Edge at Pathways Regional Inc.

S-4 Leitrim Urban Expansion Area

Serviceability Report

2026-06-01

S-4 Leitrim Urban Expansion Area

Serviceability Report

2026-06-01

Prepared By:
Arcadis Professional Services (Canada) Inc.
333 Preston Street, Suite 500
Ottawa, Ontario
K1S 5N4

Prepared For:
The Edge at Pathways Regional Inc.
1737 Woodward Drive, 2nd Floor
Ottawa, ON
K2C 0P9

Our Ref:
145172.6.04.03

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2026-06-01
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
M.GHASRI
100520793
2026-06-01
PROVINCE OF ONTARIO

Demetrius Yannoulopoulos, P.Eng
Principal | Practice Lead, Land Engineering

Mahsa Ghasri, P.Eng
Project Engineer, Water Resources

Ryan Magladry, C.E.T
Associate Principal | Practice Lead, Land Engineering

Angela Soward
Engineering Intern

https://arcadiso365.sharepoint.com/sites/145172/Internal Documents/6.0_Technical/6.04_Civil/03_Reports/Servicability Report/Submission No. 4/CTR_S-4UEA_Serviceability_2026-06-01.docx

This document is intended only for the use of the individual or entity for which it was prepared and may contain information that is privileged, confidential and exempt from disclosure under applicable law. Any dissemination, distribution or copying of this document is strictly prohibited.

Version Control

Issue	Revision No.	Date Issued	Page No.	Description	Reviewed By
1	1	2025-01-24		Existing Conditions Report Issued to the City of Ottawa (Draft)	RM/DY
1	2	2025-03-25		Existing Conditions Report Issued to the City of Ottawa	RM/DY
1	3	2025-05-29		Existing Conditions Report Issued to the City of Ottawa	RM/DY
2	4	2025-08-08		Serviceability Report Issued to City of Ottawa	RM/DY
2	5	2025-10-20		Serviceability Report Issued to City of Ottawa	RM/DY
2	6	2026-04-15		Serviceability Report Issued to City of Ottawa	RM/DY
2	7	2026-06-01		Serviceability Report Issued to City of Ottawa	RM/DY

Contents

Executive Summary 1
1 Introduction 2
  1.1 Study Area 2
2 Background Information 3
  2.1 Terms of Reference 3
  2.2 Synopsis of Previous Studies 3
  2.3 Alternative Solutions 4
3 Natural Heritage Systems 5
  3.1 Terms of Reference 5
  3.2 Summary of Findings 5
4 Geotechnical 7
  4.1 Summary of Geotechnical Investigation 7
  4.2 Summary of Mineral Resource Impact Assessment 7
  4.3 Summary of Environmental Noise Control Study 7
  4.4 Summary of Hydrogeological Study 8
5 Water Distribution 9
  5.1 Background 9
  5.2 Existing Conditions 9
  5.3 Evaluation of Alternative Solutions 9
    5.3.1 Evaluation of Water Servicing Alternatives 10
      5.3.1.1 Do Nothing 10
      5.3.1.2 Private Water Wells 10
      5.3.1.3 Communal Water Well and Distribution System 10
      5.3.1.4 Extension and/or Upgrade of Municipal Servicing 10
  5.4 Concept Plan Development 10
  5.5 Recommended Water Distribution Plan 10
    5.5.1 Design Criteria 11
    5.5.2 System Pressures 11
    5.5.3 Watermain Layout 11
6 Wastewater Servicing 14
  6.1 Background 14
  6.2 Existing Conditions 14

6.2.1 Evaluation of Downstream System 14
6.2.1.1 Normal Operating Conditions 15
6.2.1.2 Update to the Leitrim Storm and Sanitary Hydraulic Model 15
6.2.1.3 Model Files 25
6.3 Evaluation of Alternative Solutions 25
6.3.1 Evaluation of Wastewater Servicing Alternatives 26
6.3.1.1 Do Nothing 26
6.3.1.2 Private Septic System 26
6.3.1.3 Communal Collection and Treatment System 26
6.3.1.4 Extension and/or Upgrade of Existing Municipal Servicing 26
6.4 Concept Plan Development 26
6.5 Recommended Wastewater Servicing Plan 27
6.5.1 Design Criteria 27
6.5.2 Wastewater Servicing Layout 28
6.5.3 Development Charge Recoveries 28
6.5.4 Cost Sharing Obligations 28
7 Stormwater Servicing 29
7.1 Background 29
7.2 Existing Stormwater Infrastructure 29
7.3 Existing Stormwater Management Facility 30
7.4 Existing Leitrim Wetland 30
7.5 Evaluation of Alternative Solutions 31
7.5.1 Evaluation Parameters 31
7.5.1.1 Do Nothing 31
7.5.1.2 Dedicated Stormwater Management Facility 31
7.5.1.3 Use of Existing Municipal Infrastructure and Stormwater Facilities 32
7.5.2 Stormwater Servicing Solutions 33
7.5.2.1 Western Wetland Stormwater Management Facility with OGS & Eastern Dry Pond with Outlet to Dun Skipper Drive 33
7.5.2.2 Western Wetland Stormwater Management Facility & Eastern Stormwater Management Facility with Outlet to Dun Skipper Drive 35
7.5.2.3 Western Wetland Stormwater Management Facility & Eastern Dry-Pond Facility with Outlet to Sora Way/Bank Street 36

7.5.2.4 Western Wetland Stormwater Management Facility, No On-Site Eastern Stormwater Management Facility & Outlet to Sora Way, Bank Street 37
7.6 Recommended Stormwater Servicing Plan 40
7.6.1 Design Criteria 40
7.6.1.1 Dual Drainage Design 40
7.6.1.1.1 Minor System 40
7.6.1.1.2 Major System 41
7.6.1.2 Runoff Volume Controls 42
7.6.1.3 Water Balance 42
7.6.1.4 Water Quality 42
7.6.1.5 Water Quantity 43
7.6.2 Stormwater Servicing Layout 43
7.6.2.1 Existing Constructed Channel and Drainage Swale 44
7.6.3 Hydraulic and Hydrologic Evaluation 45
7.6.3.1 Design Storm Events 45
7.6.3.2 Model Input Parameters 45
7.6.3.3 Modelling Results 46
7.6.4 Development Charge Recoveries 49
7.6.5 Cost Sharing Obligations 49
8 Utility Infrastructure 50
8.1 Electrical Distribution 50
8.2 Gas Distribution 50
8.3 Telecommunications 50
9 Grading and Roads 51
9.1 Existing Topography 51
9.2 Existing Road Network 51
9.3 Concept Plan Development 51
9.4 Recommended Grading 51
9.4.1 Overland Flow Routing 52
9.4.2 Relation to Proposed Servicing Works 52
9.4.3 Maximum Permissible Grade Raise 52
9.4.4 On-Site Earthworks and Connectivity with Existing Roadways 52
9.4.5 Retaining Walls and Stable Slope Embankments 53
10 Implementation and Phasing 54

10.1 Offsite Projects 54
10.1.1 Water Connection to Kelly Farm Drive 54
10.1.2 Water Connection to Bank Street 54
10.1.3 Sanitary Sewer Extension along Bank Street 54
10.1.4 Sanitary Sewer Extension from Paakanaak Avenue 55
10.1.5 Storm Sewer Extension along Bank Street 55
10.2 Phasing 55
10.3 Approvals 55
11 Conclusions and Recommendations 60
11.1 Water Distribution 60
11.2 Wastewater Collection 60
11.3 Stormwater Management 60
11.4 Utility Infrastructure 61

Tables

Table 5-1: Proposed Watermain Connection 1 – Kelly Farm Drive (Pre SUC Pressure Zone Reconfiguration) 12
Table 5-2: Proposed Watermain Connection 2 – Bank Street (Pre SUC Pressure Zone Reconfiguration) .. 12
Table 5-3: Proposed Watermain Connection 1 – Kelly Farm Drive (Post SUC Pressure Zone Reconfiguration) 12
Table 5-4: Proposed Watermain Connection 2 – Bank Street (Post SUC Pressure Zone Reconfiguration) 12
Table 6-1 Summary of Expansion Land Flows 16
Table 6-2 Update to Leitrim Hydraulic Model – Summary of Sanitary HGLs 16
Table 6-3 Update to Leitrim Hydraulic Model – Introduction of Sanitary Overflow – Summary of Sanitary HGLs 21
Table 6-4 Summary of XPSWMM model files provided in digital submission 25
Table 7-1 Update to Leitrim Hydraulic Model – Water Quality Volumes 32
Table 7-2 Performance of the Findlay Creek Village Stormwater Facility 33
Table 7-3 City of Ottawa Minimum Allowable Slopes for Storm Sewer Pipes 41
Table 7-4 Typical Runoff Coefficients 41
Table 7-5: PCSWMM SWMF Utilized Storage Results 46
Table 7-6: PCSWMM Outlet Peak Discharge Results 47
Table 7-7: Storm Hydraulic Grade Line for Subject Site for the 100 Year 3 Hour Chicago and 100 Year 3 Hour Chicago Increased by 20% Storm Events 47

Chart 7-1: Western Linear Facility Outflow During 25 mm Event **49**
Table 10-1: Evaluation of Appendix A Table A.1 of the CLI-ECA **57**

Figures

Figure 1-1 – Site Location **2**

Appendices

Appendix A

- S-4 Leitrim Urban Expansion Area Concept Plan 14a

Appendix B

- S-4 Leitrim West of Bank Street Terms of Reference (Servicing)
- City Correspondence Regarding Review of the Existing Conditions

Appendix C

- Figure 5-1 Existing Watermain Layout
- S-4 Leitrim Expansion Lands Water Demands
- S-4 UEA Boundary Conditions Received December 2025
- S-4 Leitrim Expansion Lands Water Model Results
- Figure 5-2 Preferred Water Distribution Plan

Appendix D

- Figure 6-1 Existing Sanitary Sewer Layout
- S-4 & S-5 Leitrim Expansion Lands Sanitary Sewer Design Sheet (OSDG)
- S-4 & S-5 Leitrim Expansion Lands Sanitary Sewer Design Sheet (Annual Event)
- S-4 & S-5 Leitrim Expansion Lands Sanitary Sewer Design Sheet (Rare Event)
- S-4 & S-5 Leitrim Expansion Lands Sanitary Sewer Design Sheet (Normal Operating Conditions)
- Correspondence with DSEL – S5 Lands Flows
- Figure 6-2 Preferred Wastewater Collection System and Outlet to Paakanaak Avenue
- Figure 6-3 Preferred Wastewater Outlet to Labrador Crescent
- Figure 6-4 Preferred Wastewater Drainage Area Plan
- Figure 6-5 Conceptual Overflow Cross Section

Appendix E

- Figure 7-1 Existing Storm Sewer Layout
- Excerpt Eastern Outlet Release Rate
- Figure 7-2 Preferred Storm Sewer Plan
- Figure 7-3 Preferred Storm Outlet to Bank Street

- Figure 7-4 Preferred Storm Outlet to Existing Constructed Channel
- Figure 7-5 Preferred Storm Drainage Area Plan
- Figure 7-6 Preferred Stormwater Management Concept Plan
- WSWMF-1 Conceptual Western SWM Facility Design
- WSWMF-2 Conceptual Western SWMF – Cell 1 Plan View and Profile
- WSWMF-3 Conceptual Western SWMF – Cell 2 Plan View and Profile
- WSWMF-4 Conceptual Western SWMF – Cross Sections
- Pathways at Findlay Creek (Remer Lands) Constructed Channel General Plan
- Excerpt Constructed Channel Design Brief Section 3
- Excerpt Constructed Channel Design Brief Figure 1
- Constructed Channel 5-year Monitoring Report
- Meeting Minutes and Observation Comments from July 25th Site Meeting with SNCA, City of Ottawa, Regional Group and Arcadis
- Water Quality Calculations

Appendix F

- Figure 9-1 Existing Topography
- Figure 9-2 Preferred Macro Grading Plan

Executive Summary

Arcadis Professional Services (Canada) Inc. (Arcadis) has been retained by the Edge at Pathways Regional Inc. to prepare the Serviceability Report for the Leitrim Urban Expansion Area (UEA) S-4. The S-4 UEA is approximately 14 ha of land generally bound by the rural vacant lands to the west, existing rural residential and future Earl Armstrong Road to the south, Bank Street to the east and the existing Leitrim Development Area to the north.

This report demonstrates the conceptual serviceability of the study area. This includes demonstrating capacity of the existing municipal systems such as water distribution, municipal wastewater and stormwater systems, and utilities such as hydro, gas, and telecommunications to accommodate the S-4 UEA.

Water

The existing municipal water network can accommodate the proposed development of the lands without the need for significant off-site improvements or extensions. SUC pressure updates are anticipated prior to detailed design however, fire flow demands can be met under existing conditions.

Wastewater

The proposed development can be accommodated by the existing municipal wastewater network and including a new wastewater overflow in the vicinity of Sora Way at Bank Street (Zone 790). The western portion of the S-4 UEA can outlet north to Paakanaak Avenue without the need for significant off-site improvements or extensions. The eastern portion of the S-4 UEA can outlet east to Bank Street and North to Labrador Crescent. Significant off-site extension is required.

Stormwater

The proposed development can be accommodated by its natural outlet, the Leitrim Wetland Buffer to the west, and to the existing Findlay Creek municipal stormwater management facility (SWMF). The western portion of the S-4 UEA can outlet west to the Leitrim Wetland Buffer and the eastern portion of the S-4 UEA can outlet east to Bank Street. The eastern outlet to Bank Street will include construction of a new sewer to convey flows north to the Findlay Creek Stormwater Management Facility.

The report will also discuss the development of the concept plan, including alternative servicing schemes for each municipal system, and provide a discussion of the opportunities and constraints, as required under the Municipal Class EA process. In addition, the report will recommend the preferred servicing strategy based on the preferred concept plan.

1 Introduction

Arcadis Professional Services (Canada) Inc., hereinafter referred to as “Arcadis”, has been retained by Edge at Pathways Regional Inc. to prepare a Serviceability Report in support of the proposed land use plan for the Leitrim S-4 Urban Expansion area introduced as part of the City of Ottawa’s New Official Plan 2021-386. The purpose of this report is to provide documentation of the existing municipal infrastructure and an analysis of alternative servicing solutions that support a recommended servicing approach for the lands. The report aims to provide context on the Natural Systems, Water Distribution, Wastewater Disposal, Stormwater Management and topographic constraints associated with the S-4 Lands.

The new infrastructure proposed for the site requires approval under the Ontario Environmental Assessment Act through the Municipal Class Environmental Assessment. The Serviceability Report is prepared following the integration of the Municipal Class Environmental Assessment (EA) and Planning Act process as outlined in the Municipal Engineers Association (MEA) Municipal Class EA document. Specifically, the Serviceability Report has been completed to satisfy Phases 1 & 2. Additionally, this report has been prepared in support of the Draft Plan of Subdivision and Zoning By-law Amendment publications.

1.1 Study Area

The Leitrim Urban Expansion Area (UEA) S-4 encompasses approximately 14 ha of land, located west of Bank Street and south of the existing Pathways South Development. The site is bounded on the north side by existing residential development, on the east side by Bank Street and is confined to the south by the future Earl Armstrong Road extension, adjacent to the south property line.

The development area consists primarily of undeveloped lands under single ownership by the Edge at Pathways Regional Inc., a city-owned water pump station, and three existing rural lots with frontage along Bank Street.

Please refer to **Figure 1-1** below for more information on the site location.

Figure 1-1 – Site Location

2 Background Information

In 2016, IBI Group (now Arcadis) completed the “Updated Serviceability Study for the Leitrim Development Area.” At that time, the subject property was not part of the urban envelope in Leitrim. It was brought into the Leitrim Development area in 2021 under the City of Ottawa’s New Official Plan 2021-386.

2.1 Terms of Reference

The City of Ottawa has accepted the terms of reference prepared by Arcadis regarding deliverables for approval of the S-4 lands. A copy of the Terms of Reference has been included in **Appendix B**. As discussed in section 2.5 of the Terms of Reference, this report is intended to be a scoped-down Master Servicing Study. The findings of this report will generally follow the City of Ottawa IMP Appendix C: Guideline for Preparing Terms of Reference for a Master Servicing Study. In lieu of a dedicated Existing Conditions Report, the existing conditions review will form part of the Serviceability Study.

This report is expected to be issued in multiple draft stages to align with the Municipal Class Environmental Assessment process.

The anticipated stages are as follows.

- Existing Conditions Review
- Concept Plan Development & Recommended Land Use Plan Servicing

The city has currently completed the Existing Conditions Review. An email from Cam Elsby can be found in **Appendix B** confirming that all comments have been addressed at this stage.

2.2 Synopsis of Previous Studies

The information displayed in this report has been obtained in accordance with the following reports:

- Design Brief Pathways South at Findlay Creek - Phase 2 4840 Bank Street Leitrim Development Area prepared by IBI Group dated May 2021
- Design Brief Pathways at Findlay Creek 4800 Bank Street – Phase 2 Leitrim Development Area, prepared by IBI Group dated September 2019
- Earl Armstrong Road Extension (Albion Road to Hawthorne Road) Environmental Assessment Study – Environmental Study Report prepared for The City of Ottawa, prepared by Parsons Group, dated November 2019
- Design Brief Pathways at Findlay Creek (Remer Lands) - 4800 Bank Street Constructed Channel Leitrim Development Area, prepared by IBI Group, dated August 2018
- Updated Serviceability Study for the Leitrim Development Area, prepared for the City of Ottawa by IBI Group, 2016
- Pathways at Findlay Creek – Constructed Channel Monitoring (Year 5), prepared for Leitrim South Holdings Inc., prepared by Cambium Inc., dated October 30, 2024

2.3 Alternative Solutions

The Municipal Class Environmental Assessment Act defines “Alternate Solutions” as “feasible ways of solving an identified problem (deficiency) or addressing an opportunity from which a preferred solution is selected”. The water, wastewater and stormwater subsections of this report will discuss the alternative solutions for each. NOTE: Alternative solutions include the “do nothing” alternative.

As noted in Section 1, this report has been prepared in accordance with the integrated EA process as outlined in Section A.2.9 of the MEA Municipal Class EA process (June 2000, amended 2007). The following sections of this report detail the development and assessment of water distribution, wastewater servicing and storm sewer system and stormwater management alternatives to determine a preferred servicing strategy for the Leitrim S-4 Urban expansion area as defined by the City of Ottawa’s New Official Plan 2021-386, respecting the requirements of the MEA Municipal Class EA process.

- Due to the relatively small size of the S-4 UEA, its single ownership, and confinement by existing residential, natural lands, and arterial roadways of Bank Street and Future Earl Armstrong, the assessment of servicing alternatives has been completed using a single-stage approach. The assessment is completed in sufficient detail to facilitate evaluation and selection of a preferred alternative.

3 Natural Heritage Systems

Arcadis Professional Services (Canada) Inc. was retained by The Edge at Pathways Regional Inc. to prepare the *S4-Leitrim Urban Expansion Area Natural Heritage Existing Conditions Report*, which was prepared in March 2025. The purpose of the report was to present all necessary information and findings for a collective understanding of the boundaries, attributes, connectivity and functions of relevant environmental features, within the subject site and surrounding area.

3.1 Terms of Reference

The City of Ottawa has accepted the terms of reference prepared by Arcadis regarding deliverables for approval of the S-4 lands. A copy is included in **Appendix B**.

3.2 Summary of Findings

The Environmental Impact Study (EIS) has been prepared to support land-use planning for the future development of the Leitrim West Urban Expansion Area - S4 Lands to make an informed decision as to whether the proposed Project will have a negative impact on any significant natural heritage features and/or ecological functions that are present within the Study Area of the EIS. The EIS outlines the methodologies and associated results of the Background Screening and Field Data Collection completed as part of this study. The following natural heritage features were identified within the Study Area:

- ➢ Six headwater drainage features were assessed within the Study Area, two (2) of which are situated in the Urban Expansion Area Limits. The proposed management recommendation for these features is “No Management Required”, meaning they can be removed, and all associated flows can be incorporated into a stormwater management system. Authorization under the *Conservation Authorities Act* (1990) is required, as these features are also related to regulated wetland features.
- ➢ Habitat for Species of Conservation Concern (eastern wood-pewee, wood thrush) was identified within the Study Area.
- ➢ Field surveys also confirmed the presence of two (2) Species at Risk (butternut and black ash) that will require further assessment and potential authorization/permitting under the *Endangered Species Act* (2007).
- ➢ Only one (1) wetland inclusion was identified within the eastern extents of the Urban Expansion Area Limits. This wetland feature is not significant and should not warrant protection.

Section 8.1.1 of the EIS identifies risk mitigation measures for watercourses and drainage features. Those measures are summarized below;

- ✓ Any in-water works in surface water features on-site should be undertaken outside of the in-water works timing restriction period for warmwater fish habitats (i.e., April 15 to June 30; Golder, 2016).
- ✓ A Fish and Wildlife Salvage should be conducted for these features within 48 hours of Project activities.
- ✓ Grading and drainage shall be designed to ensure proper management of drainage off the site during construction activities.
- ✓ Consistent with the EMP (Golder, 2016), a 15 m setback was recommended for the Conveyance Channel

- ✓ Stormwater management solutions should meet the criteria outlined in the Golder (2016) EMP with respect to water quality and quantity flowing into the Leitrim PSW.
- ✓ A permit will be required from SNC for the removal of Headwater Drainage Features (HDFs), as well as for any alterations to the Conveyance Channel to accommodate the proposed stormwater solutions in the western extents of the Site.

The Environmental Impact Study highlights the need for a balanced approach to ensure the area's environmental value is maintained while enabling sustainable development. Despite the presence of environmentally significant features, the report concludes that, with proper planning, mitigation, and adherence to regulatory requirements, the development can proceed without causing long-term damage to the site's ecological functions. This summary outlines the key findings, recommendations, and timelines for actions required to minimize the project's environmental impacts.

4 Geotechnical

The Edge at Pathways Regional Inc. has retained Paterson Group to prepare a Geotechnical Investigation for the subject lands. The Report PG6912-1 Revision 5 *Geotechnical Investigation Proposed Residential Development & Offsite Sewer Installation 4850 Bank Street Ottawa, Ontario,* was prepared on April 15, 2026. The report's purpose was to analyze the subsoil and groundwater conditions and to provide geotechnical recommendations related to the proposed residential development at the subject site, including stormwater management facilities. Paterson Group has also prepared a report, PG6999-1 Revision 1 *Mineral Resource Impact Assessment 4850 Bank Street – Ottawa, Ontario*, prepared August 8, 2025, and PG6999-2 *Environmental Noise Control Study – Stationary Noise Component 4850 Bank Street – Ottawa, Ontario*, prepared January 18, 2024, and PH5087-REP.01.R1 *Hydrogeological Study – Proposed Residential Development 4850 Bank Street – Ottawa, Ontario*, prepared October 17, 2025.

4.1 Summary of Geotechnical Investigation

Paterson Group provided soil profile data using test pits and boreholes. The samples indicated that the subsurface consists mainly of glacial till, overlaid by a layer of topsoil. Paterson has noted practical refusal in all boreholes, ranging from 0.7 m to 4.5 m below the existing surface. It has been concluded that boulders and/or bedrock removal will likely be required as part of servicing installation; however, it will not impact grading operations.

Groundwater levels were measured on December 15, 2023, January 29, 2024, July 3, 2025, February 26, 2026, and March 20, 2026, and were found to be between 0.13 and 2.47 m below the existing surface. Paterson Group has noted that the long-term groundwater levels are estimated to range from 1.0 m to 2.0 m below the current surface. Trench plugs (clay seals) will be provided in the mainline servicing trenches to minimize impacts on the groundwater table. Localized lowering is expected where permanent open excavations are proposed and where the underside of footing elevations are located below the seasonally high groundwater table. Each underside of footing is provided with uncontrolled perimeter foundation drainage and will be designed to be a minimum of 300mm above the 100-year hydraulic grade line within the sewer system.

Topsoil shall be stripped from any areas below buildings, services and paved areas.

No grade raise restrictions have been identified.

Roadway and Driveway structure recommendations have been provided.

4.2 Summary of Mineral Resource Impact Assessment

Paterson Group reviewed the subject site to determine if development lands within 500m of the Bedrock resource extraction site would cause undue hardships on the proposed development. Due to the City of Ottawa's Official Plan, Schedule B6 – Rural Transect, expansion of the resource extraction site west of Bank Street would not be possible. The report also concludes that there is sufficient separation between the proposed development and the existing bedrock quarry located east of Bank Street.

4.3 Summary of Environmental Noise Control Study

Paterson Group reviewed the environmental stationary noise from the existing GIP Quarry east of Bank Street. The impacts of stationary noise from existing quarry operations on subject lands meet current MECP requirements. As such, no additional noise control mitigation measures are required. However, the provision for air conditioning will be necessary to ensure that windows do not need to be opened.

4.4 Summary of Hydrogeological Study

Paterson Group has also been engaged to perform a hydrogeological assessment for the development area. The report PH5087-REP.01.R2*, Hydrogeological Study Proposed Residential Development 4850 Bank Street – Ottawa, ON*, was prepared on April 15, 2026. The report aims to conduct pre- and post-development water budget analyses, develop a conceptual model to characterize site conditions, identify hydrologic and hydrogeologic features within the study area, outline targets to mitigate post-development impacts, and assess how climate change projections may affect the water budget.

The report concludes that infiltration-based Low Impact Development (LID) measures are not recommended due to the shallow ground water table observed onsite. The report defers discussion related to additional stormwater management measures to this report. The recommended stormwater management plan is discussed further in Section 7 of this report.

During a meeting held on June 16th, 2025, with representatives from South Nation Conservation (SNC), Edge at Pathways Regional Inc., and Arcadis, SNC noted verbally that dry conditions currently exist in the southern parts of the wetland and the constructed channel. They also mentioned that increasing recharge opportunities within the wetland could benefit the Wetland complex. The Constructed Channel Monitoring (Year 5) Report, prepared by Cambium Inc., October 30, 2025, concluded that the constructed channel is functioning as designed and is well established. The post-development storm drainage area contributing to the Leitrim Wetland has slightly expanded compared to the pre-development area. Peaking flows are limited to the pre-development release rate, and additional retention volume is needed in the proposed linear SWM facility before it connects with the existing Constructed Channel. Further discussion of the proposed stormwater management concept is provided in Section 7 of this report.

5 Water Distribution

5.1 Background

The Leitrim Community is connected to the City of Ottawa central water distribution system, which sources water from the Ottawa River and is treated at the Lemieux Island and Britannia Water Treatment Plants before it is discharged to the water distribution network. The City of Ottawa has in place various measures to maintain system pressures and water quality through a series of pumping stations and elevated storage tanks. As development expands in the region, new infrastructure is designed and tested to meet the City of Ottawa and provincial guidelines for drinking water demands and quality. The water distribution network must expand in time, to meet the needs of Ottawa’s growing population.

5.2 Existing Conditions

The subject site is within the SUC Pressure Zone of the City of Ottawa’s water distribution system. The SUC pressure zone is expected to be upgraded in 2027. **Figure 5-1** in **Appendix C** illustrates the major watermain trunks within the Leitrim Community and on Bank Street, adjacent to the subject lands.

An existing 400 mm diameter watermain extends south along Bank Street and ultimately extends in a south-eastern direction to the Village of Russell.

An existing 400mm diameter watermain extends south along Kelly Farm Drive.

The existing development located immediately north of the subject lands (Pathways South) connects to Bank Street at Miikana Road and Dun Skipper Drive with 250 mm and 400 mm diameter watermains, respectfully and to existing water infrastructure in the Findlay Creek Village. The 250 mm diameter watermain on Miikana Road reduces to 200 mm from Cedar Creek Drive to Spreadwing Way and then increases to 250 mm from Spreadwing Way to Paakanaak Avenue. The 400 mm diameter watermain on Dun Skipper Drive continues to Kelly Farm Drive, which is reduced to 250 mm to Miikana Road. A 250 mm diameter watermain exists on Paakanaak Avenue from Dun Skipper Drive to Miikana Road. The location of existing watermains is shown on **Figure 5-1** in **Appendix C.**

5.3 Evaluation of Alternative Solutions

In the case of water, the issue (problem) is the supply of potable water and fire protection to service the urban development, and the incorporation of this water distribution system into the existing water system for the greater Leitrim Community, while meeting the required design criteria set out by regulatory agencies (City of Ottawa and Ministry of the Environment).

The water servicing alternatives considered for the S-4 UEA are:

- Do Nothing
- Private Water Wells
- Communal Water Well and Distribution System
- Extension and/or Upgrade of Existing Municipal Services

5.3.1 Evaluation of Water Servicing Alternatives

5.3.1.1 Do Nothing

The “Do Nothing” alternative is not viewed as a feasible option in this case because it restricts the City from achieving the development targets set for the new Official Plan lands.

5.3.1.2 Private Water Wells

The “Private Water Well” alternative might result in a significantly lower water demand in this case. However, it does not align with the City of Ottawa’s infrastructure policy for urban areas. Considering the density of development proposed in the new Official Plan, the spacing required between private wells would limit density potential. Therefore, this alternative is not recommended as a viable option for this application.

5.3.1.3 Communal Water Well and Distribution System

The “Communal Water Well and Distribution System” could be designed to meet the demand requirements of the new Official Plan; however, this alternative does not align with the City's Urban Infrastructure policy. It could potentially impact the aquifer that provides water supply to other areas, which would negatively impact the environment. This option may also require increased operation and maintenance costs due to the addition of a remote treatment facility. Due to concerns associated with this type of system, it is recommended that this alternative not be pursued.

5.3.1.4 Extension and/or Upgrade of Municipal Servicing

The “Extension and/or Upgrade of Existing Municipal Servicing” alternative is a practical water servicing option that has been implemented to serve the urban area adjacent to the northern property line of the S-4 UEA. This solution has proven to cause minimal social and environmental impacts, while also being a cost-effective choice that uses residual capacity in existing water infrastructure. Therefore, it is recommended that the “Extension and/or Upgrade of Existing Municipal Water Services” be chosen as the preferred alternative for water servicing.

5.4 Concept Plan Development

The proximity of existing water distribution infrastructure offers an efficient servicing approach for the subject lands with minimal impact on surrounding properties. Corridors have been incorporated into the concept plan to ensure connectivity with existing development lands. Refer to the Concept Plan provided in **Appendix A**.

5.5 Recommended Water Distribution Plan

Figure 5-1 in **Appendix C** identifies the ideal locations for future watermain connections to existing city infrastructure. The subject site is proposed to be serviced through a connection to Bank Street, to the east and Paakanaak Avenue, to the north. These locations are both feasible and pose the least impact on surrounding developments. A water demand calculation has been conducted for the proposed residential development, based on the concept plan provided in **Appendix A**. With respect to the existing infrastructure at the proposed connection locations, there is sufficient capacity in the water distribution system to meet demands from the proposed development however, an SUC Pressure Zone Reconfiguration is expected.

5.5.1 Design Criteria

Water demands have been calculated for the site based on per unit population density and consumption rates taken from *Leitrim Community Consumption* rates Tables 4.1 and 4.2 of the City of Ottawa Design Guidelines – Water Distribution and are summarized as follows:

• Single Family	3.4 person per unit
• Townhouse and Semi-Detached	2.7 person per unit
• Average Apartment	1.8 person per unit
• Residential Average Day Demand	280 l/cap/day
• Residential Peak Daily Demand	700 l/cap/day
• Residential Peak Hour Demand	1,540 l/cap/day

Water demands for the subject area were determined based on a preliminary working concept plan which estimated a population of 771 people using similar density rates as described in the Leitrim Community Master Servicing Study. A copy of the water demand calculation is located in **Appendix C.**

The estimated Average Daily Demand is 2.42 L/s.

The estimated Maximum Daily Demand is 6.27 L/s.

The estimated Peak Hour Demand is 13.75 L/s

The estimated Fire Flow Demand is 10,000 L/min (166 L/s) based on the low-density type of housing units proposed.

5.5.2 System Pressures

The Ottawa Design Guidelines – Water Distribution (WDG001), July 2010, City of Ottawa, Clause 4.2.2 states that the preferred practice for design of a new distribution system is to have normal operating pressures range between 345 kPa (50 psi) and 552 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in Clause 4.2.2 of the guidelines are as follows:

Minimum Pressure	Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi)
Fire Flow	During the period of maximum day demand, the system pressure shall not be less than 140 kPa (20 psi) during a fire flow event.
Maximum Pressure	Maximum pressure at any point in the distribution system shall not exceed 689 kPa (100 psi). In accordance with the Ontario Building/Plumbing Code, the maximum pressure should not exceed 552 kPa (80 psi). Pressure reduction controls will be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

5.5.3 Watermain Layout

A preliminary Hydraulic model has been completed using InfoWater Pro for the proposed development including connections to the existing watermain system. The City of Ottawa has provided boundary conditions for the two anticipated connection locations, which are based on the estimated demands noted above. The City has provided results for both the pre and post-SUC Pressure Zone Reconfiguration scenarios. A copy of the boundary conditions is located in **Appendix C** and summarized below**.**

Table 5-1: Proposed Watermain Connection 1 – Kelly Farm Drive (Pre SUC Pressure Zone Reconfiguration)

OPERATING CONDITION	HYDRAULIC GRADE LINE (HGL) m
Max Day	154.8
Peak Hour	145.7
Max Day + Fire (10,000 l/min)	138.9

Table 5-2: Proposed Watermain Connection 2 – Bank Street (Pre SUC Pressure Zone Reconfiguration)

OPERATING CONDITION	HYDRAULIC GRADE LINE (HGL) m
Max Day	154.5
Peak Hour	145.3
Max Day + Fire (10,000 l/min)	138.4

Table 5-3: Proposed Watermain Connection 1 – Kelly Farm Drive (Post SUC Pressure Zone Reconfiguration)

OPERATING CONDITION	HYDRAULIC GRADE LINE (HGL) m
Max Day	146.9
Peak Hour	141.6
Max Day + Fire (10,000 l/min)	136.7

Table 5-4: Proposed Watermain Connection 2 – Bank Street (Post SUC Pressure Zone Reconfiguration)

OPERATING CONDITION	HYDRAULIC GRADE LINE (HGL) m
Max Day	146.9
Peak Hour	140.6
Max Day + Fire (10,000 l/min)	136.4

The hydraulic water model incorporates the boundary conditions, the water demands for each scenario and a fire flow demand of 10,000 l/min. A 250mm diameter watermain is proposed along the northern street, extending east to a connection on Bank Street, and then north along the Kelly Farm Drive extension to connect to the existing main at Paakanaak Avenue and Kelly Farm Drive. All other water mains in the proposed development are proposed to be 200mm in diameter, with a 150mm diameter watermain proposed within the future Earl Armstrong ROW.

Developed lands west of Kelly Farm Drive will require a looped watermain. The existing pathway block between the subject lands and Paakanaak Avenue is anticipated to serve as the wastewater outlet. It does not provide adequate horizontal separation for a second utility. To avoid a critical node at the intersection of Kelly Farm Drive and the local road network, a looped main is provided within the protected area of the future Earl Armstrong ROW. This looped watermain provides redundancy between the lands east and west of Kelly Farm Drive.

Results of the hydraulic model are included in **Appendix C,** and summarized as follows:

Scenario	**Pre-SUC Zone**	**Post-SUC Zone**
Basic Day (Max HGL) Pressure Range	442.42 to 522.3 kPa	365.01 to 448.88 kPa
Peak Hour Pressure Range	351.57 to 429.21 kPa	309.84 to 383.16 kPa
Max Day + 10,000 l/min Fire Flow	All nodes pass	All nodes pass

A comparison of the results and design criteria is summarized as follows:

Maximum Pressure	All nodes under both pressure zones have basic day pressures under 552 kPa (80 psi), therefore pressure reducing control is not required for this development.
Minimum Pressure	All nodes under both pressure zones have peak hour pressures above the minimum value of 276 kPa (40 psi).
Fire Flow	Under the Pre- (Existing Conditions) and Post Post-SUC Pressure Zone Reconfiguration all nodes pass the 10,000 l/min fire flow, that is all nodes can accommodate a 10,000 l/min fire with the system residual pressures remaining above 140 kPa (20 psi).

6 Wastewater Servicing

6.1 Background

All wastewater collected within the City of Ottawa infrastructure is directed to Ottawa's Central Treatment Plant, R.O. Pickard Environmental Centre. Wastewater is gathered via sanitary sewers where flows merge in mainline trunk sewers and are then transported to sanitary pumping stations before reaching the treatment plant. Development areas across the City contain collectors and trunk sewers designed to meet City of Ottawa standards and Provincial Regulations for wastewater flows and peak conditions. As these development areas expand, it becomes necessary to extend the existing infrastructure to handle the increased flows.

6.2 Existing Conditions

The Leitrim Development Area is served by the Findlay Creek Sanitary Pump Station, located at 3173 Findlay Creek Drive. In order to meet the wastewater demand of a developing community, the 2024 Infrastructure Master Plan highlights this facility for upgrades to enhance overall network resilience.

The existing sewer infrastructure in the Leitrim Development Area consists of 200 – 250 mm diameter local sewers and 300 - 375 mm diameter mainline trunk sewers, routing flows to Findlay Creek Drive. At Findlay Creek Drive, wastewater is discharged into an existing 600 mm diameter trunk sewer and conveyed to the Pump station.

Figure 6-1 in **Appendix D** illustrates the existing sewer network through the adjacent development to the Findlay Creek Sanitary Pump Station. It shows that flows begin at multiple dead-end upstream manholes at Kelly Farm Drive and Paakanaak Avenue. At this point, wastewater flows north, east, and west respectively, in 200 mm diameter sewers. The three routes eventually merge at Kelly Farm Drive and Miikana Road into a 300 mm diameter trunk sewer. Continuing downstream on Kelly Farm Drive, a 375 mm diameter trunk sewer captures flows from Miikana Road, Sora Way, and the rest of the Findlay Creek development.

6.2.1 Evaluation of Downstream System

Based on the nature of the existing topography and the location of existing sanitary sewers, it is anticipated that the wastewater flows from the S-4 Lands will outlet to Paakanaak Avenue and to Labrador Crescent (via Bank Street). A preliminary analysis was completed using OSDG criteria for the development area; it is anticipated that the S-4 Lands will contribute **4.45L/s** of peak flow to Paakanaak Avenue and **8.23L/s** of peak flow to Labrador Crescent. The City of Ottawa's new Official Plan 2021-386 also identified another expansion area in Leitrim. This area is referred to as Area S-5, which is adjacent to and east of Bank Street, north of the subject site. Wastewater flows from a portion of the S-5 lands are also anticipated to outlet to the Sora Way sanitary sewer, located downstream of Labrador Crescent. Preliminary discussions with the owners of the S-5 Lands have indicated that the anticipated peak flow rate from the S-5 lands to Sora Way is **8.39 L/s** (as provided by DSEL January 15, 2025, correspondence included in **Appendix D**).

West Outlet

The flows downstream of the proposed connection point in Paakanaak Avenue to Kelly Farm Drive have been assessed to determine the impact of the subject lands on the existing infrastructure. The Sewer Design Sheet attached in **Appendix D** is provided to review the residual capacity in these sewers. Accompanying sewer design sheets have been provided in **Appendix D** to identify where flows originated, to form the final sewer design analysis mentioned previously.

At the proposed connection on Paakanaak Avenue, the existing sewer has a theoretical available capacity of **44.34 L/s** in a 200 mm diameter sewer, as shown on the as-built Sanitary Sewer Design Sheet prepared by IBI Group in 2021, located in **Appendix D**.

Downstream on Paakanaak Avenue, through the Pathways at Findlay Creek (Remer Lands) development, to Kelly Farm Drive, residual capacities range from **6.29 L/s** to **41.08 L/s**. Flows from lands within the Leitrim Development Area (West of Bank Street), south of Miikana Road, converge at Kelly Farm Drive and Miikana Road where the residual capacity is 7.04 L/s.

East Outlet

As previously noted, flow from the eastern portion of the subject lands will outlet to Sora Way, via Labrador Crescent and Bank Street. Additional inflows of **8.39L/s** from the S-5 Lands are also proposed to connect directly into the eastern limits of Sora Way. Based on the current City of Ottawa Sewer Design Criteria (280 L/c/d residential design flow and 0.33L/s/Ha infiltration allowance), the proposed design flows exceed the theoretical residual capacity at several locations, beginning at Kelly Farm Drive and Sora Way and heading downstream on Kelly Farm Drive to Findlay Creek Drive. The net result has the potential for localized surcharging of the existing system under theoretical peak conditions during normal pump station operation. These results are shown in the Sewer Design Sheets for Ottawa Sewer Design Guidelines (OSDG) found in **Appendix D**.

In an effort to mitigate this unfavourable situation, an update to the existing model for the Leitrim Development Area was completed using Peak flows established under the previous design criteria for both the rare and annual storm events. For the rare and annual events, monitored parameters have been utilized for the proposed development, and for the existing development, west of Bank Street and south of Findlay Creek Drive. The per capita consumption rate used for this evaluation is 200L/c/d. The HGL in the system is not dictated by the peak wastewater flows, but rather by the Storm Sewer HGL at the wastewater overflow located at Kelly Farm Drive and Findlay Creek Drive.

6.2.1.1 Normal Operating Conditions

At the request of the City of Ottawa, the system was reviewed under normal operating conditions. Sewer Design Sheets for “Normal Operating Conditions” are included in **Appendix D**. These conditions assume full operating capacity of the Findlay Creek Pump Station. Monitored flow parameters of 200 L/c/d are used for existing developments and design parameters of 280 L/c/d are used for new growth areas. Under these conditions, there are no instances of theoretical surcharge in the downstream system.

Under normal operating conditions and the flow criteria listed above, the updated model results indicate that the existing sanitary sewers between the S-4 East and West, and S-5 West connections to Findlay Creek Drive provide adequate conveyance capacity without surcharge.

6.2.1.2 Update to the Leitrim Storm and Sanitary Hydraulic Model

The existing Leitrim XPSWMM hydraulic model, which includes the storm and sanitary servicing within the Leitrim Development Area, has been updated as follows:

- Wastewater peak flows have been updated based on the current OSDG for lands south of Findlay Creek Drive, as noted above; these lands are part of what was historically referred to as Zones 3, 6 and 7 in the modelling documentation.
- Wastewater peak flows from S-4 and S-5 expansion areas were added, as noted above.
- Select refinements to existing infrastructure based on as-built data:
  - Ground elevation at select nodes revised to reflect as-built ground elevations

  - Elevations of existing Kelly Farm Drive sanitary overflow box pipe
- Reduction in computational time step to resolve a simulation vibration

Below is a summary of the S-4 and S-5 UEA flows used within the Leitrim Hydraulic Model update.

Table 6-1 Summary of Expansion Land Flows

UEA Sub-Area	Peak Flow L/s OSDG	Peak Flow L/s Annual Event	Peak Flow L/s Rare Event
S-4 East (Labrador/Sora)	8.38	5.83	7.95
S-4 West (Paakanaak)	5.82	2.91	4.11
S-5 West (Sora)	8.39	5.45	6.64
S-5 North (Shuttleworth)	12.76	8.69	11.43

Please note that the peak flows mentioned above and used within the model update are considered conservative and estimated based on the early concept plan development of the proposed subdivision.

Resulting sanitary hydraulic grade line (HGL) elevations are presented in the following table with a comparison to existing underside of footing (USF) elevations. The 100-year 24-hour SCS Type II (103.2 mm) and corresponding stress test have been simulated, considering both the rare and annual events. For the rare event, a minimum freeboard of 0.3 m between the 100-year HGL and USF is the guideline, whereas for the annual event, the 100-year HGL can be within 0.3 m of the USF. Typical USF elevations are in the order of 1.95 m to 2.05 m below finished road grades. Accordingly, a predicted HGL at a depth of 2.35 m at or below road grades is considered to meet the 0.3 m freeboard criteria. Freeboard values less than 0.30 m and 0.00 m for the rare and annual, respectively, are highlighted in red in the table below. Consistent with previous Leitrim sanitary evaluations, the 3-hour Chicago storm has also been simulated. Supporting model files and results are enclosed as part of the digital submission.

It should be noted that the node annotation for the sanitary sewers in XPSWMM does not include a letter before the node name. For example, XPSWMM node 11100A corresponds to sanitary manhole MH11100A.

