SYSTEM
ULTIMATE STAGE PRESSURE ZONES

Note:
- Pipes proposed in previous stage are identified by a dashed linetype.
- Fire Flow Availability at Campground varies between 90% to 100% depending on preferred level of service. See Section 4.1.4.

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- Legend:**
- Physically Separate Pressure Zone
 - PRV Station
 - Reservoir & Pumpouse
 - Truckfill
 - Water Treatment Plant
 - Campground Booster Pumpouse
- Fire Flow Availability**
- Exceeds Fire Flow Requirements
 - 80% - 99%
 - 60% - 80%
 - 40% - 60%
 - 0% - 40%
- Pipe Size**
- <= 100 mmø
 - 150 mmø
 - 200 mmø
 - 250 mmø
 - 300 mmø
 - 350 mmø
 - 450 mmø
 - Proposed 200 mmø
 - Proposed 250 mmø
 - Proposed 300 mmø
 - Proposed 350 mmø



FIGURE 5-6
GRANDE CACHE WATER MASTER PLAN

FUTURE WATER SYSTEM
ULTIMATE STAGE FIRE FLOW

Note:
- Pipes proposed in previous stage are identified by a dashed linetype
- Fire Flow Availability at Campground varies between 90% to 100% depending on preferred level of service. See Section 4.1.4.

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6 OPINION OF PROBABLE COSTS

This Section presents conceptual opinion of probable cost estimates for capital costs associated with recommended upgrades to the existing system, as well as subsequent development stages where applicable. For future development scenarios, costs are generally presented for watermains not anticipated to be covered by developers. These include offsite watermains and those over 300 mm diameter. Cost for watermains over 300 mm diameter are anticipated to be recovered through development charges or offsite levies. Costs related to supply of fire flow to the Campground have not been outlined at this time. Further investigation will be required to determine the extend of upgrades required at the booster station to accommodate increased pumping capacity (should a new booster station be installed). The 200 mm pipe upgrade to provide fire flow to the Campground has also not been included at this time.

Table 6-1 presents the estimated capital cost and implementation timelines for the proposed upgrades. Due to the conceptual nature of this study and understanding that there exist unknown variables beyond the scope of this study, the estimates presented herein include a contingency of 15% and an engineering allowance of 15% of the total estimated costs. All costs are based on recent tender prices of similar scope and location. All costs are in 2022 dollars and do not include GST. Detailed cost estimate is attached in [Appendix A](#).

Table 6-1 Capital Cost and Implementation Plan

Description	Capital Cost	Implementation Timeline
Existing System Upgrades		
Upsize Watermains	\$369,000	Within next 1 to 3 years
Adjust PRV Settings	\$60,000	Within next 1 to 3 years
Install PRV Stations (7)	\$1,155,000	Within next 1 to 3 years
Modify PRV Station #1 Piping and Adjust PRV Setting	\$530,000	Within next 1 to 3 years
Pressure Zone Separations	\$150,000	Within next 1 to 3 years
Subtotal	\$2,264,000	
Engineering and Contingency (30%)	\$680,000	
Existing Upgrades Total	\$2,944,000	
Interim Stage (No Upgrades)		
Ultimate Stage		
Upsize Watermains (within existing developed areas)	\$1,994,000	When South Bench area is developed
Install PRV Stations (6)	\$990,000	When South Bench area is developed
Subtotal	\$2,984,000	
Engineering and Contingency (30%)	\$896,000	
Ultimate Stage Total	\$3,880,000	

Note: Costs to install new watermains and PRVs in future growth areas are considered to be undertaken by developers at no cost to the MD.

Our opinion of probable cost to install on-lot PRVs is approximately \$715 per lot, including 30% for contingency and engineering/coordination costs. The total cost of installing on-lot PRVs in lieu of PRV stations, would be dependent on the number of homes within each pressure zone. The cost to install one PRV Station is equivalent to installing 300 on-lot PRVs.

7 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusions

- An average per capita consumption value of 300 L/c/d is appropriate for use in this assessment. This is a reduction from 350 L/c/d as applied in the MD's Servicing Standards, but it is appropriate when considering the water consumption of the Hamlet as a whole.
- As per the MD's Servicing Standards, a peaking factor of 2.0 will be applied to estimate peak day demands and a peaking factor of 3.0 will be applied to estimate the peak hour demand.
- The normal system operating pressure range is established to be from 350 kPa (50 psi) to 550 kPa (80 psi), with a lower minimum pressure during peak hour demand scenarios of 310 kPa (45 psi) and lower minimum zone pressure during fire event of 150 kPa (22 psi).
- The existing water distribution system model was updated to reflect recent upgrades to the distribution system, pumps, and the estimated water demands.
- Based on the model results, the majority of the Hamlet is simulated to have pressure within the normal operating range. However, several areas are simulated to fall outside of this range.
- A few areas currently cannot fully meet the target fire flow requirements due to long dead ends. There will be water available for fire fighting, however, it will not meet the desired target flowrate.
- There are no concerns about pumping capacity at the Distribution Reservoir and Pumphouse and at the WTP.
- There is ample reservoir storage capacity to meet the required water storage requirements for the next 20 years.
- Upgrades to the distribution system will be required to meet the recommended fire flow at select locations within the Hamlet. Upgrades are not recommended for all deficient areas, as some will be rectified over time as adjacent areas develop.
- Three additional pressure zones are proposed in the area west of Hwy 40 to address varying elevations within the Hamlet.

7.2 Recommendations

- AE recommends minimum pipe sizing's to follow MD's Servicing Standards except for residential developments (200 mm diameter).
- Confirm and / or adjust PRV setting for distribution and fire pump headers.
- Proceed with recommended upgrades as shown in **Figure 4-1**.
- Undertake pressure zone adjustments as identified in **Table 4-1** and **Figure 4-1**, this includes:
 - Adjust pressure settings at existing PRV stations.
 - Install seven new PRV stations to create three additional pressure zones within the developed areas of the Hamlet.
 - Physically separate pressure zones.
- Upgrade distribution mains to the minimum recommended pipe size during local system improvement opportunities.
- Plan for staged expansion of the water system as presented in **Figure 5-1** and **Figure 5-4**.

CLOSURE

This report was prepared for the Municipal District of Greenview No. 16 to provide a Water Maser Plan for the Hamlet of Grande Cache.

The services provided by Associated Engineering Alberta Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,

Associated Engineering Alberta Ltd.

Sean Nicoll, P.Eng.
Project Manager

Li Wang, P.Eng.
Project Engineer

APPENDIX A - COST ESTIMATES

Table A-1
Hamlet of Grande Cache Water Master Plan
Cost Breakdown - Existing System Upgrades

Proposed Upgrade		Existing Condition	Proposed Condition	Quantity	Unit	Unit Cost	Total
WM Upsizing	Shand Ave, from 106 St in SW direction (J-45 to J-146)	150mm	200mm	100	l.m.	\$3,689	\$369,000
Pressure Zone #1	Physically Separate Pressure Zones near 9901 Hoppe Ave EX WVAL-01163	Closed Valve	Remove WM	1	ea.	\$30,000	\$30,000
Pressure Zone #2	Adjust PRV Station #4 PRV Setting	86 psi (1319.6m HGL)	55 psi (1300m HGL)	1	ea.	\$30,000	\$30,000
Pressure Zone #4	Install PRV Station #5	-	74 psi (1274m HGL)	1	ea.	\$165,000	\$165,000
	Install PRV Station #6	-	48 psi (1274m HGL)	1	ea.	\$165,000	\$165,000
	Install PRV Station #7	-	54.5 psi (1274m HGL)	1	ea.	\$165,000	\$165,000
	Physically Separate Pressure Zones near 19131 Moberly Road WVAL-00409	Closed Valve	Remove WM	1	ea.	\$30,000	\$30,000
	Install PRV Station #8	-	70.5 psi (1274m HGL)	1	ea.	\$165,000	\$165,000
Pressure Zone #5	Physically Separate Pressure Zones near 10900 Berge Drive EX WVAL-00200	Closed Valve	Remove WM	1	ea.	\$30,000	\$30,000
	Adjust PRV Station #2 PRV Setting	44 psi (1249m HGL)	60 psi (1259.8m HGL)	1	ea.	\$30,000	\$30,000
Pressure Zone #6	Install PRV Station #9	-	48 psi (1257m HGL)	1	ea.	\$165,000	\$165,000
	Physically Separate Pressure Zones near 11058 hoppe Avenue EX WVAL-00274	Closed Valve	Remove WM	1	ea.	\$30,000	\$30,000
	Install PRV Station #10	-	54 psi (1257m HGL)	1	ea.	\$165,000	\$165,000
Pressure Zone #7	Modify PRV Station #1 Watermain Routing and Adjust PRV Setting	62 psi (1250.3m HGL)	46 psi (1240m HGL)	1	ea.	\$530,000	\$530,000
	Install PRV Station #11	-	53 psi (1240m HGL)	1	ea.	\$165,000	\$165,000
	Physically Separate Pressure Zones near 10733 104 Avenue	-	Remove WM	1	ea.	\$30,000	\$30,000
Pressure	<i>Subtotal</i>						<i>\$2,264,000</i>
	Engineering (15%)						\$340,000
	Contingency (15%)						\$340,000
	Total						\$2,944,000

Table A-2
Hamlet of Grande Cache Water Master Plan
Cost Breakdown - Ultimate System Upgrades

Proposed Upgrade		Existing Condition	Proposed Condition	Quantity	Unit	Unit Cost	Amount
WM Upsizing	From Old WTP to intersection of Hoppe Ave and HWY 40 (J-160 to J-88)	200mm	350mm	315	l.m.	\$3,987	\$1,256,000
	Infront of Highschool, from 10614 Shand Ave to intersection of Shand Ave and 107 St (J-146 to J-46)	150mm	200mm	200	l.m.	\$3,689	\$738,000
Pressure Zone #5	Install PRV Station #12	-	1259.8m HGL	1	ea.	\$165,000	\$165,000
	Install PRV Station #13	-	1259.8m HGL	1	ea.	\$165,000	\$165,000
Pressure Zone #8	Install PRV Station #14	-	1229m HGL	1	ea.	\$165,000	\$165,000
	Install PRV Station #15	-	1229m HGL	1	ea.	\$165,000	\$165,000
Pressure Zone 2	Install PRV Station #16	-	1229m HGL	1	ea.	\$165,000	\$165,000
	Install PRV Station #17	-	1300m HGL	1	ea.	\$165,000	\$165,000
Pressure	<i>Subtotal</i>						<i>\$2,984,000</i>
	Engineering (15%)						\$448,000
	Contingency (15%)						\$448,000
	Total						\$3,880,000

Table A-3
Hamlet of Grande Cache Water Master Plan
Cost Breakdown - Watermain Upsize Unit Costs (\$/l.m.)

Developed Land		
Item	200mm	350mm
Asphalt Pavement Removal and Replacement	\$60	\$60
Granular Base Removal and Replacement	\$70	\$70
Curb, Gutter, and Sidewalk Removal and Replacement	\$500	\$500
Trenching and Backfilling	\$600	\$650
Pipe Zone Material	\$40	\$40
Supply and Install Watermain	\$500	\$600
Existing Pavement Repair	\$175	\$200
Fire Hydrant (1 every 90m)	\$190	\$190
Gate Valve (1 every 100m)	\$50	\$95
Fittings (tee, bend, reducer, plugs)	\$100	\$115
Reconnect Services	\$280	\$280
Manhole/Valve/Catchbasin Adjustments	\$15	\$15
Miscellaneous (Mob/demob, Survey, Singage) - 10%	\$258	\$282
Subtotal	\$2,838	\$3,097
Contingency (15%)	\$426	\$464
Engineering (15%)	\$426	\$426
Total	\$3,689	\$3,987



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GLOBAL PERSPECTIVE.
LOCAL FOCUS.

REPORT

Municipal District of Greenview

Hamlet of Grande Cache Wastewater Collection System Master Plan



JULY 2023



Platinum
member

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1 INTRODUCTION

In 2018, the Municipal District of Greenview No. 16 (MD) commenced administration of the Hamlet of Grande Cache (the Hamlet). In 2022, the MD retained Associated Engineering (Associated) to complete an update to the Utility Master Plan (UMP) for the water distribution system, wastewater collection system, stormwater drainage system, roadway transportation systems and select buildings within the Hamlet. This report focuses on the completion of the wastewater collection system UMP update.

The existing wastewater system model was developed in 2007 using the XPSWMM software and it included the main trunks within the Hamlet. A new model using PCSWMM was developed as part of this study to incorporate all gravity pipes within the Hamlet. PCSWMM is a fully dynamic computer model designed for simulating flows and water levels within wastewater systems. It can simulate real storm events, design flows, reverse flows, and surcharging/backwater conditions. This model was developed based on the 2022 Closed-Circuit Television (CCTV) Monitoring Program. This model was used for the following:

- Assess the Hamlet's existing wastewater system level of service (LOS).
- Identify and address any capacity issues within the Hamlet's wastewater system.
- Propose wastewater system upgrades to convey sanitary flows due to future growth and development of the Hamlet.

1.1 Objective and Scope

The purpose of this project was to develop a wastewater system master plan for existing and future development within the Hamlet. The information from the assessment and master plan will be incorporated within a multi-year Capital Infrastructure Rehabilitation Program, which will guide the MD to maximize capital expenditures for their infrastructure.

In general, the scope of work involved the following tasks:

- Review of background information.
- Establishment of design criteria.
- Completion of a flow monitoring program.
- Evaluation of the existing wastewater system.
- Recommendation of upgrades to the existing system.
- Development of future system servicing concepts.
- Preparation of a comprehensive report.

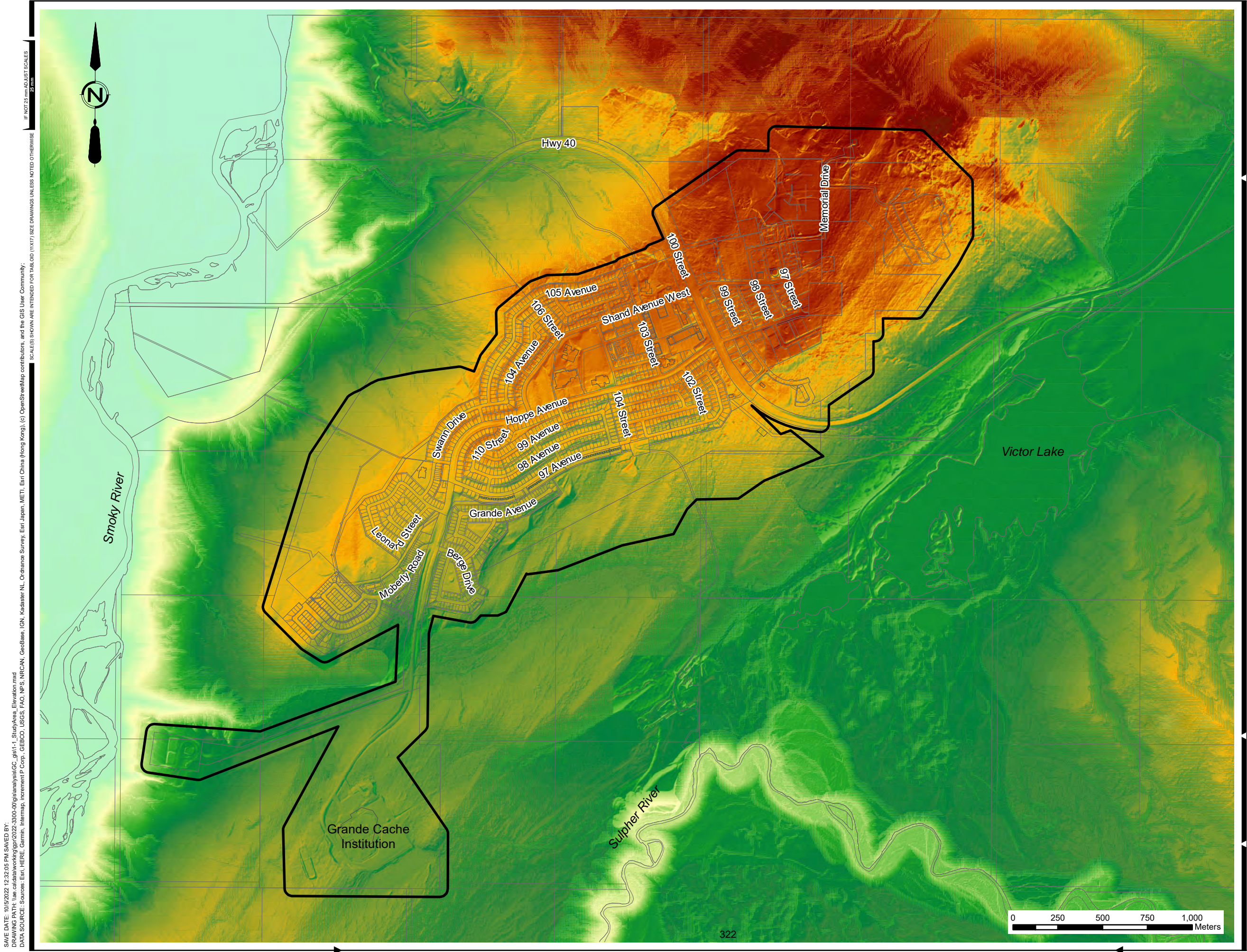
1.2 Study Area

The Hamlet of Grande Cache is located within western Alberta, at the foothills of the Rocky Mountains. The Hamlet is approximately 120 km northwest of Hinton. The core area of the Hamlet is located along Highway 40 (Hwy 40), within a plateau bordered by the Smoky River to the west, the Sulphur River to the south, and Victor Lake to the east.


Figure 1-1 shows the boundary of the study area and ground elevations from the Light Detection and Ranging (LiDAR) of the region. The topography within the study area generally drains from northeast to southwest with the lowest elevations near the Wastewater Treatment Plant (WWTP).

The 2016 Land Use Plan was used for the existing developed areas to establish infiltration potential into the wastewater system. The Hamlet includes residential areas of various densities including single-family homes, condominiums, and apartment complexes. Concentrated commercial/industrial developments are located east of 100 street and main institutional areas located north of Shand Avenue, west of 100 Street and north of Hoppe Avenue, west of 104 street.


The Hamlet has an urban wastewater collection system. The wastewater system includes gravity sewers ranging in size from 100 mm to 600 mm in diameter and manholes of various depths. The existing system is described in detail in [Section 3](#).



Legend:

 Study Area

Elevation

 1988 m
1456 m
924 m

Hillshade from altalis LiDAR 7.5 DEM
and Airborne Imaging



FIGURE 1-1
GRANDE CACHE WASTEWATER MASTER PLAN
STUDY AREA AND LIDAR ELEVATION

AE PROJECT No.	2022-3300-00
SCALE	1:20,000
APPROVED DATE	2022OCT05
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1.3 Background Information Collection and Review

Background information provided by the MD, those obtained by Associated from previous project records, and other sources were reviewed. This information is listed below.

- Utility Baseplan and Orthophotos (MD, 2022)
- Grande Cache Wastewater System CCTV Reports (Associated, 2022)
- Water Usage Records (MD, 2019-2021)
- Large Demand Water User Records (MD, 2021)
- LiDAR 7.5 Ground Elevation (Altalis, 2021)
- Development Guidelines and Municipal Servicing Standards (MD, 2020)
- Grande Cache Raw Waterline Upgrade Design Basis Memo (Associated, 2019)
- Overview of Waterworks and Wastewater Systems – Draft (Associated 2019)
- Town of Grande Cache Land Use Bylaw No. 799 (Grande Cache, 2016)
- Town of Grande Cache Riverview Area Structure Plan (Environmental Design Solutions, 2013)
- Grande Cache Wastewater Collection System Master Plan, Draft (ISL, 2007)
- LiDAR 1 m Ground Elevation (MD, 2005)
- Grande Cache As-built Water and Sanitary Sewer (Associated Engineering Services Ltd., 1969)

1.4 Acknowledgements

Associated Engineering gratefully recognizes the contribution from the Municipal District of Greenview and the Hamlet of Grande Cache in the development on this Master Plan. Special thanks to Doug Brown, Amanda Cummings, Tanner Curtis, and Chelsea Henry who collaborated on this project.

2 DESIGN CRITERIA

2.1 General

The population and land use of a community are principal components of wastewater generation. The following section defines the design criteria required for this assessment.

2.1.1 General Population

The population is a major factor for a community's wastewater system assessment. The population will provide an estimate of the wastewater generated from residential and non-residential land uses. Historical population for the Hamlet of Grande Cache were obtained from three levels of government (federal, provincial, and municipal). Federal, provincial, and municipal data were obtained from the Federal Census Program, Alberta Regional Dashboard, and the MD Census Program, respectively. These historical data are compared in **Table 2-1**.

Table 2-1 Historical Population Statistics

Year	Statistics Canada		Alberta Regional Dashboard		MD Greenview	
	Population	Annual Growth	Population	Annual Growth	Population	Annual Growth
2021	3,276	-1.71%	3,670	-0.27%	3,037	-5.78%
2020			3,680	0.85%		
2019			3,649	7.54%	3,421	-
2018			3,393	-1.28%		
2017			3,437	-5.58%		
2016	3,571	-3.73%	3,640	-8.66%		
2015			3,985	-7.33%		
2014			4,300	-5.20%		
2013			4,536	1.98%		
2012			4,448	-0.80%		
2011	4,319	-	4,484	-		

Generally, the population is similar between census conducted by the various levels of the government. Note, the population data from Statistics Canada and the Alberta Regional Dashboard includes the population from the Grande Cache Institution (the Institution) that have resided there for more than six months. This discrepancy contributes to the difference between the MD's population data and data from the provincial and federal governments.

Through conversations with the MD, Associated has adopted the population estimates from the MD of Greenview for this study (3,037 residents in the Hamlet).

The population at Grande Cache follows the boom and bust cycles of the local economy and has been relatively stable with population varying between 3,000 to 3,700 residents in recent years. Considering data provided by the MD, it appears that the population within the Hamlet has declined by approximately 5.8%, annually, since 2019. However, this study has assumed a moderate **growth rate of 1%** to accommodate future development and planning.

Table 2-2 presents the projected population for the Hamlet for the next 20 years (2022 - 2042). Since the latest record for the population data was in 2021, it was assumed the growth rate for 2022 was **3,067 residents** based on a 1% growth rate.

Table 2-2 20 Years Population Projection

Timeline	Population (1% Annual Growth)
Current: 2022	3,067
5 Years: 2027	3,224
10 Years: 2032	3,388
15 Years: 2037	3,561
20 Years: 2042	3,743

2.1.2 Other Population

Based on information from the Correctional Services Canada (last modified in 2017), the Grande Cache Institution has a rate capacity of 243 inmates. Limited information is available for the sewage generation at the Institution. Therefore, the observed 2021 water usage (Water Distribution System Master Plan, Associated Engineering 2022) was used to analyze wastewater generation from the Institution.

2.1.3 Population Density

Population densities are used to estimate the population, or equivalent population, for different land use areas. These values are used in conjunction with the per capita daily consumption to estimate the demands on the water system and the wastewater system. A representative sample was taken to establish the current residential density within Grande Cache. Based on this sample there are approximately 9.1 lots/ha. Based on the 2016 Statistics Canada Census data, there are approximately 2.6 ppl/lot, resulting in approximately 24 ppl/ha. However, using a value of 3.5 ppl/lot based on the Municipal Servicing Standards (MD, 2022), the density would be approximately 32 ppl/ha. This study assumed that the current density is 30 ppl/ha (approximated average).

The future single-family residential density was estimated for this study as 40 ppl/ha based on the assumption that the future single-family developments will achieve higher density due to the current residential densification trends. The density for medium- and high-density residential developments were assumed to be 2.5 and 5 times higher, 75 ppl/ha and 150 ppl/ha, respectively, than the low-density development density of 30 ppl/ha. Density for non-residential developments were also estimated based on other towns of similar size and within proximity to Grande Cache, specifically Beaverlodge and Valleyview.

Table 2-3 summarizes the proposed population densities.

Table 2-3 Proposed Population Density

Development Area	Population Density	
	Existing	Future
Single-Family Residential/Low-Density Residential	30 ppl/ha	40 ppl/ha
Multi-Family Residential/Medium-Density Residential	75 ppl/ha	75 ppl/ha
Walk-Up Apartments/High-Density Residential	150 ppl/ha	150 ppl ha
Institutional (equivalent population, ep)	30 ep/ha	30 ep/ha
Commercial/Industrial (equivalent population, ep)	25 ep/ha	25 ep/ha

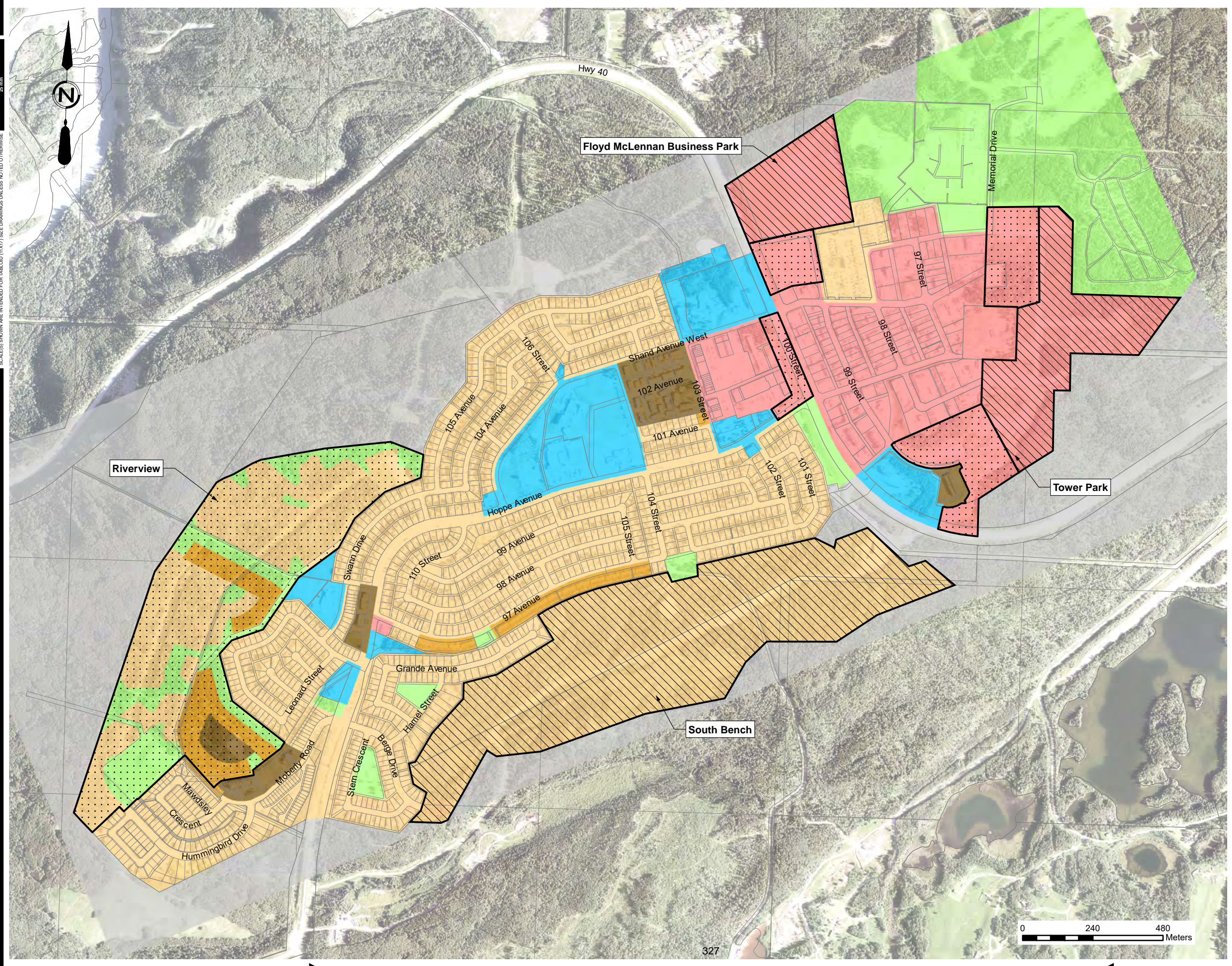
2.1.4 Land Use

The Land Use Map for the Hamlet of Grande Cache (**Figure 2-1**), was used for existing and future land use designations within the Hamlet. Existing land use information was obtained from the Hamlet's Land Use Bylaw (2016). Future land use information was obtained from the approved Area Structure Plans (ASPs) and through conversations with MD Planning and Development Department.

The current land use within the Hamlet generally consists of residential developments west of Hwy 40 and commercial/industrial developments east of Hwy 40. Land surrounding the Hamlet is currently designated as urban reserve.

SAVE DATE: 9/15/2022 12:29:38 PM SAVED BY:
DRAWING PATH: \\ae.ca\data\working\p\2022-3300-00\gis\analysis\GC_gis1-2_Land_Use.mxd
DATA SOURCE: .

IF NOT 25 mm ADJUST SCALES
SCALE(S) SHOWN ARE INTENDED FOR TABL/CID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



- Legend:**
- Land Use**
- Commercial / Industrial
 - Institutional
 - Residential - High Density
 - Residential - Medium Density
 - Residential - Low Density
 - Parks / Open Space
 - Urban Reserve
 - Existing Land Use
- Future Land Use**
- Interim Phase
 - Ultimate Phase



FIGURE 1-2
GRANDE CACHE WASTEWATER MASER PLAN

LAND USE

AE PROJECT No.	2022-3300-00
SCALE	1:12,500
APPROVED DATE	2022OCT05
REV	
DESCRIPTION	ISSUED FOR DRAFT

2.1.5 Future Staged Growth Areas

Figure 2-1 also presents the proposed future staged growth areas as determined through consultation with the MD. **Table 2-4** presents the population associated with each future development stage, based on future residential densities noted in **Table 2-3**.

The Riverview area northwest of existing developments has an ASP with future land use plans. The Riverview ASP focuses on the western edge of the Hamlet and proposed to develop the land with mainly low-density residential dwellings. The South Bench area located south of the existing development, was also identified for potential future residential growth. However, there are no development plans for the South Bench area.

Future commercial areas that may be developed include highway commercial areas south of Hwy 40, between Shand Avenue and Hoppe Avenue, the Floyd McLennan Business Park, and the Tower Park area.

Through discussion with the MD's Planning and Development Department, the future growth areas were categorized into two development stages, based on potential development timeframe. This is shown on **Figure 2-1**. It should be noted the development stages are conceptual and developed for the purpose of the UMP. Actual developments may occur at different areas and timeframe, based on various factors.

Table 2-4 Staged Population Growth

Future Stage	Additional Population	Total Population
Interim	2,176	5,243
Ultimate	2,563	7,806

It should be noted the estimated population at the interim and ultimate development stage are estimates used for the purpose of this study. These estimates were based on the future densities (**Figure 2-1**).

2.2 Wastewater Collection System

The MD's Servicing Standards (2020) for wastewater sewer were adopted and discussed in the following sections.

2.2.1 Dry Weather Flow

Residential Dry Weather Flow

Residential wastewater was estimated based on the Hamlet's population using the following formula:

$$Q_{PDW} = \frac{G * P * PF}{86,400}$$

Where:

Q_{PDW} = peak dry weather flow rate (L/s)

G = per capita daily sewage generation rate (L/c/d)

P = contributing population

PF = residential peaking factor calculated using Harmon's Formula

The residential peak dry weather flow was estimated by applying a peaking factor to the average daily flow. The peaking factor accounts for sewage generation of residents throughout the day (such as in the morning prior to leaving the house and in the afternoon after work). The peaking factor will be the larger of 2.5 or Harmon's Peaking Factor:

$$PF = 1 + \frac{14}{4 + P_p^{0.5}}$$

Where:

P_p = contributing population in 1,000s

PF = residential peaking factor

The MD's Servicing Standards (2020) note the minimum wastewater generation rate of 350 L/c/d. However, the domestic sewage generation rate of **300 L/c/d** was adopted based on the historical water consumption of the Hamlet over the past 3 years.

Non-Residential Dry Weather Flow

The wastewater generation rate for all non-residential developments was assumed to be **20,000 L/ha/day** based on the MD's Servicing Standards (2020).

Grande Cache Institution and Municipal Campground

All the water consumption from the Grande Cache Institution was assumed to discharge approximately 58,600 m³ into the wastewater system, annually. This is equivalent to a DWF of 1.86 L/s.

The Grande Cache Municipal Campground, located within the northwest portion of the Hamlet, currently uses a septic field for their sewage management. The existing campground has 77 full- and- partial-service campsites. Based on the Alberta Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems (2013), the expected sewage flow generated from campgrounds is 80 L/d/campsite. This sewage generation rate was applied for the campground.

2.2.2 Wet Weather Flow

The wet weather flow includes the dry weather flow from groundwater infiltration (through joints, leaky pipes) and stormwater inflow (from manhole vents within sag locations). An inflow of 0.4 L/s for each manhole within a road sag and infiltration allowance of 0.28 L/s/ha was recommended based on the MD's Guidelines and Servicing Standards (2020).

It was assumed that weeping tiles were connected to the wastewater collection system for houses built prior to 1988.

The Development Guidelines & Municipal Servicing Standards (2020) also state that rainfall should be based on data for the specific area where available. There was no rainfall data available specifically for the Hamlet of Grande Cache. Therefore, the intensity-duration-frequency (IDF) of rainfall data from the City of Grande Prairie 2022 Design Manual was adopted due to its proximity to Grande Cache.

2.2.3 Other Considerations

Based on the MD's Guidelines and Servicing Standards (2020), the following standards for the gravity wastewater system within the Hamlet was applied:

- Minimum pipe diameter of 200 mm in residential areas and 250 mm in non-residential areas.
- Flow velocity within the pipe should be between 0.75 m/s to 3.00 m/s.
- Manning's roughness value of 0.013, based on PVC and concrete pipe material, was used for all gravity wastewater pipes
- Pipe design peak flow rate should be 86% of the pipe full flow capacity. However, existing pipes with less capacity are accepted.
- Pipe to be designed to carry the design peak flow at a flow depth equal or less than 80% of the pipe diameter.
- Pipe should be PVC material for 600 mm diameter or less and concrete material for bigger than 900 mm diameter.
- All manholes should have a minimum diameter of 1200 mm.
- Pipe slope of the first upstream section should be a minimum of 1.0%. Minimum slopes in other sections shall follow [Table 2-5](#). However, existing slopes less than below are accepted.

Table 2-5 Minimum Pipe Slope

Pipe Diameter (mm)	Minimum Design Slope (%)
200	0.40%
250	0.28%
300	0.22%
375	0.15%
450	0.12%
525	0.10%
600 or Greater	0.08%

3 EXISTING WASTEWATER COLLECTION SYSTEM

3.1 Existing Facilities

The existing wastewater collection system within the Hamlet includes approximately 35 km of pipes and over 400 manholes. The system conveys wastewater via gravity and generally flows from northeast to southwest, towards the WWTP. The existing system includes four main trunks listed in **Table 3-1**.

Table 3-1 Existing Wastewater Trunks

Trunk Name	Length (km)	Diameter (mm)	Start Location	End Location
Northern Trunk	2.0	250 to 375	Griffith Trail, north of 105 Avenue	Hoppe Avenue, south of Stern Crescent
Central Trunk	2.3	200 to 375	Intersection of 97 Avenue and 102 Street	South of intersection of Stephenson Drive and 131 Moberly Road
Southern Trunk	2.8	375 to 450	Sewer Line Road (south of Water Treatment Plant)	Intersection of Hoppe Avenue and Sewer Line Road
Collection Trunk	1.3	375 to 600	Intersection of Hoppe Avenue and Sewer Line Road	WWTP

There are also several overflow weirs within the system, which convey surcharge flows to two downstream pipe segments during high flow conditions. **Figure 3-1** shows the existing wastewater system.

There are no lift stations or low pressure sewer systems within the wastewater collection system.

3.2 Model Development

The existing wastewater model was developed using PCSWMM and the MD's Geographical Information System (GIS) database. This database includes:

- Location of pipes;
- Location of manholes;
- Manhole rim elevations;
- Manhole invert elevations;
- Pipe diameters; and
- Pipe materials.

Available record drawings were also reviewed to fill in data gaps. Additional information gathered from the Wastewater System Flushing and CCTV Program were also reviewed and incorporated into the model.

Missing data information that could not be filled by record drawings or the CCTV program was interpolated based on available data. Due to the missing rim elevations, all manhole rim elevations were extracted from the LiDAR surface to stay consistent. It is recommended that the Hamlet confirm and validate their GIS data for more accurate model inputs and future use.

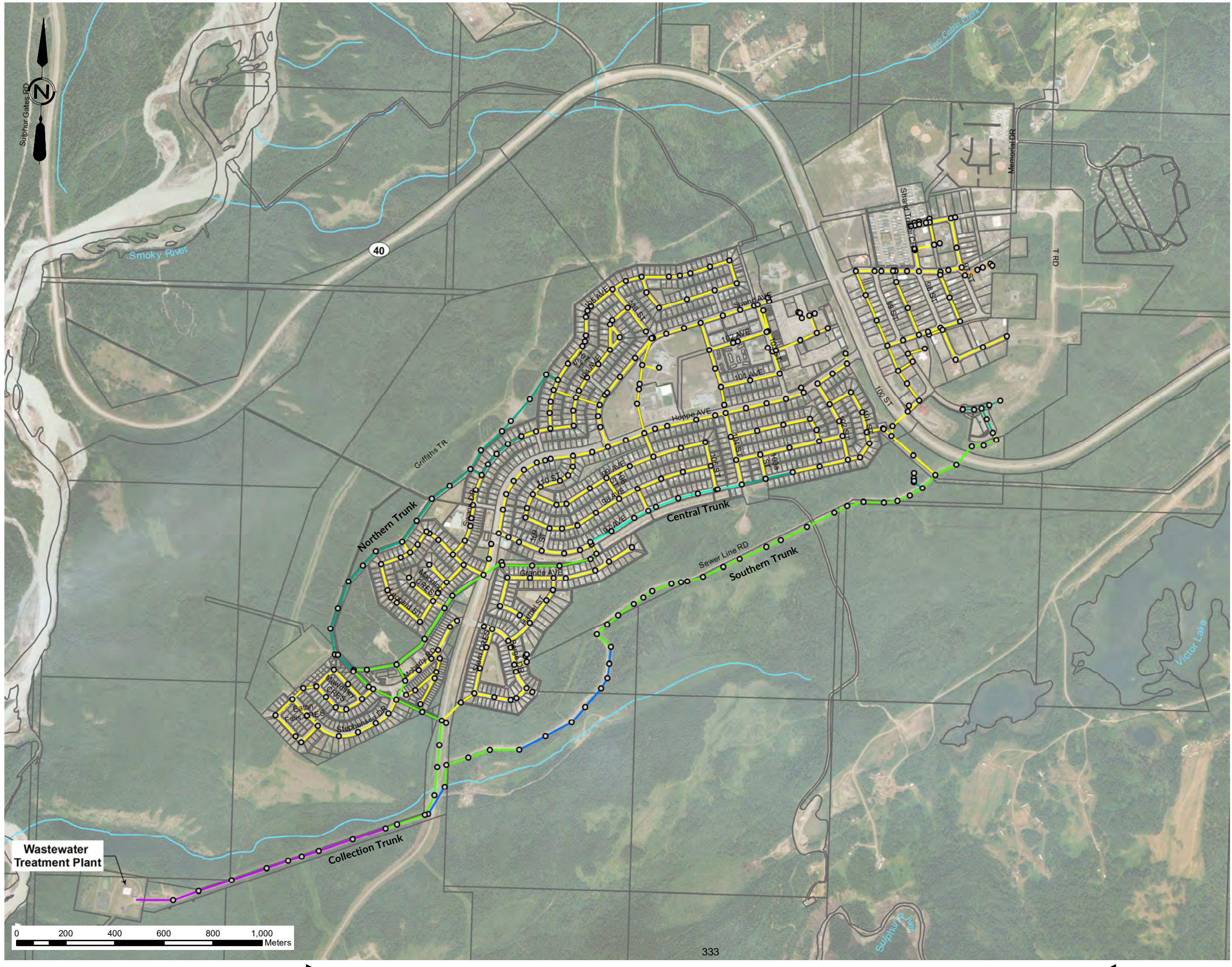
The model was developed using PCSWMM, a one-dimensional (1D) fully dynamic computer software designed for simulating flows and levels within the storm and wastewater collection systems. This software can simulate real storm events, design flows, reverse flows, forcemains, pump stations, and surcharging/backwater conditions.

Land use and population density for the development areas were applied based on the design criteria outlined in [Section 2](#). DWF contributing areas were aggregated and assigned to manholes based on the MD's GIS data provided. The WWF contributing areas for I/I include DWF catchments, parks/open spaces and roads. The closest manhole was assigned to contributing areas with missing data.

Inflow and infiltration from the Grande Cache Institution was excluded from the model due to the lack of information.

SAVE DATE: 3/1/2023 3:02:31 PM SAVED BY:
DRAWING PATH: C:\2022-3300_GrandeCache\WaterMasterPlan\SanitaryMasterPlan\Figs-1_ExistingSanitarySewerCollectionSystem.mxd
DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm AS SHOWN, ADJUST SCALES
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- Sanitary Manhole
- Watercourse

Wastewater Pipe Diameter (mm)

- 150
- 200
- 250
- 300
- 375
- 450
- 600



FIGURE 3-1

GRANDE CACHE WASTEWATER MASTER PLAN

EXISTING WASTEWATER COLLECTION SYSTEM

AE PROJECT No.	2022-3300
SCALE	1:15,000
APPROVED DATE	2023MAR01
REV DESCRIPTION	ISSUED FOR DRAFT

4 FLOW MONITORING PROGRAM

As part of this project’s scope, a Flow Monitoring Program was required. Associated partnered with SFE Global Inc. (SFE) to conduct flow monitoring within the Hamlet between April and October 2022. The objective of the monitoring program was to collect reliable flow data within the wastewater collection system for model calibration and validation of flow. The 2022 flow monitoring program consisted of three monitoring sites in strategically selected locations within the system, and one tipping-bucket style rain gauge. SFE installed and operated the equipment. In addition, they collected the flow monitoring data and maintained an online database. Associated provided the following services pertinent to the Flow Monitoring Program:

- Project Management.
- Flow and rainfall data processing.
- Quality Control and Assurance.
- Finalized flow and rainfall database.

4.1 Flow Monitor and Rain Gauge Locations

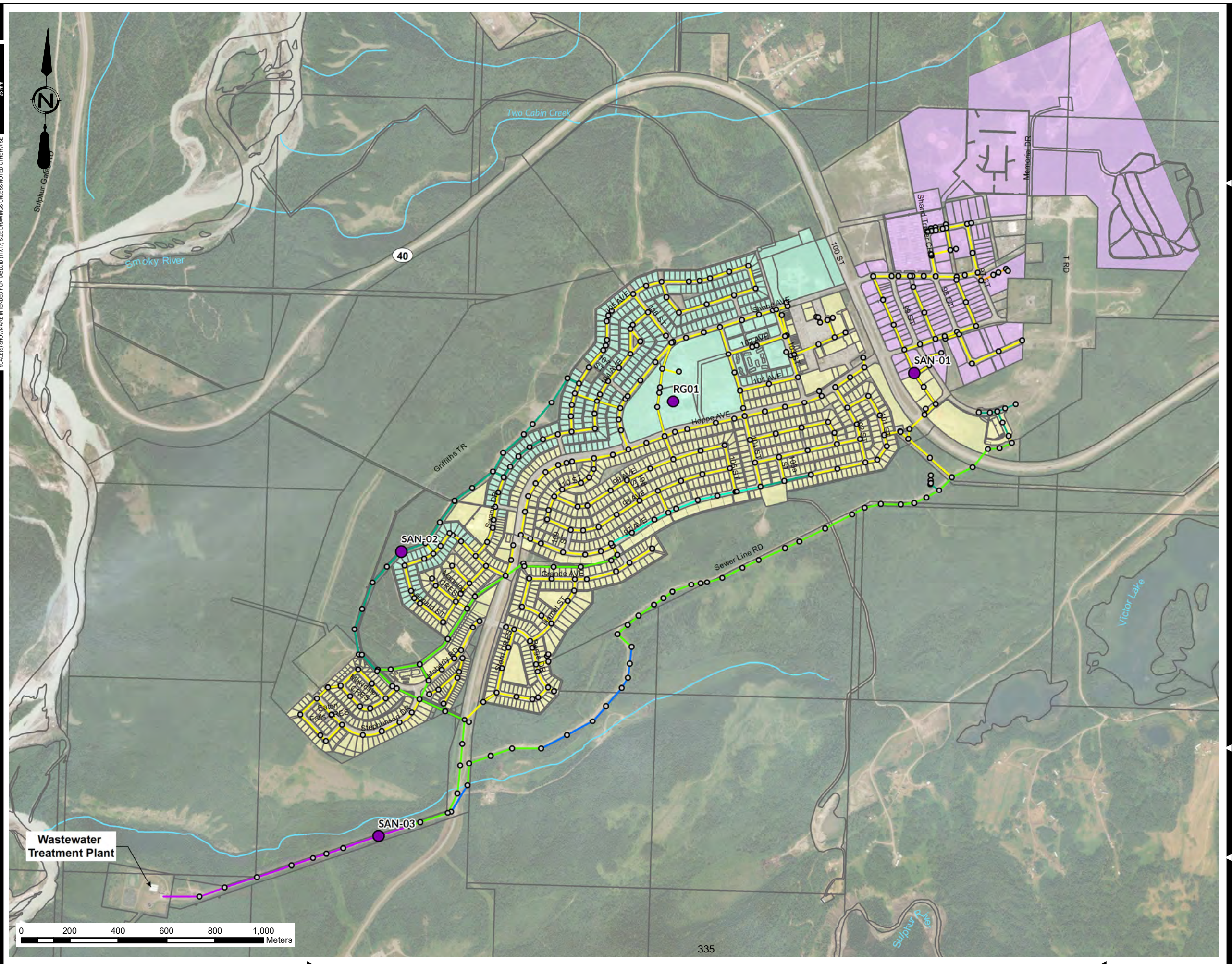
Figure 4-1 shows the location of the flow monitors and rain gauges that were installed and operated in 2022. **Table 4-1** provides an overview of each site, its instrumentation and operation. Associated chose flow monitor locations based on system characteristics (such as pipe size and slope) and catchment characteristics (such as land use and area). The flow monitors were installed in mid April and removed in mid October 2022.

4.2 Flow Monitor and Rain Gauge Catchment Areas

Figure 4-1 illustrates the estimated catchment areas for each monitor. The catchment areas were estimated because there are several overflow weirs and split flows, which may divert flow during high flow conditions. Flow Monitor SAN-01 was located west of the Visitor Centre, at the intersection of 98 Avenue and the alley between 100 Street and 99 Street. This monitor captures flows from the majority of the non-residential developments east of Hwy 40. Flow Monitor SAN-02 was located within the Northern Trunk, north of Leonard Street. This monitor captures flow from mainly residential developments at the northern part of the Hamlet. Monitor SAN-03 was located within the Collection Trunk at Sewer Line Road. The monitor capture flows from the entire Hamlet.

Table 4-1 provides a summary of the estimated catchment area and land use for each flow monitoring site.

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DRAWING PATH: C:\2022-3300_GrandeCache\WaterMasterPlan\SanitaryMasterPlan\Fig4-1_2022MonitoringProgramLocation.mxd
DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE
IF NOT 25 mm AS SHOWN SCALES



Legend:

- Sanitary Manhole
- Monitor Locations
- Watercourse

Wastewater Pipe Diameter (mm)

- 150
- 200
- 250
- 300
- 375
- 450
- 600

Estimated Flow Monitor Catchment

- Monitor 1 & 3
- Monitor 2 & 3
- Monitor 3



FIGURE 4-1
GRANDE CACHE WASTEWATER MASTER PLAN
2022 MONITORING PROGRAM LOCATIONS

AE PROJECT No.	2022-3300
SCALE	1:15,000
APPROVED DATE	2023MAR01
REV DESCRIPTION	ISSUED FOR DRAFT

Site	Pipe Size (mm)	Pipe Name (Asset_ID)	Location	Install Date	Removal Date	Total Catchment Area (ha)	Land Use Area (ha)						
							Residential Low Density	Residential Medium Density	Residential High Density	Commercial/Industrial	Institutional	Parks/Open Space	Road Area
SAN-01	200	MiC_00343 (SSMAIN-00397)	North of 98 Avenue, alley between 100 Street and 99 Street	April 18, 2022	October 19, 2022	99.0	5.5	0	0	24.2	0	66.5	2.8
SAN-02	250	MiC_00173 (SSMAIN-00222)	North of 11338 Leonard Street	April 18, 2022	October 19, 2022	52.8	26.6	0	3.2	0	17.11	0	5.9
SAN-03	600	MiC_00125 (SSMAIN-00163)	Sewer Line Road, approximately 350 m west of Hoppe Ave	April 18, 2022	October 19, 2022	264.7	102.0	3.0	6.8	29.0	28.6	71.1	24.2
RG01			Recreation Centre Roof	April 7, 2022	October 20, 2022								

4.3 Instrumentation

4.3.1 Flow Monitor

Area-Velocity meters were installed at each flow monitor site. This type of monitor uses a pressure sensor to measure depth and an ultrasonic velocity sensor to measure velocity under both full and partially-full gravity pipe conditions. In addition, two sensors were installed at each site to provide backup and quality control data where variable flows or sediment accumulation has the potential to occur.

All sites were inspected and cleaned during monthly maintenance visits and manual depth and velocity measurements were taken to verify meter operations and accuracy. Any required repairs or maintenance were made at these times. All monitor data was compiled automatically and posted to an online database. Associated reviewed this data on a monthly basis for quality control and provided SFE with maintenance requests.

4.3.2 Rain Gauge

One tipping-bucket rain gauge was installed to measure rainfall rates, which varies substantially over time and space during storm events. The rain gauge, RG01, was installed on the roof of the Grande Cache Recreation Centre, as shown on **Figure 4-1**.

A tipping-bucket rain gauge records rainfall in 0.25 mm increments over 5-minute time periods. The operation and accuracy of the rain gauge was verified with a measured volume of water during installation and upon removal.

4.4 Data Review and Analysis

4.4.1 Flow Data Processing

Equipping monitoring sites with two flow monitors provides backup in the event of a flow monitor malfunction as well as an independent check to ensure accuracy of the monitors. In addition, manual depth and velocity measurements were made during each site maintenance visit to verify accuracy of the flow monitors. This approach generates large datasets, which need to be processed to generate the flows required for this study.

During the data processing stage, flow data was analyzed under a rigorous quality control process to compile the final data base. Associated used a custom-designed spreadsheet tool to complete the data processing and to produce quality and consistent data.

The flow data processing stage involved the following:

- Confirming pipe sizes and monitor site locations.
- Screening to identify device malfunctions and velocity drop-outs during low-flow periods.
- Comparing scatterplots of depth and velocity readings to check for consistency, stability, and to substitute for velocity drop-outs.
- Discarding and correcting suspect or unreliable data or adjusting depth or velocity readings where indicated.
- Comparing depth and velocity measurements to calculate the final flow readings.
- Reviewing the final flow data to ensure consistency.

In general, the flow data obtained from the flow monitoring program was found to be of good quality. However, throughout the course of the monitoring period, connectivity issues were experienced making real-time data review difficult.

To illustrate the data review process, **Figure 4-2** displays the raw level readings taken by the two sensors at Flow Monitor 3. **Figure 4-3** displays the raw velocity readings taken at the same site. The velocity data shows that both sensors had velocity data drop-outs throughout the monitoring season.

The primary issue affecting data accuracy within a wastewater system is deposition of solids during low-flow periods. This affects the velocity sensors and causes data drop-outs when the sensors become buried. This is apparent in **Figure 4-3** during most nighttime periods. Occasionally, one or more of the depth sensors is affected by ragging or calibration shifts. This demonstrates the value of the redundant flow monitoring strategy.

Figure 4-4 displays the final calculated flows for Flow Monitor 3 after the data processing and quality control. All sites were processed and reviewed in a similar manner.

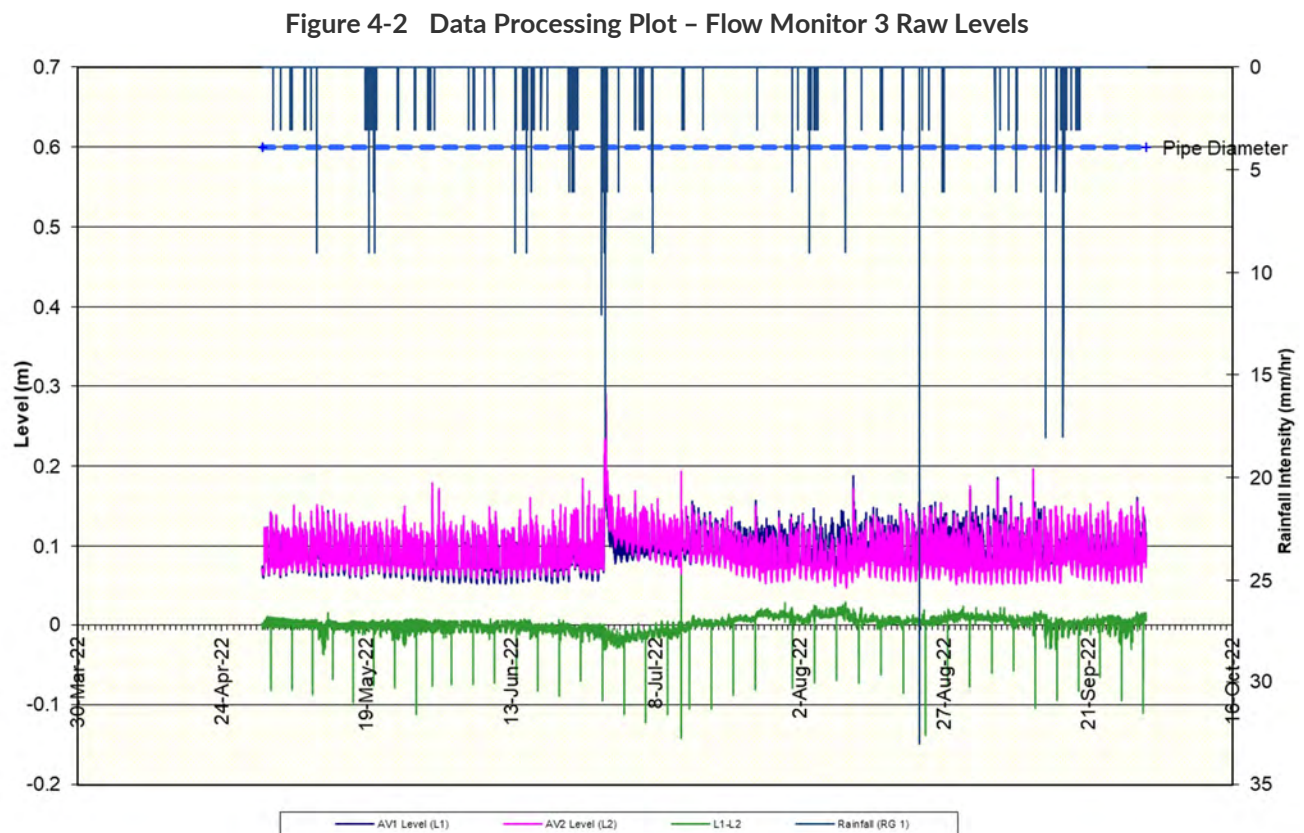


Figure 4-3 Data Processing Plot – Flow Monitor 3 Raw Velocities

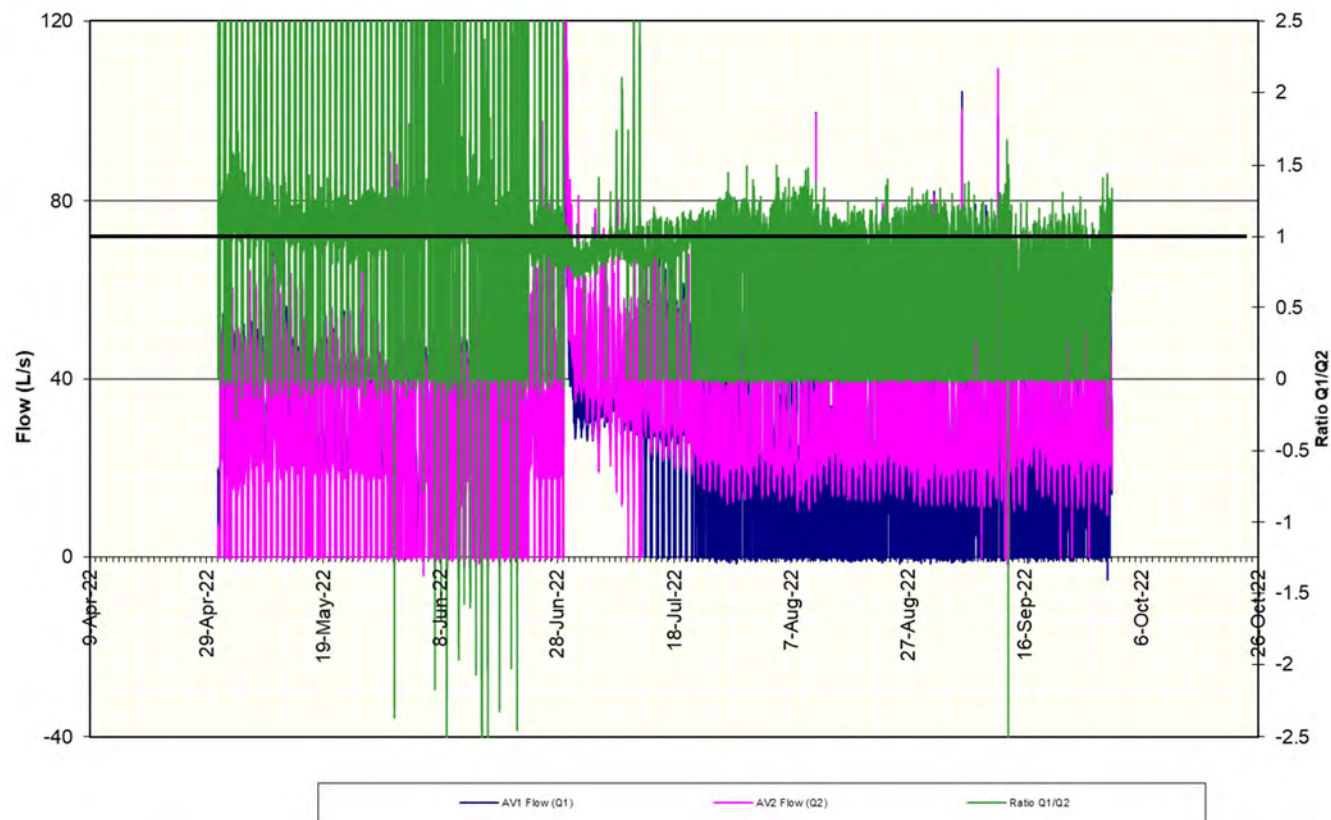
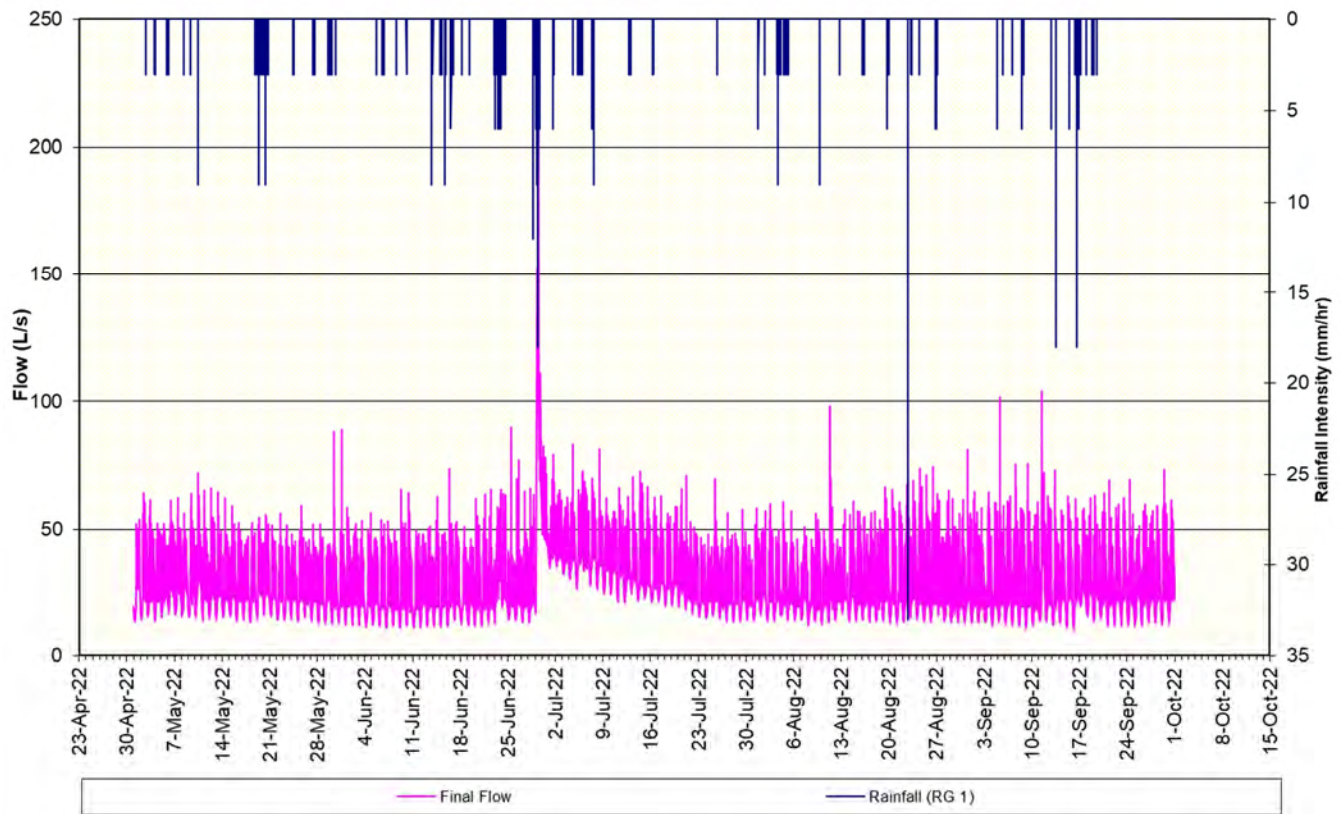


Figure 4-4 Data Processing Plot – Flow Monitor 3 Final Processed Flow



4.4.2 Rain Gauge Data

The collection of rainfall data is important for correlation with flow response within the wastewater sewer system.