Table 6-2 Update to Leitrim Hydraulic Model – Summary of Sanitary HGLs

XPSWMM Node	USF (m)	Finished Grade (m)	100 year 24 hour SCS				100 year 24 hour SCS + 20%			
			Sanitary Inflow Scenario				Sanitary Inflow Scenario			
	Existing	Existing	Rare		Annual		Rare		Annual	
	Proposed	*Proposed*	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)
Zone 1										
150	93.10	95.05	89.64	3.46	90.40	2.70	89.69	3.41	90.72	2.38
130	93.29	95.22	89.28	4.01	90.40	2.89	89.33	3.96	90.72	2.57
120	n/a	95.29	88.94	n/a	90.40	n/a	88.98	n/a	90.71	n/a
110	n/a	95.42	88.99	n/a	90.38	n/a	89.03	n/a	90.69	n/a
100	n/a	94.45	89.04	n/a	90.34	n/a	89.08	n/a	90.63	n/a
Zone 2										

XPSWMM Node	USF (m)	Finished Grade (m)	100 year 24 hour SCS				100 year 24 hour SCS + 20%			
			Sanitary Inflow Scenario				Sanitary Inflow Scenario			
	Existing	Existing	Rare		Annual		Rare		Annual	
	Proposed	*Proposed*	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)
270/19	92.60	94.57	90.55	2.05	90.60	2.00	90.62	1.98	90.92	1.68
260/15	92.45	94.29	90.44	2.01	90.55	1.90	90.50	1.95	90.86	1.59
250/14	92.25	94.29	90.37	1.88	90.51	1.74	90.44	1.81	90.83	1.42
240/13	92.10	94.05	90.29	1.81	90.48	1.62	90.36	1.74	90.80	1.30
230/12	91.90	93.81	90.23	1.67	90.45	1.45	90.29	1.61	90.77	1.13
Zone 3										
333	91.55	93.45	90.76	0.79	90.68	0.87	90.81	0.74	90.95	0.60
355	*91.43*	*93.48*	90.78	0.65	90.69	0.74	90.83	0.60	90.96	0.47
361	*91.93*	*93.81*	90.79	1.14	90.69	1.24	90.84	1.09	90.97	0.96
330/11	91.88	93.92	90.13	1.75	90.40	1.48	90.18	1.70	90.72	1.16
132-SANIO	91.90	93.92	90.29	1.61	90.37	1.53	90.29	1.61	90.70	1.20
Zone 4										
404/401	93.11	95.18	90.73	2.38	90.70	2.41	90.80	2.31	91.02	2.09
410/411	92.93	94.83	90.71	2.22	90.69	2.24	90.78	2.15	91.01	1.92
Zone 5										
541/599	n/a	n/a	90.78	n/a	90.72	n/a	90.85	n/a	91.05	n/a
583	93.43	95.65	90.81	2.62	90.75	2.68	90.88	2.55	91.08	2.35
584	93.55	95.34	90.84	2.71	90.77	2.78	90.92	2.63	91.11	2.44
594	93.33	95.46	90.86	2.47	90.80	2.53	90.94	2.39	91.13	2.20
527	93.13	95.36	90.89	2.24	90.82	2.31	90.97	2.16	91.15	1.98
524	93.60	95.63	90.91	2.69	90.84	2.76	90.99	2.61	91.17	2.43
523	93.47	95.56	90.93	2.54	90.86	2.61	91.01	2.46	91.18	2.29
520	93.80	96.02	91.24	2.56	91.25	2.55	91.24	2.56	91.29	2.51
533	93.80	95.86	91.62	2.18	91.62	2.18	91.62	2.18	91.62	2.18
532	93.90	95.94	91.90	2.00	91.90	2.00	91.90	2.00	91.90	2.00
538	93.95	95.97	92.54	1.41	92.54	1.41	92.54	1.41	92.54	1.41
535	94.55	96.50	93.30	1.25	93.30	1.25	93.30	1.25	93.30	1.25
Zone 6										
608	*94.55*	*96.70*	93.18	1.37	91.87	2.68	93.24	1.31	92.13	2.42
609	*94.20*	*96.35*	93.11	1.09	91.82	2.38	93.16	1.04	92.08	2.12
620	*93.70*	*95.85*	92.99	0.71	91.75	1.95	93.04	0.66	92.01	1.69
630	*93.80*	*95.95*	92.92	0.88	91.71	2.09	92.97	0.83	91.98	1.82
6171	94.30	96.00	92.72	1.58	91.61	2.69	92.77	1.53	91.87	2.43
6183	94.60	96.75	92.63	1.97	91.56	3.04	92.69	1.91	91.83	2.77
6175A	93.65	95.68	92.50	1.15	91.49	2.16	92.55	1.10	91.76	1.89
6106	93.50	95.07	92.39	1.11	91.44	2.06	92.44	1.06	91.71	1.79
646	*92.60*	*94.75*	92.25	0.35	91.37	1.23	92.31	0.29	91.64	0.96

XPSWMM Node	USF (m)	Finished Grade (m)	100 year 24 hour SCS				100 year 24 hour SCS + 20%			
			Sanitary Inflow Scenario				Sanitary Inflow Scenario			
	Existing	Existing	Rare		Annual		Rare		Annual	
	Proposed	*Proposed*	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)
6156	98.00	100.00	96.04	1.96	96.04	1.96	96.04	1.96	96.04	1.96
6115	94.71	96.30	92.52	2.19	91.54	3.17	92.58	2.13	91.81	2.90
6101	n/a	95.38	92.47	n/a	91.50	n/a	92.53	n/a	91.78	n/a
647	92.93	94.95	92.25	0.68	91.37	1.56	92.31	0.62	91.64	1.29
Zone 7										
790	92.58	94.49	93.38	-1.30	92.37	0.21	93.93	-1.35	92.59	-0.01
770	92.20	94.17	93.39	-1.19	92.06	0.14	93.44	-1.24	92.29	-0.09
760	*92.20*	94.25	93.14	-0.94	91.90	0.30	93.19	-0.99	92.14	0.06
750	*92.20*	94.25	92.80	-0.60	91.70	0.50	92.85	-0.65	91.94	0.26
730	92.15	94.10	91.91	0.24	91.20	0.95	91.96	0.19	91.46	0.69
740	92.30	94.35	92.53	-0.23	91.54	0.76	92.58	-0.28	91.79	0.51
780	92.43	94.56	93.53	-1.10	92.14	0.29	93.58	-1.15	92.37	0.06
700	92.00	93.67	91.39	0.61	90.95	1.05	91.44	0.56	91.21	0.79
735	92.50	94.58	92.25	0.25	91.38	1.12	92.30	0.20	91.64	0.86
771	92.23	93.85	93.40	-1.17	92.06	0.17	93.45	-1.22	92.29	-0.06
775	*92.35*	*94.50*	93.43	-1.08	92.08	0.27	93.48	-1.13	92.31	0.04
745	92.13	94.09	92.03	0.10	91.25	0.88	92.08	0.05	91.52	0.61
755	92.58	94.49	92.12	0.46	91.30	1.28	92.18	0.41	91.57	1.01
Zone 8										
825A	92.80	94.89	90.68	2.12	90.67	2.13	90.75	2.05	90.99	1.81
815/851	93.44	95.49	90.71	2.73	90.71	2.73	90.78	2.66	91.03	2.41
805/879	94.44	96.46	92.35	2.09	92.35	2.09	92.35	2.09	92.35	2.09
801/887	98.60	100.89	96.77	1.83	96.77	1.83	96.77	1.83	96.77	1.83
Zone 9										
923	n/a	96.20	94.06	n/a	93.48	n/a	94.13	n/a	93.48	n/a
920	99.35	101.50	96.26	3.09	96.23	3.12	96.26	3.09	96.23	3.12
910	n/a	97.60	94.79	n/a	94.56	n/a	94.86	n/a	94.56	n/a
907	98.85	101.00	98.36	0.49	96.98	1.87	98.36	0.49	96.98	1.87
904	n/a	97.60	95.84	n/a	95.79	n/a	95.84	n/a	95.79	n/a
900	100.85	103.00	98.89	1.96	98.86	1.99	98.89	1.96	98.86	1.99
Zone 10										
139	*90.60*	*92.75*	89.45	1.15	89.86	0.74	89.45	1.15	89.92	0.68
138	n/a	n/a	89.48	n/a	89.88	n/a	89.48	n/a	89.94	n/a
136	n/a	n/a	89.52	n/a	89.91	n/a	89.52	n/a	89.96	n/a
134	*91.90*	*93.95*	89.56	2.34	89.94	1.96	89.57	2.33	89.99	1.91
133	91.93	94.04	89.57	2.36	89.95	1.98	89.57	2.36	89.99	1.94
135	91.75	93.80	89.53	2.22	89.92	1.83	89.54	2.21	89.97	1.78

XPSWMM Node	**USF (m)**	**Finished Grade (m)**	**100 year 24 hour SCS**				**100 year 24 hour SCS + 20%**			
			Sanitary Inflow Scenario				**Sanitary Inflow Scenario**			
	Existing	**Existing**	**Rare**		**Annual**		**Rare**		**Annual**	
	Proposed	***Proposed***	**HGL (m)**	**USF – HGL (m)**	**HGL (m)**	**USF – HGL (m)**	**HGL (m)**	**USF – HGL (m)**	**HGL (m)**	**USF – HGL (m)**
129	*92.11*	*94.12*	89.59	2.52	89.99	2.12	89.60	2.51	90.01	2.10
128	*92.66*	*94.73*	90.72	1.94	90.71	1.95	90.72	1.94	90.71	1.95
127	*94.46*	*96.10*	91.67	2.79	91.66	2.80	91.67	2.79	91.66	2.80
126	95.10	97.15	92.50	2.60	92.49	2.61	92.50	2.60	92.49	2.61
132	*92.06*	*94.05*	89.57	2.49	89.95	2.11	89.58	2.48	90.00	2.06
131	*92.26*	*94.25*	89.58	2.68	89.97	2.29	89.59	2.67	90.00	2.26
130A	*93.26*	*95.48*	89.60	3.66	90.00	3.26	89.61	3.65	90.02	3.24
121	96.55	98.80	93.88	2.67	93.88	2.67	93.88	2.67	93.88	2.67
117	98.00	100.30	95.33	2.67	95.33	2.67	95.33	2.67	95.33	2.67
114	99.81	101.82	96.77	3.04	96.77	3.04	96.77	3.04	96.77	3.04
110A	100.79	103.30	97.69	3.11	97.69	3.11	97.69	3.11	97.69	3.11
107	102.21	104.77	98.45	3.76	98.45	3.76	98.45	3.76	98.45	3.76
105	102.64	104.68	98.90	3.74	98.90	3.74	98.90	3.74	98.90	3.74
104	102.76	104.48	99.24	3.52	99.24	3.52	99.24	3.52	99.24	3.52
Zone 11										
11100A	n/a	95.55	91.29	n/a	90.98	n/a	91.37	n/a	91.28	n/a
11110A	n/a	95.65	91.43	n/a	91.05	n/a	91.50	n/a	91.34	n/a
1125	*94.40*	*96.50*	91.89	2.51	91.30	3.10	91.97	2.43	91.55	2.85
Zone 12										
1273A	*n/a*	*94.50*	91.28	n/a	90.96	n/a	91.35	n/a	91.28	n/a
1271A	*n/a*	*94.50*	91.69	n/a	91.15	n/a	91.76	n/a	91.47	n/a
1270	*n/a*	*94.80*	91.83	n/a	91.22	n/a	91.89	n/a	91.54	n/a
1290	*93.45*	*95.60*	91.91	1.54	91.26	2.19	91.98	1.47	91.58	1.87
1260	*93.20*	*95.35*	91.94	1.26	91.27	1.93	92.01	1.19	91.59	1.61
1280	*n/a*	*96.20*	94.05	n/a	93.42	n/a	94.12	n/a	93.43	n/a
Zone 13										
202	n/a	94.00	89.15	n/a	90.26	n/a	89.18	n/a	90.50	n/a
203	92.01	93.08	89.21	2.80	90.21	1.80	89.23	2.78	90.43	1.58
204	91.34	93.08	89.28	2.06	90.16	1.18	89.30	2.04	90.35	0.99
205	91.13	93.08	89.35	1.78	90.12	1.01	89.36	1.77	90.28	0.85
206	n/a	93.08	89.36	n/a	90.00	n/a	89.37	n/a	90.12	n/a
207	90.90	93.08	89.37	1.53	89.88	1.02	89.37	1.53	89.97	0.93
1335/141	90.30	93.08	89.37	0.93	89.81	0.49	89.37	0.93	89.88	0.42
13185A	n/a	92.17	89.36	n/a	89.61	n/a	89.36	n/a	89.65	n/a
13137B	n/a	92.20	89.35	n/a	89.47	n/a	89.36	n/a	89.48	n/a
13137A	90.14	92.25	89.36	0.78	89.47	0.67	89.37	0.77	89.49	0.65
13136A	90.27	92.27	89.44	0.83	89.51	0.76	89.44	0.83	89.53	0.74

XPSWMM Node	USF (m)	Finished Grade (m)	100 year 24 hour SCS				100 year 24 hour SCS + 20%			
			Sanitary Inflow Scenario				Sanitary Inflow Scenario			
	Existing	Existing	Rare		Annual		Rare		Annual	
	Proposed	*Proposed*	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)
13135A	90.55	92.58	89.52	1.03	89.56	0.99	89.52	1.03	89.57	0.98
13129A	90.49	92.70	89.56	0.93	89.57	0.92	89.56	0.93	89.59	0.90
13128A	90.62	92.80	89.65	0.97	89.62	1.00	89.65	0.97	89.63	0.99
13127A	90.65	92.90	89.71	0.94	89.65	1.00	89.71	0.94	89.66	0.99
13126A	91.22	93.00	89.75	1.47	89.67	1.55	89.76	1.46	89.68	1.54
13125A	90.89	93.10	89.77	1.12	89.68	1.21	89.78	1.11	89.69	1.20
13124A	91.00	93.20	89.79	1.21	89.69	1.31	89.79	1.21	89.70	1.30
13123A	91.62	93.15	89.80	1.82	89.69	1.93	89.80	1.82	89.70	1.92
13138A	90.11	92.11	89.38	0.73	89.48	0.63	89.38	0.73	89.49	0.62
13139A	89.89	91.91	89.39	0.50	89.49	0.40	89.39	0.50	89.50	0.39
13140A	89.89	91.88	89.39	0.50	89.49	0.40	89.39	0.50	89.50	0.39
13141A	90.02	92.10	89.40	0.62	89.49	0.53	89.40	0.62	89.50	0.52
13145A	90.12	92.17	89.40	0.72	89.49	0.63	89.40	0.72	89.50	0.62
13146A	90.15	92.20	89.40	0.75	89.49	0.66	89.40	0.75	89.50	0.65
13147A	90.17	92.21	89.40	0.77	89.49	0.68	89.40	0.77	89.50	0.67
13114A	90.52	92.41	89.75	0.77	89.69	0.83	89.75	0.77	89.70	0.82
13115A	90.22	92.33	89.75	0.47	89.69	0.53	89.76	0.46	89.70	0.52
13116A	90.37	92.39	89.76	0.62	89.69	0.68	89.76	0.61	89.70	0.67
13117A	90.42	92.41	89.76	0.66	89.69	0.73	89.76	0.66	89.70	0.72
13147AA	90.17	92.21	89.76	0.41	89.69	0.48	89.76	0.41	89.70	0.47
13142AA	90.08	92.01	89.75	0.33	89.69	0.39	89.76	0.32	89.70	0.38
13142A	90.08	92.01	89.40	0.68	89.49	0.59	89.40	0.68	89.50	0.58

The above indicates that the updates to the model result in insufficient freeboard through Zone 7, which corresponds to Sora Way extending from Bank Street to Kelly Farm Drive, as well as Kelly Farm Drive itself and Cedar Creek Drive.

To alleviate this situation, a sanitary overflow has been introduced into the model to reduce HGL elevations. The overflow has been simulated as a 900 mm-diameter pipe with an invert elevation of 90.70, extending from sanitary Node 790 to storm MH790 on Sora Way, immediately west of Bank Street. The resulting sanitary HGL elevations are summarized in the following table.

Table 6-3 Update to Leitrim Hydraulic Model – Introduction of Sanitary Overflow – Summary of Sanitary HGLs

XPSWMM Node	USF (m)	Finished Grade (m)	100 year 24 hour SCS				100 year 24 hour SCS + 20%			
			Sanitary Inflow Scenario				Sanitary Inflow Scenario			
	Existing	Existing	Rare		Annual		Rare		Annual	
	Proposed	*Proposed*	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)
Zone 1										
150	93.10	95.05	89.29	3.81	90.40	2.70	89.29	3.81	90.72	2.38
130	93.29	95.22	88.96	4.33	90.40	2.89	88.96	4.33	90.71	2.58
120	n/a	95.29	88.64	n/a	90.39	n/a	88.64	n/a	90.71	n/a
110	n/a	95.42	88.71	n/a	90.38	n/a	88.71	n/a	90.68	n/a
100	n/a	94.45	88.79	n/a	90.34	n/a	88.80	n/a	90.62	n/a
Zone 2										
270/19	92.60	94.57	90.27	2.33	90.60	2.00	90.27	2.33	90.92	1.68
260/15	92.45	94.29	90.13	2.32	90.54	1.91	90.13	2.32	90.86	1.59
250/14	92.25	94.29	90.05	2.20	90.51	1.74	90.04	2.21	90.83	1.42
240/13	92.10	94.05	89.95	2.15	90.47	1.63	89.95	2.15	90.79	1.31
230/12	91.90	93.81	89.87	2.03	90.44	1.46	89.87	2.03	90.76	1.14
Zone 3										
333	91.55	93.45	90.18	1.37	90.59	0.96	90.18	1.37	90.86	0.69
355	*91.43*	*93.48*	90.20	1.23	90.60	0.83	90.20	1.23	90.87	0.56
361	*91.93*	*93.81*	90.21	1.72	90.61	1.32	90.21	1.72	90.87	1.06
330/11	91.88	93.92	89.74	2.14	90.40	1.48	89.74	2.14	90.72	1.16
132-SANIO	91.90	93.92	90.30	1.60	90.37	1.53	90.29	1.61	90.70	1.20
Zone 4										
404/401	93.11	95.18	90.48	2.63	90.69	2.42	90.48	2.63	91.02	2.09
410/411	92.93	94.83	90.45	2.48	90.68	2.25	90.45	2.48	91.01	1.92
Zone 5										
541/599	n/a	n/a	90.53	n/a	90.72	n/a	90.53	n/a	91.05	n/a
583	93.43	95.65	90.57	2.86	90.74	2.69	90.57	2.86	91.08	2.35
584	93.55	95.34	90.61	2.94	90.76	2.79	90.61	2.94	91.11	2.44
594	93.33	95.46	90.64	2.69	90.79	2.54	90.64	2.69	91.13	2.20
527	93.13	95.36	90.67	2.46	90.81	2.32	90.67	2.46	91.16	1.97
524	93.60	95.63	90.69	2.91	90.84	2.76	90.69	2.91	91.17	2.43
523	93.47	95.56	90.70	2.77	90.85	2.62	90.70	2.77	91.19	2.28
520	93.80	96.02	91.25	2.55	91.25	2.55	91.25	2.55	91.29	2.51
533	93.80	95.86	91.62	2.18	91.62	2.18	91.62	2.18	91.62	2.18
532	93.90	95.94	91.90	2.00	91.90	2.00	91.90	2.00	91.90	2.00
538	93.95	95.97	92.54	1.41	92.54	1.41	92.54	1.41	92.54	1.41
535	94.55	96.50	93.30	1.25	93.30	1.25	93.30	1.25	93.30	1.25
Zone 6										
608	*94.55*	*96.70*	92.30	2.25	91.56	2.99	92.30	2.25	91.70	2.85

XPSWMM Node	USF (m)	Finished Grade (m)	100 year 24 hour SCS				100 year 24 hour SCS + 20%			
			Sanitary Inflow Scenario				Sanitary Inflow Scenario			
	Existing	Existing	Rare		Annual		Rare		Annual	
	Proposed	*Proposed*	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)
609	*94.20*	*96.35*	92.22	1.98	91.51	2.69	92.22	1.98	91.65	2.55
620	*93.70*	*95.85*	92.09	1.61	91.45	2.25	92.09	1.61	91.59	2.11
630	*93.80*	*95.95*	92.02	1.78	91.41	2.39	92.02	1.78	91.55	2.25
6171	94.30	96.00	91.81	2.49	91.32	2.98	91.81	2.49	91.46	2.84
6183	94.60	96.75	91.72	2.88	91.28	3.32	91.72	2.88	91.42	3.18
6175A	93.65	95.68	91.58	2.07	91.22	2.43	91.58	2.07	91.36	2.29
6106	93.50	95.07	91.47	2.03	91.16	2.34	91.47	2.03	91.31	2.19
646	*92.60*	*94.75*	91.32	1.28	91.10	1.50	91.32	1.28	91.26	1.34
6156	98.00	100.00	96.04	1.96	96.04	1.96	96.04	1.96	96.04	1.96
6115	94.71	96.30	91.61	3.10	91.47	3.24	91.61	3.10	91.47	3.24
6101	n/a	95.38	91.56	n/a	91.24	n/a	91.56	n/a	91.39	n/a
647	92.93	94.95	91.32	1.61	91.10	1.83	91.32	1.61	91.26	1.67
Zone 7										
790	92.58	94.49	91.08	1.50	91.06	1.52	91.07	1.51	91.07	1.51
770	92.20	94.17	91.10	1.10	91.06	1.14	91.10	1.10	91.13	1.07
760	*92.20*	94.25	91.08	1.12	91.04	1.16	91.08	1.12	91.12	1.08
750	*92.20*	94.25	91.05	1.15	91.02	1.18	91.05	1.15	91.12	1.08
730	92.15	94.10	90.94	1.21	90.93	1.22	90.94	1.21	91.10	1.05
740	92.30	94.35	91.01	1.29	90.99	1.31	91.01	1.29	91.11	1.19
780	92.43	94.56	91.10	1.33	91.06	1.37	91.10	1.33	91.12	1.31
700	92.00	93.67	90.60	1.40	90.78	1.22	90.60	1.40	90.99	1.01
735	92.50	94.58	90.98	1.52	90.96	1.54	90.98	1.52	91.11	1.39
771	92.23	93.85	91.10	1.13	91.06	1.17	91.10	1.13	91.13	1.10
775	*92.35*	*94.50*	91.14	1.21	91.10	1.25	91.14	1.21	91.15	1.20
745	92.13	94.09	91.07	1.06	90.99	1.14	91.07	1.06	91.15	0.98
755	92.58	94.49	91.18	1.40	91.04	1.54	91.18	1.40	91.20	1.38
Zone 8										
825A	92.80	94.89	90.42	2.38	90.66	2.14	90.42	2.38	90.99	1.81
815/851	93.44	95.49	90.46	2.98	90.69	2.75	90.46	2.98	91.03	2.41
805/879	94.44	96.46	92.35	2.09	92.35	2.09	92.35	2.09	92.35	2.09
801/887	98.60	100.89	96.77	1.83	96.77	1.83	96.77	1.83	96.77	1.83
Zone 9										
923	n/a	96.20	93.96	n/a	93.48	n/a	93.96	n/a	93.48	n/a
920	99.35	101.50	96.26	3.09	96.23	3.12	96.26	3.09	96.23	3.12
910	n/a	97.60	94.65	n/a	94.56	n/a	94.65	n/a	94.56	n/a
907	98.85	101.00	98.36	0.49	96.98	1.87	98.36	0.49	96.98	1.87
904	n/a	97.60	95.84	n/a	95.79	n/a	95.84	n/a	95.79	n/a

XPSWMM Node	USF (m)	Finished Grade (m)	100 year 24 hour SCS				100 year 24 hour SCS + 20%			
			Sanitary Inflow Scenario				Sanitary Inflow Scenario			
	Existing	Existing	Rare		Annual		Rare		Annual	
	Proposed	*Proposed*	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)
900	100.85	103.00	98.89	1.96	98.86	1.99	98.89	1.96	98.86	1.99
Zone 10										
139	*90.60*	*92.75*	89.42	1.18	89.86	0.74	89.42	1.18	89.92	0.68
138	n/a	n/a	89.45	n/a	89.88	n/a	89.45	n/a	89.94	n/a
136	n/a	n/a	89.49	n/a	89.91	n/a	89.49	n/a	89.96	n/a
134	*91.90*	*93.95*	89.54	2.36	89.94	1.96	89.54	2.36	89.99	1.91
133	91.93	94.04	89.54	2.39	89.94	1.99	89.54	2.39	89.99	1.94
135	91.75	93.80	89.51	2.24	89.92	1.83	89.51	2.24	89.97	1.78
129	*92.11*	*94.12*	89.57	2.54	89.98	2.13	89.57	2.54	90.01	2.10
128	*92.66*	*94.73*	90.72	1.94	90.71	1.95	90.72	1.94	90.71	1.95
127	*94.46*	*96.10*	91.67	2.79	91.66	2.80	91.67	2.79	91.66	2.80
126	95.10	97.15	92.50	2.60	92.49	2.61	92.50	2.60	92.49	2.61
132	*92.06*	*94.05*	89.55	2.51	89.95	2.11	89.55	2.51	90.00	2.07
131	*92.26*	*94.25*	89.56	2.70	89.97	2.29	89.56	2.70	90.00	2.26
130A	*93.26*	*95.48*	89.58	3.68	90.00	3.26	89.58	3.68	90.02	3.24
121	96.55	98.80	93.88	2.67	93.88	2.67	93.88	2.67	93.88	2.67
117	98.00	100.30	95.33	2.67	95.33	2.67	95.32	2.68	95.33	2.67
114	99.81	101.82	96.77	3.04	96.77	3.04	96.77	3.04	96.77	3.04
110A	100.79	103.30	97.69	3.11	97.69	3.10	97.69	3.11	97.69	3.11
107	102.21	104.77	98.45	3.76	98.45	3.76	98.45	3.76	98.45	3.76
105	102.64	104.68	98.90	3.74	98.90	3.74	98.90	3.74	98.90	3.74
104	102.76	104.48	99.24	3.52	99.24	3.52	99.24	3.52	99.24	3.52
Zone 11										
11100A	n/a	95.55	91.07	n/a	90.97	n/a	91.07	n/a	91.27	n/a
11110A	n/a	95.65	91.22	n/a	91.05	n/a	91.22	n/a	91.33	n/a
1125	*94.40*	*96.50*	91.70	2.70	91.29	3.11	91.70	2.70	91.55	2.85
Zone 12										
1273A	*n/a*	*94.50*	91.06	n/a	90.95	n/a	91.06	n/a	91.28	n/a
1271A	*n/a*	*94.50*	91.49	n/a	91.14	n/a	91.49	n/a	91.47	n/a
1270	*n/a*	*94.80*	91.63	n/a	91.21	n/a	91.63	n/a	91.53	n/a
1290	*93.45*	*95.60*	91.72	1.73	91.25	2.20	91.72	1.73	91.58	1.87
1260	*93.20*	*95.35*	91.75	1.45	91.26	1.94	91.75	1.45	91.59	1.61
1280	*n/a*	*96.20*	93.95	n/a	93.42	n/a	93.95	n/a	93.43	n/a
Zone 13										
202	n/a	94.00	88.97	n/a	90.25	n/a	88.97	n/a	90.50	n/a
203	92.01	93.08	89.06	2.95	90.21	1.80	89.07	2.94	90.43	1.58
204	91.34	93.08	89.17	2.17	90.16	1.18	89.18	2.16	90.35	0.99

XPSWMM Node	USF (m)	Finished Grade (m)	100 year 24 hour SCS				100 year 24 hour SCS + 20%			
			Sanitary Inflow Scenario				Sanitary Inflow Scenario			
	Existing	Existing	Rare		Annual		Rare		Annual	
	Proposed	*Proposed*	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)
205	91.13	93.08	89.27	1.86	90.11	1.02	89.28	1.85	90.28	0.85
206	n/a	93.08	89.30	n/a	90.00	n/a	89.31	n/a	90.12	n/a
207	90.90	93.08	89.32	1.58	89.88	1.02	89.34	1.56	89.97	0.93
1335/141	90.30	93.08	89.34	0.96	89.81	0.49	89.35	0.95	89.87	0.43
13185A	n/a	92.17	89.34	n/a	89.61	n/a	89.35	n/a	89.65	n/a
13137B	n/a	92.20	89.33	n/a	89.47	n/a	89.35	n/a	89.48	n/a
13137A	90.14	92.25	89.34	0.80	89.47	0.67	89.36	0.78	89.49	0.65
13136A	90.27	92.27	89.42	0.85	89.51	0.76	89.43	0.84	89.53	0.74
13135A	90.55	92.58	89.51	1.04	89.56	0.99	89.51	1.04	89.57	0.98
13129A	90.49	92.70	89.54	0.95	89.57	0.92	89.54	0.95	89.59	0.90
13128A	90.62	92.80	89.63	0.99	89.62	1.00	89.63	0.99	89.63	0.99
13127A	90.65	92.90	89.69	0.96	89.65	1.00	89.69	0.96	89.66	0.99
13126A	91.22	93.00	89.74	1.48	89.67	1.55	89.74	1.48	89.68	1.54
13125A	90.89	93.10	89.76	1.13	89.68	1.21	89.76	1.13	89.69	1.20
13124A	91.00	93.20	89.78	1.22	89.69	1.31	89.78	1.22	89.70	1.30
13123A	91.62	93.15	89.79	1.83	89.69	1.93	89.79	1.83	89.70	1.92
13138A	90.11	92.11	89.36	0.75	89.48	0.63	89.36	0.75	89.49	0.62
13139A	89.89	91.91	89.37	0.52	89.49	0.40	89.38	0.51	89.50	0.39
13140A	89.89	91.88	89.37	0.52	89.49	0.40	89.38	0.51	89.50	0.39
13141A	90.02	92.10	89.38	0.64	89.49	0.53	89.38	0.64	89.50	0.52
13145A	90.12	92.17	89.38	0.74	89.49	0.63	89.39	0.73	89.50	0.62
13146A	90.15	92.20	89.38	0.77	89.49	0.66	89.39	0.76	89.50	0.65
13147A	90.17	92.21	89.38	0.79	89.49	0.68	89.39	0.78	89.50	0.67
13114A	90.52	92.41	89.74	0.78	89.69	0.83	89.74	0.78	89.70	0.82
13115A	90.22	92.33	89.74	0.48	89.69	0.53	89.74	0.48	89.70	0.52
13116A	90.37	92.39	89.74	0.63	89.69	0.68	89.74	0.63	89.70	0.67
13117A	90.42	92.41	89.74	0.68	89.69	0.73	89.74	0.68	89.70	0.72
13147AA	90.17	92.21	89.74	0.43	89.69	0.48	89.74	0.43	89.70	0.47
13142AA	90.08	92.01	89.74	0.34	89.69	0.39	89.74	0.34	89.70	0.38
13142A	90.08	92.01	89.38	0.70	89.49	0.59	89.38	0.70	89.50	0.58

The above results indicate that introducing the sanitary overflow results in lowering sanitary HGLs, providing sufficient freeboard to meet City criteria. The new sanitary overflow is considered conceptual but intended to illustrate a potential solution of adding the S-4 and S-5 lands to the existing sanitary network. Detailed design of the overflow, including its location, will be completed at the detail design stage and approved by the City of Ottawa. **Figure 6-5 Conceptual Overflow Section** has been provided in **Appendix D.**

6.2.1.3 Model Files

Model files included in the digital submission are summarized below.

Table 6-4 Summary of XPSWMM model files provided in digital submission

Model Scenario	Storm Event	Model File for Sanitary Inflow Scenario	
		Rare	Annual
Model Update	100 year 24 hour SCS Type II	145172-202503-SC3-RARE-24SCS100.xp	145172-202503-SC3-ANN-24SCS100.xp
Model Update	100 year 24 hour SCS Type II + 20%	145172-202503-SC3-RARE-24SCS120.xp	145172-202503-SC3-ANN-24SCS120.xp
Model Update	100 year 3 hour Chicago	145172-202503-SC3-RARE-3CHI100.xp	145172-202503-SC3-ANN-3CHI100.xp
Model Update	100 year 3 hour Chicago + 20%	145172-202503-SC3-RARE-3CHI120.xp	145172-202503-SC3-ANN-3CHI120.xp
New Sanitary Overflow	100 year 24 hour SCS Type II	145172-202503-SC4-RARE-24SCS100.xp	145172-202503-SC4-ANN-24SCS100.xp
New Sanitary Overflow	100 year 24 hour SCS Type II + 20%	145172-202503-SC4-RARE-24SCS120.xp	145172-202503-SC4-ANN-24SCS120.xp
New Sanitary Overflow	100 year 3 hour Chicago	145172-202503-SC4-RARE-3CHI100.xp	145172-202503-SC4-ANN-3CHI100.xp
New Sanitary Overflow	100 year 3 hour Chicago + 20%	145172-202503-SC4-RARE-3CHI120.xp	145172-202503-SC4-ANN-3CHI120.xp

6.3 Evaluation of Alternative Solutions

In the case of wastewater, the issue (problem) is the disposal of wastewater generated by the urban development, and the incorporation of an alternative solution within the greater Leitrim Community, while satisfying the regulatory agencies (City of Ottawa and Ministry of the Environment).

The wastewater servicing alternatives considered for the S-4 UEA are:

- Do Nothing
- Private Septic Systems
- Communal Septic System
- Extension and/or Upgrade of Existing Municipal Services

6.3.1 Evaluation of Wastewater Servicing Alternatives

6.3.1.1 Do Nothing

The “Do Nothing” alternative is not regarded as a feasible choice in this context because it does not assist the City meet the development objectives outlined in the new Official Plan.

6.3.1.2 Private Septic System

The “Private Septic System” alternative can service residential units; however, the septic bed area requirements would significantly increase the individual lot area resulting in reduced unit density which would not adhere to City development objectives. Additionally typical septic systems release nitrates into the local groundwater, this option could lead to increased nitrate load in the groundwater, resulting in adverse environmental effects. Therefore, this alternative is not recommended as a viable choice for this application.

6.3.1.3 Communal Collection and Treatment System

The “Communal Collection and Treatment System” could be designed to meet the demand requirements of the new Official Plan, but there are significant social and environmental concerns associated with this type of system. Heavy nitrate loading into the groundwater system is a concern with this option, which will have a negative environmental impact due to the development density specified in the new Official Plan. This option also potentially requires increased operation and maintenance costs due to the introduction of a remote treatment facility. It may also have negative social impacts due to the risk of occasional odour problems. Due to concerns related to this type of system, it is recommended that this alternative not be pursued.

6.3.1.4 Extension and/or Upgrade of Existing Municipal Servicing

The “Extension and/or Upgrade of Existing Municipal Servicing” alternative is a feasible wastewater servicing option that has been implemented to serve the urban area next to the northern boundary of the new Official Plan Leitrim S-4 UEA lands. This solution has proven to cause minimal social and environmental impacts while providing the benefit of being cost-effective by utilizing residual capacity in existing wastewater infrastructure. The extension of municipal services is also the preferred servicing option recommended in City and Provincial policy statements for urban areas.

It is therefore advised that the “Extension and/or Upgrade to Existing Municipal Wastewater Services” continue to be regarded as the preferred wastewater servicing option.

6.4 Concept Plan Development

The proximity of existing wastewater infrastructure in Paakanaak Avenue provides an optimal servicing approach for the western portion of the subject lands with minimal impacts on surrounding properties. The availability of existing wastewater infrastructure on Labrador Crescent offers the opportunity to service the eastern portion of the subject lands as well as the western portion of the S-5 UEA. This approach will have minor impacts on the surrounding properties. Corridors have been included in the concept plan to ensure connectivity with existing development lands. Refer to the Concept Plan provided in **Appendix A.**

6.5 Recommended Wastewater Servicing Plan

Given the topography of the subject lands and the existing wastewater infrastructure, the S4 UEA will have two wastewater outlets serving the eastern and western portions of the site. Figure 6-3 in Appendix D shows the approximate division of drainage areas for these two outlets. Flows will enter the existing municipal wastewater collection system at two locations, as noted below, and will eventually reach the Findlay Creek Sanitary Pumping Station.

Due to the proximity of existing sewers and available capacity, as shown in the Sanitary Sewer Design Sheets in **Appendix D**, Arcadis recommends that the western portion of the subject lands be connected to the existing sewers on Paakanaak Avenue. The proposed connection point is between MHSA76708 and MHSA76709 (*geoOttawa*), utilizing the vacant block between civic 549 and 545. The approximate sewer invert elevation at this location is indicated on **Figure 6-2** in **Appendix D**. The suggested connection point minimizes impact on surrounding residences near the vacant block and aligns with the low point on the adjacent lands, making it an optimal downstream location.

As mentioned earlier, due to site topography, capacity, and the availability of existing infrastructure, Arcadis recommends that the eastern portion of the site outlet be connected to a proposed sanitary sewer on Bank Street. The proposed sewers will carry flows from the site downstream and connect to existing infrastructure at Labrador Crescent (MHSA71680). The site will connect to the proposed sewers on Bank Street via an emergency access block shown on the concept plan in **Appendix A**. This connection to Bank Street aims to minimize impact on the north-side residential developments. The sewer design will focus on minimizing the impact on traffic as well as on the existing residences and businesses along Bank Street.

Analysis of available capacity in existing infrastructure at, and downstream of, the two connection locations mentioned above, is included in **section 6.2** and **Appendix D**.

6.5.1 Design Criteria

The sanitary sewers for the subject lands will be designed based on current City of Ottawa design criteria and population densities established in the 2016 Leitrim Updated Serviceability Report, which includes but is not limited to the following:

Design Flow:

Average Residential Flow = 280 l/cap/day

Average Commercial/ Industrial Flow = 28,000 l/Ha/day

Peak Residential Factor = Harmon Formula

Peak Commercial/ Institutional Factor = 1.0

Infiltration Allowance = 0.33 l/sec/Ha

Population Densities:

Single Family Units = 3.2 p/u

Townhouse & Back-to-Back Units = 2.4 p/u

1 Bedroom Apartment = 1.4 p/u

2 Bedroom Apartment = 2.4 p/u

Population calculations for the subject lands, used to determine design flows, were based on the concept plan attached in **Appendix A.**

6.5.2 Wastewater Servicing Layout

Using the preferred concept plan and attributes identified during the evaluation stages, a conceptual wastewater drainage system has been developed to serve the Study Area. The plan aligns with the previously discussed concept, where lands west of Kelly Farm Drive will drain to Paakanaak Avenue, and lands east of Kelly Farm Drive will drain to Labrador Crescent via Bank Street. Refer to **Figure 6-2** and **Figure 6-3** in **Appendix D**.

The Preferred Wastewater Servicing Layout demonstrates a new sewer connection to Paakanaak Avenue via an existing Pathway Block. No additional off-site servicing work is required to service the western outlet.

The Preferred Wastewater Service Layout shows a new sewer connection to Labrador Crescent via Bank Street. This connection will need approximately 850 meters of off-site sewer work within the Bank Street right-of-way. At the detail design stage, the sewer design will be circulated to stakeholders for approval, including the application for municipal consent.

Furthermore, as part of assessing existing conditions, a new wastewater overflow is necessary to adequately protect residences within Zone 7 of the Leitrim Community (Kelly Farm Drive and Sora Way). The overflow could be situated within the Sora Way right-of-way or on the nearby S-5 Community property on the east side of Bank Street. Discussions about the placement are ongoing, and more details will be provided during the detailed design phase.

6.5.3 Development Charge Recoveries

The size of the proposed infrastructure does not meet the threshold for development charge recoveries.

6.5.4 Cost Sharing Obligations

The majority of wastewater servicing works in support of this development are not eligible for cost-sharing with other parties, as their sole benefit is to the S-4 UEA lands. However, if the parcels with frontage on Bank Street (4848, 4852, 4856 and 4860 Bank Street) undergo development, requiring sanitary servicing, they will be required to enter into a cost-sharing agreement with the Edge at Pathways Regional Inc. for their proportional share of flows in the sewer extension along Bank Street.

The construction of the new sanitary overflow will be shared between the S-4 UEA and the contributing portion of the S-5 UEA. Costs will be shared on a design flow basis, excluding peak factors.

7 Stormwater Servicing

7.1 Background

The subject property is within the Leitrim Development Area (LDA), located south of the existing Pathways at Findlay Creek Development and adjacent to Bank Street. **Figure 7-1** in **Appendix E** illustrates the existing storm sewer network through the adjoining development to the Findlay Creek Stormwater Management Facility.

Surface drainage from the subject site is split and flows to the northeast towards the Bank Street roadside ditch and to the northwest towards the Leitrim Wetland Buffer via a drainage swale and constructed channel built as part of the Pathways Phase 1 development.

There are currently no municipal services within the subject site, including storm sewers. The collection of stormwater runoff from the study area will be necessary for the orderly development of the subject lands, and the collected stormwater will need to be managed to mitigate any negative impacts on the downstream lands.

7.2 Existing Stormwater Infrastructure

Pathways and Pathways South are existing developments in the Leitrim Development Area and are situated directly north of the subject lands. Arcadis completed the detailed designs for Pathways in August 2017 and for Pathways South in May 2019.

In the detailed design report of Pathways Phase 1, a small portion of the future Earl Armstrong Road was assumed to be serviced via storm sewers on Dun Skipper Drive, with an inflow rate of **523 L/s**. This approach was consistent with that outlined in the 'Final Updated Serviceability Report (Class EA OPA 76 Areas 8a, 9a and 9b) Leitrim Development Area' prepared by IBI Group, 2016. Relevant report excerpts are included in **Appendix E**. Since the completion of the Pathways Phase 1 report, the alignment of Earl Armstrong Road has shifted further south, as outlined in an Environmental Assessment (EA) completed in November 2019. Due to topographic constraints, the EA determined that Earl Armstrong will outlet to future Bank Street and Hawthorne Road stormwater facilities. As a result, 523 L/s of additional capacity is available to service the eastern portion of the subject lands.

As part of the Pathways Phase 1 development, a constructed channel and associated drainage swale were designed to collect and convey surface runoff from undeveloped areas south of the development, directing it to the Leitrim Wetland Buffer. Details for the design of the constructed channel and drainage swale are included in the *Design Brief Pathways at Findlay Creek (Remer Lands) – 4800 Bank Street Constructed Channel Leitrim Development Area (Constructed Channel Design Brief)* completed by IBI group in August 2018. The existing drainage swale was constructed parallel to the conventional rear-yard drainage swale within the rear yards of properties bordering the subject site. A portion of the drainage swale outlets to the constructed channel at the confluence with the existing watercourse INT-3 as shown on the Constructed Channel General Plan included in **Appendix E**.

Modelling and design flows are discussed in Section 3 of the Constructed Channel Design Brief, with design peak flows included in Table 3.2. Section 3.3 notes the drainage swale was designed to convey a 100-year flow of 0.66 m^3/s from watercourse INT-2. Any discharge from the proposed development will need to be controlled to this rate to meet the pre-development design flows. Relevant excerpts from the design brief have been included in **Appendix E**.

7.3 Existing Stormwater Management Facility

The end-of-pipe Findlay Creek Village Stormwater Facility (previously referred to as Pond 1) was constructed east of Bank Street and provides water quantity and quality control for the upstream tributary drainage area. The facility was built in 2007 and consists of two inlets (western and northern) and an outlet structure to Findlay Creek.

As outlined in **Section 7.2 t**he eastern portion of the subject lands is proposed to be serviced by storm sewers on Dun Skipper Drive, which ultimately discharge into the Findlay Creek Village Stormwater Facility. Maintaining the previously assumed allocation will not negatively affect the downstream hydraulic grade line and pond performance.

7.4 Existing Leitrim Wetland

The Leitrim Wetland Buffer is a natural feature located northwest of the subject property. It serves as a surface water conveyance system, managing surface drainage from the Pathway and Pathway South developments, as well as from the southern off-site rural lands. As part of the Pathway Phase 1 development, a Constructed Channel was built to ensure the existing surface flow regime and function of the Leitrim Wetland Buffer are maintained post-development. The Constructed Channel receives flows from undeveloped lands to the south, via natural topographical relief and by a constructed swale within the rear yards of the existing Pathways South development. In accordance with the design plan for the Constructed Channel, The Regional Group completed a 5-year monitoring plan. Refer to Constructed Channel Monitoring (Year 5) Report, prepared for Leitrim South Holdings Inc., by Cambium Inc., October 30, 2024, included in **Appendix E**.

The Leitrim Wetland and surrounding tributaries are the natural headwater features of the Findlay Creek. Its outlet is weir-controlled within the Findlay Creek Village community, at the northwest corner of Helen Rapp Way. Flows from the wetland area outlet through a watercourse corridor towards Bank Street, and ultimately in a south-easterly direction, by-passing the Findlay Creek SWMF.

Edge at Pathways Regional Inc., Arcadis, and the South Nation Conservation (SNC) met on June 16th, 2025, to discuss the servicing strategy involving the wetland and the existing constructed channel. Discussions included SNC's desire for additional hydration conditions in the channel and potential solutions to improve them. A follow-up site meeting was held on July 25, 2025, attended by the City of Ottawa, The Edge at Pathways Regional Inc., SNCA, and Arcadis.

The constructed channel was observed to have adequate vegetation growth and to be in general conformance with the design intent. As mentioned above, hydration concerns were flagged at various locations along the channel; however, there was evidence of flows suspected during wet weather events. Arcadis discussed the recommended servicing option for the S4 UEA of a linear stormwater facility, to be routed to the constructed channel at the southern limits. It was determined that there were no concerns regarding the existing channel's ability to accept flows from the proposed development. Linear stormwater management facility, quality and quantity requirements are outlined in **Section 7.6** of this report. There is an opportunity to increase flows from pre-development conditions if the SNC and the City of Ottawa see the event as beneficial to the constructed channel and wetlands. Comments from the SNCA in response to the site meeting are provided in **Appendix E**.

As outlined in **Section 7.2**, the western portion of the subject lands is proposed to be serviced by the Constructed Channel, which ultimately discharges into the Leitrim Wetland Buffer. Post-development flows are expected to remain at pre-development levels to prevent negative impacts on the downstream system.

7.5 Evaluation of Alternative Solutions

In the case of stormwater, the issue (problem) is the management of surface and sub-surface stormwater flows. The design of the major and minor systems must adhere to the City of Ottawa and MECP design criteria while maintaining a practical and feasible engineering approach. Flows leaving the site must meet pre-development conditions, as set out by the regulatory agencies (City of Ottawa, Ministry of Environment, Conservation Authorities and Parks).

The stormwater servicing parameters considered for evaluating alternative solutions to service the S-4 UEA are:

- Do Nothing
- Dedicated On-Site Stormwater Management Facility
- Use of Existing Municipal Infrastructure and Stormwater Facilities

7.5.1 Evaluation Parameters

7.5.1.1 Do Nothing

The “Do Nothing” alternative is not considered a viable option, as this application will consist of future residential buildings requiring stormwater management, in line with municipal and provincial regulations and as imposed by the new Official Plan.

7.5.1.2 Dedicated Stormwater Management Facility

The “Dedicated Stormwater Management Facility” alternative can be evaluated based on the requirements to service the eastern and western portions of the development, identified in this report as east and west of future Kelly Farm Drive. Due to the existing topography and grading constraints of the site, the major system flow will outlet to the east and west, respectively. Options for minor system outlets of the east and west portions of the site are further evaluated throughout this section.

As discussed above, due to the site's topography, a dedicated stormwater management facility is required to provide an outlet for major system flows from the site's western portion. A linear facility is required to convey these flows from the development to the existing constructed channel. This linear facility can be designed to provide either quantity control or both quantity and quality control. Quantity control will be achieved by ensuring that the release rate meets the pre-development conditions established in the design of the constructed channel. Quality control can be achieved by constructing a Linear Wetland Facility combined with an OGS. The Linear Wetland Facility option is discussed further in section 7.5.2.1 of this report. Due to the natural topography of the site, any alternative for major flow conveyance would require significant retaining walls or stable-slope embankments exceeding 6m in height (this alternative is not considered feasible)

A dedicated stormwater management facility for the eastern portion of the site is only required to provide quantity control, depending on the eastern outlet configuration. Constructing a facility to provide quantity and quality treatment would require sufficient volume/area to store flows from the site, in accordance with the principles of dual drainage. To preserve pre-development flows, a relatively large storage capacity is necessary. However, existing infrastructure in the community provides sufficient capacity for this area of development.

The two available outlets for the eastern portion of the site, at Dun Skipper Drive and at Sora Way/Bank Street, are located upstream of the Findlay Creek Stormwater Management Facility. This facility has adequate capacity to provide quality treatment for flows from the subject site.

7.5.1.3 Use of Existing Municipal Infrastructure and Stormwater Facilities

The “Use of existing municipal infrastructure and Stormwater Facilities” alternative discusses the available outlets and existing stormwater facilities in the community and how this established infrastructure can be used to service the subject lands. As described in previous sections, servicing opportunities for the site are evaluated for the site's eastern and western portions. The only feasible outlet for the western portion of the site is the existing constructed channel, which conveys water to the wetlands. Opportunities for the type of linear facility that may be constructed from the property to the respective outlet are discussed in the sections below.

The eastern portion of the site is suitable for this alternative, as existing municipal infrastructure and stormwater facilities are available and have sufficient capacity to accept flows from the subject lands, depending on the servicing configuration.

Under this alternative, two main outlets are available to service the site.

- A 1350 mm dia. storm sewer is installed within the Dun Skipper drive right-of-way at the Dun Skipper/ Bank Street intersection with an available capacity of 523L/s. This sewer conveys flow through the community and eventually outlets to the Findlay Creek Stormwater Management facility, which provides quality treatment for receiving water.
- A 3000 x 3600mm storm sewer at Sora Way and Bank Street, located just upstream of the Findlay Creek Village Stormwater Management Facility (FCVSWMF). This option is suitable if the subject site's servicing method requires a higher release rate. As mentioned above, quality treatment will then be provided at the FCVSWMF.

The Findlay Creek Village Stormwater Management Facility provides an enhanced level of protection, which corresponds to 80% TSS removal. The storage requirements for the FCVSWMF, including the S4 UEA, have been determined in accordance with the MOE Manual and are summarized in Table 7-1. Supporting calculations are provided in **Appendix E.**

Table 7-1 Update to Leitrim Hydraulic Model – Water Quality Volumes

Stormwater Facility	Level of Protection	Urban Drainage Area	Permanent Storage (cu-m)		Extended Storage (cu-m)		Total Storage (cu-m)	
		Type of Facility % IMP	Required	Provided /Designed	Required	Provided /Designed	Required	Provided /Designed
Findlay Creek Village, including S4 UEA	Enhanced	418 ha Wet Pond 55%	62,830	88,889	16,718	43,137	79,548	132,026

The FCVSWMF will provide 132,026 cu-m of permanent and extended storage for water quality treatment, exceeding the MOE Manual requirements. Therefore, it is concluded that the facility can provide water quality control for the S4 Expansion Lands.

The hydraulic performance of the FCVSWMF is summarized below in Table 7-2. The results presented in the table are based on the hydraulic evaluation with the Annual Event Sanitary Flow.

Table 7-2 Performance of the Findlay Creek Village Stormwater Facility

Storm Event	Table 6.5 from DEC 2017 Design Brief					Current Evaluation				
	Storage (ha-m)		Discharge (cms)**	Water Level Elevation (m)		Storage (ha-m)		Discharge (cms)**	Water Level Elevation (m)	
	With Permanent Storage	Without Permanent Storage		Existing Cell	Expanded Cell	With Permanent Storage	Without Permanent Storage		Existing Cell	Expanded Cell
Permanent Storage	8.89		n/a	87.10	87.10	8.89		n/a	87.10	87.10
100 year 24 hour SCS Type II (103.2 mm)	23.19	14.30	10.89	88.59	88.59	24.02	15.14	11.65	88.66	88.67
100 year 3 hour Chicago (71.7 mm)	21.15	12.26	8.44	88.39	88.40	21.54	12.65	8.95	88.43	88.44

The comparison of the FCVSWMF function indicates general consistency, with slight increases relative to the results presented in the respective design briefs. The resulting hydraulic modelling for the upstream subdivision system meets the OSDG for hydraulic grade line freeboard.

7.5.2 Stormwater Servicing Solutions

In Section 7.5.1 of this report, the evaluation parameters used to determine servicing alternatives for the subject site were outlined. Due to the land's natural topography and the proximity of existing outlets, servicing alternatives may differ between the site's eastern and western portions. The following section of this report outlines several servicing alternatives that combine the parameters from the previous sections to best suit the site requirements.

To evaluate the proposed alternatives, the minor-system capture and major-system conveyance for the S4 Expansion Lands were modelled in SWMHYMO. Considering the interconnections within the LDA system, the overall LDA hydrologic and hydraulic models were updated. The resulting SWMHYMO hydrographs for the S4 Expansion Lands were then imported into the overall LDA hydraulic model to assess the impact on the SWM facility and the LDA storm and sanitary sewers. It should be noted that the results presented in tables 7-1 and 7-2, above, are based on the alternative that generates the most critical HGL, as discussed in section 7.5.2.4.

7.5.2.1 Western Wetland Stormwater Management Facility with OGS & Eastern Dry Pond with Outlet to Dun Skipper Drive

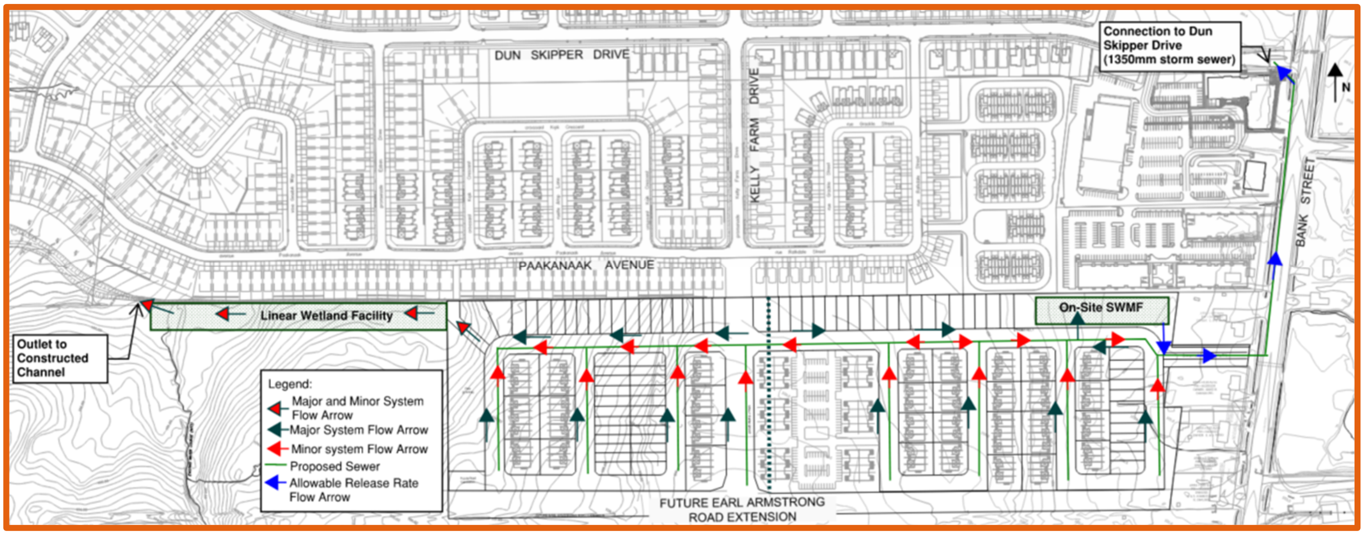
For lands west of Kelly Farm Drive, the “Dedicated Stormwater Management Facility” is a suitable alternative for servicing. A facility that provides quality treatment and quantity control with sufficient volume/area to store flows from the site, in accordance with the principles of dual drainage. The recommended plan is to combine an on-site oil-and-grit separator (OGS) with a linear wetland pond facility to meet quality and quantity control requirements. The storage requirements for this facility are approximately 4100 m3. Existing infrastructure (the constructed channel) and natural wetlands in the community provide the necessary outlet for the proposed development.

Additionally, SNCA has expressed a desire for increased hydration in the existing constructed channel and Leitrim Wetland Buffer area. Therefore, a solution that increases hydration during low-flow events, while maintaining pre-development peak flows, is the ideal approach for the site's stormwater management strategy. As further discussed in section 7.6 of this report, the minor system tributary to the linear wetland pond facility has been increased as an opportunity to provide additional hydration to the constructed channel and wetlands. The result of this approach is that the on-site storm sewer network draining west would extend east of Future Kelly Farm Drive, requiring sewers at greater depths than if the tributary were confined to the drainage divide centered on Kelly Farm Drive.

For lands east of Kelly Farm Drive, the “Use of Existing Municipal Infrastructure and Stormwater Facilities” is a viable option for this application, as the proposed outlet locations align well with existing site conditions.

Under pre-development conditions, the eastern portion of the site drains towards Bank Street. As noted in **Section 7.2,** the storm sewer located within Dun Skipper Drive was initially designed with 523 L/s allocated to the future Earl Armstrong Road Realignment. Due to the updates to the Earl Armstrong Road Alignment detailed in the 2019 EA, stormwater is to be directed to the future Bank Street and Hawthorne stormwater management facilities; the 523 L/s release rate remains suitable to support the proposed development. The Dun Skipper Drive storm sewer eventually outlets into the Findlay Creek Stormwater Management Facility, where quality control is provided. The “Use of Existing Municipal Infrastructure and Stormwater Facilities” offers a practical option for maintaining these existing drainage conditions. The infrastructure on Dun Skipper Drive provides a suitable connection point for extending municipal services to manage the site's eastern drainage outlet. Additional retention for flows exceeding the allowable release rate is required on-site and provided by a dry pond facility that does not affect minor system HGLs.

A sketch is provided below detailing the direction of minor and major system flow under this option, with the respective outlets identified.



The linear wetland pond facility, combined with the OGS as described above, is estimated to cost **$1,100,000.**

It is estimated that the over-depth sewers required to serve a small area east of Kelly Farm Drive would incur a **$100,000** premium over a conventionally designed storm sewer system.

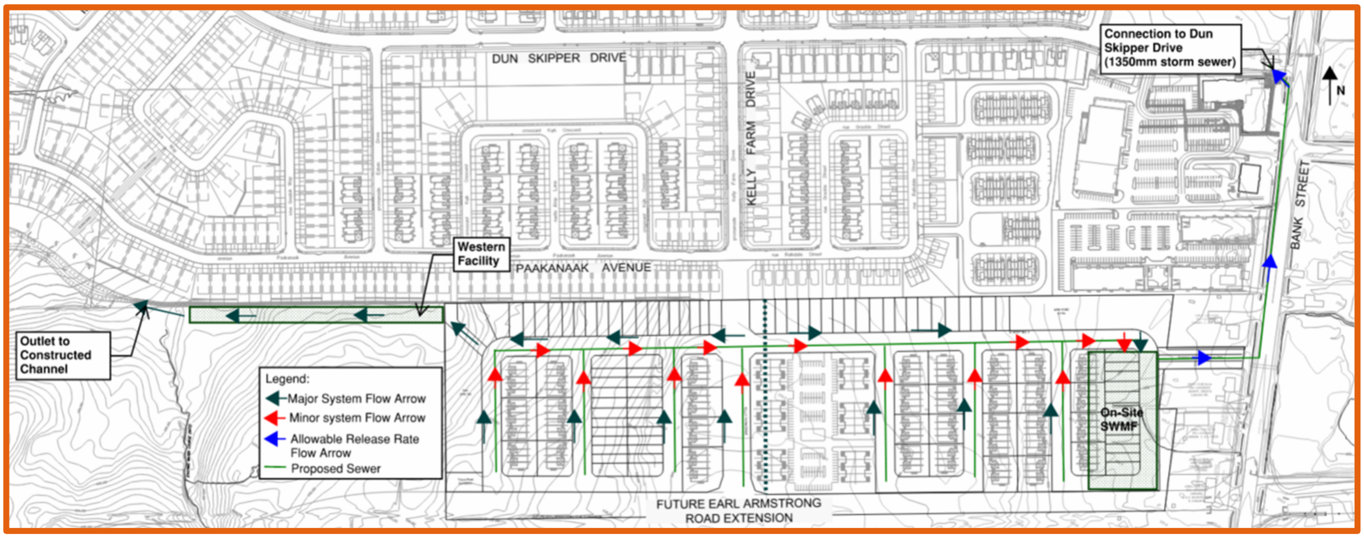
The off-site storm sewer (+/-750mm dia.) works in Bank Street required to connect to Dun Skipper, including traffic control and reinstatement, are estimated at **$1,150,000**

The on-site dry pond facility, sized to retain the major system flows at the allowable release rate as mentioned above, is estimated to cost **$235,000** (including land costs). The on-site dry-pond facility is estimated to require 0.30Ha of land.

7.5.2.2 Western Wetland Stormwater Management Facility & Eastern Stormwater Management Facility with Outlet to Dun Skipper Drive

Under this alternative, 100% of the minor system flows from the subject lands are directed east. An On-site SWMF is required to provide quantity control for the minor and major flow attenuation to respect the residual capacity in the Dun Skipper storm sewer.

Major flow from lands west of Kelly Farm Drive will outlet to a wetland stormwater management facility, following the natural topography as described above in Section 7.5.2.1. Contrary to the SWMF identified in Section 7.5.2.1, this facility would not require quality control measures, and its storage volume requirements are significantly less than in the previous option, at 900 m3. Given the leaner shape to the facility, due to the outlet control conditions, the footprint of the facility is relatively similar in size to Option 1. A sketch is provided below detailing the direction of minor and major system flow under this option, with the respective outlets identified.



The eastern on-site SWMF for this option would require sufficient depth to retain minor flows from the entire parcel and major flows from the portion east of Kelly Farm Drive. The facility would also require 5000 m3 of storage and 1.0 Ha of land. The required facility configuration, as shown above, would necessitate a redesign of the concept plan. In addition, the facility would need to be designed at an elevation below the underside of the footings to meet the required freeboard for the proposed low-density residential development. This option would require a significant grade raise and retaining walls at the eastern limits of the site. Consideration would be required for liners and ballast if the pond is set below the groundwater table elevation.

To accommodate minor system servicing on the western side, deeper than conventional storm sewers would be required. At the highest point of the site (extension of Kelly Farm Drive), storm sewer depths of approximately 7 m would be required, with 4 m of rock removal. The on-site servicing costs associated with over-depth installation, rock removal, and oversized trunk sewers are estimated at **$900,000**.

It is estimated that the off-site storm sewer (+/-750mm dia.) works in Bank Street required to connect to Dun Skipper, including traffic control and reinstatement, are estimated at **$1,150,000** (identical to Option 1, above).

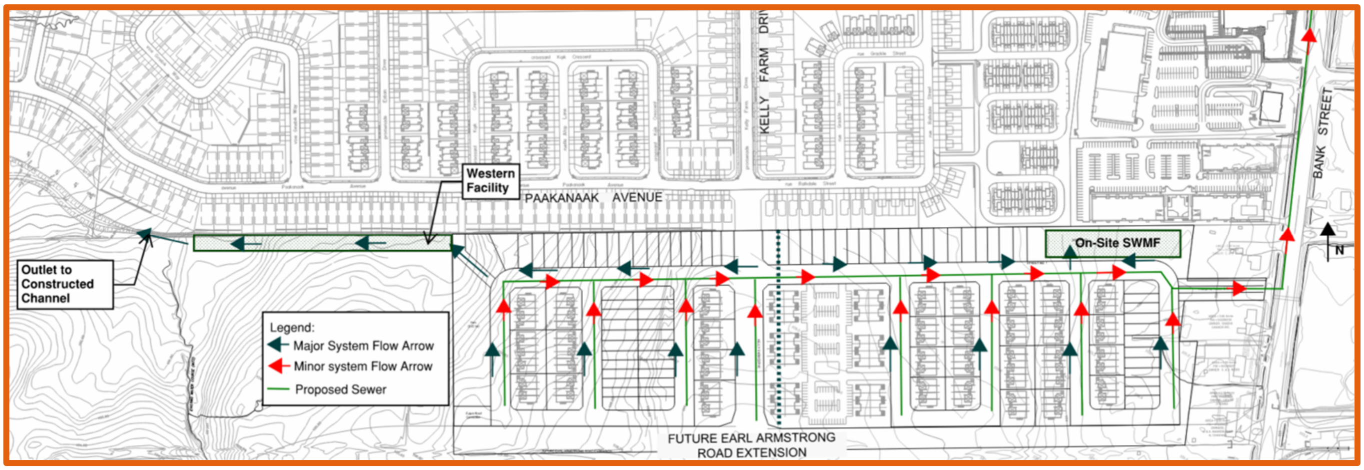
The estimated cost of the Eastern on-site SWMF is **$850,000** (including land costs) and would require 1.0 Ha of land dedicated to the facility. Additional costs will be incurred for maintenance access and landscaping requirements.

The western outlet wetland SWMF for major flow retention is estimated at **$600,000**.

7.5.2.3 Western Wetland Stormwater Management Facility & Eastern Dry-Pond Facility with Outlet to Sora Way/Bank Street

Similar to the option identified in Section 7.5.2.2, 100% of the minor system flow from the subject lands is directed east, including 100% of the major flow for lands east of Kelly Farm Drive. This alternative consists of an outlet pipe sized to convey minor system flow for 100% of the subject site; the minor system flows are modelled at 1.414 m^3/s (1414 L/s). These flows exceed the available capacity of the Dun Skipper storm sewer. Therefore, the outlet pipe would bypass the Dun Skipper storm sewer and connect directly into the 3000 x 3600 mm storm sewer pipe at Sora Way and Bank Street, just upstream of the Findlay Creek SWMF. Major system flow from lands east of Kelly Farm Drive will be retained on-site by use of a dry pond facility. This dry pond is sized similarly to the eastern dry pond identified in Section 7.5.2.1.

Major flow from lands west of Kelly Farm Drive will outlet to a conveyance channel, as described above in section 7.5.2.2., designed to provide quantity control only for flows exceeding the 2-year up to the 100-year. A sketch is provided below detailing the direction of minor and major system flow under this option, with the respective outlets identified.



This option incurs significant costs associated with extending a storm sewer outlet pipe (±1050 mm dia.) approximately 930m north on Bank Street, within the existing ROW.

It is estimated that the off-site storm sewer (+/-1050mm dia.) works in Bank Street required to connect to the 3000 x 3600mm sewer at Sora Way and Bank Street, including traffic control and reinstatement, are estimated at approximately **$4,100,000**.

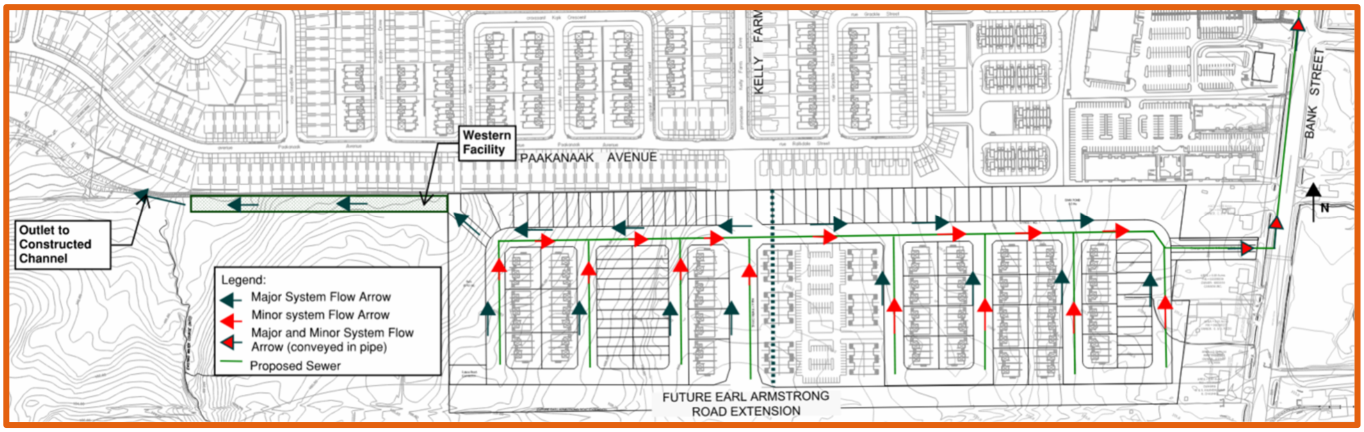
Under this option, to accommodate minor system servicing on the western side, deeper than conventional storm sewers would be necessary. At the highest point of the site (extension of Kelly Farm Drive), sewer depths of approximately 7m would be required, with 4m of rock removal. The cost associated with over-depth installation, rock removal and oversized trunk sewers is estimated at **$900,000.**

It is estimated that an on-site dry pond facility sized to retain the major system flows to the allowable release rate, as mentioned above, is **$235,000** (including land costs). The on-site dry-pond facility is estimated to require 0.30Ha of land.

The western outlet SWMF for major flow retention is **$600,000**

7.5.2.4 Western Wetland Stormwater Management Facility, No On-Site Eastern Stormwater Management Facility & Outlet to Sora Way, Bank Street

Under this option, 100% of the minor system flow from the subject lands is directed east, including 100% of the major flow for lands east of Kelly Farm Drive. Major flow from lands west of Kelly Farm Drive will outlet to the conveyance channel, as described above, designed to provide quantity control only for flows exceeding the 2-year up to the 100-year. No on-site stormwater management facility is required for lands that drain east. This alternative involves sizing the storm sewer to accept minor system flows for the entire site and major flows from the portion of the site east of Kelly Farm Drive; the minor system flows are modelled at 2.964 m^3/s (2964 L/s). The outlet pipe bypasses the Dun Skipper storm sewer and connects the 3000 x 3600 mm storm sewer pipe directly in Sora Way and Bank Street, just upstream of the Findlay Creek SWMF. A sketch is provided below detailing the direction of minor and major system flow under this option, with the respective outlets identified.



This option incurs significant costs associated with extending a storm sewer outlet pipe (±1350 mm dia.) approximately 930m north on Bank Street, within the existing ROW. It is estimated that the off-site storm sewer (+/-1350mm dia.) works in Bank Street required to connect to the 3000 x 3600 mm sewer at Sora Way and Bank Street, including traffic control and reinstatement, are estimated at approximately **$4,700,000**.

Under this option, to accommodate minor system servicing on the western side, deeper than conventional storm sewers would be necessary. At the highest point of the site (extension of Kelly Farm Drive), sewer depths of approximately 7m would be required, with 4m of rock removal. The cost associated with over-depth installation, rock removal and oversized trunk sewers is estimated at **$900,000.**

The western outlet SWMF for major flow retention is **$600,000**

Summary of Evaluation of Alternative Stormwater Management Solutions

	Option #1 Western Wetland Linear SWMF & Eastern Dry Pond/ Minor System Outlet to Dun Skipper	Option #2 Western Wetland SWMF & Eastern Wet-Pond Facility (Outlet to Dun Skipper)	Option #3 Western Wetland SWMF & Eastern Dry Pond Facility (Outlet to Sora Way/ Bank Street)	Option #4 Western Wetland SWMF, No Eastern On-site SWMF (Outlet to Sora Way/ Bank Street)
Impact on Respective Outlets	West ✓ Maintain the pre-development release rate allocated to the constructed channel ✓ Increased hydration to the constructed channel and to the wetland area	West ✓ Major system flow outlet only to the constructed channel × Detrimental impact on the Constructed Channel and Leitrim Wetland Buffer Area by removing base flows and hydration potential	West ✓ Major system flow outlet only to the constructed channel × Detrimental impact on the Constructed Channel and Leitrim Wetland Buffer Area by removing base flows and hydration potential	West ✓ Major system flow outlet only to the constructed channel × Detrimental impact on the Constructed Channel and Leitrim Wetland Buffer Area by removing base flows and hydration potential
	East ✓ Outlet to Dun Skipper restricted to the allocated release rate (523 L/s) ✓ Negligible impact on existing FCVSWMF	East ✓ Outlet to Dun Skipper restricted to the allocated release rate (523 L/s) ✓ Negligible impact on existing FCVSWMF	East ✓ FCSWMF has significant capacity to accept flows from the subject site	East ✓ FCSWMF has significant capacity to accept flows from the subject site
Impact to Existing Community	× Install approximately 300m of storm sewer on Bank Street to connect to Dun Skipper × Temporary impacts to the community (i.e., lane/road closures)	× Install approximately 300m of storm sewer on Bank Street to Dun Skipper × Temporary impacts to the community (i.e., lane/road closures)	× Install approximately 930m of storm sewer on Bank Street to Sora Way × Increased temporary impacts to the community (above option 1 & 2) i.e., lane/road closures, longer construction time and more ROW distance affected	× Install approximately 930m of storm sewer on Bank Street to Sora Way × Increased temporary impacts to the community (above option 1 & 2) i.e., lane/road closures, longer construction time and more ROW distance affected
Cost Implications for SWMF and/or Offsite Works	$1,100,000 (Western Linear SWMF) $ 100,000 (On-Site Sewer Over-depth) $1,150,000 (Bank Street Sewer Works) $ 235,000 (Eastern Dry Pond incl Land Cost) **$2,585,000 TOTAL**	$ 600,000 (Western Linear SWMF) $ 900,000 (On-Site Sewer Over-depth) $1,150,000 (Bank Street Sewer Works) $ 850,000 (Eastern Dry Pond incl Land Cost) **$3,500,000 TOTAL**	$ 600,000 (Western Linear SWMF) $ 900,000 (On-Site Sewer Over-depth) $4,100,000 (Bank Street Sewer Works) $ 235,000 (Eastern Dry Pond incl Land Cost) **$5,835,000 TOTAL**	$ 600,000 (Western Linear SWMF) $ 900,000 (On-Site Sewer Over-depth) $4,700,000 (Bank Street Sewer Works) $ 0 (Eastern Pond N/A) **$6,200,000 TOTAL**
Land Dedication/ Design Restrictions	✓ On-site Dry Pond Facility is practical for the grading constraints onsite ✓ 0.30 Ha Land required for dry pond ✓ Practical sewer depths minimize on-site installation and rock removal costs	× On-site eastern facility requires concept plan re-design to accommodate size requirements × On-site Eastern facility requires 1.0Ha for a pond block to accommodate the storage requirements and grading constraints × Excessive sewer depths increase on-site installation and rock removal costs	✓ On-site Dry Pond Facility is practical for the grading constraints onsite ✓ 0.30 Ha Land required for dry pond × Excessive sewer depths increase on-site installation and rock removal costs	× Excessive sewer depths increase on-site installation and rock removal costs × Off-Site Sewers sized to accommodate the 2-year event, and the 100-year event for lands east of KFD. Excessive sewer-sizing increases on-site installation costs

7.6 Recommended Stormwater Servicing Plan

7.6.1 Design Criteria

The conceptual stormwater management system incorporates standard urban drainage design and stormwater management features that can be summarized as follows:

- a dual drainage concept
- Performance Targets
    - achievement of 80% Total Suspended Solids (TSS) removal (enhanced level of protection) in accordance with MECP guidelines
    - compliance with MOE stormwater management objectives as defined in CLI-ECA Appendix A, including:
        - water balance and infiltration objectives, where feasible
        - water quality
        - erosion control
        - water quantity (peak flow control and flood protection)
- end-of-pipe stormwater management facilities.

7.6.1.1 Dual Drainage Design

The dual drainage system accommodates both minor and major stormwater runoff. During frequent storm events, the effective runoff from a catchment area is released directly through catch basin inlets into the storm sewer network, known as the minor system. During less frequent storm events, the balance of the flow (in excess of the minor flow) is accommodated by a system of rear-yard swales and street segments, known as the major system. Opportunities for on-site storage in road sags are available across the site. Inlet control devices (ICDs) will be utilized across the site to control the surcharge in the minor system during infrequent storm events and maximize use of the available on-site storage. ICDs will be designed at the detailed design stage. A Preferred Storm Drainage Area plan was prepared, **Figure 7-5** in **Appendix E**, which depicts the anticipated major and minor system drainage areas with their respective outlets.

Inlet Control Devices (ICD) will be employed to limit inflows to the storm system to meet the design criteria of 2-year peak flow for local roads and the 5-year peak flow for collector roads. The road profiles will need to be designed to accommodate the residual flow during infrequent events. The sizing of ICDs will be completed at the detailed design stage.

7.6.1.1.1 Minor System

The minor system storm sewers will be sized based on the rational method, applying standards of both the City of Ottawa and MECP. Some of the key criteria for this site include the following:

• Sewer Sizing:	Rational Method
• Design Return Period:	1:2-year (local streets)

1:5-year (collector roads)

- Initial Time of Concentration: 10 minutes
- Manning's: 0.013
- Minimum Velocity: 0.80 m/s
- Maximum Velocity: 3.00 m/s
- Minimum Slope: Refer to below Table 7-3

Table 7-3 City of Ottawa Minimum Allowable Slopes for Storm Sewer Pipes

Pipe Diameter (mm)	Slope (%)
250	0.432
300	0.34
375	0.25
450	0.195
525	0.16
600	0.132
675	0.113
750 and larger	0.10

With respect to runoff coefficients, this report assumes the values presented in the following table.

Table 7-4 Typical Runoff Coefficients

Development		Runoff Coefficient, C
Residential	Front Yards	0.71
	Rear Yards	0.55
Residential	Medium-Density Blocks	0.70
Parks	Neighbourhood	0.25

7.6.1.1.2 Major System

The major system conveyance for the S-4 UEA is to each of the two proposed stormwater management facilities as depicted in the overall stormwater concept plan shown in **Figure 7-6** and following overland flow routes depicted in **Figure 9-2**.

The major system will be designed to ensure the following;

- Maximum 100-year street Ponding depth: 0.35m in Roadways
- Maximum Static rear yard Ponding depth: 0.30m

- 100-year Street Freeboard: 0.15m to House Grade (Building Opening)
- 100-year+20% Street Freeboard: 0.01m to House Grade (Building Opening)
- Rear-yard Static Freeboard: 0.30m to House Grade (Building Opening)

7.6.1.2 Runoff Volume Controls

Stormwater management objectives for the site, including water balance, water quality, and water quantity, should be met using the hierarchical approach outlined in the MECP's Low Impact Development Stormwater Management Guidance Manual Draft (2022) to control the 90th-percentile event.

The runoff volume control target hierarchy has the following order:

- Control hierarchy priority 1: Retention
- Control hierarchy priority 2: LID Filtration
- Control hierarchy priority 3: Conventional treatment

Implementing LID retention controls to maintain or mitigate impacts on the site's water balance and overall runoff volumes is not considered feasible. The Hydrogeological Study of the site, completed by Paterson Group, identified a shallow groundwater table as a constraint and did not recommend infiltration LID measures. Alternative strategies, such as evapotranspiration to reduce runoff volumes, are not achievable while meeting the city's criteria for dual drainage and positive drainage on private residential lots.

Dedicated LID Filtration controls are not feasible in low-density residential neighborhood configurations while adhering to the principles of dual drainage, the confines of City Standard 18m ROW's and to the Sewer Design Guidelines. Localized lot-level filtration controls can be implemented through BMPs such as roof downspout disconnection, routing runoff to vegetated landscape areas, and the use of rear-yard swales.

Conventional treatment is recommended by centralized SWM facilities designed to meet water quality and quantity targets, without credit for priority 2 controls.

7.6.1.3 Water Balance

The water budget analysis, completed by Paterson Group, as part of their Hydrogeological Study of the site determined that under pre-development conditions, 21,992,400 L/year of surplus water is infiltrated, and 14,661,600 L/year leaves the site as surplus runoff. Under post-development conditions, the infiltrated volume from the site decreases by 72% to 6,168,925 L/year, and the surplus runoff increases by 356% to 72,011,680 L/year.

As noted in **Section 7.6.1.2**, LID retention controls have not been deemed feasible for the site. The excess surplus runoff volume will be collected and conveyed by the proposed storm system and discharged to the east and west outlets. To mitigate the infiltration deficit under post-development conditions and benefit the receiving wetland, it is preferable to convey excess runoff from the western portion of the site to the Leitrim Wetland Buffer via the Constructed Channel, with stormwater quantity and quality controlled by the proposed linear western stormwater management facility.

7.6.1.4 Water Quality

Water quality treatment corresponding to 80% TSS removal is required for stormwater runoff from the site. Centralized SWM facilities must be designed in accordance with MOE's Stormwater Management Planning and Design Guidance Manual (2003).

Water quality control for the eastern outlet is provided by the Findlay Creek Stormwater Management Facility, which ultimately receives flow from the Dun Skipper Drive storm sewer, as noted in **Section 7.2** and **Section 7.3**. As such, the eastern stormwater management facility does not need to be designed to provide water quality control.

Discharge from the western portion of the site will be conveyed to the Leitrim Wetland Buffer via the existing constructed channel, noted in **Section 7.2** and **Section 7.4**. Water quality control will be provided by the western linear facility, which will function as a wetland pond in combination with an Oil and Grit Separator (OGS) unit. The OGS unit is proposed upstream of the facility to provide pre-treatment, capturing coarse sediments and potentially improving the operation and maintenance of the pond. The OGS unit will be sized to the maximum achievable size within site constraints to maximize sediment and floatable removal efficiency. The western linear SWM facility will be designed in accordance with MOE guidelines to provide an enhanced level of protection (80% TSS removal), including a sediment forebay and targeting a minimum detention time of 24 hours.

The total drainage area from the site contributing to the wetland pond is 7.89 ha, with an imperviousness of 68%. Based on Table 3.2 of the MECP Stormwater Management Planning and Design Manual (2003), a design storage of approximately 80 m^3/ha is typically applied for constructed wetland facilities providing a basic level of protection (80% TSS removal). Accordingly, the wetland pond requires a permanent storage volume of approximately 632 m^3.

7.6.1.5 Water Quantity

Peak flows from the site are required to be controlled to the capacity of the receiving system. Discharge to the eastern outlet must be managed and maintained below the available capacity of 523 L/s for the receiving Dun Skipper Drive storm sewer as noted in **Section 7.2**.

The constructed channel serves as the western outlet for the site and, as noted in **Section 7.2**, was designed to convey a 100-year peak flow of 0.66 m^3/s from watercourse INT-2. Discharge from the western linear stormwater management facility will be designed such that the total combined flow from the western linear SWM facility and the existing rear yard swale does not exceed 0.66 m^3/s.

Both eastern and western stormwater management facilities must provide sufficient detention volumes to control flows to the rates noted above, along with a minimum 300 mm freeboard during the 100-year event.

7.6.2 Stormwater Servicing Layout

The preferred stormwater servicing concept is shown in **Figure 7-6**. The subject site will be designed with a dual drainage system as discussed in **Section 7.6.1.1**. Major flow from the proposed development will be conveyed in accordance with the Proposed Macro Grading Plan shown in **Figure 9-2**. The major system divide is located east of Kelly Farm Drive, with 5.4 ha directed to the western outlet via the western linear stormwater management facility and 6.9 ha directed to the eastern outlet via a proposed dry pond. The minor system divide has been placed further east, with 4.4 ha directed to the east outlet and 7.9 ha to the western outlet.

The proposed storm sewer plan for the subject site is shown on **Figure 7-2** and will be designed to convey the 2-year event for local streets in accordance with the criteria noted in **Section 7.6.1.1.1**. Additional details for the eastern outlet to the existing Dun Skipper Drive storm sewer is shown on **Figure 7-3**.

The smaller drainage area directed to the east outlet will allow for the minor system to bypass the proposed eastern dry pond as shown on the stormwater management concept schematic included in **Figure 7-6** and conveyed directly to the Dun Skipper Drive storm sewer acting as the eastern outlet. Major flow will be routed to the dry pond and controlled to ensure the total flow does not exceed the allowable release rate of 523 L/s. The Findlay Creek Stormwater Management Facility provides quality control for the eastern outlet. The FCVSWMF Operation and

Maintenance Manual (OMM) will be updated to incorporate the proposed modifications to the facility, including changes to its servicing area, functionality, and performance characteristics.

The east dry pond will be designed to provide quantity control for the 100-year event as specified in **Table 7-5** of **Section 7.6.3.3**, and maintain 300 mm freeboard during the 100-year event, which will also contain the 100-year + 20% stress test event. The emergency overland flow route from the eastern dry pond (and subdivision lands) is directed to Bank Street via the emergency access and servicing block.

Conceptual design drawings for the eastern dry pond are shown on **Figure 7-3** located in **Appendix E.** The total volume of the dry pond, below elevation 102.90, is 1690 m^3. This ensures that the 100-year and 100-year +20% stress test volumes are fully contained within the pond. Refer to **Section 7.6.3.3**. for the required storage volume for each event. The maximum static ponding elevation in the facility is approximately 103.10 m, which is controlled by the boulevard grade at the emergency overflow route located in the servicing block to Bank Street. The top of the bank around the perimeter of the eastern dry pond is set to 103.20 m. This ensures a minimum 300 mm freeboard above the 100-year ponding elevation. For the purpose of this report, the concept plan for the eastern pond has been overestimated to account for any modifications to volumes/ configuration that may be needed during detailed design.

Conceptual design drawings for the western linear stormwater management facility located between the western boundary of the S-4 UEA lands and the Constructed Channel are shown on **Sheet WSWMF-1 to WSWMF-4** included in **Appendix E**. Total flow from External Area A2 and Area W1, and minor flow from Area E1 shown on **Figure 7-6** will be conveyed and controlled by the facility. Due to the existing topography west of the subject site, the western linear facility concept is split into two cells acting as wetland ponds in series. An OGS unit, sized to the maximum extent feasible within site constraints, will be provided to operate alongside the western facility as part of a treatment-train approach, achieving the required enhanced level of treatment (80% TSS removal).

During significant events, excess flow will cascade from Cell 1 to Cell 2 and be controlled to ensure the 100-year peak flow does not exceed 0.66 m^3/s before discharging to the Constructed Channel. The western linear facility will be designed to provide approximately 4100 m^3 of storage volume and maintain 300 mm minimum of freeboard during the 100-year event. During the 100-year + 20% stress test event, the facility will provide approximately 4600 m^3 of storage volume and maintain positive freeboard. The emergency overland flow route from the western wetland pond (and subdivision lands) is directed to the Leitrim Wetland Buffer via the conveyance channel.

The modelling effort supporting the preferred stormwater servicing layout is discussed in **Section 7.6.3**.

7.6.2.1 Existing Constructed Channel and Drainage Swale

As noted in **Section 7.2**, as part of the existing Pathways development to the north, a constructed channel was provided west of the UEA areas, and west of the Pathways lotting fabric, which includes drainage provisions for lands south of the Pathways development.

A portion of this drainage scheme is a dual-swale design, located within the rear yards of civic addresses 501 to 591 Paakanaak Avenue (odd numbers only). The dual swale design intent was to provide conventional rear-yard drainage to the minor system via the swale closest to the home. The secondary swale, south of the conventional swale, was designed as a continuous swale to the constructed channel. This swale would provide capture and conveyance for flows from the S4 UEA. At the time of the Pathways development, the area now designated as the S4 UEA had no allowance for construction within the property lines, resulting in the dual-swale design in the rear yards of the civic addresses noted above. The stormwater management intent of the S-4 UEA lands is to capture run-off contributing to this swale, utilizing internal collection sewers within the streets and rear yards of adjacent lots and directing flows to the constructed linear SWM facility as part of the S-4 UEA's western outlet.

The “dual swale” design within the privately owned lots of the Pathways community will become redundant. It will no longer serve its original purpose of providing drainage for land to the south (The S4 UEA). While the swale may no longer convey flows from lands to the south, its inherent design does provide a drainage outlet for upstream lots to the east. It is recommended that homeowners continue to maintain this as an unobstructed swale to avoid negatively impacting upstream lots.

7.6.3 Hydraulic and Hydrologic Evaluation

Modelling was completed in PCSWMM using the EPA SWMM Engine 5.2.4 to assess the feasibility of the preferred stormwater servicing solution. SWMM is a fully dynamic model capable of single-event and continuous simulations for both hydrologic and hydraulic analysis for dual drainage systems.

The subject site was simulated as a dual drainage system at the conceptual level, with the major system modelled according to the preferred grading plan and the minor system according to the preferred storm sewer plan. Drainage areas on the subject site included in the modelling are shown in **Figure 7-5** with the overall stormwater servicing concept and external area A2 shown in **Figure 7-6**.

Modelling design storm events, inputs and results are discussed in the sections below.

7.6.3.1 Design Storm Events

A summary of the design storms and model files included as part of the assessment of the recommended stormwater management concept is included below:

- 4 hour 25 mm Chicago - 145172-Cattizone_4H25MM_V02.pcz
- 2 year 3 hour Chicago - 145172-Cattizone_3H2CHI_V02.pcz
- 2 year 24 hour SCS Type II - 145172-Cattizone_24H2SCS_V02.pcz
- 100 year 3 hour Chicago - 145172-Cattizone_3H100CHI_V02.pcz
- 100 year 24 hour SCS Type II - 145172-Cattizone_24H100SCS_V02.pcz
- 100 year 3 hour Chicago + 20% (Stress test) - 145172-Cattizone_3H120CHI_V02.pcz
- 100 year 24 hour SCS Type II + 20% (Stress test) - 145172-Cattizone_24H120SCS_V02.pcz

7.6.3.2 Model Input Parameters

Model input parameters for drainage areas are summarized below for drainage areas within the subject site. External drainage area A2 (Shown on **Figure 7-6**) was previously modelled as part of the Constructed Channel Hydraulic evaluation using the NASHYD runoff routine and has been included in this assessment with flows directed to the western facility. Excerpts from the Constructed Channel Design Brief discussing modelling parameters and results have been included in **Appendix E**. The external drainage area has been reduced to account for the proposed development, with other parameters maintained from the original assessment.

- **Area and Imperviousness:** Catchments used in the modelling are shown in **Figure 7-5**, Preferred Storm Drainage Area Plan. Impervious ratios are consistent with the runoff coefficients indicated on the figure.
- **Infiltration:** Infiltration losses were selected to be consistent with the OSDG. The Horton values are as follows: Max. infiltration rate = 76.2 mm/h, Min. infiltration rate = 13.2 mm/h, Decay constant = 4.14 1/hr.
- **Subcatchment Width:** The catchment width was based on the conveyance route length of the drainage area and multiplied by two. The multiplier of two was only used if the drainage area had runoff contribution from both sides of the drainage area. This approach is consistent with the OSDG.
- **Slope:** An average slope of 1% has been used for subcatchment flow routing.

- **Initial Abstraction (Detention Storage):** Detention storage depths of 1.57 mm and 4.67 mm were used for impervious and pervious areas, respectively. These values are consistent with the OSDG.
- **Manning's Roughness:** Manning's roughness coefficients of 0.013 and 0.25 were used for impervious and pervious areas, respectively.
- **Major and Minor System:** The dual drainage system has been incorporated into the modelling. Inverts for the major system have been set consistent with the Preferred Macro Grading Plan shown on **Figure 9-5.** Minor system capture throughout the subject site has been set to the 2-year modelled runoff.

7.6.3.3 Modelling Results

Modelling results are summarized in the tables below. Utilized storage to control discharge for each stormwater management facility is shown in **Table 7-5**, peak discharge results to the east and west outlets are shown in **Table 7-6,** and hydraulic grade line (HGL) results for the subject site are presented in **Table 7-7** .

During the 100-year event, outflow from the eastern dry pond is controlled to 21 L/s, utilizing approximately 1550 m^3 of storage. Results indicate the total discharge to the eastern outlet, including outflow from the dry pond and the minor system, is 488 L/s, below the allowable release rate of 523 L/s to the Dun Skipper Drive storm sewer.

Outflow from the western linear facility is controlled to 660 L/s during the 100-year event, utilizing 2854 m^3 in Cell 1 and 1227 m^3 in Cell 2 for a total storage volume of approximately 4100 m^3. Outflow results from the facility during the 25mm event (4 hour 25mm Chicago) is included in **Chart 7-1** and show that the target drawdown time of 24 hours is achieved.

The HGL elevations are presented in the following **Table 7-7:** Storm Hydraulic Grade Line for Subject Site for the 100 Year 3 Hour Chicago and 100 Year 3 Hour Chicago Increased by 20% Storm Events along with a comparison of under-side of footing (USF) elevations for the subject site. Where USF elevations are not available, a comparison with existing ground elevations (EG) is provided. The HGL results indicate that the minimum 0.3 m clearance between the USF and HGL is maintained across the subject site for the 100 year 3 hour Chicago and the 100 year 3 hour Chicago increased by 20% storm event.

Table 7-5: PCSWMM SWMF Utilized Storage Results

Design Storm Event		Inflow (L/s)	Outflow (L/s)	Utilized Storage (m^3)
Eastern Dry Pond				
100-Year 3 hour Chicago		1009	18	968
100-Year 24 hour SCS Type II		602	13	525
100-Year 3 hour Chicago + 20%		1457	21	1529
100-Year 24 hour SCS Type II + 20%		965	17	934
Western Linear Facility				
100-Year 3 hour Chicago	Cell 1	1682	705	2641
	Cell 2	705	545	1155
100-Year 24 hour SCS Type II	Cell 1	1586	860	2854
	Cell 2	860	660	1227
100-Year 3 hour Chicago + 20%	Cell 1	2019	963	2995

	Cell 2	963	830	1328
100-Year 24 hour SCS Type II + 20%	Cell 1	1919	1117	3200
	Cell 2	1117	979	1412

Table 7-6: PCSWMM Outlet Peak Discharge Results

Design Storm Event	Peak Discharge (L/s)	
	Eastern Outlet	Western Outlet
25 mm 4 hour Chicago	283	26
2-Year 3 hour Chicago	418	32
2-Year 24 hour SCS Type II	329	54
100-Year 3 hour Chicago	488	545
100-Year 24 hour SCS Type II	484	660
100-Year 3 hour Chicago + 20%	493	830
100-Year 24 hour SCS Type II + 20%	488	979

Table 7-7: Storm Hydraulic Grade Line for Subject Site for the 100 Year 3 Hour Chicago and 100 Year 3 Hour Chicago Increased by 20% Storm Events

PCSWMM MH (SEWER NODE)	USF / (Existing Ground Elevation) (M)	STORM HYDRAULIC GRADE LINE			
		100 YEAR 3 HOUR CHICAGO		100 YEAR 3 HOUR CHICAGO + 20%	
		HGL (M)	USF–HGL (EG - HGL) (M)	HGL (M)	USF–HGL (EG - HGL) (M)
Subject Site					
MH100	107.65	106.51	1.14	106.51	1.14
MH101	106.1	105.44	0.66	105.44	0.66
MH102	106.1	104.97	1.13	104.97	1.13
MH103	104	102.71	1.29	102.7	1.3
MH104	106.75	106.14	0.61	106.14	0.61
MH105	107.65	106.85	0.8	106.85	0.8
MH106	107.85	107.05	0.8	107.05	0.8
MH107-1	105.4	104.79	0.61	104.79	0.61
MH107-2	105.4	104.36	1.04	104.36	1.04
MH108	106.3	104.79	1.51	104.79	1.51
MH109	106.6	104.15	2.45	104.15	2.45

PCSWMM MH (SEWER NODE)	USF / (Existing Ground Elevation) (M)	STORM HYDRAULIC GRADE LINE			
		100 YEAR 3 HOUR CHICAGO		100 YEAR 3 HOUR CHICAGO + 20%	
		HGL (M)	USF–HGL (EG - HGL) (M)	HGL (M)	USF–HGL (EG - HGL) (M)
MH110	106.2	103.86	2.34	103.86	2.34
MH111	105.75	103.58	2.17	103.59	2.16
MH112	104	103.45	0.55	103.45	0.55
MH120	101.8	101.11	0.69	101.11	0.69
MH121	101.45	101	0.45	101	0.45
MH122	101.4	100.78	0.62	100.78	0.62
MH123	101.1	100.5	0.6	100.5	0.6
MH124	101.3	100.7	0.6	100.71	0.59
MH125	102.37	101.72	0.65	101.72	0.65
MH126	102.2	101.07	1.13	101.07	1.13
MH127	105.6	105	0.6	105	0.6
MH128	105.3	104.9	0.4	104.9	0.4
MH129	105.25	104.85	0.4	104.85	0.4
MH130	104.85	104.12	0.73	104.12	0.73
MH131	106.45	105.68	0.77	105.68	0.77
Bank Street					
MH200	101.50	100.01	1.49	100.01	1.49
MH201	101.00	96.17	4.83	96.18	4.82
MH202	99.750	96.11	3.65	96.12	3.64
MH203	100.00	96.09	3.91	96.11	3.89
MH204	99.50	96.09	3.41	96.10	3.40

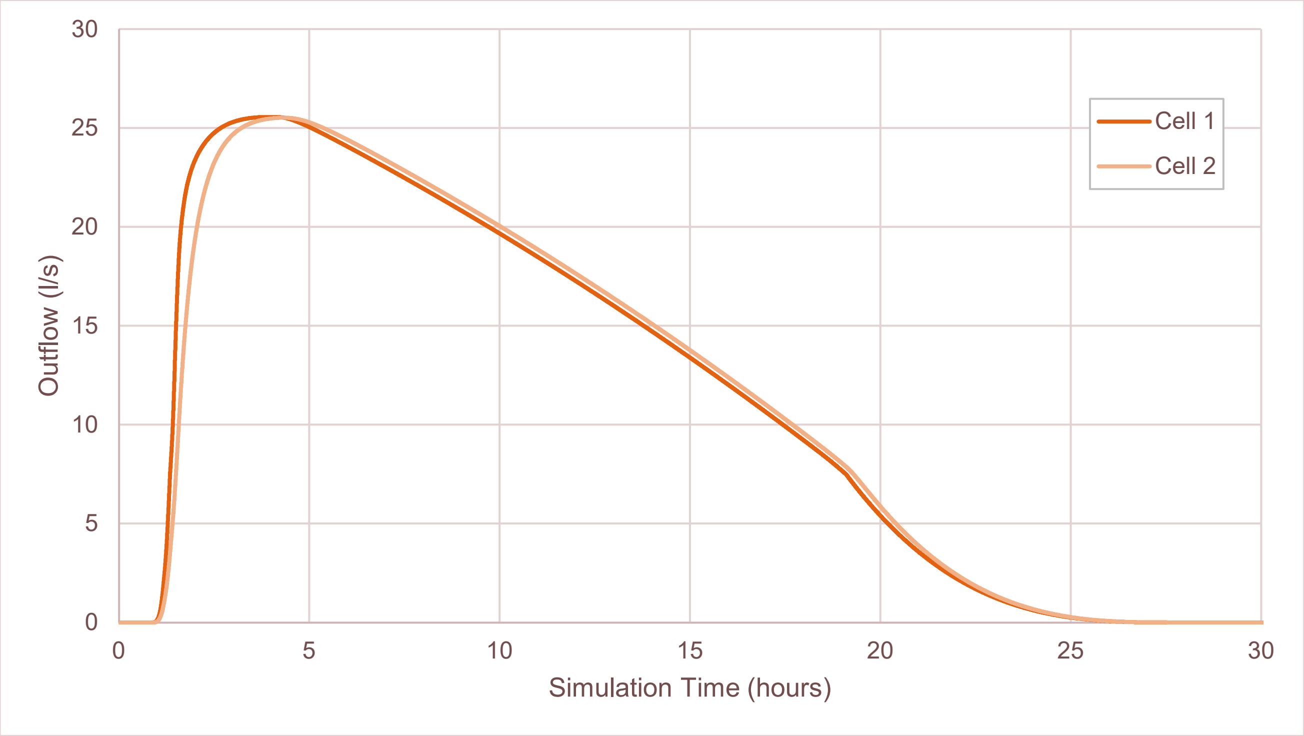


Chart 7-1: Western Linear Facility Outflow During 25 mm Event

7.6.4 Development Charge Recoveries

Storm Sewer works proposed to support this UEA do not meet the requirements for Development Charge Recoveries.