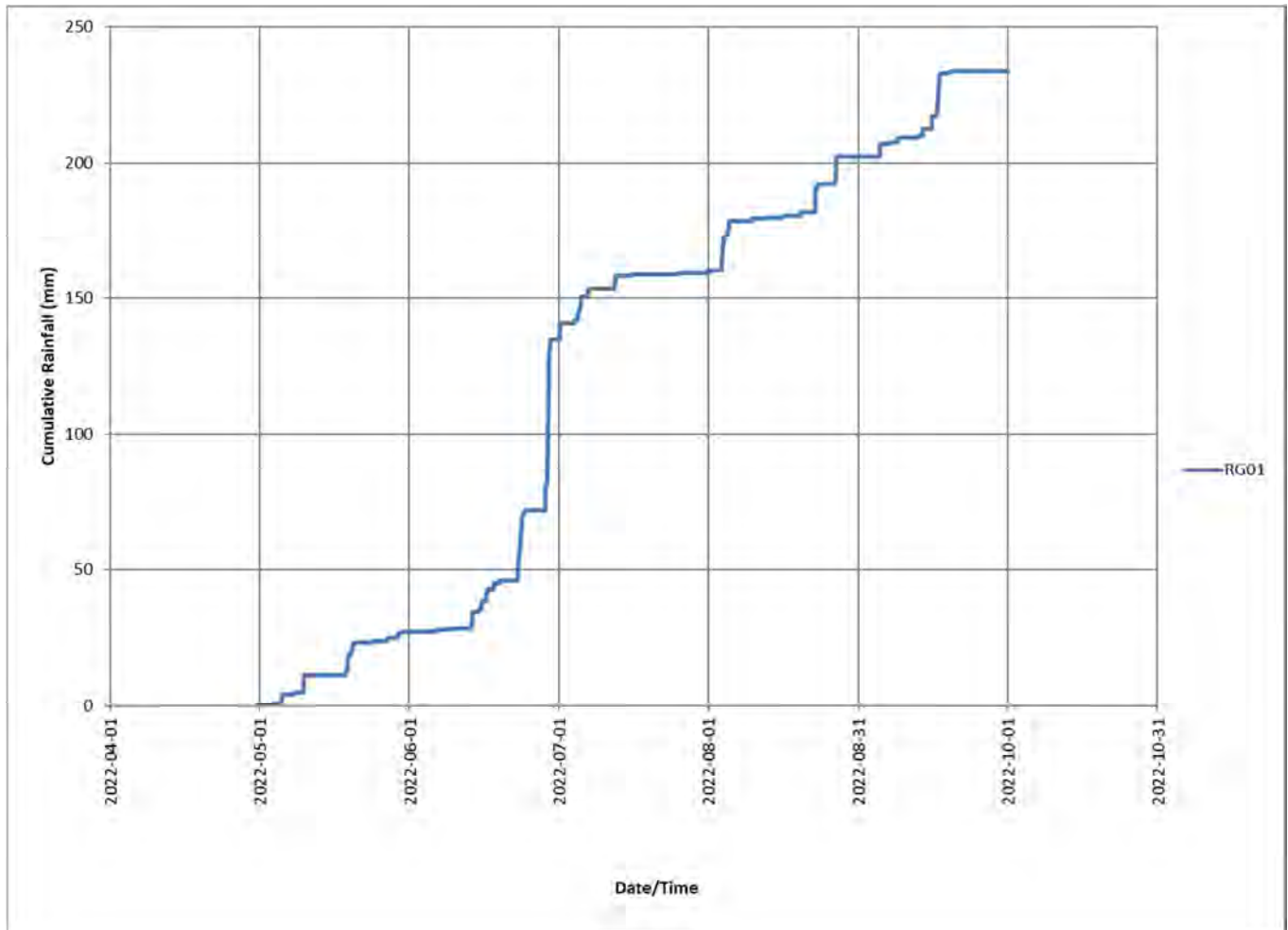
Table 4-2 provides a summary of the daily rainfall depths observed at the rain gauge installed in 2022. Days that have significant rainfall (more than 10 mm) are highlighted in yellow. The cumulative rainfall is plotted in **Figure 4-5**.

As shown in **Table 4-2**, three storm events had more than 10 mm of rainfall at the rain gauge. The largest event occurred on June 29. No data adjustments were required for the rainfall data.

Table 4-2 Grande Cache Monitoring Program – Rain Gauge Summary

	Daily Total Rainfall (mm)		Daily Total Rainfall (mm)		Daily Total Rainfall (mm)		Daily Total Rainfall (mm)		Daily Total Rainfall (mm)		Daily Total Rainfall (mm)
	RG01		RG01		RG01		RG01		RG01		RG01
01-May-22	0	31-May-22	0	01-Jul-22	6	31-Jul-22	0.75	31-Aug-22	0	01-Oct-22	0
02-May-22	0.25	01-Jun-22	0	02-Jul-22	0	01-Aug-22	0.25	01-Sep-22	0	02-Oct-22	0
03-May-22	0	02-Jun-22	0	03-Jul-22	0	02-Aug-22	0	02-Sep-22	0	03-Oct-22	0
04-May-22	0.75	03-Jun-22	0	04-Jul-22	1.25	03-Aug-22	9	03-Sep-22	0	04-Oct-22	0
05-May-22	2.25	04-Jun-22	0	05-Jul-22	8.5	04-Aug-22	6	04-Sep-22	4.5	05-Oct-22	0
06-May-22	1.25	05-Jun-22	0.25	06-Jul-22	0	05-Aug-22	3.5	05-Sep-22	0.25	06-Oct-22	0
07-May-22	0	06-Jun-22	0.5	07-Jul-22	3	06-Aug-22	0	06-Sep-22	0	07-Oct-22	0
08-May-22	0.5	07-Jun-22	0	08-Jul-22	0	07-Aug-22	0	07-Sep-22	0.5	08-Oct-22	0
09-May-22	0.25	08-Jun-22	0.25	09-Jul-22	0	08-Aug-22	0	08-Sep-22	1.75	09-Oct-22	0
10-May-22	6.25	09-Jun-22	0	10-Jul-22	0	09-Aug-22	1	09-Sep-22	0	10-Oct-22	0
11-May-22	0	10-Jun-22	0.25	11-Jul-22	0	10-Aug-22	0	10-Sep-22	0	11-Oct-22	0
12-May-22	0	11-Jun-22	0	12-Jul-22	2.5	11-Aug-22	0	11-Sep-22	0	12-Oct-22	0
13-May-22	0	12-Jun-22	0	13-Jul-22	2.25	12-Aug-22	0.25	12-Sep-22	0.75	13-Oct-22	0
14-May-22	0	13-Jun-22	6	14-Jul-22	0	13-Aug-22	0	13-Sep-22	2.5	14-Oct-22	0
15-May-22	0	14-Jun-22	0	15-Jul-22	0	14-Aug-22	0	14-Sep-22	0	15-Oct-22	0
16-May-22	0	15-Jun-22	4	16-Jul-22	0.5	15-Aug-22	0	15-Sep-22	4.25	16-Oct-22	0
17-May-22	0	16-Jun-22	3.75	17-Jul-22	0	16-Aug-22	0.75	16-Sep-22	12.25	17-Oct-22	0
18-May-22	0.75	17-Jun-22	0.5	18-Jul-22	0	17-Aug-22	0	17-Sep-22	3.5	18-Oct-22	0
19-May-22	7.25	18-Jun-22	2	19-Jul-22	0	18-Aug-22	0	18-Sep-22	0.5	19-Oct-22	0
20-May-22	4	19-Jun-22	1	20-Jul-22	0	19-Aug-22	1	19-Sep-22	0.5	20-Oct-22	0
21-May-22	0	20-Jun-22	0	21-Jul-22	0	20-Aug-22	0.25	20-Sep-22	0	21-Oct-22	0
22-May-22	0	21-Jun-22	0	22-Jul-22	0	21-Aug-22	0	21-Sep-22	0	22-Oct-22	0
23-May-22	0	22-Jun-22	0	23-Jul-22	0	22-Aug-22	9	22-Sep-22	0	23-Oct-22	0
24-May-22	0.5	23-Jun-22	23.5	24-Jul-22	0	23-Aug-22	1.25	23-Sep-22	0	24-Oct-22	0
25-May-22	0	24-Jun-22	2.25	25-Jul-22	0.5	24-Aug-22	0.25	24-Sep-22	0	25-Oct-22	0
26-May-22	0	25-Jun-22	0	26-Jul-22	0	25-Aug-22	0	25-Sep-22	0	26-Oct-22	0
27-May-22	1.25	26-Jun-22	0	27-Jul-22	0	26-Aug-22	5.5	26-Sep-22	0	27-Oct-22	0
28-May-22	0	27-Jun-22	0	28-Jul-22	0	27-Aug-22	4.5	27-Sep-22	0	28-Oct-22	
29-May-22	1.75	28-Jun-22	9.5	29-Jul-22	0	28-Aug-22	0	28-Sep-22	0	29-Oct-22	
30-May-22	0.5	29-Jun-22	53.5	30-Jul-22	0	29-Aug-22	0	29-Sep-22	0	30-Oct-22	
		30-Jun-22	0			30-Aug-22	0	30-Sep-22	0		
Month Total	28		107		25		33		31		0

Figure 4-5 Grande Cache 2022 Monitoring – Cumulative Rainfall



4.4.3 Data Analysis

Upon completion of the flow and rain data processing, the flow data was combined with the rainfall data with a statistical approach using a spreadsheet tool designed and developed by Associated. The final data was analyzed to verify the flow data, to provide a better understanding of the variation of the wastewater flows during a storm event (i.e. inflow/infiltration), and to define parameters for the wastewater model calibration and validation.

The statistical analysis stage involves the following steps:

- The spreadsheet tool uses the reviewed flow data to generate a base flow for dry weather periods and plots it with the measured flow and rainfall data. This plot was used to identify the wet weather events.
- The most relevant storm events were selected and plotted to show the base flow, monitored flow, and rainfall during the wet weather event. The flows of interest are those where the monitored total flow was significantly affected during a storm event (i.e. conspicuous increase of total flow from the beginning to the end of the storm event). **Figure 4-6** shows an example of the plot for Flow Monitor 3 during the June 28-29, 2022 storm event. This event indicates a peak flow rate of 213 L/s, which is about seven times larger than the approximate base flow of 33 L/s.

- A plot was made to compare the peak rainfall intensity over various durations for each storm event to the historical IDF curves (2022 City of Grande Prairie data). This process was used to assess the magnitude of each storm event. A comparison of the IDF profiles for the City of Grande Prairie (City of Grande Prairie, 2022) and the observed storm events are presented in **Figure 4-7**. The magnitude of the rainfall events which occurred in 2022 were not significant (<10-year return period); therefore, this provides a limitation to the model calibration and validation. This is discussed further in **Section 5**.
- Rainfall depths, runoff rates, and volumes were correlated to define the relationship between I/I and rainfall depths. The line of best-fit was used to determine the relationship mathematically (regression equation). For example, **Figure 4-8** illustrates an example of the relationship between I/I rate and the 1-hour rainfall depths for Flow Monitor 3. The Index of Determination (R^2) value (0.61) is a measure of the strength of correlation and confidence in the results. An R^2 value of 0 indicates no relationship while 1 indicates perfect agreement. The rainfall duration that provides the strongest correlation with the peak flow rate was identified through this analysis. The 3-hour rainfall depths had the strongest correlation with the peak I/I rates with an R^2 of 0.99 for Flow Monitor 3.
- The regression equation with the highest R^2 value was then applied to the statistical, historical, rainfall depths for each return period as defined in the IDF curve (City of Grande Prairie, 2022). **Figure 4-9** shows the design storm curve for Flow Monitor 3 indicating an I/I flow rate of 1.67 L/s/ha during the 1:25-Year design storm event for this site. Note, the design flows are preliminary estimates based on only one year of data and should be used with caution.
- Average dry weather flows (ADWF) in L/s/ha and Peak Factors (PFs) were also estimated from the monitored flow data. The PF was defined as the ratio of Peak DWF (PDWF) to the ADWF.

Figure 4-6 Measured Total Flow – Flow Monitor 3 (June 28-29, 2022)

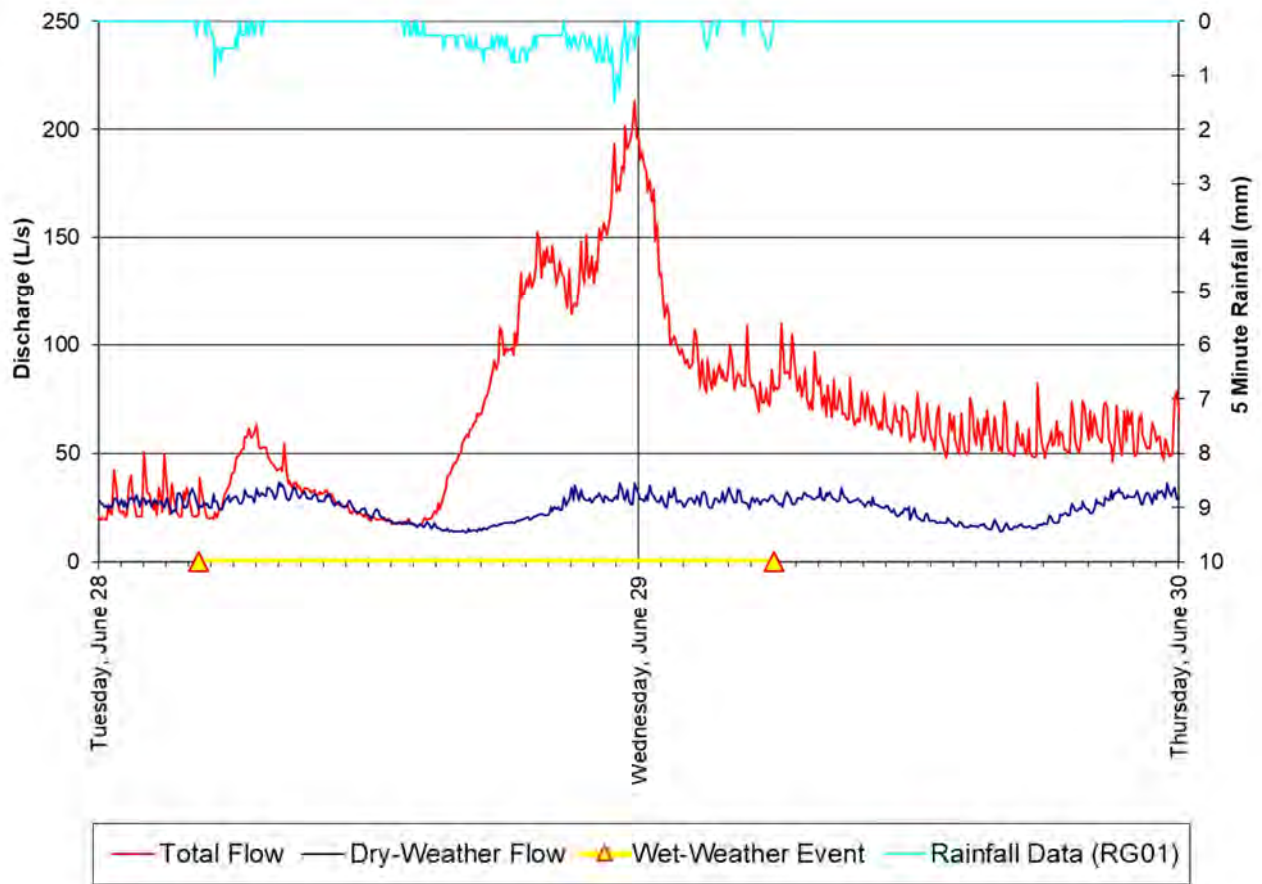


Figure 4-7 Storm ID Profiles

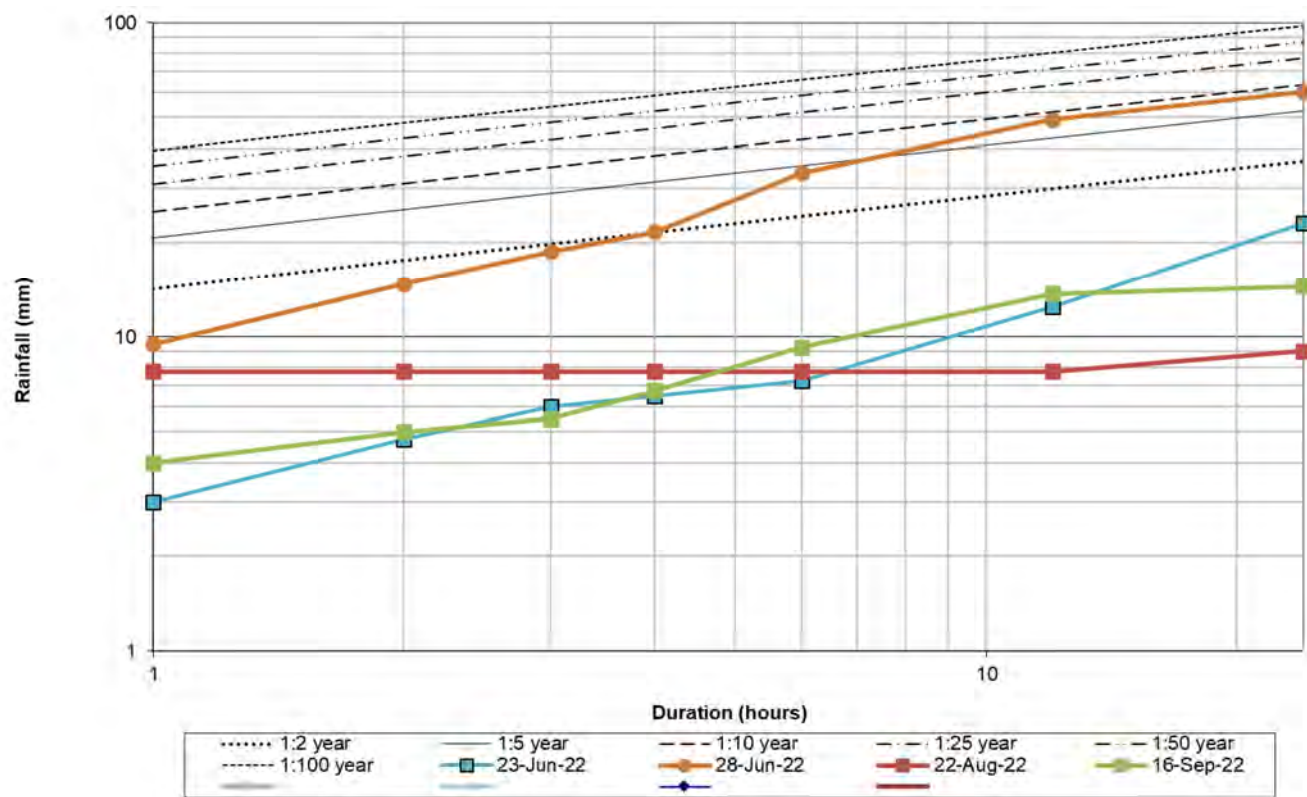


Figure 4-8 Regression Plot – Flow Monitor 3 and Rain Gauge

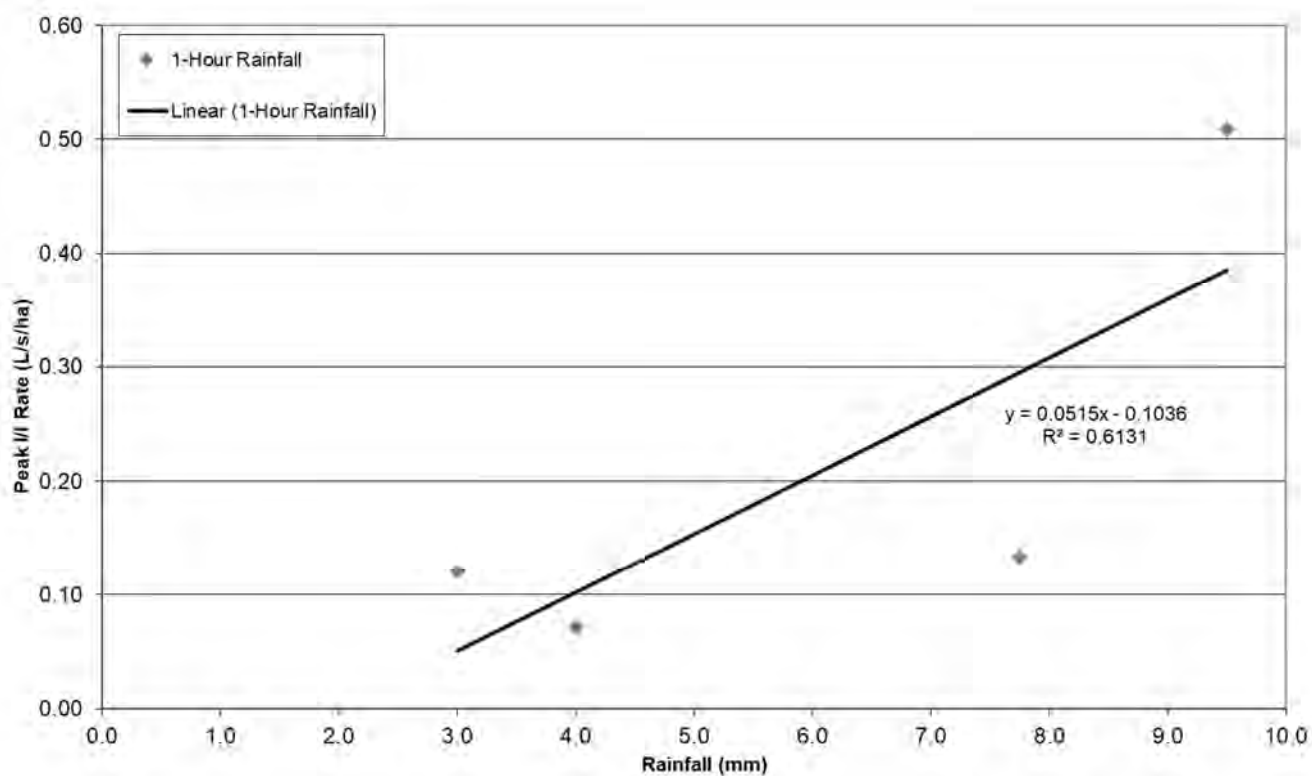
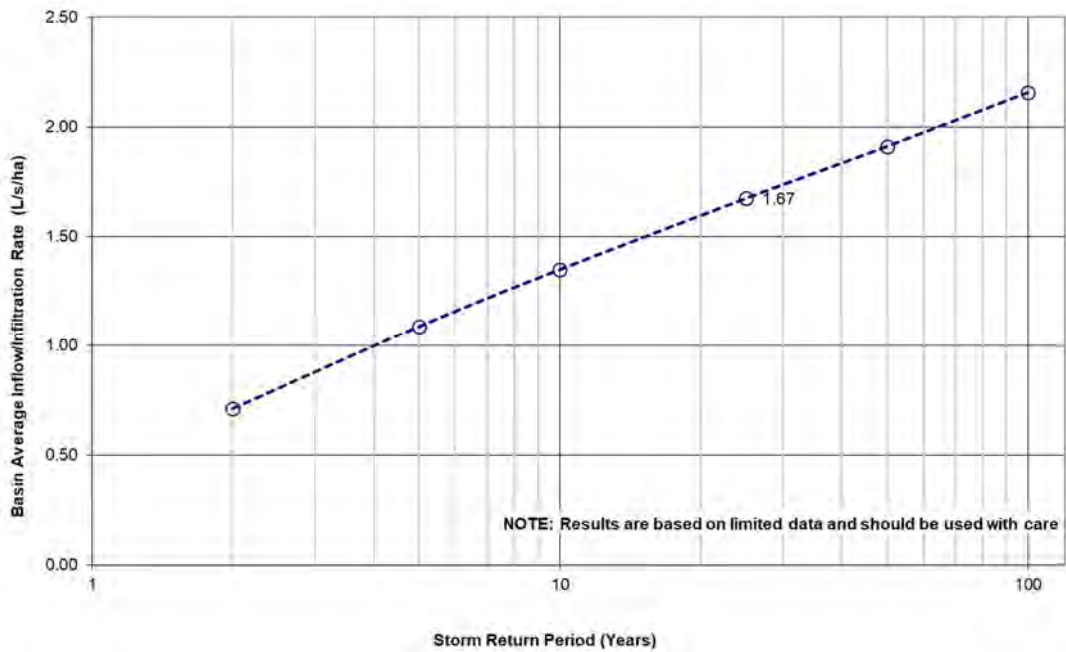


Figure 4-9 Projected Design Curve – Flow Monitor 3 with Rain Gauge



4.4.4 Data Summary

Table 4-3 summarizes the results from the 2022 Flow Monitoring Program. The results indicate the following:

- The storm events which occurred within the Hamlet of Grande Cache during the 2022 monitoring period were generally small in magnitude and short in duration, most less than a 2-year return period.
- Observed rainfall magnitudes were limited due to the available monitoring data (one year). Further flow monitoring is recommended to increase the confidence level in the data analysis. It is recommended that the Hamlet implement a continuous wastewater sewer flow monitoring program.
- The 1:25-Year I/I rates range from 0.44 L/s/ha in Catchment 1 to 2.75 L/s/ha in Catchment 2. This indicates that high I/I was occurring within the Hamlet’s residential and institutional area. The higher I/I rate for Catchment 2 and Catchment 3 can be attributed to the higher parks/open space land use within Catchment 1.
- The 1:100-Year I/I rates were approximately 20% higher than the 1:25-Year I/I rate which reflects the statistical characteristics of rainfall.
- The peaking factors range between 1.28 and 1.56 which are lower than those usually computed using the equation provided within the MD’s Municipal Engineering Standards.
- I/I rates were all higher than the standard 0.28 L/s/ha.

Table 4-3 I/I and DWF Flow Summary

Monitor	Total Catchment Area (ha)	I/I Peak Flow		ADWF (L/s)	PDWF (L/s)	Peaking Factor
		1:25-yr (L/s/ha)	1:100-yr (L/s/ha)			
1	99.0	0.44	0.56	4.26	5.44	1.28
2	52.8	2.75	3.60	2.9	4.2	1.45
3	264.7	1.67	2.16	24.97	39.08	1.56

5 MODEL CALIBRATION AND VALIDATION

Calibration and validation of a hydrologic and hydraulic model is imperative to provide results with confidence and reliability. Wastewater models must calibrate and validate to both DWF and WWF events to accurately predict sewer hydraulics. The new PCSWMM model was simulated using three rain-free periods (DWF) and three storm events (WWF) for calibration and validation.

5.1 Dry Weather Flow Calibration

DWF within the wastewater sewer system is the domestic component of sewer flow generated by household activities. This is observed during times of no precipitation (absent any infiltration or stormwater inflow).

PCSWMM uses the following parameters to model the dry weather flow:

- Average dry weather flow rate to each manhole.
- Diurnal curve depicting the typical variation of sewer flow throughout the day.

Distinct diurnal curves and average dry weather flow rates for each land use class were estimated from the 2022 flow monitoring data.

Residential diurnal patterns typically have two peaks during the weekday - one in the morning when people are starting their day and the other in the evening when people come home from school/work. The weekend peak tends to be higher and start later in the day. Commercial, institutional, and industrial diurnal weekday patterns tend to vary depending on the type of land use, but generally have higher flow during business hours and reduced flows outside of business hours. The weekend pattern for commercial and institutional may vary from the weekday flow pattern while industrial weekend patterns are expected to be significantly reduced as workers take time off.

The dry weather flow from the Grande Cache Institution was assumed as a baseflow assigned to a manhole, along the Collection Trunk, downstream of Flow Monitor 3. A time pattern is unknown and currently not assigned for this DWF since the diurnal patterns from the Grande Cache Institution will not follow any of the typical patterns discussed above.

After processing and analyzing the flow monitoring data as described in [Section 4](#), diurnal patterns were produced for each monitored location. [Table 5-1](#) summarizes the land use areas and percentages for each monitoring location. Flow Monitor 1 catchment area is primarily a commercial/industrial land use. Flow Monitor 2 has a ratio of 6:4 residential to institutional area. Flow Monitor 3 catchment area is comprised mostly of residential land use with a mixture of commercial/industrial and institutional area.

Table 5-1 Flow Monitor Land Use Areas

Flow Monitor	Total Area (ha) ¹	Residential Area (ha)	Commercial/Industrial Area (ha) ²	Institutional Area (ha)
1	29.7	5.5	24.2	0.0
		(19%)	(81%)	(0%)
2	46.9	29.8	0.0	17.1
		(63%)	(0%)	(37%)
3	169.3	111.7	29.0	28.6
		(66%)	(17%)	(17%)

The weekday and weekend diurnal patterns for each flow monitor are illustrated in [Appendix A](#). Flow Monitor 1 does not exhibit a big drop in flows from 12 AM to 5 AM as the other monitors. This could be attributed to it being a primarily commercial/industrial land use. It generally has smaller flows during the weekend except around lunch time. Flow Monitors 2 and 3 were expected to have the typical residential diurnal pattern based on their catchment areas, which included greater than 50% residential land use. The two distinct peaks on diurnal curves typically seen from residential land use areas was observed. Flow Monitor 2 has peak flows during the lunch period for both the weekday and weekend. However, Flow Monitor 3 has a later peak on the weekends, which might be due to its mixture of commercial/industrial and institutional land use. The diurnal curves for each monitored gauge location were assigned within the PCSWMM model.

The domestic sewage generation rate of 300 L/s/day and a non-residential rate of 20,000 L/ha/day was adopted for this assessment as discussed in [Section 2](#). In general, the model showed higher simulated flows for Flow Monitor 1 and underestimated simulated flows for Monitor 2 and 3.

The model was calibrated for the DWF using flow measurements obtained from July 17 to 24, 2022. The DWF was calibrated using flow measurements that were smoothed using a one-hour moving average to reduce noise and facilitate simulated/observed flow comparison. The calibration results estimated the following average generation rates:

- Residential (low density) – 300 L/c/d
- Residential (medium density) – 300 L/c/d
- Residential (high density) – 300 L/c/d
- Commercial/Industrial – 16,000 L/ha/d
- Institutional – 25,000 L/ha/d

The DWFs were modelled using the unit flows and diurnal curves discussed above. A reasonable match between the simulated and observed values was found. [Figure 5-1](#), [Figure 5-2](#) and [Figure 5-3](#) show the simulated and observed flows at Flow Monitor 1, 2 and 3 for the DWF period of July 17 to 24, 2022, respectively.

¹ Does not include road areas and parks/open spaces

² Does not include area from the Grande Cache Institution

Simulated peak flows were found to be within approximately 30% of the observed flows, on average. [Table 5-2](#) summarizes the simulated and observed peak flow, total volume, and percent error during the DWF calibration event.

Figure 5-1 DWF Calibration Flow Monitor 1 – July 17 to July 24, 2022

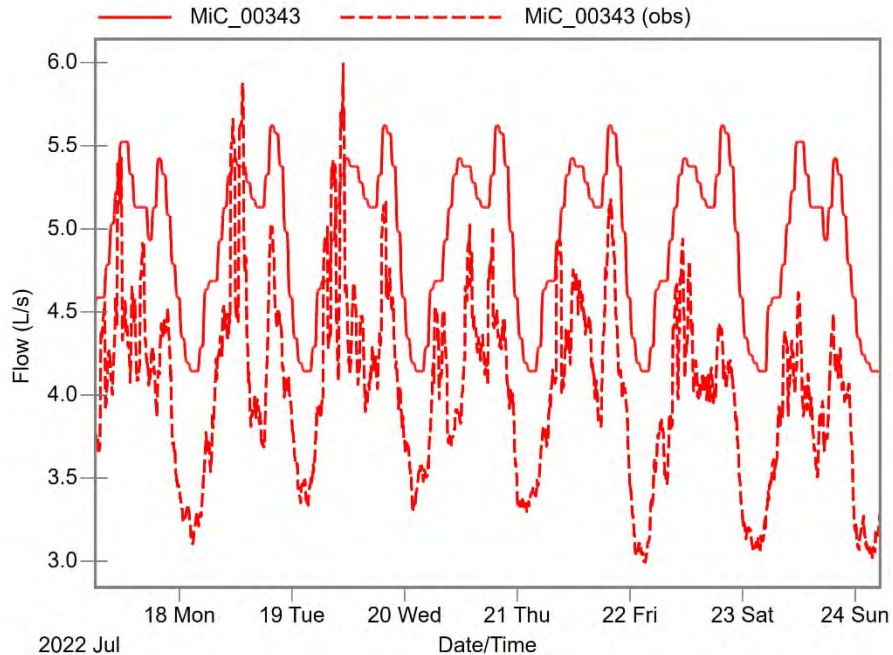


Figure 5-2 DWF Calibration Monitor 3 – July 17 to July 24, 2022

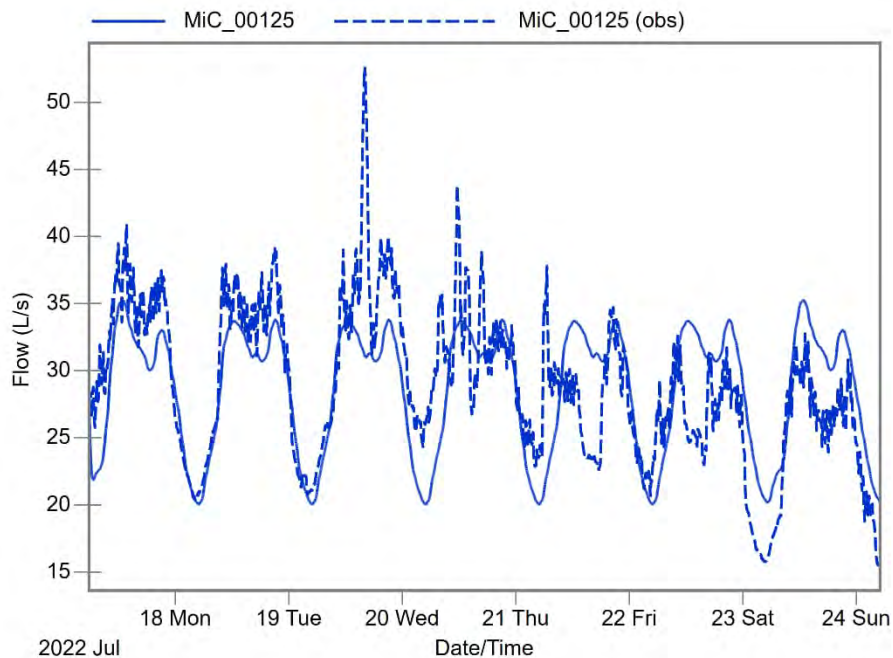


Figure 5-3 DWF Calibration Flow Monitor 2 – July 17 to July 24, 2022

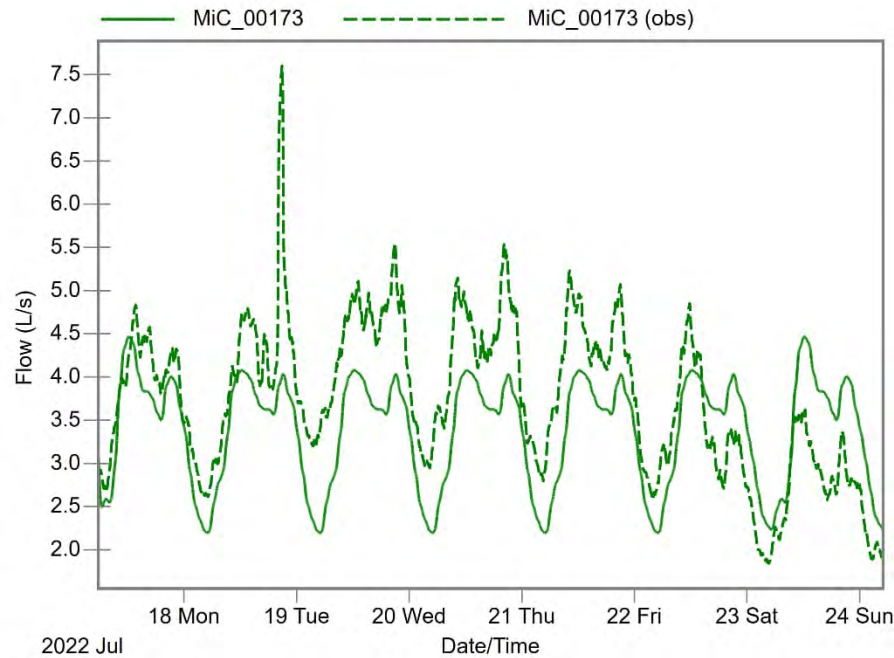


Table 5-2 DWF Calibration Peak Flow and Volume Comparison

Flow Monitor	Volume (m³)				Peak Flow (L/s)			
	Observed	Simulated	Simulated/ Observed	%Error	Observed	Simulated	Simulated/ Observed	%Error
1	2437	2982	1.22	22%	5.99	5.62	0.94	-6%
2	2260	2044	0.90	-10%	7.60	4.46	0.59	-41%
3	17470	17310	0.99	-1%	52.59	35.25	0.67	-33%

In general, the simulated flows in Flow Monitor 1 are greater than the observed flows for this period. As shown in **Figure 5-2** and **Figure 5-3**, a peak was observed during the dry weather event at Flow Monitor 2 and 3. Recorded peaks during a rain-free period can be attributed to watering of residential lawns or car washing. The peak can also be attributed to rainfall that was not within the proximity of the rain gauge. Therefore, the %Error for peak flow presented in **Table 5-2** are higher than they should be. Overall, the calibration results were reasonably good and are acceptable for the purposes of this study.

5.2 Dry Weather Flow Validation

The DWF calibration was validated using flow measurements obtained from May 11-18, 2022 and August 28-September 4, 2022. The DWF was validated using flow measurements that were smoothed using a one-hour moving average to reduce noise and facilitate simulated/observed flow comparison. It should be noted that rainfall was observed prior to these DWF period. Therefore, observed flows were slightly higher than the simulated flows at the beginning of the period.

Results showed that simulated and observed flows matched reasonably well at each monitoring site taking this observed flow increase into account. On average, the simulated peak flows were found to be within 30% of observed flows. Based on these values, the model results were considered reasonable validation for DWF parameters.

Validation plots at the Flow Monitors are included in [Appendix B](#).

5.3 Wet Weather Flow Calibration

The second component of flow within a wastewater sewer system is the stormwater inflow during a storm event. The stormwater inflow is commonly referred to as I/I, Rainwater-Dependent Inflow (RDI), or Rainwater-Dependent Inflow and Infiltration (RDII). Typically, it is significantly larger than the DWF (in terms of peak flow) but is much more difficult to quantify accurately. This is because the rainwater inflow varies substantially with space, time, and rainfall intensity.

The rainwater inflow includes the following:

- **General I/I** – the fast response to rainfall which includes flows entering through manhole covers or direct stormwater connections. It is affected by the nature and magnitude of the surface runoff; therefore, by rainfall intensity.
- **Weeping Tile Inflow** – this occurs where weeping tiles are connected to the wastewater sewers (assumed for houses built prior to 1988). It is generated by rainwater inflow but is less direct and slower to respond than the general inflow component. It is influenced by lot grading and roof downspout connections, storm rainfall intensity and volume, and to a lesser extent, by groundwater levels.
- **Groundwater Infiltration** – this is a slow-responding component that generally includes flows entering through cracked manholes, cracked pipes, open joints, and the long-term response of weeping tile flow to groundwater levels. Infiltration is governed by groundwater levels that tend to be relatively stable over time but can rise during prolonged periods of heavy rainfall increasing ground saturation.

PCSWMM uses the unit hydrograph method to estimate RDI from a given rainfall input. There are up to three hydrographs, one for short-term response, one for the intermediate-term response, and one for the slower, long-term response. Each unit hydrograph is defined by three parameters:

- **R:** the fraction of rainfall volume that enters the sewer system.
- **T:** the time from the onset of rainfall to the peak of the unit hydrograph in hours.
- **K:** the ratio of time to recession of the unit hydrograph to the time to peak.

There can also be an initial abstraction parameter associated with each unit hydrograph, which determines how much rainfall is lost to interception and depression storage before any runoff is generated. The initial abstraction is described by three parameters:

- **D_{max}** is the maximum depth of depression storage (mm).
- **D_{rec}** is the rate of recovery of the depression storage during dry periods (mm/day).
- **D_o** is the starting depth (mm).

These parameters provide considerable flexibility in simulating the I/I process but also create significant challenges in calibration of the model due to the large number of possible parameter combinations. In practice, this means that a substantial amount of monitored flow and rainfall data is required to achieve an adequate calibration.

Associated used the flow monitoring data collected during the 2022 monitoring program to calibrate the WWF parameters based on comparison of simulated and observed flows at the three monitoring locations. The rainfall data collected during the 2022 Flow Monitoring Program was reviewed ([Section 4](#)). [Table 5-3](#) provides a summary of the rainfall characteristics for three of the largest storm events that occurred during the 2022 monitoring season (April to October) based on data obtained from the rain gauge.

Table 5-3 WWF Calibration/Validation Storm Evens Summary

Start of Event	Total Rainfall (mm)	Peak Flow (L/s)	Approximate Duration (hours)	Approximate Design Storm Event Return Period (years)
June 23-24, 2022 ³	25.7	8.4	39	< 2
June 28-29, 2022 ⁴	62.7	59.6	26	< 10
August 22-23, 2022 ²	10.2	7.0	14	< 2

The largest storm event during the flow monitoring period occurred on June 28-29, 2022. This event was chosen for the calibration of the PCSWMM model. The magnitude of this storm was approximately equivalent to a 1:10-year design storm event at the 24-hour duration. This storm was simulated, and model parameters were adjusted through an iterative process to achieve the best match between the simulated and observed results. Note, the final flow data was smoothed using a one-hour moving average to reduce data noise and facilitate model/observed flow comparison. [Table 5-4](#) summarizes the calibrated model parameters for I/I.

³ Calibration Event

⁴ Validation Event

Table 5-4 Summary of WWF Calibrated Model Parameters

	R	T	K	D _{max}	D _{rec}	D _o
Catchment 1						
Short-Term	0.005	0.3	6	7	2	0
Medium-Term	0.008	0.55	12	15	1	0
Long-Term	0.01	3	20	18	5	0
Catchment 2						
Short-Term	0.02	0.3	4	8	2	0
Medium-Term	0.03	0.5	6	25	1	0
Long-Term	0.047	2	7	20	1	0
Catchment 3						
Short-Term	0.005	0.2	4	2	1	0
Medium-Term	0.01	0.4	5	5	0	0
Long-Term	0.02	2	7	4	0	0

A comparison of the simulated and observed peak flows shows a close match for the WWF calibration. **Figure 5-4** to **Figure 5-6** shows the calibrated and the observed flows for all monitor sites.

Figure 5-4 WWF Calibration Flow Monitor 1 – June 28-June 29, 2022

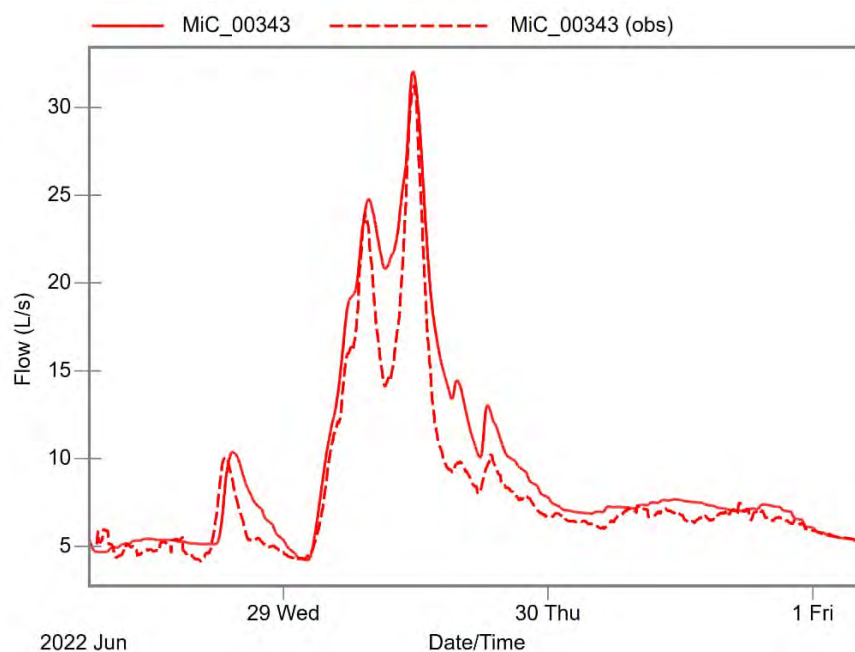


Figure 5-5 WWF Calibration Flow Monitor 2 – June 28 – June 29, 2022

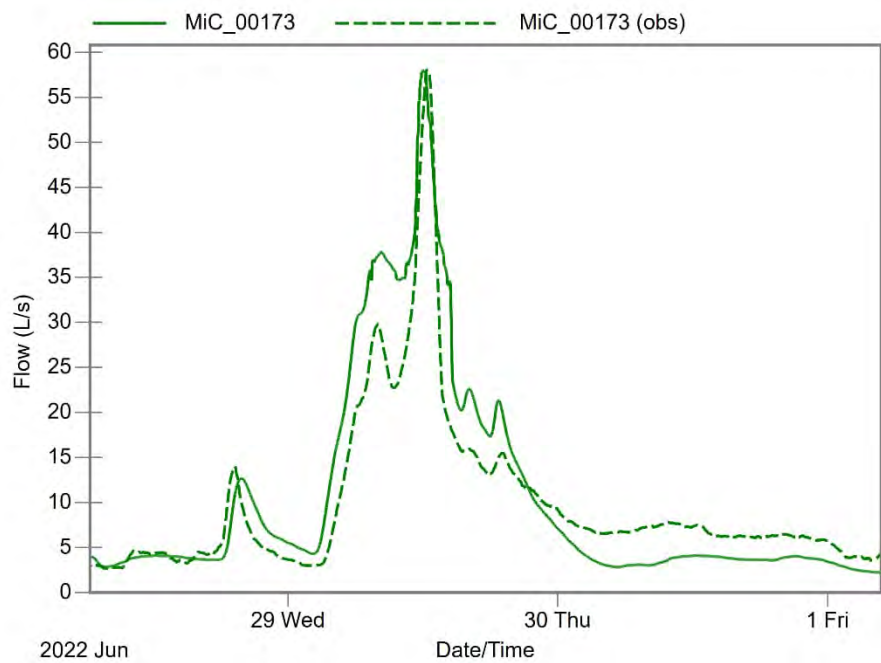
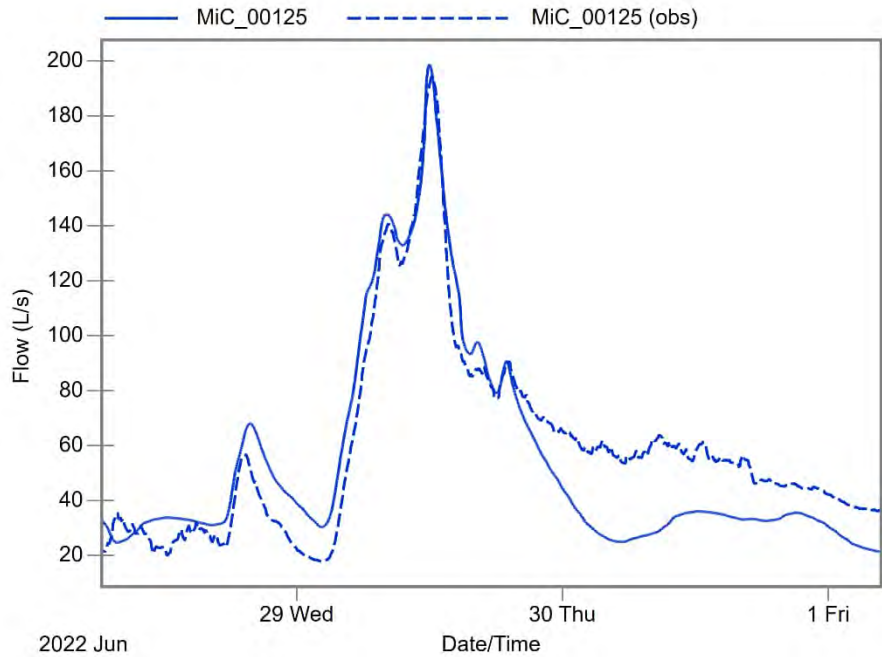


Figure 5-6 WWF Calibration Flow Monitor 3 – June 28 – June 29, 2022



Simulated peak flows were found to be within 3% of the observed flows during the June 28-29, 2022 event. **Table 5-5** summarizes the simulated and observed peak flows, volumes, and percent error during the WWF calibration event.

Table 5-5 WWF Calibration Peak Flow and Volume Comparison

Flow Monitor	Volume (m ³)				Peak Flow (L/s)			
	Simulated	Observed	Simulated/ Observed	%Error	Simulated	Observed	Simulated/ Observed	%Error
1	2363	2064	1.1	14.5%	32.0	31.3	1.0	2.5%
2	2692	2509	1.1	7.3%	58.0	58.1	1.0	-0.1%
3	13820	15020	0.9	-8.0%	198.7	194.2	1.0	2.3%

The calibration model results show that the manholes along and upstream (Swann Drive and 105 Avenue) of the North trunk were surcharging above ground. The MD noted that flooding was not observed in 2022. However, this does not indicate that surcharging above ground at these manholes did not occur. It should be noted that these manholes are located close to a steep, sloping terrain where water can drain without flooding the surrounding area. Surcharging these manholes within the model can be due to the following reasons:

- Most of these manholes are shallow manholes.
- Pipe sizes are 200 mm and 250 mm, which do not have capacity.
- Most of these pipes have mild slopes, which reduces the capacity creating flow constriction.
- Conservative calibration parameters (see next section).

5.1 Wet Weather Flow Validation

The model was validated with the June 23 and August 23, 2022 storm events. These storms were significantly less than a 1:2-year design storm event (**Figure 4-7**). Validation results showed that the model overestimated flows when compared to the observed. On average, the simulated peak flows were found to be within 20% of the observed flows. This overestimation can be attributed to the magnitude of the validation events and the inability to accurately represent initial soil conditions (antecedent soil moisture) within the model. Based on this, the model was considered slightly conservative, which was deemed acceptable. Therefore, the model was considered validated for the WWF parameters. Validation plots at each Flow Monitor are included in **Appendix B**.

5.2 Calibration and Validation Summary

Perfect agreement is not realistic at all locations due to the spatial variability of rainfall intensities, model approximations, model representation of initial soil conditions, and limitations of the flow monitoring data. Therefore, the model was considered adequate to estimate peak dry weather and wet weather flows for the system assessment that follows. Associated recommends additional calibration and validation as more observed data becomes available. This will increase the confidence in the representation of the system during various design storm events.

6 EXISTING SYSTEM PERFORMANCE

Upon the completion of the model calibration and validation, the following design storm events were simulated using the 2021 IDF curves of the City of Grande Prairie:

- 1:5-Year 4-Hour Chicago Distribution.
- 1:10-Year 4-Hour Chicago Distribution.
- 1:25-Year 4-Hour Chicago Distribution.
- 1:25-Year 24-Hour Chicago Distribution.
- 1:100-Year 4-Hour Chicago Distribution.

These storm events were used to assess the existing wastewater system during wet weather flow events. In addition, a dry weather flow period with no rainfall was also simulated.

The model results for each node (manhole) were converted into Grade Line Factors (GLFs) to illustrate surcharge levels. The GLF indicates where the Hydraulic Grade Line (HGL) water level is expected to surcharge below or above ground level at each manhole. Areas where the system is surcharged to within 2.5 m of ground elevation have the potential risk of basement flooding due to wastewater sewer backup. Shallow manholes were noted where the total depth from rim to invert elevation is less than or equal to 2.5 m. Therefore, basement flooding is a possibility, but is not necessarily more likely at these locations.

The model results for the wastewater pipes were converted into Theoretical Loading Factors (TLFs) to illustrate the ratio of peak flow to pipe capacity. Values greater than 1.0 indicate the pipe is overcapacity. Note that pipes can be overloaded locally due to flat gradients without significantly affecting the overall performance of the system.

The following is a summary of the existing system assessment during the design storm events. **Figure 6-1** to **Figure 6-6** present the wastewater model results.

DWF Existing System (Figure 6-1)

- The existing system has sufficient capacity to convey dry weather flow.
- Three manholes were simulated to have GLF less than 2.5 m from ground, they are located near the High School, along the Northern Trunk, and along the Collection Trunk. However, the HGL was simulated to be at approximately 2.4 m from ground and within the pipe. Therefore, their performance is acceptable.
- Several manholes were simulated to have GLF less than 2.5 m from ground. This is due to shallow depth of bury and the flow was simulated to be within the pipe. These manholes will always have their GLF within 2.5 m of the ground elevation, which may present a higher risk of basement flooding (if service connections are present near these locations). These manholes are labeled as Shallow Manholes on **Figure 6-1**.

1:5-year, 4-hour Chicago Distribution (Figure 6-2)

- The majority of the wastewater collection system has sufficient capacity to convey the 1:5-year, 4-hour design storm.
- There are nine manholes with GLF within 2.5 m of ground elevation. They are mainly located in four areas:
 - Along Central Trunk on 97 Avenue, east of 108 Street.
 - Along Northern Trunk, northwest of Leonard Street.

- Near the High School.
- Along the Collection Trunk.
- Four pipes were simulated to be at or above capacity:
 - The 200 mm diameter pipe along 108 Street, south of 97 Avenue, was simulated to be over three times its capacity. This is caused by the 300 mm diameter pipes along 97 Avenue discharging more flow than the conveyance capacity of this segment of pipe.
 - The 200 mm diameter pipe along 97 Avenue, east of 105 Street is overcapacity. This pipe is acting as a bottleneck due to the larger pipe capacity upstream and downstream of this pipe.
 - A section of 250 mm diameter pipe along Northern Trunk, north of Leonard Street was also simulated to be overcapacity. This is caused by a section of pipe with flat grades.
 - A section of 200 mm diameter pipe immediately west of the Recreation Centre was simulated to be overcapacity. This is caused by a section of pipe with flat grades.

1:10-year, 4-hour Chicago Distribution (Figure 6-3)

- There are 16 manholes with GLF within 2.5 m of ground elevation. They were simulated to be in the same area as the 1:5-year, 4-hour rainfall event:
 - Along Central Trunk on 97 Avenue, east of 108 Street.
 - Along Northern Trunk, northwest of Leonard Street.
 - Near the High School.
 - Along the Collection Trunk.
- Flooding was simulated along 97 Street and 107 Street. This was caused by the lack of capacity along 108 Street.
- Twenty-one pipe segments are flowing at or above capacity:
 - Surcharging along 108 Street and 97 Avenue increased during the 1:10-year, 4-hour design storm event. The cause of the constriction is identical to the cause during the 1:5-year, 4-hour designs storm event – undersized pipe downstream of bigger diameter pipes.
 - The Northern Trunk surcharged above pipe crown with up to 150 % overcapacity of pipes. Note, the risk of basement flooding is relatively low along the Northern Trunk since there are no service connections to the Trunk.
 - The 200mm diameter pipes near the High School and the Recreation Centre were overcapacity. This is caused by flat pipes and is considered acceptable.
 - Similarly, one segment of 200 mm diameter pipe east of Hwy 40 is simulated to be overcapacity. This is also caused by flat pipe slopes and is considered acceptable.