7.6.5 Cost Sharing Obligations

Internal storm sewer works are not subject to any cost-sharing obligations.

Storm sewer works in Bank Street are not subject to any cost-sharing obligations.

The developers within the S-4 UEA will be subject to oversizing costs for the storm sewer allocation in Dun Skipper, through to the Findlay Creek SWMF.

8 Utility Infrastructure

8.1 Electrical Distribution

The study area is within the Hydro Ottawa service area. Existing electrical distribution networks are present along Bank Street, and within the existing Pathway's development adjacent to the subject lands. Electrical loadings will be provided to Hydro Ottawa during the detailed design stage to assist in the design of the on-site distribution system and any off-site system upgrades.

8.2 Gas Distribution

The study area is within Enbridge Gas Distribution's service area. Existing natural gas pipelines are present along Bank Street, and within the existing Pathway's development to the north. Natural gas demand loadings will be provided to Enbridge Gas Distribution during the detailed design stage to assist in the design of the onsite distribution system and any offsite system upgrades.

8.3 Telecommunications

It is assumed that Bell and Rogers will provide telecommunications services in the study area. Each provider has existing aerial communications facilities along Bank Street and within the existing Pathway's development to the north.

9 Grading and Roads

9.1 Existing Topography

The existing topography of the subject site is relatively high compared with developed lands to the north, the existing Leitrim Wetland to the west, existing rural undeveloped lands to the south, and Bank Street to the east. There is a localized high point at the approximate center of the development lands, with elevations falling to the east, west, north, and south. **Figure 9-1** in **Appendix G** displays a heat map of the existing topography of the subject site, Bank Street and the Findlay Creek Development. As shown in **Figure 9-1,** the land's slope is generally north, toward Findlay Creek Drive. There is an approximate grade difference of 20m between the S-4 UEA high point and the Leitrim Development Area low point at Sora Way and Bank Street.

Approximate grading constraints (elevations are noted below);

- Bank Street @ Emergency Access (servicing connection) Block – 101.50
- Kelly Farm Drive @ Paakanaak Avenue – 109.00
- Kelly Farm Drive @ Future Earl Armstrong – 109.88 (CL elevation provided in MCEA)
- Existing Ground at western development limit – 104.40
- Existing Ground at eastern development limit – 101.60

9.2 Existing Road Network

The site is well served by existing municipal roads. The site has frontage along Bank Street to the east, which is also designated as Highway 31, and Kelly Farm Drive to the north, a collector road existing north of the site, with intended extension through the subject lands.

The future Earl Armstrong Extension is anticipated along the southern flanks of the subject lands. Kelly Farm Drive is intended to be extended to Earl Armstrong.

9.3 Concept Plan Development

The proposed concept plan intends to maximize low-rise density with an efficient road network that provides connectivity to external roads. The development of the concept plan provides the following.

- Window streets along arterial roads
- Stormwater Management Dry-Pond Facility
- Pathway Block Integration with Pathways Development to the North
- Park Block with frontage along a local road and natural areas to the west
- Emergency access road and servicing corridor to Bank Street
- Frontage and servicing allocations along local streets for future development of existing rural residences/businesses along Bank Street

9.4 Recommended Grading

The overall grading concept has been depicted on the **Macro Grading Plan Figure 9-2** located in **Appendix G**. This plan will serve as a general guide to the lot level grading for the proposed detailed design of the subdivision works. The concept intends to blend continuous slope segments of roads not exceeding 5% gradient, with flat sections incorporating a saw-tooth road design with road gradients ranging from 0.5%-2%.

The concept has been completed with the consideration of the following elements.

- Overland Flow Routing during major storm events
- Anticipated House construction relative to the proposed servicing works
- Maximum Permissible Grade Raise Restrictions
- Minimizing earthwork requirements and retaining walls
- Connectivity with the existing Kelly Farm Drive and Bank Street, and with the future Earl Armstrong
- Minimizing Retaining Walls and incorporating stable slope embankments into the design

9.4.1 Overland Flow Routing

Previous sections of this report discussed the existing topographical conditions, the pre-development run-off direction and the on-site major storm overland flow concept. The conveyance generally follows the natural topography with routing following the internal road network and outletting at the north-west and north-east corners of the development.

The north-west outlet follows the minor system outlet for the west and eventually discharges into the Leitrim Wetland area. Overland Flows above the 100-year + 20% stress test event will also be directed towards the Leitrim Wetland area.

The north-east outlet follows the minor system for the east and discharges into a dry pond for temporary retention to prevent overwhelming the downstream minor system. Overland flows above the 100-year + 20% stress test event will outlet to Bank Street, where conveyance is provided via existing roadside ditches in a northbound manner.

9.4.2 Relation to Proposed Servicing Works

The depth of existing utilities, including the approximate 850m sanitary sewer extension along Bank Street, has a negligible impact on the grading concept of the site. It is expected that stepped sewers will be required to connect to Paakanaak Avenue and to Bank Street to minimize sewer trench depths and maintain sewage velocities to within acceptable limits.

Storm or sanitary sewer Hydraulic Grade Lines will not have an impact on onsite grading, and it is anticipated that the 300mm minimum underside of footing freeboard separations can be met.

9.4.3 Maximum Permissible Grade Raise

No grade raise restriction was identified in the Geotechnical Report PG6912-1, prepared by Paterson Group, dated March 26, 2026.

9.4.4 On-Site Earthworks and Connectivity with Existing Roadways

The concept plan intends to provide functional roadway connections with external roads. Where possible, road grades have been established to minimize import or excess earth-moving operations off-site.

The general grading concept will see a balancing of material from the site’s high point (Kelly Farm Drive) to the lower areas along the eastern and western development limits.

9.4.5 Retaining Walls and Stable Slope Embankments

The proposed road grades at each of the eastern and western development limits range from 0.6 to 1.65m above the existing ground elevation.

Along the eastern development limit, a 3:1 stable slope embankment is proposed to transition from the right-of-way to existing ground. A small block of isolated land can be utilized in this area to provide the transition. Additionally, a window street has been provided along Earl Armstrong. The site generally follows the proposed profile of the future roadway, a small section (+/-50m) at the south-easterly limits of the development will require a small retaining wall with a maximum height of approximately 1.4m.

Along the western development limits, a parkette has been provided bordering the natural area. It is expected that the parkette area will be able to incorporate a 4:1 stable slope embankment into its design to facilitate the approximate 2m transition from the proposed road grade to the existing ground.

10 Implementation and Phasing

10.1 Offsite Projects

As discussed in the above sections of this report, the preferred water, wastewater, and stormwater servicing solutions require off-site works, within existing municipal rights of way. These works involve connections between existing municipal services and the extension of infrastructure to the development limits.

10.1.1 Water Connection to Kelly Farm Drive

The preferred water servicing solution for the subject site is to extend existing municipal infrastructure. This solution includes a connection to the existing 250 mm watermain on Paakanaak Avenue and Kelly Farm Drive. The elevation of the top of the watermain is at approximately 106.470 and is located on the north side of the roadway. This will require a full-length road cut and temporary road closure at the connection location. A temporary shut-off of the water service is also required for a portion of this watermain, affecting approximately 14 homes on Paakanaak Avenue. Following the connection works, road reinstatement of the fully affected asphalt area will be required. The works described above will be carried out with consideration for the surrounding community. Adequate notice of water shut-offs and works within the roadway will be provided to residents, and all necessary measures required by the municipality and regulatory authorities will be in place prior to the commencement of these works.

10.1.2 Water Connection to Bank Street

The preferred water servicing solution for the subject site is to extend existing municipal infrastructure. This solution includes a connection to the existing 400 mm watermain on Bank Street. The elevation of the top of the watermain is approximately 98.75 and is located on the west side of the roadway. This will require a partial road-cut and temporary shut-off of a portion of the watermain within Bank Street. Following the connection works, road reinstatement of the fully affected asphalt area will be required. The works described above will be carried out with consideration for the surrounding community. Adequate notice of water shut-offs and works within the roadway will be provided to residents, and all necessary measures required by the municipality and regulatory authorities will be in place prior to the commencement of these works.

10.1.3 Sanitary Sewer Extension along Bank Street

The preferred wastewater servicing solution for the subject site is to extend existing municipal infrastructure. As discussed in section 6.5, due to the site topography, location, and capacity of available infrastructure, the east side of the subject site will outlet to Bank Street and flow north to a proposed connection at Labrador Crescent. This solution involves constructing a new 200 mm dia. sanitary sewer along Bank Street. The total length of the proposed sewer is approximately 850 m and is to be installed 2.5-5.5 m below the existing ground. The currently proposed alignment of the sewer is on the east side of Bank Street, within the asphalt shoulder. This alignment will require a temporary shift of the north- and south-bound lanes to the west, allowing the north-bound lane to remain open throughout the project. While traffic slowdowns will occur, this option minimizes impacts on the surrounding community.

As mentioned above, a wastewater connection is proposed to the existing sewer on Labrador Crescent, depicted in **Figure 6-2** in **Appendix D**. The depth of excavation at the proposed connection is approximately 4.0 m deep and will require a full-width road cut on Bank Street and a partial road cut on Labrador Crescent. Following sewer installation, reinstatement of all affected surface works will be required. This should include road reinstatement, curbs, sidewalks, bike lanes/multi-use paths, trees, and landscaping reinstatements. Adequate notice of the works mentioned above will be provided to the community, and all necessary measures required by the municipality and regulatory authorities will be in place prior to the commencement of these works.

10.1.4 Sanitary Sewer Extension from Paakanaak Avenue

The preferred wastewater servicing solution for the subject site is to extend existing municipal infrastructure. For the western portion of the subject site, this will be through a connection to the sanitary sewers on Paakanaak Avenue. The proposed sewers will be constructed through the existing pathway block between civic #545 and #549, as shown on **Figure 6-2** in **Appendix D**. The depth of excavation at the proposed connection is approximately 3.0 m and will require a partial road cut and temporary closure on Paakanaak Avenue. This work is anticipated to be completed concurrently with the watermain connection works to limit the impact on the surrounding community Following sewer and watermain installation, an asphalt and curb reinstatement, where applicable, will be required. Adequate notice of the above-mentioned works will be provided to the community, and all necessary measures required by the municipality and regulatory authorities will be in place prior to the commencement of these works.

10.1.5 Storm Sewer Extension along Bank Street

The preferred stormwater servicing solution for the eastern portion of the subject site consists of an on-site stormwater management facility with an outlet to a newly constructed sewer on Bank Street. The approximate location of the new storm sewer is shown in **Figure 7-2** in **Appendix E**. The proposed sewer will range from 2.5 to 4.5m below the existing ground and will convey flows from the site downstream on Bank Street and connect to the existing 1350 mm storm sewer on Dun Skipper Drive (MHST79649). Arcadis is currently evaluating the preferred alignment of the storm sewer within the Bank Street right-of-way. Traffic considerations, location of existing utilities and municipal infrastructure are being considered when evaluating alignment alternatives. A road cut may be required at the Bank Street and Dun Skipper intersection, including reinstatement of all surface works. Adequate notice of the above-mentioned works will be provided to the community, and all necessary measures required by the municipality and regulatory authorities will be in place prior to the commencement of these works.

10.2 Phasing

Phasing of this development is not expected due to its relatively small size. Should the developer wish to proceed with phasing this development, consultations with City staff are recommended during detailed design stages to ensure that an adequate level of service is provided for vehicle and pedestrian connectivity, emergency access, water resilience and quality, and suitable wastewater and stormwater outlets are achievable.

10.3 Approvals

This report aims to support the Municipal Class EA process and the provisions of the Planning Act. It also seeks to demonstrate the site's functional servicing aspects to support draft plan approval. In addition to these processes, the following agency approvals will be required to implement the proposed development plan.

- Ontario Water Resources Act

  All projects involving wastewater pump stations, sanitary sewers, storm sewers and stormwater management facilities will require an Environmental Compliance Approval (ECA) from the Ministry of the Environment. ECAs for stormwater management facilities generally include post-construction water quality monitoring to demonstrate the facility's performance with respect to the TSS removal design target. The infrastructure proposed to support this development is subject to the City of Ottawa Continuous Linear ECA (CLI-ECA), and MECP approval is not required.

Table 10-1 below summarizes the conclusions/ findings of this report as they relate to the stormwater management evaluation criteria set out in the CLI-ECA. The evaluation opportunities as listed in Appendix A Table A.1 of the CLI-ECA are outlined below. These evaluation opportunities have been analyzed according to the evaluation hierarchy described in footnote [3] of the table.

- Conservation Authorities Act

  All works associated with the enhancement of the outlets to the Leitrim Wetland Area will require approval by the South Nation Conservation Authority under Section 28 of the Conservation Authorities Act.

- Municipal Approvals

  The City of Ottawa Development Guidelines identify typical reports and studies necessary to support Draft Plan Approval. In addition, Draft Plan conditions may identify specific studies necessary to secure governmental approvals for the respective developments.

Table 10-1: Evaluation of Appendix A Table A.1 of the CLI-ECA

Evaluation Opportunity	Evaluation Hierarchy	Analysis Completed (✓ or ×)	Conclusions	Supporting Documents
Water Balance For Development Scenarios	Retention (infiltration, reuse, or evapotranspiration)	✓	According to the Hydrogeological Study prepared by Paterson group, retention by means of infiltration is not recommended due to high groundwater tables and the presence of bedrock. Based on traditional BMPs, roof leaders are to discharge to vegetated areas, where site-level retention and filtration are provided for more frequent events. The lot grading will consist of a split drainage design, where runoff is directed to the street and to the rear-yard drainage system. The rear yard drainage systems provide vegetated swales with a City standard subdrainage system. This will facilitate site-level retention and filtration, while providing a dedicated outlet for more frequent rainfall events to minimize standing water in privately owned rear yards.	Paterson Group Report PH5087-REP.01.R1 Hydrogeological Study – Proposed Residential Development 4850 Bank Street Ottawa, ON
	LID filtration	✓	The MTO Low Impact Development Stormwater Management Guidance Manual (January 2022) identifies several filtration-based LID practices. Based on site constraints and grading limitations, downspout disconnection and vegetated filter strips are recommended for this development. Downspout disconnection will be encouraged for rear-yard roof leaders to promote localized runoff filtration and attenuation. In addition, vegetated filter strips will be incorporated into the standard rear-yard drainage system, consisting of shallow swales and catch basins, to provide filtration and convey runoff.	

Evaluation Opportunity	Evaluation Hierarchy	Analysis Completed (✓ or ×)	Conclusions	Supporting Documents
	Conventional Stormwater Management	✓	While lot-level source controls and BMPs are implemented throughout the development, conventional stormwater management solutions that provide quality and quantity control are proposed for the development site.	Conceptual Level Demonstration in this report
Water Quality For Development Scenarios	General	✓	Based on traditional BMPs, roof leaders are to discharge to vegetated areas, where site-level retention and filtration are provided for more frequent events. The lot grading will consist of split drainage design, where runoff is directed to the street and to the rear-yard drainage system. The rear yard drainage systems feature vegetated swales with a City-standard subdrainage system. This will facilitate site-level retention and filtration, while providing a dedicated outlet for more frequent rainfall events to minimize standing water in privately owned rear yards.	Conceptual Level Demonstration in this report
	Suspended Solids	✓	Conventional methods are proposed with 80% TSS Removal	Conceptual Level Demonstration in this report
	Phosphorus	x	The site is not tributary to Lake Erie or Lake Simcoe, or its Tributaries	
Erosion Control (Watershed) For Development Scenarios	N/A	✓	-Peak Flows are controlled to below Pre-development -25mm event is controlled to a 24-hour drawdown time -Detailed Erosion Control Measures to be included at Detailed Design Stages	

Evaluation Opportunity	Evaluation Hierarchy	Analysis Completed (✓ or ×)	Conclusions	Supporting Documents
Water Quantity (Minor and Major System)	N/A	✓	As per municipal Standards, Stormwater Management Planning and Design Manual and existing design constraints for the Constructed Channel (west outlet) and Findlay Creek Stormwater Management Facility (east outlet)	Conceptual Level Demonstration in this report
Flood Control (Watershed Hydrology)	N/A	✓	On-site retention for the 100-year return storm event, per municipal guidelines and standards, and Stormwater Management Planning and Design Manual	Conceptual Level Demonstration in this report
Construction Erosion and Sediment Control	N/A	✓	Detailed Erosion and Sediment Control Plans for construction will be provided at the Detailed Design Stages	Defer to Detailed Design

11 Conclusions and Recommendations

This report briefly outlines the process by which the subject lands have progressed from the OPA, which brought the lands into the urban boundary, to the preparation of the concept plan. The findings in this report are to be read in conjunction with the Planning Rationale, Master Transportation Study, and the Environmental Impact Study. The basis of this Serviceability Report also intends to replace the Assessment of Adequacy of Public Services Report (APSR) required to support the application for Draft Plan Approval of the S-4 UEA lands.

11.1 Water Distribution

The recommended Water Distribution system is illustrated in **Figure 5-2** in **Appendix C**. The recommended network utilizes a typical hierarchy of nominal watermain sizes to provide necessary domestic and fire flows to support the development in accordance with City of Ottawa, OPS and MECP standards, specifications and design requirements.

Internal watermain sizes will vary from 200mm to 250mm in diameter.

The recommended water plan involves connections to the existing water network on Kelly Farm Drive and Bank Street.

11.2 Wastewater Collection

The recommended Wastewater collection system is illustrated in **Figure 6-2** in **Appendix D**. The recommended network utilizes 200mm diameter sanitary sewer sizes in accordance with City of Ottawa, OPS and MECP standards, specifications and design requirements for on and off-site works.

Collected wastewater will be discharged to the existing municipal infrastructure on Paakanaak Avenue and Labrador Crescent. Off-site extensions are required through an existing pathway block off Paakanaak Avenue, and via a 850m sewer extension along Bank Street.

A new sanitary sewer overflow is required to limit the sanitary HGL within a section of the downstream sewer. The purpose of the overflow is to provide relief to the system during station failure and/or extreme wet weather events. These scenarios were calculated under conditions of a “Rare Event,” which uses a higher infiltration rate. In this scenario, the HGL exceeded several USF elevations, as summarized in Table 6-2 of this report. Following the introduction of the new overflow, freeboard was re-established between the HGL and USF elevations, as summarized in Table 6-3 of this report. Final sizing and location of the new overflow will be coordinated during the detailed design stages and will include discussions with City staff and landowners east of Bank Street.

Upgrades to existing municipal infrastructure are not required.

11.3 Stormwater Management

The recommended Stormwater Management system is illustrated in **Figure 7-2** in **Appendix E**. The recommended network utilizes a typical hierarchy of nominal storm sewer sizes in accordance with the City of Ottawa, OPS, and MECP standards, specifications, and design requirements.

Storm sewer sizes are expected to range from 300mm to 900mm in diameter.

The recommended system utilizes two outlets that similarly correspond with existing conditions. The western outlet will require a newly constructed linear wetland facility combined with a dedicated Oil and Grit Separator to provide stormwater quality and quantity controls. It will outlet to the existing constructed channel, adjacent to the Pathways Phase 3 community, and into the Leitrim Wetland Area. The eastern outlet will require an on-site dry pond facility to control major storm events, and a minor system extension along Bank Street to Dun Skipper, utilizing existing allocated capacity in the system. The existing Findlay Creek Stormwater Management Facility provides quality control for the eastern outlet.

11.4 Utility Infrastructure

Utility companies have noted the area can be serviced, and they will advance the design of their respective plants once the detailed design commences on the plan of subdivision. They requested that they remain informed during the Plan of Subdivision process.

Appendix A

- S-4 Leitrim Urban Expansion Area Concept Plan 14a

Unit Mix Breakdown

Unit Type	Count	Mix %	Target
42' Singles	14	**5%**	**5%**
35' Singles	21	**7%**	**10%**
31' Singles	18	**6%**	**10%**
27' Singles	24	**8%**	**10%**
2 Storey Townhouse	131	**43%**	**40%**
Back-to-Back Stacked	96	**32%**	**25%**
TOTAL	**304**	100%	100%

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

M:\2023\123168\CAD\Planning\Concept Plans\123168-CP14a.dwg, Concept Plan - Dual Scale, Jun 13, 2025 - 1:54pm, wsloss

No.	REVISION	DATE	BY
4.	REVISED PER COMMENTS	JUNE 13/25	RT
3.	CONCEPTUAL LOTTING ADDED	JUNE 02/25	RT
2.	REVISED PER COMMENTS	MAY 22/25	RT
1.	PREPARED FOR DISCUSSION	MAY 09/25	RT

SCALE
1:1500 (A1) /
1:3000 (11x17)
1:1500
0 15 30 45 60

DESIGN XXX
CHECKED XXX
DRAWN wls
CHECKED XXX
APPROVED XXX

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY of OTTAWA
4850 BANK STREET

DRAWING NAME
CONCEPT PLAN 14A

PROJECT No. 123168-00
REV REV #4
DRAWING No. 123168-CP14a

PLAN24x36.DWG - 914.4mmx609.6mm

Appendix B

- S-4 Leitrim West of Bank Street Terms of Reference (Servicing)
- City Correspondence Regarding Review of the Existing Conditions

Memo

SUBJECT
S-4 Leitrim West of Bank Street
Terms of Reference (Servicing)

TO
John Bougadis
Senior Project Manager, Infrastructure Planning
City of Ottawa

DATE
July 02, 2024

OUR REF
Places Canada – Land Engineering

DEPARTMENT
Land Engineering

PROJECT NUMBER
145172

COPIES TO
Robin Van de Lande, City of Ottawa
Joe Zagorski, City of Ottawa
Greg Winters, Novatech
Evan Garfinkel, Regional Group
Mahsa Ghasri, Arcadis
Peter Spal, Arcadis

NAME
Ryan Magladry, C.E.T
ryan.magladry@arcadis.com

The following has been prepared as the Terms of Reference associated with the servicing components for the City of Ottawa S-4 Leitrim Expansion Lands. These Terms describe the scope of work associated with preparing a Serviceability Report and Natural Heritage Existing Conditions Report in support of the final land use plan for the subject development area.

1.1 Study Area

The S-4 Leitrim Expansion Land covers approximately 13.7 ha of heavily vegetated land located west of Bank Street at the southern limit of the existing Leitrim Development Area. It is bounded to the north by an existing residential community, to the east by Bank Street and undeveloped lands to the south and west. The location of the future Earl Armstrong extension is planned to encroach over the southern property line of the subject lands. A municipal class environmental assessment has already been completed for the Earl Armstrong extension. The Leitrim Wetlands and Rideau Carleton Raceway and Casino are located to the west of the property. An aerial photo of the subject site location is provided below;

2.1 Natural Heritage Existing Conditions Report

A Natural Heritage Existing Conditions Report (NHECR) will be prepared to support land-use planning for the development of the S-4 Leitrim Expansion Lands. Below are the proposed NHECR Terms of Reference;

2.1.1 Policy Framework and Technical Document Review

This section includes a summary of the relevant regional, provincial, and federal acts, regulations and policies that apply to the proposed development in respect to the Natural Heritage Features (NHF). It briefly describes the implications these may have for the construction of the infrastructure.

2.1.2 Existing Conditions

Summary of the existing Natural Heritage Features within and adjacent to the Project Area based on a combination of background data and on-site field investigations.

- Historic Land Use
- Landforms, Soils, and Geology
- Surface and Groundwater Features
- Natural Heritage Features
- Natural Heritage System

2.1.3 Constraints and Opportunities

This section provides a summary of the natural heritage features identified through background data review and field data collection and outlines the constraints and potential opportunities associated with the Project Area.

2.1.4 Implementation and Phasing

Recommendations will be provided for additional studies and or approvals required to support development applications (e.g., Environmental Impact Study, Tree Conservation Report).

2.2 Collect and Review Background Information

- Collect legal and topographic information.
- Collect Geotechnical and Hydrogeological information.
- Meet City staff and SNCA to review existing reports (water, sanitary and stormwater management for the surrounding area), including the 2016 Updated Serviceability Study Leitrim Development Area, and local Design Briefs for neighbouring downstream subdivisions.
- Scope existing water supply opportunities and constraints.
- Scope existing sanitary outlet opportunities and constraints.
- Review planned off-site infrastructure upgrades in the vicinity of 4850 Bank Street, including a review of the City’s Infrastructure Master Plan for currently planned upgrades.
- Identify outlet concerns and detailed analysis requirements.

2.3 Assist in Developing the Preferred Land Use Concept Plan

In comparison to other expansion lands, the site's area is relatively small (13.7 ha), is under single ownership and is heavily constrained on three sides. There is an existing residential development to the north and east (Bank Street) and the future Earl Armstrong Road will impact the southern portion of the site. To this end, we assume that the development of the preferred Land Use Concept Plan will be a fairly straightforward process and will not involve a detailed analysis of multiple alternatives. We will;

- Provide technical support to the Planning Team, as it works to determine a preferred concept.
- Provide preliminary evaluation of the preferred concept plan with input from City, SNCA and MECP.

2.4 Determine Preferred Servicing Strategy in Conjunction with Finalizing Preferred Land Use Concept

Consult with Stakeholders, Landowner(s), the City of Ottawa, SNCA, and MECP to finalize a preferred servicing strategy to provide water, wastewater, and stormwater services to the preferred land use concept. This process will require coordination with the planning of the preferred land use concept and implementation of the recommendations of the Natural Heritage Analysis and Geotechnical and Hydrogeological investigations.

Based on general design assumptions, provide conceptual design requirements for water, wastewater and stormwater management systems.

Identify works proposed, if any, that are subject to the class EA process and what process will be used to satisfy this requirement.

- Adjust the servicing concept to reflect any changes in the preferred land use concept to reflect public input.
- Liaise with the City, SNCA, Landowner and MECP to confirm the viability of the revised servicing concept and finalize the preferred servicing concept in conjunction with the finalized land use concept.

2.5 Prepare Serviceability Report

The Serviceability Report for the subject lands will be a scoped-down Master Servicing Study. It will generally follow the City of Ottawa's IMP Appendix C: Guideline for Preparing Terms of Reference for a Master Servicing Study. The report will address Water Distribution, Wastewater Collection, Stormwater Servicing Requirements, and Grading Requirements.

Typical larger, more complex development areas require an Existing Conditions Report. For this site, we propose summarizing the existing conditions and integrating the findings within the Serviceability Report.

Arcadis will endeavour to compile information on existing conditions from various sources, including previous studies, existing and new topographic mapping and surveys, as-built records and liaisons with the City of Ottawa. This information will form the basis of the existing conditions report and set the parameters for the Serviceability Report.

- Acquire base topographical mapping from NRCAN and Surveying consultants and provide commentary on existing site topography, including peripheral areas.
- Acquire base survey mapping from surveying consultants.
- Acquire geotechnical and hydrogeological field investigations from Geotechnical consultants and determine if a geomorphology study is required.
- Complete a scoped Natural Heritage Existing Conditions Report
- Identify adjacent lands, rural or urban, and their drainage patterns and discuss how it impacts the proposed development.
- Identify opportunities and constraints associated with the supply of:

  - Potable water;
  - Wastewater; and,
  - Stormwater management systems, including currently planned upgrades in the City's Infrastructure Master Plan.
  - The Existing Conditions Plan (s) will be prepared in conjunction with the Natural Heritage Existing Conditions Report to ensure the existing conditions associated with the study area's geotechnical, hydrogeological, and fluvial geomorphology assessments are included in the overall existing conditions plan.

We will work with City Staff to determine the scope limits for off-site future development for adjacent lands. At the time of writing these Terms of Reference, it is not anticipated that any additional lands will need to be evaluated as part of this Serviceability Report.

Due to the small size, single landowner, and relative simplicity of servicing the subject lands, the Serviceability Report is not expected to discuss Section V – Evaluation of Alternative Servicing Plans and identification of preferred Servicing Plans of the City of Ottawa IMP Appendix C: Guideline for Preparing Terms of Reference for a Master Servicing Study.

The Serviceability Report will provide a discussion for financing off-site servicing-related works.

The Serviceability Report will provide functional-level analysis and recommendations for the following;

Water Distribution System

- Due to the small size of the S-4 lands and its location immediately adjacent to Bank Street and the Leitrim Development Area, no analysis of offsite or trunk watermains is anticipated. The City will provide boundary conditions for at least two adjacent locations, such as Bank Street and Paakanaak Avenue.
- Provide an updated demand allocation in accordance with consumption rates based on the City of Ottawa Design Guidelines for Water Distribution or based on area-specific consumption rates provided by the City of Ottawa.
- Clearly define the relevant sections of the City of Ottawa Design Guidelines for Water Distribution, to be utilized in the detailed design of the water distribution system.
- Complete preliminary construction phasing analysis of the overall water system to identify thresholds for construction of major upgrades (if any are required) and clearly identify any thresholds in the report.
- Ensure consistency with the NHECR and incorporate mitigation measures as required.

Wastewater Collection System

- Since the S-4 lands are adjacent to existing urban developments, we will explore opportunities to connect to available existing local sanitary sewers. Due to the nature of the site's topography, where two natural drainage patterns, one eastward and one westward, we will review and recommend gravity connections at two locations. We expect one of these connections will involve an offsite gravity sewer in a section of Bank Street connecting to Labrador Crescent, and the other to Paakanaak Avenue.
- Work with the City to review and confirm acceptable design criteria in the event current flow generation design guidelines are not appropriate based on theoretical flows depicted in the 2016 Updated Serviceability Study Leitrim Development Area or City of Ottawa Sewer Design Guidelines. All existing downstream sanitary sewer infrastructure was designed without consideration of 4850 Bank Street.
- Work with the City to review and confirm the available capacity in the Leitrim Sanitary Pump Station and downstream outlet sewers.

- Delineate the preferred sanitary drainage areas in compliance with the City of Ottawa Sewer Design Guidelines.
- Prepare estimated population projections based on the preferred Development Plan.
- Develop Sanitary Calculation Sheets in accordance with the City of Ottawa Sewer Design Guidelines (no hydraulic modelling of the system will be conducted as part of this study. If needed, we assume that the city will complete all dynamic modelling independently of this study).
- Prepare preliminary plan and profile drawings of offsite sanitary sewer systems for the preferred option.
- Clearly define the relevant sections of the City of Ottawa Sewer Design Guidelines, to be utilized in the detailed design of the wastewater collection system.
- Complete preliminary construction phasing analysis of the overall sanitary sewer system to identify thresholds for construction of major upgrades and clearly identify the thresholds in the report.
- Ensure consistency with the NHECR and incorporate mitigation measures as required.

Stormwater Management and Storm Conveyance Design

- Develop a stormwater management rationale for the community in accordance with the recommendations of the Natural Heritage Existing Conditions Report and preferred concept plan constraints.
- Develop a preferred trunk storm sewer network and pond concept(s) based on the preferred land use plan.
- Develop storm drainage area plans for the preferred land use plan in compliance with the City of Ottawa Sewer Design Guidelines.
- Develop stormwater management hydrologic and hydraulic models supporting the preferred land use plan in compliance with the City of Ottawa Sewer Design Guidelines and relevant storm rainfall data. This analysis will assume existing design criteria for the new urban areas.
- Define major system routing maintaining City criteria for maximum permitted flow on streets.
- Provide grading and sewer network options, including plan and profile drawings for the proposed major storm trunk sewers and a preliminary 100-year hydraulic grade line calculation.
- Conducting preliminary dual drainage system stress simulation using 100 year +20% event.
- Clearly identify the relevant sections of the City of Ottawa Sewer Design Guidelines, to be utilized in the detailed design of the storm sewer network.
- Develop conceptual pond facility layouts to support the preferred land use plan.
- Summarize pond volume requirements and outlet controls in accordance with the stormwater management hydrologic and hydraulic models in compliance with the City of Ottawa Sewer Design Guidelines, and relevant storm rainfall data.

  Ensure consistency with the NHECR and incorporate mitigation measures as required.

Master Grading

- Prepare a preferred grading plan for the subject development lands that optimizes earthworks within the concept plan area in compliance with the City of Ottawa Sewer Design Guidelines and reflects grade raise constraints identified in the geotechnical report for the project.
- Include overland flow routes for major/emergency storms.

Phasing Plan

- Prepare a functional phasing plan for the development area. The serviceability report will also discuss the potential phasing of the development and the constraints associated with each phase.

Utilities Overview

- Coordinate with utility companies (Hydro, gas, and communications, etc.) to provide an overview of the requirements for servicing the community, identifying schedule and budget expectations.

Regulatory Approvals

- Circulate the Serviceability Report to the City of Ottawa, SNCA and MECP for Comments, discussion and Approval.
- Revise the Serviceability Report, as required, to reflect final comments from stakeholder agencies.
- Provide a discussion on integration with the City's CLI-ECA

EA Process (If required)

- Coordinate with City staff and planning consultants to determine the scope of a potential MCEA.
- Identify the steps and processes for proceeding through the MCEA from commencement to completion.
- On Approval of Concept Plan by City Staff, Issue Notice of Completion of Project identifying projects subject to the class environmental assessment process and notifying Completion of EA Process.

2.6 Deliverables

The deliverables for the site servicing will include:

A detailed Serviceability Report will be prepared following the steps of Class EA process (if required) which details storm drainage, wastewater, and water infrastructure needs in support of the proposed development. This report will include but not be limited to:

- Identification of Existing Conditions;
- Master Grade Plan(s), identifying fill constraint areas;
- Major System Flow Routing Plan;
- Local Storm Sewer Distribution Plan;
- Local Sanitary Distribution Plan;
- Local Water Distribution Plan;
- Master Stormwater Management Plan, including conceptual SWM facility designs;
- Digital copies of all models used to analyze the proposed infrastructure.

Appendix A

City of Ottawa – Guideline for Preparing Terms of Reference

Appendix C: Guideline for Preparing Terms of Reference for a Master Servicing Study

Guideline for Preparing Terms of Reference for a Master Servicing Study

June 2023

Overview

A Master Servicing Study (MSS) is typically completed as part of a Community Design Plan (CDP) process, or in conjunction with a land use planning process for a Local Plan area where coordination of water, wastewater and/or stormwater servicing is required between multiple developments and/or landowners that would proceed through separate, subsequent development approvals processes under the Planning Act. The purpose of this Standard Terms of Reference for Master Servicing Studies (MSS ToR) is to outline the scope of the studies that are required in accordance with the MSS Policies in Section 2.6 of the Infrastructure Master Plan (IMP) Policies and Programs document. The MSS ToR identify the general scope and expectations of technical studies required to support the master planning of infrastructure, where local plans are needed to support development in Future Neighbourhood Overlay areas (also referenced as 'expansion areas').

The terms outlined in the MSS ToR are intended to be a reference guide for developers and their professional consultant team (hereafter "Project Team"). The scope of investigation identified in this document is intended to address typical study requirements. Standard practice requires the Project Team to meet with City staff early in the planning process to discuss area-specific servicing issues prior to finalizing the Terms of Reference that will guide preparation of the MSS. This process is intended to ensure the studies are appropriately scoped, and integration requirements of the Municipal Class Environmental Assessment planning process can be satisfied.

The scope of study to be undertaken in an MSS will be dependent on the planning process requirements to remove the Future Neighbourhood Overlay. Where a full CDP process is required, the MSS will require greater integration / coordination with other supporting master planning studies, including the CDP, Environmental Management Plan (EMP) and Transportation Master Plan (TMP). Where the subject expansion area is small, and is largely owned by one landowner, removing the Future Neighbourhood Overlay may be satisfied through preparation of a Concept Plan. In such circumstances the scope of the MSS may be reduced where integration / coordination with other master planning documents is small in scope or not required. A schedule identifying Future Neighbourhood Overlay areas requiring a CDP versus CP planning process will be approved by Council. In all circumstances, the MSS Terms of Reference for expansion areas need to include the preparation and evaluation of servicing alternatives, as appropriate.

It is the responsibility of expansion area landowners to confirm the specific study requirements have been fulfilled by completing the checklist in Schedule A, prior to completing their professional reports or technical studies, and to ensure the various reports are appropriately coordinated and integrated. Unless extenuating circumstances apply, all studies and reports are expected to be completed at the expense of the benefiting landowners.

Annex 5, 6, and 7 of the OP document existing Area Specific Study locations, and Urban and Rural Secondary Plan areas, respectively, where previous MSSs or other master planning of infrastructure (for example, Environmental Management Plans or Master Drainage Plans) have been completed. This MSS ToR is also to be followed when completing updates / addenda to previously approved master planning documents when:

- land use changes may be proposed in these areas;
- there has been a change in the environmental setting; and/or
- the Class Environmental Assessment approval may have lapsed due to delays in project implementation in these areas.

MSS Study Process

The following represent the standard steps expected during the completion of the MSS study process:

i) Preparation and approval of an area-specific Terms of Reference;
ii) Documentation of existing conditions;
iii) Documentation of future development conditions;
iv) Identification of servicing design constraints and evaluation criteria;
v) Development of water, wastewater, and stormwater servicing alternatives and compatible grading plans;
vi) Evaluation of alternative servicing plans and identification of preferred water, wastewater, and stormwater servicing plans;
vii) Development of Implementation Plan including phasing and financial plans; and
viii) Securing all required planning approvals.

A landowners group is to be established in areas requiring a CDP, and a Project Lead will be chosen for the study. In areas requiring only a CP the majority landowner will identify the Project Lead responsible for completing the MSS. Project Leads will be responsible for ensuring the MSS includes documentation of servicing alternatives for minority / non-participating landowners.

The Project Lead will be responsible for assembling a multi-disciplinary consultant team ('the Consultant Team') with the required expertise to prepare the Community Design Plan and supporting studies, i.e., MSS, Environmental Management Plan (EMP) for the Neighbourhood Overlay and/or Industrial & Logistics areas. In areas requiring a Concept Plan only, the Project Lead is to ensure the principles of master planning are followed, including evaluation of alternatives.

While an MSS is largely a technical (engineering) document, the evaluation process required to arrive at the preferred servicing solutions involves an integrated, inter-disciplinary effort by consultants preparing the CDP/CP and EMP with expertise in water resources and municipal engineering, and supporting disciplines including hydrogeology, geotechnical engineering, geomorphology and natural sciences (aquatic and terrestrial biology).

Preparation of Area Specific Terms of Reference, Study Schedule, and Consultation Plan

Working from this document, the Project Lead will be responsible for preparing a Terms of Reference for the MSS that is tailored to address the anticipated area-specific servicing issues, while also addressing and mitigating potential environmental impacts.

The Project Lead and representatives from the Project Team and landowners will meet with City staff to discuss the content and scope of the Terms of Reference expected to address all study components of the MSS, in addition to the anticipated Study Schedule and details of the Consultation Plan.

The City will identify a Project Manager overseeing the MSS, who will be responsible for assembling a Technical Advisory Committee (TAC) with representation from various City business groups and external agencies.

The submitted servicing plans are to comply with all City and agency Design Guidelines and Policies. A Draft Terms of Reference will be circulated to TAC members for review and comment. The area specific Terms of Reference are to be completed to the satisfaction of the General Manager of the Infrastructure and Water Services Department (IWSD).

The MSS must identify the process through which legal outlets are to be established for each of the outlets identified through the EMP. It is expected that early discussions with the City's Drainage Superintendent will be held during the MSS process, ensuring compliance with the Drainage Act process - required to establish a "legal and sufficient outlet" for the area. Where drainage through Federal lands is required, this process must consider applicable federal approvals. MSS approval will be contingent on sufficient notification and opportunity for input from affected property owners regarding these outlets. While there is a need to coordinate the planning of stormwater servicing with Drainage Act projects, the approval process for works required under the Drainage Act is separate from the MSS study process. The development proponent and/or landowners are responsible for initiating and completing this process.

i) Documentation of Existing Conditions

Using a combination of existing reports, mapping, monitoring, and inventory data, supplemented by field investigations and surveys, an existing conditions report will be prepared to document baseline conditions including an assessment of residual system capacities and design constraints to be factored in MSS recommendations.

A partial list of existing conditions to be documented includes:

- Base mapping – topographic mapping; property ownership; surficial geology; surface water; LiDAR; Official Plan and Zoning related information; water, wastewater, and stormwater services; geotechnical and hydrogeological data; etc.

- Summary of relevant reports – previous relevant master planning documents and their findings and recommendations; servicing and geotechnical reports of nearby development applications; environmental impact studies; watershed, subwatershed and floodplain mapping studies; environmental management plans
- Supplementary field investigations per approved ToRs and/or IMP policies -: topographic survey (drainage outlets; environmental features; etc.); flow monitoring; geotechnical and hydrogeological investigation; environmental inventorying work (EMP); geomorphology study; etc.
- Adjacent rural lands – document all adjacent rural designated lands that naturally drain through the expansion area that could form part of the City's longer-term growth needs and would rely on future service connections through the expansion area.
- Preparation of existing conditions models: water distribution network; wastewater collection system; stormwater drainage; water budget; etc.
- Archaeological study

The City will make available its GIS data and archived reports to assist the Project Team, in addition to other supporting information, such as water and sanitary boundary conditions. The Project Lead and Project Manager will be responsible for establishing the required data sharing agreements.

Studies documenting existing conditions shall be prepared and integrated in accordance with any other relevant standard ToR or guidelines for those studies (for example, the EMP and Water Budget ToR). Where an EMP is not being prepared for the expansion area, the MSS is to include modelling of the existing on-site and off-site (subwatershed / reach) conditions of the receiving watercourse sufficient to establish stormwater design criteria.

Through coordination with the Final EMP, where one is being prepared, the Final MSS will formally document the stormwater management performance criteria per Appendix A of the Consolidated Linear Infrastructure-Environmental Compliance Approval process.

ii) Documentation of Future Development Conditions

This study task will be completed as an iterative process in consultation with the Project Team and TAC members, and through coordination with the CDP/CP process. Water demand, wastewater generation, and post-development drainage conditions will be documented, as appropriate, in the evaluation of alternative land use concepts within the expansion area.

Subject to OP Policy 4.7.1.15, potential future demands from the adjacent rural lands documented in task ii) above, are to be documented and factored in sensitivity analysis before recommending the preferred servicing plans.

Based on consultation with City staff, projects identified in the City's Infrastructure Master Plan that are needed to support servicing of the area are to be documented. (Depending on the expected project timing, Front Ending Agreements may be required to meet development expectations.)

Future conditions computer models will be developed for evaluating alternative on-site and off-site (downstream) water, wastewater, and stormwater servicing required for the alternative development concepts, as appropriate. Computer models are to be developed consistent with requirements in City Design Guidelines.

iii) Identification of Servicing Design Constraints and Evaluation Criteria

A comparison of future conditions demands against residual capacities of existing water, wastewater, and stormwater systems is to be completed to identify the potential scope of on-site and off-site infrastructure required to support future development applications within the Neighbourhood Overlay area, and potential future rural expansion lands.

Based on the anticipated scale, configuration, and location of anticipated on-site and off-site infrastructure requirements, a set of evaluation criteria and a scoring methodology representing a range of relevant factors for the water distribution network, wastewater collection system, and stormwater management system will be developed and finalized in consultation with the TAC to fulfill standard Class Environmental Assessment evaluation of alternatives solutions. Typical evaluation criteria may include land use compatibility; compatibility with existing and planned infrastructure capacity; flood protection; grading requirements; project phasing and implementation flexibility; life cycle costs; impacts to sensitive habitat; overall resiliency of the proposed systems under current and future climate conditions; and capital cost. The evaluation of stormwater management alternatives and related drainage improvements is to show compliance with criteria established in the EMP. MSS recommendations must be consistent with all OP and IMP policies.

iv) Development of Grading Plan, and Water, Wastewater and Stormwater Servicing Alternatives

The MSS is to document water, wastewater, and stormwater servicing approaches, at a conceptual level, for the alternative CDP/CP land use concepts being evaluated. Preferred water, wastewater and stormwater servicing alternatives and the associated grading plan for the preferred land use concept are to be prepared at a functional design level of detail. Development of Local Plan areas typically proceeds in a phased manner. Accordingly, the phasing of development should be considered when preparing the servicing alternatives and plans, this includes consideration for interim measures.

Grading Plan

The grading plan is to inform design elements to be factored in overall community and infrastructure planning. Working within boundary constraints, the grading plan is to consider various design criteria including grade raise restrictions, natural hazard setbacks, and City of Ottawa Sewer and Water Design Guidelines (SWDG) criteria regarding frost cover, minor and major system design, and enable an optimal servicing plan free of conflicts.

The grading plan is also to provide sufficient detail in areas of community amenities like parks and pathways to ensure constraints to their ultimate development are minimized, required easements are identified, and their development can proceed economically. The grading plan is also to avoid the use of retaining walls, which will only be permitted in exceptional circumstances, supported by detailed justification.

Water, Wastewater, and Stormwater Servicing and LID Plans

Servicing plans are to be prepared to a functional design level of detail. This includes all watermains 300mm diameter and larger, sanitary sewers 250mm diameter and larger; and storm sewers, generally, 900mm and larger. An LID concept plan is also to be prepared, demonstrating how LID measures will be integrated with the overall land use and servicing plans to achieve applicable runoff volume control, water budget or other related targets identified in a subwatershed study, EMP or the MSS. Where the MSS has been prepared in support of a Concept Plan, servicing plans are to be completed with additional detail typically required in a Functional Servicing Report.

The servicing alternatives are to provide a servicing solution for all lands within the study area, including land owned by non-participating landowners. Servicing solutions should also optimize the resiliency of the system to mitigate the impacts of a changing climate on the system performance. Servicing plans that deviate from City design guidelines will only be permitted in exceptional circumstances, supported by detailed justification.

Area specific Terms of Reference are to detail the proposed modelling scenarios that will be factored in the formulation and evaluation of the servicing plan alternatives, based on all City and other applicable design guidelines and the existing and future area-specific water pressure zone configurations, and wastewater and stormwater outlets.

v) Evaluation of Alternative Servicing Plans and Identification of Preferred Water, Wastewater, and Stormwater Servicing Plans

The alternative servicing plans are to be evaluated based on the criteria and scoring methodology approved by the TAC in Task 'iv'. The results of the evaluation will be considered preliminary until the Project Team has satisfactorily addressed comments by TAC members, based on their review of documentation supporting the servicing plans. The Terms of Reference are to describe the evaluation and consultation processes with TAC members and the public.

vi) Development of Implementation Plan Including Phasing and Financial Plans

An Implementation Plan is to be prepared to guide decision making concerning the timing of infrastructure needs required to support development within the urban expansion area. If appropriate, the Implementation Plan should include a Phasing Plan when the scope of work, or location of development is dependent on the completion and commissioning of certain on-site or off-site infrastructure.

The Implementation Plan must also identify all anticipated Regulatory approval requirements.

Financing of trunk infrastructure required to support development in Local Plan areas can also influence the Implementation Plan. Consequently, a Financial Plan is to be prepared that details: the status and available funding of off-site works; and financing options such as Front Ending Agreements (FEAs) required to advance the construction of trunk services required to support the development. FEAs may be required for early implementation of projects identified in the City's Infrastructure Master Plan, or for Development Charge-eligible projects identified in the MSS, per Official Plan policy 4.7.1.17.

Where the potential future servicing requirements of adjacent rural lands would require a change in the preferred servicing and/or grading plans of the expansion area, the additional cost of allowing for future servicing of the longer-term development lands is also to be documented in the financial analysis.

vii) Securing All Required Planning Approvals

Depending on area-specific issues and the scope and location of off-site infrastructure (requiring municipal and Class EA planning approvals), the need for Provincial or Federal planning approvals could also be triggered. The Terms of Reference will identify how the CDP/CP and/or MSS planning process will be coordinated with / has been expanded to fulfill planning process requirements of applicable Provincial and Federal legislation.

To streamline future approvals through the Consolidated Linear Infrastructure Environmental Compliance Approval process, the Final MSS will formally document

i) the stormwater management performance criteria per Appendix A of the CLI-ECA;
ii) provide a listing of anticipated / proposed stormwater management infrastructure per Schedule B of the CLI-ECA; and
iii) identify any anticipated / proposed stormwater management infrastructure that exceeds the CLI-ECA approval authority and will require direct submission to the MECP at the project implementation stage.

Re: S-4 UEA Draft Serviceability Report - Existing Conditions

From Elsby, Cam <Cam.Elsby@ottawa.ca>
Date Tue 15/07/2025 15:46
To Soward, Angela <angela.soward@arcadis.com>
Cc Evan Garfinkel <egarfinkel@regionalgroup.com>; Magladry, Ryan <ryan.magladry@arcadis.com>; Bougadis, John <john.bougadis@ottawa.ca>; Zanjani, Roza <roza.zanjani@ottawa.ca>

Arcadis Warning: Exercise caution with email messages from external sources such as this message. Always verify the sender and avoid clicking on links or scanning QR codes unless certain of their authenticity.

Hi Angela,

Thank you for providing the updated sanitary design sheets; I see that the use of monitored flows produces no surcharge for the existing areas on Sora Way and Kelly Farm Drive. Regarding the overflow design, we're comfortable with the response letter's information to satisfy the concept considering that the rare event is accommodated with the inclusion of the overflow. We can iron out the full design during the detailed design phase.

Our comments are now addressed at this stage of the process.

Kind regards,

Cam Elsby, P.Eng., M.Eng.
Senior Project Manager, Infrastructure Planning (T)
Infrastructure and Water Services Department (IWSD)
City of Ottawa
110 Laurier Avenue West, Ottawa, ON
613.580.2424 ext. 21443
cam.elsby@ottawa.ca

Classified as City of Ottawa - Public / Ville d'Ottawa - classé public

---

From: Soward, Angela <angela.soward@arcadis.com>
Sent: Friday, July 11, 2025 1:45 PM
To: Elsby, Cam <Cam.Elsby@ottawa.ca>
Cc: Evan Garfinkel <egarfinkel@regionalgroup.com>; ryan.magladry <ryan.magladry@arcadis.com>; Bougadis, John <John.Bougadis@ottawa.ca>; Zanjani, Roza <roza.zanjani@ottawa.ca>
Subject: Re: S-4 UEA Draft Serviceability Report - Existing Conditions

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.
ATTENTION : Ce courriel provient d’un expéditeur externe. Ne cliquez sur aucun lien et n’ouvrez pas de pièce jointe, excepté si vous connaissez l’expéditeur.

Good afternoon, Cam,

Please see attached our response letter to the comments we received via email on July 2nd , 2025. At this stage the hope is to hold off on a formal re-submission as we are working through the concept plan development and analysis of preferred solutions. Our next submission will have these comments incorporated.

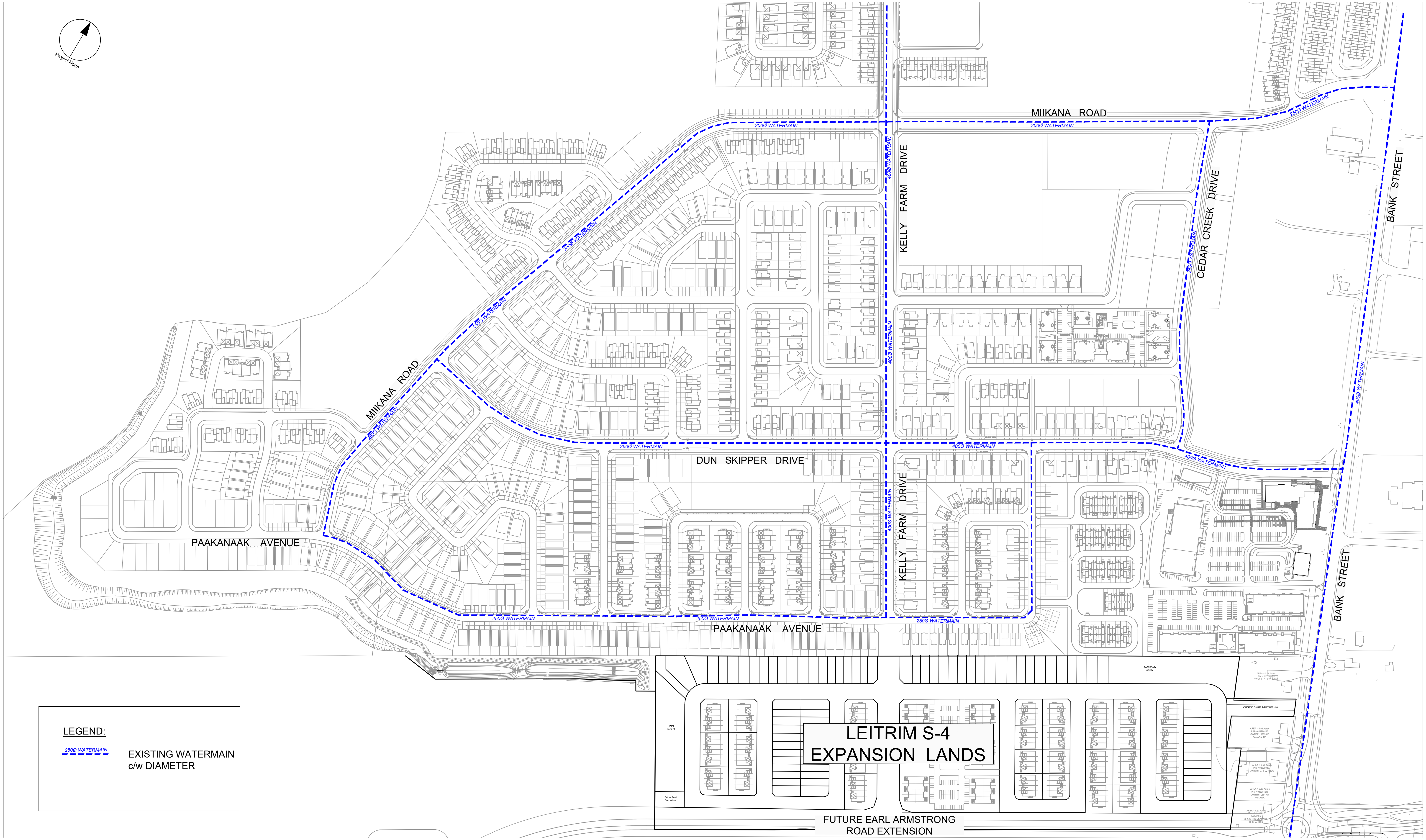
We would like to note that the three sanitary sewer design sheets (Rare, Annual and OSDG) were updated at last submission (May 2025) However, were missed when compiling the final document. This may have caused some confusion when looking at our analysis. I've attached the correct sewer design sheets that should be referenced, hopefully this will help clarify elements of the report.

Please let me know if you have any additional questions/ comments.

Thanks,

Appendix C

- Figure 5-1 Existing Watermain Layout
- S-4 Leitrim Expansion Lands Water Demands
- S-4 UEA Boundary Conditions Received December 2025
- S-4 Leitrim Expansion Lands Water Model Results
- Figure 5-2 Preferred Water Distribution Plan



J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Water figure.dwg Last Saved By: milnem4626 Last Saved At: Oct. 20, 25

ARCADIS

Project Title

SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

Drawing Title

EXISTING WATERMAIN LAYOUT

Sheet No.

FIGURE 5-1

ARCADIS IBI GROUP
500-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
ibigroup.com

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : **S-4 LEITRIM EXPANSION LANDS**
LOCATION : **CITY OF OTTAWA**
DEVELOPER : **REGIONAL GROUP**

FILE: 145172
DATE PRINTED: 17-Oct-25
DESIGN: LE
PAGE : 1 OF 1

NODE	RESIDENTIAL					NON-RESIDENTIAL			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND
	UNITS				POP'N	INDTRL	EMP	INST.										
	SF	SD & TH	APT	TC (ha)		(ha.)	(ha.)	(ha.)	Res.	Non-res.	Total	Res.	Non-res.	Total	Res.	Non-res.	Total	(l/min)
J14	7	12			56				0.18	0.00	0.18	0.46	0.00	0.46	1.00	0.00	1.00	10,000
J16	6	16			64				0.21	0.00	0.21	0.52	0.00	0.52	1.13	0.00	1.13	10,000
J18		23			62				0.20	0.00	0.20	0.50	0.00	0.50	1.11	0.00	1.11	10,000
J20	6	23			83				0.27	0.00	0.27	0.67	0.00	0.67	1.47	0.00	1.47	10,000
J22	6	23			83				0.27	0.00	0.27	0.67	0.00	0.67	1.47	0.00	1.47	10,000
J24	12	24			106				0.34	0.00	0.34	0.86	0.00	0.86	1.88	0.00	1.88	10,000
J28		17			46				0.15	0.00	0.15	0.37	0.00	0.37	0.82	0.00	0.82	10,000
P02	6				20				0.07	0.00	0.07	0.17	0.00	0.17	0.36	0.00	0.36	10,000
P04	6				20				0.07	0.00	0.07	0.17	0.00	0.17	0.36	0.00	0.36	10,000
P06		17			46				0.15	0.00	0.15	0.37	0.00	0.37	0.82	0.00	0.82	10,000
P09	6	8			42				0.14	0.00	0.14	0.34	0.00	0.34	0.75	0.00	0.75	10,000
P10		17			46				0.15	0.00	0.15	0.37	0.00	0.37	0.82	0.00	0.82	10,000
P13		8			22				0.07	0.00	0.07	0.18	0.00	0.18	0.39	0.00	0.39	10,000
P20	5	7			36				0.12	0.00	0.12	0.29	0.00	0.29	0.64	0.00	0.64	10,000
S15-010	12				41				0.13	0.00	0.13	0.33	0.00	0.33	0.73	0.00	0.73	10,000
TOTALS	72				771						2.52			6.27			13.75	

ASSUMPTIONS

RESIDENTIAL DENSITIES
- Single Family (SF) 3.4 p / p / u
- Semi Detached (SD) & Townhouse (TH) 2.7 p / p / u
- Apartment (APT) 1.8 p / p / u
-Town Centre Area (TC) 122.4 p / p / ha

AVG. DAILY DEMAND
- Residential 280 l / cap / day
- Employment 35,000 l / ha / day
- INST 28,000 l / ha / day

MAX. DAILY DEMAND
- Residential 700 l / cap / day
- Employment 52,500 l / ha / day
- INST 42,000 l / ha / day

MAX. HOURLY DEMAND
- Residential 1,540 l / cap / day
- Employment 94,500 l / ha / day
- INST 75,600 l / ha / day

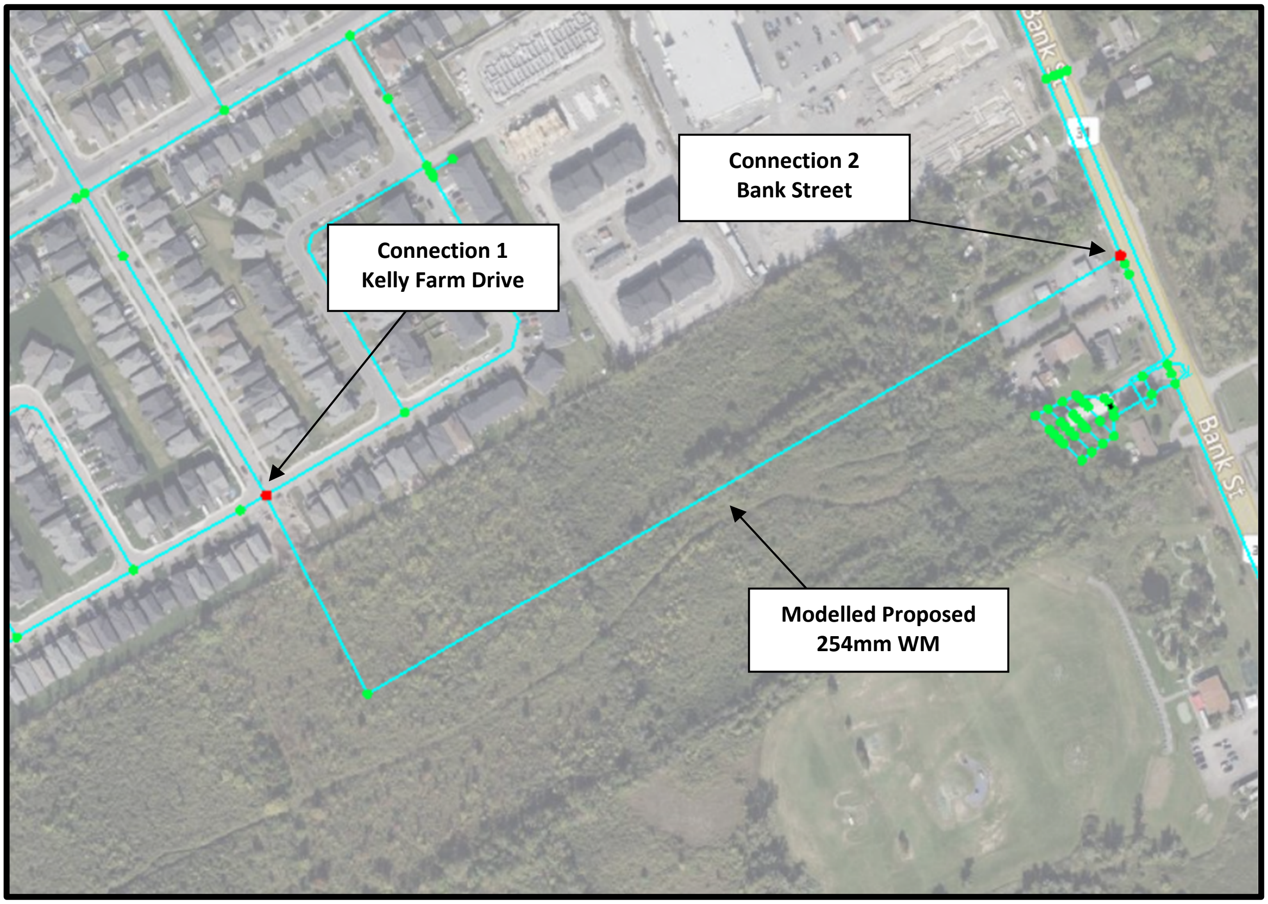
FIRE FLOW
- SF, SD, TH & ST 10,000 l / min
- ICI 13,000 l / min

Boundary Conditions
S4 – Urban Expansion Area

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	148	2.46
Maximum Daily Demand	368	6.14
Peak Hour	811	13.52
Fire Flow Demand #1	10,000	166.67

Location



Results

Existing Conditions

Connection 1 – Kelly Farm Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.8	65.5
Peak Hour	145.7	52.5
Max Day plus Fire Flow #1	138.9	42.9
[1] Ground Elevation =	108.8	m

Connection 2 – Bank Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.8	77.1
Peak Hour	145.3	63.5
Max Day plus Fire Flow #1	138.4	53.7
[1] Ground Elevation =	100.7	m

Future SUC

Connection 1 – Kelly Farm Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	146.9	54.2
Peak Hour	141.6	46.6
Max Day plus Fire Flow #1	136.7	39.7
[1] Ground Elevation =	108.8	m

Connection 2 – Bank Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	146.9	65.8
Peak Hour	140.6	56.8
Max Day plus Fire Flow #1	136.4	50.8
[1] Ground Elevation =	100.7	m

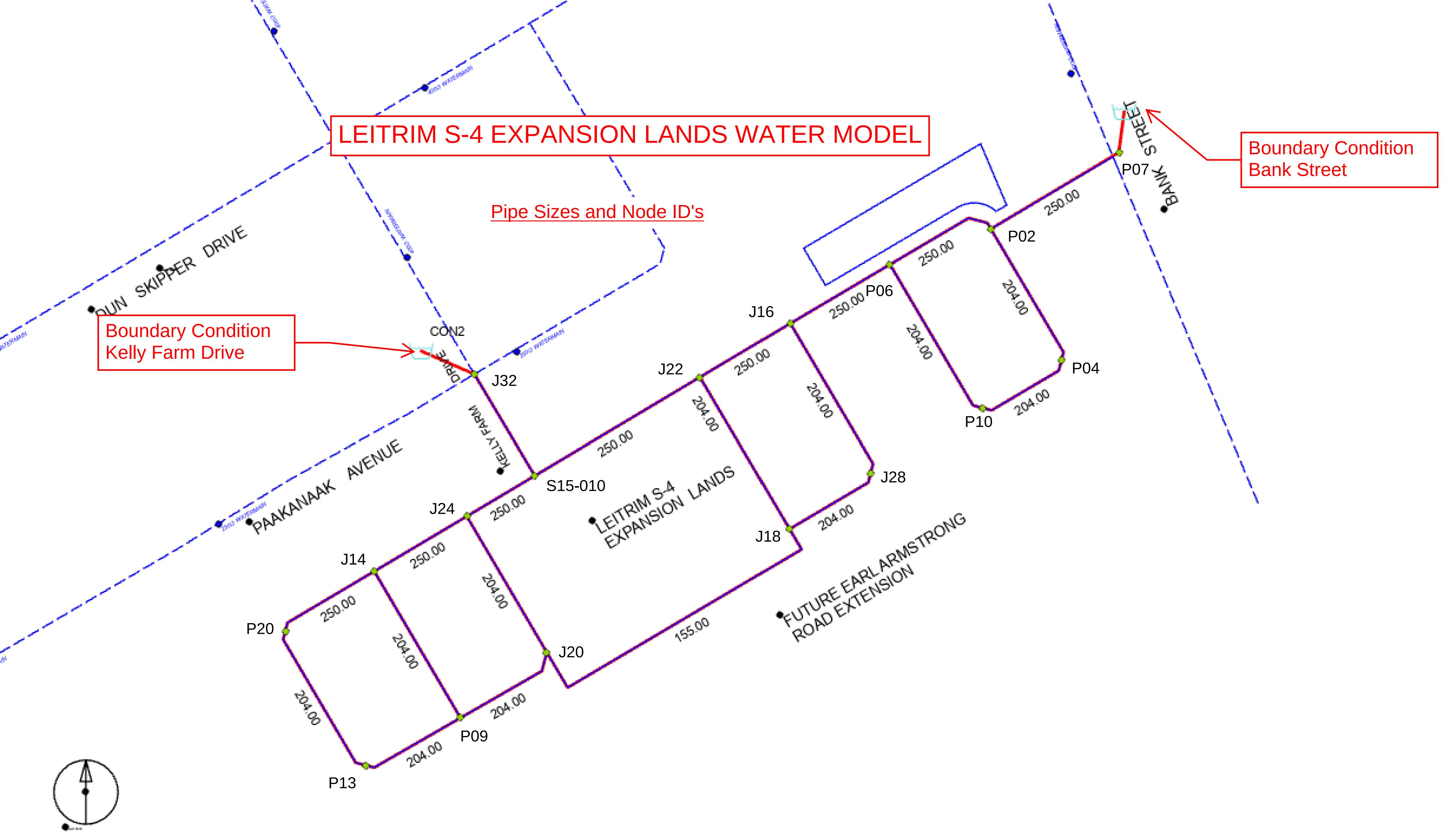
Notes

1. A 254mm WM between Connection 1 & Connection 2 was modelled to ensure a looping scenario for the purposes of these boundary conditions, as requested by City staff. The engineer is responsible for determining the appropriate sizing and material for this necessary WM extension and all internal networks.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

LEITRIM S-4 EXPANSION LANDS WATER MODEL



Existing Conditions Basic Day Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1	☐	J14	0.18	108.00	154.80	458.59	4.04
2	☐	J16	0.21	106.55	154.80	472.80	7.13
3	☐	J18	0.20	108.45	154.80	454.18	16.11
4	☐	J20	0.27	109.65	154.80	442.42	13.11
5	☐	J22	0.27	108.30	154.80	455.66	9.06
6	☐	J24	0.34	108.45	154.80	454.18	1.60
7	☐	J28	0.15	106.70	154.80	471.33	12.24
8	☐	J32	0.00	109.00	154.80	448.80	0.01
9	☐	P02	0.07	103.00	154.80	507.59	1.46
10	☐	P04	0.07	103.15	154.80	506.12	5.04
11	☐	P06	0.15	104.20	154.80	495.83	5.18
12	☐	P07	0.00	101.50	154.80	522.30	0.01
13	☐	P09	0.14	108.75	154.80	451.24	19.74
14	☐	P10	0.15	104.37	154.80	494.17	8.09
15	☐	P13	0.07	108.10	154.80	457.61	38.51
16	☐	P20	0.12	106.00	154.80	478.19	10.47
17	☐	S15-010	0.13	108.60	154.80	452.72	0.82

Existing Conditions Max Day + Fire (10,000 l/min) - Fireflow Design Report

		ID	Capacity Assessment	Total Demand (L/s)	Hydrant Available Flow (L/s)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (kPa)
1	☐	J14	PASS	167.13	256.13	J14	139.96
2	☐	J16	PASS	167.19	385.31	J16	139.96
3	☐	J18	PASS	167.17	243.78	J18	139.96
4	☐	J20	PASS	167.34	222.37	J20	139.96
5	☐	J22	PASS	167.34	365.20	J22	139.96
6	☐	J24	PASS	167.53	310.28	J20	131.02
7	☐	J28	PASS	167.04	242.18	J28	139.96
8	☐	P02	PASS	166.84	492.82	P02	139.96
9	☐	P04	PASS	166.84	268.02	P04	139.96
10	☐	P06	PASS	167.04	431.28	P06	139.96
11	☐	P09	PASS	167.01	224.17	P09	139.96
12	☐	P10	PASS	167.04	255.31	P10	139.96
13	☐	P13	PASS	166.85	197.35	P13	139.96
14	☐	P20	PASS	166.99	234.99	P20	139.96
15	☐	S15-010	PASS	167.00	450.68	J20	131.39

		ID	Critical Node Pressure at Fire Demand (kPa)	Critical Pressure for Design Run (kPa)	Hydrant Design Flow (L/s)	Hydrant Pressure at Design Flow (kPa)
1	☐	J14	227.30	139.96	256.13	139.96
2	☐	J16	276.63	139.96	385.31	139.96
3	☐	J18	218.02	139.96	243.78	139.96
4	☐	J20	198.83	139.96	222.37	139.96
5	☐	J22	259.80	139.96	365.20	139.96
6	☐	J24	234.99	139.96	300.31	149.08
7	☐	J28	225.67	139.96	242.18	139.96
8	☐	P02	319.89	139.96	492.81	139.96
9	☐	P04	260.61	139.96	268.02	139.96
10	☐	P06	302.42	139.96	431.28	139.96
11	☐	P09	204.02	139.96	224.17	139.96
12	☐	P10	245.88	139.96	255.31	139.96
13	☐	P13	182.39	139.96	197.35	139.96
14	☐	P20	224.05	139.96	234.99	139.96
15	☐	S15-010	259.74	139.96	436.77	148.64

		ID	Critical Node Pressure at Design Flow (kPa)
1	☐	J14	139.96
2	☐	J16	139.96
3	☐	J18	139.96
4	☐	J20	139.96
5	☐	J22	139.96
6	☐	J24	139.96
7	☐	J28	139.96
8	☐	P02	139.96
9	☐	P04	139.96
10	☐	P06	139.96
11	☐	P09	139.96
12	☐	P10	139.96
13	☐	P13	139.96
14	☐	P20	139.96
15	☐	S15-010	139.96

Existing Conditions Peak Hour Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1	☐	J14	1.00	108.00	145.53	367.78	0.40
2	☐	J16	1.13	106.55	145.42	380.88	0.56
3	☐	J18	1.11	108.45	145.44	362.50	1.15
4	☐	J20	1.47	109.65	145.53	351.57	1.12
5	☐	J22	1.47	108.30	145.45	364.04	0.17
6	☐	J24	1.88	108.45	145.54	363.42	0.14
7	☐	J28	0.82	106.70	145.43	379.54	1.32
8	☐	J32	0.00	109.00	145.70	359.61	0.00
9	☐	P02	0.36	103.00	145.34	414.94	0.94
10	☐	P04	0.36	103.15	145.35	413.53	1.24
11	☐	P06	0.82	104.20	145.37	403.43	0.65
12	☐	P07	0.00	101.50	145.30	429.21	1.07
13	☐	P09	0.75	108.75	145.53	360.40	1.82
14	☐	P10	0.82	104.37	145.36	401.62	0.99
15	☐	P13	0.39	108.10	145.53	366.78	2.08
16	☐	P20	0.64	106.00	145.53	387.37	1.05
17	☐	S15-010	0.73	108.60	145.55	362.08	0.05

Existing Conditions Peak Hour Pipe Report

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count	Water Age (hrs)
1	☐	P149	P07	P02	110.79	250.00	110.00	-11.69	0.24	0.04	0.40	Open	0	0.00
2	☐	P151	J20	J24	117.31	204.00	110.00	-2.86	0.09	0.01	0.08	Open	0	0.00
3	☐	P159	P13	P09	80.74	204.00	110.00	0.67	0.02	0.00	0.01	Open	0	0.00
4	☐	P163	P06	J16	86.00	250.00	110.00	-14.05	0.29	0.05	0.56	Open	0	0.00
5	☐	P167	P10	P06	128.98	204.00	110.00	-3.44	0.11	0.01	0.11	Open	0	0.00
6	☐	P169	P13	P20	120.18	204.00	110.00	-1.06	0.03	0.00	0.01	Open	0	0.00
7	☐	P183	CON2	J32	1.00	250.00	110.00	25.44	0.52	0.00	1.68	Open	0	0.00
8	☐	P185	CON1	P07	1.00	250.00	110.00	-11.69	0.24	0.00	0.40	Open	0	0.00
9	☐	P187	J14	P20	81.32	250.00	110.00	1.70	0.03	0.00	0.01	Open	0	0.00
10	☐	P189	J20	P09	84.15	204.00	110.00	-1.37	0.04	0.00	0.02	Open	0	0.00
11	☐	P195	J22	J18	130.76	204.00	110.00	2.44	0.07	0.01	0.06	Open	0	0.00
12	☐	P197	J14	P09	126.37	204.00	110.00	1.45	0.04	0.00	0.02	Open	0	0.00
13	☐	P201	J16	J22	78.00	250.00	110.00	-11.91	0.24	0.03	0.41	Open	0	0.00
14	☐	P203	J22	S15-010	142.87	250.00	110.00	-15.82	0.32	0.10	0.70	Open	0	0.00
15	☐	P207	J24	S15-010	58.78	250.00	110.00	-8.89	0.18	0.01	0.24	Open	0	0.00
16	☐	P209	J24	J14	80.00	250.00	110.00	4.15	0.08	0.00	0.06	Open	0	0.00
17	☐	P215	J32	S15-010	87.70	250.00	110.00	25.44	0.52	0.15	1.69	Open	0	0.00
18	☐	P217	J18	J28	74.45	204.00	110.00	4.09	0.13	0.01	0.15	Open	0	0.00
19	☐	P219	J28	J16	128.66	204.00	110.00	3.27	0.10	0.01	0.10	Open	0	0.00
20	☐	P223	P02	P06	87.40	250.00	110.00	-9.79	0.20	0.03	0.29	Open	0	0.00
21	☐	P225	P02	P04	112.62	204.00	110.00	-2.26	0.07	0.01	0.05	Open	0	0.00
22	☐	P227	P04	P10	72.70	204.00	110.00	-2.62	0.08	0.00	0.07	Open	0	0.00
23	☐	P229	J18	J20	249.79	155.00	100.00	-2.76	0.15	0.08	0.34	Open	0	0.00

Future SUC Basic Day Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1	☐	J14	0.18	108.00	146.90	381.18	4.04
2	☐	J16	0.21	106.55	146.90	395.39	7.13
3	☐	J18	0.20	108.45	146.90	376.77	16.11
4	☐	J20	0.27	109.65	146.90	365.01	13.11
5	☐	J22	0.27	108.30	146.90	378.24	9.06
6	☐	J24	0.34	108.45	146.90	376.77	1.60
7	☐	J28	0.15	106.70	146.90	393.92	12.24
8	☐	J32	0.00	109.00	146.90	371.39	0.01
9	☐	P02	0.07	103.00	146.90	430.18	1.46
10	☐	P04	0.07	103.15	146.90	428.71	5.04
11	☐	P06	0.15	104.20	146.90	418.42	5.18
12	☐	P07	0.00	101.50	146.90	444.88	0.01
13	☐	P09	0.14	108.75	146.90	373.83	19.74
14	☐	P10	0.15	104.37	146.90	416.75	8.09
15	☐	P13	0.07	108.10	146.90	380.20	38.51
16	☐	P20	0.12	106.00	146.90	400.78	10.47
17	☐	S15-010	0.13	108.60	146.90	375.30	0.82

Future SUC Max Day + Fire (10,000 l/min) - Fireflow Design Report

		ID	Capacity Assessment	Total Demand (L/s)	Hydrant Available Flow (L/s)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (kPa)
1	☐	J14	PASS	167.13	237.43	J14	139.96
2	☐	J16	PASS	167.19	359.87	J16	139.96
3	☐	J18	PASS	167.17	225.65	J18	139.96
4	☐	J20	PASS	167.34	204.29	J20	139.96
5	☐	J22	PASS	167.34	338.27	J22	139.96
6	☐	J24	PASS	167.53	286.97	J20	130.63
7	☐	J28	PASS	167.04	226.03	J28	139.96
8	☐	P02	PASS	166.84	466.21	P02	139.96
9	☐	P04	PASS	166.84	253.45	P04	139.96
10	☐	P06	PASS	167.04	406.42	P06	139.96
11	☐	P09	PASS	167.01	207.00	P09	139.96
12	☐	P10	PASS	167.04	240.55	P10	139.96
13	☐	P13	PASS	166.85	182.87	P13	139.96
14	☐	P20	PASS	166.99	219.76	P20	139.96
15	☐	S15-010	PASS	167.00	416.44	J20	131.15

		ID	Critical Node Pressure at Fire Demand (kPa)	Critical Pressure for Design Run (kPa)	Hydrant Design Flow (L/s)	Hydrant Pressure at Design Flow (kPa)
1	☐	J14	206.41	139.96	237.43	139.96
2	☐	J16	256.06	139.96	359.87	139.96
3	☐	J18	197.35	139.96	225.65	139.96
4	☐	J20	177.95	139.96	204.29	139.96
5	☐	J22	239.13	139.96	338.27	139.96
6	☐	J24	214.10	139.96	275.83	149.47
7	☐	J28	205.02	139.96	226.03	139.96
8	☐	P02	299.65	139.96	466.21	139.96
9	☐	P04	240.33	139.96	253.45	139.96
10	☐	P06	282.04	139.96	406.42	139.96
11	☐	P09	183.13	139.96	207.00	139.96
12	☐	P10	225.58	139.96	240.55	139.96
13	☐	P13	161.50	139.96	182.87	139.96
14	☐	P20	203.15	139.96	219.76	139.96
15	☐	S15-010	238.82	139.96	401.12	148.89

		ID	Critical Node Pressure at Design Flow (kPa)
1	☐	J14	139.96
2	☐	J16	139.96
3	☐	J18	139.96
4	☐	J20	139.96
5	☐	J22	139.96
6	☐	J24	139.96
7	☐	J28	139.96
8	☐	P02	139.96
9	☐	P04	139.96
10	☐	P06	139.96
11	☐	P09	139.96
12	☐	P10	139.96
13	☐	P13	139.96
14	☐	P20	139.96
15	☐	S15-010	139.96

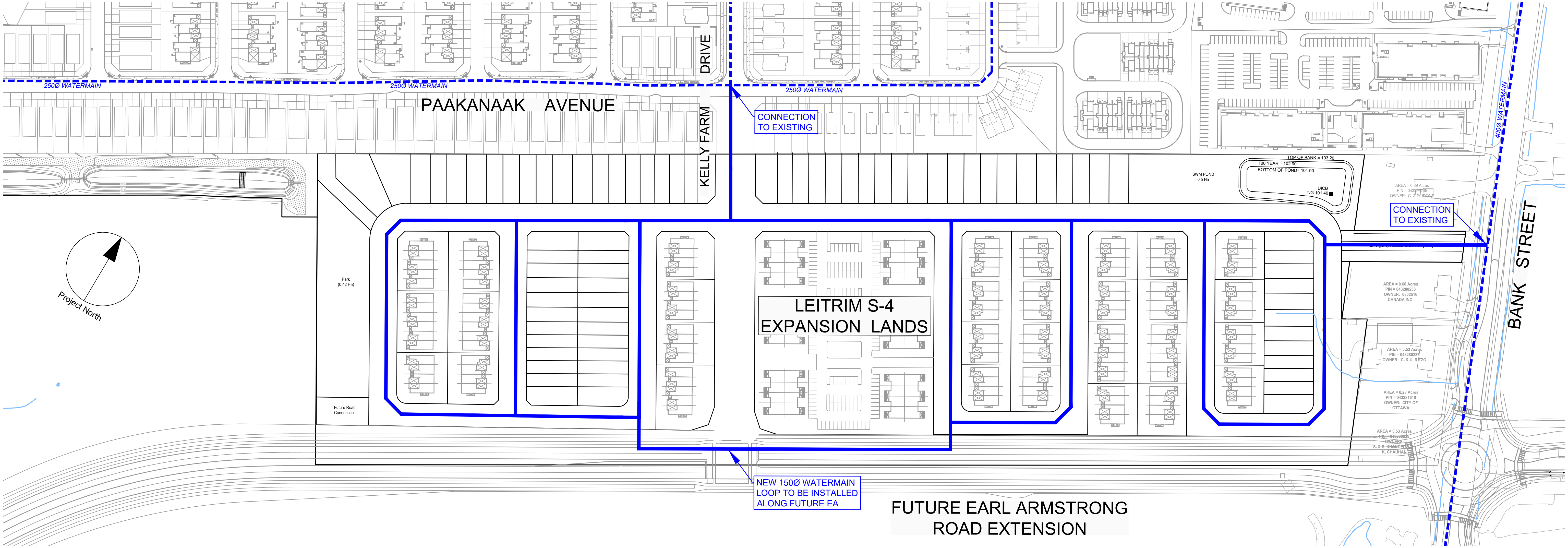
Future SUC Peak Hour Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1	☐	J14	1.00	108.00	141.28	326.10	0.32
2	☐	J16	1.13	106.55	140.98	337.40	0.39
3	☐	J18	1.11	108.45	141.05	319.48	0.87
4	☐	J20	1.47	109.65	141.27	309.84	0.89
5	☐	J22	1.47	108.30	141.07	321.10	0.11
6	☐	J24	1.88	108.45	141.29	321.76	0.11
7	☐	J28	0.82	106.70	141.02	336.33	0.96
8	☐	J32	0.00	109.00	141.60	319.42	0.00
9	☐	P02	0.36	103.00	140.76	369.98	0.60
10	☐	P04	0.36	103.15	140.78	368.74	0.76
11	☐	P06	0.82	104.20	140.84	359.02	0.44
12	☐	P07	0.00	101.50	140.60	383.16	0.67
13	☐	P09	0.75	108.75	141.27	318.71	1.40
14	☐	P10	0.82	104.37	140.80	356.95	0.63
15	☐	P13	0.39	108.10	141.27	325.08	1.62
16	☐	P20	0.64	106.00	141.28	345.69	0.86
17	☐	S15-010	0.73	108.60	141.31	320.49	0.03

Future SUC Peak Hour Pipe Report

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count	Water Age (hrs)
1	☐	P149	P07	P02	110.79	250.00	110.00	-22.94	0.47	0.15	1.39	Open	0	0.00
2	☐	P151	J20	J24	117.31	204.00	110.00	-3.82	0.12	0.02	0.14	Open	0	0.00
3	☐	P159	P13	P09	80.74	204.00	110.00	1.04	0.03	0.00	0.01	Open	0	0.00
4	☐	P163	P06	J16	86.00	250.00	110.00	-25.30	0.52	0.14	1.67	Open	0	0.00
5	☐	P167	P10	P06	128.98	204.00	110.00	-6.01	0.18	0.04	0.31	Open	0	0.00
6	☐	P169	P13	P20	120.18	204.00	110.00	-1.43	0.04	0.00	0.02	Open	0	0.00
7	☐	P183	CON2	J32	1.00	250.00	110.00	36.69	0.75	0.00	3.32	Open	0	0.00
8	☐	P185	CON1	P07	1.00	250.00	110.00	-22.94	0.47	0.00	1.39	Open	0	0.00
9	☐	P187	J14	P20	81.32	250.00	110.00	2.07	0.04	0.00	0.02	Open	0	0.00
10	☐	P189	J20	P09	84.15	204.00	110.00	-2.24	0.07	0.00	0.05	Open	0	0.00
11	☐	P195	J22	J18	130.76	204.00	110.00	3.45	0.11	0.01	0.11	Open	0	0.00
12	☐	P197	J14	P09	126.37	204.00	110.00	1.95	0.06	0.00	0.04	Open	0	0.00
13	☐	P201	J16	J22	78.00	250.00	110.00	-20.32	0.41	0.09	1.11	Open	0	0.00
14	☐	P203	J22	S15-010	142.87	250.00	110.00	-25.24	0.51	0.24	1.66	Open	0	0.00
15	☐	P207	J24	S15-010	58.78	250.00	110.00	-10.72	0.22	0.02	0.34	Open	0	0.00
16	☐	P209	J24	J14	80.00	250.00	110.00	5.02	0.10	0.01	0.08	Open	0	0.00
17	☐	P215	J32	S15-010	87.70	250.00	110.00	36.69	0.75	0.29	3.32	Open	0	0.00
18	☐	P217	J18	J28	74.45	204.00	110.00	6.93	0.21	0.03	0.41	Open	0	0.00
19	☐	P219	J28	J16	128.66	204.00	110.00	6.11	0.19	0.04	0.32	Open	0	0.00
20	☐	P223	P02	P06	87.40	250.00	110.00	-18.47	0.38	0.08	0.93	Open	0	0.00
21	☐	P225	P02	P04	112.62	204.00	110.00	-4.83	0.15	0.02	0.21	Open	0	0.00
22	☐	P227	P04	P10	72.70	204.00	110.00	-5.19	0.16	0.02	0.24	Open	0	0.00
23	☐	P229	J18	J20	249.79	155.00	100.00	-4.59	0.24	0.22	0.87	Open	0	0.00

J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Preferred Watermain.dwg Last Saved By: milnem4626 Last Saved At: Oct. 20, 25



LEGEND:

━━━	PROPOSED WATERMAIN
250Ø WATERMAIN - - -	EXISTING WATERMAIN c/w DIAMETER

ARCADIS

Project Title

SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

Drawing Title

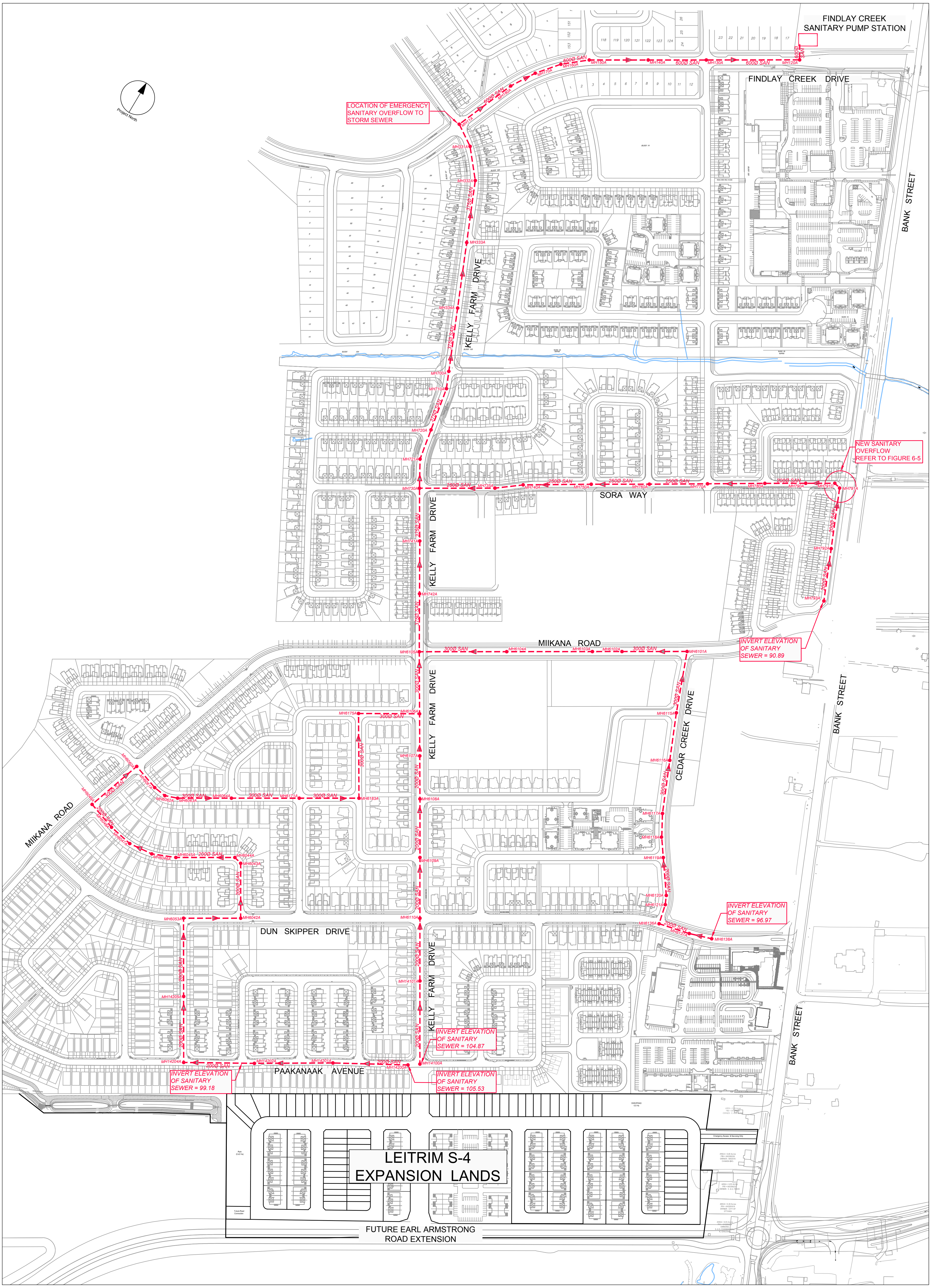
PREFERRED WATER DISTRIBUTION PLAN

Sheet No.

FIGURE 5-2

Appendix D

- Figure 6-1 Existing Sanitary Sewer Layout
- S-4 & S-5 Leitrim Expansion Lands Sanitary Sewer Design Sheet (OSDG)
- S-4 & S-5 Leitrim Expansion Lands Sanitary Sewer Design Sheet (Annual Event)
- S-4 & S-5 Leitrim Expansion Lands Sanitary Sewer Design Sheet (Rare Event)
- S-4 & S-5 Leitrim Expansion Lands Sanitary Sewer Design Sheet (Normal Operating Conditions)
- Correspondence with DSEL – S5 Lands Flows
- Figure 6-2 Preferred Wastewater Collection System and Outlet to Paakanaak Avenue
- Figure 6-3 Preferred Wastewater Outlet to Labrador Crescent
- Figure 6-4 Preferred Wastewater Drainage Area Plan
- Figure 6-5 Conceptual Overflow Cross Section



J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Sanitary Sewer figure.dwg Last Saved By: milnem4626 Last Saved At: Oct. 20, 25

LEGEND:

200Ø SAN	EXISTING SANITARY SEWER c/w DIAMETER

ARCADIS

Project Title

SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

Drawing Title

EXISTING SANITARY
SEWER LAYOUT

Sheet No.