1:25-year, 4-hour Chicago Distribution (Figure 6-4)

- Significant flooding was simulated at 38 manholes in two areas:
 - Along the Northern Trunk and surrounding areas, caused by small diameter pipes and flat slopes.
 - Along 97 Avenue, east of 108 Street, caused by small diameter pipes, flat slopes, and flow constraint along 108 Street.
- There are 17 manholes with GLF within 2.5 m of ground elevation, in five areas:
 - Near flooding along the Northern Trunk and the 97 Avenue Central Trunk.
 - Near the High School.
 - Within the non-residential development, east of Hwy 40.
 - Along the Collection Trunk.

- The number of pipes overcapacity increased to 36. Four of the pipes are flowing over twice their capacity and the pipe located on 108 Street is flowing at five times its capacity.

1:25-year, 24-hour Chicago Distribution (Figure 6-5)

- Surcharged water levels and pipe overcapacity within the system increased due to the longer duration design storm event. This can be attributed to ground becoming more saturated with longer rainfall duration, resulting in more I/I.
- The number of manholes with GFL within 2.5 m of ground elevation increased to 23 with 55 additional manholes surcharged above ground.
- Fifty-two pipes are flowing at or above capacity. Among them, 15 pipes are flowing greater than twice their capacity.

1:100-year, 4-hour Chicago Distribution (Figure 6-6)

During a 1:100-year, 4-hour design storm event, three areas of the Hamlet flooded:

- Northern Trunk and surrounding area.
- Central Trunk and surrounding area.
- Pipes along the alley between Hwy 40 and 99 Street, within the non-residential developments.

There was an increase of manholes with GLF within 2.5 m of ground elevation to 32 with 71 manholes surcharged to above ground.

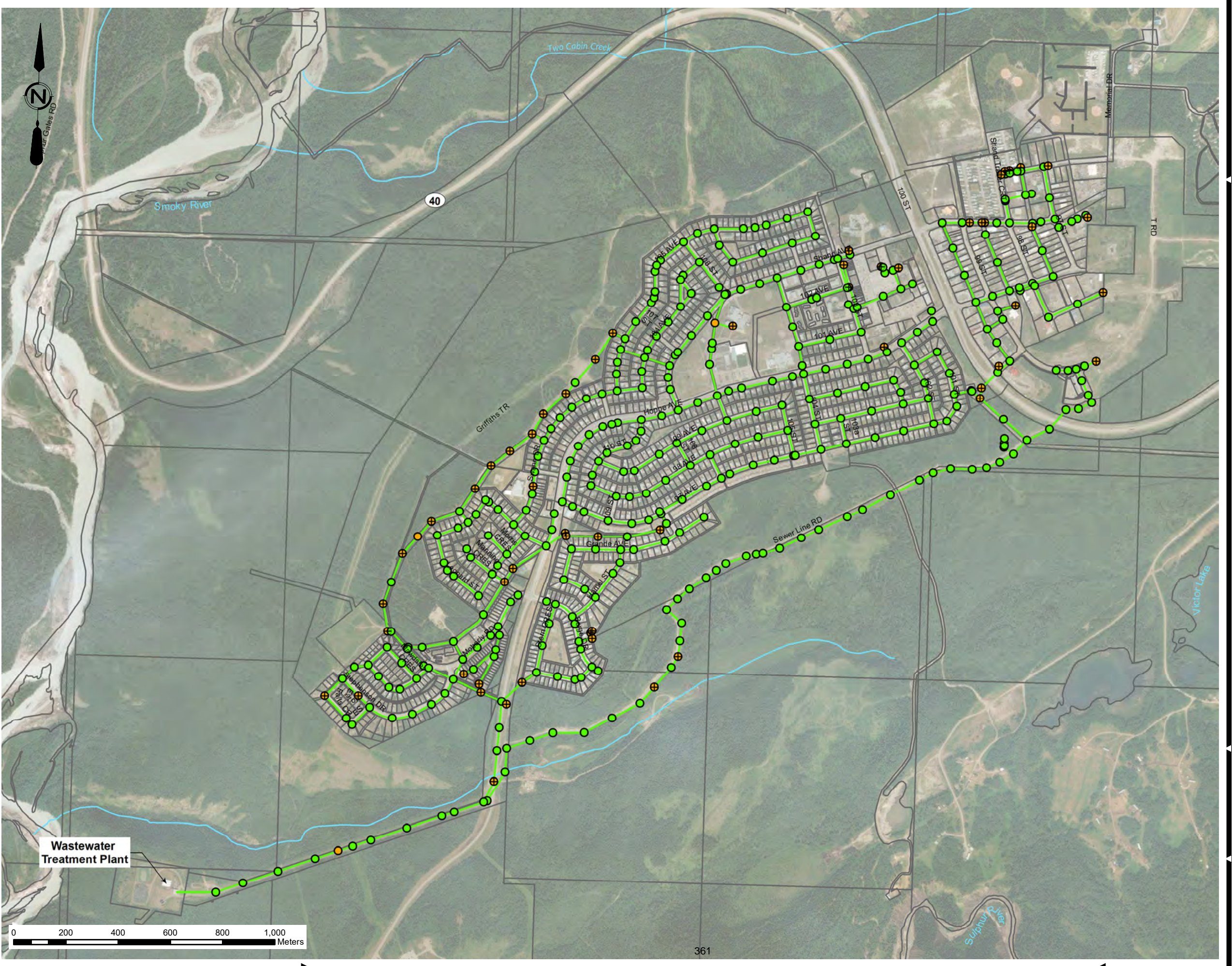
The number of pipes flowing at or above capacity increased to 60. Among them, 15 pipes are flowing greater than twice their capacity.

Overall, the existing wastewater sewer system can provide a 1:5-year LOS with no surcharge to ground. However, localized sections of pipes are overcapacity, specifically the Central Trunk, east of 108 Street. The TLF of pipes and manhole GLFs increase with larger design storm intensities and duration. It is recommended that further model calibration is completed to increase confidence in the representation of large, high intensity design storm event results.

Improvement of the LOS to 1:25-year was proposed to provide a more robust system to address current issues with the existing system. In addition, this will mitigate the increase in frequency of storm events within the region due to climate change.

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Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm AS SHOWN, ADJUST SCALES
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



- Legend:**
- Watercourse
 - HGL Depth from Ground (Grade Line Factor)**
 - < 0 m (Flooding)
 - 0 - 2.5 m
 - > 2.5 m
 - ⊕ Shallow (Depth < 2.5m)
 - Pipe Utilization (Theoretical Loading Factor)**
 - 0 to <1.0 (Less than 100%)
 - 1 to <1.5 (100%-150%)
 - 1.5 to <2.0 (150%-200%)
 - >2.0 (More than 200%)

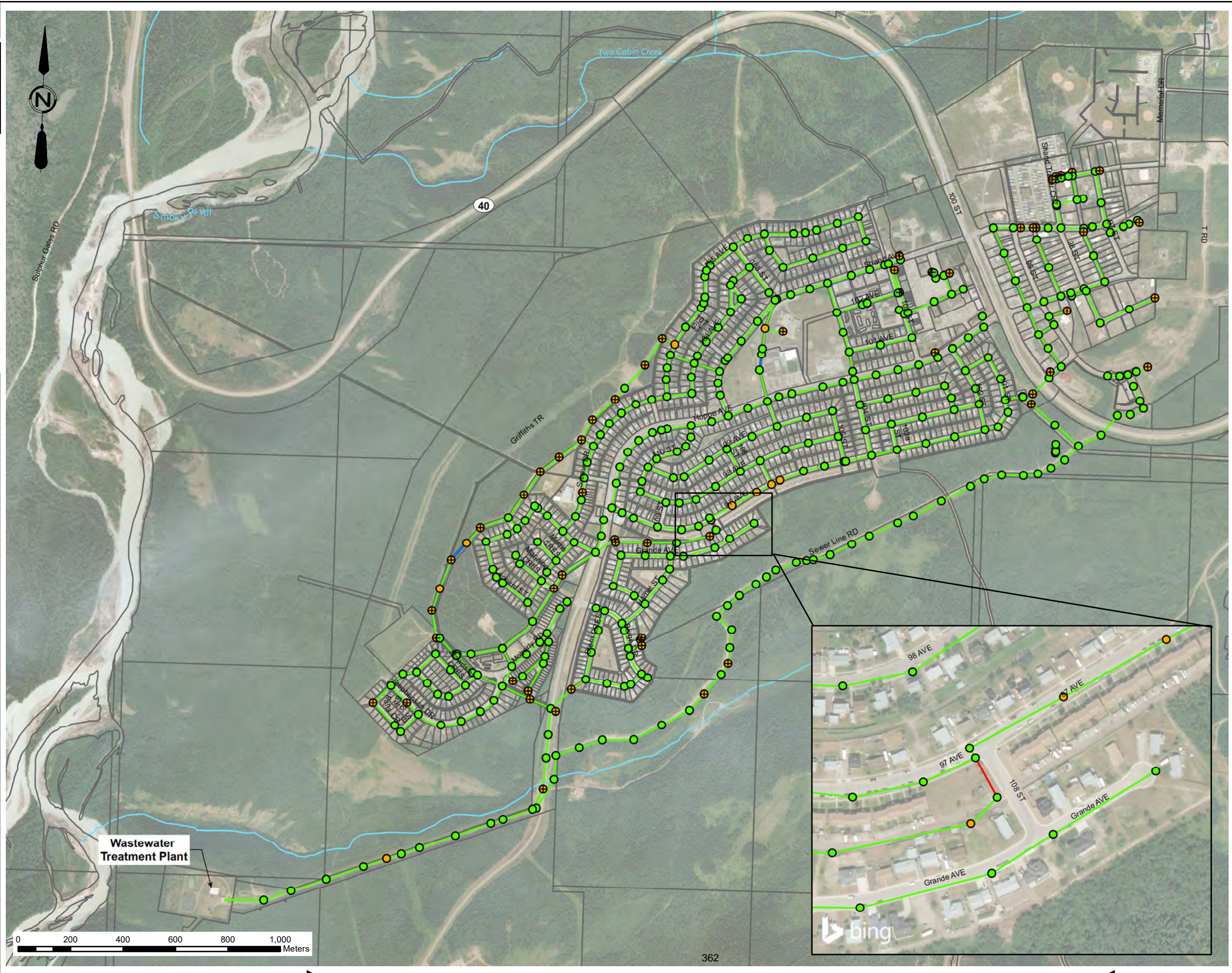


FIGURE 6-1
GRANDE CACHE WASTEWATER MASTER PLAN

EXISTING SYSTEM RESULTS - DWF	
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APPROVED DATE	2023MAR01
REV	
DESCRIPTION	ISSUED FOR DRAFT

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Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm AS SHOWN, ADJUST SCALES
SCALE(S) SHOWN ARE INTENDED FOR TABLON (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



- Legend:**
- Watercourse
 - HGL Depth from Ground (Grade Line Factor)
 - (Flooding)
 - 0 - 2.5 m
 - > 2.5 m
 - ⊕ Shallow (Depth < 2.5m)
 - Pipe Utilization (Theoretical Loading Factor)
 - 0 to <1.0 (Less than 100%)
 - 1 to <1.5 (100%-150%)
 - 1.5 to <2.0 (150%-200%)
 - >2.0 (More than 200%)

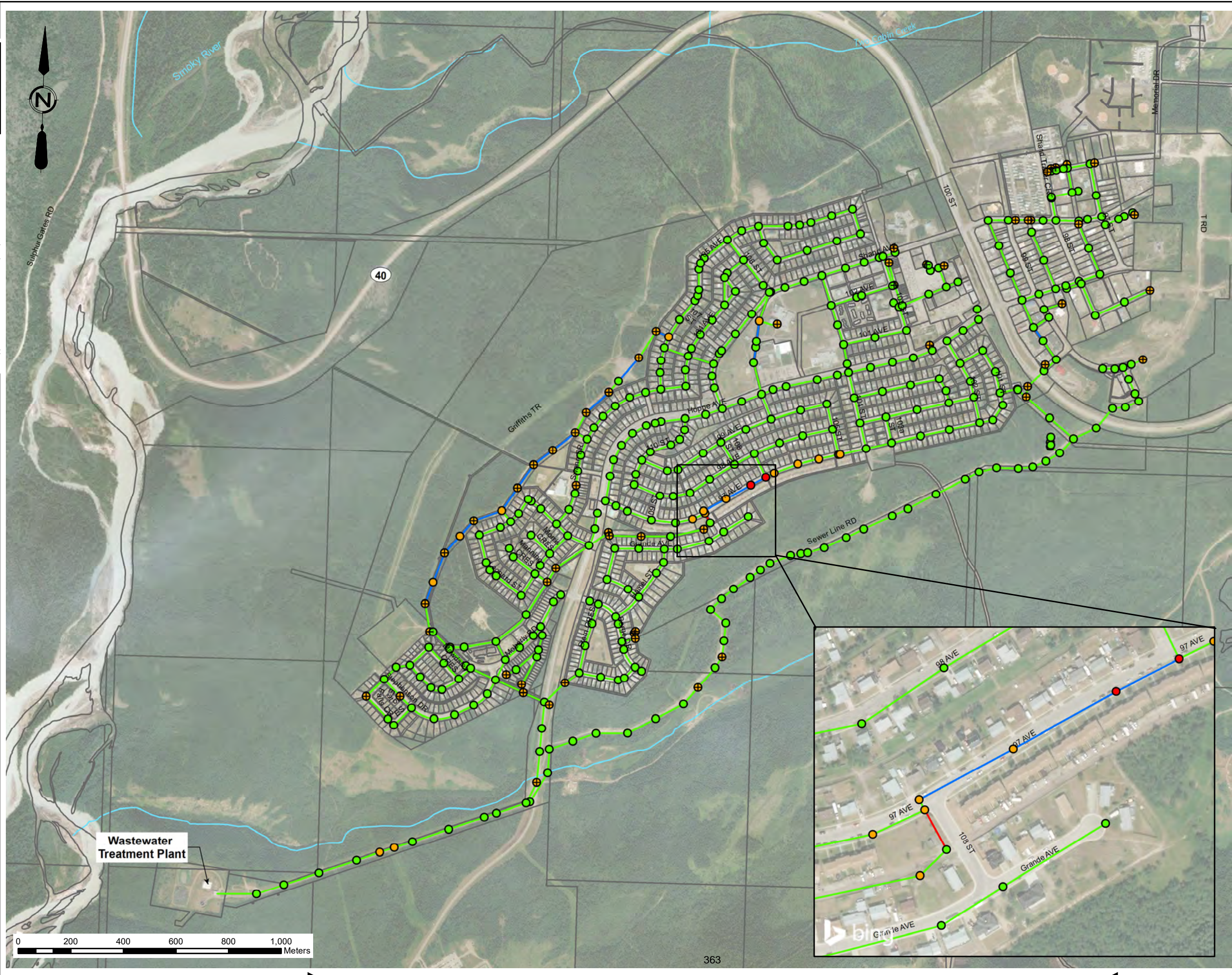


FIGURE 6-2
GRANDE CACHE WASTEWATER MASTER PLAN

EXISTING SYSTEM RESULTS - 1:5 - YEAR, 4 - HOUR	
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APPROVED	
DATE	2023MAR01
REV	
DESCRIPTION	ISSUED FOR DRAFT

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IF NOT 25 mm AS SHOWN ON THIS SCALE, SCALE(S) SHOWN ARE INTENDED FOR TABLON (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



- Legend:**
- Watercourse
 - HGL Depth from Ground (Grade Line Factor)**
 - (Flooding)
 - 0 - 2.5 m
 - > 2.5 m
 - ⊕ Shallow (Depth < 2.5m)
 - Pipe Utilization (Theoretical Loading Factor)**
 - 0 to <1.0 (Less than 100%)
 - 1 to <1.5 (100%-150%)
 - 1.5 to <2.0 (150%-200%)
 - >2.0 (More than 200%)

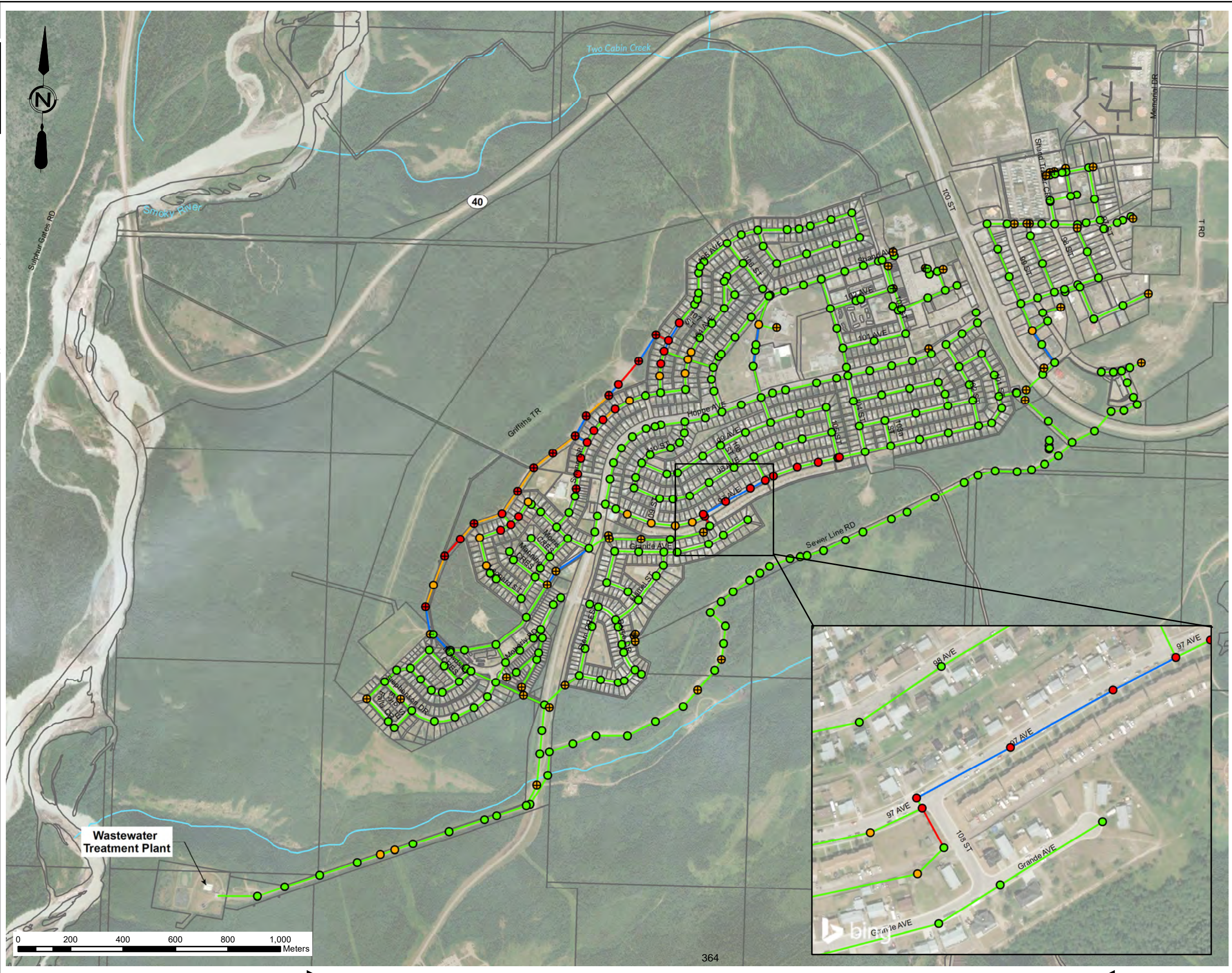


FIGURE 6-3
GRANDE CACHE WASTEWATER MASTER PLAN

EXISTING SYSTEM RESULTS - 1:10 - YEAR, 4 - HOUR	
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IF NOT 25 mm AS SHOWN ON SCALE
SCALE(S) SHOWN ARE INTENDED FOR TABLON (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



- Legend:**
- Watercourse
 - HGL Depth from Ground (Grade Line Factor)**
 - (Flooding)
 - 0 - 2.5 m
 - > 2.5 m
 - ⊕ Shallow (Depth < 2.5m)
 - Pipe Utilization (Theoretical Loading Factor)**
 - 0 to <1.0 (Less than 100%)
 - 1 to <1.5 (100%-150%)
 - 1.5 to <2.0 (150%-200%)
 - >2.0 (More than 200%)

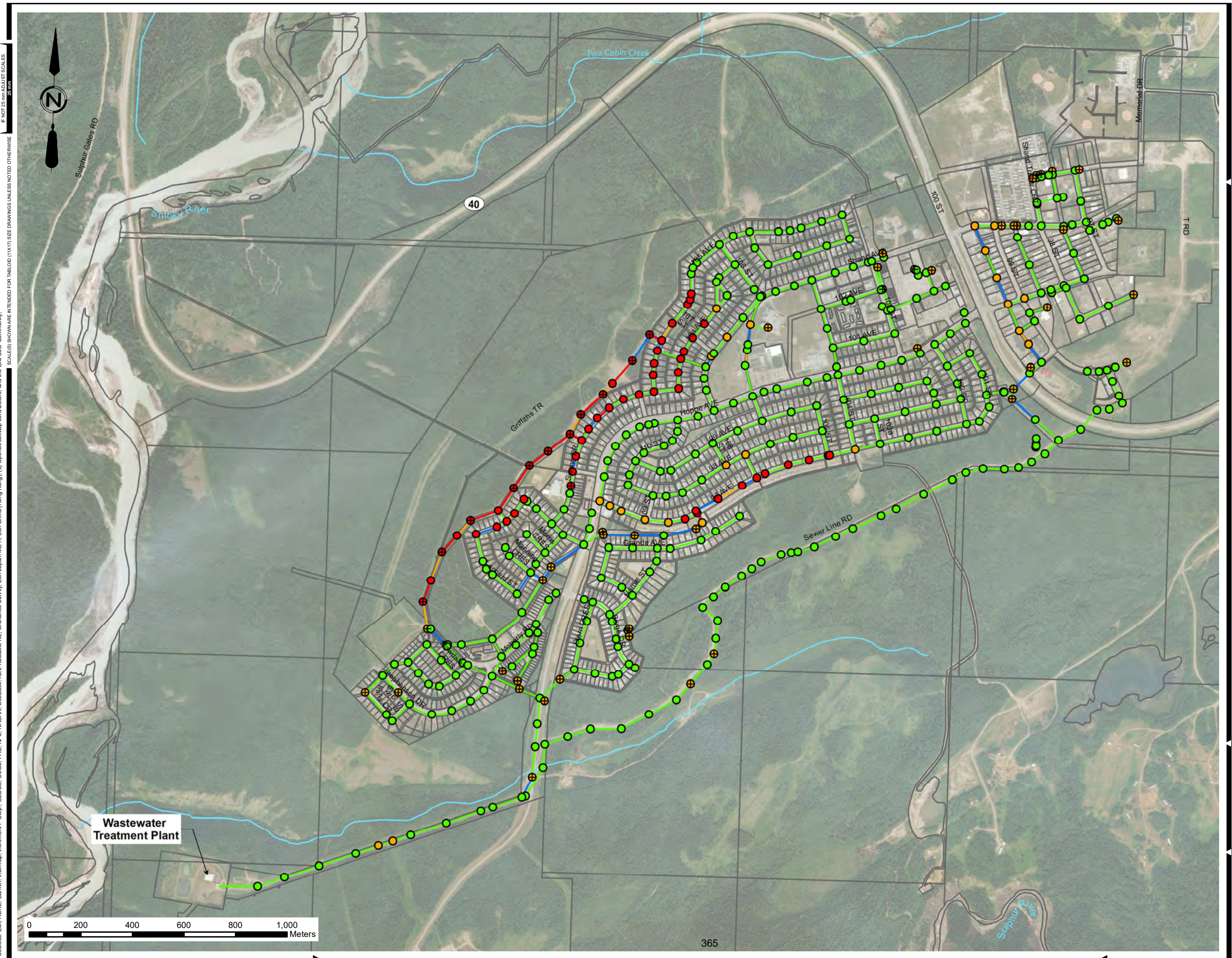


FIGURE 6-4
GRANDE CACHE SANITARY MASTER PLAN

EXISTING SYSTEM RESULTS -
1:25 - YEAR, 4 - HOUR

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APPROVED	
DATE	2023MAR01
REV	
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Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



- Legend:**
- Watercourse
 - HGL Depth from Ground (Grade Line Factor)**
 - (FLOODING)
 - 0 - 2.5 m
 - > 2.5 m
 - ⊕ Shallow (Depth < 2.5m)
 - Pipe Utilization (Theoretical Loading Factor)**
 - 0 to <1.0 (Less than 100%)
 - 1 to <1.5 (100%-150%)
 - 1.5 to <2.0 (150%-200%)
 - >2.0 (More than 200%)



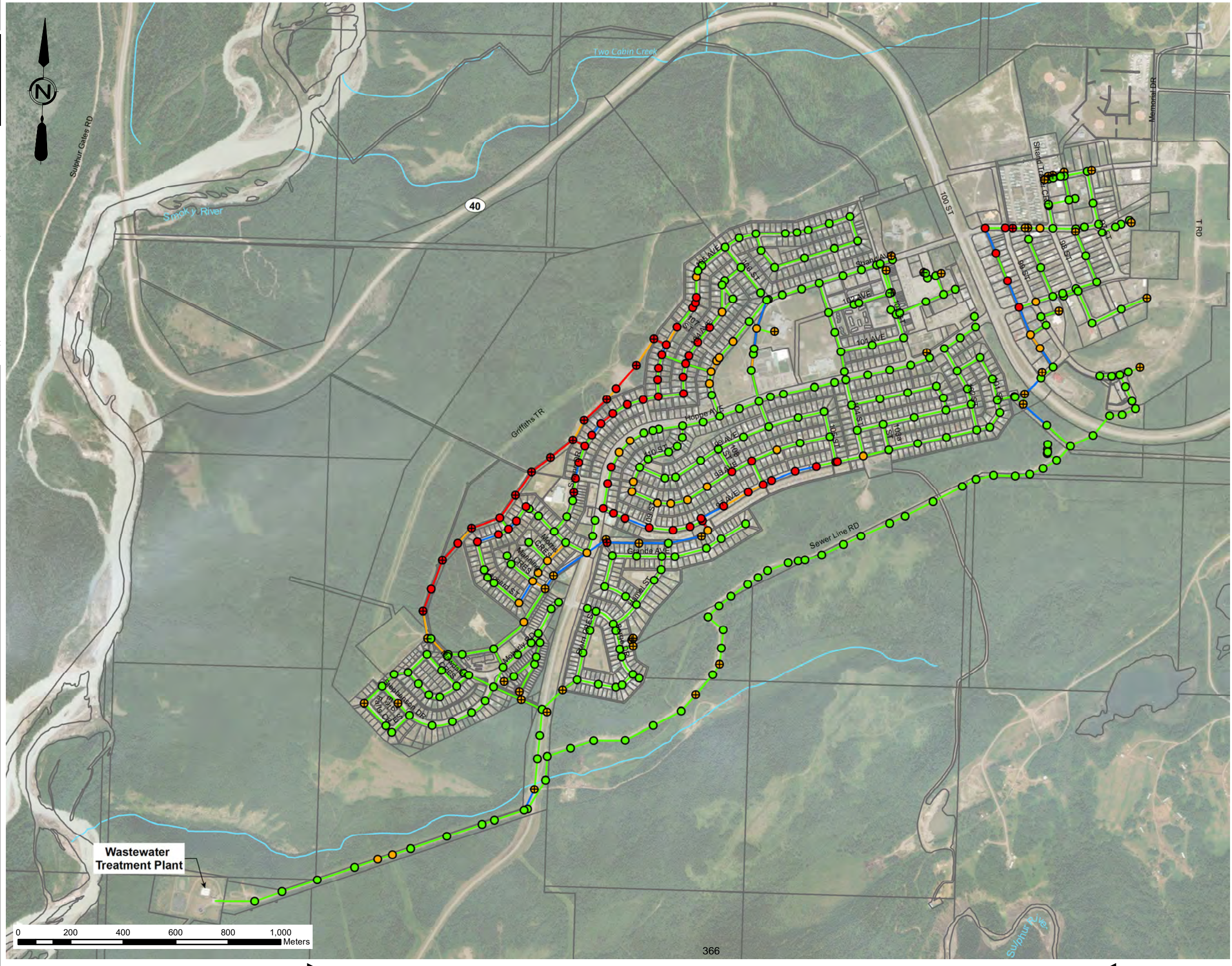
FIGURE 6-5
GRANDE CACHE WASTEWATER MASTER PLAN

EXISTING SYSTEM RESULTS -
1:25 - YEAR, 24 - HOUR

AE PROJECT No.	2022-3300
SCALE	1:14,000
APPROVED	
DATE	2023MAR01
REV	
DESCRIPTION	ISSUED FOR DRAFT

SAVE DATE: 2/22/2023 3:18:54 PM SAVED BY:
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DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm AS SHOWN, ADJUST SCALES
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- Watercourse
- HGL Depth from Ground (Grade Line Factor)
 - (Flooding)
 - 0 - 2.5 m
 - > 2.5 m
 - ⊕ Shallow (Depth < 2.5m)
- Pipe Utilization (Theoretical Loading Factor)
 - 0 to <1.0 (Less than 100%)
 - 1 to <1.5 (100%-150%)
 - 1.5 to <2.0 (150%-200%)
 - >2.0 (More than 200%)



FIGURE 6-6
GRANDE CACHE WASTEWATER MASTER PLAN

EXISTING SYSTEM RESULTS - 1:100 - YEAR, 4 - HOUR	
AE PROJECT No.	2022-3300
SCALE	1:14,000
APPROVED	
DATE	2023MAR01
REV	
DESCRIPTION	ISSUED FOR DRAFT

7 EXISTING SYSTEM UPGRADES

Associated identified several required upgrades to the existing wastewater system based on the system's LOS of 1:25-year, 4-hour design storm event. Proposed upgrades were focused on increasing pipe capacity and lowering surcharge levels within shallow manholes. **Figure 7-1** shows the trunk upgrades identified within the existing system and is summarized below:

- **Upgrade #1:** along Northern Trunk, starting at 105 Avenue to Moberly Road. Propose to upgrade approximately 1780 m of the existing 200 mm and 250 mm diameter pipes and upsize to 250 mm and 375 mm diameter, respectively.
- **Upgrade #2:** along Central Trunk, from the intersection of 105 Street and 97 Avenue to 108 Street. Propose to upgrade approximately 320 m of the existing 200 mm and 300 mm diameter pipes to 375 mm diameter pipes.

Figure 7-1 also shows the model results including the proposed upgrades during the 1:25-year, 4-hour design storm event. Two segments of pipe west of Hoppe Avenue were overcapacity, which is caused by flat pipe slopes. Several manholes along the Northern Trunk were shown to have HGL within 2.5 m from ground. These are acceptable because these do not affect the performance of the system downstream.

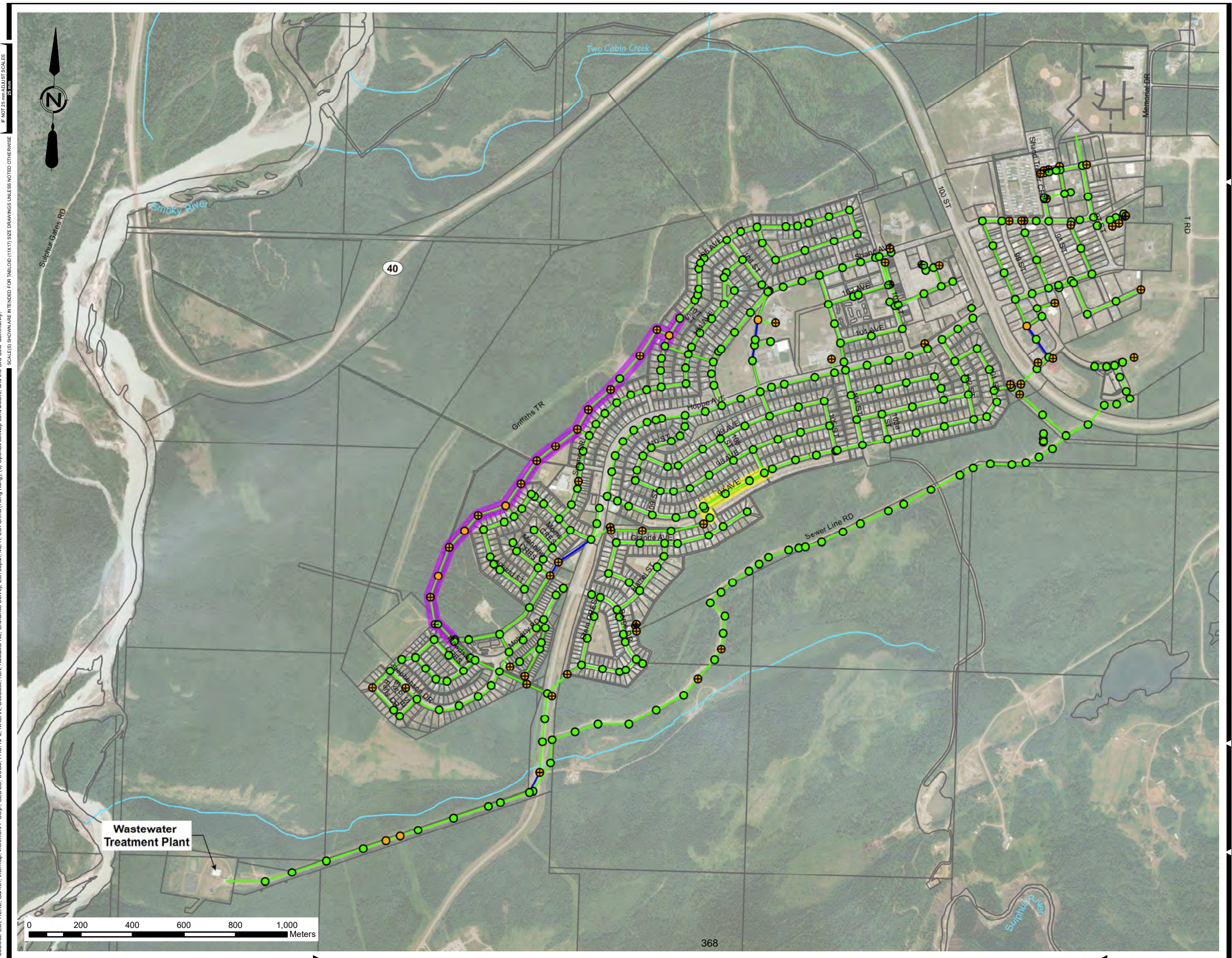
Detailed results showing the HGL profiles of existing and proposed systems during the 1:25-year, 4-hour design storm event are presented in **Appendix C. Table C-1** and **Table C-2** summarize the existing and proposed pipe configurations. Results indicate that the proposed upgrades increase pipe capacity and decrease surcharge levels.

Figure C-1 to **Figure C-3** illustrate the simulated maximum HGL profiles for the existing Northern and Central Trunks during the 1:25-year, 4-hour design storm event. **Figure C-4** to **Figure C-6** show the simulated maximum HGL profiles during the 1:25-year, 4-hour design storm event with the proposed Northern and Central trunk upgrades.

Note, no upgrades were proposed for the wastewater pipes west of the High School, Recreation Centre, and within the alley east of Hwy 40. These pipes were overcapacity due to flat pipe slopes. However, the manholes have sufficient freeboard to surcharge.

Further refinement of each recommended upgrade should be completed based on the final development plans and site assessment during the preliminary design stage. The upgrades for each location should be based upon site constraints, construction method, budget, etc.

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DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

Watercourse

HGL Depth from Ground (Grade Line Factor)

- (Filling) (Symbol)
- 0 - 2.5 m
- > 2.5 m
- ⊕ Shallow (Depth < 2.5m)

Pipe Utilization (Theoretical Loading Factor)

- 0 to <1.0 (Less than 100%)
- 1 to <1.5 (100%-150%)
- 1.5 to <2.0 (150%-200%)
- >2.0 (More than 200%)

Trunk Upgrades

- Trunk Upgrade 1
- Trunk Upgrade 2



FIGURE 7-1
GRANDE CACHE WASTEWATER MASTER PLAN

UPGRADES EXISTING SYSTEM RESULTS -
1:25 - YEARS, 4 HOUR

AE PROJECT No.	2022-3300
SCALE	1:14,000
APPROVED	
DATE	2023MAR01
REV	
DESCRIPTION	ISSUED FOR DRAFT

8 FUTURE SYSTEM SERVICING CONCEPT

Figure 2-1 presents the proposed future staged growth areas for the Hamlet of Grande Cache. The future wastewater sewer system concept is presented in two phases: Interim and Ultimate Development. ASPs were included within the future wastewater concept, where applicable

The existing system PCSWMM model was expanded to include the estimated future flows from the interim and ultimate growth areas during the 1:25-year, 4-hour design storm event. These flows were based on the following parameters:

- Population density:
 - Low-density residential – 30 ppl/ha
 - Medium-density residential – 75 ppl/ha
 - High-density residential – 150 ppl/ha
- Residential sewage generation rate – 300 L/c/day
- Commercial/Industrial sewage generation rate – 16,000 L/ha/day
- Institutional sewage generation rate – 25,000 L/ha/day

The conceptual future trunk system was developed based on the above and is provided in [Appendix D](#). Several upgrades to the existing system were identified for future development stages. Proposed pipe upgrades for the implementation stages are illustrated in [Figure 8-2](#) and summarized as follows:

- **Interim upgrades:** Interim development east of Hwy 40 require upgrades to the existing 200 mm diameter pipes from Shand Avenue, along the alley between 99 Street and 100 Street, to east of the Water Treatment Plant. This upgrade consists of upsizing approximately 1100 m of 200 mm diameter pipes to 250 mm and 300 mm diameter pipes.
- **Ultimate upgrades:** Ultimate development requires upsizing pipes along the Southern Trunk and the Collection Trunk. Proposed upgrades consist of upsizing approximately 1200 m of existing 375 mm and 600 mm diameter pipes to 450 mm and 675 mm diameter pipes, respectively.

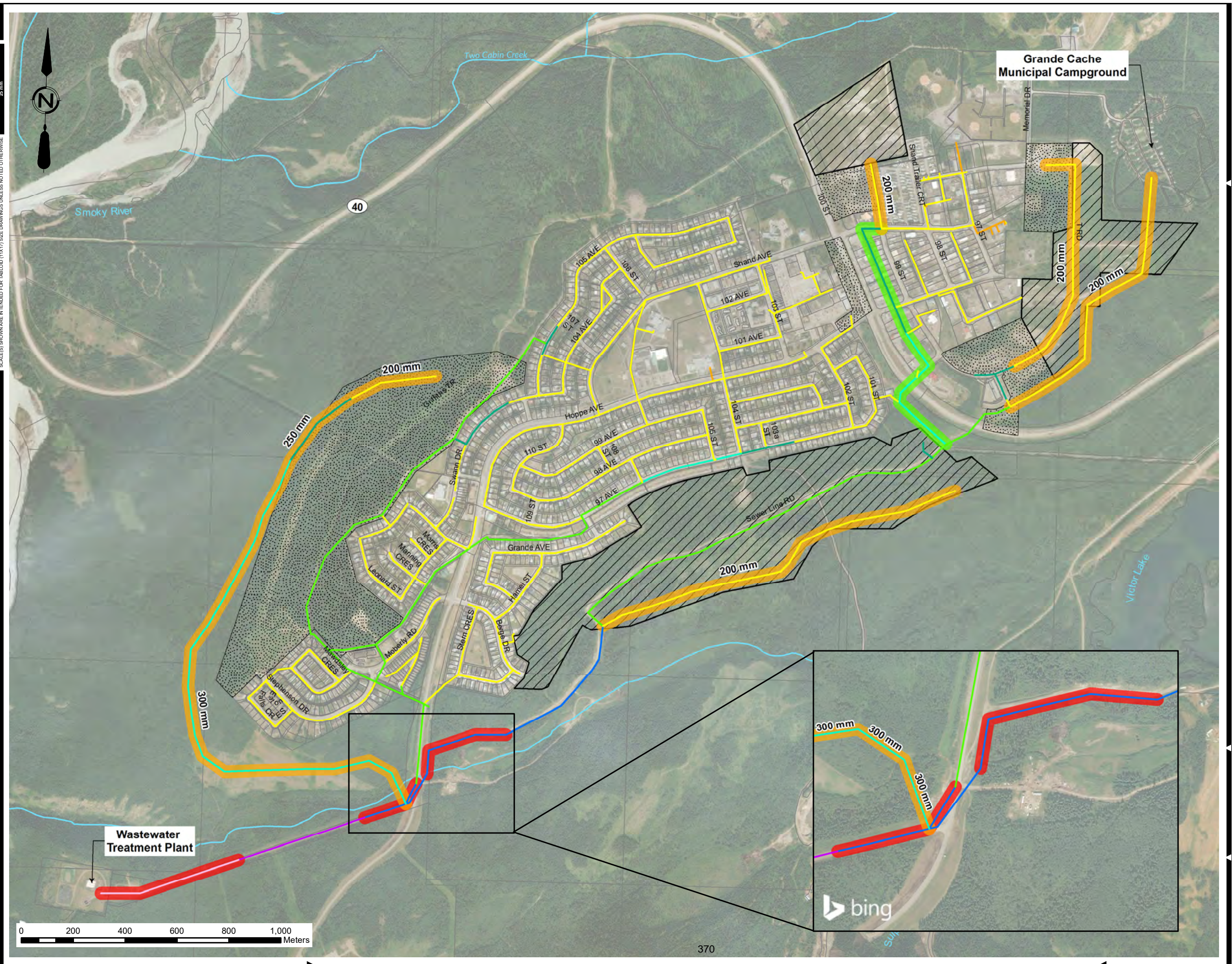
Details on the proposed upgrades are summarized in [Appendix C \(Table C-3 and Table C-4\)](#). Minimum pipe slopes, based on [Table 2-5](#), were applied during implementation of upgrades.

Based on information available to date, flows from the additional future areas within the Hamlet can be conveyed through gravity sewers by incorporating a drop manhole structure along the proposed trunk servicing the Riverview area. This design should be refined during the preliminary design stage.

It is recommended that the Ultimate Sanitary Servicing Concept be followed as development within the Hamlet progresses. Development should progress in an orderly manner with discouragement of “leap-frogging”.

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DATA SOURCE: © 2022 Microsoft Corporation © 2022 Maxar © CNES (2022) Distribution Airbus DS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

IF NOT 25 mm AS SHOWN OTHERWISE
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



- Legend:**
- Watercourse
 - Interim Upgrade to Existing
 - Ultimate Upgrade to Existing
 - Conceptual Future Trunk
- Wastewater Pipe Diameter (mm)**
- 150
 - 200
 - 250
 - 300
 - 350
 - 450
 - 600
 - 675
- Future Landuse**
- Interim Phase
 - Ultimate Phase



FIGURE 8-1
GRANDE CACHE WASTEWATER MASTER PLAN
CONCEPTUAL FUTURE TRUNK WITH UPGRADES TO EXISTING SYSTEM

AE PROJECT No.	2022-3300
SCALE	1:14,000
APPROVED DATE	2023MAR01
REV	
DESCRIPTION	ISSUED FOR DRAFT

9 OPINION OF PROBABLE COST

Table 9-1 provides the conceptual opinion of probable cost estimates for the capital costs associated with the recommended upgrades to the existing system and future trunks. Pipe materials conform to the current engineering standards and should be reviewed during detailed design for suitability and based on current economic conditions.

Based on the level of details of this study and the understanding that design conditions are unknown, the estimates presented herein include a contingency of 30% and an engineering allowance of 15% of the total estimated costs. All costs are based on recent tender prices of similar scope and location. All costs are in 2023 dollars and do not include GST. A detailed cost estimate is attached in [Appendix E](#).

Table 9-1 Opinion of Probable Cost

Proposed Upgrade	Length (m)	Cost
Existing System Upgrades		
Upgrade #1 - Northern Trunk	1780	\$3,811,400
Upgrade #2 - Central Trunk	321	\$877,300
	Engineering	\$702,500
	Contingency	\$1,404,900
	Subtotal	\$6,796,100
Existing System Upgrades (During Interim Development Phase)		
Pipe east of Hwy 43	1097	\$2,454,500
	Engineering	\$368,500
	Contingency	\$737,000
	Subtotal	\$3,560,000
Existing System Upgrades (During Ultimate Development Phase)		
Southern Trunk	397	\$2,349,800
Collection Trunk	808	\$902,500
	Engineering	\$487,600
	Contingency	\$975,100
	Subtotal	\$4,715,000
	Total Cost of Upgrades to Existing	\$15,071,100
Future Trunks		
Interim Development Phase	4058	\$7,425,500
Ultimate Development phase	2653	\$4,098,800
	Engineering	\$1,729,000
	Contingency	\$3,457,900
	Total Cost of Future Development	\$16,711,200
	Total Capital Costs	\$31,782,300

10 CONCLUSIONS AND RECOMMENDATIONS

The following are the key findings to the Wastewater Collection Master Plan update:

- The topography of the Hamlet of Grande Cache generally drains from northeast to southwest with the lowest elevations near the Wastewater Treatment Plant (WWTP).
- The current land use within the Hamlet generally consists of residential developments west of Hwy 40 and commercial/industrial developments east of Hwy 40. Land surrounding the Hamlet is currently designated as urban reserve.
- The Hamlet has an urban wastewater collection system, which include gravity sewers ranging in size from 100 to 600 mm in diameter and manholes.
- In general, the flow data obtained from the flow monitoring program was found to be of good quality. However, throughout the course of the monitoring period, connectivity issues were experienced making real-time data review difficult.
- Associated completed extensive data processing and statistical analysis of the flow and rainfall data as described in [Section 4](#).
- The magnitude of the rainfall events which occurred in 2022 were not significant (<10-year return period).
- Distinct diurnal curves and average dry weather flow rates for each land use class were estimated from the 2022 flow monitoring data.
- The calibration results estimated the following average generation rates:
 - **Residential (low density) – 300 L/c/d**
 - **Residential (medium density) – 300 L/c/d**
 - **Residential (high density) – 300 L/c/d**
 - **Commercial/Industrial – 16,000 L/ha/d**
 - **Institutional – 25,000 L/ha/d**
- The PCWMM model was simulated for week-long DWF periods to calibrate and validate against observed flows. Results showed that simulated and observed flows matched reasonably well at each monitoring site. On average, the peak flows were found to be within 30% of observed flows. Based on these values, the model results were considered calibrated and validated for DWF parameters.
- The largest storm event during the flow monitoring period occurred on June 28-29, 2022. This event was chosen for the calibration of the PCSWMM model. Simulated peak flows were found to be within 3% of the observed flows.
- The model was validated with the June 23 and August 23, 2022 storm events. These storms were significantly less than a 1:2-year design storm event ([Figure 4-7](#)). On average, the simulated peak flows were found to be within 20% of the observed flows. Based on this, the model was considered slightly conservative, which was deemed acceptable. Therefore, the model was considered validated for the WWF parameters.
- Overall, the existing wastewater sewer system can provide a 1:5-year LOS with no surcharge to ground. However, localized sections of pipes are overcapacity, specifically the Central Trunk, east of 108 Street.
- Improvement of the LOS to 1:25-year was proposed to provide a more robust system to address current issues with the existing system. In addition, this will mitigate the increase in frequency of storm events within the region due to climate change.
- Several upgrades were proposed to address pipe capacity issues within the Hamlet's existing wastewater system. These upgrades are based on the system's performance during the 1:25-year, 4-hour design storm

event. Approximately 1780 m of the Northern Trunk and 320 m of the Central Trunk are proposed to be upsized to eliminate flow constraints.

- During the Interim Development Phase, upgrades to approximately 1100 m of existing wastewater pipe east of Hwy 43 is required.
- During the Ultimate Development Phase, upgrades to approximately 400 m of the existing Southern Trunk and approximately 810 m of the existing Collection Trunk are required.
- The conceptual future trunk system was developed based on available information. Flows from the additional future areas within the Hamlet can be conveyed through gravity sewers by incorporating a drop manhole structure along the proposed trunk servicing the Riverview area. This design should be refined during the preliminary design stage.

The following are key recommendations to the Wastewater Collection Master Plan update:

- It is recommended that the Hamlet confirm and validate their GIS data for more accurate model inputs and future use.
- Further flow monitoring is recommended to increase the confidence level in the data analysis. It is recommended that the Hamlet implement a continuous wastewater sewer flow monitoring program.
- Associated recommends additional calibration and validation as more observed data becomes available. This will increase the confidence in the representation of the system during various design storm events.
- Further refinement of each recommended upgrade should be completed based on the final development plans and site assessment during the preliminary design stage. The upgrades for each location should be based upon site constraints, construction method, budget, etc.
- It is recommended that the Ultimate Sanitary Servicing Concept be followed as development within the Hamlet progresses. Development should progress in an orderly manner with discouragement of “leap-frogging”.

CLOSURE

This report was prepared for the Municipal District of Greenview to provide a Wastewater Master Plan for the Hamlet of Grande Cache.

The services provided by Associated Engineering Alberta Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,

Associated Engineering Alberta Ltd.

Sean Nicoll, P.Eng.
Project Manager

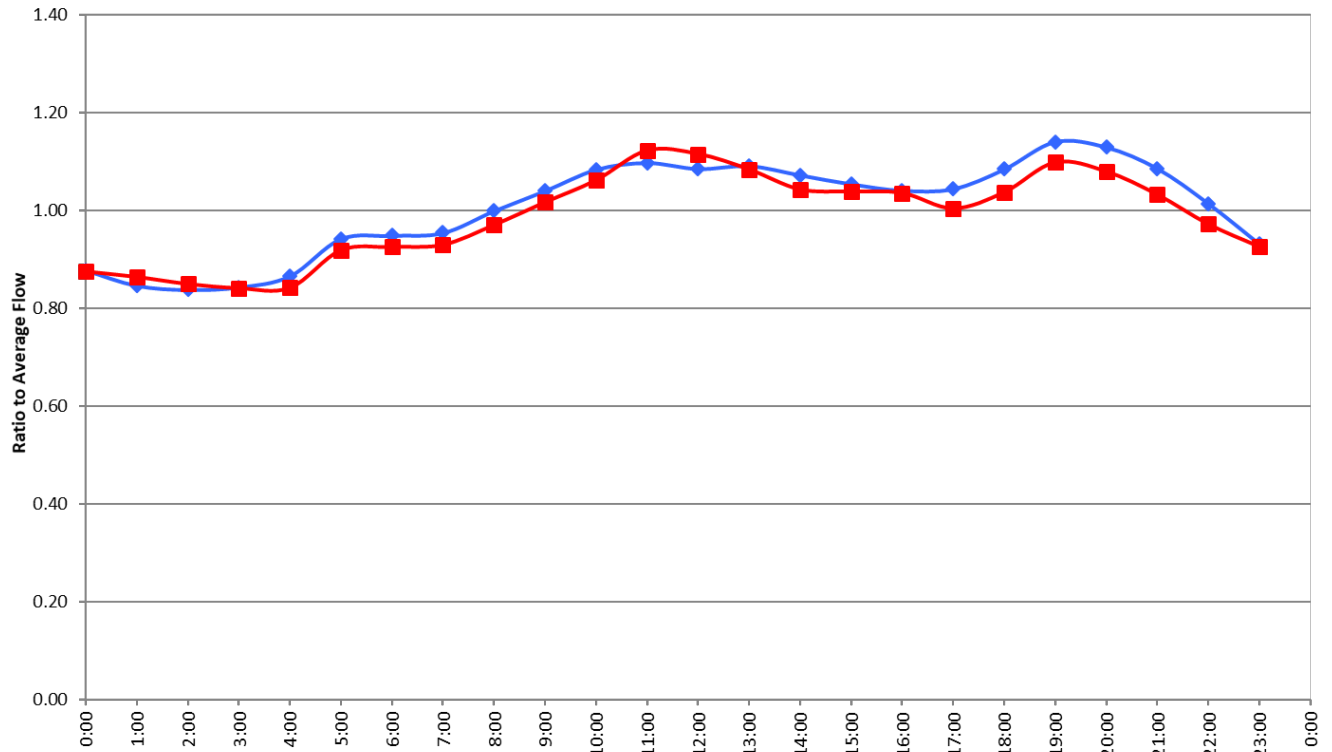
Li Wang, P.Eng.
Project Engineer

A red rectangular box with rounded corners containing a white speech bubble. Inside the speech bubble is a handwritten signature in blue ink that reads "Arlette Fernandez".