FIGURE 6-1

ARCADIS PROFESSIONAL SERVICES (CANADA) INC.
500-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
arcadis.com

SANITARY SEWER DESIGN SHEET

Existing Conditions Report - OSDG
Regional Group
CITY OF OTTAWA

red italics	denotes as-built sewer information (where applicable)

LOCATION						RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
						AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
																INSTITUTIONAL		COMMERCIAL		INDUSTRIAL																
STREET	AREA ID	FROM MODEL ID	TO MODEL ID	FROM MH	TO MH		SF	TH/SD	1 Bed APT	2 Bed APT		IND	CUM			IND	CUM	IND	CUM	IND	CUM			IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
S-4 Leitrim Expansion Lands	Future	S4W		S-4	Paakanaak	4.80	44	47				253.6	253.6	3.49	2.87		0.0		0.0		0.0	1.00	0.00	4.80	4.80	1.58	0.00	0.0	4.45	20.24	0.00	200	0.35	0.624	15.79	78.02%
	S-4 Lands West - Flows to Pathways																																			
Pakaanaak	Idone Phase 2A	Outlet to Dun Skipper via Esban		MH14200A	MH14201A	0.75	16					51.2	51.2	2.99	0.50	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.75	0.75	0.25	0.00	0.0	0.74	54.85	*103.09*	200	*2.57*	1.691	54.11	98.65%
Pakaanaak	Idone Phase 2A	Outlet to Dun Skipper via Esban		MH14201A	MH14202A	0.55	9					28.8	333.6	2.84	3.06	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.55	6.1	2.01	0.00	0.0	5.08	49.47	*110.49*	200	*2.09*	1.525	44.39	89.73%
Pakaanaak	Idone Phase 2A	Outlet to Dun Skipper via Esban		MH14202A	MH14204A	0.48	8					25.6	359.2	2.83	3.29	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.48	6.58	2.17	0.00	0.00	5.46	46.16	*97.85*	200	*1.82*	1.423	40.70	88.17%
Esban	Idone Phase 2A	Outlet to Dun Skipper via Esban		MH14204A	MH14205A	0.67	2	20				54.4	413.6	2.81	3.77	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.67	7.3	2.39	0.00	0.0	6.16	41.20	*92.41*	200	*1.45*	1.271	35.04	85.05%
Esban	Idone Phase 2A	Outlet to Dun Skipper via Esban		MH14205A	BLK6035A	0.83	16					51.2	464.8	2.79	4.21	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.83	8.08	2.67	0.00	0.00	6.88	48.51	*65.10*	200	*2.01*	1.496	41.64	85.83%
Esban	Pathways Phase 2	Outlet to Dun Skipper via Esban		BLK6035A	MH6053A	0.25	4					12.8	477.6	2.79	4.32	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25	8.33	2.75	0.00	0.00	7.07	48.03	*44.18*	200	*1.97*	1.481	40.96	85.28%
Dun Skipper	Pathways Phase 2			MH6052A	MH6053A	0.51	8					25.6	25.6	3.02	0.25	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.51	0.51	0.17	0.00	0.00	0.42	29.03	*72.11*	200	*0.72*	0.895	28.61	98.56%
Dun Skipper	Pathways Phase 2			MH6053A	MH6042A	0.43	7					22.4	525.6	2.78	4.73	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.43	9.27	3.06	0.00	0.00	7.79	20.81	*80.65*	200	*0.37*	0.642	13.02	62.57%
Block 58	Idone Phase 2A	Outlet to Dun Skipper via Kijik		BLK6036A	MH6041A	3.20	17	56			0.81	188.8	188.8	2.89	1.77	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	4.01	4.01	1.32	0.00	0.00	3.09	45.65	*43.79*	200	*1.78*	1.408	42.56	93.22%
Dun Skipper	Pathways Phase 2			MH6041A	MH6042A	0.12	1					3.2	192.0	2.89	1.80	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.12	4.13	1.36	0.00	0.00	3.16	42.19	*17.74*	200	*1.52*	1.301	39.02	92.50%
Omagaki Way	Pathways Phase 2	Outlet to Miikana via Omagaki		MH6042A	MH6043A	0.58		18				43.2	760.8	2.72	6.72	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.58	13.98	4.61	0.00	0.00	11.33	27.37	*76.96*	200	*0.64*	0.844	16.04	58.61%
Omagaki Way	Pathways Phase 2	Outlet to Miikana via Omagaki		MH6043A	MH6044A	0.18		3				7.2	768.0	2.72	6.78	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.18	14.16	4.67	0.00	0.00	11.45	28.42	*11.55*	200	*0.69*	0.876	16.97	59.72%
Omagaki Way	Pathways Phase 2	Outlet to Miikana via Omagaki		MH6044A	MH6045A	0.58	2	16				44.8	812.8	2.71	7.15	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.58	14.74	4.86	0.00	0.00	12.01	21.91	*82.91*	200	*0.41*	0.676	9.90	45.17%
Omagaki Way	Pathways Phase 2	Outlet to Miikana via Omagaki		MH6045A	MH6046A	0.27	6					19.2	832.0	2.71	7.31	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.27	15.01	4.95	0.00	0.00	12.26	19.95	*33.87*	200	*0.34*	0.615	7.69	38.55%
Omagaki Way	Pathways Phase 2	Outlet to Miikana via Omagaki		MH6046A	MH6047A	0.29	5					16.0	848.0	2.71	7.44	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	15.30	5.05	0.00	0.00	12.49	22.70	*34.27*	200	*0.44*	0.700	10.21	44.98%
Omagaki Way	Pathways Phase 2	Outlet to Miikana via Omagaki		MH6047A	MH6048A	0.27	4					12.8	860.8	2.70	7.54	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.27	15.57	5.14	0.00	0.00	12.68	22.70	*33.85*	200	*0.44*	0.700	10.01	44.12%
Omagaki Way	Pathways Phase 2	Outlet to Miikana via Omagaki		MH6048A	MH6049A	0.17	2					6.4	867.2	2.70	7.60	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.17	15.74	5.19	0.00	0.00	12.79	25.38	*41.61*	200	*0.55*	0.782	12.58	49.59%
Paakanaak	*Pathways Phase 3*	*Outlet to Paakanaak*			*MH6003A*	*1.20*	*22*																													
Paakanaak	*Pathways Phase 2*	*Paakanak*		*MH6003A*	*MH6004*	*0.47*	*11*																													
Paakanaak				MH6004A	MH6008A	**1.80**	**35**					112.0	112.0	2.94	1.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.80	1.80	0.59	0.00	0.00	1.66	20.24	*19.82*	200	*0.35*	0.624	18.58	91.80%
Paakanaak	*Idone Phase 2A*	*Outlet to Paakanaak*			*BLK6005A*	*1.97*	*37*																													
Paakanaak	*Pathways Phased 2*	*Outlet to Paakanaak*			*MH6008A*	*0.61*	*10*																													
Miikana Road	Pathways Phase 2	603		MH6008A	MH6030A	**2.92**	**51**					163.2	275.2	2.86	2.55	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	2.92	4.7	1.56	0.00	0.0	4.11	43.82	*64.09*	200	*1.64*	1.351	39.71	90.63%
Miikana Road	Pathways Phase 2			MH6030A	MH6031A	0.18	3					9.6	284.8	2.85	2.63	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.18	4.9	1.62	0.00	0.00	4.25	38.10	*23.40*	200	*1.24*	1.175	33.85	88.85%
Miikana Road	Pathways Phase 2		608	MH6031A	MH6032A	0.14	3					9.6	294.4	2.85	2.72	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.14	5.0	1.66	0.00	0.00	4.38	20.81	*38.20*	200	*0.37*	0.642	16.43	78.95%
Paakanaak	*Pathways Phase 3*	*Outlet to Gartersnake via Paak*			*MH6308A*	*0.87*	*8*	*6*																												
Gartersnake	*Pathways Phase 3*	*Outlet to Phase 2 Connection*		*MH6308A*	*MH6018A*	*1.16*	*5*	*22*																												
Pathways Block60	*Pathways Block60*	*Outlet to Phase 2 Connection*			*MH6018A*	*0.95*		*26*																												
Ninaatik Place	*Pathways Phase 2*	*Outlet to Gartersnake*			*MH6018A*	*0.61*	*9*	*2*																												
Gartersnake	*Pathways Phase 2*	*Outlet to Miikana*		*MH6018A*	*MH6032A*	*0.59*		*13*																												
Miikana Road	Pathways Phase 2	608		MH6032A	MH6033A	**4.48**	**27**	**69**				252.0	546.4	2.77	4.91	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	4.48	9.5	3.14	0.00	0.0	8.05	21.91	*62.90*	200	*0.41*	0.676	13.86	63.25%
Miikana Road	Pathways Phase 2		609	MH6033A	MH6050A	0.29	5					16.0	562.4	2.77	5.05	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	9.8	3.24	0.00	0.00	8.28	20.24	62.75	200	0.35	0.624	11.96	59.08%
Ginebik	*Idone Phase 2A*	*Outlet to Ginebik*			*MH6038A*	*3.08*	*50*																													
Ginebik	*Pathways Phase 2*	*Outlet to Dun Skipper*		*MH6038A*	*MH6051A*	*0.86*	*14*																													
Dun Skipper	*Pathways Phase 2*	*Outlet to Miikana*			*MH6050A*	*0.77*	*11*																													
Miikana Road	Pathways Phase 2/	609		MH6050A	MH6034A	**5.13**	**79**					252.8	815.2	2.71	7.17	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.13	14.94	4.93	0.00	0.00	12.10	33.98	*22.99*	250	*0.30*	0.671	21.88	64.40%
Block 46 (Park)	Pathways Phase 2			MH6049AW	MH6034A						2.85	0.0	0.0	3.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.85	2.85	0.94	0.00	0.00	0.94	20.53	*15.47*	200	*0.36*	0.633	19.59	95.42%
Miikana	Pathways Phase 2		620	MH6034A	MH6049A							0.0	815.2	2.71	7.17	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	17.8	5.87	0.00	0.00	13.04	31.63	*60.76*	*250*	*0.26*	0.624	18.59	58.78%
Miikana	vays Phase 2/ Idone Pl	620	630	MH6049A	MH6060A	0.37		*7*				16.8	1699.2	2.58	14.23	0.00	0.0	0.00	0.0	0.00	0.00	1.00	0.00	0.37	33.9	11.19	0.00	0.0	25.42	43.97	*81.59*	*300*	*0.19*	0.603	18.56	42.20%
Spreadwing	Pathways Phase 2	630		MH6060A	MH6061A	0.21	4					12.8	1712.0	2.58	14.33	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	34.11	11.26	0.00	0.00	25.58	43.97	*38.76*	*300*	*0.19*	0.603	18.39	41.82%
Spreadwing	Pathways Phase 2			MH6061A	MH6062A	0.21	4					12.8	1724.8	2.58	14.43	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	34.32	11.33	0.00	0.00	25.75	47.32	*18.24*	*300*	*0.22*	0.648	21.57	45.58%
Spreadwing	Pathways Phase 2			MH6062A	MH6063A	0.15	2					6.4	1731.2	2.58	14.48	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.15	34.47	11.38	0.00	0.00	25.85	43.97	*18.20*	*300*	*0.19*	0.603	18.12	41.21%
Spreadwing	Pathways Phase 2			MH6063A	MH6064A	0.54	8					25.6	1756.8	2.58	14.67	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.54	35.01	11.55	0.00	0.00	26.23	46.23	*75.32*	*300*	*0.21*	0.634	20.00	43.27%
Spreadwing	Pathways Phase 2			MH6064A	EXBLK3171A	0.44	7					22.4	1779.2	2.57	14.85	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.44	35.45	11.70	0.00	0.00	26.54	45.12	*51.94*	*300*	*0.20*	0.618	18.57	41.16%
Spreadwing	Pathways Phase 2		6171	BLK3171AW	MH6171A							0.0	1779.2	2.57	14.85	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	35.45	11.70	0.00	0.00	26.54	45.12	*43.00*	*300*	*0.20*	0.618	18.57	41.16%
Minikan	Pathways Phase 1	Outlet to Spreadwing Way			MH6171A	2.06	40					128.0	128.0	2.93	1.21	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.06	2.06	0.68	0.00	0.00	1.89	50.75	*84.42*	200	*2.20*	1.565	48.86	96.27%
Spreadwing	Pathways Phase 1	6171	6183	MH6171A	MH6183A	0.15						0.0	1907.2	2.56	15.83	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.15	37.7	12.43	0.00	0.0	28.26	45.12	*83.61*	*300*	*0.20*	0.618	16.86	37.37%

Zaatiik Grove	**Pathways Phase 1**			MH6182A	MH6183A	1.18	18					57.6	57.6	2.98	0.56	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.18	1.18	0.39	0.00	0.00	0.95	54.10	*74.74*	*200*	*2.50*	1.668	53.16	98.25%
Zaatiik Grove	**Pathways Phase 1**	6183	6175	MH6183A	MH6175A							0.0	1964.80	2.56	16.27	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	38.84	12.82	0.00	0.00	29.09	45.12	*118.54*	*300*	*0.20*	0.618	16.03	35.53%
Zaatiik Grove	***Pathways Phase 1***	*high level sani*		*MH61783B*	*MH6175A*	*0.67*	*12*					*38.4*	*38.40*	3.00	*0.37*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.67*	*0.67*	*0.22*	*0.00*	*0.00*	*0.59*	*37.48*	*6.00*	*200*	*1.20*	*1.156*	*36.89*	*98.41%*
Minikan Street	**Pathways Phase 1**		6175	MH6175B	MH6175D	1.74	28					89.6	89.60	2.95	0.86	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.74	1.74	0.57	0.00	0.00	1.43	45.12	*6.00*	*300*	*0.20*	0.618	43.68	96.83%
Minikan Street	**Pathways Phase 1**	6175	6106	MH6175A	MH6106A							0.0	2092.80	2.54	17.24	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	41.25	13.61	0.00	0.00	30.85	45.12	*85.46*	*300*	*0.20*	0.618	14.26	31.61%
Minikan Street	***Pathways Phase 1***	*high level sani*		*MH6106C*	*MH6106A*	*0.58*	*10*					*32.0*	*32.0*	3.01	*0.31*	*0.00*	*0.0*	*0.00*	*0.0*	*0.00*	*0.0*	*1.00*	*0.00*	*0.58*	*0.6*	*0.19*	*0.00*	*0.00*	*0.50*	*28.63*	*6.00*	*200*	*0.70*	*0.883*	*28.12*	*98.24%*
												2124.8	TRUE											41.8	TRUE											
Kelly Farm Drive	***Idone Phase 1***	*Outlet to Dun Skipper*			*MH6110A*	*1.64*	*28*																													
Dun Skipper	***Pathways Phase 1***	*Dunskipper to Kelly Farm Drive*		*MH6132A*	*MH6110A*	*0.53*	*9*																													
Kelly Farm Drive	***Pathways Phase 1***	*Kelly Farm Drive to Salamander*		*MH6110A*	*MH6108A*	*1.08*	*18*																													
Salamander	***Pathways Phase 1***	*Outlet to Kelly Frm Drive*		*MH6156A*	*MH6108A*	*1.23*	*19*																													
Kelly Farm Drive	***Pathways Phase 1***	*Kelly Farm Drive*		*MH6108A*	*MH6106A*	*0.51*	*6*																													
Kelly Farm Drive	**Pathways Phase 1**	6106	647	MH6106A	MH647A	**5.18**	**80**					256.0	2380.80	2.52	19.41	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.18	47.01	15.51	0.00	0.00	34.92	45.12	*86.86*	*300*	*0.20*	0.618	10.19	22.60%
Wabikon Crescent	**Pathways Phase 2**	*Outlet to Miikana*		MH6070A	MH6080A	2.16		58			0.06																									
Miikana	**Pathways Phase 2**	*Miikana*		MH6079A	MH6080A	0.80		21																												
Miikana	**Pathways Phase 2**		646	MH6080A	MH6081A	**3.88**		**104**			**0.06**	249.6	249.6	2.87	2.32	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	3.94	3.9	1.30	0.00	0.00	3.62							
Miikana Road	**Pathways Phase 2**	646		MH6081A	BLK6105AW	1.02		30				72.0	72.0	2.97	0.69	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	1.02	1.0	0.34	0.00	0.0	1.03							
Miikana Road	**Pathways Phase 2**		647	BLK6105AW	*EX. MH647A*	0.70		23				55.2	376.8	2.82	3.44	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.70	5.7	1.87	0.00	0.0	5.31	20.24	*17.00*	*200*	*0.35*	0.624	14.93	73.76%
Salamander Way	**Pathways Phase 1**	6156	6157	MH6156A	MH6157A	0.29	3					9.6	9.6	3.05	0.09	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	0.29	0.10	0.00	0.00	0.19							
Salamander Way	**Pathways Phase 1**	6157	6158	MH6157A	MH6158A	0.07		1				2.4	12.0	3.04	0.12	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.07	0.36	0.12	0.00	0.00	0.24							
Salamander Way	**Pathways Phase 1**	6158	6153	MH6158A	MH6153A	0.54		14				33.6	45.6	2.99	0.44	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.54	0.90	0.30	0.00	0.00	0.74							
Block 436 (Park)	**Pathways Phase 1**		6153	MH6159A	MH6153A						0.83	0.0	0.0	3.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.83	0.83	0.27	0.00	0.00	0.27							
Salamander Way	**Pathways Phase 1**	6153	6154	MH6153A	MH6154A	0.03						0.0	45.6	2.99	0.44	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.03	1.8	0.58	0.00	0.0	1.02							
Salamander Way	**Pathways Phase 1**	6154	6115	MH6154A	MH6115A	0.13						0.0	45.6	2.99	0.44	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.13	1.89	0.62	0.00	0.00	1.07							
Rallidale Street	***Idone Phase 1***	*Outlet to Dun Skipper via Rallidale*		*MH14110A*	*MH1411A*	*1.83*	*9*	*39*																												
Grackle Street	***Idone Phase 1***	*Outlet to Dun Skipper via Grackle*		*MH14120A*	*MH1411A*	*1.41*		*43*																												
Rallidale Street	***Idone Phase 1***	*Outlet to Dun Skipper*		*MH1411A*	*MH6133A*	*0.27*		*6*																												
Dun Skipper	***Pathways Phase 1***	*Dun Skipper*		*MH6132A*	*MH6133A*	*0.64*	*11*																													
Dun Skipper	***Pathways Phase 1***	*Dun Skipper*		*MH6133A*	*MH6136A*	*1.43*	*26*																													
Pathways Block 203	***Pathways Block 203***	*Outlet to Dun Skipper*			*MH6136A*	*1.62*		*80*																												
Pathways Block 204	***Pathways Block 204***	*Outlet to Home Hardware*			*MH1A*	*1.54*			*77*	*103*																										
Home Hardware	***Home Hardware***	*Outlet to Dun Skipper*		*MH6A*	*MH6138A*				*54*	*87*								*2.53*																		
Dun Skipper	***Pathways Phase 1***	*Dun Skipper / Cedar Creek*		*MH6138A*	*MH6136A*	*0.18*																														
Cedar Creek	***Pathways Phase 1***	*Cedar Creek*		*MH6136A*	*MH6119A*	*0.17*																														
Pingwi Place	***Pathways Phase 1***	*Outlet to Cedar Creek*		*MH6132A*	*MH6119A*	*1.93*	*20*	*24*																												
Pathways Block 241	***Pathways Block***	*Outlet to Cedar Creek*		*BLK6119AE*	*MH6119A*													*3.01*																		
Cedar Creek	***Pathways Phase 1***	*Cedar Creek*		*MH6119A*	*MH6117A*	*0.12*																														
Pathways Block 232	***Pathways Block 232***	*Outlet to Cedar Creek*			*MH6117A*	*1.01*			*12*	*80*																										
Cedar Creek	**Pathways Phase 1**		6115	MH6117A	MH6115A	**12.21**	**66**	**226**	**143**	**270**		1520.8	1520.8	2.61	12.84	0.00	0.00	**5.54**	5.54	0.00	0.00	1.00	1.09	17.75	19.64	6.48	0.00	0.00	20.41							
Cedar Creek	**Pathways Phase 1**	6115	6101	MH6115A	MH6101A	0.61		18				43.2	1609.60	2.59	13.53	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.61	20.25	6.68	0.00	0.00	21.31							
Miikana Road	**Pathways Phase 1**	6101	6102	MH6101A	MH6102A	0.45		11				26.4	1636.00	2.59	13.74	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.45	20.70	6.83	0.00	0.00	21.66							
Pathways Block 225	**Pathways Block 225**		6102		MH6102A	0.94		34				81.6	81.60	2.96	0.78	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.94	0.94	0.31	0.00	0.00	1.09							
Miikana Road	**Pathways Phase 1**	6102	6103	MH6102A	MH6103A	0.23		6				14.4	1732.00	2.58	14.48	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.23	21.87	7.22	0.00	0.00	22.79							
Miikana Road	**Pathways Phase 1**	6103	6104	MH6103A	MH6104A	0.66		18				43.2	1775.20	2.58	14.82	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.66	22.53	7.43	0.00	0.00	23.34							
School Block	**Pathways Block 223**	Outlet to Miikana		BLK6104AS	MH6104A							0.0	0.00	3.10	0.00	2.55	2.55	0.00	0.00	0.00	0.00	1.00	0.50	2.55	2.55	0.84	0.00	0.00	1.34							
Miikana Road	**Pathways Phase 1**	6104	6105B	MH6104A	MH6104B	0.6		15				36.0	1811.20	2.57	15.09	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.60	25.68	8.47	0.00	0.00	25.16							
Miikana Road	**Pathways Phase 1**	6105B	647	MH6104B	MH647							0.0	1811.20	2.57	15.09	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.00	25.68	8.47	0.00	0.00	25.16							
												1811.2	TRUE											25.7	TRUE											
KELLY FARM DRIVE	**FC South Stage2 PH4B**	647	755	MH647A	MH742A	0.28		5				12.0	4580.80	2.37	35.15	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.28	78.63	25.95	0.00	0.00	62.69	101.84	*80.31*	*375*	*0.31*	0.893	39.15	38.44%
KESTREL STREET	***FC South Stage2 PH4B***	*Undeveloped lands to Kestrel*		*BLKHEAD*	*MH751A*	*0.65*		*22*																												
PARK BLOCK	***FC South Stage2 PH4B***	*Park land*		*MH744A*	*MH745A*						*1.22*																									
KESTREL STREET	***FC South Stage2 PH4B***	*Outlet to Kelly Farm*		*MH751A*	*MH742A*	*0.49*		*15*																												
KELLY FARM DRIVE	**FC South Stage2 PH4B**	755	745	MH742A	MH741A	**1.53**		**48**			**1.22**	115.2	4696.00	2.36	35.95	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	2.75	81.38	26.86	0.00	0.00	64.39	101.84	*80.31*	*375*	*0.31*	0.893	37.45	36.77%
KELLY FARM DRIVE	**FC South Stage2 PH4B**	745	730	MH741A	MH730A	0.28		5				12.0	4708.00	2.36	36.03	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.28	81.66	26.95	0.00	0.00	64.57	101.84	*80.31*	*375*	*0.31*	0.893	37.27	36.60%
HELEN RAPP WAY	**FC South Stage2 PH4A**	*Outlet to Helen Rapp Way South*			MH738A	0.34	5																													
HELEN RAPP WAY	**FC South Stage2 PH4B**			MH735A	MH738A	1.21	20																													
MAYBERLY	**FC South Stage2 PH4B**			MH738A	MH731A	0.52	9																													
HELEN RAPP WAY	**FC South Stage2 PH4B**	*Outlet to Maberly*		MH735A	MH731A	1.33	24																													
HELEN RAPP WAY	**FC South Stage2 PH4B**	*Outlet to Kelly Farm*		MH731A	MH730A	0.51	9																													
						3.91	**67**																													

S-4 Lands East - Flows to Bank Street																																				
S-4 Leitrim Expansion Lands	**Future**			**S-4**	**Bank**	**8.47**	**33**	**84**		**90**		**496.2**	**496.2**	3.38	**5.44**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**8.47**	**8.47**	**2.80**	**0.00**	**0.0**	**8.23**	**20.24**	**0.00**	**200**	**0.35**	**0.624**	**12.01**	**59.34%**
Bank Street	**Future**			**Bank**	**MH300A**						**2.25**	**0.0**	**496.2**	2.79	**4.48**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**2.25**	**10.72**	**3.54**	**0.00**	**0.0**	**8.02**	**20.24**	**0.00**	**200**	**0.35**	**0.624**	**12.23**	**60.40%**
Bank Street_San	**Proposed**			**MH300A**	**MH200A**							**0.0**	**496.2**	2.79	**4.48**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.00**	**10.72**	**3.54**	**0.00**	**0.0**	**8.02**	**20.24**	**71.44**	**200**	**0.35**	**0.624**	**12.23**	**60.40%**
Bank Street_San	**Proposed**			**MH200A**	**MH100A**						**0.66**	**0.0**	**496.2**	2.79	**4.48**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.66**	**11.38**	**3.76**	**0.00**	**0.0**	**8.23**	**20.24**	**92.12**	**200**	**0.35**	**0.624**	**12.01**	**59.32%**
Bank Street_San	**Proposed**	**S4E**		**MH100A**	**MH793A**							**0.0**	**496.2**	2.79	**4.48**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.00**	**11.38**	**3.76**	**0.00**	**0.0**	**8.23**	**24.19**	**24.98**	**200**	**0.50**	**0.746**	**15.96**	**65.96%**
Labrador Crescent	**FC STAGE 2 PHASE 4C**	Sparta Lands		BLK794AS	MH794A	2.80		24		220		519.6	519.6	2.78	4.68		0.0		0.00		0.0	1.00	0.00	2.80	2.80	0.92	0.00	0.0	5.60	19.66	*33.00*	200	*0.33*	0.606	14.05	71.49%
Labrador Crescent	**FC STAGE 2 PHASE 4C**			MH794A	MH791A	0.49		20				48.0	1063.8	2.67	9.20		0.0		0.0		0.0	1.00	0.00	0.49	14.7	4.84	0.00	0.0	14.04	19.66	*19.60*	200	*0.33*	0.606	5.61	28.55%
Potential S-5 Lands	**Potential**	**S5W**		**S-5**	**MH791D/A**	**4.78**						**630.0**	**630.0**	3.34	**6.81**		**0.0**		**0.00**		**0.0**	**1.00**	**0.00**	**4.78**	**4.8**	**1.58**	**0.00**	**0.0**	**8.39**							
Labrador Crescent	**FC STAGE 2 PHASE 4C**	790		MH791A	MH790A	0.25		7				16.8	1710.6	2.58	14.32		0.0		0.0		0.0	1.00	0.00	0.25	19.7	6.50	0.00	0.0	20.82	19.95	*73.40*	200	*0.34*	0.615	-0.87	-4.34%
HAWKMERE WAY	***FC STAGE 2 PHASE 4C***	*Outlet to Labrador Crescent*		*MH769A*	*MH797A*	*1.27*		*40*																												
Labrador Crescent	***FC STAGE 2 PHASE 4C***	*Outlet to Sora Way*		*MH795A*	*MH790A*	*0.73*		*33*																												
Sora Way	**FC STAGE 2 PHASE 4C**		780	MH790A	MH780A	**2.39**		**86**				206.4	1917.0	2.56	15.90		0.0		0.0		0.0	1.00	0.00	2.39	22.1	7.29	0.00	0.0	23.19	21.09	*86.10*	200	*0.38*	0.650	-2.10	-9.96%
Eric Maloney	***FC STAGE 2 PHASE 4C***	*Outlet to Sora Way*		*MH786A*	*MH780A*	*1.45*		*43*																												
Sora Way	**FC STAGE 2 PHASE 4C**	780	770	MH780A	MH770A	**1.81**		**53**				127.2	2044.2	2.55	16.87		0.0		0.0		0.0	1.00	0.00	1.81	23.9	7.89	0.00	0.0	24.76	19.80	*9.50*	200	*0.33*	0.611	-4.96	-25.04%
Future Cedar Creek	**FC STAGE 2 PHASE 4B**	775	770	MH777A	MH770A	4.75		161				386.4	386.4	2.82	3.53		0.0		0.0		0.0	1.00	0.00	4.75	4.8	1.57	0.00	0.0	5.10							
Eric Maloney	***FC STAGE 2 PHASE 4C***		771	*MH787A*	*MH772A*	*0.70*	*12*																													
Cedar Creek	**FC STAGE 2 PHASE 4B**	771	770	MH772A	MH770A	**1.83**		**34**				81.6	81.6	2.96	0.78		0.0		0.0		0.0	1.00	0.00	1.83	1.8	0.60	0.00	0.0	1.39							
Sora Way	**FC STAGE 2 PHASE 4B**	770	760	MH770A	MH760A	**5.02**	**3**	**161**				396.0	2908.2	2.47	23.30		0.0		0.0		0.0	1.00	0.00	5.02	35.5	11.72	0.00	0.0	35.02							
Sagebush Cresc. East	***FC STAGE 2 PHASE 4C***	*Outlet to Sora*		*MH763A*	*MH760A*	*1.02*	*17*																							*27.59*	*107.80*	*200*	*0.65*	*0.851*	*27.59*	*100.00%*
Sora Way	**FC STAGE 2 PHASE 4B**	760	750	MH760A	MH750A	**1.39**	**23**					73.6	2981.8	2.47	23.84		0.0		0.0		0.0	1.00	0.00	1.39	36.9	12.17	0.00	0.0	36.01	31.02	*81.07*	250	*0.25*	0.612	-4.99	-16.09%
Sagebush Cresc. West	***FC STAGE 2 PHASE 4C***	*Outlet to Sora*		*MH763A*	*MH750A*	*1.41*	*23*																							*20.24*	*108.40*	*200*	*0.35*	*0.624*	*20.24*	*100.00%*
Sora Way	**FC STAGE 2 PHASE 4B**	750	740	MH750A	MH740A	**2.09**	**36**					115.2	3097.0	2.46	24.67		0.0		0.0		0.0	1.00	0.00	2.09	39.0	12.86	0.00	0.0	37.54	31.02	*94.16*	250	*0.25*	0.612	-6.52	-21.01%
Sora Way	**FC STAGE 2 PHASE 4B**	740	735	MH740A	MH735A	0.31	6					19.2	3116.2	2.46	24.81		0.0		0.0		0.0	1.00	0.00	0.31	39.3	12.97	0.00	0.0	37.78	31.63	*40.58*	250	*0.26*	0.624	-6.14	-19.42%
Sora Way	**FC STAGE 2 PHASE 4B**	735	730	MH735A	MH730A	0.46	6					19.2	3135.4	2.46	24.95		0.0		0.00		0.0	1.00	0.00	0.46	39.8	13.12	0.00	0.0	38.07	46.84	*105.34*	250	*0.57*	0.924	8.77	18.72%
												3135.4	TRUE											39.8	TRUE											

Existing MH730A to Findlay Creek Drive																																				
KELLY FARM DRIVE	**Findlay Creek Phase 4**	730		MH730A	MH720A	**4.11**	**67**					214.4	8057.80	2.23	58.19	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	4.11	125.52	41.42	0.00	0.00	101.20	96.79	*78.80*	375	*0.28*	0.849	-4.41	-4.56%
MAGPIE STREET	***FC South Stage2 PH4A***	*Outlet to Kelly Farm*		*MH703A*	*MH720A*	*1.57*	*29*																													
SILVERBELL CRESCENT	***FC South Stage2 PH4B***	*Outlet to Kelly Farm*		*MH714A*	*MH720A*	*1.14*	*11*	*12*																												
KELLY FARM DRIVE	**Findlay Creek Phase 4**		710	MH720A	MH710A	**2.83**	**40**	**12**				156.8	8214.60	2.22	59.19	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	2.83	128.35	42.36	0.00	0.00	103.14	84.79	*53.20*	375	*0.21*	0.744	-18.34	-21.63%
KELLY FARM DRIVE	**Findlay Creek Phase 4**	710	700	MH710A	MH700A	0.05						0.0	8214.60	2.22	59.19	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.05	128.40	42.37	0.00	0.00	103.15	154.12	*26.70*	375	*0.71*	1.352	50.97	33.07%
HELEN RAPP	***FC South Stage2 PH4A***	*Outlet to Kelly Farm*		*MH703A*	*MH700A*	*2.24*	*30*	*8*																												
SILVERBELL CRESCENT	***FC South Stage2 PH4B***	*Outlet to Kelly Farm*		*MH714A*	*MH700A*	*0.96*	*6*	*12*																												
KELLY FARM DRIVE	**Findlay Creek Phase 4**	700	333	MH700A	MH333A	**4.38**	**44**	**37**				229.6	8444.20	2.22	60.65	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	4.38	132.78	43.82	0.00	0.00	106.06	115.68	*179.20*	375	*0.40*	1.015	9.62	8.32%
JAVA 3	***FCJ JAVA 3***	*Outlet to Wood Acres Grove*		*FCJ3*	*MH364A*	*0.67*				*48*																										
Wood Acres Grove	**FC South Stage 3**		363	MH364A	MH363A	**1.23**		**15**		**48**		136.8	136.80	2.92	1.30	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.23	1.23	0.41	0.00	0.00	1.70							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	363	362	MH363A	MH362A	0.42		12				28.8	165.60	2.91	1.56	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.42	1.65	0.54	0.00	0.00	2.10							
CEDAR CREEK DRIVE	**Findlay Creek Stage 3**	*Outlet to Wood Acres Grove*		MH365A	MH362A	0.28		8																												
CEDAR CREEK DRIVE	**Findlay Creek Stage 3**	*Outlet to Wood Acres Grove*		MH342A	MH362A	0.30		10																												
WOOD ACRES GROVE	**Findlay Creek Stage 3**	362	361	MH362A	MH361A	**1.11**		**34**				81.6	247.20	2.87	2.30	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.11	2.76	0.91	0.00	0.00	3.21							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	361		MH361A	MH360A	0.41		13				31.2	278.40	2.86	2.58	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.41	3.17	1.05	0.00	0.00	3.62							
WOOD ACRES GROVE	Findlay Creek Stage 3			MH360A	MH356A	0.71		25				60.0	338.40	2.83	3.11	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.71	3.88	1.28	0.00	0.00	4.39							
WOOD ACRES GROVE	**Findlay Creek Stage 3**		355	MH356A	MH355A	0.19		4				9.6	348.00	2.83	3.19	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.19	4.07	1.34	0.00	0.00	4.53							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	355	353	MH355A	MH353A	0.55		16				38.4	386.40	2.82	3.53	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.55	4.62	1.52	0.00	0.00	5.05							
ALASKEN DRIVE	Findlay Creek Stage 3			MH360A	MH352A	0.56		16				38.4	38.40	3.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.56	0.56	0.18	0.00	0.00	0.56							
ALASKEN DRIVE	***Findlay Creek Stage 3***			*MH352A*	*MH351A*	*0.19*		*3*																												
ALASKEN DRIVE	**Findlay Creek Stage 3**		350	MH351A	MH350	**0.88**		**27**				64.8	103.20	2.94	0.98	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.88	1.44	0.48	0.00	0.00	1.46							
ALASKEN DRIVE	**Findlay Creek Stage 3**	350	353	MH350A	MH353A	0.06		2				4.8	108.00	2.94	1.03	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.06	1.50	0.50	0.00	0.00	1.52							
ALASKEN DRIVE	**Findlay Creek Stage 3**	353	333	MH353A	MH333A	**0.43**		**8**				19.2	513.60	2.78	4.63	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.43	6.55	2.16	0.00	0.00	6.79							
FINDLAY CREEK DRIVE	**Findlay Creek Phase 4**	333	330-11	MH333A	MH11A	1.19	8	12				54.4	9012.20	2.20	64.24	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	1.19	140.52	46.37	0.00	0.00	112.21	118.54	*188.70*	375	*0.42*	1.040	6.33	5.34%
												9012.2	TRUE			2.6	TRUE	5.5	TRUE	0.0	TRUE			140.5	TRUE											
S5 LANDS TO COWANS	**COWANS GROVE**	S5E	COWANS	S5E	COWANS	10.99						861.0	861.00	2.70	7.55	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	10.99	10.99	3.63	0.00	0.00	11.17							

Design Parameters:

Residential			ICI Areas			
SF	3.2	p/p/u				
TH/SD	2.4	p/p/u	INST	17,000	L/Ha/day	
1 Bed	1.4	p/p/u	COM	17,000	L/Ha/day	
2 Bed	2.1	p/p/u	IND	17,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha			L/Ha/day	

Notes:

1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.6
   where K = 0.6 Correction Factor (existing areas only)
5. Commercial and Institutional Peak Factors based on total area,
1.5 if greater than 20%, otherwise 1.0

Designed: AS/RM

Checked: RM/DY

Dwg. Reference: 145172-100

No.	Revision	Date
1.	Existing Conditions Report Submission No. 2 2025-03-25	
2.	Existing Conditions Report Submission No. 3 2025-05-29	
3.	Serviceability Report Submission No. 1 2025-08-08	

File Reference:	Date:	Sheet No:
145172-6.04.03	2025-08-08	1 of 1

Note: For this exercise the current (revised) criteria for normal operating conditions was applied to existing areas
Harmon - correction factor is now 0.6
ICI peak factor is always 1.0
INST, COM, IND release rates changed as noted
Demand = 200 per capita L/day
Infiltration allowance = 0.3 L/s/Ha

ARCADIS PROFESSIONAL SERVICES (CANADA) INC.
500-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
arcadis.com

red italics **denotes as-built sewer information (where applicable)**

SANITARY SEWER DESIGN SHEET

Existing Conditions Report - Annual Event
Regional Group
CITY OF OTTAWA

LOCATION						RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
STREET	AREA ID	FROM MODEL ID	TO MODEL ID	FROM MH	TO MH	AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW	IND	CUM	(L/s)	CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
							SF	TH/SD	1 Bed APT	2 Bed APT		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL				IND	CUM	(L/s)				(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
																IND	CUM	IND	CUM	IND	CUM															
S-4 Leitrim Expansion Lands	**Future**	**S4W**		**S-4**	**Paakanaak**	**4.80**	**44**	**47**				**253.6**	**253.6**	2.87	**1.68**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**4.80**	**4.80**	**1.44**	**0.00**	**0.0**	**3.12**	**20.24**	**0.00**	**200**	**0.35**	**0.624**	**17.12**	**84.58%**
S-4 Lands West - Flows to Pathways																																				
Pakaanaak	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14200A	MH14201A	0.75	16					51.2	51.2	2.99	0.35	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.75	0.75	0.23	0.00	0.0	0.58	54.85	*103.09*	200	*2.57*	1.691	54.27	98.94%
Pakaanaak	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14201A	MH14202A	0.55	9					28.8	333.6	2.84	2.19	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.55	6.10	1.83	0.00	0.00	4.02	49.47	*110.49*	200	*2.09*	1.525	45.45	91.87%
Pakaanaak	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14202A	MH14204A	0.48	8					25.6	359.2	2.83	2.35	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.48	6.58	1.97	0.00	0.00	4.32	46.16	*97.85*	200	*1.82*	1.423	41.84	90.63%
Esban	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14204A	MH14205A	0.67	2	20				54.4	413.6	2.81	2.69	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.67	7.3	2.18	0.00	0.0	4.86	41.20	*92.41*	200	*1.45*	1.271	36.34	88.19%
Esban	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14205A	BLK6035A	0.83	16					51.2	464.8	2.79	3.01	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.83	8.08	2.42	0.00	0.00	5.43	48.51	*65.10*	200	*2.01*	1.496	43.08	88.81%
Esban	**Pathways Phase 2**	Outlet to Dun Skipper via Esban		BLK6035A	MH6053A	0.25	4					12.8	477.6	2.79	3.09	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25	8.33	2.50	0.00	0.00	5.58	48.03	*44.18*	200	*1.97*	1.481	42.44	88.37%
Dun Skipper	**Pathways Phase 2**			MH6052A	MH6053A	0.51	8					25.6	25.6	3.02	0.18	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.51	0.51	0.15	0.00	0.00	0.33	29.03	*72.11*	200	*0.72*	0.895	28.70	98.86%
Dun Skipper	**Pathways Phase 2**			MH6053A	MH6042A	0.43	7					22.4	525.6	2.78	3.38	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.43	9.27	2.78	0.00	0.00	6.16	20.81	*80.65*	200	*0.37*	0.642	14.65	70.40%
Block 58	**Idone Phase 2A**	Outlet to Dun Skipper via Kijik		BLK6036A	MH6041A	3.20	17	56			0.81	188.8	188.8	2.89	1.26	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	4.01	4.01	1.20	0.00	0.00	2.47	45.65	*43.79*	200	*1.78*	1.408	43.18	94.59%
Dun Skipper	**Pathways Phase 2**			MH6041A	MH6042A	0.12	1					3.2	192.0	2.89	1.29	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.12	4.13	1.24	0.00	0.00	2.52	42.19	*17.74*	200	*1.52*	1.301	39.66	94.02%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6042A	MH6043A	0.58		18				43.2	760.8	2.72	4.80	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.58	13.98	4.19	0.00	0.00	8.99	27.37	*76.96*	200	*0.64*	0.844	18.38	67.15%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6043A	MH6044A	0.18		3				7.2	768.0	2.72	4.84	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.18	14.16	4.25	0.00	0.00	9.09	28.42	*11.55*	200	*0.69*	0.876	19.33	68.02%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6044A	MH6045A	0.58	2	16				44.8	812.8	2.71	5.11	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.58	14.74	4.42	0.00	0.00	9.53	21.91	*82.91*	200	*0.41*	0.676	12.38	56.51%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6045A	MH6046A	0.27	6					19.2	832.0	2.71	5.22	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.27	15.01	4.50	0.00	0.00	9.72	19.95	*33.87*	200	*0.34*	0.615	10.23	51.27%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6046A	MH6047A	0.29	5					16.0	848.0	2.71	5.31	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	15.30	4.59	0.00	0.00	9.90	22.70	*34.27*	200	*0.44*	0.700	12.79	56.36%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6047A	MH6048A	0.27	4					12.8	860.8	2.70	5.39	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.27	15.57	4.67	0.00	0.00	10.06	22.70	*33.85*	200	*0.44*	0.700	12.64	55.68%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6048A	MH6049A	0.17	2					6.4	867.2	2.70	5.43	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.17	15.74	4.72	0.00	0.00	10.15	25.38	*41.61*	200	*0.55*	0.782	15.23	60.01%
Paakanaak	***Pathways Phase 3***	*Outlet to Paakanaak*			*MH6003A*	*1.20*	*22*																													
Paakanaak	***Pathways Phase 2***	*Paakanak*		*MH6003A*	*MH6004*	*0.47*	*11*																													
Paakanaak				MH6004A	MH6008A	**1.80**	**35**					112.0	112.0	2.94	0.76	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.80	1.80	0.54	0.00	0.00	1.30	20.24	*19.82*	200	*0.35*	0.624	18.94	93.57%
Paakanaak	***Idone Phase 2A***	*Outlet to Paakanaak*			*BLK6005A*	*1.97*	*37*																													
Paakanaak	***Pathways Phased 2***	*Outlet to Paakanaak*			*MH6008A*	*0.61*	*10*																													
Miikana Road	**Pathways Phase 2**	603		MH6008A	MH6030A	**2.92**	**51**					163.2	275.2	2.86	1.82	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	2.92	4.7	1.42	0.00	0.0	3.24	43.82	*64.09*	200	*1.64*	1.351	40.58	92.62%
Miikana Road	**Pathways Phase 2**			MH6030A	MH6031A	0.18	3					9.6	284.8	2.85	1.88	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.18	4.9	1.47	0.00	0.00	3.35	38.10	*23.40*	200	*1.24*	1.175	34.75	91.21%
Miikana Road	**Pathways Phase 2**		608	MH6031A	MH6032A	0.14	3					9.6	294.4	2.85	1.94	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.14	5.0	1.51	0.00	0.00	3.45	20.81	*38.20*	200	*0.37*	0.642	17.36	83.41%
Paakanaak	***Pathways Phase 3***	*Outlet to Gartersnake via Paak*			*MH6308A*	*0.87*	*8*	*6*																												
Gartersnake	***Pathways Phase 3***	*Outlet to Phase 2 Connection*		*MH6308A*	*MH6018A*	*1.16*	*5*	*22*																												
Pathways Block60	***Pathways Block60***	*Outlet to Phase 2 Connection*			*MH6018A*	*0.95*		*26*																												
Ninaatik Place	***Pathways Phase 2***	*Outlet to Gartersnake*			*MH6018A*	*0.61*	*9*	*2*																												
Gartersnake	***Pathways Phase 2***	*Outlet to Miikana*		*MH6018A*	*MH6032A*	*0.59*		*13*																												
Miikana Road	**Pathways Phase 2**	608		MH6032A	MH6033A	**4.48**	**27**	**69**				252.0	546.4	2.77	3.51	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	4.48	9.5	2.86	0.00	0.0	6.36	21.91	*62.90*	200	*0.41*	0.676	15.55	70.96%
Miikana Road	**Pathways Phase 2**		609	MH6033A	MH6050A	0.29	5					16.0	562.4	2.77	3.60	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	9.8	2.94	0.00	0.00	6.55	20.24	62.75	200	0.35	0.624	13.70	67.66%
Ginebik	*Idone Phase 2A*	*Outlet to Ginebik*			*MH6038A*	*3.08*	*50*																													
Ginebik	*Pathways Phase 2*	*Outlet to Dun Skipper*		*MH6038A*	*MH6051A*	*0.86*	*14*																													
Dun Skipper	*Pathways Phase 2*	*Outlet to Miikana*			*MH6050A*	*0.77*	*11*																													
Miikana Road	**Pathways Phase 2/**	609		MH6050A	MH6034A	**5.13**	**79**					252.8	815.2	2.71	5.12	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.13	14.94	4.48	0.00	0.00	9.60	33.98	*22.99*	250	*0.30*	0.671	24.38	71.74%
Block 46 (Park)	**Pathways Phase 2**			MH6049AW	MH6034A						2.85	0.0	0.0	3.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.85	2.85	0.86	0.00	0.00	0.86	20.53	*15.47*	200	*0.36*	0.633	19.67	95.84%
Miikana	**Pathways Phase 2**		620	MH6034A	MH6049A							0.0	815.2	2.71	5.12	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	17.8	5.34	0.00	0.00	10.46	31.63	*60.76*	*250*	*0.26*	0.624	21.18	66.94%
Miikana	**vays Phase 2/ Idone Ph**	620	630	MH6049A	MH6060A	0.37		7				16.8	1699.2	2.58	10.16	0.00	0.0	0.00	0.0	0.00	0.00	1.00	0.00	0.37	33.9	10.17	0.00	0.0	20.33	43.97	*81.59*	*300*	*0.19*	0.603	23.64	53.76%
Spreadwing	**Pathways Phase 2**	630		MH6060A	MH6061A	0.21	4					12.8	1712.0	2.58	10.23	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	34.11	10.23	0.00	0.00	20.47	43.97	*38.76*	*300*	*0.19*	0.603	23.51	53.46%
Spreadwing	**Pathways Phase 2**			MH6061A	MH6062A	0.21	4					12.8	1724.8	2.58	10.30	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	34.32	10.30	0.00	0.00	20.60	47.32	*18.24*	*300*	*0.22*	0.648	26.72	56.46%
Spreadwing	**Pathways Phase 2**			MH6062A	MH6063A	0.15	2					6.4	1731.2	2.58	10.34	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.15	34.47	10.34	0.00	0.00	20.68	43.97	*18.20*	*300*	*0.19*	0.603	23.29	52.97%
Spreadwing	**Pathways Phase 2**			MH6063A	MH6064A	0.54	8					25.6	1756.8	2.58	10.48	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.54	35.01	10.50	0.00	0.00	20.98	46.23	*75.32*	*300*	*0.21*	0.634	25.25	54.61%
Spreadwing	**Pathways Phase 2**			MH6064A	EXBLK3171A	0.44	7					22.4	1779.2	2.57	10.60	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.44	35.45	10.64	0.00	0.00	21.24	45.12	*51.94*	*300*	*0.20*	0.618	23.88	52.92%
Spreadwing	**Pathways Phase 2**		6171	BLK3171AW	MH6171A							0.0	1779.2	2.57	10.60	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	35.45	10.64	0.00	0.00	21.24	45.12	*43.00*	*300*	*0.20*	0.618	23.88	52.92%
Minikan	**Pathways Phase 1**	Outlet to Spreadwing Way			MH6171A	2.06	40					128.0	128.0	2.93	0.87	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.06	2.06	0.62	0.00	0.00	1.49	50.75	*84.42*	200	*2.20*	1.565	49.27	97.07%
Spreadwing	**Pathways Phase 1**	6171	6183	MH6171A	MH6183A	0.15						0.0	1907.2	2.56	11.31	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.15	37.7	11.30	0.00	0.0	22.60	45.12	*83.61*	*300*	*0.20*	0.618	22.51	49.90%

Zaatiik Grove	Pathways Phase 1			MH6182A	MH6183A	1.18	18					57.6	57.6	2.98	0.40	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.18	1.18	0.35	0.00	0.00	0.75	54.10	74.74	200	2.50	1.668	53.35	98.61%
Zaatiik Grove	Pathways Phase 1	6183	6175	MH6183A	MH6175A							0.0	1964.80	2.56	11.62	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	38.84	11.65	0.00	0.00	23.27	45.12	118.54	300	0.20	0.618	21.84	48.42%
Zaatiik Grove	Pathways Phase 1	high level sani		MH61783B	MH6175A	0.67	12					38.4	38.40	3.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.67	0.67	0.20	0.00	0.00	0.47	37.48	6.00	200	1.20	1.156	37.01	98.75%
Minikan Street	Pathways Phase 1		6175	MH6175B	MH6175D	1.74	28					89.6	89.60	2.95	0.61	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.74	1.74	0.52	0.00	0.00	1.13	45.12	6.00	300	0.20	0.618	43.98	97.49%
Minikan Street	Pathways Phase 1	6175	6106	MH6175A	MH6106A							0.0	2092.80	2.54	12.32	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	41.25	12.38	0.00	0.00	24.69	45.12	85.46	300	0.20	0.618	20.43	45.27%
Minikan Street	Pathways Phase 1	high level sani		MH6106C	MH6106A	0.58	10					32.0	32.0	3.01	0.22	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.58	0.6	0.17	0.00	0.00	0.40	28.63	6.00	200	0.70	0.883	28.23	98.61%
												2124.8	TRUE											41.8	TRUE											
Kelly Farm Drive	Idone Phase 1	Outlet to Dun Skipper			MH6110A	1.64	28																													
Dun Skipper	Pathways Phase 1	Dunskipper to Kelly Farm Drive		MH6132A	MH6110A	0.53	9																													
Kelly Farm Drive	Pathways Phase 1	Kelly Farm Drive to Salamander		MH6110A	MH6108A	1.08	18																													
Salamander	Pathways Phase 1	Outlet to Kelly Frm Drive		MH6156A	MH6108A	1.23	19																													
Kelly Farm Drive	Pathways Phase 1	Kelly Farm Drive		MH6108A	MH6106A	0.51	6																													
Kelly Farm Drive	Pathways Phase 1	6106	647	MH6106A	MH647A	5.18	80					256.0	2380.80	2.52	13.86	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.18	47.01	14.10	0.00	0.00	27.97	45.12	86.86	300	0.20	0.618	17.15	38.01%
Wabikon Crescent	Pathways Phase 2	Outlet to Miikana		MH6070A	MH6080A	2.16		58			0.06																									
Miikana	Pathways Phase 2	Miikana		MH6079A	MH6080A	0.80		21																												
Miikana	Pathways Phase 2		646	MH6080A	MH6081A	3.88		104			0.06	249.6	249.6	2.87	1.66	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	3.94	3.9	1.18	0.00	0.00	2.84							
Miikana Road	Pathways Phase 2	646		MH6081A	BLK6105AW	1.02		30				72.0	72.0	2.97	0.49	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	1.02	1.0	0.31	0.00	0.0	0.80							
Miikana Road	Pathways Phase 2		647	BLK6105AW	EX. MH647A	0.70		23				55.2	376.8	2.82	2.46	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.70	5.7	1.70	0.00	0.0	4.16	20.24	17.00	200	0.35	0.624	16.08	79.46%
Salamander Way	Pathways Phase 1	6156	6157	MH6156A	MH6157A	0.29	3					9.6	9.6	3.05	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	0.29	0.09	0.00	0.00	0.15							
Salamander Way	Pathways Phase 1	6157	6158	MH6157A	MH6158A	0.07		1				2.4	12.0	3.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.07	0.36	0.11	0.00	0.00	0.19							
Salamander Way	Pathways Phase 1	6158	6153	MH6158A	MH6153A	0.54		14				33.6	45.6	2.99	0.32	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.54	0.90	0.27	0.00	0.00	0.59							
Block 436 (Park)	Pathways Phase 1		6153	MH6159A	MH6153A						0.83	0.0	0.0	3.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.83	0.83	0.25	0.00	0.00	0.25							
Salamander Way	Pathways Phase 1	6153	6154	MH6153A	MH6154A	0.03						0.0	45.6	2.99	0.32	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.03	1.8	0.53	0.00	0.0	0.84							
Salamander Way	Pathways Phase 1	6154	6115	MH6154A	MH6115A	0.13						0.0	45.6	2.99	0.32	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.13	1.89	0.57	0.00	0.00	0.88							
Rallidale Street	Idone Phase 1	Outlet to Dun Skipper via Rallidale		MH14110A	MH1411A	1.83	9	39																												
Grackle Street	Idone Phase 1	Outlet to Dun Skipper via Grackle		MH14120A	MH1411A	1.41		43																												
Rallidale Street	Idone Phase 1	Outlet to Dun Skipper		MH1411A	MH6133A	0.27		6																												
Dun Skipper	Pathways Phase 1	Dun Skipper		MH6132A	MH6133A	0.64	11																													
Dun Skipper	Pathways Phase 1	Dun Skipper		MH6133A	MH6136A	1.43	26																													
Pathways Block 203	Pathways Block 203	Outlet to Dun Skipper			MH6136A	1.62		80																												
Pathways Block 204	Pathways Block 204	Outlet to Home Hardware			MH1A	1.54			77	103																										
Home Hardware	Home Hardware	Outlet to Dun Skipper		MH6A	MH6138A				54	87								2.53																		
Dun Skipper	Pathways Phase 1	Dun Skipper / Cedar Creek		MH6138A	MH6136A	0.18																														
Cedar Creek	Pathways Phase 1	Cedar Creek		MH6136A	MH6119A	0.17																														
Pingwi Place	Pathways Phase 1	Outlet to Cedar Creek		MH6132A	MH6119A	1.93	20	24																												
Pathways Block 241	Pathways Block	Outlet to Cedar Creek		BLK6119AE	MH6119A													3.01																		
Cedar Creek	Pathways Phase 1	Cedar Creek		MH6119A	MH6117A	0.12																														
Pathways Block 232	Pathways Block 232	Outlet to Cedar Creek			MH6117A	1.01			12	80																										
Cedar Creek	Pathways Phase 1		6115	MH6117A	MH6115A	12.21	66	226	143	270		1520.8	1520.8	2.61	9.17	0.00	0.00	5.54	5.54	0.00	0.00	1.00	1.09	17.75	17.75	5.33	0.00	0.00	15.59							
Cedar Creek	Pathways Phase 1	6115	6101	MH6115A	MH6101A	0.61		18				43.2	1609.60	2.59	9.67	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.61	20.25	6.08	0.00	0.00	16.83							
Miikana Road	Pathways Phase 1	6101	6102	MH6101A	MH6102A	0.45		11				26.4	1636.00	2.59	9.81	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.45	20.70	6.21	0.00	0.00	17.11							
Pathways Block 225	Pathways Block 225		6102		MH6102A	0.94		34				81.6	81.60	2.96	0.56	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.94	0.94	0.28	0.00	0.00	0.84							
Miikana Road	Pathways Phase 1	6102	6103	MH6102A	MH6103A	0.23		6				14.4	1732.00	2.58	10.34	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.23	21.87	6.56	0.00	0.00	18.00							
Miikana Road	Pathways Phase 1	6103	6104	MH6103A	MH6104A	0.66		18				43.2	1775.20	2.58	10.58	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.66	22.53	6.76	0.00	0.00	18.43							
School Block	Pathways Block 223	Outlet to Miikana		BLK6104AS	MH6104A							0.0	0.00	3.10	0.00	2.55	2.55	0.00	0.00	0.00	0.00	1.00	0.50	2.55	2.55	0.77	0.00	0.00	1.27							
Miikana Road	Pathways Phase 1	6104	6105B	MH6104A	MH6104B	0.6		15				36.0	1811.20	2.57	10.78	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.60	25.68	7.70	0.00	0.00	20.08							
Miikana Road	Pathways Phase 1	6105B	647	MH6104B	MH647							0.0	1811.20	2.57	10.78	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.00	25.68	7.70	0.00	0.00	20.08							
												1811.2	TRUE											25.7	TRUE											
KELLY FARM DRIVE	FC South Stage2 PH4B	647	755	MH647A	MH742A	0.28		5				12.0	4580.80	2.37	25.11	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.28	78.63	23.59	0.00	0.00	50.29	101.84	80.31	375	0.31	0.893	51.55	50.62%
KESTREL STREET	FC South Stage2 PH4B	Undeveloped lands to Kestrel		BLKHEAD	MH751A	0.65		22																												
PARK BLOCK	FC South Stage2 PH4B	Park land		MH744A	MH745A						1.22																									
KESTREL STREET	FC South Stage2 PH4B	Outlet to Kelly Farm		MH751A	MH742A	0.49		15																												
KELLY FARM DRIVE	FC South Stage2 PH4B	755	745	MH742A	MH741A	1.53		48			1.22	115.2	4696.00	2.36	25.68	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	2.75	81.38	24.41	0.00	0.00	51.68	101.84	80.31	375	0.31	0.893	50.16	49.25%
KELLY FARM DRIVE	FC South Stage2 PH4B	745	730	MH741A	MH730A	0.28		5				12.0	4708.00	2.36	25.74	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.28	81.66	24.50	0.00	0.00	51.83	101.84	80.31	375	0.31	0.893	50.02	49.11%
HELEN RAPP WAY	FC South Stage2 PH4A	Outlet to Helen Rapp Way South			MH738A	0.34	5																													
HELEN RAPP WAY	FC South Stage2 PH4B			MH735A	MH738A	1.21	20																													
MAYBERLY	FC South Stage2 PH4B			MH738A	MH731A	0.52	9																													
HELEN RAPP WAY	FC South Stage2 PH4B	Outlet to Maberly		MH735A	MH731A	1.33	24																													
HELEN RAPP WAY	FC South Stage2 PH4B	Outlet to Kelly Farm		MH731A	MH730A	0.51	9																													
						3.91	67																													

S-4 Lands East - Flows to Bank Street																																				
S-4 Leitrim Expansion Lands	**Future**			**S-4**	**Bank**	**8.47**	**33**	**84**		**90**		**496.2**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**8.47**	**8.47**	**2.54**	**0.00**	**0.0**	**5.74**	**20.24**	**0.00**	**200**	**0.35**	**0.624**	**14.50**	**71.64%**
Bank Street	**Future**			**Bank**	**MH300A**						**2.25**	**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**2.25**	**10.72**	**3.22**	**0.00**	**0.0**	**6.42**	**20.24**	**0.00**	**200**	**0.35**	**0.624**	**13.83**	**68.31%**
Bank Street_San	**Proposed**			**MH300A**	**MH200A**							**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.00**	**10.72**	**3.22**	**0.00**	**0.0**	**6.42**	**20.24**	**71.44**	**200**	**0.35**	**0.624**	**13.83**	**68.31%**
Bank Street_San	**Proposed**			**MH200A**	**MH100A**						**0.66**	**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.66**	**11.38**	**3.41**	**0.00**	**0.0**	**6.61**	**20.24**	**92.12**	**200**	**0.35**	**0.624**	**13.63**	**67.33%**
Bank Street_San	**Proposed**	**S4E**		**MH100A**	**MH793A**							**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.00**	**11.38**	**3.41**	**0.00**	**0.0**	**6.61**	**24.19**	**24.98**	**200**	**0.50**	**0.746**	**17.58**	**72.67%**
Labrador Crescent	**FC STAGE 2 PHASE 4C**	Sparta Lands		BLK794AS	MH794A	2.80		24		220		519.6	519.6	2.78	3.34		0.0		0.00		0.0	1.00	0.00	2.80	2.80	0.84	0.00	0.0	4.18	19.66	*33.00*	200	*0.33*	0.606	15.47	78.72%
Labrador Crescent	**FC STAGE 2 PHASE 4C**			MH794A	MH791A	0.49		20				48.0	1063.8	2.67	6.57		0.0		0.0		0.0	1.00	0.00	0.49	14.7	4.40	0.00	0.0	10.97	19.66	*19.60*	200	*0.33*	0.606	8.68	44.17%
Potential S-5 Lands	**Potential**	**S5W**		**S-5**	**MH791D/A**	**4.78**						**630.0**	**630.0**	2.75	**4.01**		**0.0**		**0.00**		**0.0**	**1.00**	**0.00**	**4.78**	**4.8**	**1.43**	**0.00**	**0.0**	**5.45**							
Labrador Crescent	**FC STAGE 2 PHASE 4C**	790		MH791A	MH790A	0.25		7				16.8	1710.6	2.58	10.23		0.0		0.0		0.0	1.00	0.00	0.25	19.7	5.91	0.00	0.0	16.14	19.95	*73.40*	200	*0.34*	0.615	3.82	19.12%
HAWKMERE WAY	***FC STAGE 2 PHASE 4C***	*Outlet to Labrador Crescent*		*MH769A*	*MH797A*	*1.27*		*40*																												
Labrador Crescent	***FC STAGE 2 PHASE 4C***	*Outlet to Sora Way*		*MH795A*	*MH790A*	*0.73*		*33*																												
Sora Way	**FC STAGE 2 PHASE 4C**		780	MH790A	MH780A	**2.39**		**86**				206.4	1917.0	2.56	11.36		0.0		0.0		0.0	1.00	0.00	2.39	22.1	6.63	0.00	0.0	17.99	21.09	*86.10*	200	*0.38*	0.650	3.11	14.72%
Eric Maloney	***FC STAGE 2 PHASE 4C***	*Outlet to Sora Way*		*MH786A*	*MH780A*	*1.45*		*43*																												
Sora Way	**FC STAGE 2 PHASE 4C**	780	770	MH780A	MH770A	**1.81**		**53**				127.2	2044.2	2.55	12.05		0.0		0.0		0.0	1.00	0.00	1.81	23.9	7.17	0.00	0.0	19.22	19.66	*9.50*	200	*0.33*	0.606	0.43	2.21%
Future Cedar Creek	**FC STAGE 2 PHASE 4B**	775	770	MH777A	MH770A	4.75		161				386.4	386.4	2.82	2.52		0.0		0.0		0.0	1.00	0.00	4.75	4.8	1.43	0.00	0.0	3.95							
Eric Maloney	***FC STAGE 2 PHASE 4C***		771	*MH787A*	*MH772A*	*0.70*	*12*																													
Cedar Creek	**FC STAGE 2 PHASE 4B**	771	770	MH772A	MH770A	**1.83**		**34**				81.6	81.6	2.96	0.56		0.0		0.0		0.0	1.00	0.00	1.83	1.8	0.55	0.00	0.0	1.11							
Sora Way	**FC STAGE 2 PHASE 4B**	770	760	MH770A	MH760A	**5.02**	**3**	**161**				396.0	2908.2	2.47	16.64		0.0		0.0		0.0	1.00	0.00	5.02	35.5	10.65	0.00	0.0	27.29							
Sagebush Cresc. East	***FC STAGE 2 PHASE 4C***	*Outlet to Sora*		*MH763A*	*MH760A*	*1.02*	*17*																							*27.59*	*107.80*	*200*	*0.65*	*0.851*	*27.59*	*100.00%*
Sora Way	**FC STAGE 2 PHASE 4B**	760	750	MH760A	MH750A	**1.39**	**23**					73.6	2981.8	2.47	17.03		0.0		0.0		0.0	1.00	0.00	1.39	36.9	11.07	0.00	0.0	28.09	31.02	*81.07*	250	*0.25*	0.612	2.93	9.43%
Sagebush Cresc. West	***FC STAGE 2 PHASE 4C***	*Outlet to Sora*		*MH763A*	*MH750A*	*1.41*	*23*																							*20.24*	*108.40*	*200*	*0.35*	*0.624*	*20.24*	*100.00%*
Sora Way	**FC STAGE 2 PHASE 4B**	750	740	MH750A	MH740A	**2.09**	**36**					115.2	3097.0	2.46	17.62		0.0		0.0		0.0	1.00	0.00	2.09	39.0	11.69	0.00	0.0	29.32	31.02	*94.16*	250	*0.25*	0.612	1.70	5.48%
Sora Way	**FC STAGE 2 PHASE 4B**	740	735	MH740A	MH735A	0.31	6					19.2	3116.2	2.46	17.72		0.0		0.0		0.0	1.00	0.00	0.31	39.3	11.79	0.00	0.0	29.51	31.63	*40.58*	250	*0.26*	0.624	2.12	6.71%
Sora Way	**FC STAGE 2 PHASE 4B**	735	730	MH735A	MH730A	0.46	6					19.2	3135.4	2.46	17.82		0.0		0.00		0.0	1.00	0.00	0.46	39.8	11.93	0.00	0.0	29.75	46.84	*105.34*	250	*0.57*	0.924	17.09	36.49%
												3135.4	TRUE											39.8	TRUE											

Existing MH730A to Findlay Creek Drive																																				
KELLY FARM DRIVE	**Findlay Creek Phase 4**	730		MH730A	MH720A	**4.11**	**67**					214.4	8057.80	2.23	41.56	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	4.11	125.52	37.66	0.00	0.00	80.81	96.79	*78.80*	375	*0.28*	0.849	15.98	16.51%
MAGPIE STREET	***FC South Stage2 PH4A***	*Outlet to Kelly Farm*		*MH703A*	*MH720A*	*1.57*	*29*																													
SILVERBELL CRESCENT	***FC South Stage2 PH4B***	*Outlet to Kelly Farm*		*MH714A*	*MH720A*	*1.14*	*11*	*12*																												
KELLY FARM DRIVE	**Findlay Creek Phase 4**		710	MH720A	MH710A	**2.83**	**40**	**12**				156.8	8214.60	2.22	42.28	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	2.83	128.35	38.51	0.00	0.00	82.38	83.82	*53.20*	375	*0.21*	0.735	1.45	1.72%
KELLY FARM DRIVE	**Findlay Creek Phase 4**	710	700	MH710A	MH700A	0.05						0.0	8214.60	2.22	42.28	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.05	128.40	38.52	0.00	0.00	82.39	154.12	*26.70*	375	*0.71*	1.352	71.73	46.54%
HELEN RAPP	***FC South Stage2 PH4A***	*Outlet to Kelly Farm*		*MH703A*	*MH700A*	*2.24*	*30*	*8*																												
SILVERBELL CRESCENT	***FC South Stage2 PH4B***	*Outlet to Kelly Farm*		*MH714A*	*MH700A*	*0.96*	*6*	*12*																												
KELLY FARM DRIVE	**Findlay Creek Phase 4**	700	333	MH700A	MH333A	**4.38**	**44**	**37**				229.6	8444.20	2.22	43.32	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	4.38	132.78	39.83	0.00	0.00	84.75	115.68	*179.20*	375	*0.40*	1.015	30.93	26.74%
JAVA 3	***FCJ JAVA 3***	*Outlet to Wood Acres Grove*		*FCJ3*	*MH364A*	*0.67*				*48*																										
Wood Acres Grove	**FC South Stage 3**		363	MH364A	MH363A	**1.23**		**15**		**48**		136.8	136.80	2.92	0.93	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.23	1.23	0.37	0.00	0.00	1.29							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	363	362	MH363A	MH362A	0.42		12				28.8	165.60	2.91	1.11	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.42	1.65	0.50	0.00	0.00	1.61							
CEDAR CREEK DRIVE	**Findlay Creek Stage 3**	*Outlet to Wood Acres Grove*		MH365A	MH362A	0.28		8																												
CEDAR CREEK DRIVE	**Findlay Creek Stage 3**	*Outlet to Wood Acres Grove*		MH342A	MH362A	0.30		10																												
WOOD ACRES GROVE	**Findlay Creek Stage 3**	362	361	MH362A	MH361A	**1.11**		**34**				81.6	247.20	2.87	1.64	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.11	2.76	0.83	0.00	0.00	2.47							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	361		MH361A	MH360A	0.41		13				31.2	278.40	2.86	1.84	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.41	3.17	0.95	0.00	0.00	2.79							
WOOD ACRES GROVE	Findlay Creek Stage 3			MH360A	MH356A	0.71		25				60.0	338.40	2.83	2.22	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.71	3.88	1.16	0.00	0.00	3.38							
WOOD ACRES GROVE	**Findlay Creek Stage 3**		355	MH356A	MH355A	0.19		4				9.6	348.00	2.83	2.28	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.19	4.07	1.22	0.00	0.00	3.50							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	355	353	MH355A	MH353A	0.55		16				38.4	386.40	2.82	2.52	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.55	4.62	1.39	0.00	0.00	3.91							
ALASKEN DRIVE	Findlay Creek Stage 3			MH360A	MH352A	0.56		16				38.4	38.40	3.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.56	0.56	0.17	0.00	0.00	0.43							
ALASKEN DRIVE	***Findlay Creek Stage 3***			*MH352A*	*MH351A*	*0.19*		*3*																												
ALASKEN DRIVE	**Findlay Creek Stage 3**		350	MH351A	MH350	**0.88**		**27**				64.8	103.20	2.94	0.70	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.88	1.44	0.43	0.00	0.00	1.14							
ALASKEN DRIVE	**Findlay Creek Stage 3**	350	353	MH350A	MH353A	0.06		2				4.8	108.00	2.94	0.74	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.06	1.50	0.45	0.00	0.00	1.19							
ALASKEN DRIVE	**Findlay Creek Stage 3**	353	333	MH353A	MH333A	**0.43**		**8**				19.2	513.60	2.78	3.31	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.43	6.55	1.97	0.00	0.00	5.27							
FINDLAY CREEK DRIVE	**Findlay Creek Phase 4**	333	330-11	MH333A	MH11A	1.19	8	12				54.4	9012.20	2.20	45.89	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	1.19	140.52	42.16	0.00	0.00	89.64	118.54	*188.70*	375	*0.42*	1.040	28.90	24.38%
												9012.2	TRUE			2.6	TRUE	5.5	TRUE	0.0	TRUE			140.5	TRUE											
S5 LANDS TO COWANS	**COWANS GROVE**	S5E	COWANS	S5E	COWANS	10.99						861.0	861.00	2.70	5.39	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	10.99	10.99	3.30	0.00	0.00	8.69							

Design Parameters:

Residential		
SF	3.2	p/p/u
TH/SD	2.4	p/p/u
1 Bed	1.4	p/p/u
2 Bed	2.1	p/p/u
Other	60	p/p/Ha

ICI Areas			
INST	17,000	L/Ha/day	
COM	17,000	L/Ha/day	
IND	17,000	L/Ha/day	MOE Chart
		L/Ha/day	

Notes:

1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 200 L/day 200 L/day
3. Infiltration allowance: 0.3 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.6
   where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
1.5 if greater than 20%, otherwise 1.0

Designed: AS/RM

Checked: RM/DY

Dwg. Reference: 145172-100

No.	Revision	Date
1.	Existing Conditions Report Submission No. 2 2025-03-25	
2.	Existing Conditions Report Submission No. 3 2025-05-29	
3.	Serviceability Report Submission No. 1 2025-08-08	

File Reference:	Date:	Sheet No:
145172-6.04.03	2025-08-08	1 of 1

Note: For this exercise the current (revised) criteria for the rare event was used which has made changes to the following
Harmon - correction factor is not 0.6
ICI peak factor is always 1.0
INST, COM, IND release rates changed as noted
Demand = 200 per capita L/day
Infiltration allowance = 0.3 L/s/Ha

ARCADIS PROFESSIONAL SERVICES (CANADA) INC.
500-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
arcadis.com

red italics	**denotes as-built sewer information (where applicable)**

SANITARY SEWER DESIGN SHEET

Existing Conditions Report - Rare Event
Regional Group
CITY OF OTTAWA

LOCATION						RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
						AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
																INSTITUTIONAL		COMMERCIAL		INDUSTRIAL																
STREET	AREA ID	FROM MODEL ID	TO MODEL ID	FROM MH	TO MH		SF	TH/SD	1 Bed APT	2 Bed APT		IND	CUM			IND	CUM	IND	CUM	IND	CUM			IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
S-4 Leitrim Expansion Lands	**Future**	**S4W**		**S-4**	**Paakanaak**	**4.80**	**44**	**47**				**253.6**	**253.6**	2.87	**1.68**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**4.80**	**4.80**	**2.64**	**0.00**	**0.0**	**4.32**	**20.24**	**0.00**	**200**	**0.35**	**0.624**	**15.92**	**78.65%**
S-4 Lands West - Flows to Pathways																																				
Pakaanaak	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14200A	MH14201A	0.75	16					51.2	51.2	2.99	0.35	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.75	0.75	0.41	0.00	0.0	0.77	54.85	*103.09*	200	*2.57*	1.691	54.09	98.60%
Pakaanaak	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14201A	MH14202A	0.55	9					28.8	333.6	2.84	2.19	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.55	6.10	3.36	0.00	0.00	5.54	49.47	*110.49*	200	*2.09*	1.525	43.92	88.79%
Pakaanaak	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14202A	MH14204A	0.48	8					25.6	359.2	2.83	2.35	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.48	6.58	3.62	0.00	0.00	5.97	46.16	*97.85*	200	*1.82*	1.423	40.19	87.07%
Esban	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14204A	MH14205A	0.67	2	20				54.4	413.6	2.81	2.69	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.67	7.3	3.99	0.00	0.0	6.68	41.20	*92.41*	200	*1.45*	1.271	34.53	83.79%
Esban	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14205A	BLK6035A	0.83	16					51.2	464.8	2.79	3.01	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.83	8.08	4.44	0.00	0.00	7.45	48.51	*65.10*	200	*2.01*	1.496	41.06	84.64%
Esban	**Pathways Phase 2**	Outlet to Dun Skipper via Esban		BLK6035A	MH6053A	0.25	4					12.8	477.6	2.79	3.09	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25	8.33	4.58	0.00	0.00	7.67	48.03	*44.18*	200	*1.97*	1.481	40.36	84.04%
Dun Skipper	**Pathways Phase 2**			MH6052A	MH6053A	0.51	8					25.6	25.6	3.02	0.18	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.51	0.51	0.28	0.00	0.00	0.46	29.03	*72.11*	200	*0.72*	0.895	28.57	98.42%
Dun Skipper	**Pathways Phase 2**			MH6053A	MH6042A	0.43	7					22.4	525.6	2.78	3.38	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.43	9.27	5.10	0.00	0.00	8.48	20.81	*80.65*	200	*0.37*	0.642	12.33	59.27%
Block 58	**Idone Phase 2A**	Outlet to Dun Skipper via Kijik		BLK6036A	MH6041A	3.20	17	56			0.81	188.8	188.8	2.89	1.26	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	4.01	4.01	2.21	0.00	0.00	3.47	45.65	*43.79*	200	*1.78*	1.408	42.18	92.40%
Dun Skipper	**Pathways Phase 2**			MH6041A	MH6042A	0.12	1					3.2	192.0	2.89	1.29	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.12	4.13	2.27	0.00	0.00	3.56	42.19	*17.74*	200	*1.52*	1.301	38.63	91.57%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6042A	MH6043A	0.58		18				43.2	760.8	2.72	4.80	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.58	13.98	7.69	0.00	0.00	12.49	27.37	*76.96*	200	*0.64*	0.844	14.89	54.38%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6043A	MH6044A	0.18		3				7.2	768.0	2.72	4.84	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.18	14.16	7.79	0.00	0.00	12.63	28.42	*11.55*	200	*0.69*	0.876	15.79	55.57%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6044A	MH6045A	0.58	2	16				44.8	812.8	2.71	5.11	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.58	14.74	8.11	0.00	0.00	13.21	21.91	*82.91*	200	*0.41*	0.676	8.70	39.69%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6045A	MH6046A	0.27	6					19.2	832.0	2.71	5.22	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.27	15.01	8.26	0.00	0.00	13.47	19.95	*33.87*	200	*0.34*	0.615	6.48	32.46%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6046A	MH6047A	0.29	5					16.0	848.0	2.71	5.31	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	15.30	8.42	0.00	0.00	13.73	22.70	*34.27*	200	*0.44*	0.700	8.97	39.51%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6047A	MH6048A	0.27	4					12.8	860.8	2.70	5.39	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.27	15.57	8.56	0.00	0.00	13.95	22.70	*33.85*	200	*0.44*	0.700	8.74	38.53%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6048A	MH6049A	0.17	2					6.4	867.2	2.70	5.43	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.17	15.74	8.66	0.00	0.00	14.08	25.38	*41.61*	200	*0.55*	0.782	11.29	44.50%
Paakanaak	***Pathways Phase 3***	*Outlet to Paakanaak*			*MH6003A*	*1.20*	*22*																													
Paakanaak	***Pathways Phase 2***	*Paakanak*		*MH6003A*	*MH6004*	*0.47*	*11*																													
Paakanaak				MH6004A	MH6008A	**1.80**	**35**					112.0	112.0	2.94	0.76	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.80	1.80	0.99	0.00	0.00	1.75	20.24	*19.82*	200	*0.35*	0.624	18.49	91.35%
Paakanaak	***Idone Phase 2A***	*Outlet to Paakanaak*			*BLK6005A*	*1.97*	*37*																													
Paakanaak	***Pathways Phased 2***	*Outlet to Paakanaak*			*MH6008A*	*0.61*	*10*																													
Miikana Road	**Pathways Phase 2**	603		MH6008A	MH6030A	**2.92**	**51**					163.2	275.2	2.86	1.82	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	2.92	4.7	2.60	0.00	0.0	4.42	43.82	*64.09*	200	*1.64*	1.351	39.40	89.92%
Miikana Road	**Pathways Phase 2**			MH6030A	MH6031A	0.18	3					9.6	284.8	2.85	1.88	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.18	4.9	2.70	0.00	0.00	4.58	38.10	*23.40*	200	*1.24*	1.175	33.53	87.99%
Miikana Road	**Pathways Phase 2**		608	MH6031A	MH6032A	0.14	3					9.6	294.4	2.85	1.94	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.14	5.0	2.77	0.00	0.00	4.71	20.81	*38.20*	200	*0.37*	0.642	16.10	77.35%
Paakanaak	***Pathways Phase 3***	*Outlet to Gartersnake via Paak*			*MH6308A*	*0.87*	*8*	*6*																												
Gartersnake	***Pathways Phase 3***	*Outlet to Phase 2 Connection*		*MH6308A*	*MH6018A*	*1.16*	*5*	*22*																												
Pathways Block60	***Pathways Block60***	*Outlet to Phase 2 Connection*			*MH6018A*	*0.95*		*26*																												
Ninaatik Place	***Pathways Phase 2***	*Outlet to Gartersnake*			*MH6018A*	*0.61*	*9*	*2*																												
Gartersnake	***Pathways Phase 2***	*Outlet to Miikana*		*MH6018A*	*MH6032A*	*0.59*		*13*																												
Miikana Road	**Pathways Phase 2**	608		MH6032A	MH6033A	**4.48**	**27**	**69**				252.0	546.4	2.77	3.51	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	4.48	9.5	5.24	0.00	0.0	8.74	21.91	*62.90*	200	*0.41*	0.676	13.17	60.10%
Miikana Road	**Pathways Phase 2**		609	MH6033A	MH6050A	0.29	5					16.0	562.4	2.77	3.60	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	9.8	5.40	0.00	0.00	9.00	20.24	62.75	200	0.35	0.624	11.24	55.54%
Ginebik	*Idone Phase 2A*	*Outlet to Ginebik*			*MH6038A*	*3.08*	*50*																													
Ginebik	*Pathways Phase 2*	*Outlet to Dun Skipper*		*MH6038A*	*MH6051A*	*0.86*	*14*																													
Dun Skipper	*Pathways Phase 2*	*Outlet to Miikana*			*MH6050A*	*0.77*	*11*																													
Miikana Road	**Pathways Phase 2/**	609		MH6050A	MH6034A	**5.13**	**79**					252.8	815.2	2.71	5.12	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.13	14.94	8.22	0.00	0.00	13.34	33.98	*22.99*	250	*0.30*	0.671	20.64	60.75%
Block 46 (Park)	**Pathways Phase 2**			MH6049AW	MH6034A						2.85	0.0	0.0	3.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.85	2.85	1.57	0.00	0.00	1.57	20.53	*15.47*	200	*0.36*	0.633	18.96	92.36%
Miikana	**Pathways Phase 2**		620	MH6034A	MH6049A							0.0	815.2	2.71	5.12	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	17.8	9.78	0.00	0.00	14.90	31.63	*60.76*	*250*	*0.26*	0.624	16.73	52.88%
Miikana	**vays Phase 2/ Idone Ph**	620	630	MH6049A	MH6060A	0.37		7				16.8	1699.2	2.58	10.16	0.00	0.0	0.00	0.0	0.00	0.00	1.00	0.00	0.37	33.9	18.65	0.00	0.0	28.81	43.97	*81.59*	*300*	*0.19*	0.603	15.17	34.49%
Spreadwing	**Pathways Phase 2**	630		MH6060A	MH6061A	0.21	4					12.8	1712.0	2.58	10.23	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	34.11	18.76	0.00	0.00	28.99	43.97	*38.76*	*300*	*0.19*	0.603	14.98	34.06%
Spreadwing	**Pathways Phase 2**			MH6061A	MH6062A	0.21	4					12.8	1724.8	2.58	10.30	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	34.32	18.88	0.00	0.00	29.18	47.32	*18.24*	*300*	*0.22*	0.648	18.14	38.33%
Spreadwing	**Pathways Phase 2**			MH6062A	MH6063A	0.15	2					6.4	1731.2	2.58	10.34	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.15	34.47	18.96	0.00	0.00	29.30	43.97	*18.20*	*300*	*0.19*	0.603	14.67	33.37%
Spreadwing	**Pathways Phase 2**			MH6063A	MH6064A	0.54	8					25.6	1756.8	2.58	10.48	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.54	35.01	19.26	0.00	0.00	29.74	46.23	*75.32*	*300*	*0.21*	0.634	16.49	35.68%
Spreadwing	**Pathways Phase 2**			MH6064A	EXBLK3171A	0.44	7					22.4	1779.2	2.57	10.60	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.44	35.45	19.50	0.00	0.00	30.10	45.12	*51.94*	*300*	*0.20*	0.618	15.01	33.28%
Spreadwing	**Pathways Phase 2**		6171	BLK3171AW	MH6171A							0.0	1779.2	2.57	10.60	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	35.45	19.50	0.00	0.00	30.10	45.12	*43.00*	*300*	*0.20*	0.618	15.01	33.28%
Minikan	**Pathways Phase 1**	Outlet to Spreadwing Way			MH6171A	2.06	40					128.0	128.0	2.93	0.87	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.06	2.06	1.13	0.00	0.00	2.00	50.75	*84.42*	200	*2.20*	1.565	48.75	96.06%
Spreadwing	**Pathways Phase 1**	6171	6183	MH6171A	MH6183A	0.15						0.0	1907.2	2.56	11.31	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.15	37.7	20.71	0.00	0.0	32.02	45.12	*83.61*	*300*	*0.20*	0.618	13.10	29.03%

Zaatiik Grove	**Pathways Phase 1**			MH6182A	MH6183A	1.18	18					57.6	57.6	2.98	0.40	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.18	1.18	0.65	0.00	0.00	1.05	54.10	*74.74*	*200*	*2.50*	1.668	53.05	98.07%
Zaatiik Grove	**Pathways Phase 1**	6183	6175	MH6183A	MH6175A							0.0	1964.80	2.56	11.62	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	38.84	21.36	0.00	0.00	32.98	45.12	*118.54*	*300*	*0.20*	0.618	12.13	26.89%
Zaatiik Grove	***Pathways Phase 1***	*high level sani*		*MH61783B*	*MH6175A*	*0.67*	*12*					*38.4*	*38.40*	3.00	*0.27*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.67*	*0.67*	*0.37*	*0.00*	*0.00*	*0.64*	*37.48*	*6.00*	*200*	*1.20*	*1.156*	*36.85*	*98.30%*
Minikan Street	**Pathways Phase 1**		6175	MH6175B	MH6175D	1.74	28					89.6	89.60	2.95	0.61	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.74	1.74	0.96	0.00	0.00	1.57	45.12	*6.00*	*300*	*0.20*	0.618	43.55	96.52%
Minikan Street	**Pathways Phase 1**	6175	6106	MH6175A	MH6106A							0.0	2092.80	2.54	12.32	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	41.25	22.69	0.00	0.00	35.00	45.12	*85.46*	*300*	*0.20*	0.618	10.11	22.41%
Minikan Street	***Pathways Phase 1***	*high level sani*		*MH6106C*	*MH6106A*	*0.58*	*10*					*32.0*	*32.0*	3.01	*0.22*	*0.00*	*0.0*	*0.00*	*0.0*	*0.00*	*0.0*	*1.00*	*0.00*	*0.58*	*0.6*	*0.32*	*0.00*	*0.00*	*0.54*	*28.63*	*6.00*	*200*	*0.70*	*0.883*	*28.09*	*98.11%*
												2124.8	TRUE											41.8	TRUE											
Kelly Farm Drive	***Idone Phase 1***	*Outlet to Dun Skipper*			*MH6110A*	*1.64*	*28*																													
Dun Skipper	***Pathways Phase 1***	*Dunskipper to Kelly Farm Drive*		*MH6132A*	*MH6110A*	*0.53*	*9*																													
Kelly Farm Drive	***Pathways Phase 1***	*Kelly Farm Drive to Salamander*		*MH6110A*	*MH6108A*	*1.08*	*18*																													
Salamander	***Pathways Phase 1***	*Outlet to Kelly Frm Drive*		*MH6156A*	*MH6108A*	*1.23*	*19*																													
Kelly Farm Drive	***Pathways Phase 1***	*Kelly Farm Drive*		*MH6108A*	*MH6106A*	*0.51*	*6*																													
Kelly Farm Drive	**Pathways Phase 1**	6106	647	MH6106A	MH647A	**5.18**	**80**					256.0	2380.80	2.52	13.86	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.18	47.01	25.86	0.00	0.00	39.72	45.12	*86.86*	*300*	*0.20*	0.618	5.40	11.96%
Wabikon Crescent	**Pathways Phase 2**	*Outlet to Miikana*		MH6070A	MH6080A	2.16		58			0.06																									
Miikana	**Pathways Phase 2**	*Miikana*		MH6079A	MH6080A	0.80		21																												
Miikana	**Pathways Phase 2**		646	MH6080A	MH6081A	**3.88**		**104**			**0.06**	249.6	249.6	2.87	1.66	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	3.94	3.9	2.17	0.00	0.00	3.82							
Miikana Road	**Pathways Phase 2**	646		MH6081A	BLK6105AW	1.02		30				72.0	72.0	2.97	0.49	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	1.02	1.0	0.56	0.00	0.0	1.06							
Miikana Road	**Pathways Phase 2**		647	BLK6105AW	*EX. MH647A*	0.70		23				55.2	376.8	2.82	2.46	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.70	5.7	3.11	0.00	0.0	5.57	20.24	*17.00*	*200*	*0.35*	0.624	14.67	72.47%
Salamander Way	**Pathways Phase 1**	6156	6157	MH6156A	MH6157A	0.29	3					9.6	9.6	3.05	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	0.29	0.16	0.00	0.00	0.23							
Salamander Way	**Pathways Phase 1**	6157	6158	MH6157A	MH6158A	0.07		1				2.4	12.0	3.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.07	0.36	0.20	0.00	0.00	0.28							
Salamander Way	**Pathways Phase 1**	6158	6153	MH6158A	MH6153A	0.54		14				33.6	45.6	2.99	0.32	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.54	0.90	0.50	0.00	0.00	0.81							
Block 436 (Park)	**Pathways Phase 1**		6153	MH6159A	MH6153A						0.83	0.0	0.0	3.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.83	0.83	0.46	0.00	0.00	0.46							
Salamander Way	**Pathways Phase 1**	6153	6154	MH6153A	MH6154A	0.03						0.0	45.6	2.99	0.32	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.03	1.8	0.97	0.00	0.0	1.28							
Salamander Way	**Pathways Phase 1**	6154	6115	MH6154A	MH6115A	0.13						0.0	45.6	2.99	0.32	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.13	1.89	1.04	0.00	0.00	1.36							
Rallidale Street	***Idone Phase 1***	*Outlet to Dun Skipper via Rallidale*		*MH14110A*	*MH1411A*	*1.83*	*9*	*39*																												
Grackle Street	***Idone Phase 1***	*Outlet to Dun Skipper via Grackle*		*MH14120A*	*MH1411A*	*1.41*		*43*																												
Rallidale Street	***Idone Phase 1***	*Outlet to Dun Skipper*		*MH1411A*	*MH6133A*	*0.27*		*6*																												
Dun Skipper	***Pathways Phase 1***	*Dun Skipper*		*MH6132A*	*MH6133A*	*0.64*	*11*																													
Dun Skipper	***Pathways Phase 1***	*Dun Skipper*		*MH6133A*	*MH6136A*	*1.43*	*26*																													
Pathways Block 203	***Pathways Block 203***	*Outlet to Dun Skipper*			*MH6136A*	*1.62*		*80*																												
Pathways Block 204	***Pathways Block 204***	*Outlet to Home Hardware*			*MH1A*	*1.54*			*77*	*103*																										
Home Hardware	***Home Hardware***	*Outlet to Dun Skipper*		*MH6A*	*MH6138A*				*54*	*87*								*2.53*																		
Dun Skipper	***Pathways Phase 1***	*Dun Skipper / Cedar Creek*		*MH6138A*	*MH6136A*	*0.18*																														
Cedar Creek	***Pathways Phase 1***	*Cedar Creek*		*MH6136A*	*MH6119A*	*0.17*																														
Pingwi Place	***Pathways Phase 1***	*Outlet to Cedar Creek*		*MH6132A*	*MH6119A*	*1.93*	*20*	*24*																												
Pathways Block 241	***Pathways Block***	*Outlet to Cedar Creek*		*BLK6119AE*	*MH6119A*													*3.01*																		
Cedar Creek	***Pathways Phase 1***	*Cedar Creek*		*MH6119A*	*MH6117A*	*0.12*																														
Pathways Block 232	***Pathways Block 232***	*Outlet to Cedar Creek*			*MH6117A*	*1.01*			*12*	*80*																										
Cedar Creek	**Pathways Phase 1**		6115	MH6117A	MH6115A	**12.21**	**66**	**226**	**143**	**270**		1520.8	1520.8	2.61	9.17	0.00	0.00	**5.54**	5.54	0.00	0.00	1.00	1.09	17.75	17.75	9.76	0.00	0.00	20.02							
Cedar Creek	**Pathways Phase 1**	6115	6101	MH6115A	MH6101A	0.61		18				43.2	1609.60	2.59	9.67	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.61	20.25	11.14	0.00	0.00	21.89							
Miikana Road	**Pathways Phase 1**	6101	6102	MH6101A	MH6102A	0.45		11				26.4	1636.00	2.59	9.81	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.45	20.70	11.39	0.00	0.00	22.29							
Pathways Block 225	**Pathways Block 225**		6102		MH6102A	0.94		34				81.6	81.60	2.96	0.56	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.94	0.94	0.52	0.00	0.00	1.08							
Miikana Road	**Pathways Phase 1**	6102	6103	MH6102A	MH6103A	0.23		6				14.4	1732.00	2.58	10.34	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.23	21.87	12.03	0.00	0.00	23.46							
Miikana Road	**Pathways Phase 1**	6103	6104	MH6103A	MH6104A	0.66		18				43.2	1775.20	2.58	10.58	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.66	22.53	12.39	0.00	0.00	24.06							
School Block	**Pathways Block 223**	Outlet to Miikana		BLK6104AS	MH6104A							0.0	0.00	3.10	0.00	2.55	2.55	0.00	0.00	0.00	0.00	1.00	0.50	2.55	2.55	1.40	0.00	0.00	1.90							
Miikana Road	**Pathways Phase 1**	6104	6105B	MH6104A	MH6104B	0.6		15				36.0	1811.20	2.57	10.78	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.60	25.68	14.12	0.00	0.00	26.50							
Miikana Road	**Pathways Phase 1**	6105B	647	MH6104B	MH647							0.0	1811.20	2.57	10.78	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.00	25.68	14.12	0.00	0.00	26.50							
												1811.2	TRUE											25.7	TRUE											
KELLY FARM DRIVE	**FC South Stage2 PH4B**	647	755	MH647A	MH742A	0.28		5				12.0	4580.80	2.37	25.11	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.28	78.63	43.25	0.00	0.00	69.95	101.84	*80.31*	*375*	*0.31*	0.893	31.89	31.32%
KESTREL STREET	***FC South Stage2 PH4B***	*Undeveloped lands to Kestrel*		*BLKHEAD*	*MH751A*	*0.65*		*22*																												
PARK BLOCK	***FC South Stage2 PH4B***	*Park land*		*MH744A*	*MH745A*						*1.22*																									
KESTREL STREET	***FC South Stage2 PH4B***	*Outlet to Kelly Farm*		*MH751A*	*MH742A*	*0.49*		*15*																												
KELLY FARM DRIVE	**FC South Stage2 PH4B**	755	745	MH742A	MH741A	**1.53**		**48**			**1.22**	115.2	4696.00	2.36	25.68	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	2.75	81.38	44.76	0.00	0.00	72.03	101.84	*80.31*	*375*	*0.31*	0.893	29.81	29.27%
KELLY FARM DRIVE	**FC South Stage2 PH4B**	745	730	MH741A	MH730A	0.28		5				12.0	4708.00	2.36	25.74	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.28	81.66	44.91	0.00	0.00	72.24	101.84	*80.31*	*375*	*0.31*	0.893	29.60	29.07%
HELEN RAPP WAY	**FC South Stage2 PH4A**	*Outlet to Helen Rapp Way South*			MH738A	0.34	5																													
HELEN RAPP WAY	**FC South Stage2 PH4B**			MH735A	MH738A	1.21	20																													
MAYBERLY	**FC South Stage2 PH4B**			MH738A	MH731A	0.52	9																													
HELEN RAPP WAY	**FC South Stage2 PH4B**	*Outlet to Maberly*		MH735A	MH731A	1.33	24																													
HELEN RAPP WAY	**FC South Stage2 PH4B**	*Outlet to Kelly Farm*		MH731A	MH730A	0.51	9																													
						3.91	**67**																													