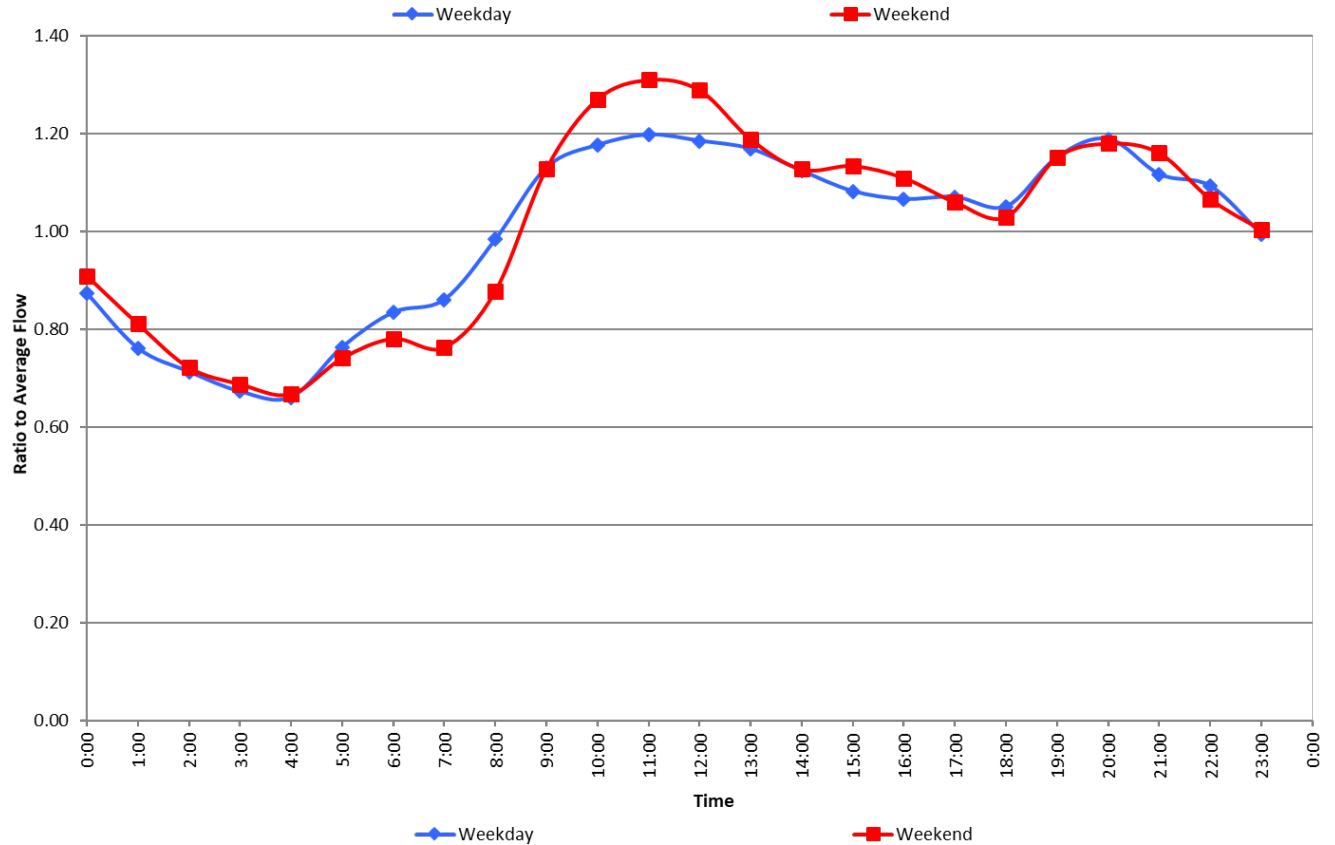
Arlette Fernandez, E.I.T.
Water Resources Engineer-In-Training

APPENDIX A - DIURNAL PATTERNS

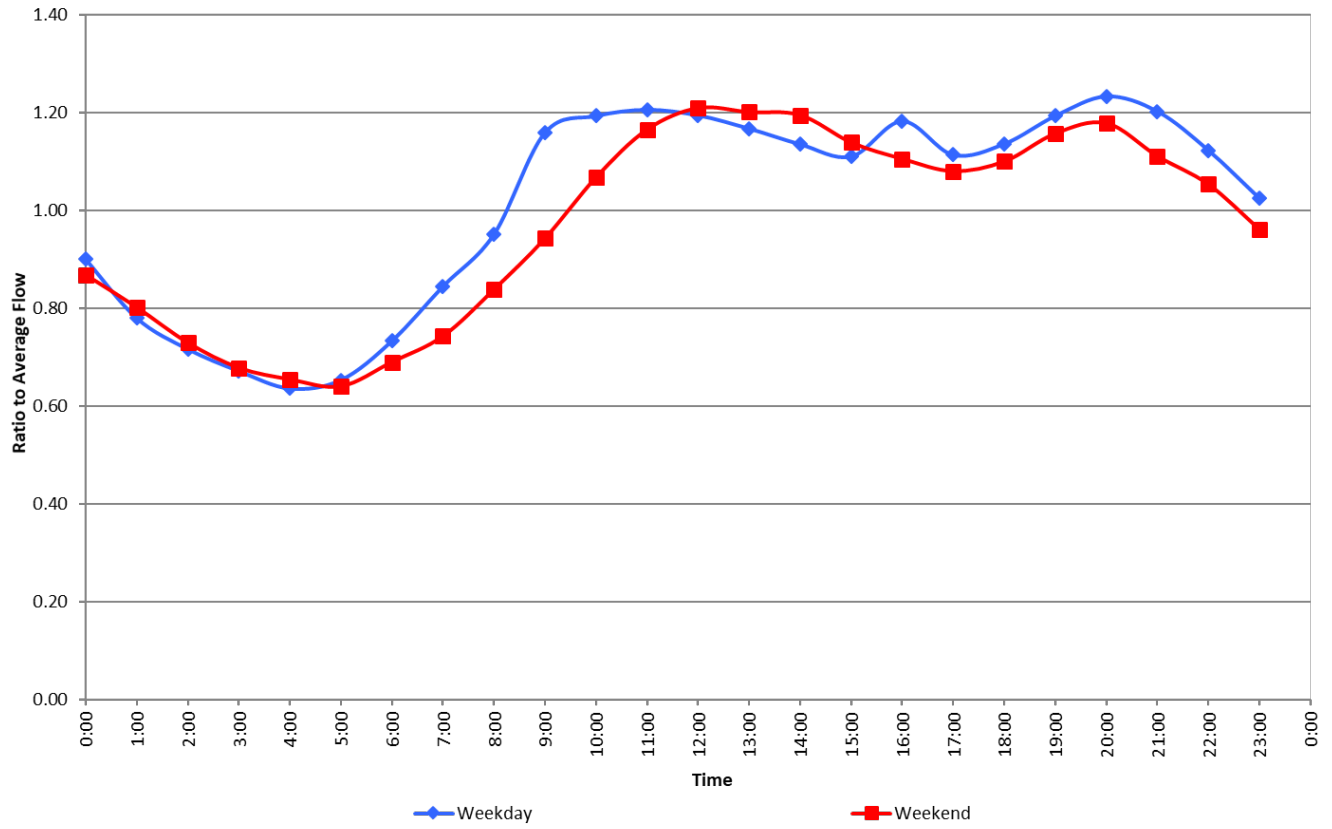
Grande Cache Flow Monitoring Program - Meter SAN 01 with Rain Gauge RG01



Grande Cache Flow Monitoring Program - Meter SAN 02 with Rain Gauge RG01

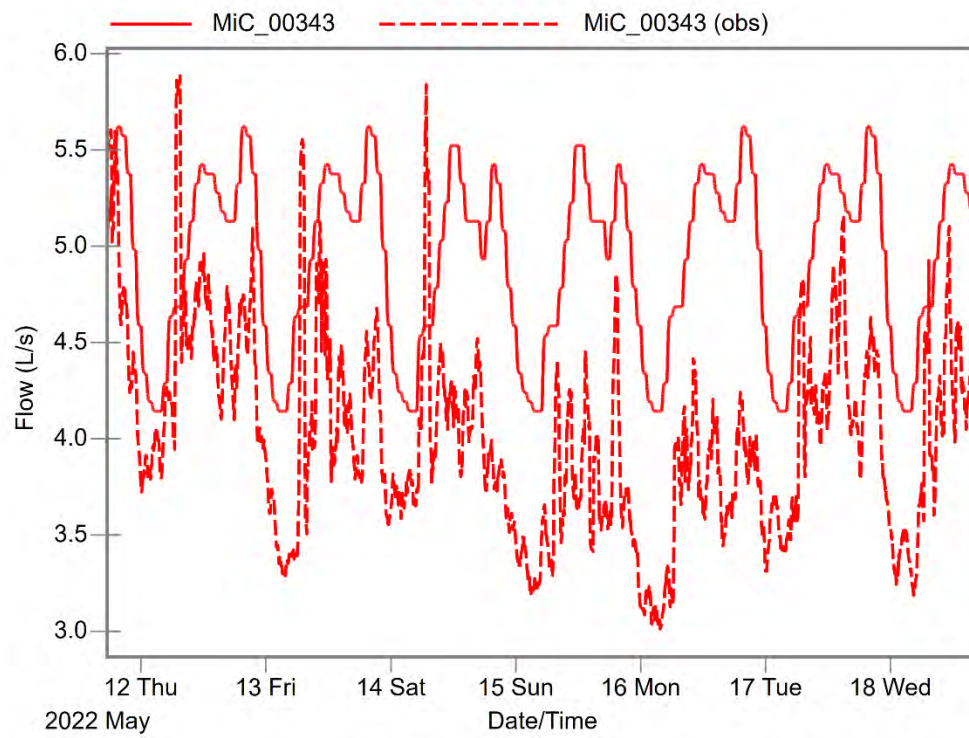


Grande Cache Flow Monitoring Program - Meter SAN 03 with Rain Gauge RG01

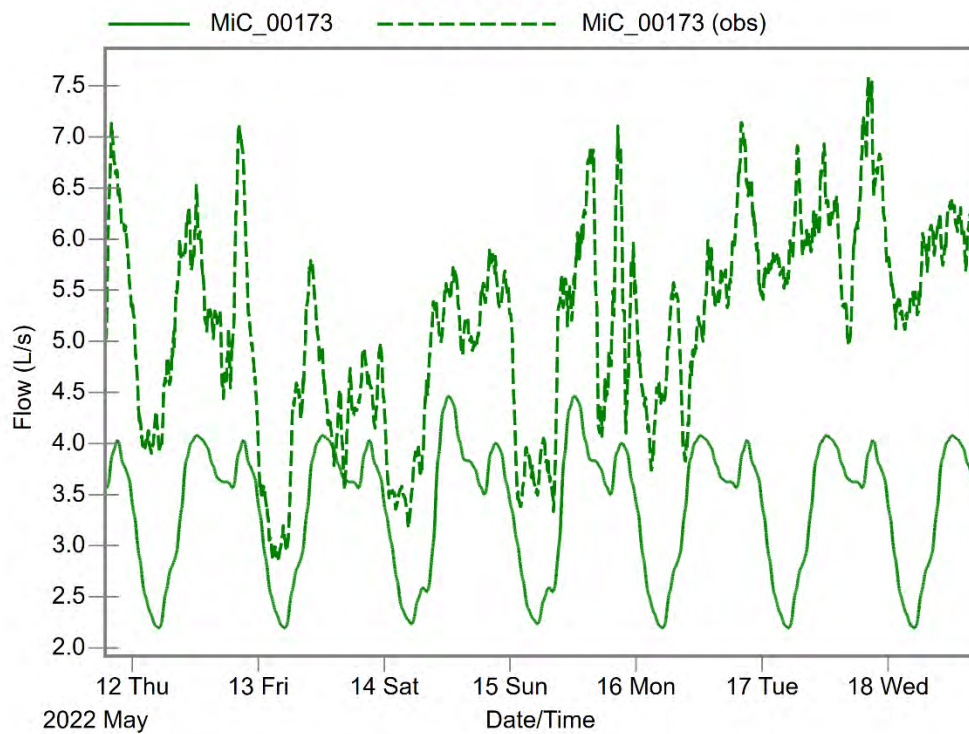


APPENDIX B - CALIBRATION AND VALIDATION PLOTS

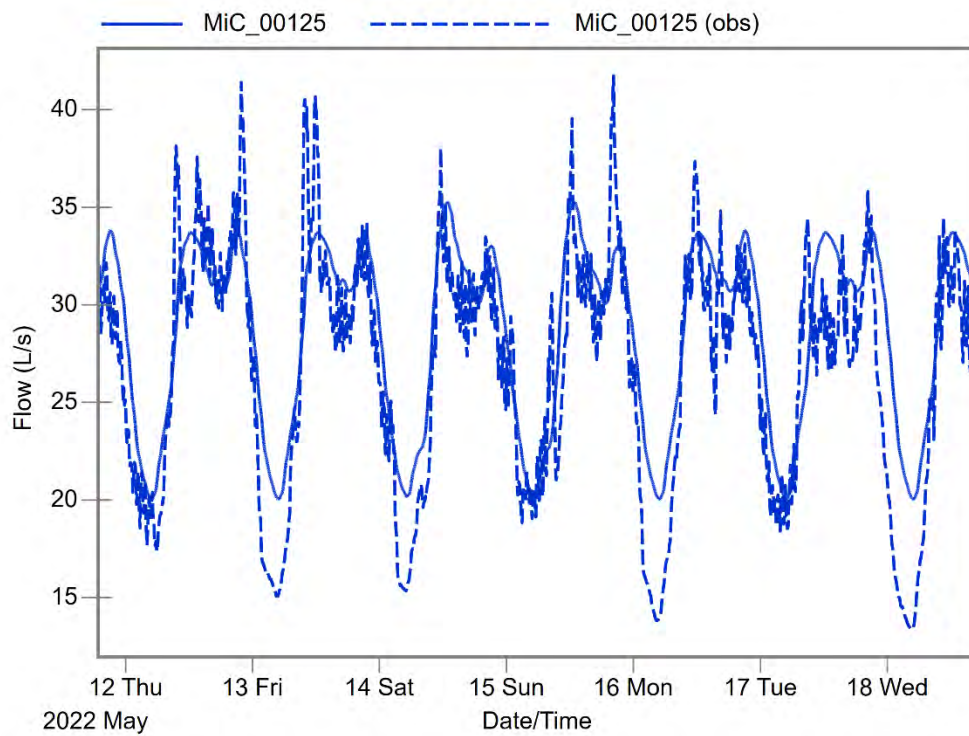
Dry Weather Flow Validation
May 11, 2022 – May 18, 2022



Flow Monitor 1

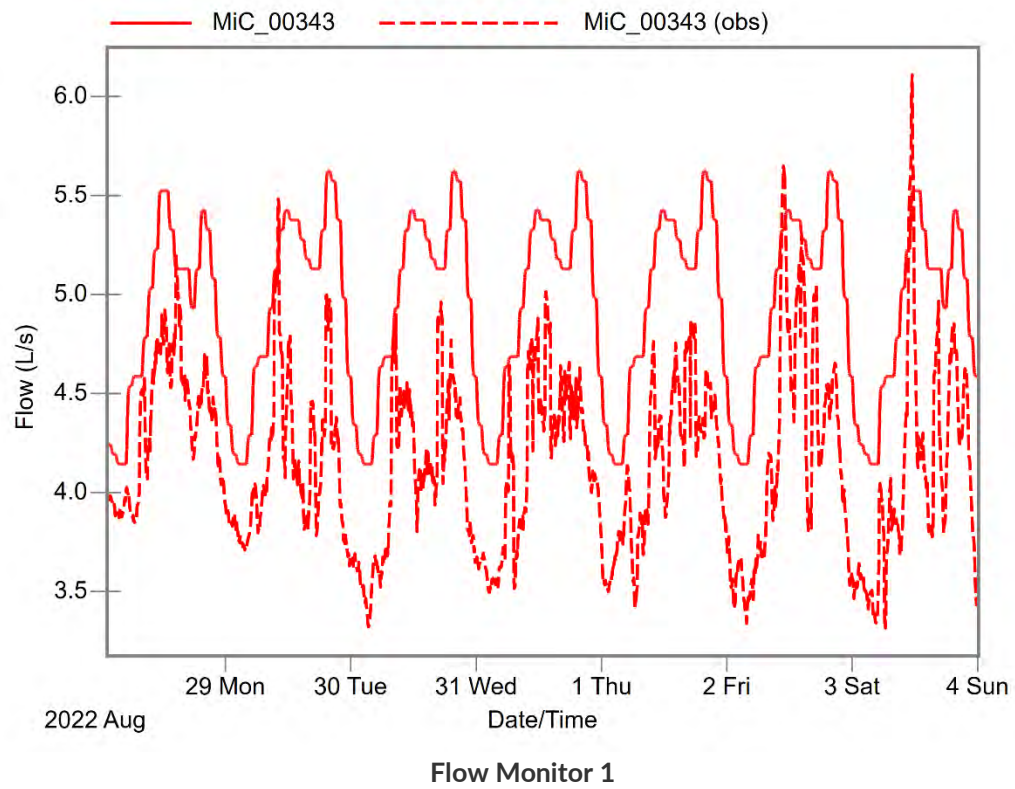


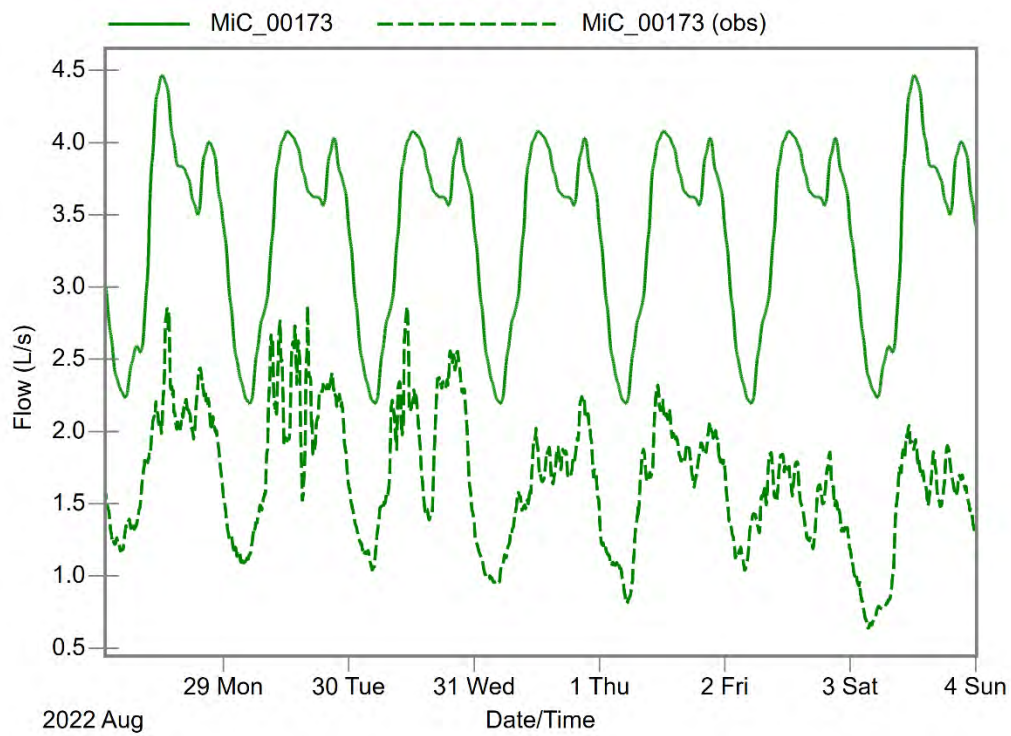
Flow Monitor 2



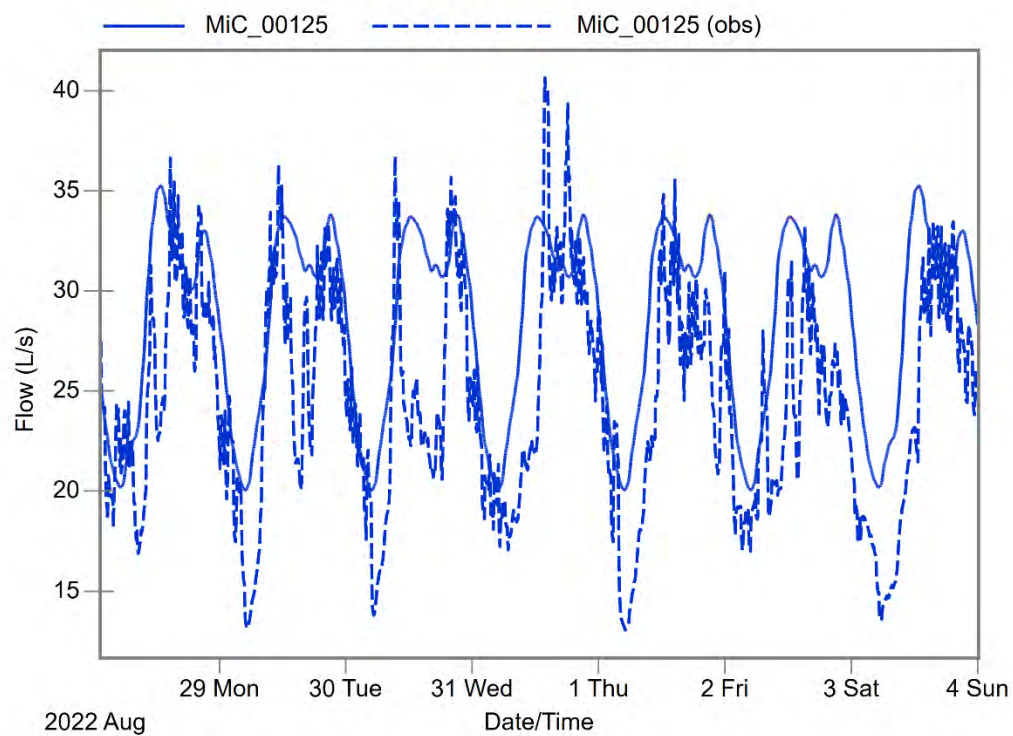
Flow Monitor 3

Dry Weather Flow Validation
August 28, 2022 – September 4, 2022



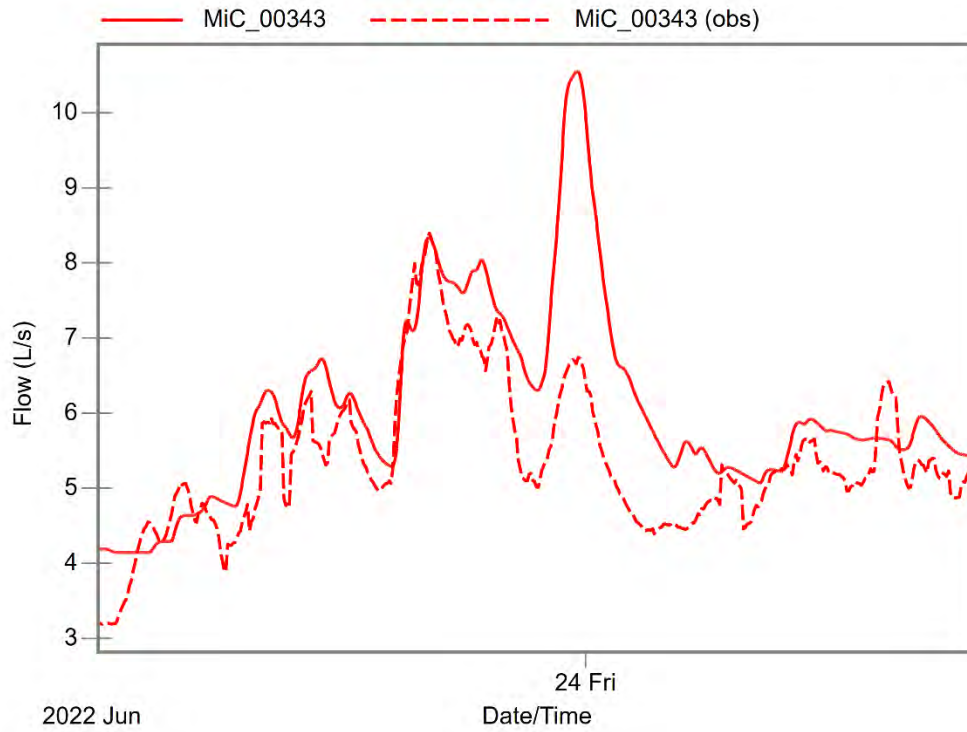


Flow Monitor 2

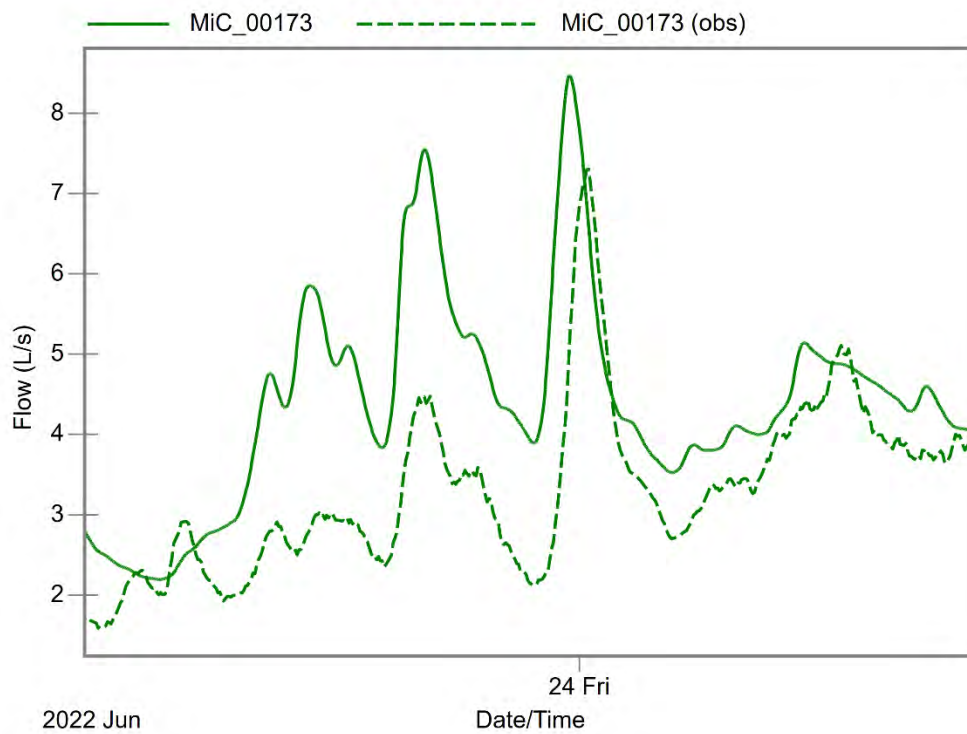


Flow Monitor 3

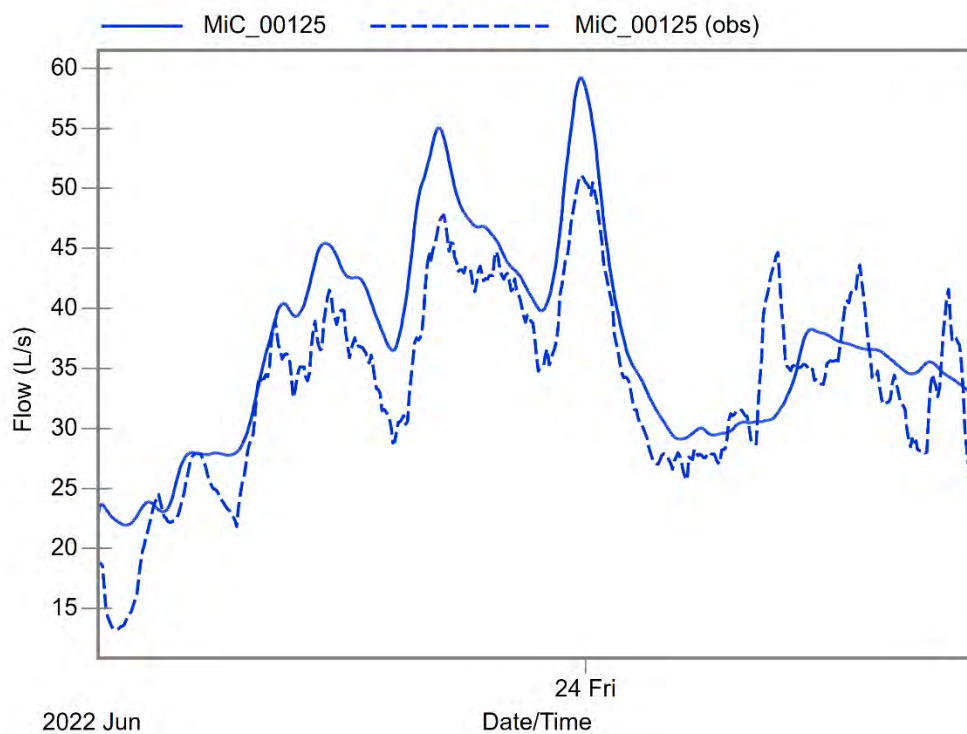
Wet Weather Flow Validation
June 23-24, 2022



Flow Monitor 1

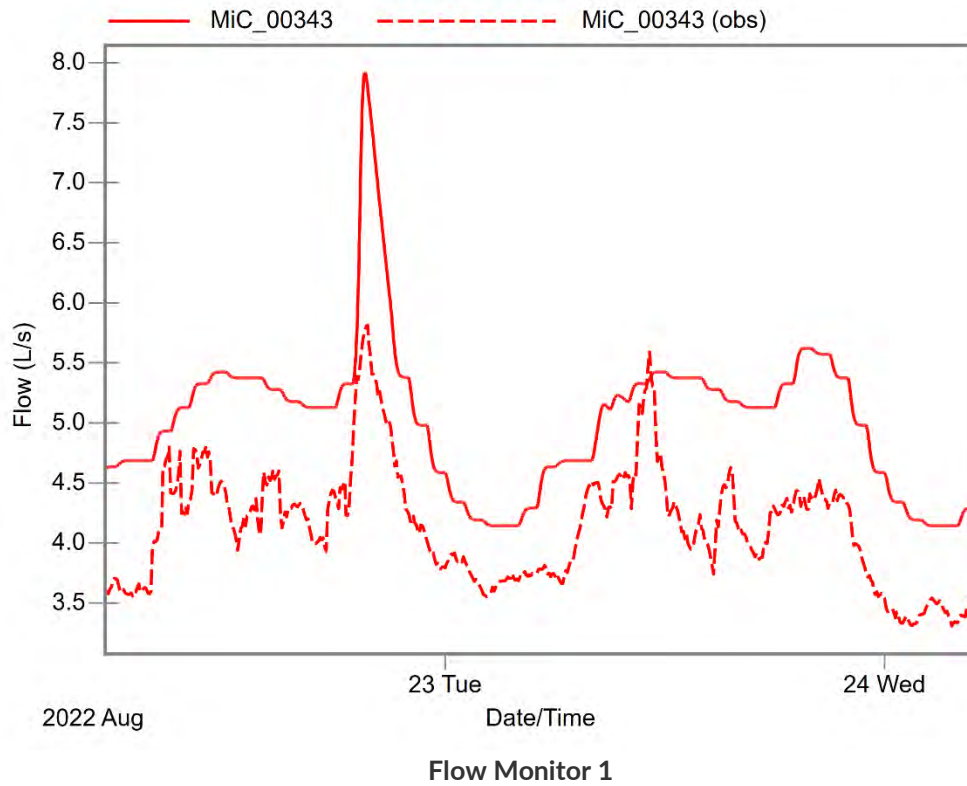


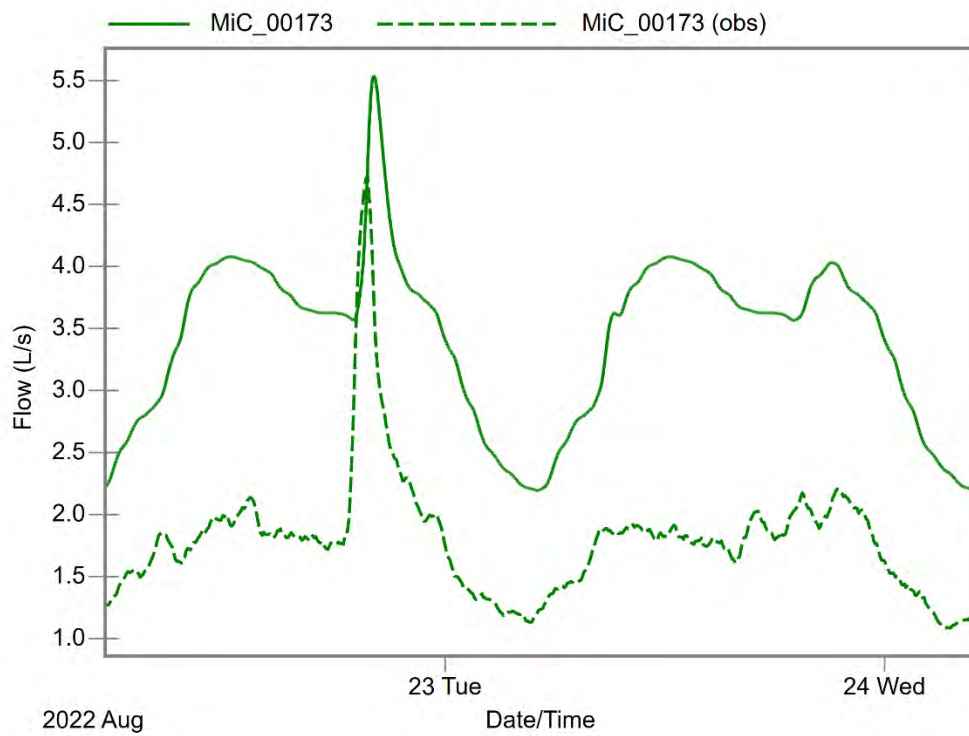
Flow Monitor 2



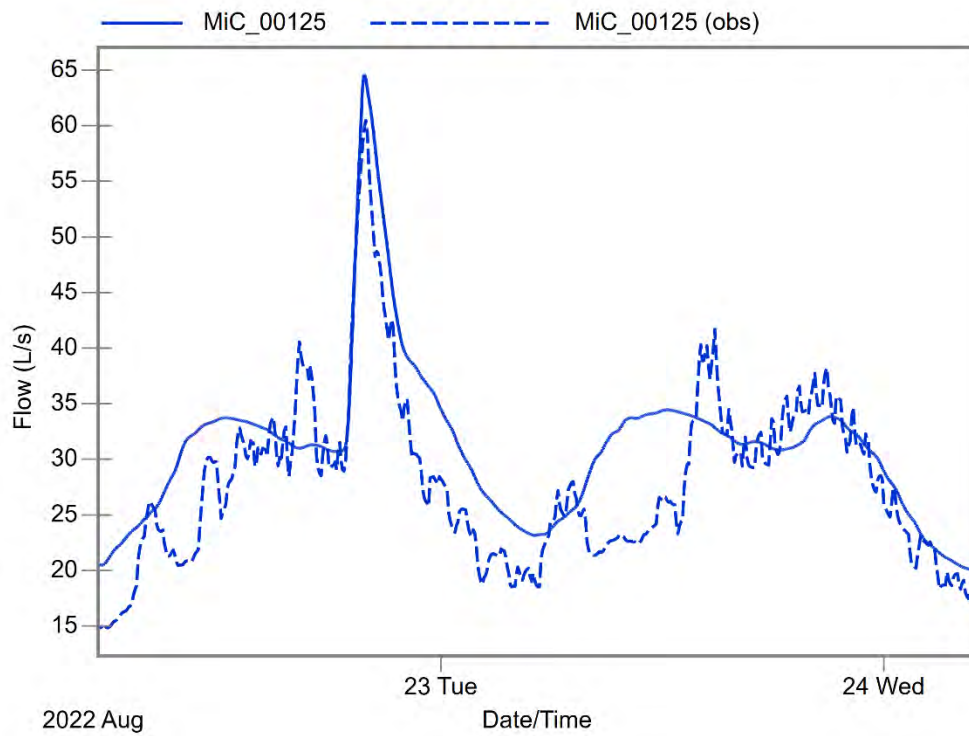
Flow Monitor 3

Wet Weather Flow Validation
August 22-23, 2022





Flow Monitor 2



Flow Monitor 3

APPENDIX C - UPGRADES TO THE EXISTING SYSTEM

Table C-1: Upgrade #1 – Existing and Proposed Pipe Configurations

					Existing		Proposed	
Location	Name	From_MH	To_MH	Length (m)	Diameter (m)	Q _p /Q _f ¹	Diameter (m)	Q _p /Q _f ¹
105 Avenue	MiC_00370 ²	MiJ_00244	MiJ_00145	43.85	0.2	1.06	0.25	0.62
105 Avenue	MiC_00037 ³	MiJ_00339	MiJ_00145	77.92	0.02	1.08	0.25	0.60
Griffith Trail	MiC_00217	MiJ_00145	MiJ_00295	52.31	0.25	2.06	0.375	0.73
Griffith Trail	MiC_00218	MiJ_00295	MiJ_00354	120.53	0.25	1.30	0.375	0.46
Griffith Trail	MiC_00199	MiJ_00354	MiJ_00309	117.81	0.25	2.41	0.375	0.85
Griffith Trail	MiC_00430	MiJ_00309	MiJ_00170	54.89	0.25	1.42	0.375	0.50
Griffith Trail	MiC_00429	MiJ_00170	MiJ_00330	116.76	0.25	1.90	0.375	0.67
Griffith Trail	MiC_00428	MiJ_00330	MiJ_00122	87.08	0.25	1.34	0.375	0.47
Griffith Trail	MiC_00354	MiJ_00122	MiJ_00204	107.98	0.25	1.78	0.375	0.69
Griffith Trail	MiC_00355	MiJ_00204	MiJ_00267	91.00	0.25	1.93	0.375	0.75
Griffith Trail	MiC_00359	MiJ_00267	MiJ_00303	107.98	0.25	1.93	0.375	0.75
Griffith Trail	MiC_00174	MiJ_00303	MiJ_00239	105.18	0.25	1.73	0.375	0.67
Griffith Trail	MiC_00173	MiJ_00239	MiJ_00371	113.50	0.25	1.83	0.375	0.77
Griffith Trail	MiC_00162	MiJ_00371	MiJ_00041	78.50	0.25	1.69	0.375	0.71
Griffith Trail	MiC_00161	MiJ_00041	MiJ_00347	87.67	0.25	2.05	0.375	0.86
Fire Break Road	MiC_00160	MiJ_00347	MiJ_00219	118.28	0.25	1.74	0.375	0.73
Fire Break Road	MiC_00159	MiJ_00219	MiJ_00402	88.37	0.25	1.86	0.375	0.78
Fire Break Road	MiC_00102	MiJ_00402	MiJ_00071	107.03	0.25	1.40	0.375	0.59
Fire Break Road	MiC_00158	MiJ_00071	MiJ_00266	12.04	0.25	0.23	0.375	0.10
Moberly Road	MiC_00116	MiJ_00266	MiJ_00413	91.71	0.25	1.31	0.375	0.55

¹ Q_p/Q_f – Peak flow fraction of conduit full flow computed during the 1:25-year, 4-hour simulation
² Profile UP1-A
³ Profile UP1-B

Table C-1: Upgrade #2 – Existing and Proposed Pipe Configurations

					Existing		Proposed	
Location	Name	From_MH	To_MH	Length (m)	Diameter (m)	Q_p/Q_f^4	Diameter (m)	Q_p/Q_f^4
97 Avenue	MiC_00282	MiJ_00188	MiJ_00015	64.39	0.3	1.33	0.375	0.76
97 Avenue	MiC_00283	MiJ_00015	MiJ_00208	107.33	0.3	1.46	0.375	0.83
97 Avenue	MiC_00284	MiJ_00208	MiJ_00109	97.46	0.3	1.27	0.375	0.72
97 Avenue and 108 Street	MiC_00285	MiJ_00109	MiJ_00096	10.29	0.3	0.69	0.375	0.39
West of 108 Street	MiC_00286	MiJ_00096	MiJ_00039	41.51	0.2	5.01	0.375	0.98

⁴ Q_p/Q_f – Peak flow fraction of conduit full flow computed during the 1:25-year, 4-hour simulation



Figure C-1: UP1-A – Existing System Hydraulic Grade Line Profile (1:25-year, 4-hour)



Figure C-2: UP1-B – Existing System Hydraulic Grade Line Profile (1:25-year, 4-hour)

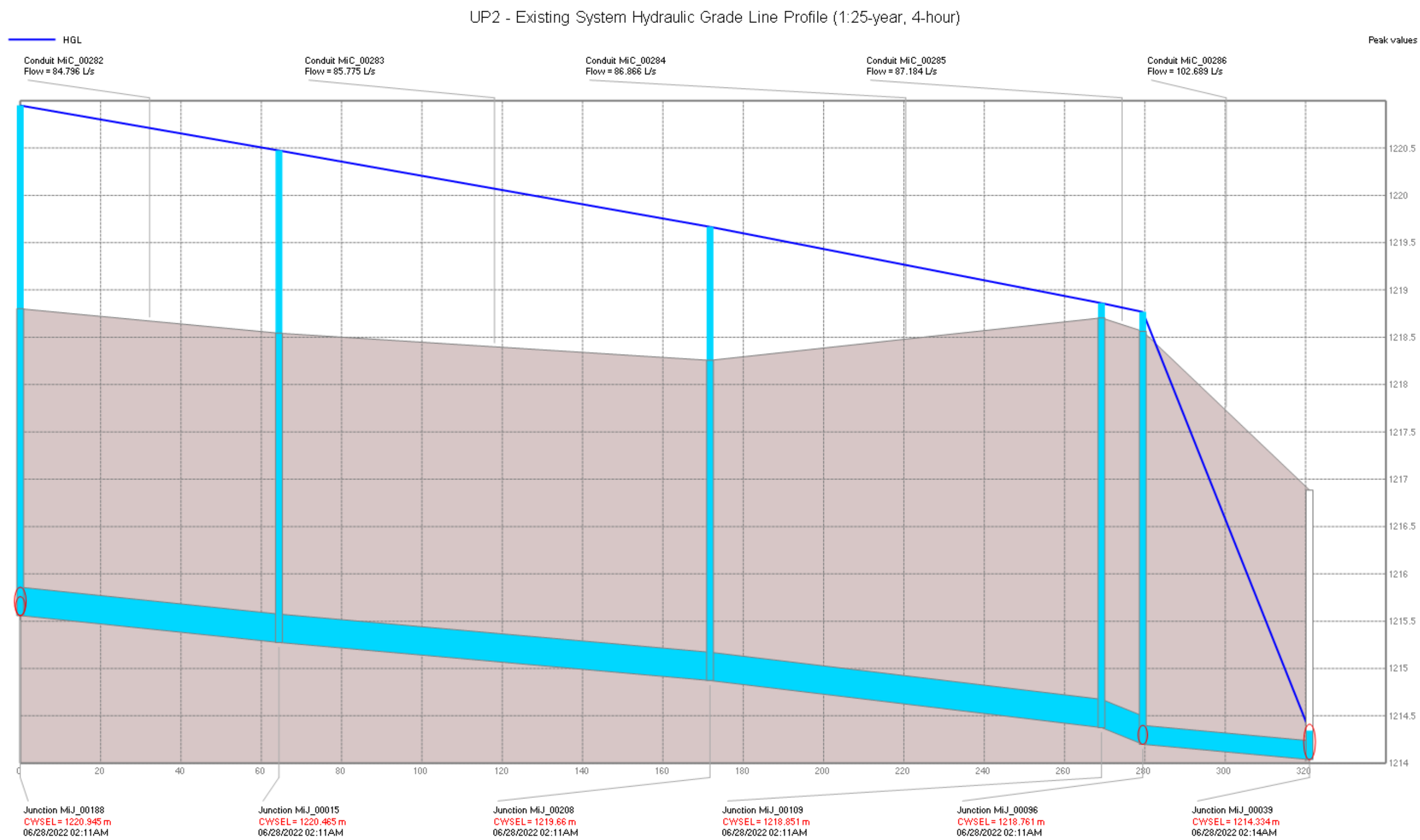


Figure C-3: UP2 – Existing System Hydraulic Grade Line Profile (1:25-year, 4-hour)

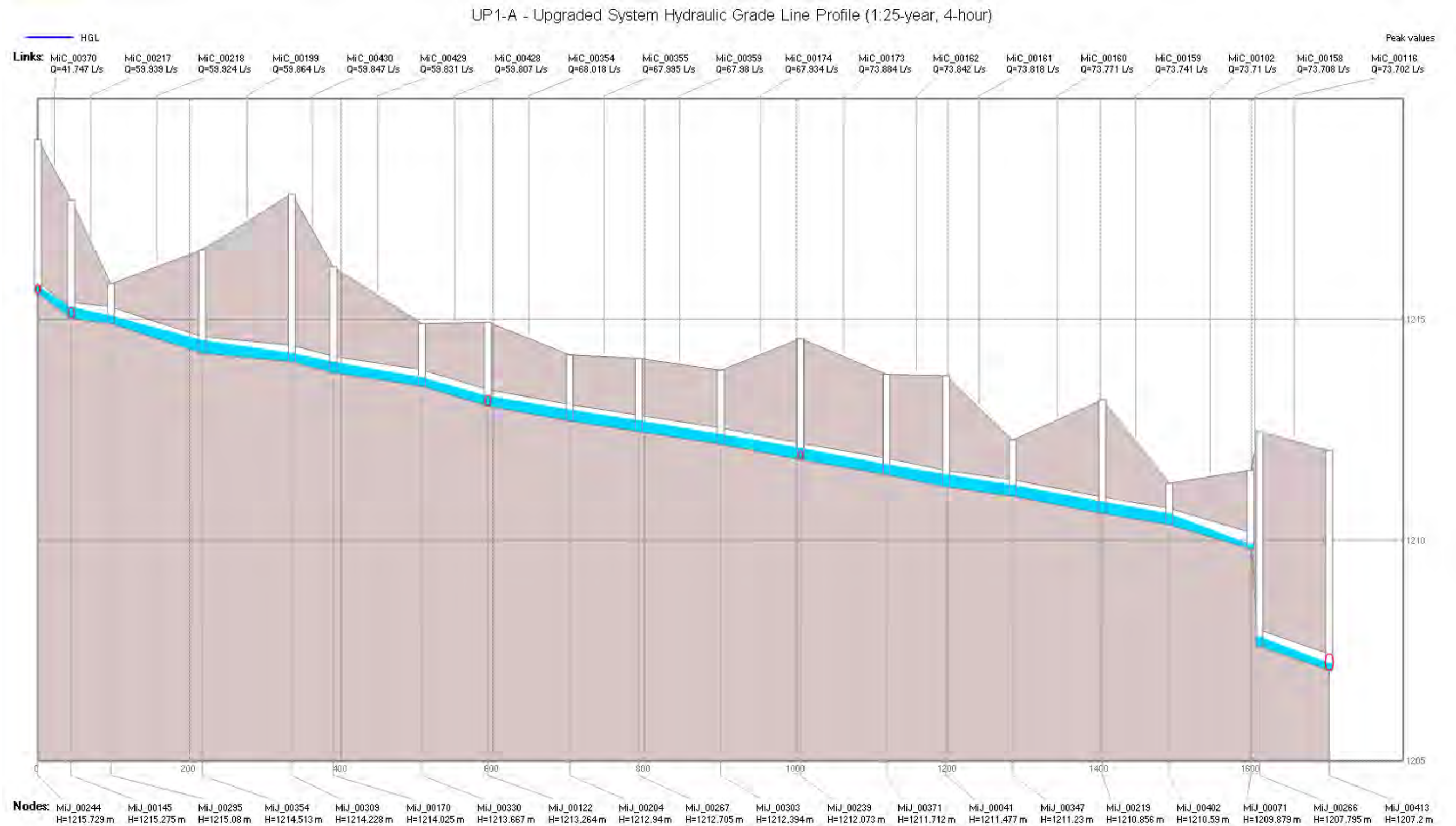


Figure C-4: UP1-A - Proposed System Hydraulic Grade Line Profile (1:25-year, 4-hour)

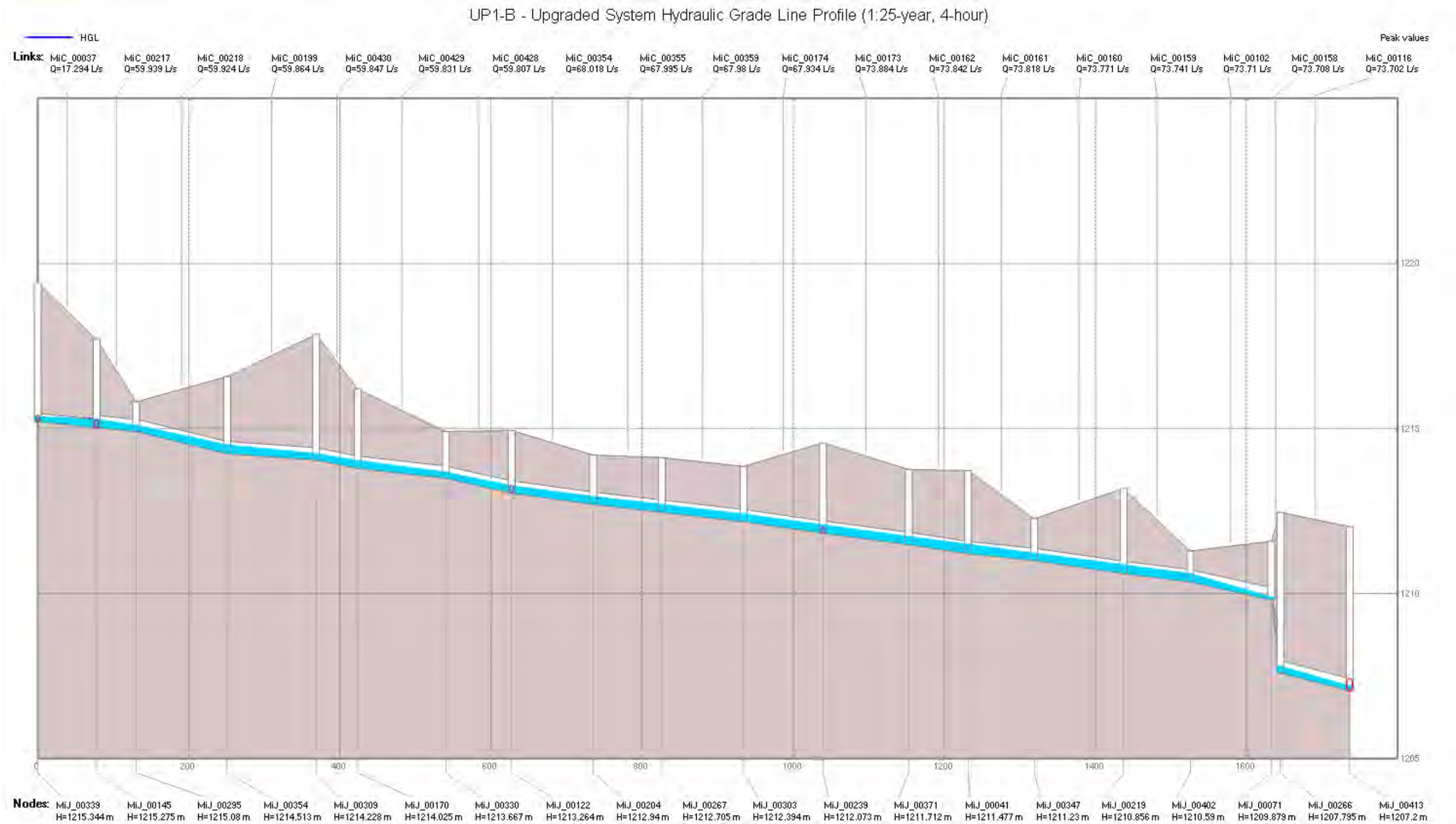


Figure C-5: UP1-B - Proposed System Hydraulic Grade Line Profile (1:25-year, 4-hour)

UP2 - Upgraded System Hydraulic Grade Line Profile (1:25-year, 4-hour)

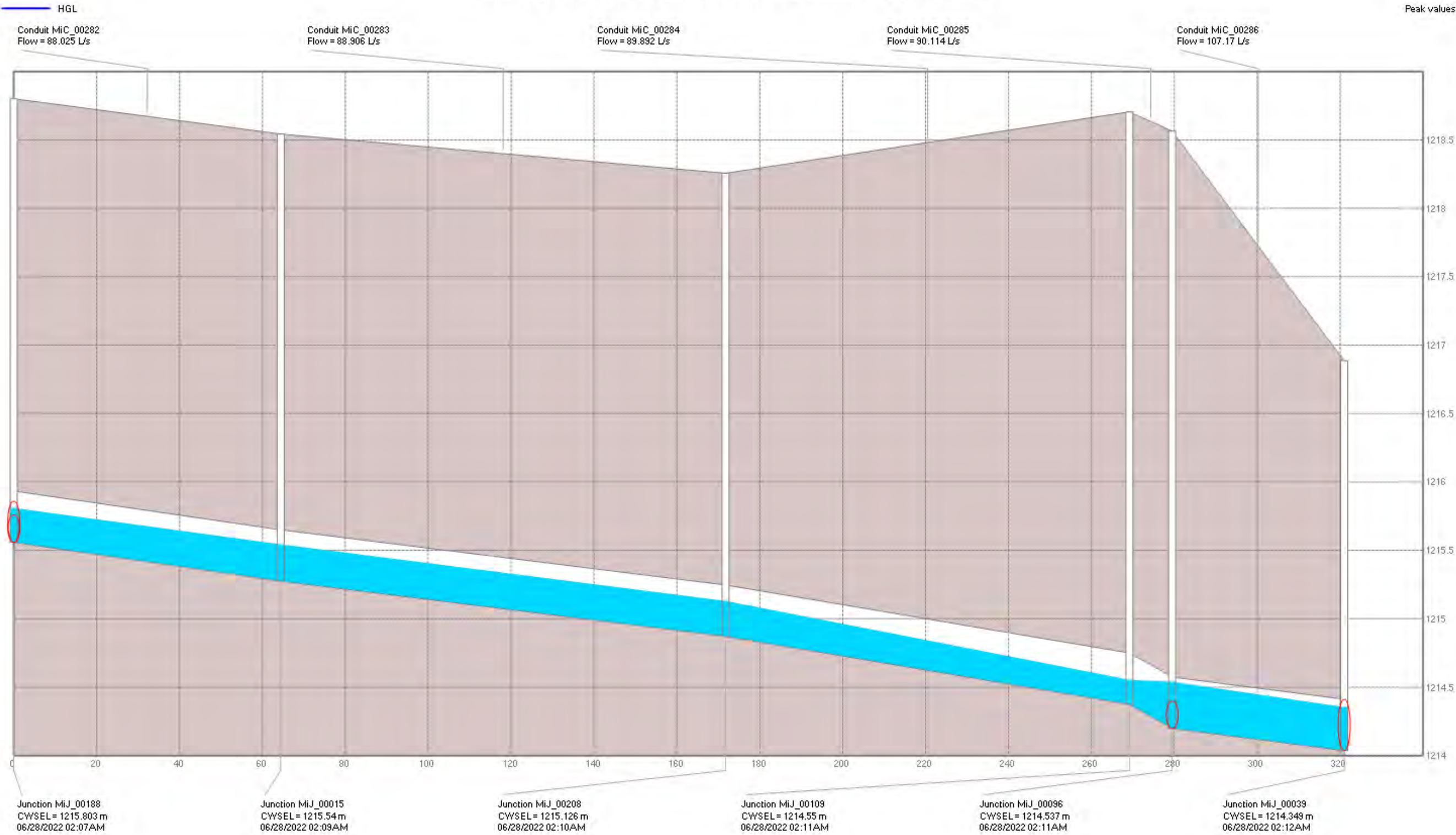


Figure C-6: UP2 - Proposed System Hydraulic Grade Line Profile (1:25-year, 4-hour)

**UPGRADES TO EXISTING SYSTEM FOR ULTIMATE DEVELOPMENT
(1:25-YEAR, 4-HOUR)**

Table C-3: Interim Phase Pipe Upgrade

					Existing		Proposed	
Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Q _p /Q _f ⁵	Diameter (m)	Q _p /Q _f ⁵
Shand Avenue	MiC_00328	MiJ_00378	MiJ_00095	76.23	0.2	1.13	0.25	0.64
Between 99 Street and 100 Street	MiC_00329	MiJ_00095	MiJ_00276	105.08	0.2	1.51	0.25	0.85
Between 99 Street and 100 Street	MiC_00356	MiJ_00276	MiJ_00137	112.69	0.2	1.36	0.25	0.76
Between 99 Street and 100 Street	MiC_00332	MiJ_00137	MiJ_00059	110.83	0.2	1.72	0.25	0.97
Between 99 Street and 100 Street	MiC_00341	MiJ_00059	MiJ_00299	112.69	0.2	1.48	0.25	0.84
Between 99 Street and 100 Street	MiC_00343	MiJ_00299	MiJ_00005	63.50	0.2	2.59	0.3	0.95
Between 99 Street and 100 Street	MiC_00344	MiJ_00005	MiJ_00269	86.28	0.2	1.89	0.3	0.69
98 Avenue	MiC_00073	MiJ_00269	MiJ_00083	63.12	0.2	0.98	0.3	0.36
Crossing Bighorn Highway	MiC_00346	MiJ_00083	MiJ_00304	86.35	0.2	1.38	0.3	0.5
Sewer Line Road	MiC_00461	MiJ_00304	MiJ_00273	39.45	0.2	0.82	0.3	0.3
Sewer Line Road	MiC_00379	MiJ_00273	MiJ_00401	120.21	0.2	1.17	0.3	0.5
Sewer Line Road	MiC_00380	MiJ_00401	MiJ_00435	120.25	0.2	0.82	0.3	0.35

⁵ Q_p/Q_f – Peak flow fraction of conduit full flow computed during the 1:25-year, 4-hour simulation

Table C-4: Ultimate Phase Pipe Upgrade – 1								
					Existing		Proposed	
Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Q_p/Q_f^6	Diameter (m)	Q_p/Q_f^6
Sewer Line Road	MiC_00422	MiJ_00236	MiJ_00280	120.01	0.375	1.81	0.45	1.2
Sewer Line Road	MiC_00423	MiJ_00280	MiJ_00058	92.98	0.375	1.43	0.45	0.95
Sewer Line Road	MiC_00016	MiJ_00058	MiJ_00298	94.23	0.375	1.43	0.45	0.95
Hoppe Avenue	MiC_00121	MiJ_00298	MiJ_00374	89.43	0.375	0.67	0.45	0.45

Table C-5: Ultimate Phase Pipe Upgrade – 2								
					Existing		Proposed	
Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Q_p/Q_f^6	Diameter (m)	Q_p/Q_f^6
Hoppe Avenue	MiC_00424	MiJ_00425	MiJ_00432	88.57	0.375	1.11	0.45	0.68
Sewer Line Road	MiC_00123	MiJ_00432	MiJ_00086	119.22	0.375	1.09	0.45	0.7
Sewer Line Road	MiC_00124	MiJ_00086	MiJ_00226	49.03	0.375	1.04	0.45	0.67

Table C-6: Ultimate Phase Pipe Upgrade – 3								
					Existing		Proposed	
Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Q_p/Q_f^6	Diameter (m)	Q_p/Q_f^6
Sewer Line Road	MiC_00131	MiJ_00362	MiJ_00279	141.05	0.675	1.16	0.675	0.88
Sewer Line Road	MiC_00132	MiJ_00279	MiJ_00007	110.03	0.675	1.01	0.675	0.77
Sewer Line Road	MiC_00001	MiJ_00007	MiO_00002	149.39	0.675	0.31	0.675	0.23

⁶ Q_p/Q_f – Peak flow fraction of conduit full flow computed during the 1:25-year, 4-hour simulation

APPENDIX D - FUTURE CONCEPT

Table D
Hamlet of Grande Cache
Future Concept Details

Riverview Conduits

Name	Inlet Node	Outlet Node	Length (m)	Inlet Elevation (m)	Outlet Elevation (m)	Slope (m/m)	Diameter (m)
MiC_93566	MiJ_93528	MiJ_93506	213.43	1191.00	1180.33	0.050	0.20
MiC_93567	MiJ_93506	MiJ_93508	130.59	1180.33	1179.15	0.009	0.20
MiC_93568	MiJ_93508	MiJ_93507	157.38	1179.15	1176.79	0.015	0.25
MiC_93569	MiJ_93507	MiJ_93509	180.85	1176.79	1176.07	0.004	0.25
MiC_93570	MiJ_93509	MiJ_93510	108.19	1176.07	1175.64	0.004	0.30
MiC_93571	MiJ_93510	MiJ_93511	125.15	1175.64	1175.01	0.005	0.30
MiC_93572	MiJ_93511	MiJ_93512	109.94	1175.01	1174.46	0.005	0.30
MiC_93573	MiJ_93512	MiJ_93513	119.33	1174.46	1172.31	0.018	0.30
MiC_93574	MiJ_93513	MiJ_93514	132.24	1172.31	1171.78	0.004	0.30
MiC_93575	MiJ_93514	MiJ_93515	118.82	1171.78	1171.31	0.004	0.30
MiC_93576	MiJ_93515	MiJ_93516	111.85	1171.31	1170.86	0.004	0.30
MiC_93577	MiJ_93516	MiJ_93517	144.30	1170.86	1170.28	0.004	0.30
MiC_93578	MiJ_93517	MiJ_93518	93.40	1170.28	1169.91	0.004	0.30
MiC_93579	MiJ_93518	MiJ_93519	96.73	1169.91	1169.52	0.004	0.30
MiC_93580	MiJ_93519	MiJ_93520	84.11	1169.52	1169.19	0.004	0.30
MiC_93581	MiJ_93520	MiJ_93521	104.15	1169.19	1168.77	0.004	0.30
MiC_93582	MiJ_93521	MiJ_93522	121.67	1168.77	1168.28	0.004	0.30
MiC_93583	MiJ_93522	MiJ_93523	124.51	1168.28	1167.79	0.004	0.30
MiC_93584	MiJ_93523	MiJ_93524	86.89	1167.79	1167.44	0.004	0.30
MiC_93585	MiJ_93524	MiJ_93525	88.19	1167.44	1167.09	0.004	0.30
MiC_93586	MiJ_93525	MiJ_93526	139.89	1167.09	1165.69	0.010	0.30
MiC_93587	MiJ_93526	MiJ_93527	98.80	1153.53	1148.59	0.050	0.30
MiC_93588	MiJ_93527	MiJ_00432	130.79	1148.59	1142.06	0.050	0.30

Table D Continued
Hamlet of Grande Cache
Future Concept Details

Riverview Junctions

Name	Invert Elevation (m)	Rim Elevation (m)	Depth (m)
MiJ_93528	1191.00	1197.47	6.47
MiJ_93506	1180.33	1183.23	2.90
MiJ_93508	1179.15	1182.13	2.97
MiJ_93507	1176.79	1179.51	2.71
MiJ_93509	1176.07	1178.80	2.73
MiJ_93510	1175.64	1179.77	4.13
MiJ_93511	1175.01	1177.73	2.72
MiJ_93512	1174.46	1178.18	3.71
MiJ_93513	1172.31	1175.13	2.81
MiJ_93514	1171.78	1177.35	5.56
MiJ_93515	1171.31	1176.44	5.13
MiJ_93516	1170.86	1174.36	3.50
MiJ_93517	1170.28	1179.06	8.78
MiJ_93518	1169.91	1177.73	7.82
MiJ_93519	1169.52	1175.00	5.48
MiJ_93520	1169.19	1175.41	6.22
MiJ_93521	1168.77	1172.18	3.41
MiJ_93522	1168.28	1174.90	6.61
MiJ_93523	1167.79	1174.57	6.78
MiJ_93524	1167.44	1173.80	6.36
MiJ_93525	1167.09	1173.65	6.56
MiJ_93526	1153.53	1169.12	15.59
MiJ_93527	1148.59	1152.11	3.51
MiJ_00432	1142.06	1146.13	4.08

Table D Continued
Hamlet of Grande Cache
Future Concept Details

Floyd McLennan Business Park Conduits

Name	Inlet Node	Outlet Node	Length (m)	Inlet Elevation (m)	Outlet Elevation (m)	Slope (m/m)	Diameter (m)
MiC_93589	MiJ_93530	MiJ_93531	132.89	1272.65	1269.33	0.025	0.20
MiC_93590	MiJ_93531	MiJ_00378	118.42	1269.33	1265.77	0.030	0.20

Floyd McLennan Business Park Junctions

Name	Invert Elevation (m)	Rim Elevation (m)	Depth (m)
MiJ_93530	1272.65	1276.07	3.42
MiJ_93531	1269.33	1274.40	5.08

Tower Park Conduits – 1

Name	Inlet Node	Outlet Node	Length (m)	Inlet Elevation (m)	Outlet Elevation (m)	Slope (m/m)	Diameter (m)
MiC_93593	MiJ_93532	MiJ_93533	112.83	1292.66	1290.40	0.020	0.20
MiC_93594	MiJ_93533	MiJ_93534	115.30	1290.40	1285.21	0.045	0.20
MiC_93595	MiJ_93534	MiJ_93535	196.01	1285.21	1279.33	0.030	0.20
MiC_93596	MiJ_93535	MiJ_93536	193.22	1279.33	1263.87	0.080	0.20
MiC_93597	MiJ_93536	MiJ_93537	114.08	1263.87	1258.17	0.050	0.20
MiC_93598	MiJ_93537	MiJ_93538	111.31	1258.17	1252.60	0.050	0.20
MiC_93599	MiJ_93538	MiJ_93539	72.18	1252.60	1251.16	0.020	0.20
MiC_93600	MiJ_93539	MiJ_00228	70.55	1251.16	1250.81	0.005	0.20

Table D Continued
Hamlet of Grande Cache
Future Concept Details

Tower Park Junctions – 1

Name	Invert Elevation (m)	Rim Elevation (m)	Depth (m)
MiJ_93532	1292.66	1295.26	2.60
MiJ_93533	1290.40	1293.67	3.27
MiJ_93534	1285.21	1288.16	2.95
MiJ_93535	1279.33	1285.45	6.11
MiJ_93536	1263.87	1270.30	6.42
MiJ_93537	1258.17	1264.90	6.73
MiJ_93538	1252.60	1255.93	3.32
MiJ_93539	1251.16	1253.94	2.78

Tower Park Conduits – 2

Name	Inlet Node	Outlet Node	Length (m)	Inlet Elevation (m)	Outlet Elevation (m)	Slope (m/m)	Diameter (m)
MiC_93601	MiJ_93540	MiJ_93541	164.53	1272.66	1266.08	0.040	0.20
MiC_93602	MiJ_93541	MiJ_93542	101.06	1266.08	1263.05	0.030	0.20
MiC_93603	MiJ_93542	MiJ_93543	104.42	1263.05	1262.01	0.010	0.20
MiC_93604	MiJ_93543	MiJ_93544	130.38	1262.01	1261.48	0.004	0.20
MiC_93605	MiJ_93544	MiJ_93545	111.73	1261.48	1257.02	0.040	0.20
MiC_93606	MiJ_93545	MiJ_93546	113.95	1257.02	1247.33	0.085	0.20
MiC_93607	MiJ_93546	MiJ_93547	98.02	1247.33	1242.43	0.050	0.20
MiC_93608	MiJ_93547	MiJ_93548	112.32	1242.43	1237.37	0.045	0.20
MiC_93609	MiJ_93548	MiJ_93549	110.59	1237.37	1235.72	0.015	0.20
MiC_93610	MiJ_93549	MiJ_00099	118.69	1235.72	1235.24	0.004	0.20

Table D Continued
Hamlet of Grande Cache
Future Concept Details

Tower Park Junctions - 2

Name	Invert Elevation (m)	Rim Elevation (m)	Depth (m)
MiJ_93540	1272.66	1278.48	5.82
MiJ_93541	1266.08	1271.57	5.49
MiJ_93542	1263.05	1267.79	4.74
MiJ_93543	1262.01	1264.60	2.60
MiJ_93544	1261.48	1267.39	5.91
MiJ_93545	1257.02	1265.20	8.18
MiJ_93546	1247.33	1254.86	7.53
MiJ_93547	1242.43	1245.60	3.17
MiJ_93548	1237.37	1244.55	7.18
MiJ_93549	1235.72	1238.43	2.72
MiJ_00099	1235.24	1238.35	3.11

Table D Continued
Hamlet of Grande Cache
Future Concept Details

South Bench Conduits

Name	Inlet Node	Outlet Node	Length (m)	Inlet Elevation (m)	Outlet Elevation (m)	Slope (m/m)	Diameter (m)
MiC_95414	MiJ_93553	MiJ_93552	108.68	1213.04	1208.69	0.04	0.20
MiC_95415	MiJ_93552	MiJ_93551	95.04	1208.69	1204.89	0.04	0.20
MiC_95416	MiJ_93551	MiJ_93550	94.98	1204.89	1202.04	0.03	0.20
MiC_95417	MiJ_93550	MiJ_93554	118.48	1202.04	1198.49	0.03	0.20
MiC_95418	MiJ_93554	MiJ_93555	103.31	1198.49	1195.39	0.03	0.20
MiC_95419	MiJ_93555	MiJ_93556	107.90	1195.39	1194.31	0.01	0.20
MiC_95420	MiJ_93556	MiJ_93557	93.59	1194.31	1189.63	0.05	0.20
MiC_95421	MiJ_93557	MiJ_93558	45.94	1189.63	1188.25	0.03	0.20
MiC_95422	MiJ_93558	MiJ_93559	65.53	1188.25	1186.28	0.03	0.20
MiC_95423	MiJ_93559	MiJ_93560	106.90	1186.28	1184.15	0.02	0.20
MiC_95424	MiJ_93560	MiJ_93561	92.52	1184.15	1182.30	0.02	0.20
MiC_95425	MiJ_93561	MiJ_93562	84.56	1182.30	1180.61	0.02	0.20
MiC_95426	MiJ_93562	MiJ_93563	85.58	1180.61	1178.89	0.02	0.20
MiC_95427	MiJ_93563	MiJ_93564	86.41	1178.89	1177.17	0.02	0.20
MiC_95428	MiJ_93564	MiJ_93565	112.85	1177.17	1174.91	0.02	0.20
MiC_95429	MiJ_93565	MiJ_00168	85.09	1174.91	1173.21	0.02	0.20

Table D Continued
Hamlet of Grande Cache
Future Concept Details

South Bench Junctions

Name	Invert Elevation (m)	Rim Elevation (m)	Depth (m)
MiJ_93553	1217.84	1213.04	4.80
MiJ_93552	1214.18	1208.69	5.49
MiJ_93551	1208.91	1204.89	4.02
MiJ_93550	1206.20	1202.04	4.16
MiJ_93554	1201.11	1198.49	2.62
MiJ_93555	1201.48	1195.39	6.09
MiJ_93556	1200.86	1194.31	6.55
MiJ_93557	1196.13	1189.63	6.50
MiJ_93558	1194.38	1188.25	6.13
MiJ_93559	1192.60	1186.28	6.32
MiJ_93560	1190.00	1184.15	5.86
MiJ_93561	1189.17	1182.30	6.87
MiJ_93562	1188.62	1180.61	8.02
MiJ_93563	1184.43	1178.89	5.53
MiJ_93564	1183.23	1177.17	6.06
MiJ_93565	1178.47	1174.91	3.56
MiJ_00168	1178.15	1173.21	4.94

APPENDIX E - UNIT COST BREAKDOWN

Table E
Hamlet of Grande Cache
Pipe Upgrades Cost Breakdown

Upgrades to Existing System

Upgrade #1

Location	Name	From_MH	To_MH	Length (m)	Diameter (m)	Unit Cost (\$/m)	Pipe Cost	Type
105 Avenue	MiC_00370	MiJ_00244	MiJ_00145	43.85	0.25	3700	\$ 162,300	Developed
105 Avenue	MiC_00037	MiJ_00339	MiJ_00145	77.92	0.25	3700	\$ 288,300	Developed
Griffith Trail	MiC_00217	MiJ_00145	MiJ_00295	52.31	0.375	3960	\$ 207,200	Developed
Griffith Trail	MiC_00218	MiJ_00295	MiJ_00354	120.53	0.375	3030	\$ 365,200	Undeveloped
Griffith Trail	MiC_00199	MiJ_00354	MiJ_00309	117.81	0.375	3030	\$ 357,000	Undeveloped
Griffith Trail	MiC_00430	MiJ_00309	MiJ_00170	54.89	0.375	3030	\$ 166,300	Undeveloped
Griffith Trail	MiC_00429	MiJ_00170	MiJ_00330	116.76	0.375	3030	\$ 353,800	Undeveloped
Griffith Trail	MiC_00428	MiJ_00330	MiJ_00122	87.08	0.375	3030	\$ 263,900	Undeveloped
Griffith Trail	MiC_00354	MiJ_00122	MiJ_00204	107.98	0.375	3030	\$ 327,200	Undeveloped
Griffith Trail	MiC_00355	MiJ_00204	MiJ_00267	91.00	0.375	3030	\$ 275,700	Undeveloped
Griffith Trail	MiC_00359	MiJ_00267	MiJ_00303	107.98	0.375	3030	\$ 327,200	Undeveloped
Griffith Trail	MiC_00174	MiJ_00303	MiJ_00239	105.18	0.375	3030	\$ 318,700	Undeveloped
Griffith Trail	MiC_00173	MiJ_00239	MiJ_00371	113.50	0.375	3030	\$ 343,900	Undeveloped
Griffith Trail	MiC_00162	MiJ_00371	MiJ_00041	78.50	0.375	3030	\$ 237,800	Undeveloped
Griffith Trail	MiC_00161	MiJ_00041	MiJ_00347	87.67	0.375	3030	\$ 265,600	Undeveloped
Fire Break Road	MiC_00160	MiJ_00347	MiJ_00219	118.28	0.375	3030	\$ 358,400	Undeveloped
Fire Break Road	MiC_00159	MiJ_00219	MiJ_00402	88.37	0.375	3030	\$ 267,800	Undeveloped
Fire Break Road	MiC_00102	MiJ_00402	MiJ_00071	107.03	0.375	3030	\$ 324,300	Undeveloped
Fire Break Road	MiC_00158	MiJ_00071	MiJ_00266	12.04	0.375	3030	\$ 36,500	Undeveloped
Moberly Road	MiC_00116	MiJ_00266	MiJ_00413	91.71	0.375	3030	\$ 277,900	Undeveloped
Total				1780	Total		\$ 5,525,000	

Table E Continued
Hamlet of Grande Cache
Pipe Upgrades Cost Breakdown

Upgrade 2

Location	Name	From_MH	To_MH	Length (m)	Diameter (m)	Unit Cost (\$/m)	Pipe Cost	Type
97 Avenue	MiC_00282	MiJ_00188	MiJ_00015	64.39	0.375	3960	\$ 255,000	Developed
97 Avenue	MiC_00283	MiJ_00015	MiJ_00208	107.33	0.375	3960	\$ 425,000	Developed
97 Avenue	MiC_00284	MiJ_00208	MiJ_00109	97.46	0.375	3960	\$ 385,900	Developed
97 Avenue and 108 Street	MiC_00285	MiJ_00109	MiJ_00096	10.29	0.375	3960	\$ 40,800	Developed
West of 108 Street	MiC_00286	MiJ_00096	MiJ_00039	41.51	0.375	3960	\$ 164,400	Developed
			Total	321		Total	\$ 1,271,100	

Interim Upgrades to Existing

Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Unit Cost (\$/m)	Pipe Cost	Type
Shand Avenue	MiC_00328	MiJ_00378	MiJ_00095	76.23	0.25	3700	\$ 282,100	Developed
Between 99 Street and 100 Street	MiC_00329	MiJ_00095	MiJ_00276	105.08	0.25	2770	\$ 291,100	Undeveloped
Between 99 Street and 100 Street	MiC_00356	MiJ_00276	MiJ_00137	112.69	0.25	2770	\$ 312,200	Undeveloped
Between 99 Street and 100 Street	MiC_00332	MiJ_00137	MiJ_00059	110.83	0.25	3700	\$ 410,100	Developed
Between 99 Street and 100 Street	MiC_00341	MiJ_00059	MiJ_00299	112.69	0.25	3700	\$ 417,000	Developed
Between 99 Street and 100 Street	MiC_00343	MiJ_00299	MiJ_00005	63.50	0.3	2890	\$ 183,500	Undeveloped
Between 99 Street and 100 Street	MiC_00344	MiJ_00005	MiJ_00269	86.28	0.3	2890	\$ 249,300	Undeveloped
98 Avenue	MiC_00073	MiJ_00269	MiJ_00083	63.12	0.3	3810	\$ 240,500	Developed
Crossing Bighorn Highway	MiC_00346	MiJ_00083	MiJ_00304	86.35	0.3	3810	\$ 329,000	Developed
Sewer Line Road	MiC_00461	MiJ_00304	MiJ_00273	39.45	0.3	3810	\$ 150,300	Developed
Sewer Line Road	MiC_00379	MiJ_00273	MiJ_00401	120.21	0.3	2890	\$ 347,400	Undeveloped
Sewer Line Road	MiC_00380	MiJ_00401	MiJ_00435	120.25	0.3	2890	\$ 347,500	Undeveloped
Total				1097		Total	\$ 3,560,000	

Table E Continued
Hamlet of Grande Cache
Pipe Upgrades Cost Breakdown

Ultimate Upgrades to Existing

Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Unit Cost (\$/m)	Pipe Cost	Type
Sewer Line Road	MiC_00422	MiJ_00236	MiJ_00280	120.01	0.45	3300	\$ 396,000	Undeveloped
Sewer Line Road	MiC_00423	MiJ_00280	MiJ_00058	92.98	0.45	3300	\$ 306,800	Undeveloped
Sewer Line Road	MiC_00016	MiJ_00058	MiJ_00298	94.23	0.45	3300	\$ 311,000	Undeveloped
Hoppe Avenue	MiC_00121	MiJ_00298	MiJ_00374	89.43	0.45	3300	\$ 295,100	Undeveloped
Total				397		Total	\$ 1,308,900	

Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Unit Cost (\$/m)	Pipe Cost	Type
Hoppe Avenue	MiC_00424	MiJ_00425	MiJ_00432	88.57	0.45	4380	\$ 387,900	Developed
Sewer Line Road	MiC_00123	MiJ_00432	MiJ_00086	119.22	0.45	3300	\$ 393,400	Undeveloped
Sewer Line Road	MiC_00124	MiJ_00086	MiJ_00226	49.03	0.45	3300	\$ 161,800	Undeveloped
			Total	257		Total	\$ 943,100	

Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Unit Cost (\$/m)	Pipe Cost	Type
Sewer Line Road	MiC_00131	MiJ_00362	MiJ_00279	141.05	0.675	4470	\$ 630,500	Undeveloped
Sewer Line Road	MiC_00132	MiJ_00279	MiJ_00007	110.03	0.675	4470	\$ 491,900	Undeveloped
Sewer Line Road	MiC_00001	MiJ_00007	MiO_00002	149.39	0.675	4470	\$ 667,800	Undeveloped
			Total	400		Total	\$ 1,790,200	

Table E Continued
Hamlet of Grande Cache
Pipe Upgrades Cost Breakdown

Future Concept								
Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Unit Cost (\$/m)	Pipe Cost	Type
Riverview	MiC_93566	MiJ_93528	MiJ_93506	213.43	0.2	2240	\$ 478,100	Undeveloped
Riverview	MiC_93567	MiJ_93506	MiJ_93508	130.59	0.2	2240	\$ 292,500	Undeveloped
Riverview	MiC_93568	MiJ_93508	MiJ_93507	157.38	0.25	2770	\$ 436,000	Undeveloped
Riverview	MiC_93569	MiJ_93507	MiJ_93509	180.85	0.25	2770	\$ 501,000	Undeveloped
Riverview	MiC_93570	MiJ_93509	MiJ_93510	108.19	0.3	2890	\$ 312,700	Undeveloped
Riverview	MiC_93571	MiJ_93510	MiJ_93511	125.15	0.3	2890	\$ 361,700	Undeveloped
Riverview	MiC_93572	MiJ_93511	MiJ_93512	109.94	0.3	2890	\$ 317,700	Undeveloped
Riverview	MiC_93573	MiJ_93512	MiJ_93513	119.33	0.3	2890	\$ 344,900	Undeveloped
Riverview	MiC_93574	MiJ_93513	MiJ_93514	132.24	0.3	2890	\$ 382,200	Undeveloped
Riverview	MiC_93575	MiJ_93514	MiJ_93515	118.82	0.3	2890	\$ 343,400	Undeveloped
Riverview	MiC_93576	MiJ_93515	MiJ_93516	111.85	0.3	2890	\$ 323,200	Undeveloped
Riverview	MiC_93577	MiJ_93516	MiJ_93517	144.30	0.3	2890	\$ 417,000	Undeveloped
Riverview	MiC_93578	MiJ_93517	MiJ_93518	93.40	0.3	2890	\$ 269,900	Undeveloped
Riverview	MiC_93579	MiJ_93518	MiJ_93519	96.73	0.3	2890	\$ 279,600	Undeveloped
Riverview	MiC_93580	MiJ_93519	MiJ_93520	84.11	0.3	2890	\$ 243,100	Undeveloped
Riverview	MiC_93581	MiJ_93520	MiJ_93521	104.15	0.3	2890	\$ 301,000	Undeveloped
Riverview	MiC_93582	MiJ_93521	MiJ_93522	121.67	0.3	2890	\$ 351,600	Undeveloped
Riverview	MiC_93583	MiJ_93522	MiJ_93523	124.51	0.3	2890	\$ 359,800	Undeveloped
Riverview	MiC_93584	MiJ_93523	MiJ_93524	86.89	0.3	2890	\$ 251,100	Undeveloped
Riverview	MiC_93585	MiJ_93524	MiJ_93525	88.19	0.3	2890	\$ 254,900	Undeveloped
Riverview	MiC_93586	MiJ_93525	MiJ_93526	139.89	0.3	2890	\$ 404,300	Undeveloped
Riverview	MiC_93587	MiJ_93526	MiJ_93527	98.80	0.3	2890	\$ 285,500	Undeveloped
Riverview	MiC_93588	MiJ_93527	MiJ_00432	130.79	0.3	2890	\$ 378,000	Undeveloped
			Total	2821		Total	\$ 7,889,200	

Table E Continued
Hamlet of Grande Cache
Pipe Upgrades Cost Breakdown

Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Unit Cost (\$/m)	Pipe Cost	Type
Floyd McLennan Business Park	MiC_93589	MiJ_93530	MiJ_93531	132.89	0.2	2240	\$ 297,700	Undeveloped
Floyd McLennan Business Park	MiC_93590	MiJ_93531	MiJ_00378	118.42	0.2	3160	\$ 374,200	Developed
Total				251		Total	\$ 671,900	

Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Unit Cost (\$/m)	Pipe Cost	Type
T Road	MiC_93593	MiJ_93532	MiJ_93533	112.83	0.2	2240	\$ 252,700	Undeveloped
T Road	MiC_93594	MiJ_93533	MiJ_93534	115.30	0.2	2240	\$ 258,300	Undeveloped
T Road	MiC_93595	MiJ_93534	MiJ_93535	196.01	0.2	2240	\$ 439,100	Undeveloped
T Road	MiC_93596	MiJ_93535	MiJ_93536	193.22	0.2	2240	\$ 432,800	Undeveloped
Old Griffith Trail	MiC_93597	MiJ_93536	MiJ_93537	114.08	0.2	2240	\$ 255,500	Undeveloped
Old Griffith Trail	MiC_93598	MiJ_93537	MiJ_93538	111.31	0.2	2240	\$ 249,300	Undeveloped
North of Old Griffith Trail	MiC_93599	MiJ_93538	MiJ_93539	72.18	0.2	2240	\$ 161,700	Undeveloped
North of Old Griffith Trail	MiC_93600	MiJ_93539	MiJ_00228	70.55	0.2	2240	\$ 158,000	Undeveloped
Total				985		Total	\$ 2,207,400	

Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Unit Cost (\$/m)	Pipe Cost	Type
Southwest of Campground Road, through the Nordic Ski trails	MiC_93601	MiJ_93540	MiJ_93541	164.53	0.2	2240	\$ 368,500	Undeveloped
North of T Place and Nordic Ski Trails	MiC_93602	MiJ_93541	MiJ_93542	101.06	0.2	2240	\$ 226,400	Undeveloped
South of T Place and Nordic Ski Trails	MiC_93603	MiJ_93542	MiJ_93543	104.42	0.2	2240	\$ 233,900	Undeveloped
South of T Place, east of T Road	MiC_93604	MiJ_93543	MiJ_93544	130.38	0.2	2240	\$ 292,100	Undeveloped
South of T Place, east of T Road	MiC_93605	MiJ_93544	MiJ_93545	111.73	0.2	2240	\$ 250,300	Undeveloped
East of Old Griffith Trails	MiC_93606	MiJ_93545	MiJ_93546	113.95	0.2	2240	\$ 255,300	Undeveloped
East of Old Griffith Trails	MiC_93607	MiJ_93546	MiJ_93547	98.02	0.2	2240	\$ 219,600	Undeveloped
South of Old Griffith Trails	MiC_93608	MiJ_93547	MiJ_93548	112.32	0.2	2240	\$ 251,600	Undeveloped
South of Old Griffith Trails	MiC_93609	MiJ_93548	MiJ_93549	110.59	0.2	2240	\$ 247,700	Undeveloped
South of Old Griffith Trails	MiC_93610	MiJ_93549	MiJ_00099	118.69	0.2	2240	\$ 265,900	Undeveloped
Total				1166		Total	\$ 2,611,300	

Table E Continued
Hamlet of Grande Cache
Pipe Upgrades Cost Breakdown

Location	Name	Inlet Node	Outlet Node	Length (m)	Diameter (m)	Unit Cost (\$/m)	Pipe Cost	Type
South Bench	MiC_95414	MiJ_93553	MiJ_93552	108.68	0.2	2240	\$ 243,400	Undeveloped
South Bench	MiC_95415	MiJ_93552	MiJ_93551	95.04	0.2	2240	\$ 212,900	Undeveloped
South Bench	MiC_95416	MiJ_93551	MiJ_93550	94.98	0.2	2240	\$ 212,700	Undeveloped
South Bench	MiC_95417	MiJ_93550	MiJ_93554	118.48	0.2	2240	\$ 265,400	Undeveloped
South Bench	MiC_95418	MiJ_93554	MiJ_93555	103.31	0.2	2240	\$ 231,400	Undeveloped
South Bench	MiC_95419	MiJ_93555	MiJ_93556	107.90	0.2	2240	\$ 241,700	Undeveloped
South Bench	MiC_95420	MiJ_93556	MiJ_93557	93.59	0.2	2240	\$ 209,600	Undeveloped
South Bench	MiC_95421	MiJ_93557	MiJ_93558	45.94	0.2	2240	\$ 102,900	Undeveloped
South Bench	MiC_95422	MiJ_93558	MiJ_93559	65.53	0.2	2240	\$ 146,800	Undeveloped
South Bench	MiC_95423	MiJ_93559	MiJ_93560	106.90	0.2	2240	\$ 239,400	Undeveloped
South Bench	MiC_95424	MiJ_93560	MiJ_93561	92.52	0.2	2240	\$ 207,200	Undeveloped
South Bench	MiC_95425	MiJ_93561	MiJ_93562	84.56	0.2	2240	\$ 189,400	Undeveloped
South Bench	MiC_95426	MiJ_93562	MiJ_93563	85.58	0.2	2240	\$ 191,700	Undeveloped
South Bench	MiC_95427	MiJ_93563	MiJ_93564	86.41	0.2	2240	\$ 193,600	Undeveloped
South Bench	MiC_95428	MiJ_93564	MiJ_93565	112.85	0.2	2240	\$ 252,800	Undeveloped
South Bench	MiC_95429	MiJ_93565	MiJ_00168	85.09	0.2	2240	\$ 190,600	Undeveloped
Total				1487		Total	\$ 3,331,500	



REQUEST FOR DECISION

SUBJECT:	Main Street Lofts and Tower Park Estates		
SUBMISSION TO:	COMMITTEE OF THE WHOLE	REVIEWED AND APPROVED FOR SUBMISSION	
MEETING DATE:	November 21, 2023	CAO:	MANAGER:
DEPARTMENT:	PLANNING & DEVELOPMENT	DIR: MAV	PRESENTER: MAV
STRATEGIC PLAN:	Economy	LEG:	

RELEVANT LEGISLATION:

Provincial (cite) – N/A

Council Bylaw/Policy (cite) – N/A

RECOMMENDED ACTION:

MOTION: That Committee of the Whole accepts the Main Street Lofts and Tower Park Estates report for information, as presented.

BACKGROUND/PROPOSAL:

Action List Item Re: Main Street Lofts

On July 25, 2023, Council passed MOTION: 23.07.416 directing Administration to undertake a detailed review of the Main Street Lofts project, as follows:

Moved by: COUNCILLOR DAVE BERRY

That Council direct Administration to present a report to Council by end of March 2024 or sooner regarding the Main Street Loft properties in Grande Cache, outlining current ownership of the properties, an in-depth study of the structural integrity, adherence to building and safety codes, and a cost analysis of repair versus demolition.

FOR: Reeve Olsen, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry

AGAINST: Deputy Reeve Bill Smith

CARRIED

Mainstreet Lofts Development and Enforcement History:

The Mainstreet Lofts includes 10 commercial and 34 residential units, each with separate titles within the condominium plan. The common property, owned by the condominium corporation, includes the parking area, walking areas between residential units, and the remainder of the lot to property lines. A stop order has been issued on the property to address the lack of infrastructure completed during the subdivision. The lack of acceptance of the water and sewer is problematic as it has been functioning for over a decade, but there is no record of it being inspected and accepted by the Town/Greenview and has most recently been shut off, along with power, due to an eviction under the fire safety code.

Although simple testing may be sufficient to accept the underground utilities, the roadway, sidewalks and drainage infrastructure have not been completed and in 2014 Associated Engineering estimated the cost to bring the development to compliance to be \$1,814,200. Between 2012 and 2017 the Town obtained legal opinion several times to understand to best way to move forward with enforcement on the property, it appears communication with property owners was limited or ineffective during this time and the Town was

not able to undertake the costs of correcting or completing the work and did not require sufficient securities at the time of development approval.

Surrounding Development - Tower Park Estates Area Structure Plan (ASP):

The Tower Park Estates ASP sets out two development areas. Overall, this development was planned to accommodate over ~90 acres of land up to 1050 residents and employment areas sufficient to support that population. The northern portion is expected to be for industrial-style development. This portion of the plan had a separate phase plan and had servicing scenarios contingent on the development of the initial phase of the southern portions 'Urban Village'. The southern portion (with Phase 2 including the Main Street Lofts) is an 'Urban Village' design. This is intended to include a mix of residential and commercial land uses allowing a 400m walking distance to meet most of the needs of daily life. It is expected development in this area will be Low/midrise Building (two (2) to five (5) story buildings) with commercial street level development being highly encouraged.

Current Status:

Since August, Administration has been working with a private developer attempting to refurbish the Main Street Lofts to provide for workforce housing and complete/accept infrastructure required to remedy the outstanding stop order/servicing concerns. The developer has been working towards safety codes and fire safety compliance and has initiated applications to address planning compliance and resolve the lack of servicing. The developer has submitted deposits to acquire 32 units currently in receivership with an anticipated court date in January/February providing them a majority share in the condominium.

The developer seeking to refurbish the building understands the expectation that water and sewer servicing must be required to be restored (tested and accepted) prior to gaining any occupancy and these conditions can be addressed in a development agreement.

The overland infrastructure (road, sidewalks, lighting, drawing) is beyond their scope to complete, would mostly benefit future adjacent development and is an outstanding item under the stop order they seek to remove. This issue could be solved by undertaking a Local Improvement for these improvements and a recent discussion with both the Main Street Lofts developer and a representative of the Tower Park Estates landowners viewed this option favourably, pending the amount and length of the improvement levy.

Local Improvements Option to complete outstanding infrastructure:

Local improvements are projects Council considers to be of greater benefit to a particular area of the municipality than to the whole municipality. Examples include curbs and gutters, sidewalks, and roadways specific to a street that does not serve the entire community. Local improvement projects improve amenities and increase attractiveness and accessibility without burdening all Greenview taxpayers with the full financial responsibility of improving these areas. Local improvements can be initiated by residents or Greenview and if initiated a petition against a Local Improvement must have support from 2/3 of the property owners responsible for paying local improvement tax and must represent half (50%) of the assessed value of identified properties.

The recommended Local Improvements Administration would address the needs of the Mainstreet Lofts and three other nearby development sites within the Tower Park Estates subdivision fully and effectively.

These recommendations encompass all the items listed in the Associate Engineering deficiencies list, which is attached and pertains to the phase one area as indicated in the overall site plan for Tower Park Estates. This includes installation or improvement and acceptance of roads connecting the Main Street Lofts to 98 avenue, water including fire hydrants, sanitary mains, storm sewer and detention, and sidewalks and pedestrian connections to the development. Costs would be divided on an appropriate distribution of costs based on a local improvement plan developed by Greenview and approved by Council if this option is a desirable resolution to this issue.

Safety Codes and Habitability:

As per the 2019 National Fire Code (Alberta Edition) Section 47, the Regional Fire Chief acting as a Safety Codes Officer (Fire Discipline) has declared the building uninhabitable (See attached SCA Letter - Main Street Lofts Farnell Prop Dev Ltd.) and has caused all utilities to be disconnected and all remaining occupants to cease occupation effective October 6, 2023. Once the building meets the requirements of Greenview Planning and Development, has a fully operation fire alarm and sprinkler system, and passes a fire and life safety inspection the building can be occupied.

Tax Forgiveness Request:

The developer has requested the support of Greenview in removing penalties or reducing the tax burden which applies to the units they hold and the units which they are seeking to acquire from receivership in some other fashion. They understand these requests are often difficult for Council as a matter of fairness and therefore are seeking a retroactive reassessment, should forgiveness of taxes or penalties be unacceptable.

The taxpayer has indicated that a retroactive reassessment was done for another unit within the complex however in discussion with the Assessor there was no knowledge of a retroactive assessment completed or if it would even be an option. Research of the historical tax levy on the properties shows that the tax levy overall on non-residential in the complex decreased by 64% from 2018 to 2019 and a reassessment was completed in 2021 on the full complex that further reduced the tax levy by an additional 53%.

The value of taxes on these units breaks down as follows:

Units	Total Accumulated Levies	Total Accumulated Penalties	Total Number of Units
Owned currently by Main Street Developer	\$148,229.12	\$378,795.48	8 Commercial Units
Being acquired through receivership application	\$49,474.43	\$50,979.41	32 residential Units

It is not yet clear what financial impact a retroactive reassessment has or if it is a feasible option, but when asked, the Assessor didn't know what a retroactive assessment was so it's likely there is a misunderstanding of the terminology from the taxpayer.

Administration is looking for guidance on the option of tax forgiveness in part or in full prior to taking this to Council, if the motion were to be defeated at Council that would delay the process.

BENEFITS OF THE RECOMMENDED ACTION:

1. The benefit of the Committee of the Whole accepting the presentation is to be aware of the status of the Main Street Lofts project and what barriers and options exist to move this development area forward in an orderly fashion that may promote future growth in the Hamlet of Grande Cache.

DISADVANTAGES OF THE RECOMMENDED ACTION:

1. There are no perceived disadvantages to the recommendation, however, additional recommendations from Committee of the Whole on what items should be brought forward to Council, if any, would still be required.

ALTERNATIVES CONSIDERED:

Alternative #1: Committee of the Whole has the alternative to make additional recommendations to Council on what matters should be brought forward by Administration for Council's further consideration as it's related to tax forgiveness, local improvements, or other relevant matters.

FINANCIAL IMPLICATION:

There are no financial implications to the recommended action.

STAFFING IMPLICATION:

There are no staffing implications to the recommended action.

PUBLIC ENGAGEMENT LEVEL:

INCREASING LEVEL OF PUBLIC IMPACT

Inform

PUBLIC PARTICIPATION GOAL

Inform - To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.

PROMISE TO THE PUBLIC

Inform - We will keep you informed.

FOLLOW UP ACTIONS:

There are no follow-up actions to the recommended motion unless further motions are made by Committee of the Whole.

ATTACHMENT(S):

- Associated Engineering – Deficiency Report
- Tower Park Estates Phase one overall site plan
- Mainstreet Lofts Site Plan and Rendering
- 2012 Stop Order
- Tower Park Estates ASP



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November 3, 2014
File: 2014-3130.E.12.01

Brian Lott
Manager of Development & Protective Services
Town of Grande Cache
Box 300
Grande Cache, AB T0E 0Y0

**Re: MAIN STREET LOFTS STOP WORK ORDER
DEVELOPMENT PERMIT APPROVAL #K-08-048
COMPLIANCE REVIEW SUMMARY**

Dear Sir:

The Main Street Lofts (MSL) development is located within the NW 34-56-8 W6 in Grande Cache, Alberta. The MSL development was issued a Stop Order by the Municipality in March 22, 2012 due to non-compliance to the development permit conditions.

Associated Engineering (AE) has reviewed the constructed development to confirm compliance with the Stop Order and Town Engineering Standards, and to identify deficiencies and associated costs. The results of the review are detailed in two reports titled Main Street Lofts – Stop Work Order Condition Inspection – Surface Works, and Main Street Lofts – Stop Work Order Condition Inspection – Utilities. Both reports were completed in October, 2014.

This letter will provide a summary of the reports.

1 ASSESSMENT CRITERIA

The development was reviewed based upon the following assessment criteria.

1.1 CLASSIFICATION OF DEFICIENCIES

The infrastructure assessment adopted the following classifications to categorize found deficiencies:

Type "A" Deficiency

- A priority deficiency requiring repair, and/or replacement without delay.
- A deficiency which poses a risk to public safety or damage to private property.



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Type "B" Deficiency

- A deficiency that represents poor quality workmanship, but does not pose a safety risk.
- An installation that is non-compliant with the governing standards or codes.

Type "I" Deficiency

- An item requiring additional investigation and/or follow-up.
- Any items of unconfirmed or unclear ownership or custody.

1.2 TOWN STANDARDS

The Town of Grande Cache did not have their own Engineering and Construction Standards at the time the development was approved. The development permit required the development be designed and constructed in accordance with the City of Grande Prairie's Design and Construction Standards. The City of Grande Prairie's Design and Construction Standards were considered to be the Town Standards for the purposes on the project.

1.3 DESIGN DRAWINGS

The MSL development was designed by two engineering firms; ISL Engineering and Urban Systems. ISL Engineering prepared the initial design in July of 2008. Urban Systems split the development into two phases, Phase 1A and 1B, and issued design drawings on July 6, 2010 for Phase 1A and June 21, 2010 for Phase 1B. The Urban Systems drawings were never approved by the Town. The completed works were compared to the design drawings to confirm the work was completed in general conformance to the design.

2 INSPECTIONS AND SURVEY

To verify the condition of the constructed works, a field data collection program was developed. The field program included the following:

- **AE Site Inspection** (July 28 and 29, 2014): Visual confirmation of site grading, drainage, manholes and catchbasins. No physical testing was conducted.
- **Wave Engineering Site Inspection** (July 29, 2014): Visual inspection of the constructed power/telephone distribution system and overhead lighting.
- **SFE Global Infrastructure Assessment and Testing** (August 28 and 29, 2014): The work included hydrant and valve inspections, CCTV inspection of targeted mains, hydrant flow testing, and pressure testing and bacteriological testing of the water system.
- **Global Raymac completed a topographic survey** of the site on July 28 and 29, 2014. The survey mapped the location of constructed infrastructure relative to the legal boundaries of site.



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3 ACTION A.1 – PARKING AREAS

A private access road and parking area are located on the west side of the MSL development. The parking area is used by tenants of the MSL building.

The MSL parking lot and access road asphalt were observed to be in good condition. Concrete curbing was found to be spalling and broken at several locations.

The observed deficiencies and estimated costs for this action item are outlined below:

Parking Area Improvements	B	\$26,000.00

4 ACTION A.2 – SITE SERVICES

4.1 SANITARY SEWER COLLECTION SYSTEM

A sanitary sewer system consisting of 250 mm diameter PVC pipes and manholes services the development.

A review of the sanitary sewer system found the following:

- The sanitary sewer was originally inspected in June 2010 and targeted sections were re-inspected by SFE in August 2014. Sections of ovality and joint displacements were observed in the SFE inspection. The June 2010 CCTV inspection noted a cracked tee in an external drop structure and sags in various sections of the mains.
- The Manholes were observed to generally be in good condition, with grouting of grade rings required at four manholes.
- The sanitary sewer mains installed satisfy the depth of cover criteria outlined in the Town Standards and are in formal conformance with the design drawings.
- A section of sewer main runs through private property south of MSL.

4.2 WATER DISTRIBUTION SYSTEM

A water distribution system consisting of 250 mm and 300 mm diameter PVC pipes, valves and manholes services the development.



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A review of the water system found the following:

- All hydrants were found to be in acceptable operating condition.
- A hydrant flow test was conducted and showed that the Town Standard's for fire flow were not met. A cursory review of the system hydraulics and follow-up discussions with the Town suggest that the fire pump may not have come on when operating the hydrants.
- Hydrant spacing does not meet the Town standard of 90 m for a multiple-family residential and commercial/industrial area.
- A pressure test of the distribution system was completed and found no leakage.
- A bacteriological test was conducted on samples taken from the MSL. No traces of total coliforms or fecal coliforms were detected.
- All valves were found to be in acceptable operating condition.
- Valve spacing does not meet the Town Standards, which requires only one hydrant be taken out of service if the system is isolated.

4.3 POWER

Wave Engineering completed an inspection of power infrastructure on July 29, and prepared a report regarding the conformance of the power infrastructure with franchise utility standards. The Wave Engineering Inspection can be summarized as follows:

- ATCO Electric reports that they have not energized their street lights.
- Miscellaneous repairs are required at the roadway luminaries.
- The ground around the utility transformer base has sloughed. The backfill and base installation do not meet current ATCO Electric Standards.
- The underground conduit to the parking lot junction box does not have sufficient backfill or earth coverage.
- Bollards with built-in lighting are not part of ATCO Electric standard material inventory. There are also miscellaneous repairs to be done on these bollards.
- Conductors are spliced above ground and the splice is not in accordance with CEC or ATCO Electric Standards. There is no confirmation if the conductors are energized or not. As well, power conductor loops are exposed above ground, on property and within the public R.O.W. The intended purpose of the cable is unknown. These exposed cables present a safety risk to the public.

4.4 GAS

AE has contacted AltaGas to confirm acceptance of the constructed gas distribution works. AltaGas has not responded to our enquiries. We therefore assume that since gas infrastructure appears to have been commissioned and is being metered by the utility, all gas infrastructure must be in conformance to AltaGas Standards.



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4.5 COST ESTIMATES

The observed deficiencies and estimated costs for Action A.2 are outlined below:

Deficiency	Priority	Estimated Cost
Water/Sewer Type B Improvements	B	\$57,000.00
Water/Sewer Type I Improvements	I	\$57,000.00
Electrical Type A Improvements	A	\$ 9,000.00
Electrical Type B Improvements	B	\$10,700.00
Electrical Type I Improvements	I	\$16,500.00

5 ACTION A.3 – SITE GRADING AND DRAINAGE

Storm sewer infrastructure has been installed throughout the Main Street Lofts development to accommodate and convey storm drainage through the site toward the Highway 40 ditch. A storm sewer system consisting of 600 mm diameter PVC pipe has been installed.

A review of the storm drainage system found the following:

- The storm sewer was initially inspected in June 2010, and targeted sewer sections were inspected by SFE in August 2014. Sections of ovality, line deviations and joint displacements were observed in the SFE inspection. Sections of ovality were also identified in the June 2010 inspection.
- Grouting of the grade rings is required on some manholes. Grout is also required around the southwest inlet of manhole D8.
- Storm sewer mains satisfied the depth of cover criteria outlined in the Town Standards.
- Site drainage does not match the design shown on the Urban Systems drawings.
- The two temporary stormwater management ponds do not match the design shown on the Urban Systems drawings. The ponds do not meet the Town Standards.



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The observed deficiencies and estimated costs for Action Item A.3 are outlined below:

Item	Deficiency	Estimated Cost
Site Grading & Drainage Improvements	B	\$215,000.00
Site Grading & Drainage Improvements	I	\$ 20,000.00

6 ACTION A.4 – PUBLIC ROADS

The public roadways surrounding the Main Street Lofts; Main Street, Mountain Trail, and Nikoman Way were reviewed. The roadways are currently gravel surfaced with curb and gutter placed around the Main Street Loft road sections only.

A review of the roadways found the following:

- AE performed a roll test on July 29, 2014 with a loaded water truck provided by the Town. A soft spot, approximately 10 m x 5 m, was observed on Mountain Trail in front of Unit 107. The remainder of the roadway showed no deflection and is considered in compliance to the Town's Standards.
- Road geometrics, cross sections and elevations identified in the survey plan were compared with pertinent Town Standards, Urban System design drawings, and the Tower Park Estates Area Structure Plan. The comparison is summarized below:
 - AE has not verified the depth of gravel, or the constructed road structure.
 - The road and curb and gutter elevations are reasonable close to the design elevations laid out in the Urban Systems design drawings.
 - The location of the power line on Main Street matches the Town Standards and Urban Systems design drawings.
 - The location of the power line on Mountain Trail does not match the Town Standards, and only the west side of Mountain Trail matches the Urban Systems design drawings.

The observed deficiencies and estimated costs for action item A.4 are listed below.

Item	Deficiency	Estimated Cost
Public Roads Improvements	A	\$ 53,000.00
Public Roads Improvements	B	\$525,000.00



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7 ACTION A.5 – SIDEWALKS AND PEDESTRIAN CONNECTIONS

Concrete Sidewalks and Pedestrian connections encircle the MSL building. A number of deficiencies contravening the Town Standard's, were identified during AE's inspection. The deficiencies were generally related to:

- Poor concrete condition;
- Incorrect sidewalk and curb sizes;
- Tripping hazards; and
- Poor site drainage.

The observed deficiencies and estimated costs for the sidewalks and pedestrian connections are listed below. These deficiencies have been broken out into the locations relative to the MSL building.

North of Main Street Lofts

Location	Deficiency	Estimated Cost
Sidewalk & Pedestrian Connection Improvements	A	\$86,000.00
Sidewalk & Pedestrian Connection Improvements	B	\$48,000.00

East of Main Street Lofts

Location	Deficiency	Estimated Cost
Sidewalk & Pedestrian Connection Improvements	A	\$407,000.00
Sidewalk & Pedestrian Connection Improvements	B	\$109,000.00

South of Main Street Lofts

Location	Deficiency	Estimated Cost
Sidewalk & Pedestrian Connection Improvements	A	\$12,000.00
Sidewalk & Pedestrian Connection Improvements	B	\$16,000.00



**Associated
Engineering**

GLOBAL PERSPECTIVE.
LOCAL FOCUS.

November 3, 2014
Brian Lott
Town of Grande Cache
- 8 -

West of Main Street Lofts

Sidewalk & Pedestrian Connection Improvements	A	\$129,000.00
Sidewalk & Pedestrian Connection Improvements	B	\$18,000.00

The total cost of deficiencies is summarized as follows:

• Type A Improvements	\$ 696,000.00
• Type B Improvements	\$1,024,700.00
• Type I Improvements	<u>\$ 93,500.00</u>
Total	\$1,814,200.00

Detailed recommendations for next steps or correcting deficiencies can be located in the reports.

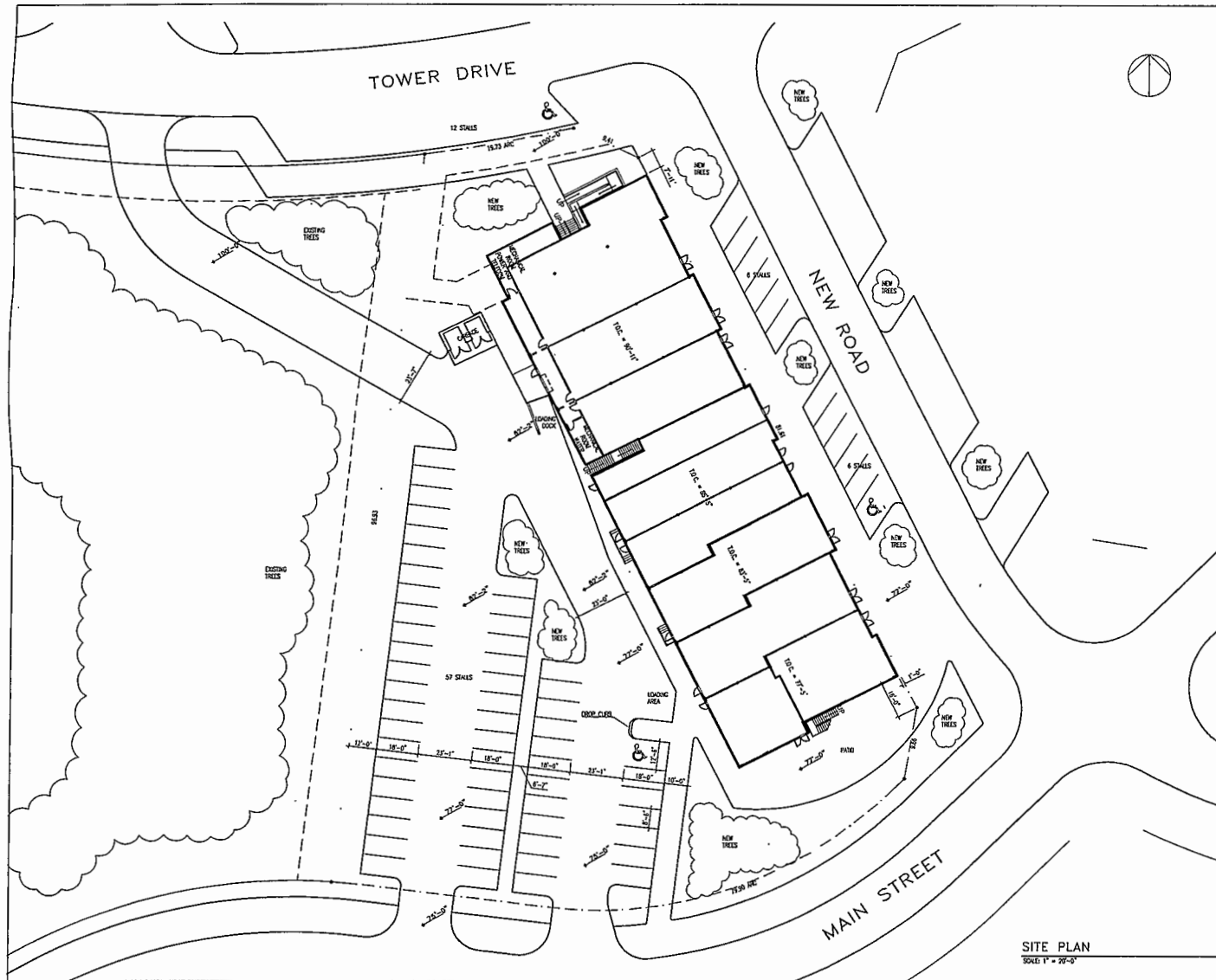
If there are any questions, please contact the undersigned, or Chad Maki in our office.

Yours truly,

Scott Kusalik, P.Eng.
Project Engineer

SK/CM/ja

Chad Maki, P. Eng.
Project Manager



SITE PLAN
SCALE 1" = 20'-0"

LEGAL DESCRIPTION

LOT 1, BLOCK 52, PLAN 002 8273
3 MAIN STREET, GRANDE DUNCE, AB

SITE AREA

3463.12 sq ft
1.53 ACRES
PERMITTED DENSITY AS PER SHAW COOK SECTION 9

UNITS

2 BEDROOM - UNIT A = 30 (812 SQ FT)
1 BEDROOM - UNIT B = 4 (1154 SQ FT)
RETAIL - UNDER 1500 SQ FT = 2
RETAIL - OVER 1500 SQ FT = 0

BUILDING AREA

MAIN FLOOR = 18,070 SQ FT
RESIDENTIAL = 79,400 SQ FT
BUILDING TOTAL = 15,370 SQ FT

PARKING

REQUIRED PARKING
RESIDENTIAL UNITS - 1 PER UNIT 24
RETAIL UNITS - 3/1000 SQ FT 48
(GROSS UNDER 1500 SQ FT EXCLUDED) 24
SHARED PARKING FACTOR 1.2 24
TOTAL REQUIRED PARKING SPACES 68
PROPOSED PARKING SPACES
SURFACE PARKING LOT 57
ON STREET PARKING 21
TOTAL PROVIDED PARKING SPACES 81

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A8	THIRD FLOOR SUITES PLAN
A9	SECTION
A10	SECTION
A11	DETAILS
A12	DETAILS
A13	NOSE PLAN



FARNELL DEVELOPMENTS

EFG
ARCHITECTS

MAIN STREET LOFTS
SITE PLAN

NO.	DATE	DESCRIPTION

A1



FARNELL DEVELOPMENTS

EFG

MAIN STREET LOFTS
ELEVATIONS

NO.	DATE	DESCRIPTION



A2

Town of Grande Cache

OFFICE OF THE DEVELOPMENT OFFICER
BOX 300, GRANDE CACHE, ALBERTA, T0E 0Y0
TELEPHONE: (780) 827-3362 FAX: (780) 827-2406
E-MAIL: admin@grandecache.ca
WEBSITE: www.grandecache.ca



March 22, 2012

Farnell Developments/Tower Park
Development Corp./ Eagle Rock Holdings/
[REDACTED]

Grande Cache Coal Corporation
[REDACTED]

Corwin Cummings
[REDACTED]

Jerzy Pepek
[REDACTED]

Skyline Motor Co. Ltd.
[REDACTED]

1451549 Alberta Ltd.
[REDACTED]

STOP ORDER

IN ACCORDANCE with the Town of Grande Cache Land Use Bylaw, being Bylaw No. 641, and Section 545 and 645 of the Municipal Government Act, RSA 2000, Chapter M-26.

NOTICE IS HEREBY GIVEN THAT ACTION MUST BE TAKEN IMMEDIATELY TO SATISFY THE OUTSTANDING DEVELOPMENT PERMIT APPROVAL CONDITIONS OF DEVELOPMENT PERMIT APPROVAL #K-08-048 and REQUIREMENTS OF THE DEVELOPMENT AGREEMENT DATED July 29, 2008, SO AS TO BRING THE MAIN STREET LOFTS DEVELOPMENT INTO COMPLIANCE WITH DEVELOPMENT PERMIT APPROVAL K-08-048, THE DEVELOPMENT AGREEMENT DATED July 29, 2008, THE TOWN'S LAND USE BYLAW AND THE TOWN'S ENGINEERING STANDARDS.

Specifically, within 30 days of the date of this Stop Order one or more of the notified parties must provide the Development Officer of the Town of Grande Cache the following:

A.) A comprehensive timetable and construction plan to implement the following actions and remedial work:

- 1.) Completion of all approved parking areas, in accordance with Development Permit Approval #K-08-48 and the Town's engineering standards, to the satisfaction of the Development Authority, including provision of record drawings for hard surfaced parking areas, signed and stamped by a professional engineer. Should any of the existing construction fail to meet legislated standards, remedial work identified by the Development Authority must be completed to bring all construction into compliance. [Condition #4, #6, #10 and #13, Development Permit Approval #K-08-48]
- 2.) Provisions of plans, signed and stamped by a professional engineer, for all services required for the site. In situations where services have been constructed without obtaining the Development Authority's approval for plans in advance of construction, contrary to condition #5 of Development Permit Approval #K-08-048, the Development Authority must be provided with record drawings, signed and stamped by a professional engineer, which must show the location of all service connections. Acceptable plans must establish the services, as constructed, meet Town engineering standards. Further, the Development Authority must be provided with professional reports showing the services have been inspected, tested and meet all Town engineering standards. Should any of the existing construction fail to meet legislated standards, remedial work identified by the Development Authority must be completed to bring all construction into compliance. [Condition #5, 6(d), 8 (c), 10, 11 and 13, Development Permit Approval #K-08-048] < Brian – this has not been complied with- but it would be worth discussing with the engineering consultant how far the CCTV testing results go in addressing the Town's concerns about underground utilities. Also, depending on the extent these services will be needed to address eventual development on the old Tower Park site, it may be that the Town will have an opportunity to have this work done then. I think the question for the engineers at this point is what level of risk/ concern there is re: undergrounds services in use by MSL.>
- 3.) Provision of plans, signed and stamped by a professional engineer, for site grading and drainage plans. In relation to site grading and drainage work that has been completed, as the Development Authority did not receive such plans prior to construction contrary to condition #6(c), the Development Authority must be provided with record drawings, signed and stamped by a professional engineer. Acceptable record drawings must establish that on site grading and drainage meet Town engineering standards. Should any of the existing construction fail to meet legislated standards, remedial work identified by the Development Authority must be completed to bring all construction into compliance. [Condition #6, 10 and 13, Development Permit Approval #K-08-048]
- 4.) Provision of plans, signed and stamped by a professional engineer, for the public road connecting the Main Street Lofts Development to 98th Avenue. On approval of said plans by the Development Authority, road construction, including paving, draining, and curbing of all driveway and parking areas, curb cuts and driveway aprons, must be completed in accordance with approved plans. Further, once

construction is completed, record drawings, signed and stamped by a professional engineer must be provided to the Development Authority. Acceptable plans will confirm the road infrastructure has been constructed to meet Town engineering standards. Should any of the existing construction fail to meet legislated standards, remedial work identified by the Development Authority must be completed to bring all construction into compliance. [Conditions #6, #8, #10 and #13, Development Permit Approval #K-08-048], **[Please refer to my comments re: #2, above. Also, this is one item that the Town may wish to consider paying for and later recovering given some of the potential issues about whether this road is truly only for the purposes of servicing MSL. I think Greg Hofmann may have more useful insight on this topic than I- or at least that it would be a good point for group discussion.]**

- 5.) Provision of plans, signed and stamped by a professional engineer, for the sidewalks and pedestrian connections to/ from the Main Street Lofts development. Upon such plans being approved and accepted by the Development Authority, the construction of said sidewalks and pedestrian connections must be completed in accordance with approved plans. Further, once construction is completed, record drawings, signed and stamped by a professional engineer must be provided to the Development Authority. Acceptable plans will confirm the sidewalks and pedestrian connections have been constructed to meet Town engineering standards. Should any of the existing construction fail to meet legislated standards, remedial work identified by the Development Authority must be completed to bring all construction into compliance. [Conditions 8, 10 and 13, Development Permit Approval #K-08-48].
- 6.) Without limiting paragraphs 1-5, above, the specific remedial work that is currently required includes:
 - i.) record drawings and test results associated with the construction and installation of existing water and sewer services must be provided. The installation and construction must meet Town engineering standards;
 - ii.) existing road access must be graded and hard surfaced;
 - iii.) existing curb and gutter construction must redone in order to conform with approved plans and comply with the Town's engineering standards;
 - iv.) extensive areas of the existing sidewalk construction have surface irregularities. There are also areas of the sidewalk construction with potentially hazardous conditions- such as drop offs and stairs without handrails and vertical flat stone slabs that create trip hazards. Acceptable plans for the sidewalk construction must be submitted to Development Authority for approval. The existing sidewalk construction must then be redone in order to conform with approved plans;
 - v.) the storm containment facilities for the site must be redone in order to conform with approved plans and comply with Town engineering standards;

- vi.) the site has open excavations which must be filled in to address any potentially unsafe conditions; **<Brian I am not sure of the status of this item>**
- vii.) many of the ornamental street light standards have been installed improperly. Remedial work on the lighting is required to comply with legislated standards;
- viii.) landscaping on site is incomplete or requires remedial work to comply with approved plans;
- ix.) the intersection of 99th street and 98th avenue must be restored to its original alignment to form a proper T intersection, in accordance with Town engineering standards;
- x.) the grade of the intersection of 99th street and 98th avenue was disturbed without authorization and must be restored to the satisfaction of the Development Authority;
- xi.) construction debris must be cleaned up and removed from the site;

B.) Adequate security and proof of insurance in relation to all on-site servicing (including but not limited to water, sewer, roads, sidewalks and pedestrian connections and lighting), landscaping and fencing. Based on the Development Authority's current information about remedial work or construction required to complete on-site services, a \$450,000.00 irrevocable letter of credit in favor of the Town, on terms and conditions acceptable to the Development Authority, is required. The Development Authority will review, and may increase or decrease, the amount of required security upon receipt of the testing or engineering information required by the terms of this Stop Order. [Condition #5 and #6(g), Development Permit Approval #K-08-048] **<Brian- the amounts may be lower now that CCTV results have been obtained>**

IN THE EVENT THAT THE ABOVE ACTIONS ARE NOT TAKEN WITHIN 30 DAYS OF THIS STOP ORDER, ALL USE AND OCCUPANCY OF THE MAIN STREET LOFTS DEVELOPMENT MUST CEASE UNTIL SUCH TIME AS THE DEVELOPMENT AUTHORITY CONFIRMS THERE HAS BEEN COMPLIANCE WITH DEVELOPMENT PERMIT APPROVAL #K-08-048, THE DEVELOPMENT AGREEMENT DATED July 29, 2008, THE TOWN LAND USE BYLAW AND THE TOWN'S ENGINEERING STANDARDS.

Under the Municipal Government Act RSA 2000, Chapter M-26 and appeal can be made to the Subdivision and Development Appeal Board within 14 days of receipt of this order. In the event the above noted deadlines for action are not complied with, and absent the filing of a timely appeal, the Town may take further action, as required to uphold the relevant Development Permit conditions, Development Agreement requirements and Land Use Bylaw provisions, with the costs and penalties that apply in relation to such actions being the sole responsibility of the owner, person in possession of the land, person responsible for the contravention, or any or all of them.

Dated at the Town of Grande Cache, this 22nd day of March, 2012

Town of Grande Cache

Tower Park Estates Area Structure Plan



Prepared by:

AECOM Canada Ltd.

17007 – 107th Avenue, Edmonton, AB, Canada T5S 1G3
T 780.486.7000 F 780.486.7070 www.aecom.com

Project Number:

5120-019-00-01-4.6.1

Date:

June 2009

Regular mtg - June 24/09
Public Hearing - July 29/09

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1. Introduction

1.1 Purpose

The purpose of the Tower Park Area Structure Plan (ASP) is to provide guidelines and policies for a land use, transportation and servicing pattern for the subject lands (the ASP area). In so doing, the ASP supports the Town of Grande Cache Municipal Development Plan (MDP) in providing a further level of definition for desirable land use and development patterns for a specific area of the Town.

The ASP also provides a firm development concept to enable Alberta Transportation to evaluate subsequent development proposals within the ASP area and surrounding lands.

Finally, the Tower Park Estates ASP is intended to inform the citizens of the Town and other stakeholders about future development within the community that will enhance its appearance, quality of life and sustainability.

1.2 Location and Area

The ASP area is located in the eastern portion of the Town, to the north and northeast of Highway 40 (**Figure 1**). It occupies a southeast facing site to the southeast of existing industrial development. The site constitutes an easterly extension of the built-up area of the Town of Grande Cache.

Much of the ASP area lies within 800 metres of Provincial Highway No. 40. Although no direct access to the highway is proposed, traffic generated from the ASP area will utilize the three existing access points between the Town and Highway 40.

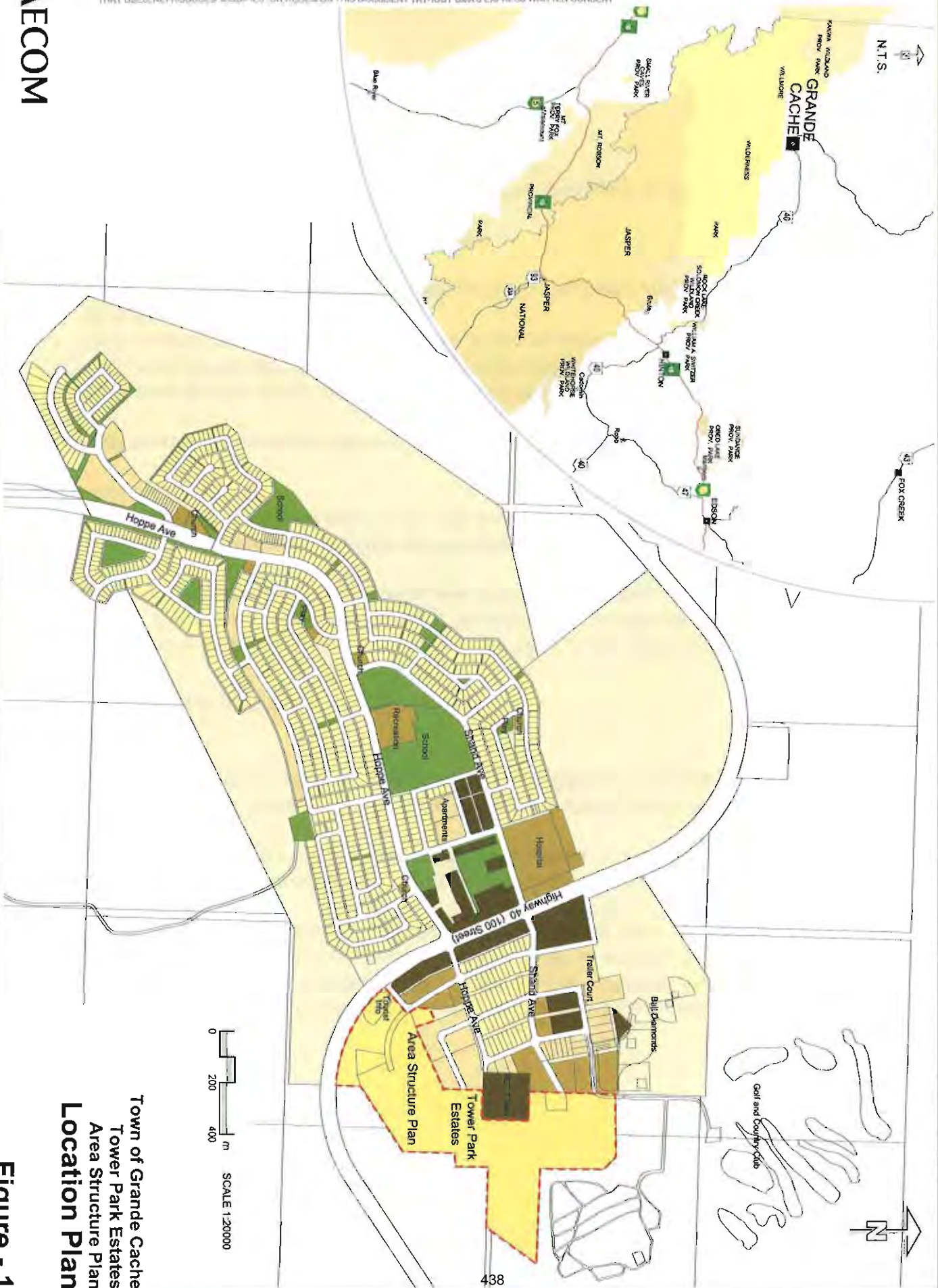
The ASP area and land ownership are shown on **Figure 3**. The ASP area comprises the following:

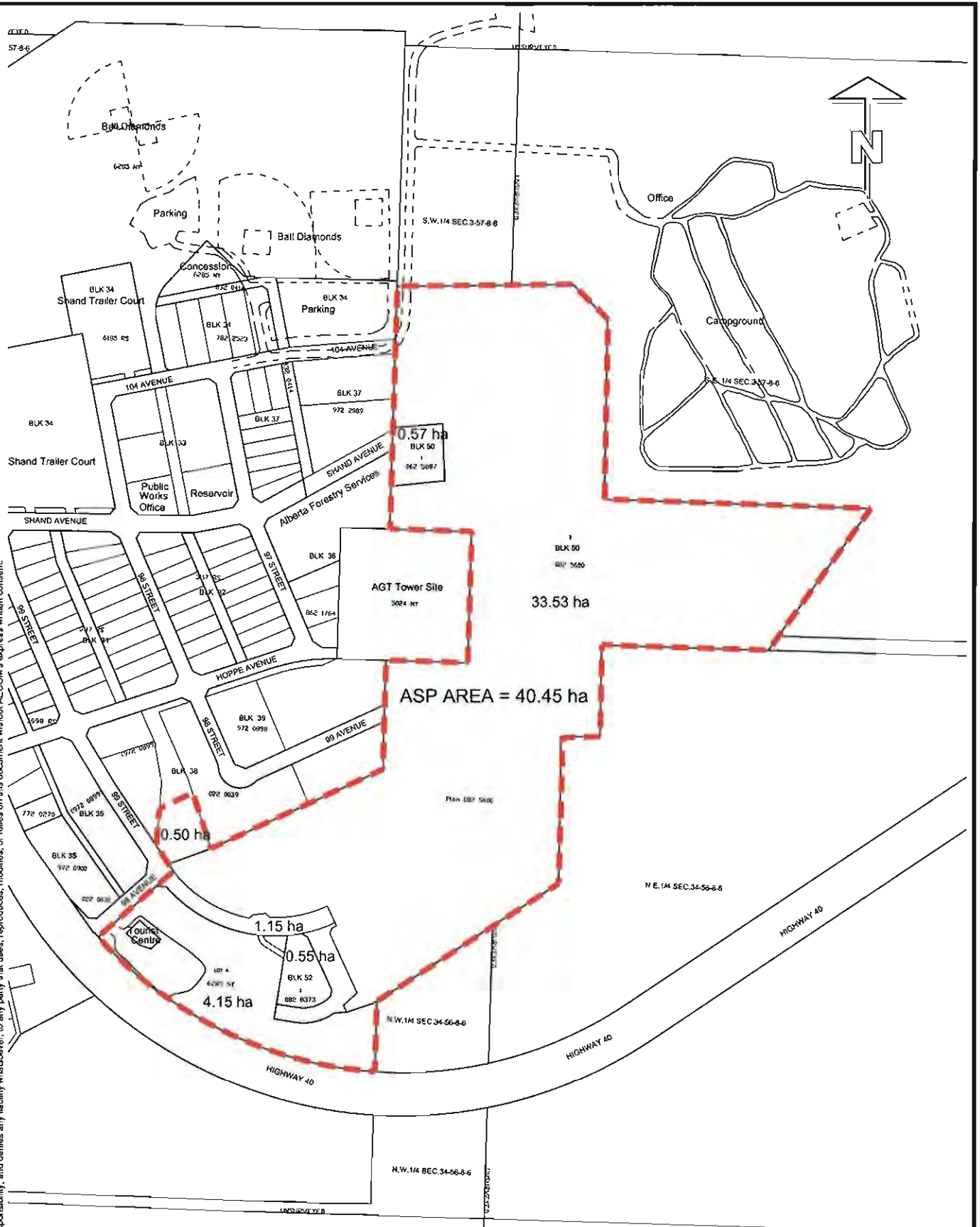
- Lot 3, Block 50, Plan 082600 approved on November 29, 2007;
- Lot 1, Block 52, Plan 0828373 approved in September, 2008;
- Lot 1, Block 30, Plan 062 5887 – the helicopter landing site owned by the provincial government;
- Lot 3, Block 38, Plan 972 0898; and
- Lot A, Plan 6285 NY – the site of the Tourism and Interpretive Centre and Birds Eye View Park.

The ASP area comprises 40.45 hectares (100.0 acres).

Policy 1.1 *The Tower Park Estates Area Structure Plan shall apply to the area contained within and defined by the boundaries shown on Figure 2.*

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LEGEND

--- Area Structure Plan Boundary

Town of Grande Cache
 Tower Park Estates
 Area Structure Plan
ASP Boundary

AECOM

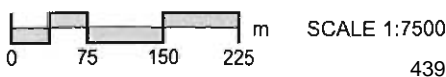
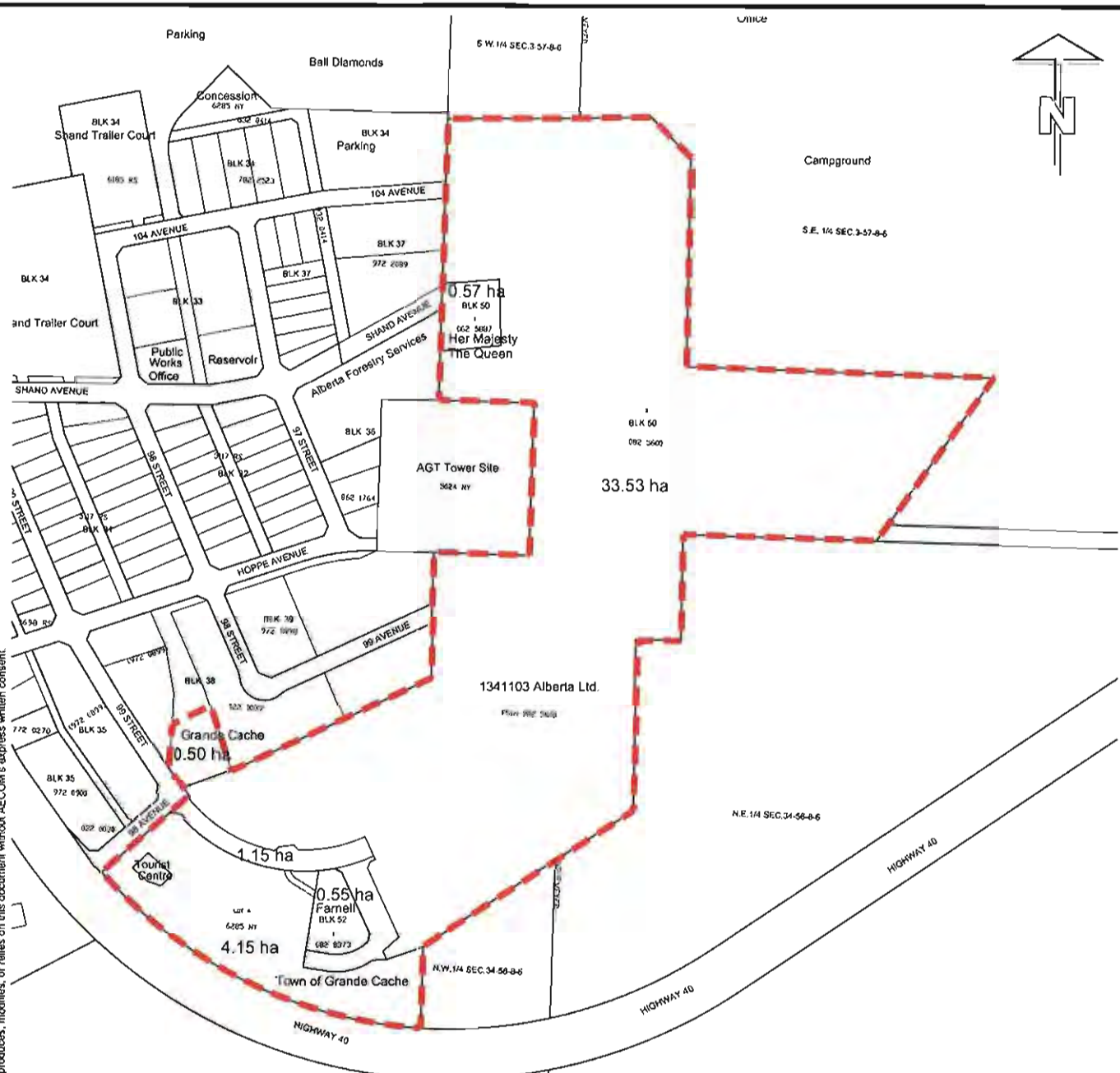


Figure - 2

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Legal	Title No.	Owner	Area on Title	Area in ASP
Lot 3, Blk 50, Pln 082 5600	082 442 470 +1	1341103 Alberta Ltd.	33.88 ha	33.53 ha
Lot 1, Blk 50, Pln 062 5887	072 042 450	Her Majesty The Queen In Right of Alberta	0.573 ha	0.57 ha
Lot 1, Blk 52, Pln 082 8373	082 451 958	Farnell Properties & Development Ltd.	0.73 ha	0.55 ha
Lot3, Blk 38, Pln 972 0898	972 086 143 +4	Town of Grande Cache	0.94 ha	0.50 ha
Lot A, Pln 6285 NY	082 255 211 +2	Town of Grande Cache	138.02 ha	4.15 ha
Road Right of Way	N/A	Public	N/A	1.55 ha
Total				40.45 ha

LEGEND
 --- Area Structure Plan Boundary

**Town of Grande Cache
 Tower Park Estates
 Area Structure Plan
 Land Ownership**

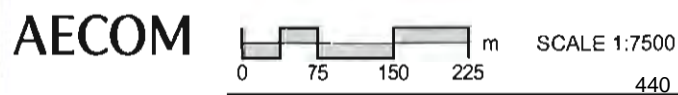


Figure - 3

1.3 Timeframe

The build-out of Tower Park Estates will be determined by market demand and be related to future economic conditions.

1.4 Interpretation

All symbols, locations and boundaries shown in the Area Structure Plan shall be interpreted as conceptual unless otherwise specified in the document or where they coincide with clearly recognizable physical or fixed features within the plan area.

A policy statement(s) containing 'shall' is mandatory and must be implemented. Where a policy provides direction that is impractical or impossible, an application may be made to amend the plan. A policy statement(s) containing 'should' is an advisory statement and indicates the preferred objective, policy and/or implementation strategy. If the 'should' statement is not followed because it is impractical or impossible, the intent of the policy may be met through other means to be agreed upon.

1.5 Background

The ASP area was originally Crown land in right of the Province of Alberta. It was transferred to the Town of Grande Cache to meet the continuing demand for industrial and related land uses. Rather than act as developer as it had done previously, the Town chose to seek private interests to develop the land. In preparation for this transfer, the Town commissioned preliminary grading and servicing drawings as the basis for development.

The successful purchaser and developer has modified the original development concept and provided additional planning and design work accordingly. The southerly portion of the ASP area is proposed as a mixed use urban village incorporating Smart Growth urban design principles. It will integrate residential, commercial, institutional and open space uses to create 'Tower Park Urban Village'. The northerly portion of the ASP area will continue as a more conventional industrial/commercial business park.

An Area Structure Plan is required for several reasons. First, the terms of the transfer of the land to private interest require the preparation of an ASP. Second, Alberta Transportation requires an approved Area Structure Plan and Traffic Impact Assessment prior to any further subdivision. Third, the Town's Municipal Development Plan requires the preparation of Area Structure Plans or conceptual schemes for the development of new areas or expansion of existing areas (Policy 15.1). Finally, the preparation of an Area Structure Plan represents comprehensive master planning and thus fulfills sound planning principles.

2. Policy and Regulatory Context

The preparation of the Tower Park ASP has been guided by and is intended to be consistent with applicable provincial and municipal land use legislation and policy.

2.1 Municipal Government Act

The Municipal Government Act (MGA) is the provincially enacted regulatory framework that directs municipalities how to enact land use policy. It enables the preparation of Municipal Development Plans (Section 632), Area Structure Plans (Section 633) and Land Use Bylaws (Section 640).

The Subdivision and Development Regulation (AR43/2002) is pertinent to this Area Structure Plan, as it states that "a subdivision authority shall not in a municipality other than a city approve an application for subdivision if the land that is the subject of the application is within 0.8 kilometres of the centre line of a highway right of way unlessthe land is contained within an area structure plan satisfactory to the Minister of Infrastructure and Transportation and the proposed use of the land is permitted under that plan" (Section 14).

2.2 Municipal Development Plan

Municipal Development Plans (MDPs) are created by municipalities to guide the long-range direction of land use within their boundaries. The Town of Grande Cache Municipal Development Plan, Bylaw 595, was adopted in 2000. It contains a number of goals, strategies and policies that affect this Area Structure Plan.

2.2.1 Goals and Strategies

The Town's current MDP identifies several goals and strategies that have been considered throughout the development of this ASP.

Economic Development Goals (Section 7.2) include the following:

- a) To create conditions that are conducive to the diversification of Grande Cache's economy [...] for which Grande Cache has an obvious economic or locational advantage.*
- b) To emphasize four season tourism and commercial recreation as a key component of Grande Cache's economy, [...] and to facilitate its continued growth and development.*
- c) To build upon Grande Cache's excellent and ever-improving transportation advantages, especially in terms of its strategic location for tourism.*
- d) To maintain and enhance the function and integrity of the Town Centre, Highway No. 40 corridor and commercial/industrial block.*

A clearly stated **population stability/growth** goal (Section 7.4) is:

To ensure a stable population base of at least 5,000 people in order to make full use of existing facilities and services.

Community resources and standards goals include the following:

- a) ***To plan and operate the Town so as to provide a social and physical environment that is conducive to growth and that unifies the community.***
- b) ***To maintain and improve upon when necessary within budgetary limits, the current high level of community parks, recreation facilities and service provision.***
- c) ***To encourage improvements to the existing level of cultural, educational and health facilities and programs available in Grande Cache.***
- d) ***To recognize the desirability of a unifying design theme and pursue the implementation of the same with the community generally and the business community in particular.***

The MDP land use designations and policies that particularly support or relate to the Tower Park Estates Area Structure Plan are presented in the following sections.

2.2.2 Land Use Designations

The Municipal Development Plan also provides generalized direction for the future use of the subject site. Map 2 of the Municipal Development Plan indicates that the site is generally 'Developable'. Map 3, the 'Generalized (Predominant) Future Land Use Concept' designates the lower portion of the subject lands for 'Highway/Tourism Commercial' use and the northern portion for 'Industrial' uses. To ensure that Section 638 of the MGA is satisfied, it may be prudent to amend Map 3 of the MDP redesignating the corresponding area to "Tower Park Urban Village".

2.2.3 General Development Policies

MDP Policy 10.4 *"The Town, in conjunction with local/provincial/federal agencies, will engage in a concerted and coordinated effort to attract businesses that would benefit from Grande Cache's proximity to outstanding commercial tourism/recreational opportunities."*

MDP Policy 10.5 *"[T]he Town shall ensure that a good supply of highway/tourism commercial lots of various sizes are always available for development east of Highway 40 at any given time."*

MDP Policy 10.6 *"The Town [will] promote not only the Town's tourist and commercial/recreation attractions but those in the surrounding area as well."*

2.2.4 Residential Development Policies

MDP Policy 12.3 *"The Town will engage in a concerted and coordinated effort to attract new residents whose choice is to reside in Grande Cache would not be dependent on finding employment in the area, typically retirees."*

MDP Policy 12.7 *"When it is appropriate to open up new residential areas, the Town shall allow residential development in small phases so as to minimize the potential problems of only a few dwellings being constructed on a single block."*

MDP Policy 12.9 *"All new residential areas will set aside at least 15% of the net developable land for multi-household dwellings. This may be allocated to a wide variety of medium to high density housing options. These multi-household family sites will be dispersed to reduce any negative effects of large-scale grouping".*

2.2.5 Industrial Commercial Development Policies

MDP Policy 10.2 *"[T]he Town shall ensure that a good supply of light industrial/service commercial lots of various sizes are always available for development east of Highway 40 at any given time."*

2.2.6 Parks, Recreational Land Use and Urban Design Policies

MDP Policy 10.8 *"[T]he Town will establish design/landscape guidelines for [highway/commercial lands] to maintain an attractive visual appeal and a unifying design theme. To this end, the Town will continue to prohibit billboards, as is stipulated in the Land Use Bylaw."*

MDP Policy 11.2 *"The Town shall ensure that Highway 40 users are well informed of the availability and specific location of major Town-provided recreation facilities."*

2.2.7 Transportation Policies

MDP Policy 13.1 *"The Town will strive to achieve continuity of arterial and collector roads and ensure that the provision of transportation facilities is coordinated with the development of new areas."*

MDP Policy 13.2 *"The Town will apply a general road hierarchy in which design of roadways is consistent with their function."*

MDP Policy 13.3 *"The Town will maintain specific performance standards for road design and construction, but will encourage innovation where alternative designs will serve an equivalent function consistent with the provisions of this Plan."*

MDP Policy 13.4 *"The Town will work with developers and other agencies to develop a continuous pedestrian and bicycle circulation system which links residential areas, schools, commercial facilities, parks and leisure facilities."*

2.2.8 Servicing and Utilities Policies

MDP Policy 13.6 *"The Town shall ensure that appropriate utility infrastructure is in place to serve development. The Town shall periodically reassess this infrastructure in relation to anticipated demands."*

MDP Policy 13.7 *"The Town will not initiate the extension of municipal services to any developable area currently unserved until in-filling of existing serviced areas for the same types of land uses occurs to suitable levels."*

MDP Policy 13.8 *"Any development on slopes greater than 15% may require analysis of slope stability through geotechnical study and measures may need to be taken to mitigate slope instability if required."*

2.3 Area Structure Plans

The MGA outlines the requirements for an Area Structure Plan (ASP). Specifically, the MGA states that ASPs must describe:

- a) the sequence of development proposed for the area,
- b) the land uses proposed for the area,
- c) the density of population proposed for the area,
- d) the general location of major transportation routes and public utilities, and
- e) other matters the council considers necessary.

These requirements are reiterated in Policy 15.1 of the MDP that outlines the requirements for ASPs as follows:

"Area structure plans or conceptual schemes shall be prepared for the development of new areas or where existing areas are being significantly altered or expanded, they shall be consistent with this Plan and shall address the following:

- a) proposed land uses,
- b) sequence of development,
- c) location of roads and public utilities,
- d) location and extent of reserve lots,
- e) major physical or manmade constraints to development, and
- f) any other matters that the Town considers necessary for a particular area."

2.4 Land Use Bylaw

The subject lands are currently zoned C-2 (Commercial Highway-Oriented) and CM (Commercial Service and Light Industrial Mixed) (**Figure 4**). The purpose of the C-2 (Commercial Highway-Oriented) district is to “provide for a range of commercial uses to serve the travelling and local public using Highway 40” (page 11-28).

The purpose of the CM (Commercial Service and Light Industrial Mixed) district is to “to provide for a wide variety of service oriented commercial outlets [...] at lower densities [and to] establish an area of light industrial uses” (page 11-31).

Although the C-2 (Commercial Highway-Oriented) district allows for a Mixed Use Development as a discretionary use, a Direct Control district is necessary for the Urban Village area of the ASP area in order to create an area of special character with a higher level of design. The Direct Control district provisions shall address but not be limited to the following elements:

- Form and character of buildings;
- Landscaping;
- Public amenity space; and
- Access and circulation.

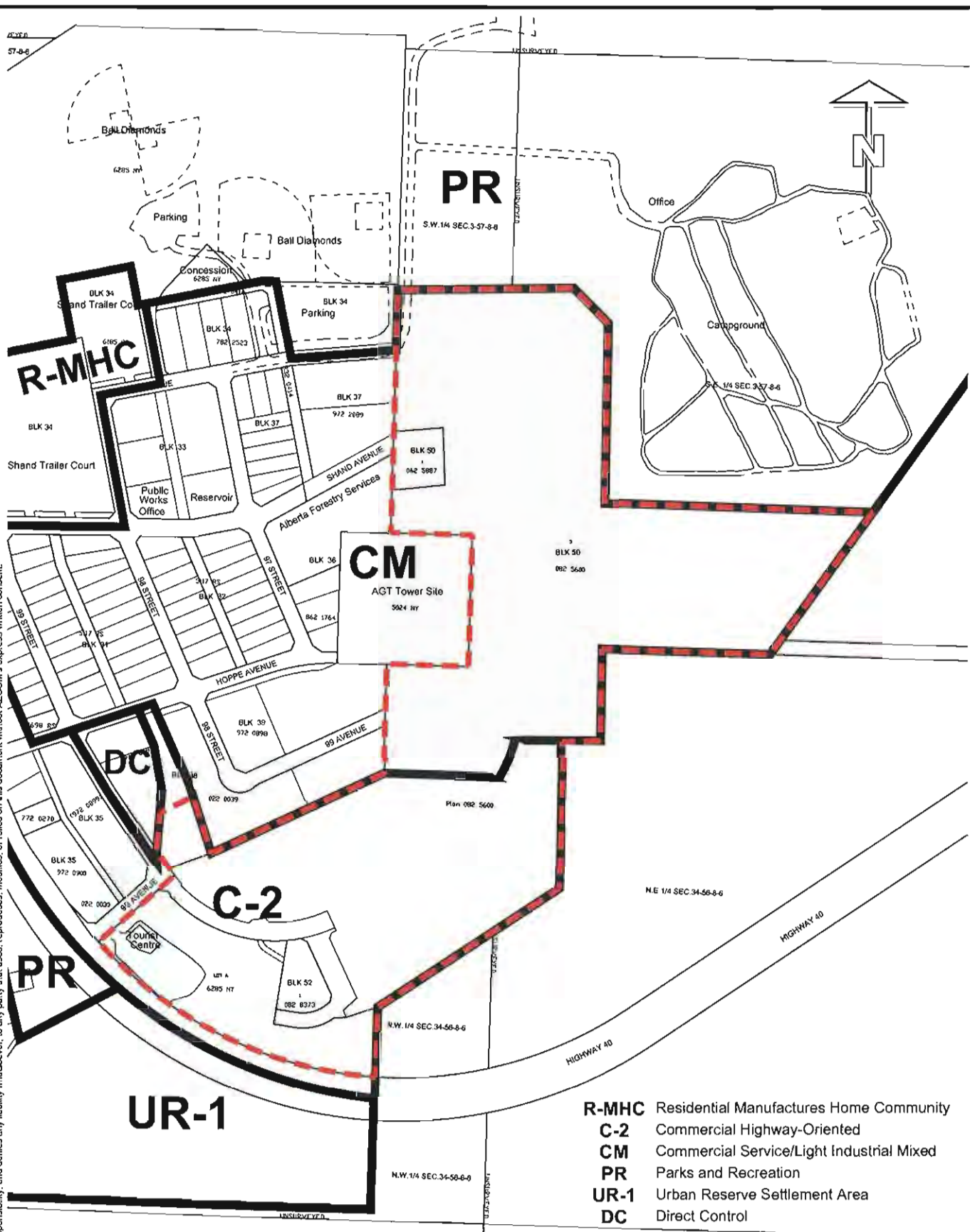
The CM (Commercial Highway-Oriented) district may be sufficient for the proposed Business Industrial Area. Discretionary uses included within the CM (Commercial Highway-Oriented) district which pose a level of environmental risk to adjacent residential lands will not be permitted. These uses include the following:

- Bulk fuel and chemical storage
- Oilfield support
- Waste management.

One or more Direct Control Districts or site-specific district may be required to ensure a higher standard of development, to limit noxious uses, to manage the provision of residents and for other purposes.

Additional sections of interest within the Land Use Bylaw that may apply to the ASP area include the following:

- a) Section 8.5 Design, Character and Appearance of Buildings and Structures,
- b) Section 8.10 Hazard Lands (building set-back of 20.12 m from top-of-bank of any watercourse or escarpment bank or slope exceeding 15 percent grade),
- c) Section 8.16 Noise Sensitive Land Uses which may address the potential for mitigation between mixed-use/residential and commercial/industrial land uses.



AECOM



Figure - 4

3. Planning Influences

3.1 Winter City Design

Winter City Design principles are premised on the understanding that many communities must strive to maximize quality of life during cold, winter months. Winter is not viewed as a hindrance but rather a positive attribute that creates variety in experience for residents. Winter City Design seeks to minimize the negative implications of a cold climate (cold weather, limited daylight, slippery surfaces, snow removal) and embellish the positive (beauty, variety in experience, opportunity for new activities). Many Canadian and Scandinavian countries have been adopting Winter City Design principles to create urban spaces that are conducive to year-round activity.

Examples of measures that can be taken to implement Winter City Design in a community include the following:

- **Improving walkability** – using non-slip surfaces, providing handrails, raising pedestrian crossings to allow for snow/ice accumulation, space between sidewalks and roadways to mitigate spray from vehicles, providing awnings to protect pedestrian walks.
- **Appropriate use of vegetation** – provision of street trees, use of salt-resistant plants near roadways, planting deciduous trees on the south side of streets to shade in summer and permit sun in winter, planting coniferous trees to provide year-round colour and protection in winter.
- **Minimizing wind and cold** – sheltered transit stops and entranceways, building design to prevent wind tunnels, provide pedestrian walks on 'sunny side' of the street.
- **Other design considerations** – seasonal lighting, use of warm colours, continuous building facades, consider room for snow storage.

3.2 New Urbanism and Smart Growth

In 1993, the Congress of New Urbanism developed a set of planning and design principles which led to a popularization of this approach across North America. New Urbanism seeks to reduce the scale of urban spaces to recreate the intimacy and sense of place that was once valued as part of the design of urban spaces. This often involves prioritizing pedestrian and public spaces and minimizing the importance of vehicular activities. Mixing residential with other complementary uses (retail, offices, parks) is understood to create 24 hour activity in a place, thereby increasing opportunity for social interaction and enhancing community safety.

Principles of New Urbanism include the following:

- Walkability
- Connectivity
- Mixed Use
- Quality architecture
- Neighbourhood structure
- Density
- Alternative transportation.

3.3 Form-Based Zoning

Zoning (land use) bylaws are the predominant means of regulating land use in Canada. These bylaws ascribe to the traditional notion of districting land based on use (also known as 'Euclidian zoning'). Euclidian zoning originally emerged in an effort to separate noxious uses from areas of human habitation but has translated into the (albeit unintended) separation of uses based on income, class and even race through districting land use based on housing type.

Form-based zoning is an approach to regulating the manner in which development occurs which focuses less on the uses of the land and, instead, emphasizes organizing building placement and exteriors as well as the nature of streets and public spaces. A form-based code can be defined as "a regulatory approach designed to shape the physical form of development while setting only broad parameters for use" (Garvin and Jourdan, 2008, p. 396).

Form-based codes comprise two components:

- a) **Regulating plan** - an aerial map of what type of building goes where
- b) **Building standards** - a set of building cross-sections and plan diagrams indicating:
 - a. Minimum and maximum height
 - b. Setbacks
 - c. Location of entrances
 - d. Parking
 - e. Yards/courtyards
 - f. General uses
 - g. Street cross-sections
 - h. Landscape standards
 - i. Architectural standards (optional).

Form-based codes are argued to support a more socially integrative community, wherein housing types and tenure forms are mixed together.

SmartCode is a template for form-based zoning developed by Duany Plater-Zyberk & Company. SmartCode involves the delineation of transects throughout a community or region. A transect is defined as “the systematic gradation of a community from its most urban to its most rural sector” (Langdon, 2006, p. 29). Transects consist of six zones, as outlined below (Duany and Talen, 2002, p. 247):

- a) Rural Preserve
- b) Rural Reserve
- c) Sub-Urban
- d) General Urban
- e) Urban Center
- f) Urban Core.

Transects seek to create a sequence of human habitats composed of varying degrees of urban intensity (Duany and Talen, 2002, p. 250). Each transect zone should have a particular set of standards attached to them, as appropriate to local conditions.

An alternative to adopting form-based zoning for an entire municipality is to adopt an overlay wherein developers can use form-based rather than conventional ordinances.

Principles by which diversity can develop (Talen, no date, pp. 30-31):

- a) Housing mix
- b) Neighbourhood facilities and services
- c) Centers and edges
- d) Connectivity.

Design guidelines have traditionally been an attempt to toe the line between prescription and discretion (Sitkowski and Ohm, 2006, p. 170). Hiring a town architect a means by which to define ‘good design’ rather than appointed review boards (Ibid, p. 171).

The Tower Park Area Structure Plan will be a site specific plan showing blocks, specifying building forms and establishing density guidelines. Should the Town of Grande Cache choose to adopt a form-based code, this plan can become a special district within it. Should zoning remain Euclidian, the ASP area, or at least the Urban Village portion, may be regulated by a Direct Control district.

3.4 20/20 Vision of the Future: Town of Grande Cache Strategic Sustainability Plan

Many of the concepts and themes of sustainable community development, smart growth and winter city design are at the heart of the Town's sustainability plan, the **20/20 Vision of the Future: Town of Grande Cache Strategic Sustainability Plan**. This vision forms the basis for the community's planning and has informed the preparation of this Area Structure Plan. Therefore key excerpts from that vision and strategic plan are stated here to show the community values and directions that inform planning for the Town of Grande Cache.

The vision statement for the Town states that

Grande Cache will be a vibrant and progressive mountain community that achieves excellence by embracing cultural diversity, safe and healthy neighbourhoods, leading edge environmental stewardship, and a sustainable diversified economy.

The vision statement is built on a set of community values that guide community decisions, help set priorities and provide direction for actions to achieve goals. These values are stated as follows:

- Strong, healthy, diverse, vibrant neighbourhoods where social interaction, culture, recreation, social and health services and life-long learning are accessible;
- A sustainable, diversified and stable economy;
- Well planned and managed community
- Strong tourism economic placing a high value on environmental stewardship;
- Environmental stewardship resulting in leading edge environmental practices;
- A safe community for diverse residents and guests;
- A culture of customer service to residents and guests;
- Healthy living, recreational and cultural activities taking place within a unique mountain environment; and
- Citizen engagement and volunteerism.

The application of the vision statement and community values will lead to community design for liveability, the incorporation of progressive green technologies into new development, a balance between trail development and roadway development, affordable housing, and pedestrian orientation in neighbourhoods all within the context of public safety and security. The Town aspires to providing outstanding indoor and outdoor recreational opportunities and facilities. All of these factors are intended to provide a superior quality of life for residents and visitors alike.

4. Site and Site Context

4.1 Location and Access

The ASP area is located east and south of the most easterly built-up area within the Town of Grande Cache. It occupies about 40 ha (100 acres) of land extending in an arc from the existing Tourism and Interpretive Centre north and east of the industrial area. A portion of the site occupies the ridge on which most of Grande Cache has been built, while the southern portion extends onto a south facing slope below the ridge.

There are three existing and one potential roadway access points to the ASP area.

Access to the southern portion of the ASP area is from the intersection of 99th Street and 98th Avenue. Ninety-eighth Avenue provides direct access to Provincial Highway 40. It is the third roadway access to Highway 40 within the Town of Grande Cache. The first phase of 99th Street has been extended into the ASP area as Main Street to provide access to initial development.

Ninety-ninth Avenue provides a second access from the industrial area to the west near the centre of the ASP area.

The third access is from 104th Avenue near the north end of the ASP area.

An additional access point could be created by the physical extension of Shand Avenue from the west. This would complement the 104th Avenue access point and provide a more direct link to the Highway 40/Shand Avenue major intersection.

4.2 Surrounding Land Use

The Tower Park Estates ASP area is located north-east of Highway 40. The subject lands are bound to the southeast by undeveloped, unpatented Crown land currently under forest cover. A small portion of these lands are designated for Industrial and Community and Commercial Recreation in the Town's Municipal Development Plan. Hence they may represent a future development opportunity if such lands could be acquired from the Crown.

To the south, the ASP area is bound by Highway 40. Across Highway 40 to the southwest is the future site of 'Townsite 2', an area designated for future urban development.

To the north and west the ASP area is bound by existing industrial development within the Floyd McLennan Industrial Park. Immediately to the west and along the northeast frontage of Highway 40 is a highway commercial area comprising hotels, motels, restaurants and service stations. The Town Centre of Grande Cache is located about 400 metres to the northwest.

To the north the ASP lands are bound by Crown lands that have been developed for the municipal campground and the municipal golf course.

The Development Concept for the ASP area includes provisions for potential access to lands to the north, east and south, including the municipal campground.

4.3 Environmental Context

Grande Cache is located within the montane ecosystem at an elevation of approximately 4,200 feet. Typical forest cover comprises aspen poplar, white spruce and lodgepole pine. Much of the site has been cleared in anticipation of development. The site is located on a south-facing slope creating a sheltered, attractive site taking maximum advantage of solar orientation for human use and enjoyment.

4.4 Topography and Drainage

The ASP area extends along the top of the ridge on which Grande Cache is located and along the southeast and south facing slope of the ridge (**Figure 5**). The highest point in the ASP area is above 1,295 metres above sea level (asl) in the northern portion, while the lowest point is 1,230 metres asl at the extreme southern end. The vertical difference is therefore about 65 metres.

The southern portion of the ASP area is the area of greater slopes. Here the elevations range from 1,230 m asl to 1,270 m asl, a vertical difference of 40 metres. Overall, the gradient averages between 10% and 15%. Locally, gradients can be as low as 5% while there are also small areas where local slopes exceed 25%. Careful site planning will address the challenges of a sloping site through grading and terracing, as has been done throughout Grande Cache. At the same time, the south facing aspect, views across the valley, positive drainage and overall rolling topography define very positive attributes for site development. Street and building alignments can be adapted to the 'grain' of the land in a creative and satisfying manner.

There are no apparent water courses draining the site. Downslope drainage would ultimately end up in Victor Lake, located in the valley to the south.

4.5 Geotechnical Conditions

Parkland GEO conducted a geotechnical investigation of the ASP area in December of 2006. The investigation involved drilling nine (9) boreholes throughout the property to provide recommendations for site preparation, foundation design/construction and pavement structures (**Figure 6**).

The geotechnical investigation found subsurface conditions of sand and gravel overlying clay till, in places, and over bedrock in other places. The sand and gravel ranges in depths from 0.5 m to 3.0m below existing grade and contains some cobbles. The bedrock is either a highly weathered sandstone or a hard clay shale.



SCALE 1:7500

Figure - 5

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LEGEND

- Area Structure Plan Boundary
- Borehole Location



Town of Grande Cache
 Tower Park Estates
 Area Structure Plan
Borehole Locations

Figure - 6

The report determined that the soil conditions within the ASP area are well suited to commercial and light industrial development. Road construction and asphalt parking areas may be placed directly onto a prepared subgrade. Utility trenching needs to consider dense gravel and sandstone at shallow depths. Building foundations will need to use shallow systems such as conventional footings; however, some areas will permit deep foundation options such as driven steel piles.

Additional geotechnical investigation will be required in conjunction with each development stage to provide recommendations regarding specific foundation and site development considerations.

4.6 Environmental Site Assessment

Parkland GEO prepared a Phase 1 Environmental Site Assessment (ESA) for the ASP lands in August, 2008. The ESA consisted of a review of historical air photos, interviews with individuals knowledgeable about the property, a site inspection and the preparation of a final report. The Phase 1 ESA concluded that the current owners do not pose a significant environmental liability or risk to the property. It was also determined that adjacent lands do not possess any high-risk environmental concerns that would influence the subject lands. The Energy and Utilities Board and Petroleum Tank Management Association of Alberta confirmed that there are no well sites or active or abandoned storage tanks on the property. Four underground storage tanks were identified in proximity to the subject area but are considered to be of low to moderate environmental concern. Lastly, municipal and provincial agencies had no environmental concerns to report.

The Phase 1 ESA concludes that the subject lands do not have any significant environmental concerns that would necessitate additional investigation. Therefore no further analysis of environmental risk was recommended.

5. Development Concept

5.1 Vision

The Tower Park Estates Area Structure Plan will provide a new focus for culture, shopping, residency, business and destination tourism for the Town of Grande Cache.

The area is located within a mountain environment, capitalizing on its setting to maintain views of the surrounding foothill and mountain environment. It will provide an urban setting close to nature.

It will be characterized by a mix of uses within a village setting providing a new and distinct residential environment close to shops, civic features, recreational facilities and employment opportunities. The village will have a compact, urban character, featuring pedestrian friendly, traffic calmed streets and a network of internal and external walkway linkages. Its focus will be a civic plaza, a gathering place for people of all ages.

Finally, it will provide an opportunity for sustainable features such as water reuse and recycling, stormwater bioswales and retention of natural areas.

5.2 Development Concept – General Description

Tower Park Estates will comprise two distinct, related precincts: an Urban Village and a Business Park. The Development Concept for Tower Park Estates is shown in **Figure 7**, while greater detail for the Urban Village is shown in **Figure 8**. Development statistics for the ASP area are presented in Table 2.

Urban Village

Generally, an Urban Village can be defined as a compact and distinct urban form with clearly defined edges and central focal point. It is intended as a place where most of the needs of daily life can be met within a convenient 400 metre walking distance. An Urban Village is a self-contained, integrated community with a mix of complementary land uses and activities, including residential, commercial, civic and recreational land uses. It is intended to provide a range of housing options which are predominantly of medium density housing forms such as town houses and low and mid-rise apartments. Live/work units are also a common feature of urban villages.

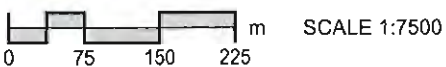
The Tower Park Estates Urban Village will occupy about 17 ha (40 acres) within the southern half of the ASP area. It has a location on a south and southeast facing slope providing dramatic views of the valley below and the mountains beyond. The slopes provide an opportunity to terrace development into the hillside creating interest and a variety of sites.

Land Use within the Urban Village will be a mix of residential, commercial and civic uses, with the opportunity of vertical integration of residential and commercial uses within multi-storey buildings.



LEGEND

- Area Structure Plan Boundary
- Urban Village
- Business Park
- Public/Open Space

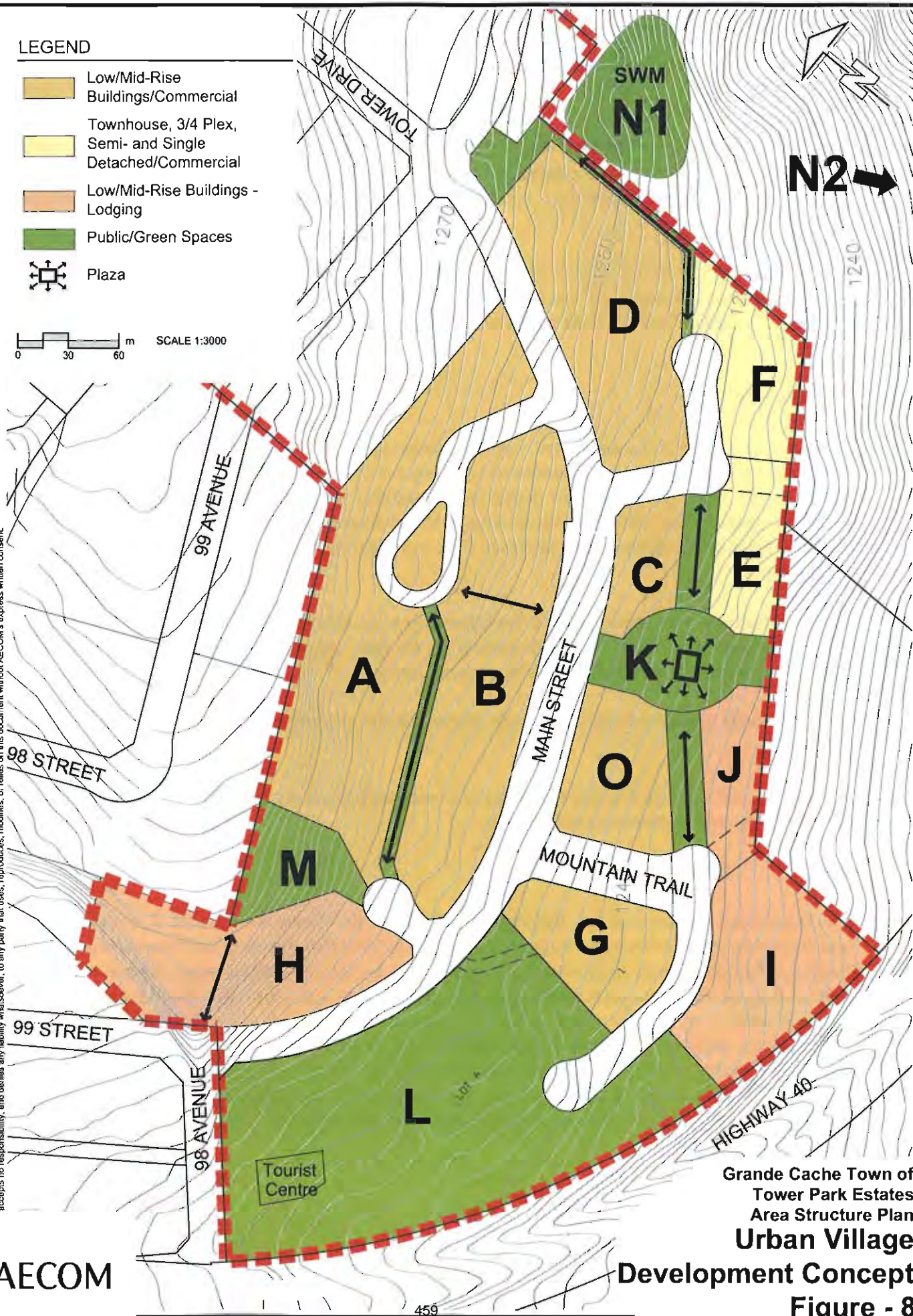


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LEGEND

- Low/Mid-Rise Buildings/Commercial
- Townhouse, 3/4 Plex, Semi- and Single Detached/Commercial
- Low/Mid-Rise Buildings - Lodging
- Public/Green Spaces
- Plaza

0 30 60 m SCALE 1:3000



Grande Cache Town of
 Tower Park Estates
 Area Structure Plan
Urban Village
 Development Concept
 Figure - 8

Main Street will constitute the primary roadway through the Urban Village, with buildings aligned close to the street to create a distinctly urban character. A variety of civic uses focusing on a central plaza will be connected by sidewalks and walkways. External walkway linkages will provide connections with the rest of the community.

The Urban Village will have a distinct sense of place and will be 'branded' accordingly to convey its special character. Special features along Tower Drive will mark the west and east entry into the Urban Village and will discourage heavy industrial traffic from passing through.

Business Park

The Business Park will be located on the ridge and plateau to the north of the Urban Village. It will provide an opportunity for light industrial and commercial uses and will constitute an easterly extension of the existing industrial park. Tower Drive will be the central street extending through the Business Park and linking it with the Urban Village. This ASP proposes to extend Shand Avenue from the west to provide an additional access to the northern portion of the Business Park and a direct connection to Highway 40 and the Town Centre beyond.

Within the Business Park there will be some opportunity in an appropriate area for a business to co-locate with a single residence within the same building on the same lot, thus providing additional security and surveillance, convenience and economies for business owners.

Opportunities for commercial use only will be provided in the southern portion of the Business Park along 99th Avenue.

The Development Concept provides for access to Crown lands to the north, east and southeast if and when these lands become available for development.

Policy 5.1. Development Concept

The Town shall ensure that the Development Concept as shown on Figures 7, 8 and 9 and all accompanying policies are adhered to in making all subsequent planning decisions within the Area Structure Plan boundaries in relation to but not limited to Land Use Bylaw amendments, subdivision applications, development permits, development agreements and servicing. Should such a decision require or amount to a major deviation from or relaxation/variation of this ASP, an amendment to this ASP shall be required. Decisions that would result in or amount to a minor deviation from or relaxation/variation of this ASP may be considered without an amendment to this ASP, in accordance with Policy 8.10, where the owner/developer can demonstrate to the satisfaction of the Town that the deviation, relaxation or variation does not substantively alter the intent, force or effect of this ASP.

5.3 Urban Village

5.3.1 General

As stated in the previous section, the Urban Village will constitute a mixed-use, pedestrian oriented neighbourhood activity centre (**Figure 8**). It will comprise a fine-grained mix of three major land uses within a relatively small area: residential, commercial and civic uses. The mixed use character of the Urban Villages will have two dimensions, horizontal and vertical. Horizontal mixed use will be achieved by locating various uses in proximity to each other. Vertical mixed use will be achieved through building forms that provide for commercial space on the ground floor and residential units above. The emphasis will be on integration of uses in common building forms, rather than a rigid segregation of land uses.

The extension of 99th Street through the Village will constitute a 'Main Street' around which major buildings and features are organized. The Main Street will have ample sidewalks on each side for ease and convenience of pedestrian movement. Buildings will be required to 'build to' the front property line and thus directly address the street. Angle parking will be accommodated within an expanded right of way to increase parking efficiency and to provide traffic calming.

Distinct entry features at the east and west end of Main Street will mark the transition to and from the Urban Village and thus contribute to its distinctive identity. These entry features are also intended to discourage heavy truck traffic from passing through, other than those required to service local businesses.

A central plaza will constitute the heart and focus of the Urban Village and will be located just south of Main Street. The plaza will provide a setting for neighbourhood and community events, social interaction, displays and a variety of formal and informal social activities. Walkway connections will radiate outwards from the central plaza providing connectivity within the village and externally to all areas of the Town. As the Urban Village will extend about 700 metres from east to west and about 300 metres from north to south, all areas will be well within 400 metres of the central plaza, providing a very walkable environment in all seasons.

At full development, a population of up to 1050 may be achieved (Table 1) depending both on final built form and household size. Along with the commercial and civic uses, the Urban Village will be characterized by a sense of vitality and amenity to meet the housing, social and work needs of a significant portion of the residents of Grande Cache.

The Development Concept shows four distinct land use zones, each zone having a distinct range of building forms, land uses and densities. Each zone comprises several sites or blocks as designated by a letter, with appropriate guidelines and policies as outlined in the policies that follow.

The Development Concept also makes provision for future roadway connections to Crown land to the south, in the event that such lands become available for development.

Policy 5.2. Main Street Entry Treatment

Special features will be required along Main Street to mark the entry and exit points along the Main Street through the Urban Village and thus reinforce the sense of place and distinct character. These defining features may include expanded curbs, changes in pavement surface markings, signs, trees or other landscape features. This will serve two purposes: one, to reinforce the special sense of place inherent in the Urban Village, and two, to discourage and divert large trucks from the adjacent business areas from travelling through the mixed use area. The nature of the features will be determined through negotiations between the Town and the developer at the time of subdivision approval for the relevant stage, and enforced through the development agreement.

Policy 5.3. 'Build-to Lines'

'Build-to Lines' shall be established within the Direct Control district that is adopted to regulate development within the Urban Village. 'Build-to' lines are the converse of setbacks. 'Build-to lines' specify that buildings shall be built on or near the front property line to create a satisfactory relationship between the building, sidewalk and street and to avoid front on-site parking.

The 'build-to' lines for buildings fronting Main Street shall specify that buildings are built either to the front property line or a short distance, less than three metres, from the front property line where there is a compelling reason, acceptable to the Town, for not building to the front property line.

'Build-to' lines shall be established for local streets other than Main Street to meet similar urban design objectives of a successful building/sidewalk/street interface.

Policy 5.4 Pedestrian Environment

Sidewalks along Main Street shall be sufficiently wide to encourage easy and convenient pedestrian movement in all seasons, to facilitate social interaction, to allow for the effects of vehicle bumper overhang, to allow ample space for street furniture, signs, light standards and public art, to provide space for merchants' sidewalk displays, to encourage storefront browsing, and generally to enliven and animate this element of the public realm. Generally, a width of four (4) metres will be adequate, increasing or 'bulbing out' at intersections and mid-block crossings.

Design guidelines for the creation of lively and safe sidewalks for both Main Street and local streets shall be created jointly by the developer and the Town with the designs enforced through the development agreement accompanying subdivision approval.

Policy 5.5 Access to Adjacent Lands

The dashed lines in the Development Concept at the southeast corner of Mountain Trail and below the southeasterly cul-de-sac indicate a future alignment for potential roadway extensions to Crown lands to the south. Regardless, a public utility corridor will be required at these two points to convey stormwater to downstream storm ponds.

5.3.2 Residential Development

Policy 5.6 Residential Land Use

Three residential building zones are established for the Urban Village, as follows:

1. **Low/mid rise Building Zone**

Residential buildings may be a maximum of five storeys in height and a minimum of two storeys. Parking may be internal (underground or at grade) or external at grade. This land use zone may also include town house units and live/work units in which the residential units are on a second and/or third storey above a main floor commercial unit. However, town house units shall comprise no more than twenty five per cent (25%) of units within this zone.

Commercial and business uses may occupy the first storey of any building within this zone. Commercial and business use may occupy the first two storeys of any building fronting onto Main Street within this zone.

The location of free-standing commercial buildings within this zone is addressed by Policy 5.12 in Section 5.3.4.

The low/mid rise building zone shall apply to Urban Village Zones A, B, C, D, G and O.

2. **Town house and Three/four-plex Building Zone**

Town houses are five or more dwellings divided by common walls and having separate entrances. They may be two to three storeys in height and have internal or external parking. Three/four-plex buildings are divided from each other by common walls and have individual or common entrances. They may have internal or external parking.

Single, semi-detached and duplex residential buildings may also be developed within this building zone, provided that the total number of such residential units does not exceed fifty per cent (50%) of the total number of units.

The Town House and Three/four-plex Building Zone shall apply to Urban Village Zones E and F.

3. **Residential Lodging Building Zone**

Residential Lodging comprises hotels, motels and related food, service, entertainment and convention facilities contained within the same building. Residential accommodation buildings shall be two storeys or more in height, and may have internal or external parking. Residential accommodation may provide both short-term and long-term stay.

The Residential Lodging Building Zone shall apply to Urban Village Zones H, I and J.

The Residential Lodging Zone may also include low/mid rise residential buildings as an alternative building form and land use, if the demand for residential lodging is insufficient to provide for build out of the three Urban Village Zones.

5.3.3 Public Spaces: Recreational, Civic and Parks

The public/civic realm will comprise three sites, each with its own distinctive character. The public realm also includes the walkways and sidewalks that provide both internal and external connectivity between these sites and the overall Town Trails system.

The three public place sites comprise the following:

1. a **civic plaza** precinct;
2. a **Hillside Park** natural area left under native forest cover; and
3. **Birds Eye View Park** in the western portion of the ASP area, and the site of the Town's **Tourism Information and Interpretive centre**.

In addition, two **stormwater management facilities** will be located on Crown land to the east and south of the ASP area, along with a bioswale to convey stormwater to these facilities (Section 7.3). It will be important to make connections with these facilities and integrate them within the overall public space system.

Civic Plaza Precinct (Zone K)

The heart of the Urban Village open space system will be a **civic plaza precinct**, comprising a plaza surrounded by businesses, civic buildings and/or residential buildings and two walkway/utility links extending east-west in each direction. The plaza will be a focal point for community gatherings, special events, art displays, markets, outdoor cafes or entertainment and cultural events as well as serving informally for informal gatherings and social interaction. The scale and size of the Urban Village is such that any point within the Village will be within 400 metres walking distance of the plaza. The civic plaza will add value both to adjacent properties, and to the entire Urban Village as a major landmark and activity centre.

It is intended that the civic plaza precinct be the subject of a planning and design exercise, jointly sponsored by the Town and the developer. Development of the plaza would be jointly undertaken by the Town and developer under a funding formula to be determined. Ongoing programming and maintenance could be led by the Town. The Town could also explore the opportunity for a separate not-for-profit group, comprising adjacent businesses, community organizations, the Town and other groups, to take responsibility for programming and maintenance. This is an arrangement that has been successful in other situations.

The thoughtful and creative design of a sustainable civic plaza is paramount to the success of the Urban Village. A clear definition of the size and scope of the plaza is premature in this Area Structure Plan.

However, the Area Structure Plan does establish development principles to guide its planning and design, and these are expressed in the policy statements that follow.

Policy 5.6 Planning and Design Process for Civic Plaza Precinct

The Town of Grande Cache will, in conjunction with the developer, take a leadership role in initiating the planning and design of the Civic Plaza Precinct. The plaza precinct will be comprehensively designed as one urban place, combining and integrating the disciplines of landscape architecture, architecture, urban design, urban planning and engineering to create an outstanding example of fine civic design.

The planning and design process shall include a consideration of capital and operating costs and measures for cost-effective programming and maintenance of ongoing operations. These measures may include the creation of a not-for-profit organization comprising business and community interests that have an interest in the success of the plaza.

Policy 5.7 Development Guidelines for Civic Plaza Precinct

The following development guidelines will be considered and incorporated into the planning and design of the Civic Plaza Precinct;

1. The size and shape of the civic plaza precinct as shown on Figure 8 is conceptual only. The final size and shape will be determined through the planning and design process. The process will consider that the plaza shall be small enough to maintain and foster a human scale and a sense of intimacy but large enough to support a variety of activities and functions.
2. The plaza will be defined by building facades on at least two sides and a street on no more than two sides.
3. The building forms that define the plaza edges will be managed as to location, height and orientation so as not to unduly block the sun and thus create a shadowing effect.
4. Commercial/civic activity will be encouraged at street level and the plaza would ideally be an extension of adjacent commercial and civic activities.
5. The plaza will be open to the south, southwest and southeast to maximize exposure to the sun in all seasons and to maximize views of the valley, foothills and mountains.
6. The two east-west walkway connections shall be an integral part of the plaza precinct to provide links with nearby parts of the Urban Village. The alignment of these walkways is also essential to accommodate critical utility connections and to provide any additional road access that the developer may require in relation to Blocks C, E, J and O.
7. There will be a direct visual and physical connection to and from Main Street to the north.
8. The planning and design process will consider the slopes of the site and consider the opportunities for spatial differentiation and interest through terracing, steps or other creative adaptations to a sloping site.

9. The plaza will be have an appropriate balance between hard landscaped areas and soft or natural landscaping to evoke the forested and alpine environment within which Grande Cache is located.
10. The plaza will include such amenities as public art, water features, trees/planting beds, benches, informal seating, bandstand, kiosks and other elements to be identified through the design process. The design process will also define a suitable distinctive, iconic landscape element or landmark to provide visual focus and a strong sense of identify for the plaza as both the heart of the Urban Village and a major civic space within the Town of Grande Cache.

Hillside Park (Zone M)

The park will be located on steeper slopes in the northwest portion of the ASP area. With an area of 0.34 ha (0.84 acres) it is one of the few areas that has not been clear-cut through site development, and serves as an example of the forest environment surrounding Grande Cache. It provides opportunities for trails leading to a vantage point overlooking the Urban Village and beyond, with appropriate interpretive treatment of the natural and built environment. An appropriate alternate name for the park may be selected to commemorate an environmental, community or historical feature, person or theme.

Policy 5.8 Hillside Park

Hillside Park shall be left in a natural condition, with improvements limited to trails and a lookout for interpretive purposes. A walkway connection will be provided across private land to the west to provide a link with Main Street and 98th Avenue, and thus provide a variety of trail loops for a varied walking experience. The ownership of Hillside Park shall be negotiated between the Town and the landowner, to be confirmed at the time of subdivision approval through the development agreement process.

Birds Eye View Park - Tourism and Interpretive Centre (Zone L)

This large area at the east entry to the Town of Grande Cache is an existing well-used landmark and activity area for Town residents and visitors alike... The Tourism Centre is an attractive architectural icon that welcomes visitors to Grande Cache. The park's existing conditions and possible development are outlined in the 'Open Space Assessment' prepared for the Town of Grande Cache in 2008 by the EDS Group Inc. The park is described as an "existing passive interpretive park featuring a walking path, gazebo seating and forest ranger stations from different decades (p.20)". It is a stopping point for tourists and a meeting place for white water rafters and contains a large gravel parking lot. The Park and the Tourism and Interpretive Centre also provide fine views of the Rocky Mountains to the west.

This will be the major park area within easy walking distance of the Urban Village. The site is large enough to provide recreational facilities and services to future residents and visitors alike. It also forms a critical link in the network of walkway and trail connections between the open space elements of the Urban Village (Civic Plaza and Hillside Park), the Town Centre, and the Town's proposed multi-use trail system. Because the site is relatively level, it provides an opportunity for parking for both on- and off-site use.

Because of the variety of potential uses that could be located on this site, and because of its strategic location relative to Highway 40, the Urban Village, the Town Centre and the rest of the community, it is felt that a Site Master Plan would be appropriate.

Policy 5.9 Bird's Eye View Park – Tourism and Interpretive Centre

The Town of Grande Cache will initiate a community-based site master planning process to identify and balance needs for this site, with the suitability of the site for a variety of purposes. Major objectives will be: to complement and enhance the activities of the Tourism and Interpretive Centre, to balance interpretive, recreational, parking and environmental needs and to define appropriate on-site and off-site trail linkages.

Storm Ponds (Zones N1 and N2 – Off-site)

Two storm ponds and connecting bioswales are proposed to handle runoff from the ASP area, as outlined in Section 7.3 and in locations shown on Figure 12. These are located on Crown land and will require successful negotiation of a lease or public utility lot with the Province.

An internal walkway connection provides a link between the plaza precinct and the northerly pond between Zones D and F.

Storm ponds in or near residential neighbourhood have a place-making function, add to the visual amenity of the neighbourhood, and provide valuable wetland habitat for a variety of plant and animal species. While these two ponds and connecting bioswales will be off-site, there are opportunities to extend the trail system along the bioswales to link the Urban Village, the storm ponds and the Town's trail system. This would add significantly to the passive recreational opportunities available to residents of the Urban Village.

Policy 5.10 Walkways to Storm Ponds

The Town will investigate the feasibility of providing trail linkages to connect the Urban Village, the storm ponds and the Town's trail system, including considerations of optimal routing, access to Crown land, responsibility for development costs and responsibility for ongoing maintenance obligations. The Town will direct the implementation of the trail linkages according to the outcome of the feasibility investigations.

5.3.4 Commercial Land Use – Urban Village

The Development Concept does not identify sites for commercial use only. The intent is that commercial use be integrated into buildings that have a residential function, whereby the first storey is commercial and the storeys above are residential. It is also possible that, in certain locations, the market place may support commercial or other business functions on the first two storeys of the residential buildings.

It is also reasonable to anticipate a demand for commercial facilities where a residential function simply may not be feasible. Yet commercial and business functions are an integral part of an Urban Village. Therefore guidelines are appropriate to designate free-standing commercial facilities at certain locations such as the Main Street. At the same time, some limitation on the total footprint of free-standing commercial facilities is appropriate to maintain the mixed use character of the village as determined by the balance between residential and commercial use.

Policy 5.11 Commercial Uses

Commercial uses will be allowed on the main storey of any building within the Urban Village. Commercial uses will be allowed on the first two storeys of any building on lots fronting Main Street.

Policy 5.12 Free-standing Commercial Uses

Commercial uses will be encouraged as part of any residential building. However, free-standing commercial buildings without a residential component will be allowed on any lot fronting Main Street to a maximum of fifty per cent of the frontage of either side of Main Street. Residential lodgings are not considered to be free-standing commercial uses.

Free-standing commercial buildings on local streets may be permitted on a discretionary basis, depending on the established character of the street.

5.3.4 Walkway Connections

The Urban Village Development Concept shows two walkway connections, likely across private lands, to provide a wider range of options for pedestrian circulation through the Urban Village. The first is a walkway connection linking Zone M, the Hillside Park with 99th Street through Zone H. The second will be a connection through Zone B opposite the civic plaza precinct, Zone K. This will require a mid-block pedestrian crossing of Main Street to provide continuity between residential areas to the north and the plaza precinct.

5.4 Business Park

5.4.1 General

The general land use pattern for the Business Park is illustrated in **Figure 9**. A transition area at the southern end will provide for commercial land use and for appropriate/compatible businesses to co-locate with a single residence within the same building on the same lot. The balance of the land is designated for commercial and light industrial use, with one parcel to be left as open space. The Town may consider establishing 'build-to lines' within the relevant Land Use District(s) in the Land Use Bylaw for the Business Park or portions of it, similar to those created within the Urban Village.

5.4.2 Transition – Commercial

The uses in the commercial area will comprise those permitted and discretionary uses now contained within the C-2 Commercial Highway-Oriented land use district with the addition of the permitted and discretionary uses listed in the CM Commercial Service and Light Industrial Mixed Use land use district. The commercial area will extend on both sides of 99th Avenue and will include an additional site east of Tower Drive and south of 99th Avenue extension.

5.4.3 Transition – Business/Residential Mixed Use

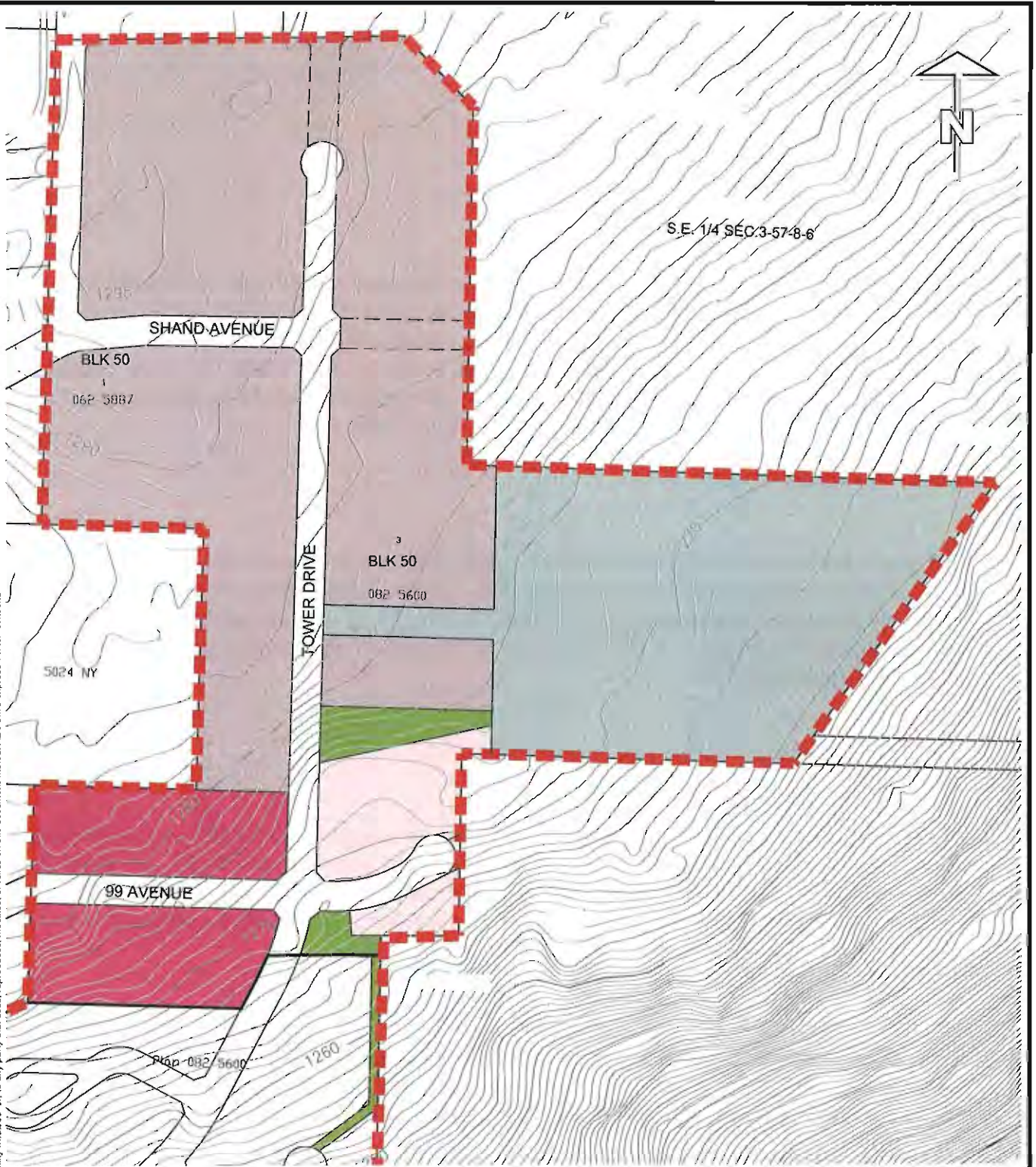
The opportunity for appropriate business uses co-locating with a single residence will occur on the north side of 99th Avenue extension. An area-specific amendment to the Land Use Bylaw will assist in the implementation of this aspect of the Business Park and clarify decision-making. The residence may be occupied by the owner of the business situated on the ground floor or be an owner's employee or a tenant.

5.4.4 Commercial/Light Industrial

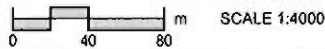
The northerly portion of the Business Park will accommodate a variety of commercial and light industrial land uses identified within the CM Commercial Service and Light Industrial Mixed Use land use district. A variety of lot sizes will be created to meet a range of market needs.

5.4.5 Open Space

An area of open space is shown that is intended to be left under existing forest cover. This area will mark the interface between the transition area to the south and the commercial/industrial portion of the Business Park to the north.



LEGEND



- Area Structure Plan Boundary
- Light Industrial
- Commercial
- Business/Residential Mixed use
- Special Planning Area
- Public/Open Space

AECOM

Town of Grande Cache
 Tower Park Estates
 Area Structure Plan
Business Park
Development Concept
Figure - 9

5.4.6 Access and Circulation

Tower Drive will be the main collector street, extending north from the Urban Village where it will be known as Main Street. It will terminate, temporarily, at the easterly extension of Shand Avenue, but may continue further north in the future to provide access to land to the north.

The extension of Shand Avenue will provide a direct roadway connection between the Business Park and Highway 40 and will complete the 'loop' collector roadway through the Business Park. Its extension will require the acquisition of Lot 50, Plan 062 5887 from Alberta Sustainable Resource Development. The matter of physically constructing Shand Avenue from the point where the roadway ends at 97th Street to the edge of the ASP area needs to be resolved between the developer and the Town. An additional benefit of extending Shand Avenue will be to provide a more direct route between the residential portion of the Town and the municipal golf course, without the necessity of traffic using the residential route along 99th Street and 104th Avenue.

5.4.7 Future Access to Crown Lands

Provision is indicated by the dashed line to protect for future access points to Crown land to the north and east. There are two potential future access points: (1) the northerly extension of Tower Drive, and (2) the easterly extension of Shand Avenue.

5.4.8 Special Planning Area

The easterly 'panhandle' within the Business Park is designated as a 'Special Planning Area'. Access shall be provided to future Stage 5 within the Business Park as shown, until an alternate access is provided across what are now crown lands in right of Alberta Sustainable Resource Development.

Policy 5.13 Special Planning Area

At the time that the ultimate land use for Stage 5 (see Figure 13) is determined, an amendment to this Area Structure Plan will be required to address land use, access, the possible provision of alternate access across Crown lands, water and sewer servicing, stormwater management and other ASP issues.

Table 1 - Land Use Statistics

	AREA (ha)	% OF GDA	DU/ha	UNITS	% OF TOTAL	PPDU	POP	% OF TOTAL
Gross Area	40.45							
Environmental Reserve	0.00							
Gross Developable Area	40.45	100%						
Collector road	2.95	7.3%						
Local road	2.68	6.6%						
Public Spaces/Parks	4.92	12.2%						
Subtotal – Other Uses*	10.55	26.1%						
Business/Residential Mixed Use	1.04	2.6%	10	11	1.9%	2.2	25	2.3%
Commercial	2.25	6.4%						
Business Industrial	11.15	27.6%						
Special Planning Area	5.97	14.8%						
Subtotal – Business Park	20.41	51.2%		11	1.9%		25	2.3%
Low/Mid-Rise Buildings/Commercial	6.17	15.3%	85	525	90.2%	1.8	945	88.2%
Townhouse/Three/Four Plex,/Commercial	0.92	2.3%	50	46	7.9%	2.2	102	9.5%
Low/Mid-Rise Buildings – Lodging	2.40	5.9%						
Subtotal – Urban Village	9.49	23.5%		571	98.1%		1047	97.7%
TOTAL	40.45	100.0%		582	100.0%		1072	100.0%

*Stormwater Management Facilities located off-site total 1.50 ha and are not included in these statistics.

6. Transportation

6.1 Regional Context

Provincial Highway 40 is a major highway in west-central Alberta, linking Hinton and the Yellowhead Highway to the south with Grande Prairie to the north. As the only highway access to Grande Cache, it is a vital route for residents, visitors and industry and the ASP area occupies a strategic location adjacent to this main highway.

6.2 Provincial Highway

While Highway 40 forms the southwestern boundary to the ASP area, another access to Highway 40 south of 98th Avenue may not be appropriate due to site lines and grades and the policies of Alberta Transportation. It is important to note that a recent draft Access Management Plan from Alberta Transportation did not identify an intersection south of 98th Avenue.

6.3 Access and Circulation

As shown in the Development Concept, a continuous collector will traverse the ASP Area. Its character, appearance and standards will vary between the two components of the ASP area, reflecting the difference in anticipated vehicles, traffic patterns and pedestrian focus between the Urban Village and the Business Park. The collector will be known as 'Main Street' within the Urban Village and 'Tower Drive' within the Business Park.

In all parts of the ASP area, but especially in the Urban Village, the importance of pedestrian movement and walkability will be reinforced through traffic calming, wide sidewalks and an overall pedestrian system defined by destinations and linkages.

Traffic calming measures may include narrower roadways, raised pedestrian crossings, curb extensions at pedestrian crossings, pedestrian islands, medians, and changes in surface materials.

Section 5.2.1 addresses the special treatment to be provided on Main Street at the east and west entry/exit points to the Urban Village.

It is proposed road standards that Main Street/Tower Drive, as the collector street through the ASP area will have an urban standard through the Urban Village and a rural standard in the Business Park. All roadways will be paved. Right-of-way, road surface, sidewalk and speed standards will be modified from the Town's standards to reflect the goals and objectives of the ASP area.

As it relates to this Area Structure Plan, the Town, in conjunction with the developer, will need to address the improvement, including pavement, of roads, such as Shand Avenue and 99th Avenue, that provide access to the ASP area.

The goal is for visitors to the Urban Village to park at a single location and walk to their destinations. This will require the development of parking lots distributed throughout the Urban Village. Standards for screening and landscape development of public and private parking lots will need to be prepared and managed to provide a safe, convenient and accessible parking for residents and visitors.

Within the urban village, diagonal parking along Main Street will be enabled by a wide right of way of 30 m to act both as a traffic calming measure and to provide greater parking yield.

6.4 Pedestrian Connectivity

A safe, convenient and attractive pedestrian system within the ASP area is essential to ensuring a liveable and walk able environment. Appropriate surface materials and places to walk to and from (origins and destinations), wayfinding signs and links to the Town's community trails system are all elements of a safe and convenient system.

The sidewalk and walkway system will link all civic and park spaces with residential areas and with the rest of the community, its Town Centre, schools, and recreational and other community facilities. Sidewalks will also be provided on at least one side of all collector streets within the Business Park.

6.5 Traffic Impact Assessment

Once the development concept for the ASP area is confirmed, a traffic impact assessment may be required to determine the effect of traffic on the adjacent roadway system, the need and cost for necessary roadway, intersection and sidewalk upgrades, and the assignment of cost for necessary upgrades.

Policy 6.1 Traffic Impact Assessment

The Town may require applicant(s)/owner(s)/developer(s)/proponent(s), at their sole expense, to prepare a Traffic Impact Assessment (TIA). The timing and scope of a TIA in relation to Highway 40 shall be as determined by the Town in consultation with Alberta Transportation. The TIA prepared in relation to Highway 40 shall be to the satisfaction of Alberta Transportation as well as the Town.

7. Servicing

7.1 Water Supply and Distribution

In 2007 a Water Distribution Master Plan was completed for the Town of Grande Cache by ISL Engineering with the intent of determining required upgrades to the existing water distribution system. Water servicing the Town is pumped from Victor Lake and treated at a plant west of Highway 40, after which water is pumped to a reservoir located in the industrial lands located east of Highway 40. The Master Plan determined that the Town's reservoir has sufficient capacity to service existing population but that planning should occur for a second reservoir when the Town's population reaches 6,600 people. It was also determined that the industrial lands east of Highway 40 do not have sufficient fire flows. As such, the Master Plan recommends upgrades to fire pumps, water lines and Pressure Reducing Valves in proximity to the ASP lands. These upgrades will be able to service the subject area.

The Master Plans proposes that the ASP area will be serviced by a 300 mm water line creating a loop extending from the existing system at 99th Street and 98th Avenue along Tower Drive to the existing system at 104 Avenue and 97 Street (**Figure 10**)

7.2 Wastewater Collection System

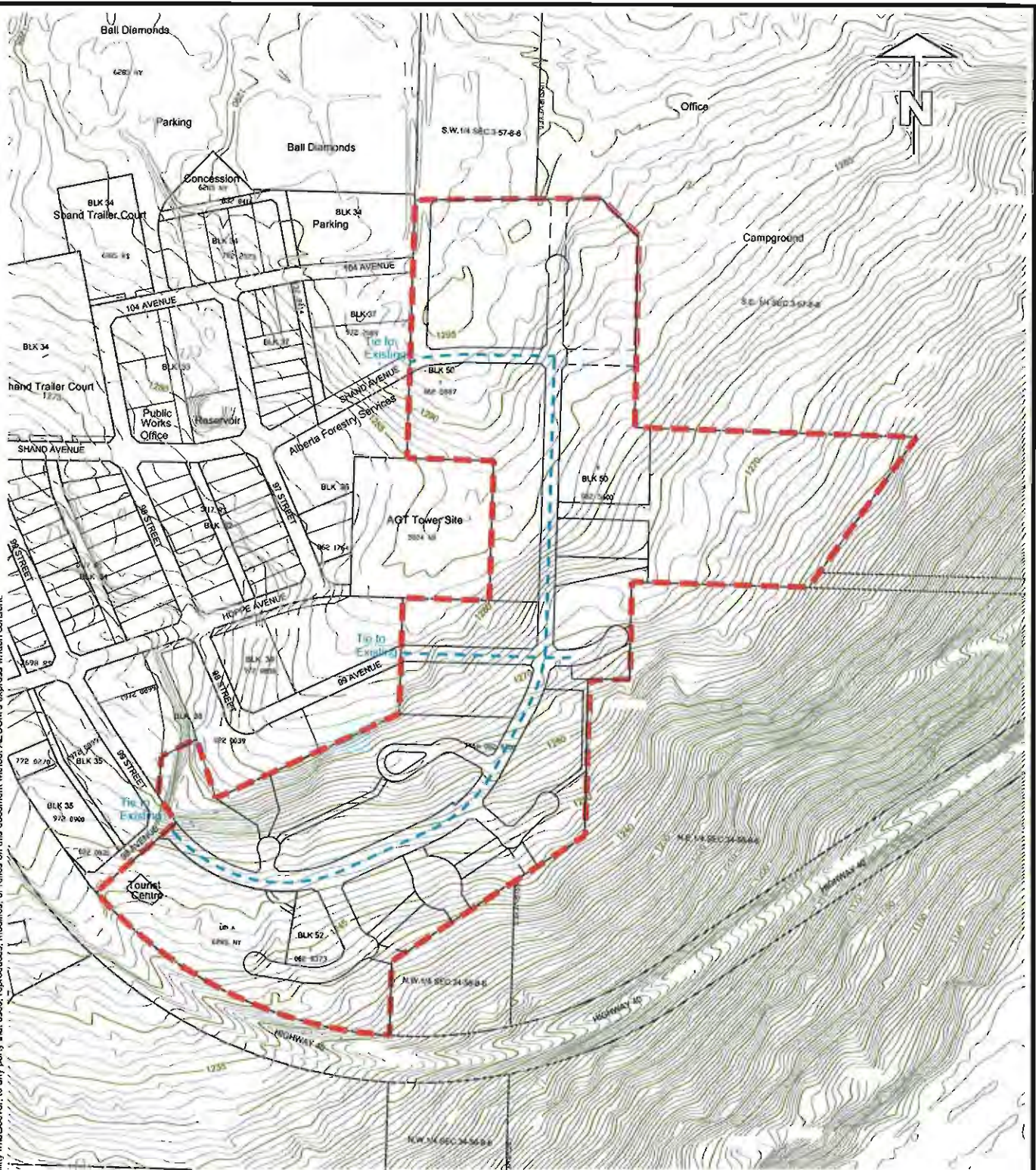
The Wastewater Collection System Master Plan was completed in October of 2007 by ISL Engineering on behalf of the Town. Its purpose was to determine upgrades required to the existing collection system and to develop servicing plans for future growth.

The Master Plan contains proposals for servicing the ASP area. Specifically,

"The Tower Site development will be serviced by gravity to the future 375/525 mm trunk which passes through Townsite 2 and connects with the 375 mm/600 mm outfall line. The proposed Tower Site 250 mm piping also allows for the connection of the campground to the Town sanitary system, and decommissioning of the septic field" (ISL, 2007, p. 11).

The 375/525 mm trunk was constructed in 2008 to a point on the opposite side of Highway 40. It will service not only the ASP area but also much of the adjacent industrial area to the north. Wastewater flows will be conveyed by the new trunk to the Town's wastewater treatment plant located about three kilometres to the southwest (**Figure 11**).

The Master Plan also recommends the decommissioning of the 200 mm trunk located just south of the subject lands, within the Tourism and Interpretive Centre site and replacing it with a 300 mm line.



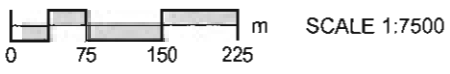
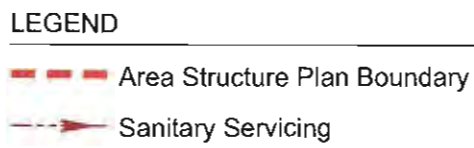
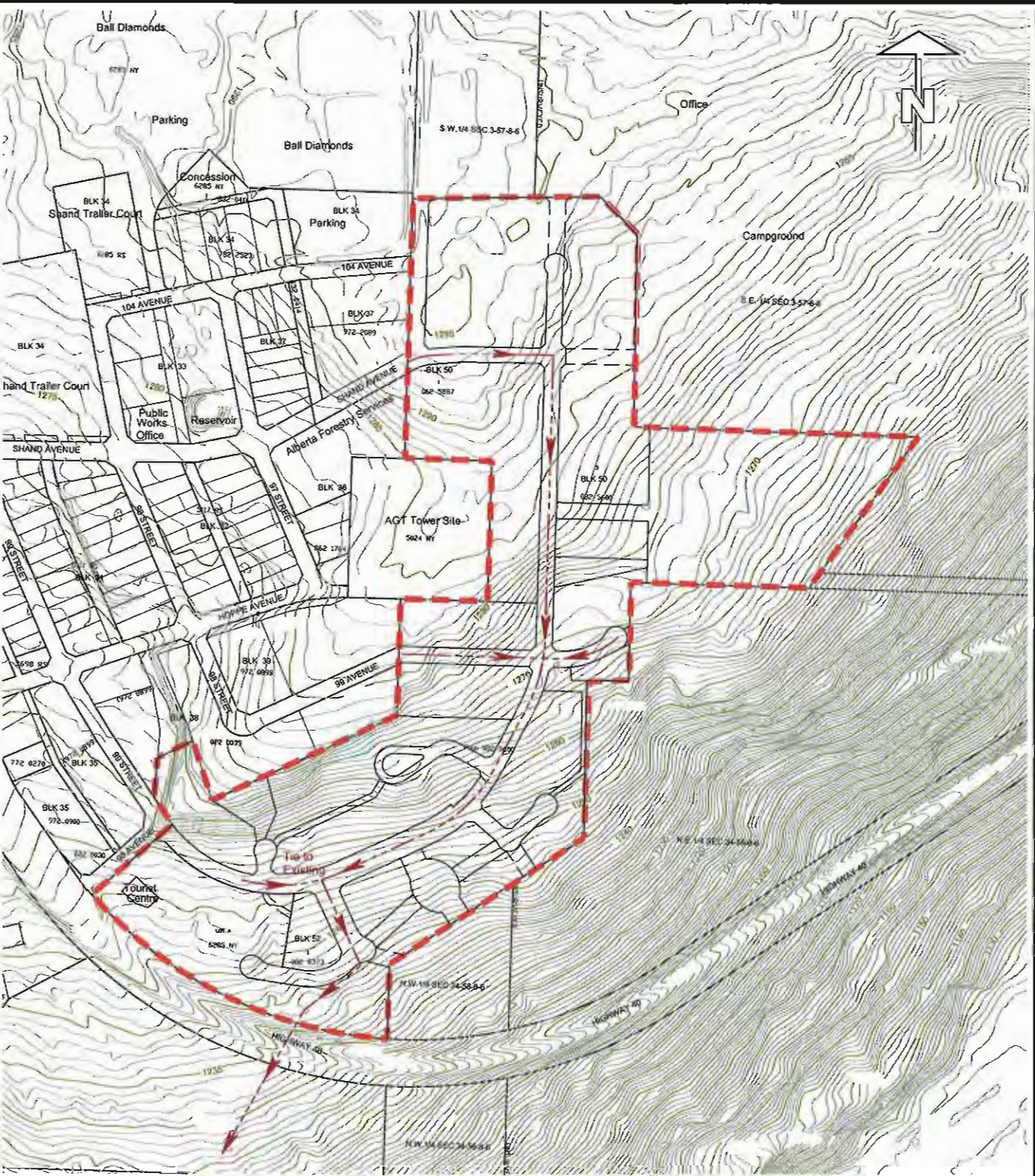
LEGEND

--- Area Structure Plan Boundary

--- Water Mains

0 75 150 225 m SCALE 1:7500

**Town of Grande Cache
 Tower Park Estates
 Area Structure Plan
 Water Servicing**



Town of Grande Cache
 Tower Park Estates
 Area Structure Plan
Sanitary Servicing

7.3 Stormwater Management

Stormwater and meltwater is proposed to be collected by open swale in the Business Park and by piped system in the Urban Village. Flows will be conveyed south and west to two ponds to be located on Crown lands to the south of the ASP area (**Figure 12**). The upper, smaller pond will act as a forebay or settlement pond primarily for stormwater flows from the Business Park. Water will then flow through an open, naturalized channel to a larger pond located just north of Highway 40. The Urban Village will drain via a pipe system to exit in an open channel system located south of and parallel to the south limit of the ASP area. This channel will be a naturalized bioswale to provide some water quality management before entering the lower storm pond.

All elements of the stormwater management system will require that the proponent receive approval from Alberta Environment at the design stage, prior to construction.

Approval will also be required from Alberta Sustainable Resource Development (ASRD) for access to and construction on Crown land. Application for such access will be made by the Town of Grande Cache.

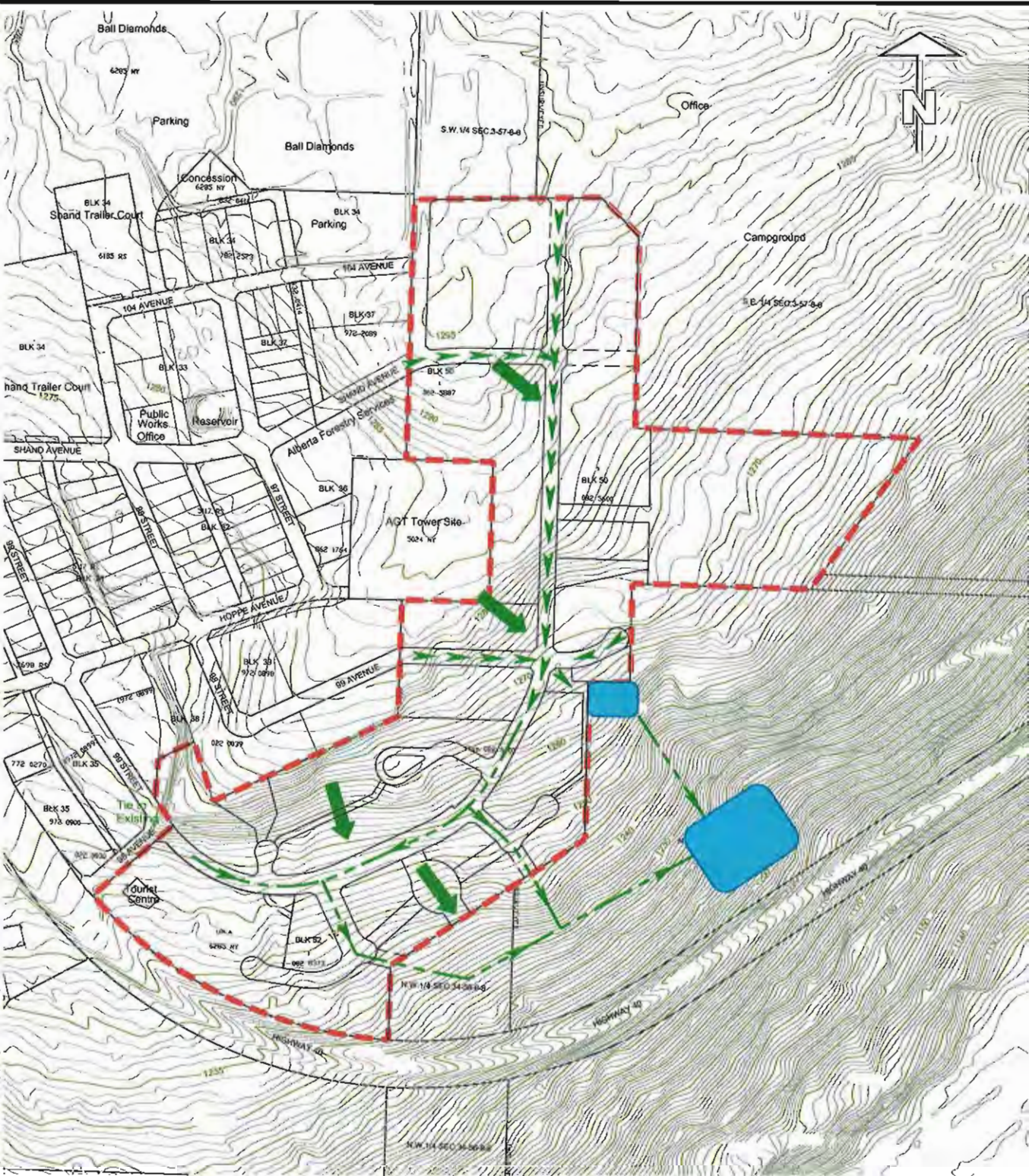
Policy 7.1 Stormwater Management Guidelines

Subdivision and development permit applications shall comply with the Stormwater Management Guidelines for the Province of Alberta 1999, prepared by Alberta Environment. There shall be no change between pre- and post-development off-site flows except where the application conforms to an approved stormwater management plan approved in conjunction with the Town.

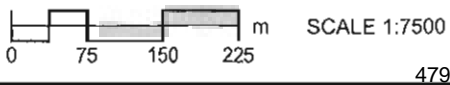
7.4 Shallow Utilities

Policy 7.2 Power lines

Proposed power lines to service the ASP area and other shallow utilities such as gas and telephone shall be installed underground.



- LEGEND**
- Area Structure Plan Boundary
 - General Drainage Direction
 - Storm Sewer
 - Surface Drainage
 - Stormwater Management Facility



**Town of Grande Cache
 Tower Park Estates
 Area Structure Plan
 Stormwater Management**

Figure - 12

8. Implementation

8.1 Land Use Bylaw

Policy 8.1 Direct Control Districts

A specifically tailored Direct Control land use district shall be prepared and inserted in the Land Use Bylaw corresponding to the Urban Village area of the ASP area to guide the development of an area of special character and higher level of design. Under this Direct Control District,

Provisions shall include but not be limited to the following:

- Form and character;
- Landscaping;
- Public amenity space; and
- Access and circulation.

Direct control districts may be prepared and adopted for those portions of the Business Park Area where warranted by special circumstances and the need to maintain a high quality environment. Site specific land use districts will be prepared and adopted for unique situations.

8.2 Subdivision and Development

Policy 8.2 Technical Information

Detailed engineering analysis and information shall be required with respect to geotechnical conditions, roads and servicing (both on- and off-site) prior to decisions being made at the subdivision and development level. All site preparation, public utilities, public roads, pedestrian walkways and any other public facilities and improvements shall be professionally designed and constructed to the satisfaction of the Town in accordance with the Town's standards.

Policy 8.3 Development Agreement

The Town may require owners/developers to enter into an agreement with the Town as a condition of an approved subdivision or development permit application pursuant to the Municipal Development Act.

Policy 8.4 Stormwater Management Approvals

The Town shall take responsibility for making all necessary arrangements and securing all required approvals regarding the disposal and management of stormwater off-site and all required documentation, permission, approvals and/or other forms of authorization from all relevant agencies

having jurisdiction in relation to the application. If an owner/applicant/proponent is prepared to undertake the required engineering, the Town may consider interim and/or on-site stormwater management until the overall stormwater management system or required components of it are in place and approved.

8.3 Development Staging

Policy 8.5 Staging

The staging of development will be determined by market forces and the cost-effective provision of infrastructure.

An illustrative staging sequence is shown on Figure 13. This staging sequence is illustrative only and may be altered to fit changing circumstances.

8.4 Force and Effect

Policy 8.6 Decisions Consistent with Area Structure Plan

The Town shall ensure that all future land use, subdivision, development and servicing decisions made regarding lands within the Tower Park Estates Area Structure Plan (ASP) shall comply with the provisions, policies, maps and drawings contained within this Area Structure Plan.

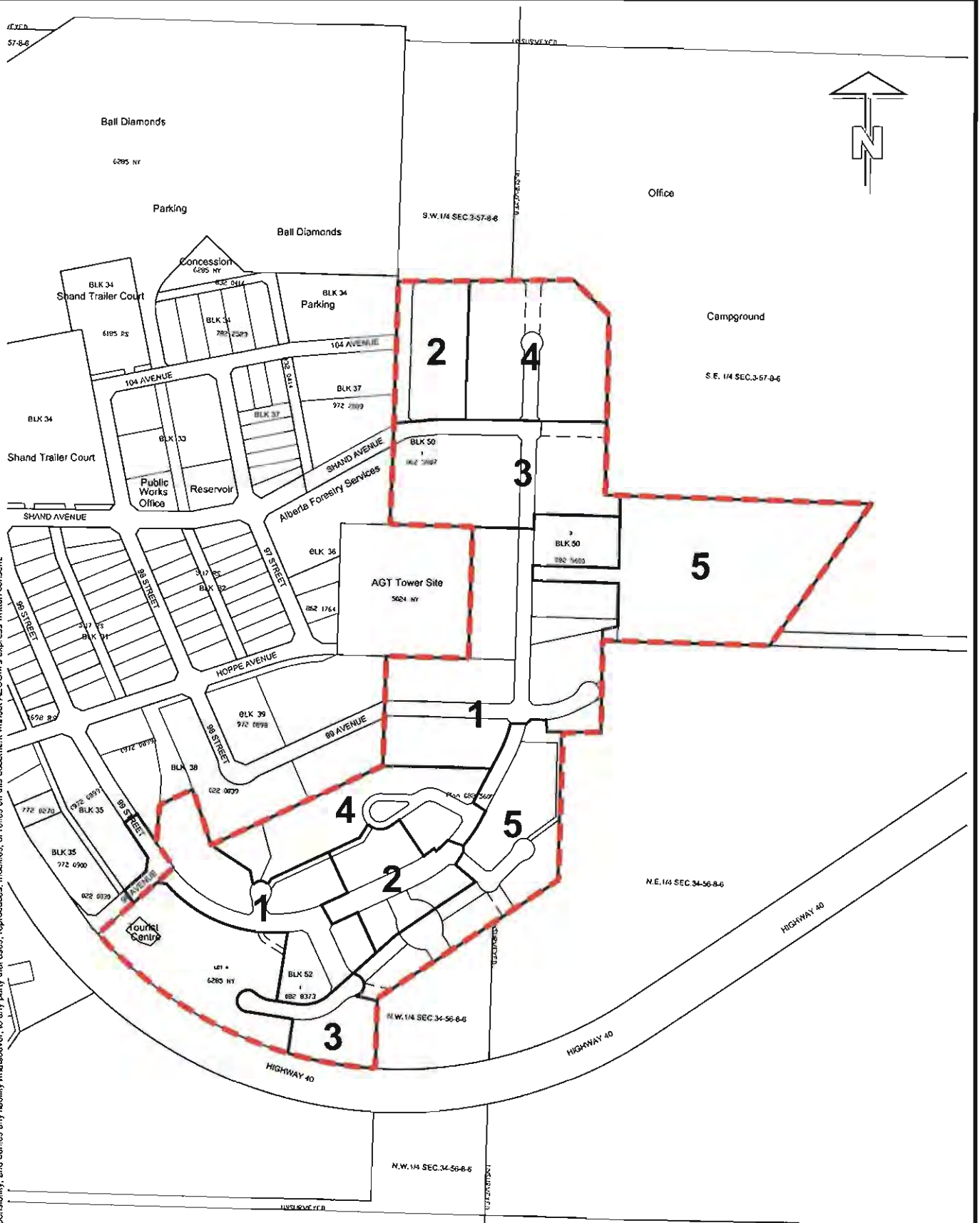
Policy 8.7 Compliance with the ASP

The Town shall pursue whatever actions are deemed appropriate or necessary to secure compliance with the provision of this ASP.

Policy 8.8 Amendments

If any decisions referred to in Policy 8.4 would constitute a major change of the provisions of this ASP, an amendment to this ASP shall be required. Decisions that would constitute a minor change to the provisions of the ASP may be considered without an amendment where the owner/developer can demonstrate to the satisfaction of the Town that the change does not substantively alter the intent, force or effect of the provisions of this ASP.

Amendments that may be required to this ASP shall be completed in accordance with the Municipal Government Act and all other applicable bylaws, policies and procedures.



LEGEND

- Area Structure Plan Boundary
- Stage Boundary

0 75 150 225 m SCALE 1:7500

Town of Grande Cache
 Tower Park Estates
 Area Structure Plan
 Development Staging

Figure - 13

Policy 8.9 Effect on Decision Making

This ASP, its concepts and provisions shall be used in conjunction with the relevant provision of the Town of Grande Cache Municipal Development Plan and Land Use Bylaw, particularly in guiding the exercise of discretion in making decisions on subdivision and development permit applications. This ASP will be used to guide any required amendments to the provisions or land use designations or districts in the Municipal Development Plan or the Land Use Bylaw. To this end, Map 3 of the Town of Grande Cache Municipal Development Plan will be amended to redesignate the corresponding area to "Tower Park Urban Village" and "Business Park" to ensure consistency with Section 638 of the Municipal Government Act.

Policy 8.10 Principles for Decision Making

The exercise of discretion or variance in deciding an application or an amendment to this ASP must be both reasonable and defensible within the letter and spirit of this ASP as well as widely accepted planning principles.

If a requirement or provision of this ASP is to be deviated from or if an amendment is to be made, it is essential that those making the decision clearly understand the rationale for the requirement or provision they are being asked to vary or amend.

Discretion, variance and amendment shall only be considered if it can be demonstrated that the discretion, variance or amendment being considered will, at a minimum, not jeopardize the policies of this ASP and, at best, better serve them.

Any variance or discretion exercised or any amendment made shall be fully documented so that the reasons and rationale for the variance or discretion exercised or the amendment are accurately recorded and clearly understood.

Policy 8.11 Compliance with the ASP

The Town shall pursue whatever actions are deemed appropriate or necessary to secure compliance with the provision of this ASP.

Policy 8.12 Repeated Amendment Applications

Should an owner/developer make repeated applications to amend this ASP once it is in effect, the Town may undertake or require that the owner/developer undertake an overall review of this ASP instead of continuing to make individual, isolated amendment applications so that the implications of the revision to this ASP can be considered and evaluated, at a minimum, in the context of the entire ASP area and, if warranted, beyond this ASP area.

Policy 8.13 FireSmart Principles

The Town shall consider the principles presented in “FireSmart: Protecting Your Community from Wildfire” in an effort to minimize the risk of wildfire within this ASP area.

Policy 8.14 Historical Resources

In any area identified by Alberta Culture and Community Spirit (ACCS), the Town shall refer any land use, subdivision or development application to ACCS and impose any conditions necessary, should the application be approved, to ensure that the owner/developer complies with any requirements ACCS identifies pursuant to historical resources legislation and regulations.

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REQUEST FOR DECISION

SUBJECT:	PLS 180042 – Grovedale Industrial Park Land Acquisition on Twp 690/HWY 40		
SUBMISSION TO:	COMMITTEE OF THE WHOLE	REVIEWED AND APPROVED FOR SUBMISSION	
MEETING DATE:	November 21, 2023	CAO:	MANAGER:
DEPARTMENT:	PLANNING & DEVELOPMENT	DIR: MAV	PRESENTER: JS
STRATEGIC PLAN:	Economy	LEG:	

RELEVANT LEGISLATION:

Provincial (cite) – N/A

Council Bylaw/Policy (cite) – N/A

RECOMMENDED ACTION:

MOTION: That Committee of the Whole recommends Council proceed with an Offer to Purchase for Crown Land, being NE 35-68-6 W6 (152.7 ac.); NW 36-68-6 W6 (156.6 ac.), pursuant to the Decision Letter on PLS 180042.

BACKGROUND/PROPOSAL:

In 2018, the Municipal District of Greenview No. 16 (Greenview) undertook an application to purchase the NE 35-68-6 W6 (152.7 ac.) and NW 36-68-6 W6 (156.6 ac.). These lands are located along Twp Road 690 (2 miles south of the Grovedale Pond), directly west of Highway 40 and north of the Secure Energy service facility 14 km north of the Greenview Industrial Gateway (GIG).

The process to acquire these lands was delayed to facilitate appropriate measures for First Nations consultation, which Greenview completed in early 2023 allowing this public land sale to proceed. A decision letter (attached) has now been issued on Public Land Sale (PLS) 180042 after more than 8 months of provincial review and that letter is attached for consideration by Committee of the Whole. The price established for these lands is [REDACTED] should these lands be acquired there would be environmental (e.g.: wetland assessment) and engineering studies (e.g., transportation impact assessment) required to determine a final layout and cost of infrastructure for future development.

Administration understands these lands were sought as an area where industrial uses supporting the GIG could be in proximity to our strategic industrial park without utilizing the more valuable, finite land of the GIG. These uses may include logistics, truck stops, light industrial supply, laydown yards, etc.

Proposal Information and Mapping provided to the Province on PLS 180042 is attached for information. The concepts in these materials are not formal and any final land use and detailed design would be established by Greenview via common land use processes and approved by Council.

BENEFITS OF THE RECOMMENDED ACTION:

1. The benefit of Committee of the Whole accepting the recommended motion is that this letter can be moved forward to Council for consideration to complete this process and acquire the lands to facilitate continued Economic Growth in Greenview.

DISADVANTAGES OF THE RECOMMENDED ACTION:

1. There are no perceived disadvantages to the recommendation.

ALTERNATIVES CONSIDERED:

Alternative #1:

That Committee of the Whole recommends to Council that they do not endorse or back the project as it proceeds.

FINANCIAL IMPLICATION:

The financial implication should Council accept the recommendation would be approximately \$1 million as the lands would cost \$749,596.00 with anticipated detailed planning (area structure plan (ASP) amendment and minor ASP development) and engineering studies (traffic impact assessment, appropriate wetlands studies, Heritage Assessment, Storm Drainage, etc.) being in the range of \$250,000.

Detailed studies are commonly required for an ASP or subdivision to be approved by Alberta Transportation (AT) as the lands are located within 1.6 km of Highway 40 and require AT approval to be developed. Should Greenview choose to develop the industrial lands directly this would have additional costs in line with other industrial park development.

STAFFING IMPLICATION:

There are no staffing implications to the recommended motion.

PUBLIC ENGAGEMENT LEVEL:

INCREASING LEVEL OF PUBLIC IMPACT

Inform

PUBLIC PARTICIPATION GOAL

Inform - To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.

PROMISE TO THE PUBLIC

Inform - We will keep you informed.

FOLLOW UP ACTIONS:

Administration will bring forward the recommendation to Council for a final decision.

ATTACHMENT(S):

- Decision Letter
- Proposal Information and Mapping provided to the Province on PLS 180042

PLS 180042

October 23, 2023

Municipal District of Greenview No.16
4707 50 St. Box 1079
Valleyview, Alberta T0H 3N0

Attention:
Martino Verhaeghe, RPP/MCIP
Director, Planning and Economic Development Martino.Verhaeghe@mdgreenview.ab.ca

Dear Mr. Verhaeghe:

Re: Application for Purchase PLS 180042
Applicant: Municipal District of Greenview No.16
Crown Land: NE 35-68-6 W6 (152.7 ac.); NW 36-68-6 W6 (156.6 ac.)

This is to advise that referral for your Application to purchase the above referenced lands has been completed. The department has determined that the Crown Land is available for sale, subject to conditions, including the requirement that you obtain a plan registerable at the Land Titles Office for the Crown Land, at your sole cost.

The estimated purchase price for the Crown Land has been determined to be [REDACTED] (subject to final determination following survey). Once you have confirmed that you are willing to continue with the transaction at the estimated purchase price we will prepare a draft Offer to Purchase.

You may wish to obtain the plan of survey prior to an Offer to Purchase being finalized. However, there is a risk that prior to finalizing the Offer a boundary change may be needed, requiring re-surveying at additional cost.

Any Offer to Purchase for the sale of the Crown Land will make note of the following considerations:

1. Wetland specific concerns

There may be some wetlands on the eastern edge of the parcel and if developed could impact the buffering capacity of the soil and flow into nearby streams. The MD of Greenview must ensure that any and all areas identified as wetlands are properly mitigated and addressed prior to any developments taking place on the land.

2. Existing land uses in area

Forestry conducts wildfire operations at Graham Fire Base located in SW-35-68-06-W6. The MD should be aware that frequent low level R/W flight operations occur out of this area associated with wildfire activities, predominately between the dates of March 1-Oct. 31 annually. It is recommended that this activity be considered with respect to any developments, to alleviate complaints to Forestry regarding their continued use of the area with rotary wing (noise etc).

3. High potential for Human-Wildlife conflict

The site has a high potential for human-wildlife conflict as the area has a high density of large predators (bears, wolves, cougar) as well as other wildlife species (elk, moose deer). The nature of this will depend on the intended end-use. It is important for the MD to consider within their planning processes that enhanced approaches to managing attractants, and deterring wildlife will be necessary to avoid future conflicts in the area. It is recommended that the MD investigate and incorporate the highest caliber human-wildlife conflict prevention practices into their Area Structure Planning and bylaw processes to ensure human-wildlife conflicts are avoided or minimized. Many communities across North America that exist in areas with high human-wildlife conflict potential have implemented enhanced measures to reduce such occurrences.

Until a formal Offer to Purchase agreement is signed, neither party is bound to proceed with the sale.

Should you have any questions or concerns I can be reached by e-mail at robert.walker@gov.ab.ca or by telephone at 780-819-7492.

Yours truly,

Robert Walker, LL.B.
Legal Analyst,
Public Lands Disposition Management

cc: Chris Yaremchuk, Lands Officer NW
Andrew Goldberg, Lands Manager NW

Public Land Sale (180042)

Background

The subject quarter sections are: NE-35-68-6-W6M and NW-36-68-6-W6M. In accordance with the Land Use Bylaw, these lands are currently zoned as Crown Land, and has the purpose of “providing a variety of land uses on Crown Lands.” These lands are currently under the ownership of the Province of Alberta. Other than a dug-out on the north portion of NE-35-68-6-W6M, both quarter sections are primarily treed areas.

Uses within the vicinity of the Quarter Sections

a. Industrial Use

- There are linear disturbances within the quarter sections due to the approximate location of oil and gas activities. There are two pipeline Right-Of-Ways found within the subject quarter sections:
 - Canadian Natural Resources Limited (CNRL) has the rights to operate the pipeline with licence 51502 which runs across both quarter sections, which is about 4.94 kms in length. The pipeline starts from a well in Section 16-36-68-6-W6M to a pipeline in Section 6-3-69-6-W6M.
 - Keyera Energy Limited has the rights to operate Pipeline with the licence 62589 which is about 27.81 kms in length. The pipeline starts from Section 3-12-69-6-W6M and ends in Section 4-26-69-8-W6M.

If these quarter sections are to be developed for rural commercial or light industrial uses, these pipeline rights of way can limit the way develop these lands. Currently, there is limited information whether these pipelines contain sour gas, however, based on the Catalis data, it does have zero (0) H₂S per Kmol; an indication that it may not contain sour gas.

- There is a temporary laydown yard associated with the pipeline operations, where a Development Permit was issued in 2021, located north of NW-36-68-6-W6M.
- There are oil and gas developments directly to the south of NW-36-68-6-W6M, managed/operated by Secure Energy Services. This is the site of the South Grande Prairie Class II Industrial Landfill. Part of the quarter section, SW 36-68-6-W6M, was going to be the site of a TCC project by Secure Energy Services, however, it was discontinued though equipment and buildings remained on location.
- There is a portion of the quarter section to the west of NE-35-68-6-W6M designated as a research plot, owned by the University of Alberta, Department of Forest Science, and a portion of the quarter section considered as a clay pit, owned by the International Paper Canada Pulp Holdings ULC.

b. Residential

There are country residential developments north of the subject quarter sections, located within the Agricultural One (A-1) district, or Country Residential One (CR-1) districts. Majority of these residential developments are single detached dwellings, with some manufactured homes and cabins. Although

Township Road 690 physically separates the subject quarter sections from these residential developments, buffers will be required to reduce any nuisance impacts, if the subject quarter sections are to be developed for commercial and industrial purposes in the future.

Forest Management Area

The quarter sections are within the Forest Management Agreement - FMA 6900016, which covers about 1,117, 146 hectares of land within the Grande Prairie area. The Forest Management Agreement (FMA) ensures that timber management and production is consistent with the sustainable forest management practices. This FMA is an agreement between the Crown land and Weyerhaeuser, and contains an approved Forest Management Plan in place. Norbord Inc, and Tolko Industries also operate within this Forest Management Area.

Environmental Significant Areas

There are no environmentally significant area within the quarter section, however, there are identified wetlands (swamp) in the portions of NW-36-68-6-W6M and the neighboring parcel to the east. To the north of the subject lands, there is a large portion of swamp and marsh areas, adjacent to the country residential parcels.

Transportation Networks

a. Roads

The quarter sections can be accessed via Township Road 690, which connects to Highway 40. This allows the road infrastructure to be connected to the provincial highway which then allows the easy transport of good and services to support services. There is also a private road (Main Haul Road North) that also connects to Township 690, which can provide an alternative route. The location of these lands also has high connectivity to markets and urban centres such as Grande Prairie, while also serving the hamlets of Grovedale, and Landry Heights.

b. Rail

The subject quarter sections are close to a fully operational rail system to the east, which proposed commercial and/or industrial support uses may utilize. Services that support rail-oriented uses can be located within these quarter sections.

Servicing

- Water servicing can be provided via on-site, privately owned service in the interim, but where there are plans for a communal or public well, these can be utilize to service the proposed/future developments within the quarter section.
- Wastewater servicing can be provided via on-site, privately owned service in the interim, but where there is a communal wastewater system, these should be encouraged to be used by proposed/future developments within the quarter section.
- Where there is a stormwater management plan in place, on-site stormwater servicing to the specific developments will need to adhere with this plan.

Future Land Use Contemplated within immediate vicinity

Map 1 provides the map of Area Structure Plans that are found within close proximity of the subject quarter sections.

a. Grovedale Area Structure Plan (ASP)

The Grovedale ASP is an Area Structure Plan/statutory plan which provides the developmental framework for the Grovedale area, spanning 46,394 hectares of land. The Plan Area for this ASP contemplates a centralized growth area which includes the hamlet of Grovedale and envision to have population concentrated in this area.

Though the Grovedale ASP does not include the subject quarter sections, it is important to ensure that current and future developments do not negatively impact adjacent lands. The current developments to the north of these quarter sections are country residential developments, while the future land designation for these lands is to remain agricultural.

Development within the subject lands will need a buffer to reduce any nuisance impacts such as noise and smell to adjacent lands, especially impacts from proposed commercial or industrial uses/developments. In addition to this, increased traffic impact and wear on road infrastructure are to be expected. As such, mitigative measures will need to be incorporated to commercial and heavy industrial uses being proposed to the subject quarter sections, ultimately reducing any nuisance impacts on residential and agricultural activities in the area.

b. Big Mountain Industrial Park ASP

The Big Mountain Industrial Park ASP is an Area Structure Plan which provides 43.7 hectares of land within Lot 2, Plan 886 2869, within SE 1-69-6-W6M. The ASP envisions this portion of the quarter section to have industrial businesses along the east of Highway 40; a subdivision of 19 lots is planned to occur. Potential uses for these lots are services that provide support for large commercial or industrial developments. These are currently zoned as Industrial Light (M-1) District.

Since lots within the Big Mountain Industrial ASP vary in sizes, where they are approximately 5 acres in size, there are potential for larger industrial developments to be sited on the subject quarter sections instead. This means that industrial developments which require parcel size larger than five (5) acres can be sited on these quarter sections.

Future Land Use Concept Scheme

The vision for this area is a mix of rural commercial and industrial uses which will support developments found in the Greenview Industrial Gateway (GIC) Industrial Park, located approximately 9 miles south of the quarter section.

Map 2 provides the maps which illustrate the type of land uses that may be allowed within the quarter sections, where the “pink” color are lands devoted for commercial to light industrial, while the “grey” color are lands designated for heavy industrial uses.

Under the current Land Use Bylaw, the LUB District that is suited for these lands is Rural Commercial. The purpose of this LUB District is to “provide for commercial uses located away from hamlets and rural settlements. Such developments may serve the travelling public or rural residents in the area and

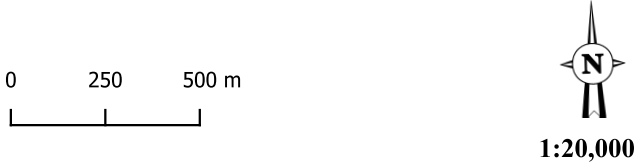
accommodate uses that require larger parcel sizes.” Uses that are permitted in this district are Service Station, Vehicle Wash, Recreational Vehicle Storage and Bulk Fueling Station. Commercial Uses which create less negative impacts on adjacent may provide a good buffer.

In the same way, for those portion of the quarter sections that are designated as Industrial Uses, the LUB District that can be zoned for this area is Industrial General (M-2) District , which has the purpose of providing “industrial uses that require relatively large tracts of unserviced land.” Typically uses that are permitted within this district ranges from a Manufacturing Plan, Truck Stop, Salvage Yard, Work Camp, Vehicle Wash, and Oil and Gas Facility. This district enables the provision of a logical/contiguous development to the industrial uses found south of the subject quarter sections.



Public Land Sale PLS180042 Overview

- Legend**
- Dispositions - PLS180042
 - PLS180042 Parcels
 - RC - Rural Commercial
 - M-2 - Industrial General
 - Transportation - Right of Way
 - Area Structure Plan
 - Big Mountain ASP
 - Grovedale ASP
 - Cadastre
 - Roads by Jurisdiction
 - MUNICIPAL
 - PRIVATE
 - PROVINCIAL



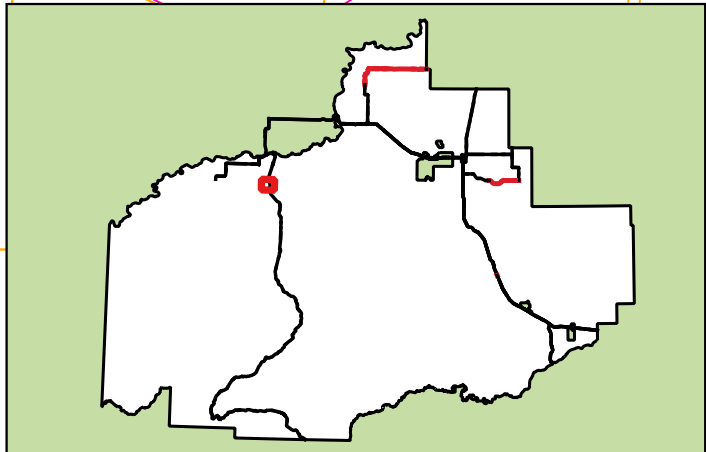
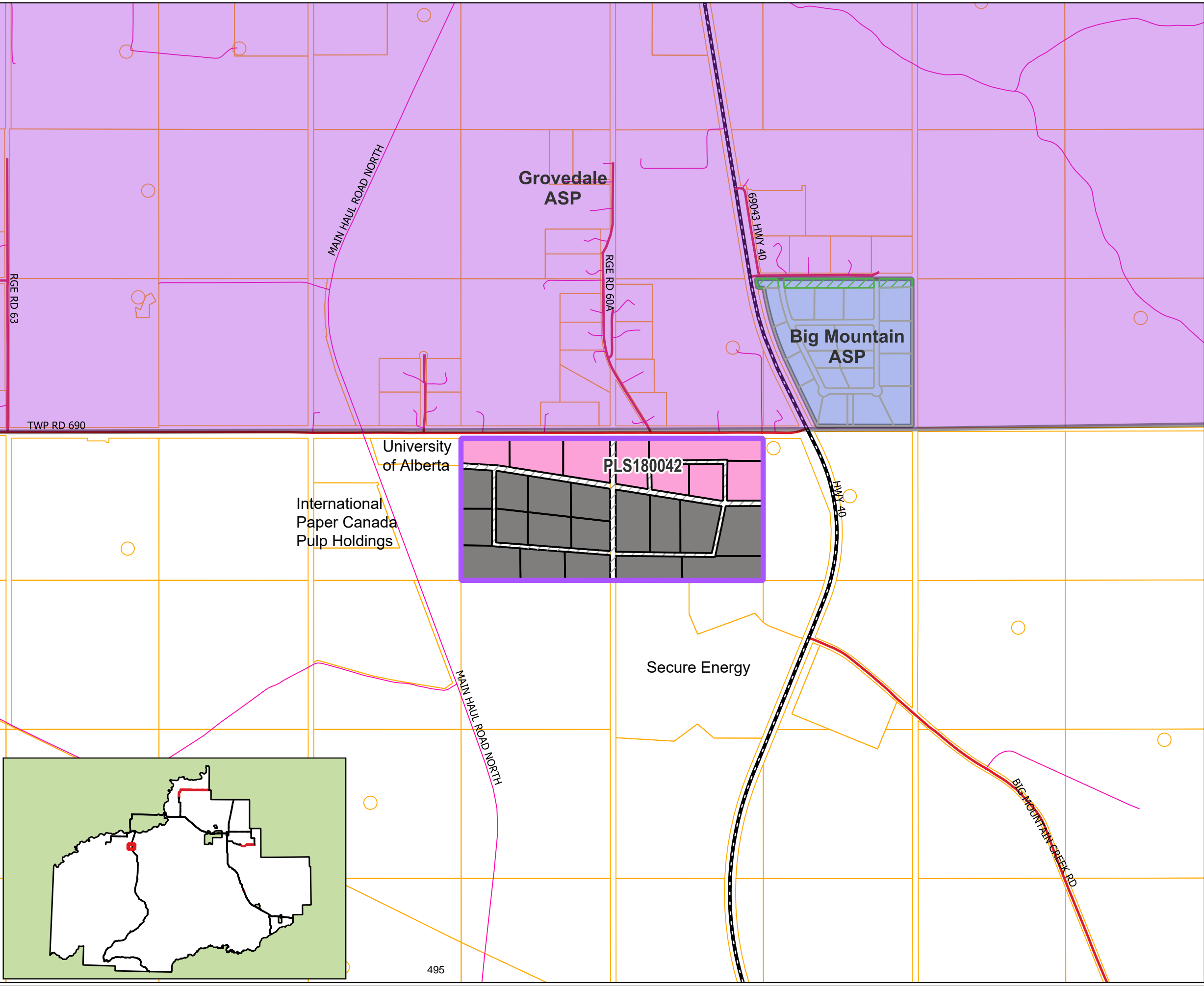
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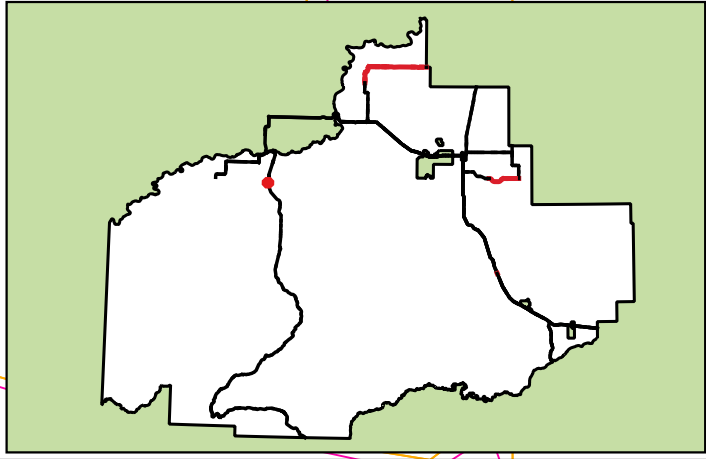
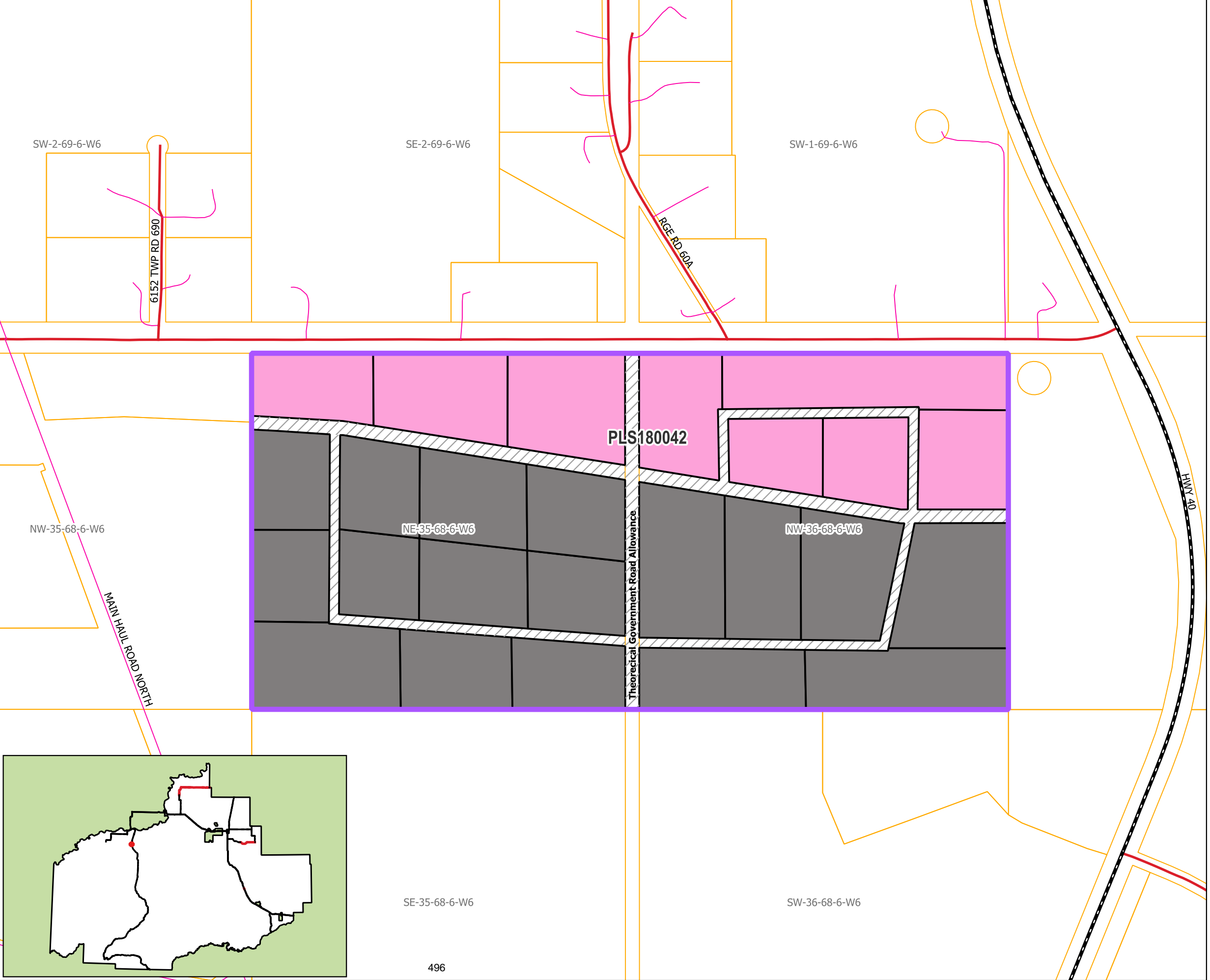
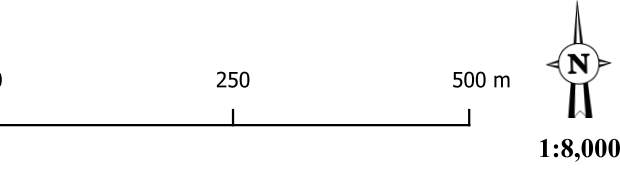
NOT RESPONSIBLE FOR ERRORS OR OMISSIONS





Public Land Sale PLS180042

- Legend**
- Dispositions - PLS180042
 - PLS180042 Parcels
 - RC - Rural Commercial
 - M-2 - Industrial General
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NOT RESPONSIBLE FOR ERRORS OR OMISSIONS

NW-36-68-6-W6M (PLS 180042) - Photos



North of NW-36-68-6-W6M, south facing along Township Road 690



North of NW-36-68-6-W6M, east facing towards Highway 40 and along Township Road 690



North of NW-36-68-6-W6M, west facing along Township Road 690



North of NW-36-68-6-W6M, north facing along Township Road 690



REQUEST FOR DECISION

SUBJECT:	Presentation: ANI How It Works Information (IRC-Event Insurance)		
SUBMISSION TO:	COMMITTEE OF THE WHOLE	REVIEWED AND APPROVED FOR SUBMISSION	
MEETING DATE:	November 21, 2023	CAO:	MANAGER:
DEPARTMENT:	CORPORATE SERVICES	DIR: EK	PRESENTER: JH
STRATEGIC PLAN:	Governance	LEG:	

RELEVANT LEGISLATION:

Provincial (cite) – N/A

Council Bylaw/Policy (cite) –N/A

RECOMMENDED ACTION:

MOTION: That Committee of the Whole accepts the presentation, ANI How It Works Information (IRC-Event Insurance) for information, as presented.

BACKGROUND/PROPOSAL:

In August 2023, Council asked Administration to further their knowledge and have a better understanding of the Associated Named Insured (ANI) program and the new Instant Risk Coverage (IRC) event insurance. This new available IRC event insurance aims to reduce risk to the ANI's and the liability to Greenview as a whole. The event insurance makes sure that if anything happens at halls, arenas, rental rooms and recreational areas, the event insurance is the primary insurance, then ANI insurance or Greenview insurance is secondary. This means a reduction of risk to the ANI's and/or Greenview's insurance when a private event is held, and incidents occur which are beyond the control of the ANI's or Greenview.

All ANI effect the liability costing for Greenview and any reduction is looked upon favourably to reducing the risk. Through this presentation, the hope is to further Councils understanding of the function of the new IRC insurance and how this will make future reductions in risk.

The presentation is based on the ANI June 5, 2023, annual meeting and will be a part of the annual ANI meeting for June 2024.

BENEFITS OF THE RECOMMENDED ACTION:

1. The benefit of Committee of the Whole accepting the recommended motion is it will result in Committee of the Whole having more knowledge regarding the ANIs and IRC programs and their functions.

DISADVANTAGES OF THE RECOMMENDED ACTION:

1. There are no perceived disadvantages to the recommended motion.

ALTERNATIVES CONSIDERED:

Alternative #1: Committee of the Whole has the alternative of not accepting the recommended motion; however, Administration does not recommend this as this presentation is for information purposes only.

FINANCIAL IMPLICATION:

Direct Costs: There are no financial implications to the recommended motion.

STAFFING IMPLICATION:

There are no staffing implications to the recommended motion.

PUBLIC ENGAGEMENT LEVEL:

INCREASING LEVEL OF PUBLIC IMPACT

Inform

PUBLIC PARTICIPATION GOAL

Inform - To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.

PROMISE TO THE PUBLIC

Inform - We will keep you informed.

FOLLOW UP ACTIONS:

There are no follow up actions to the recommended motion.

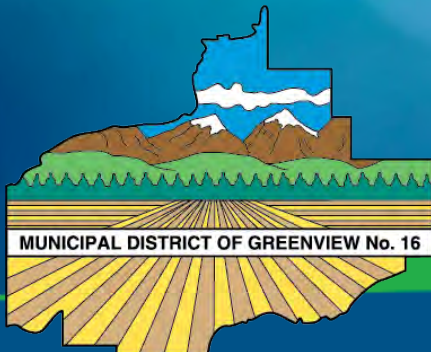
ATTACHMENT(S):

- ANI How It Works Information (IRC – Event Insurance) Presentation

ANI How it Works Information (IRC - Event Insurance)

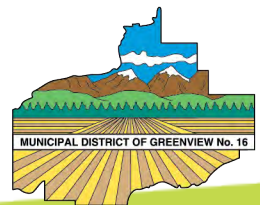
November 21, 2023

Committee of the Whole Meeting



Agenda

- RMA Presentation June 5, 2023
- Associate Named Insured (ANI) Discussion
- Instant Risk Coverage (IRC) Discussion with ANI's
- IRC Log In- Knowledge Sharing for Council
- Questions



MD Of Greenview ANI Session

June 5, 2023

Presented by Mark Sosnowski, CIP
Risk Advisor, RMA Insurance

**STARTED THE DISCUSSIONS WITH
ASSOCIATED NAMED INSURED (ANI)**



Additional Named Insureds

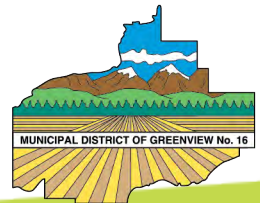
What is an ANI?

Additional Named Insureds or ANI's as we call them are nonprofit entities that municipalities allow to be added to their insurance policies. Many of our municipalities allow Additional Named Insureds on their insurance policies in one form or another.

Municipalities allow them because these organizations, community groups and nonprofit groups bring value because they improve the quality of life and provide services that their ratepayers want.

Additional Named Insured claims will impact the claims history of the Master Certificate Holder.

ANI Discussion



ANI Information Continued

What is Expected of an ANI?

Municipalities have a responsibility to all the other members of the Reciprocal, to share in the responsibility of effective risk control practices including ANI's.

ANI's owe a duty to their parent municipality to engage in effective risk control practices, so as not to expose the individual member to claims that they inherit and own directly from the ANI, nor potentially impact future insurance rates.

The ANI WILL NOT engage in any activity that differs from what the municipality is aware of at the time of being added as an ANI without notifying the municipality who in turn must notify RMA Insurance Agencies.

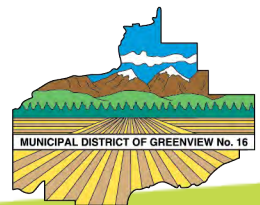
ALL INCIDENTS, no matter how minor they may appear, that occur at or through an ANI, its' operations or premises, must be reported to the municipality within 48 hours of detection, to allow for incident and claims tracking.

Remember being an ANI is a privilege not a right.



MD of Greenview ANI Session

ANI Discussion



IRC Discussion with ANI's

Renting Your Space To Others

Facility Rental Agreements

Facility use agreements should be signed before allowing a third party to utilize municipal facilities. Facility use agreements are effective in transferring risk only if the other party has the financial capability of paying claims. It is important to require the third party to purchase insurance.

Special Event Insurance/Host Liquor Liability Insurance

No matter how careful you are accidents happen. The host of an event, the municipality and your organization could be sued by anyone who claims damage or injury as a result of an event at your facility. Even if you are eventually found to be blameless, litigation expenses could severely strain your resources. Liability insurance will defend you and pay for damages that may be awarded against you. Insurance protection will provide you with peace of mind, knowing that liability and any resulting legal issues will be handled for you.

All users of municipal facilities need to purchase special event insurance and provide proof of such with the County and your organization added as an additional insured.

IRC Discussion with ANI's



Instant Risk Coverage IRC

- IRC is a FREE portal for the Municipality and its ANI's to send potential renters to purchase special event liability
- Coverage Automatically lists the Municipality and ANI as additional insured
- Broad Coverages available at competitive pricing
- Wide variety of events eligible for coverage:

Weddings/Anniversaries

Birthday Party's

Community BBQ's

Farmers Markets

Parades

Ball Hockey

Conferences

Dragon Boating

Baseball

Fitness Classes

There are other alternatives for Special Event Coverages. Your local insurance broker, Millenium Insurance or PAL for example.

Login

Support



Username or email

Password



Sign in

Forgot your Password? Click here

Instant Risk Coverage (IRC)



<https://broker.instantriskcoverage.com/login>

Instant Risk Coverage IRC



Login

Register

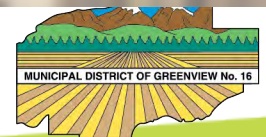
Support

Signup Today



Sign Up

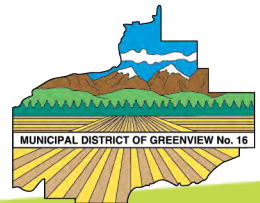
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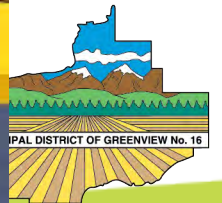
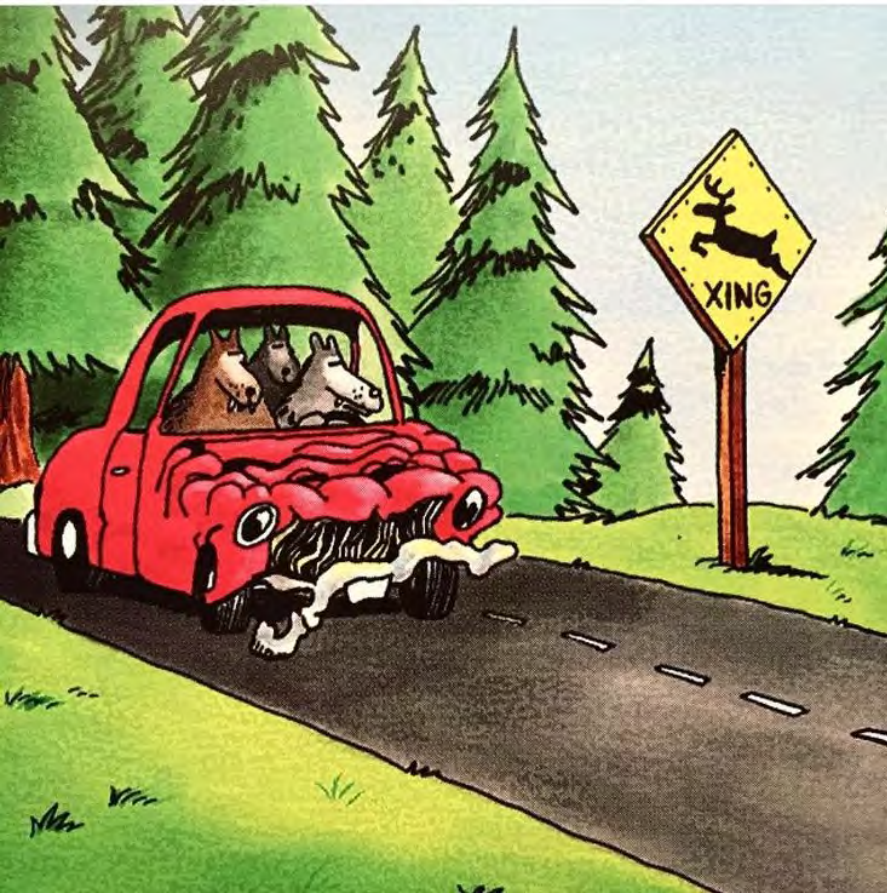
IRC Log In- Knowledge Sharing for Council

Knowledge Sharing for Council

- Working with Communications to develop a web page under the Government Tab for ANI's to have links for:
 - IRC Event Insurance
 - Incident Reporting
 - Insurance/ Liability Contact for Greenview
 - Dates for Renewal
 - ANI Annual Meeting
 - FAQ and Submit Questions for Events, Assets, and Insurance Questions



Questions



Date	Chief Administrative Officer Action Log	Responsible Party	NOTES/STATUS
	23.10.24 REGULAR COUNCIL MEETING		
October 24, 2023	<p>MOTION: 23.10.628 Moved by: COUNCILLOR TOM BURTON That Council give second reading to Bylaw 23-941 Greenview Cemetery Bylaw, as amended. DEFERRED</p> <p>MOTION: 23.10.629 Moved by: COUNCILLOR TOM BURTON That Council defer motion “Bylaw 23-941 Greenview Cemetery Bylaw” to a future council meeting. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry CARRIED</p>	P&E	
October 24, 2023	<p>MOTION: 23.10.631 Moved by: COUNCILLOR RYAN RATZLAFF That Council give third reading to Bylaw 23-940 Fireworks, as presented. DEFERRED</p> <p>MOTION: 23.10.632 Moved by: COUNCILLOR DAVE BERRY That Council direct Administration to defer Motion “Bylaw 23-940” to provide greater clarity on Bylaw 23-940 Sections 4 and 7 regarding the Forest Protection Area versus the Non-Permitted Areas, and brought back to a future Policy Review Committee Meeting. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry CARRIED</p>	P&E	

October 24, 2023	<p>MOTION: 23.10.636 Moved by: COUNCILLOR WINSTON DELORME That Council authorizes Administration to list and sell the items on the 2023 Surplus Disposal Table(s) at the next Michener Allen Auction. -Bull laptops for employee first right of refusal</p> <p style="text-align: center;">DEFERRED</p> <p>MOTION: 23.10.637 Moved by: DEPUTY REEVE BILL SMITH That Council defer motion “Asset Surplus/Disposal 2023” until the November 21, 2023, Regular Council Meeting. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	Corp. Serv	In progress
October 24, 2023	<p>MOTION: 23.10.641 Moved by: COUNCILLOR SALLY ROSSON That Council approve the five Food Banks within Greenview as the recipient(s) for the 2023 Staff Christmas Party fundraiser. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	Social Committee	Completed
	23.10.24 ORGANIZATIONAL MEETING		
October 24, 2023	<p>MOTION: 23.10.546 Moved by: COUNCILLOR DAVE BERRY That Council appoint Jake Drozda and Jeff Laughlin to the Agriculture Services Board as members at large for a 2-year term ending 2025. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	CAO SERVICES	complete
October 24, 2023	<p>MOTION: 23.10.563 Moved by: COUNCILLOR WINSTON DELORME That Council appoint Jim Savory, John Webster, Greg Nolan, and Darel Delisle to the Grande Cache Recreation Board as members at large for the term of 1 year ending 2024. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	CAO SERVICES	complete

October 24, 2023	<p>MOTION: 23.10.566 Moved by: COUNCILLOR SALLY ROSSON That Council choose not to appoint a Greenview representative to the Grande Prairie Hospital Foundation at this time, and direct Administration to send a letter as to the reasons. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	CAO SERVICES	complete
October 24, 2023	<p>MOTION: 23.10.571 Moved by: COUNCILLOR WINSTON DELORME That Council appoint Tammy Day, Gwendolyn Villebrun, and Roxanne Perron to the Green View Family & Community Services Board as members at large for the term of 1 year ending 2024. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	CAO SERVICES	complete
October 24, 2023	<p>MOTION: 23.10.573 Moved by: COUNCILLOR DALE SMITH That Council appoint Cindy Soderquist, Jessica Lavoie, Mary Wilson, and Josh McMillan as Members at Large to the Greenview Regional Multiplex Board with their term to expire 2024. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	CAO SERVICES	complete
October 24, 2023	<p>MOTION: 23.10.575 Moved by: COUNCILLOR RYAN RATZLAFF That Council appoint Jake Drozda as a Member at Large to the Greenview Regional Waste Management Commission with the term ending 2024. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	CAO SERVICES	complete
October 24, 2023	<p>MOTION: 23.10.593 Moved by: COUNCILLOR TOM BURTON That Council appoint Josefina Stoness to the MD of Greenview Library Board for a three year term expiring at the 2026 Annual Organizational Meeting. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	CAO SERVICES	complete

October 24, 2023	<p>MOTION: 23.10.615 Moved by: DEPUTY REEVE BILL SMITH That Council choose not to appoint a Greenview representative to the Wapiti Trails Management Plan Committee at this time, and direct Administration to write a letter stating the reasons why and request further direction from the committee if required. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	CAO SERVICES	complete
October 24, 2023	<p>MOTION: 23.10.612 Moved by: DEPUTY REEVE BILL SMITH That Council choose not to appoint a Greenview representative to the Wapiti River Management Plan Committee at this time, and direct Administration to write a letter stating the reasons why, and request further direction from the committee if required. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	CAO SERVICES	complete
23.10.17 COMMITTEE OF THE WHOLE			
October 17, 2023	<p>MOTION: 23.10.99 Moved by: COUNCILLOR TOM BURTON That Committee of the whole recommend to Council to schedule open houses for the Hamlet of DeBolt and Hamlet of Ridgevalley for further area structure plan discussions. FOR: Councillor Delorme, Councillor Schlieff, Councillor Burton, Councillor Rosson, Councillor Ratzlaff, Councillor Berry, Councillor Scott, Reeve Olsen, Councillor Dale Smith, Deputy Reeve Bill Smith</p> <p>CARRIED</p>	P&E	
October 10, 2023			
October 10, 2023	<p>MOTION: 23.10.509 Moved by: COUNCILLOR TOM BURTON That Council schedule a Public Hearing prior to a second reading of Bylaw 23-953, to be held on November 28, 2023, at 9:15 a.m. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	P&E	

October 10, 2023	<p>MOTION: 23.10.510 Moved by: COUNCILLOR JENNIFER SCOTT that Council approve approach application APPR22-10 for the construction of a gravel approach on NE 9-71-20-W5M via Township Road 712. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	P&E	
October 10, 2023	<p>MOTION: 23.10.511 Moved by: COUNCILLOR TOM BURTON That Council approve approach application APPR23-12, for a gravel access to SE 14-75-26-W5M via Range Road 261, relocating approach "B" as indicated in the report. FOR: Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry AGAINST: Reeve Olsen</p> <p>CARRIED</p>	P&E	
October 10, 2023	<p>MOTION: 23.10.512 Moved by: COUNCILLOR SALLY ROSSON That Council proceeds to offer the sale of the property identified as Plan 9722089; Block 34; Lot 14, to the Mountain Métis Governance Association for the market value of \$424,000, subject to a 3-year timeline to be built. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton AGAINST: Councillor Berry, Councillor Delorme</p> <p>CARRIED</p>	P&E	
October 10, 2023	<p>MOTION: 23.10.514 Moved by: COUNCILLOR DAVE BERRY That Council direct Administration to continue to pay 40% of the cost recovery fuel surcharge in The Alberta Roadbuilders and Heavy Construction Association's June 1, 2022, addendum to the 2022 Rental Rate Guide until the 2024/2025 contractor registry comes into effect on April 1, 2024. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Ratzlaff, Councillor Burton, Councillor Berry ABSENT: Councillor Scott</p> <p>CARRIED</p>	I&E	complete

October 10, 2023	<p>MOTION: 23.10.515 Moved by: COUNCILLOR CHRISTINE SCHLIEF That Council direct Administration to maintain tonne/km rates at \$0.20 per tonne/km with a \$1.00 basic loading factor in all areas except for \$0.22 per tonne/km with a \$1.00 basic loading factor on the Forestry Trunk Road to be reviewed at the first Council meeting in January 2024. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Ratzlaff, Councillor Burton, Councillor Berry ABSENT: Councillor Scott</p> <p>CARRIED</p>	I&E	complete
October 10, 2023	<p>MOTION: 23.10.516 Moved by: COUNCILLOR SALLY ROSSON That Council direct Administration to install a guardrail at the top of the slope, located at SE-31-71-20-W5 along Rge Rd 205, in the amount of \$50,000 with funds to come from the operational drainage budget. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	I&E	In Progress
October 10, 2023	<p>MOTION: 23.10.520 Moved by: COUNCILLOR SALLY ROSSON That Council approve the transfer of Policy HR 03 “Moving/Relocation Allowance” from a Council Policy to an Administrative Policy, as presented. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p> <p>MOTION: 23.10.521 Moved by: COUNCILLOR JENNIFER SCOTT That Council repeal Policy HR 03 Moving/Relocation Allowance. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	Corp. Serv	Complete

October 10, 2023	<p>MOTION: 23.10.522 Moved by: COUNCILLOR SALLY ROSSON That Council approve the sponsorship of \$2,450 to cover the cost of the rental fees for the Greenview Regional Multiplex Fieldhouse, to host the Small Business Awards event to be held October 19th, 2023, with funds to come from the Community Services Grants and Sponsorship Budget.</p> <p>FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>ABSENT: Councillor Delorme</p> <p>CARRIED</p>	Comm Serv	Complete
October 10, 2023	<p>MOTION: 23.10.523 Moved by: COUNCILLOR TOM BURTON That Council approve sponsorship in the amount of \$750.00, and up to a value of \$500.00 of in-kind donations to the Grande Spirit Foundation for the Annual Harvest Dine & Dance fundraising event, to be held on October 28, 2023, in Grande Prairie, Alberta, with funds to come from the Community Services Grants and Sponsorship budget.</p> <p>FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>ABSENT: Councillor Delorme</p> <p>CARRIED</p>	Comm Serv	Complete
October 10, 2023	<p>MOTION: 23.10.524 Moved by: COUNCILLOR DUANE DIDOW That Council approve sponsorship to the Louis Delorme Memorial Committee in the amount of \$2500.00, for 1st Annual Drive-in Movie on October 13th, 2023, in Grande Cache, with funds to come from the Community Services Grants and Sponsorships Budget.</p> <p>FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	Comm Serv	Complete
October 10, 2023	<p>MOTION: 23.10.525 Moved by: DEPUTY REEVE BILL SMITH That Council approve sponsorship to the Peace Area Riding for the Disabled Society (PARDS) in the amount of \$1,000.00, and an In-Kind Donation of value up to \$500.00, for PARDS 25th Annual Dine & Dance on November 4, 2023, at the Five Mile Hall in the County of Grande Prairie, with funds to come from the Community Services Grants and Sponsorships Budget.</p> <p>FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	Comm Serv	Complete
23.09.26 Regular Council Meeting			

September 26, 2023	<p>MOTION: 23.09.495 Moved by: COUNCILLOR RYAN RATZLAFF That Council give second reading to Bylaw 23-951, "Business Licensing Bylaw," as amended. -Remove all reference to Special Events. -Add maps showing the boundaries of each Hamlet. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	P&E	In Progress
September 26, 2023	<p>MOTION: 23.09.498 Moved by: COUNCILLOR JENNIFER SCOTT That Council authorize Administration to enter into a formal sublease agreement for the occupation and operation of Fireman's Pit, located at E 28 – 56 – 8 – W6M, as amended. -Change the term of the sublease to be renewed every 5 years. -1. change to 5th anniversary from 25th anniversary -4.8.1 change sublessor to sublessee in the 2nd paragraph. -5.2 financial records provided annually. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	Comm Serv	In Progress
	23.09.12 Regular Council Meeting		
September 12, 2023	<p>MOTION: 23.09.470 Moved by: COUNCILLOR SALLY ROSSON That Council schedule a Public Hearing prior to second reading of Bylaw 23-952, to be held on November 14, 2023, at 9:15 a.m. FOR: Reeve Olsen, Councillor Didow, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry, Councillor Dale Smith</p> <p>CARRIED</p>	P & E	In Progress

September 12, 2023	<p>MOTION: 23.09.474 Moved by: COUNCILLOR RYAN RATZLAFF That Council direct Administration to replace the Greenview Flags with Option 2, with funds to come from the Facility Maintenance Operational Budget. FOR: Reeve Olsen, Councillor Didow, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Dale Smith AGAINST: Councillor Berry</p> <p>CARRIED</p>	I & E/Comms	complete
September 12, 2023	<p>MOTION: 23.09.476 Moved by: COUNCILLOR WINSTON DELORME That Council approves up to \$55,000 as its contribution towards costs for the 18-month Land Use Planner Municipal Planning internship program, with funds to be accounted for in the 2024-2025 Planning and Development Administration Operating Budget, on completion of a successful application. FOR: Reeve Olsen, Councillor Didow, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry, Councillor Dale Smith</p> <p>CARRIED</p>	Corp Serv	
September 12, 2023	<p>MOTION: 23.09.477 Moved by: COUNCILLOR JENNIFER SCOTT That Council direct Administration to proceed with the request for making the Grovedale Community Center generator-ready, by granting approval to option 2, which involves the installation of 3 electrical transfer switches for the electrical control panels in the Grovedale Hall and arena. FOR: Reeve Olsen, Councillor Didow, Councillor Delorme, Councillor Schlieff, Councillor Scott, Councillor Burton, Councillor Berry AGAINST: Councillor Dale Smith, Councillor Ratzlaff, Councillor Rosson</p> <p>CARRIED</p>	I & E	In Progress
September 12, 2023	<p>MOTION: 23.09.484 Moved by: COUNCILLOR JENNIFER SCOTT That Council awards the Ridgevalley Wastewater Lagoon Desludging and Biosolids Removal to Lambourne Environmental Ltd, for \$431,200.00 plus GST, with funds to come from WW21001. FOR: Reeve Olsen, Councillor Didow, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry, Councillor Dale Smith</p> <p>CARRIED</p>	I & E	Postponed until 2024

September 12, 2023	<p>MOTION: 23.09.485 Moved by: COUNCILLOR TOM BURTON That Council awards the Ridgevalley Wastewater Collection System Lift Station Wet Well & Manhole Relining to Integral High Performance Coatings in the amount of \$250,449.22 plus GST, with funds to come from WW21001.</p> <p>FOR: Reeve Olsen, Councillor Didow, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry, Councillor Dale Smith</p> <p>CARRIED</p>	I & E	complete
August 22, 2023	<p>23.08.22 Regular Council Meeting</p>		
	<p>MOTION: 23.08.438 Moved by: COUNCILLOR SALLY ROSSON That Council direct Administration to initiate the process to purchase land from the Province of Alberta, being the lands shown as Roll Number 7200 in the Hamlet of Grande Cache east of Memorial Drive.</p> <p>FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	P & E	In Progress
August 22, 2023	<p>MOTION: 23.08.444 Moved by: COUNCILLOR DAVE BERRY That Council approve Policy 4025 "Dust Control", as amended.</p> <p>-1.6 under definitions should remain.</p> <p>-Remove multi parcel subdivision.</p> <p>DEFERRED</p>	I & E	In progress -- Coming to Council in December 2023
	<p>MOTION: 23.08.445 Moved by: COUNCILLOR WINSTON DELORME That Council defer motion 23.08.444 Policy 4025 Dust Control until more information can be brought forward.</p> <p>FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton</p> <p>AGAINST: Councillor Dave Berry</p> <p>CARRIED</p>		
August 22, 2023	<p>MOTION: 23.08.449 Moved by: COUNCILLOR DALE SMITH That Council approve a capital grant up to \$175,000.00 to the New Fish Creek Association for a new roof or repair of the existing roof for the New Fish Creek Community Hall, with funds to come from the Community Grants & Sponsorships budget.</p> <p>FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Rosson, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>ABSENT: Councillor Scott</p> <p>CARRIED</p>	Comm Serv.	Complete

August 22, 2023	<p>MOTION: 23.08.456 Moved by: COUNCILLOR TOM BURTON That Council direct administration to accept the Beairsto and Associates survey quote in the amount of \$8,627.50 + GST with funds to come from the Disaster Response Reserve and for Administration to proceed with issuing agreements to recoup these costs proportionally from all benefitting lands. FOR: Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry AGAINST: Reeve Olsen</p> <p>CARRIED</p>	P & E	In Progress - In contact with Beairsto. Letters will be sent to residents asking for their intent to participate in the survey. Sept 14.23
August 22, 2023	<p>MOTION: 23.08.459 Moved by: DEPUTY REEVE BILL SMITH That Council direct Administration to re-tender the Recycling, Waste and Confidential Shredding Services tender. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	I & E	In progress
23.07.25 Regular Council Meeting			
July 25, 2023	<p>MOTION: 23.07.414 Moved by: COUNCILLOR DUANE DIDOW That Council approves the purchase of 1 (one) implement caddy instead of 2 (two) utility trailers for project AG23002 to be funded from the Agricultural Services 2023 capital budget. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	Comm. Serv	In Progress
July 25, 2023	<p>MOTION: 23.07.416 Moved by: COUNCILLOR DAVE BERRY That Council direct Administration to present a report to Council by end of March 2024 or sooner regarding the Main Street Loft properties in Grande Cache, outlining current ownership of the properties, an in-depth study of the structural integrity, adherence to building and safety codes, and a cost analysis of repair versus demolition. FOR: Reeve Olsen, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry AGAINST: Deputy Reeve Bill Smith</p> <p>CARRIED</p>	P&E / ??	In Progress - Martino is in communication with a prospective buyer.

July 25, 2023	<p>MOTION: 23.07.417 Moved by: DEPUTY REEVE BILL SMITH That Council directs Administration to investigate steps for remediation and prevention of weed spreading in the mat cleaning and storage yard in the industrial park in the Hamlet of Grovedale. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	Comm. Serv	In Progress
July 25, 2023	<p>MOTION: 23.07.418 Moved by: REEVE TYLER OLSEN That Council direct Administration to prepare a report for Council for the purpose of reviewing current levels of service provided by the Greenview Fire Rescue Services for the Valleyview Rural area and potential options to provide matching levels of service throughout Greenview if disparity is discovered. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	Comm. Serv	Complete
	23.07.18 COTW		
July 20, 2023	<p>MOTION: 23.07.63 Moved by: COUNCILLOR RYAN RATZLAFF That Committee of the Whole recommend to Council that they deliberate Option two (2), a Business License Bylaw addressing Hawkers, Peddlers and Mobile Vendors with mandatory licensing within the Hamlet's of Greenview, at a Regular Council Meeting. FOR: Deputy Reeve Bill Smith, Reeve Olsen, Councillor Ratzlaff, Councillor Berry, Councillor Burton, Councillor Schlieff, Councillor Scott, Councillor Dale Smith, Councillor Delorme AGAINST: Councillor Rosson</p> <p>CARRIED</p>	P & E	In Progress - Presentation at September 26 RCM - for PH and second and third reading.
July 20, 2023	<p>MOTION: 23.07.73 Moved by: COUNCILLOR DAVE BERRY That Committee of the Whole recommend to Council that Administration bring Policies 7006 and 7002 to Policy Review Committee for review. Deputy Reeve Bill Smith, Reeve Olsen, Councillor Ratzlaff, Councillor Berry, Councillor Burton, Councillor Schlieff, Councillor Scott, Councillor Dale Smith, Councillor Rosson, Councillor Delorme</p> <p>CARRIED</p>	Corp/Comms	In progress - Presented at PRC on September 13 - will be brought forward to Council for adoption.
	23.07.11 Regular Council Meeting		

July 11, 2023	<p>MOTION: 23.07.362 Moved by: COUNCILLOR RYAN RATZLAFF That Council direct Administration to prepare an amendment to Bylaw 20-860, being the Intermunicipal Development Plan with the Town of Valleyview, to accommodate Bylaw No. 23-938 within SW-09-070-22-W5M. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	P & E	In Progress - DO presenting to Council for second and third reading on September 26, 2023.
July 11, 2023	<p>MOTION: 23.07.371 Moved by: COUNCILLOR DALE SMITH That Council approve the transfer of Policy 3009 "Ice Cover Work Operations" from a Council policy to a Safe Work Procedure, as presented. 7.1 1 A and 8.7 C can be stated "as required." MOTION: 23.07.372 Moved by: COUNCILLOR DAVE BERRY That Council defer motion 3009 Ice Cover work Operations to a future Council Meeting. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	Corp Serv	In progress
July 11, 2023	<p>MOTION: 23.07.382 Moved by: COUNCILLOR TOM BURTON That Council approve the draft Joint Use and Planning Agreement between the MD of Greenview and Grande Yellowhead Public School Division as amended and authorize Administration to enter into the Agreement. 5Swimming Lessons – page 391 of agenda. 3b – reviewed during the municipal trustee's election cycle. MOTION: 23.07.383 Moved by: COUNCILLOR TOM BURTON That Council defer motion 23.07.382 to a future Council meeting occurring after a meeting is held between Council and the Grande Yellowhead Public School Division Trustees. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	p & E	In Progress - Constance to follow up September 14, 2023.

July 11, 2023	<p>MOTION: 23.07.389 Moved by: COUNCILLOR RYAN RATZLAFF That Council direct Administration to coordinate the waste collection and hazardous tree removal around residences, with signed agreements with Greenview landowners for full cost recovery, for the 2023 wildfire affected areas within Greenview. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	P & E / I & E	complete
	23.06.27 Regular Council Meeting		
June 27, 2023	<p>MOTION: 23.06.345 Moved by: COUNCILLOR DALE SMITH That Council direct Administration to investigate providing a community water source from the dugout on SW 3-73-22 W5M. FOR: Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry AGAINST: Reeve Olsen</p> <p style="text-align: center;">CARRIED</p>	I & E	In Progress
June 27, 2023	<p>MOTION: 23.06.347 Moved by: COUNCILLOR WINSTON DELORME That Council authorize Administration to develop a formal sublease with the Grande Cache Firefighter's Association for the operation of Fireman's Pit, located at E 28 – 56 – 8 – W6M, to come back to Council for approval at a future Council Meeting. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	Comm. Serv	In Progress
June 27, 2023	<p>MOTION: 23.06.348 Moved by: COUNCILLOR RYAN RATZLAFF That Council authorize Administration to establish an agreement with the Grande Cache Firefighter's Association for the purpose of granting the Association ownership of all infrastructure located at Fireman's Pit, within Greenview's provincial recreation disposition (REC 850036). FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	Comm. Serv	In Progress
	23.06.20 Committee of the Whole		

June 20, 2023	<p>MOTION: 23.06.47 Moved by: COUNCILLOR JENNIFER SCOTT That Committee of the Whole recommend to Council to direct Administration to investigate the feasibility and cost of upgrading the street lighting along main street (RR262) and the Ridgevalley arena. FOR: Councillor Burton, Councillor Didow, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Berry, Councillor Ratzlaff ABSENT: Councillor Delorme, Reeve Olsen</p> <p style="text-align: center;">CARRIED</p>	I & E	In progress
June 20, 2023	<p>MOTION: 23.06.48 Moved by: COUNCILLOR JENNIFER SCOTT That Committee of the Whole recommend to Council to direct Administration to prepare a report on the street lighting locations within Greenview Hamlets. FOR: Councillor Burton, Councillor Didow, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Berry AGAINST: Councillor Ratzlaff, Councillor Dale Smith ABSENT: Councillor Delorme, Reeve Olsen</p> <p style="text-align: center;">CARRIED</p>	I & E	In progress
June 20, 2023	<p>MOTION: 23.06.51 Moved by: COUNCILLOR DALE SMITH That Committee of the Whole recommend to Council to choose option 3 of the Expression of Interest cost-saving measures; 1) Combined pricing and equipment hiring of contractors 2) The ability for Administration to utilize a single contractor for smaller projects 3) Tendering Forestry Trunk Road water truck services 4) Tendering Forestry Trunk Road dozer services for snow drifts 5) Requesting annual quotes from contractors in lieu of using Alberta Road Builders Association rates. FOR: Councillor Didow, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Berry, Councillor Ratzlaff, Councillor Delorme, Reeve Olsen AGAINST: Deputy Reeve Bill Smith, Councillor Burton, Councillor Scott ABSENT: Councillor Delorme</p> <p style="text-align: center;">CARRIED</p>	I & E	In progress -- COW discussion -- will be bringing forward in early 2024 for Council direction
	23.06.13 Regular Council Meeting		

June 13, 2023	<p>MOTION: 23.06.321 Moved by: COUNCILLOR JENNIFER SCOTT That Council approve additional funding to a maximum of \$179,580 to Grande Spirit Foundation to complete Option 1 of the DeBolt Senior Housing project in 2024 with funds to come from the Unrestricted Reserve. FOR: Councillor Didow, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Berry, Councillor Burton, Deputy Reeve Bill Smith, Councillor Delorme AGAINST: Councillor Ratzlaff, Reeve Olsen CARRIED</p>	Corp Serv/Comm Serv	In Progress
June 13, 2023	<p>MOTION: 23.06.332 Moved by: DEPUTY REEVE BILL SMITH That Council direct Administration to investigate the impact of the potential for land sharing network in Treaty 8 Territory. FOR: Councillor Didow, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Berry, Councillor Burton, Deputy Reeve Bill Smith, Reeve Olsen, Councillor Delorme CARRIED</p>	P & E	In Progress
	23.05.23 Regular Council Meeting		
May 9, 2023	<p>MOTION: 23.05.272 Moved by: COUNCILLOR RYAN RATZLAFF That Council award the purchase of one new 2024 Freightliner 114SD Tandem Truck Chassis with Hook Lift Attachment to Western Star and Freightliner of Grande Prairie as quoted for \$299,460.00, with funds to come from Environmental Services 2023 Capital Budget. Price may be subject to change if the pricing is adjusted for the 2024 production year which is not set yet. FOR: Reeve Olsen, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Burton, Councillor Ratzlaff, Councillor Berry AGAINST: Deputy Reeve Bill Smith, Councillor Dale Smith, Councillor Didow CARRIED</p>	I&E	In Progress Letter sent
May 9, 2023	<p>MOTION: 23.05.277 Moved by: COUNCILLOR JENNIFER SCOTT That Council approve the purchase of ten (10) ± acres of Land for the Ridgevalley Lagoon for \$30,000.00 per acre, with funds to come from the 2023 Capital Budget, WW 21001. NW-14-71-26 W5M FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Burton, Councillor Berry AGAINST: Councillor Ratzlaff CARRIED</p>	I&E	complete
	23.04.25 Regular Council Meeting		

April 25, 2023	<p>MOTION: 23.04.231 Moved by: COUNCILLOR DALE SMITH That Council approve the road construction request of approximately 830m to access NW 26-71-21 W5 located on Range Road 212 north of Township Road 714 with funding to come from Capital Block funding. FOR: Councillor Rosson, Councillor Dale Smith, Councillor Burton, Councillor Scott, Councillor Schlieff, Councillor Didow AGAINST: Councillor Delorme, Reeve Olsen, Deputy Reeve Bill Smith, Councillor Berry, Councillor Ratzlaff</p> <p>CARRIED</p>	I&E	In Progress -- Construction in 2024; Capital Project ID # RD24008
April 25, 2023	<p>MOTION: 23.04.242 Moved by: COUNCILLOR SALLY ROSSON That Council direct Administration to tender electrical transfer switch for the Greenview Regional Multiplex and the Grovedale Community Centre with funds to come from the Capital Project Budget FM22009. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Delorme, Councillor Ratzlaff, Councillor Rosson, Councillor Berry, Councillor Dale Smith, Councillor Burton, Councillor Scott, Councillor Schlieff, Councillor Didow ABSENT: Councillor Burton</p> <p>CARRIED</p>	I&E	In Progress
April 25, 2023	<p>MOTION: 23.04.246 Moved by: DEPUTY REEVE BILL SMITH That Council award the Turn-Key Haul and Store Jug Fill Station to Flowpoint Environmental Systems Inc, in the amount of \$148,475.97 plus GST, with funds to come from the 2023 Capital Budget (WD23006). FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Delorme, Councillor Ratzlaff, Councillor Rosson, Councillor Berry, Councillor Dale Smith, Councillor Burton, Councillor Scott, Councillor Schlieff, Councillor Didow</p> <p>CARRIED</p>	I&E	In progress, Pad poured, access installed, tank installed, power scheduled for last week of October. Still waiting on building
April 25, 2023	<p>MOTION: 23.04.255 Moved by: COUNCILLOR DAVE BERRY That Council direct Administration to investigate the potential of implementing a Small Business sub-class tax for the purpose of supporting small businesses within Greenview for the 2024 tax year. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Delorme, Councillor Ratzlaff, Councillor Rosson, Councillor Berry, Councillor Burton, Councillor Scott, Councillor Schlieff, Councillor Didow ABSENT: Councillor Dale Smith</p> <p>CARRIED</p>	Corp Serv	In progress
23.03.14 Regular Council Meeting			

March 14, 2023	MOTION: 23.03.138 Moved by: DEPUTY REEVE BILL SMITH That Council accept the report on Large Animal Veterinary Practice Supports for information, as presented. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Delorme, Councillor Ratzlaff, Councillor Rosson, Councillor Berry, Councillor Dale Smith, Councillor Burton, Councillor Scott, Councillor Schlieff, Councillor Didow CARRIED	Ag. Serv	In progress
	MOTION: 23.03.139 Moved by: COUNCILLOR DAVE BERRY That Council direct Administration to draft a program for Council consideration based on the Livestock Veterinary Innovation Initiative with options detailing a potential Greenview only initiative as well as a Peace Region based initiative. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Delorme, Councillor Ratzlaff, Councillor Rosson, Councillor Berry, Councillor Dale Smith, Councillor Burton, Councillor Scott, Councillor Schlieff, Councillor Didow CARRIED		
23.02.28 Regular Council Meeting			
February 28, 2023	MOTION: 23.02.103 Moved by: COUNCILLOR RYAN RATZLAFF That Council direct Administration to investigate the necessity and feasibility of having backup power supply to all of the MD Emergency Reception Centres. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry CARRIED	Comm. Serv	In Progress
February 28, 2023	MOTION: 23.02.118 Moved by: COUNCILLOR WINSTON DELORME That Council direct Administration to engage Alberta Transportation to find a solution for the failing bridge on Highway 747 near Sweathouse and the deteriorating portions of Highway 666 near Landry Heights. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry CARRIED	I&P/CAO	Bridge repair is scheduled for 2023, Hwy 666 on-going discussions. Bridge repair in progress.

February 28, 2023	<p>MOTION: 23.02.120 Moved by: REEVE TYLER OLSEN</p> <p>That Council direct Administration to work on a Conference and Education attendance policy for Council.</p> <p>FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	Leg. Services	In Progress Going to PRC June 14
	23.02.21 COTW Meeting		
	23.02.14 Regular Council Meeting		
February 14, 2023	<p>MOTION: 23.02.62 Moved by: COUNCILLOR DALE SMITH</p> <p>That Council direct Administration to support Heart River Housing with funding up to \$10,000,000 for construction on their Falher project through development of a loan guarantee bylaw.</p> <p>FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	Corp. Serv/Leg	In Progress review of draft
	23.01.24 Regular Council Meeting		
January 24, 2023	<p>MOTION: 23.01.46 Moved by: COUNCILLOR JENNIFER SCOTT</p> <p>That Council direct Administration to explore opportunities of grant funding and partnerships for the establishment of communication towers on highway 40 from Grande Cache Area to Grande Prairie utilizing fibre connection.</p> <p>FOR: Councillor Didow, Councillor Delorme, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	Corp. Serv.	In Progress report to Nov COTW
January 24, 2023	<p>MOTION: 23.01.51 Moved by: COUNCILLOR SALLY ROSSON</p> <p>That Council direct Administration to prepare a report regarding the overall response effectiveness to a pipeline emergency that occurred on January 18, 2023.</p> <p>FOR: Councillor Didow, Councillor Delorme, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton</p> <p>ABSENT: Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	Comm. Serv	In Progress
	23.01.10 Regular Council Meeting		

January 10, 2023	<p>MOTION: 23.01.09 Moved by: COUNCILLOR DALE SMITH That Council direct Administration to sign the updated Heart River Housing Letter of Understanding regarding financing dated December 15, 2022, as provided by Heart River Housing. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p> <p>MOTION: 23.01.10 Moved by: COUNCILLOR JENNIFER SCOTT That Council direct Administration to investigate assisting Heart River Housing with the debt financing of the capital projects presented and report back with the possible options. FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p style="text-align: center;">CARRIED</p>	Comm. Serv/Corp. Serv	Letter signed and sent - Second Motion - In Progress
	22.11.22 RCM		
November 22, 2022	<p>MOTION: 22.11.737 Moved by: COUNCILLOR JENNIFER SCOTT That Council support moving forward in principle with joint use of the Greenview Regional Multiplex by the New K-12 school pending a mutually beneficial joint use agreement with the Northern Gateways Public School Division. FOR: Reeve Olsen, Councillor Didow, Councillor Dale Smith, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry, Deputy Reeve Bill Smith AGAINST: Councillor Delorme</p> <p style="text-align: center;">CARRIED</p>	Ec. Dev & Planning	In Progress - 3/5 School Boards have signed agreements as of September 14, 2023.
November 22, 2022	<p>MOTION: 22.11.738 Moved by: COUNCILLOR SALLY ROSSON That Council direct Administration to host a public engagement as soon as possible for the purpose of gathering information regarding the potential joint use agreement between the Municipal District of Greenview and Northern Gateway School Division regarding the Greenview Regional Multiplex. FOR: Reeve Olsen, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry, Deputy Reeve Bill Smith</p> <p style="text-align: center;">CARRIED</p>	Ec. Dev & Planning	In Progress - Public Engagement to occur once funding details are provided.
	22.10.25 RCM		

October 25, 2022	<p>MOTION: 22.10.693 Moved by: COUNCILLOR WINSTON DELORME That Council approves 110 Street, between Hoppe Ave and 98 Avenue in Grande Cache Alberta be renamed to “Beland Blvd”.</p> <p>DEFERRED</p> <p>MOTION: 22.10.694 Moved by: COUNCILLOR WINSTON DELORME That Council defer motion 7.5 Grande Cache Street Renaming until a new policy on street naming can be brought back to Council.</p> <p>FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor, Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	Leg. Serv	In Progress PRC deferred to another meeting
October 25, 2022	<p>MOTION: 22.10.704 Moved by: COUNCILLOR WINSTON DELORME That Council approves a formal acknowledgement of the relationship between the MD of Greenview No. 16 and the Western Cree Tribal Council.</p> <p>FOR: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Didow, Councillor Dale Smith, Councillor Delorme, Councillor Schlieff, Councillor Rosson, Councillor Scott, Councillor Ratzlaff, Councillor Burton, Councillor Berry</p> <p>CARRIED</p>	CAO/Comms	In Progress
september 13,2022	<p>MOTION: 22.09.519 Moved by: COUNCILLOR WINSTON DELORME That Council direct Administration to provide a report regarding the Grande Cache Community Bus for the purpose of understanding when it will be replaced, and the associated funds dedicated to its replacement.</p> <p>For: Councillor Burton, Councillor Delorme, Councillor Ratzlaff, Councillor Rosson, Councillor Berry, Councillor Dale Smith, Councillor Scott, Councillor Schlieff, Councillor Didow. Absent: Reeve Olsen, Deputy Reeve Bill Smith</p> <p>CARRIED</p>	Comm. Serv	in progress

July 12, 2022	<p>MOTION: 22.07.417 Moved by: COUNCILLOR DUANE DIDOW That Council direct Administration to enter into an agreement with the Mountain Metis Nation Association regarding the sale of Block 9722089, Lot 34, Plan 14, within the Hamlet of Grande Cache, for the future development of a Mountain Metis Cultural Centre.</p> <p>For: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Delorme, Councillor Ratzlaff, Councillor Rosson, Councillor Berry, Councillor Dale Smith, Councillor Burton, Councillor Scott, Councillor Schlieff, Councillor Didow</p> <p style="text-align: center;">CARRIED</p> <p>MOTION: 22.07.418 Moved by: COUNCILLOR DAVE BERRY That Council direct Administration to tender the proposed reconstruction of roadway including underground utilities from 94 Avenue and 97 street intersection, east to Memorial Drive in the Hamlet of Grande Cache.</p> <p>For: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Delorme, Councillor Ratzlaff, Councillor Rosson, Councillor Berry, Councillor Dale Smith, Councillor Burton, Councillor Scott, Councillor Schlieff, Councillor Didow</p> <p style="text-align: center;">CARRIED</p>	Ec. Dev & Plan	In Progress - going to the September 19, 2023 COTW for presentation and update.
	22 06.28 RCM		
June 21, 2022	<p>MOTION: 22.06.71 Moved by: COUNCILLOR DUANE DIDOW That Committee of the Whole recommend to Council to direct Administration to explore a weed control collaboration with key stakeholders within the Willmore Wilderness and Improvement District No. 25.</p> <p>For: Reeve Olsen, Councillor Delorme, Councillor Ratzlaff, Councillor Rosson, Councillor Berry, Councillor Dale Smith, Councillor Scott, Councillor Schlieff, Councillor Didow</p> <p style="text-align: center;">CARRIED</p> <p>Absent: Councillor Burton</p>	Comm. Serv	In progress Administration has a meeting booked with the Alberta Forestry, Parks and Tourism representatives for an intergovernmental working group discussion regarding control of weed infestations in the Willmore Area of December 14th.

April 26, 2022	<p>MOTION: 22.04.223 Moved by: COUNCILLOR DAVE BERRY That Council direct Administration to call a meeting with the Town of Valleyview and Greenview Intermunicipal Collaboration Framework Committee.</p> <p>For: Deputy Reeve Bill Smith, Councillor Delorme, Councillor Ratzlaff, Councillor Rosson, Councillor Berry, Councillor Dale Smith, Councillor Tom Burton, Councillor Scott, Councillor Schlieff, Councillor Didow.</p> <p>CARRIED</p>	CAO	In Progress
22 01 11 RCM			
January 11, 2022	<p>MOTION: 22.01.23 Moved by: COUNCILLOR WINSTON DELORME That Council direct Administration to re-establish the water well and equipment that existed previously at PT-10-57-5 W6M Muskeg Seepee Cooperative, with funds to come from the 2022 Capital budget. For: Reeve Olsen, Deputy Reeve Bill Smith, Councillor Burton, Councillor Didow, Councillor Delorme, Councillor Smith, Councillor Ratzlaff, Councillor Scott, Councillor Rosson, Councillor Berry, Councillor Schlieff</p> <p>CARRIED</p>	I&E	well drilled, waiting on pump and electrical, will be completed before end of year
21 08 24 RCM			
August 24, 2021	<p>MOTION: 21.08.427 Moved by: COUNCILLOR DALE GERVAIS That Administration bring back a report on the legal ownership regarding properties in which municipal assets exist where the municipality does not own the land.</p> <p>FOR: Councillor Didow, Councillor Delorme, Councillor Urness, Councillor Olsen, Councillor Acton, Reeve Dale Smith, Councillor Chapman, Councillor Gervais, Councillor Burton, Deputy Reeve Bill Smith</p> <p>CARRIED</p>	Corp. Serv.	In progress - part of the AM project and Insurance/Contract Review
21 07 28 Special CM			
June 8, 2021	<p>MOTION: 21.06.298 Moved by: COUNCILLOR DALE GERVAIS That Council direct Administration to discontinue the use of the Greenview Regional Multiplex Logo for external and internal advertising and promotion, and have it replaced with the MD of Greenview Corporate Logo.</p> <p>CARRIED</p>	CAO Serv.	In Progress - logo only exists on the building at this point.
21 04 13 RC Meeting			

April 13, 2021	<p>MOTION: 21.04.196 Moved by: COUNCILLOR LES URNESS</p> <p>That Council direct Administration to research the concept of polling the rural and small urban municipalities in British Columbia, Alberta, Saskatchewan and Manitoba to form an association as a federal voice similar to FCM.</p> <p>For: UNANIMOUS Opposed:</p> <p>CARRIED</p>	CAO Services	In Progress - waiting for Council to attend FCM to make informed decision.
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