		S-4 Lands East - Flows to Bank Street																																		
S-4 Leitrim Expansion Lands	**Future**			**S-4**	**Bank**	**8.47**	**33**	**84**		**90**		**496.2**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**8.47**	**8.47**	**4.66**	**0.00**	**0.0**	**7.86**	**20.24**	**0.00**	**200**	**0.35**	**0.624**	**12.38**	**61.18%**
Bank Street	**Future**			**Bank**	**MH300A**						**2.25**	**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**2.25**	**10.72**	**5.90**	**0.00**	**0.0**	**9.10**	**20.24**	**0.00**	**200**	**0.35**	**0.624**	**11.15**	**55.07%**
Bank Street_San	**Proposed**			**MH300A**	**MH200A**							**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.00**	**10.72**	**5.90**	**0.00**	**0.0**	**9.10**	**20.24**	**71.44**	**200**	**0.35**	**0.624**	**11.15**	**55.07%**
Bank Street_San	**Proposed**			**MH200A**	**MH100A**						**0.66**	**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.66**	**11.38**	**6.26**	**0.00**	**0.0**	**9.46**	**20.24**	**92.12**	**200**	**0.35**	**0.624**	**10.78**	**53.27%**
Bank Street_San	**Proposed**	**S4E**		**MH100A**	**MH793A**							**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.00**	**11.38**	**6.26**	**0.00**	**0.0**	**9.46**	**24.19**	**24.98**	**200**	**0.50**	**0.746**	**14.74**	**60.91%**
Labrador Crescent	**FC STAGE 2 PHASE 4C**	Sparta Lands		BLK794AS	MH794A	2.80		24		220		519.6	519.6	2.78	3.34		0.0		0.00		0.0	1.00	0.00	2.80	2.80	1.54	0.00	0.0	4.88	19.66	*33.00*	200	*0.33*	0.606	14.77	75.16%
Labrador Crescent	**FC STAGE 2 PHASE 4C**			MH794A	MH791A	0.49		20				48.0	1063.8	2.67	6.57		0.0		0.0		0.0	1.00	0.00	0.49	14.7	8.07	0.00	0.0	14.64	19.66	*19.60*	200	*0.33*	0.606	5.01	25.51%
Potential S-5 Lands	**Potential**	**S5W**		**S-5**	**MH791D/A**	**4.78**						**630.0**	**630.0**	2.75	**4.01**		**0.0**		**0.00**		**0.0**	**1.00**	**0.00**	**4.78**	**4.8**	**2.63**	**0.00**	**0.0**	**6.64**							
Labrador Crescent	**FC STAGE 2 PHASE 4C**	790		MH791A	MH790A	0.25		7				16.8	1710.6	2.58	10.23		0.0		0.0		0.0	1.00	0.00	0.25	19.7	10.84	0.00	0.0	21.06	19.95	*73.40*	200	*0.34*	0.615	-1.11	-5.56%
HAWKMERE WAY	***FC STAGE 2 PHASE 4C***	*Outlet to Labrador Crescent*		*MH769A*	*MH797A*	*1.27*		*40*																												
Labrador Crescent	***FC STAGE 2 PHASE 4C***	*Outlet to Sora Way*		*MH795A*	*MH790A*	*0.73*		*33*																												
Sora Way	**FC STAGE 2 PHASE 4C**		780	MH790A	MH780A	**2.39**		**86**				206.4	1917.0	2.56	11.36		0.0		0.0		0.0	1.00	0.00	2.39	22.1	12.15	0.00	0.0	23.51	21.09	*86.10*	200	*0.38*	0.650	-2.42	-11.46%
Eric Maloney	***FC STAGE 2 PHASE 4C***	*Outlet to Sora Way*		*MH786A*	*MH780A*	*1.45*		*43*																												
Sora Way	**FC STAGE 2 PHASE 4C**	780	770	MH780A	MH770A	**1.81**		**53**				127.2	2044.2	2.55	12.05		0.0		0.0		0.0	1.00	0.00	1.81	23.9	13.15	0.00	0.0	25.20	19.66	*9.50*	200	*0.33*	0.606	-5.54	-28.19%
Future Cedar Creek	**FC STAGE 2 PHASE 4B**	775	770	MH777A	MH770A	4.75		161				386.4	386.4	2.82	2.52		0.0		0.0		0.0	1.00	0.00	4.75	4.8	2.61	0.00	0.0	5.13							
Eric Maloney	***FC STAGE 2 PHASE 4C***		771	*MH787A*	*MH772A*	*0.70*	*12*																													
Cedar Creek	**FC STAGE 2 PHASE 4B**	771	770	MH772A	MH770A	**1.83**		**34**				81.6	81.6	2.96	0.56		0.0		0.0		0.0	1.00	0.00	1.83	1.8	1.01	0.00	0.0	1.57							
Sora Way	**FC STAGE 2 PHASE 4B**	770	760	MH770A	MH760A	**5.02**	**3**	**161**				396.0	2908.2	2.47	16.64		0.0		0.0		0.0	1.00	0.00	5.02	35.5	19.53	0.00	0.0	36.17							
Sagebush Cresc. East	***FC STAGE 2 PHASE 4C***	*Outlet to Sora*		*MH763A*	*MH760A*	*1.02*	*17*																							*27.59*	*107.80*	*200*	*0.65*	*0.851*	*27.59*	*100.00%*
Sora Way	**FC STAGE 2 PHASE 4B**	760	750	MH760A	MH750A	**1.39**	**23**					73.6	2981.8	2.47	17.03		0.0		0.0		0.0	1.00	0.00	1.39	36.9	20.29	0.00	0.0	37.32	31.02	*81.07*	250	*0.25*	0.612	-6.30	-20.30%
Sagebush Cresc. West	***FC STAGE 2 PHASE 4C***	*Outlet to Sora*		*MH763A*	*MH750A*	*1.41*	*23*																							*20.24*	*108.40*	*200*	*0.35*	*0.624*	*20.24*	*100.00%*
Sora Way	**FC STAGE 2 PHASE 4B**	750	740	MH750A	MH740A	**2.09**	**36**					115.2	3097.0	2.46	17.62		0.0		0.0		0.0	1.00	0.00	2.09	39.0	21.44	0.00	0.0	39.06	31.02	*94.16*	250	*0.25*	0.612	-8.04	-25.93%
Sora Way	**FC STAGE 2 PHASE 4B**	740	735	MH740A	MH735A	0.31	6					19.2	3116.2	2.46	17.72		0.0		0.0		0.0	1.00	0.00	0.31	39.3	21.61	0.00	0.0	39.33	31.63	*40.58*	250	*0.26*	0.624	-7.70	-24.34%
Sora Way	**FC STAGE 2 PHASE 4B**	735	730	MH735A	MH730A	0.46	6					19.2	3135.4	2.46	17.82		0.0		0.00		0.0	1.00	0.00	0.46	39.8	21.86	0.00	0.0	39.69	46.84	*105.34*	250	*0.57*	0.924	7.15	15.27%
												3135.4	TRUE											39.8	TRUE											

Existing MH730A to Findlay Creek Drive																																			
KELLY FARM DRIVE	**Findlay Creek Phase 4**	730		MH730A	MH720A	**4.11**	**67**					214.4	8057.80	2.23	41.56	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	4.11	125.52	69.04	0.00	0.00	112.19	96.79	78.80	375	0.28	0.849	**-15.40**	**-15.91%**
MAGPIE STREET	FC South Stage2 PH4A	Outlet to Kelly Farm		MH703A	MH720A	1.57	29																												
SILVERBELL CRESCENT	FC South Stage2 PH4B	Outlet to Kelly Farm		MH714A	MH720A	1.14	11	12																											
KELLY FARM DRIVE	**Findlay Creek Phase 4**		710	MH720A	MH710A	**2.83**	**40**	**12**				156.8	8214.60	2.22	42.28	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	2.83	128.35	70.59	0.00	0.00	114.46	83.82	53.20	375	0.21	0.735	**-30.64**	**-36.56%**
KELLY FARM DRIVE	**Findlay Creek Phase 4**	710	700	MH710A	MH700A	0.05						0.0	8214.60	2.22	42.28	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.05	128.40	70.62	0.00	0.00	114.49	154.12	26.70	375	0.71	1.352	39.63	25.72%
HELEN RAPP	FC South Stage2 PH4A	Outlet to Kelly Farm		MH703A	MH700A	2.24	30	8																											
SILVERBELL CRESCENT	FC South Stage2 PH4B	Outlet to Kelly Farm		MH714A	MH700A	0.96	6	12																											
KELLY FARM DRIVE	**Findlay Creek Phase 4**	700	333	MH700A	MH333A	**4.38**	**44**	**37**				229.6	8444.20	2.22	43.32	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	4.38	132.78	73.03	0.00	0.00	117.94	115.68	179.20	375	0.40	1.015	-2.26	-1.95%
JAVA 3	FCJ JAVA 3	Outlet to Wood Acres Grove		FCJ3	MH364A	0.67				48																									
Wood Acres Grove	**FC South Stage 3**		363	MH364A	MH363A	**1.23**		**15**		**48**		136.8	136.80	2.92	0.93	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.23	1.23	0.68	0.00	0.00	1.60							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	363	362	MH363A	MH362A	0.42		12				28.8	165.60	2.91	1.11	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.42	1.65	0.91	0.00	0.00	2.02							
CEDAR CREEK DRIVE	Findlay Creek Stage 3	Outlet to Wood Acres Grove		MH365A	MH362A	0.28		8																											
CEDAR CREEK DRIVE	Findlay Creek Stage 3	Outlet to Wood Acres Grove		MH342A	MH362A	0.30		10																											
WOOD ACRES GROVE	**Findlay Creek Stage 3**	362	361	MH362A	MH361A	**1.11**		**34**				81.6	247.20	2.87	1.64	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.11	2.76	1.52	0.00	0.00	3.16							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	361		MH361A	MH360A	0.41		13				31.2	278.40	2.86	1.84	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.41	3.17	1.74	0.00	0.00	3.58							
WOOD ACRES GROVE	Findlay Creek Stage 3			MH360A	MH356A	0.71		25				60.0	338.40	2.83	2.22	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.71	3.88	2.13	0.00	0.00	4.35							
WOOD ACRES GROVE	**Findlay Creek Stage 3**		355	MH356A	MH355A	0.19		4				9.6	348.00	2.83	2.28	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.19	4.07	2.24	0.00	0.00	4.52							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	355	353	MH355A	MH353A	0.55		16				38.4	386.40	2.82	2.52	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.55	4.62	2.54	0.00	0.00	5.06							
ALASKEN DRIVE	Findlay Creek Stage 3			MH360A	MH352A	0.56		16				38.4	38.40	3.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.56	0.56	0.31	0.00	0.00	0.57							
ALASKEN DRIVE	Findlay Creek Stage 3			MH352A	MH351A	0.19		3																											
ALASKEN DRIVE	**Findlay Creek Stage 3**		350	MH351A	MH350	**0.88**		**27**				64.8	103.20	2.94	0.70	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.88	1.44	0.79	0.00	0.00	1.50							
ALASKEN DRIVE	**Findlay Creek Stage 3**	350	353	MH350A	MH353A	0.06		2				4.8	108.00	2.94	0.74	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.06	1.50	0.83	0.00	0.00	1.56							
ALASKEN DRIVE	**Findlay Creek Stage 3**	353	333	MH353A	MH333A	**0.43**		**8**				19.2	513.60	2.78	3.31	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.43	6.55	3.60	0.00	0.00	6.91							
FINDLAY CREEK DRIVE	**Findlay Creek Phase 4**	333	330-11	MH333A	MH11A	1.19	8	12				54.4	9012.20	2.20	45.89	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	1.19	140.52	77.29	0.00	0.00	124.77	118.54	188.70	375	0.42	1.040	-6.23	-5.25%
												9012.2	TRUE			2.6	TRUE	5.5	TRUE	0.0	TRUE			140.5	TRUE										
S5 LANDS TO COWANS	**COWANS GROVE**	S5E	COWANS	S5E	COWANS	10.99						861.0	861.00	2.70	5.39	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	10.99	10.99	6.04	0.00	0.00	11.43							

Design Parameters:

Residential

SF	3.2	p/p/u
TH/SD	2.4	p/p/u
1 Bed	1.4	p/p/u
2 Bed	2.1	p/p/u
Other	60	p/p/Ha

ICI Areas

INST	17,000	L/Ha/day	
COM	17,000	L/Ha/day	
IND	17,000	L/Ha/day	MOE Chart
		L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 200 L/day 200 L/day
3. Infiltration allowance: 0.55 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.6
where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
1.5 if greater than 20%, otherwise 1.0

Designed: AS/RM

Checked: RM/DY

Dwg. Reference: 145172-100

No.	**Revision**	**Date**
1.	Existing Conditions Report Submission No. 2 2025-03-25	
2.	Existing Conditions Report Submission No. 3 2025-05-29	
3.	Serviceability Report Submission No.1 2025-08-08	

File Reference:	**Date:**	**Sheet No:**
145172-6.04.03	2025-08-08	1 of 1

Note: For this exercise the current (revised) criteria for the rare event was used which has made changes to the following
Harmon - correction factor is not 0.6
ICI peak factor is always 1.0
INST, COM, IND release rates changed as noted
Demand = 200 per capita L/day
Infiltration allowance = 0.3 L/s/Ha

SANITARY SEWER DESIGN SHEET

Existing Conditions Report - Normal Operating Conditions
Regional Group
CITY OF OTTAWA

red italics denotes as-built sewer information (where applicable)

LOCATION						RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
						AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
																INSTITUTIONAL		COMMERCIAL		INDUSTRIAL																
STREET	AREA ID	FROM MODEL ID	TO MODEL ID	FROM MH	TO MH		SF	TH/SD	1 Bed APT	2 Bed APT		IND	CUM			IND	CUM	IND	CUM	IND	CUM			IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
S-4 Leitrim Expansion Lands	**Future**	**S4W**		**S-4**	**Paakanaak**	**4.80**	**44**	**47**				**253.6**	**253.6**	3.49	**2.87**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**4.80**	**4.80**	**1.58**	**0.00**	**0.0**	**4.45**	**20.24**	**0.00**	**200**	**0.35**	**0.624**	**15.79**	**78.02%**
S-4 Lands West - Flows to Pathways																																				
Pakaanaak	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14200A	MH14201A	0.75	16					51.2	51.2	2.99	0.35	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.75	0.75	0.23	0.00	0.0	0.58	54.85	*103.09*	200	*2.57*	1.691	54.27	98.94%
Pakaanaak	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14201A	MH14202A	0.55	9					28.8	333.6	2.84	2.19	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.55	6.1	1.83	0.00	0.0	4.02	49.47	*110.49*	200	*2.09*	1.525	45.45	91.87%
Pakaanaak	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14202A	MH14204A	0.48	8					25.6	359.2	2.83	2.35	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.48	6.58	1.97	0.00	0.00	4.32	46.16	*97.85*	200	*1.82*	1.423	41.84	90.63%
Esban	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14204A	MH14205A	0.67	2	20				54.4	413.6	2.81	2.69	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.67	7.3	2.18	0.00	0.0	4.86	41.20	*92.41*	200	*1.45*	1.271	36.34	88.19%
Esban	**Idone Phase 2A**	Outlet to Dun Skipper via Esban		MH14205A	BLK6035A	0.83	16					51.2	464.8	2.79	3.01	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.83	8.08	2.42	0.00	0.00	5.43	48.51	*65.10*	200	*2.01*	1.496	43.08	88.81%
Esban	**Pathways Phase 2**	Outlet to Dun Skipper via Esban		BLK6035A	MH6053A	0.25	4					12.8	477.6	2.79	3.09	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25	8.33	2.50	0.00	0.00	5.58	48.03	*44.18*	200	*1.97*	1.481	42.44	88.37%
Dun Skipper	**Pathways Phase 2**			MH6052A	MH6053A	0.51	8					25.6	25.6	3.02	0.18	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.51	0.51	0.15	0.00	0.00	0.33	29.03	*72.11*	200	*0.72*	0.895	28.70	98.86%
Dun Skipper	**Pathways Phase 2**			MH6053A	MH6042A	0.43	7					22.4	525.6	2.78	3.38	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.43	9.27	2.78	0.00	0.00	6.16	20.81	*80.65*	200	*0.37*	0.642	14.65	70.40%
Block 58	**Idone Phase 2A**	Outlet to Dun Skipper via Kijik		BLK6036A	MH6041A	3.20	17	56			0.81	188.8	188.8	2.89	1.26	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	4.01	4.01	1.20	0.00	0.00	2.47	45.65	*43.79*	200	*1.78*	1.408	43.18	94.59%
Dun Skipper	**Pathways Phase 2**			MH6041A	MH6042A	0.12	1					3.2	192.0	2.89	1.29	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.12	4.13	1.24	0.00	0.00	2.52	42.19	*17.74*	200	*1.52*	1.301	39.66	94.02%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6042A	MH6043A	0.58		18				43.2	760.8	2.72	4.80	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.58	13.98	4.19	0.00	0.00	8.99	27.37	*76.96*	200	*0.64*	0.844	18.38	67.15%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6043A	MH6044A	0.18		3				7.2	768.0	2.72	4.84	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.18	14.16	4.25	0.00	0.00	9.09	28.42	*11.55*	200	*0.69*	0.876	19.33	68.02%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6044A	MH6045A	0.58	2	16				44.8	812.8	2.71	5.11	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.58	14.74	4.42	0.00	0.00	9.53	21.91	*82.91*	200	*0.41*	0.676	12.38	56.51%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6045A	MH6046A	0.27	6					19.2	832.0	2.71	5.22	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.27	15.01	4.50	0.00	0.00	9.72	19.95	*33.87*	200	*0.34*	0.615	10.23	51.27%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6046A	MH6047A	0.29	5					16.0	848.0	2.71	5.31	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	15.30	4.59	0.00	0.00	9.90	22.70	*34.27*	200	*0.44*	0.700	12.79	56.36%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6047A	MH6048A	0.27	4					12.8	860.8	2.70	5.39	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.27	15.57	4.67	0.00	0.00	10.06	22.70	*33.85*	200	*0.44*	0.700	12.64	55.68%
Omagaki Way	**Pathways Phase 2**	Outlet to Miikana via Omagaki		MH6048A	MH6049A	0.17	2					6.4	867.2	2.70	5.43	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.17	15.74	4.72	0.00	0.00	10.15	25.38	*41.61*	200	*0.55*	0.782	15.23	60.01%
Paakanaak	***Pathways Phase 3***	*Outlet to Paakanaak*			*MH6003A*	*1.20*	*22*																													
Paakanaak	***Pathways Phase 2***	*Paakanak*		*MH6003A*	*MH6004*	*0.47*	*11*																													
Paakanaak				MH6004A	MH6008A	**1.80**	**35**					112.0	112.0	2.94	0.76	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.80	1.80	0.54	0.00	0.00	1.30	20.24	*19.82*	200	*0.35*	0.624	18.94	93.57%
Paakanaak	***Idone Phase 2A***	*Outlet to Paakanaak*			*BLK6005A*	*1.97*	*37*																													
Paakanaak	***Pathways Phased 2***	*Outlet to Paakanaak*			*MH6008A*	*0.61*	*10*																													
Miikana Road	**Pathways Phase 2**	603		MH6008A	MH6030A	**2.92**	**51**					163.2	275.2	2.86	1.82	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	2.92	4.7	1.42	0.00	0.0	3.24	43.82	*64.09*	200	*1.64*	1.351	40.58	92.62%
Miikana Road	**Pathways Phase 2**			MH6030A	MH6031A	0.18	3					9.6	284.8	2.85	1.88	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.18	4.9	1.47	0.00	0.00	3.35	38.10	*23.40*	200	*1.24*	1.175	34.75	91.21%
Miikana Road	**Pathways Phase 2**		608	MH6031A	MH6032A	0.14	3					9.6	294.4	2.85	1.94	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.14	5.0	1.51	0.00	0.00	3.45	20.81	*38.20*	200	*0.37*	0.642	17.36	83.41%
Paakanaak	***Pathways Phase 3***	*Outlet to Gartersnake via Paak*			*MH6308A*	*0.87*	*8*	*6*																												
Gartersnake	***Pathways Phase 3***	*Outlet to Phase 2 Connection*		*MH6308A*	*MH6018A*	*1.16*	*5*	*22*																												
Pathways Block60	***Pathways Block60***	*Outlet to Phase 2 Connection*			*MH6018A*	*0.95*		*26*																												
Ninaatik Place	***Pathways Phase 2***	*Outlet to Gartersnake*			*MH6018A*	*0.61*	*9*	*2*																												
Gartersnake	***Pathways Phase 2***	*Outlet to Miikana*		*MH6018A*	*MH6032A*	*0.59*		*13*																												
Miikana Road	**Pathways Phase 2**	608		MH6032A	MH6033A	**4.48**	**27**	**69**				252.0	546.4	2.77	3.51	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	4.48	9.5	2.86	0.00	0.0	6.36	21.91	*62.90*	200	*0.41*	0.676	15.55	70.96%
Miikana Road	**Pathways Phase 2**		609	MH6033A	MH6050A	0.29	5					16.0	562.4	2.77	3.60	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	9.8	2.94	0.00	0.00	6.55	20.24	62.75	200	0.35	0.624	13.70	67.66%
Ginebik	*Idone Phase 2A*	*Outlet to Ginebik*			*MH6038A*	*3.08*	*50*																													
Ginebik	*Pathways Phase 2*	*Outlet to Dun Skipper*		*MH6038A*	*MH6051A*	*0.86*	*14*																													
Dun Skipper	*Pathways Phase 2*	*Outlet to Miikana*			*MH6050A*	*0.77*	*11*																													
Miikana Road	**Pathways Phase 2/**	609		MH6050A	MH6034A	**5.13**	**79**					252.8	815.2	2.71	5.12	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.13	14.94	4.48	0.00	0.00	9.60	33.98	*22.99*	250	*0.30*	0.671	24.38	71.74%
Block 46 (Park)	**Pathways Phase 2**			MH6049AW	MH6034A						2.85	0.0	0.0	3.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.85	2.85	0.86	0.00	0.00	0.86	20.53	*15.47*	200	*0.36*	0.633	19.67	95.84%
Miikana	**Pathways Phase 2**		620	MH6034A	MH6049A							0.0	815.2	2.71	5.12	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	17.8	5.34	0.00	0.00	10.46	31.63	*60.76*	*250*	*0.26*	0.624	21.18	66.94%
Miikana	**ays Phase 2/ Idone Ph**	620	630	MH6049A	MH6060A	0.37		*7*				16.8	1699.2	2.58	10.16	0.00	0.0	0.00	0.0	0.00	0.00	1.00	0.00	0.37	33.9	10.17	0.00	0.0	20.33	43.97	*81.59*	*300*	*0.19*	0.603	23.64	53.76%
Spreadwing	**Pathways Phase 2**	630		MH6060A	MH6061A	0.21	4					12.8	1712.0	2.58	10.23	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	34.11	10.23	0.00	0.00	20.47	43.97	*38.76*	*300*	*0.19*	0.603	23.51	53.46%
Spreadwing	**Pathways Phase 2**			MH6061A	MH6062A	0.21	4					12.8	1724.8	2.58	10.30	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	34.32	10.30	0.00	0.00	20.60	47.32	*18.24*	*300*	*0.22*	0.648	26.72	56.46%
Spreadwing	**Pathways Phase 2**			MH6062A	MH6063A	0.15	2					6.4	1731.2	2.58	10.34	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.15	34.47	10.34	0.00	0.00	20.68	43.97	*18.20*	*300*	*0.19*	0.603	23.29	52.97%
Spreadwing	**Pathways Phase 2**			MH6063A	MH6064A	0.54	8					25.6	1756.8	2.58	10.48	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.54	35.01	10.50	0.00	0.00	20.98	46.23	*75.32*	*300*	*0.21*	0.634	25.25	54.61%
Spreadwing	**Pathways Phase 2**			MH6064A	EXBLK3171A	0.44	7					22.4	1779.2	2.57	10.60	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.44	35.45	10.64	0.00	0.00	21.24	45.12	*51.94*	*300*	*0.20*	0.618	23.88	52.92%
Spreadwing	**Pathways Phase 2**		6171	BLK3171AW	MH6171A							0.0	1779.2	2.57	10.60	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	35.45	10.64	0.00	0.00	21.24	45.12	*43.00*	*300*	*0.20*	0.618	23.88	52.92%
Minikan	**Pathways Phase 1**	Outlet to Spreadwing Way			MH6171A	2.06	40					128.0	128.0	2.93	0.87	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.06	2.06	0.62	0.00	0.00	1.49	50.75	*84.42*	200	*2.20*	1.565	49.27	97.07%
Spreadwing	**Pathways Phase 1**	6171	6183	MH6171A	MH6183A	0.15						0.0	1907.2	2.56	11.31	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.15	37.7	11.30	0.00	0.0	22.60	45.12	*83.61*	*300*	*0.20*	0.618	22.51	49.90%

Zaatiik Grove	**Pathways Phase 1**			MH6182A	MH6183A	1.18	18					57.6	57.6	2.98	0.40	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.18	1.18	0.35	0.00	0.00	0.75	54.10	*74.74*	*200*	*2.50*	1.668	53.35	98.61%
Zaatiik Grove	**Pathways Phase 1**	6183	6175	MH6183A	MH6175A							0.0	1964.80	2.56	11.62	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	38.84	11.65	0.00	0.00	23.27	45.12	*118.54*	*300*	*0.20*	0.618	21.84	48.42%
Zaatiik Grove	***Pathways Phase 1***	*high level sani*		*MH61783B*	*MH6175A*	*0.67*	*12*					*38.4*	*38.40*	3.00	*0.27*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.67*	*0.67*	*0.20*	*0.00*	*0.00*	*0.47*	*37.48*	*6.00*	*200*	*1.20*	*1.156*	*37.01*	*98.75%*
Minikan Street	**Pathways Phase 1**		6175	MH6175B	MH6175D	1.74	28					89.6	89.60	2.95	0.61	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.74	1.74	0.52	0.00	0.00	1.13	45.12	*6.00*	*300*	*0.20*	0.618	43.98	97.49%
Minikan Street	**Pathways Phase 1**	6175	6106	MH6175A	MH6106A							0.0	2092.80	2.54	12.32	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	41.25	12.38	0.00	0.00	24.69	45.12	*85.46*	*300*	*0.20*	0.618	20.43	45.27%
Minikan Street	***Pathways Phase 1***	*high level sani*		*MH6106C*	*MH6106A*	*0.58*	*10*					*32.0*	*32.0*	3.01	*0.22*	*0.00*	*0.0*	*0.00*	*0.0*	*0.00*	*0.0*	*1.00*	*0.00*	*0.58*	*0.6*	*0.17*	*0.00*	*0.00*	*0.40*	*28.63*	*6.00*	*200*	*0.70*	*0.883*	*28.23*	*98.61%*
												2124.8	TRUE											41.8	TRUE											
Kelly Farm Drive	***Idone Phase 1***	*Outlet to Dun Skipper*			*MH6110A*	*1.64*	*28*																													
Dun Skipper	***Pathways Phase 1***	*Dunskipper to Kelly Farm Drive*		*MH6132A*	*MH6110A*	*0.53*	*9*																													
Kelly Farm Drive	***Pathways Phase 1***	*Kelly Farm Drive to Salamander*		*MH6110A*	*MH6108A*	*1.08*	*18*																													
Salamander	***Pathways Phase 1***	*Outlet to Kelly Frm Drive*		*MH6156A*	*MH6108A*	*1.23*	*19*																													
Kelly Farm Drive	***Pathways Phase 1***	*Kelly Farm Drive*		*MH6108A*	*MH6106A*	*0.51*	*6*																													
Kelly Farm Drive	**Pathways Phase 1**	6106	647	MH6106A	MH647A	**5.18**	**80**					256.0	2380.80	2.52	13.86	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.18	47.01	14.10	0.00	0.00	27.97	45.12	*86.86*	*300*	*0.20*	0.618	17.15	38.01%
Wabikon Crescent	**Pathways Phase 2**	*Outlet to Miikana*		MH6070A	MH6080A	2.16		58			0.06																									
Miikana	**Pathways Phase 2**	*Miikana*		MH6079A	MH6080A	0.80		21																												
Miikana	**Pathways Phase 2**		646	MH6080A	MH6081A	**3.88**		**104**			**0.06**	249.6	249.6	2.87	1.66	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	3.94	3.9	1.18	0.00	0.00	2.84							
Miikana Road	**Pathways Phase 2**	646		MH6081A	BLK6105AW	1.02		30				72.0	72.0	2.97	0.49	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	1.02	1.0	0.31	0.00	0.0	0.80							
Miikana Road	**Pathways Phase 2**		647	BLK6105AW	*EX. MH647A*	0.70		23				55.2	376.8	2.82	2.46	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.70	5.7	1.70	0.00	0.0	4.16	20.24	*17.00*	*200*	*0.35*	0.624	16.08	79.46%
Salamander Way	**Pathways Phase 1**	6156	6157	MH6156A	MH6157A	0.29	3					9.6	9.6	3.05	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.29	0.29	0.09	0.00	0.00	0.15							
Salamander Way	**Pathways Phase 1**	6157	6158	MH6157A	MH6158A	0.07		1				2.4	12.0	3.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.07	0.36	0.11	0.00	0.00	0.19							
Salamander Way	**Pathways Phase 1**	6158	6153	MH6158A	MH6153A	0.54		14				33.6	45.6	2.99	0.32	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.54	0.90	0.27	0.00	0.00	0.59							
Block 436 (Park)	**Pathways Phase 1**		6153	MH6159A	MH6153A						0.83	0.0	0.0	3.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.83	0.83	0.25	0.00	0.00	0.25							
Salamander Way	**Pathways Phase 1**	6153	6154	MH6153A	MH6154A	0.03						0.0	45.6	2.99	0.32	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.03	1.8	0.53	0.00	0.0	0.84							
Salamander Way	**Pathways Phase 1**	6154	6115	MH6154A	MH6115A	0.13						0.0	45.6	2.99	0.32	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.13	1.89	0.57	0.00	0.00	0.88							
Rallidale Street	***Idone Phase 1***	*Outlet to Dun Skipper via Rallidale*		*MH14110A*	*MH1411A*	*1.83*	*9*	*39*																												
Grackle Street	***Idone Phase 1***	*Outlet to Dun Skipper via Grackle*		*MH14120A*	*MH1411A*	*1.41*		*43*																												
Rallidale Street	***Idone Phase 1***	*Outlet to Dun Skipper*		*MH1411A*	*MH6133A*	*0.27*		*6*																												
Dun Skipper	***Pathways Phase 1***	*Dun Skipper*		*MH6132A*	*MH6133A*	*0.64*	*11*																													
Dun Skipper	***Pathways Phase 1***	*Dun Skipper*		*MH6133A*	*MH6136A*	*1.43*	*26*																													
Pathways Block 203	***Pathways Block 203***	*Outlet to Dun Skipper*			*MH6136A*	*1.62*		*80*																												
Pathways Block 204	***Pathways Block 204***	*Outlet to Home Hardware*			*MH1A*	*1.54*			*77*	*103*																										
Home Hardware	***Home Hardware***	*Outlet to Dun Skipper*		*MH6A*	*MH6138A*				*54*	*87*								*2.53*																		
Dun Skipper	***Pathways Phase 1***	*Dun Skipper / Cedar Creek*		*MH6138A*	*MH6136A*	*0.18*																														
Cedar Creek	***Pathways Phase 1***	*Cedar Creek*		*MH6136A*	*MH6119A*	*0.17*																														
Pingwi Place	***Pathways Phase 1***	*Outlet to Cedar Creek*		*MH6132A*	*MH6119A*	*1.93*	*20*	*24*																												
Pathways Block 241	***Pathways Block***	*Outlet to Cedar Creek*		*BLK6119AE*	*MH6119A*													*3.01*																		
Cedar Creek	***Pathways Phase 1***	*Cedar Creek*		*MH6119A*	*MH6117A*	*0.12*																														
Pathways Block 232	***Pathways Block 232***	*Outlet to Cedar Creek*			*MH6117A*	*1.01*			*12*	*80*																										
Cedar Creek	**Pathways Phase 1**		6115	MH6117A	MH6115A	**12.21**	**66**	**226**	**143**	**270**		1520.8	1520.8	2.61	9.17	0.00	0.00	**5.54**	5.54	0.00	0.00	1.00	1.09	17.75	19.64	5.89	0.00	0.00	16.15							
Cedar Creek	**Pathways Phase 1**	6115	6101	MH6115A	MH6101A	0.61		18				43.2	1609.60	2.59	9.67	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.61	20.25	6.08	0.00	0.00	16.83							
Miikana Road	**Pathways Phase 1**	6101	6102	MH6101A	MH6102A	0.45		11				26.4	1636.00	2.59	9.81	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.45	20.70	6.21	0.00	0.00	17.11							
Pathways Block 225	**Pathways Block 225**		6102		MH6102A	0.94		34				81.6	81.60	2.96	0.56	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.94	0.94	0.28	0.00	0.00	0.84							
Miikana Road	**Pathways Phase 1**	6102	6103	MH6102A	MH6103A	0.23		6				14.4	1732.00	2.58	10.34	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.23	21.87	6.56	0.00	0.00	18.00							
Miikana Road	**Pathways Phase 1**	6103	6104	MH6103A	MH6104A	0.66		18				43.2	1775.20	2.58	10.58	0.00	0.00	0.00	5.54	0.00	0.00	1.00	1.09	0.66	22.53	6.76	0.00	0.00	18.43							
School Block	**Pathways Block 223**	Outlet to Miikana		BLK6104AS	MH6104A							0.0	0.00	3.10	0.00	2.55	2.55	0.00	0.00	0.00	0.00	1.00	0.50	2.55	2.55	0.77	0.00	0.00	1.27							
Miikana Road	**Pathways Phase 1**	6104	6105B	MH6104A	MH6104B	0.6		15				36.0	1811.20	2.57	10.78	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.60	25.68	7.70	0.00	0.00	20.08							
Miikana Road	**Pathways Phase 1**	6105B	647	MH6104B	MH647							0.0	1811.20	2.57	10.78	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.00	25.68	7.70	0.00	0.00	20.08							
												1811.2	TRUE											25.7	TRUE											
KELLY FARM DRIVE	**FC South Stage2 PH4B**	647	755	MH647A	MH742A	0.28		5				12.0	4580.80	2.37	25.11	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.28	78.63	23.59	0.00	0.00	50.29	101.84	*80.31*	*375*	*0.31*	0.893	51.55	50.62%
KESTREL STREET	***FC South Stage2 PH4B***	*Undeveloped lands to Kestrel*		*BLKHEAD*	*MH751A*	*0.65*		*22*																												
PARK BLOCK	***FC South Stage2 PH4B***	*Park land*		*MH744A*	*MH745A*						*1.22*																									
KESTREL STREET	***FC South Stage2 PH4B***	*Outlet to Kelly Farm*		*MH751A*	*MH742A*	*0.49*		*15*																												
KELLY FARM DRIVE	**FC South Stage2 PH4B**	755	745	MH742A	MH741A	**1.53**		**48**			**1.22**	115.2	4696.00	2.36	25.68	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	2.75	81.38	24.41	0.00	0.00	51.68	101.84	*80.31*	*375*	*0.31*	0.893	50.16	49.25%
KELLY FARM DRIVE	**FC South Stage2 PH4B**	745	730	MH741A	MH730A	0.28		5				12.0	4708.00	2.36	25.74	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.28	81.66	24.50	0.00	0.00	51.83	101.84	*80.31*	*375*	*0.31*	0.893	50.02	49.11%
HELEN RAPP WAY	**FC South Stage2 PH4A**	*Outlet to Helen Rapp Way South*			MH738A	0.34	5																													
HELEN RAPP WAY	**FC South Stage2 PH4B**			MH735A	MH738A	1.21	20																													
MAYBERLY	**FC South Stage2 PH4B**			MH738A	MH731A	0.52	9																													
HELEN RAPP WAY	**FC South Stage2 PH4B**	*Outlet to Maberly*		MH735A	MH731A	1.33	24																													
HELEN RAPP WAY	**FC South Stage2 PH4B**	*Outlet to Kelly Farm*		MH731A	MH730A	0.51	9																													
						3.91	**67**																													

S-4 Lands East - Flows to Bank Street																																				
S-4 Leitrim Expansion Lands	**Future**			**S-4**	**Bank**	**8.47**	**33**	**84**		**90**		**496.2**	**496.2**	3.38	**5.44**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**8.47**	**8.47**	**2.80**	**0.00**	**0.0**	**8.23**	**20.24**	**0.00**	**200**	**0.35**	**0.624**	**12.01**	**59.34%**
Bank Street	**Future**			**Bank**	**MH300A**						**2.25**	**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**2.25**	**10.72**	**3.22**	**0.00**	**0.0**	**6.42**	**20.24**	**0.00**	**200**	**0.35**	**0.624**	**13.83**	**68.31%**
Bank Street_San	**Proposed**			**MH300A**	**MH200A**							**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.00**	**10.72**	**3.22**	**0.00**	**0.0**	**6.42**	**20.24**	**71.44**	**200**	**0.35**	**0.624**	**13.83**	**68.31%**
Bank Street_San	**Proposed**			**MH200A**	**MH100A**						**0.66**	**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.66**	**11.38**	**3.41**	**0.00**	**0.0**	**6.61**	**20.24**	**92.12**	**200**	**0.35**	**0.624**	**13.63**	**67.33%**
Bank Street_San	**Proposed**	**S4E**		**MH100A**	**MH793A**							**0.0**	**496.2**	2.79	**3.20**		**0.0**		**0.0**		**0.0**	**1.00**	**0.00**	**0.00**	**11.38**	**3.41**	**0.00**	**0.0**	**6.61**	**24.19**	**24.98**	**200**	**0.50**	**0.746**	**17.58**	**72.67%**
Labrador Crescent	**FC STAGE 2 PHASE 4C**	Sparta Lands		BLK794AS	MH794A	2.80		24		220		519.6	519.6	2.78	3.34		0.0		0.00		0.0	1.00	0.00	2.80	2.80	0.84	0.00	0.0	4.18	19.66	*33.00*	200	*0.33*	0.606	15.47	78.72%
Labrador Crescent	**FC STAGE 2 PHASE 4C**			MH794A	MH791A	0.49		20				48.0	1063.8	2.67	6.57		0.0		0.0		0.0	1.00	0.00	0.49	14.7	4.40	0.00	0.0	10.97	19.66	*19.60*	200	*0.33*	0.606	8.68	44.17%
Potential S-5 Lands	**Potential**	**S5W**		**S-5**	**MH791D/A**	**4.78**						**630.0**	**630.0**	3.34	**6.81**		**0.0**		**0.00**		**0.0**	**1.00**	**0.00**	**4.78**	**4.8**	**1.58**	**0.00**	**0.0**	**8.39**							
Labrador Crescent	**FC STAGE 2 PHASE 4C**	790		MH791A	MH790A	0.25		7				16.8	1710.6	2.58	10.23		0.0		0.0		0.0	1.00	0.00	0.25	19.7	5.91	0.00	0.0	16.14	19.95	*73.40*	200	*0.34*	0.615	3.82	19.12%
HAWKMERE WAY	***FC STAGE 2 PHASE 4C***	*Outlet to Labrador Crescent*		*MH769A*	*MH797A*	*1.27*		*40*																												
Labrador Crescent	***FC STAGE 2 PHASE 4C***	*Outlet to Sora Way*		*MH795A*	*MH790A*	*0.73*		*33*																												
Sora Way	**FC STAGE 2 PHASE 4C**		780	MH790A	MH780A	**2.39**		**86**				206.4	1917.0	2.56	11.36		0.0		0.0		0.0	1.00	0.00	2.39	22.1	6.63	0.00	0.0	17.99	21.09	*86.10*	200	*0.38*	0.650	3.11	14.72%
Eric Maloney	***FC STAGE 2 PHASE 4C***	*Outlet to Sora Way*		*MH786A*	*MH780A*	*1.45*		*43*																												
Sora Way	**FC STAGE 2 PHASE 4C**	780	770	MH780A	MH770A	**1.81**		**53**				127.2	2044.2	2.55	12.05		0.0		0.0		0.0	1.00	0.00	1.81	23.9	7.17	0.00	0.0	19.22	19.80	*9.50*	200	*0.33*	0.611	0.58	2.92%
Future Cedar Creek	**FC STAGE 2 PHASE 4B**	775	770	MH777A	MH770A	4.75		161				386.4	386.4	2.82	2.52		0.0		0.0		0.0	1.00	0.00	4.75	4.8	1.43	0.00	0.0	3.95							
Eric Maloney	***FC STAGE 2 PHASE 4C***		771	*MH787A*	*MH772A*	*0.70*	*12*																													
Cedar Creek	**FC STAGE 2 PHASE 4B**	771	770	MH772A	MH770A	**1.83**		**34**				81.6	81.6	2.96	0.56		0.0		0.0		0.0	1.00	0.00	1.83	1.8	0.55	0.00	0.0	1.11							
Sora Way	**FC STAGE 2 PHASE 4B**	770	760	MH770A	MH760A	**5.02**	**3**	**161**				396.0	2908.2	2.47	16.64		0.0		0.0		0.0	1.00	0.00	5.02	35.5	10.65	0.00	0.0	27.29							
Sagebush Cresc. East	***FC STAGE 2 PHASE 4C***	*Outlet to Sora*		*MH763A*	*MH760A*	*1.02*	*17*																							*27.59*	*107.80*	*200*	*0.65*	*0.851*	*27.59*	*100.00%*
Sora Way	**FC STAGE 2 PHASE 4B**	760	750	MH760A	MH750A	**1.39**	**23**					73.6	2981.8	2.47	17.03		0.0		0.0		0.0	1.00	0.00	1.39	36.9	11.07	0.00	0.0	28.09	31.02	*81.07*	250	*0.25*	0.612	2.93	9.43%
Sagebush Cresc. West	***FC STAGE 2 PHASE 4C***	*Outlet to Sora*		*MH763A*	*MH750A*	*1.41*	*23*																							*20.24*	*108.40*	*200*	*0.35*	*0.624*	*20.24*	*100.00%*
Sora Way	**FC STAGE 2 PHASE 4B**	750	740	MH750A	MH740A	**2.09**	**36**					115.2	3097.0	2.46	17.62		0.0		0.0		0.0	1.00	0.00	2.09	39.0	11.69	0.00	0.0	29.32	31.02	*94.16*	250	*0.25*	0.612	1.70	5.48%
Sora Way	**FC STAGE 2 PHASE 4B**	740	735	MH740A	MH735A	0.31	6					19.2	3116.2	2.46	17.72		0.0		0.0		0.0	1.00	0.00	0.31	39.3	11.79	0.00	0.0	29.51	31.63	*40.58*	250	*0.26*	0.624	2.12	6.71%
Sora Way	**FC STAGE 2 PHASE 4B**	735	730	MH735A	MH730A	0.46	6					19.2	3135.4	2.46	17.82		0.0		0.00		0.0	1.00	0.00	0.46	39.8	11.93	0.00	0.0	29.75	46.84	*105.34*	250	*0.57*	0.924	17.09	36.49%
												3135.4	TRUE											39.8	TRUE											

Existing MH730A to Findlay Creek Drive																																				
KELLY FARM DRIVE	**Findlay Creek Phase 4**	730		MH730A	MH720A	**4.11**	**67**					214.4	8057.80	2.23	41.56	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	4.11	125.52	37.66	0.00	0.00	80.81	96.79	*78.80*	375	*0.28*	0.849	15.98	16.51%
MAGPIE STREET	***FC South Stage2 PH4A***	*Outlet to Kelly Farm*		*MH703A*	*MH720A*	*1.57*	*29*																													
SILVERBELL CRESCENT	***FC South Stage2 PH4B***	*Outlet to Kelly Farm*		*MH714A*	*MH720A*	*1.14*	*11*	*12*																												
KELLY FARM DRIVE	**Findlay Creek Phase 4**		710	MH720A	MH710A	**2.83**	**40**	**12**				156.8	8214.60	2.22	42.28	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	2.83	128.35	38.51	0.00	0.00	82.38	84.79	*53.20*	375	*0.21*	0.744	2.42	2.85%
KELLY FARM DRIVE	**Findlay Creek Phase 4**	710	700	MH710A	MH700A	0.05						0.0	8214.60	2.22	42.28	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	0.05	128.40	38.52	0.00	0.00	82.39	154.12	*26.70*	375	*0.71*	1.352	71.73	46.54%
HELEN RAPP	***FC South Stage2 PH4A***	*Outlet to Kelly Farm*		*MH703A*	*MH700A*	*2.24*	*30*	*8*																												
SILVERBELL CRESCENT	***FC South Stage2 PH4B***	*Outlet to Kelly Farm*		*MH714A*	*MH700A*	*0.96*	*6*	*12*																												
KELLY FARM DRIVE	**Findlay Creek Phase 4**	700	333	MH700A	MH333A	**4.38**	**44**	**37**				229.6	8444.20	2.22	43.32	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	4.38	132.78	39.83	0.00	0.00	84.75	115.68	*179.20*	375	*0.40*	1.015	30.93	26.74%
JAVA 3	***FCJ JAVA 3***	*Outlet to Wood Acres Grove*		*FCJ3*	*MH364A*	*0.67*				*48*																										
Wood Acres Grove	**FC South Stage 3**		363	MH364A	MH363A	**1.23**		**15**		**48**		136.8	136.80	2.92	0.93	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.23	1.23	0.37	0.00	0.00	1.29							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	363	362	MH363A	MH362A	0.42		12				28.8	165.60	2.91	1.11	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.42	1.65	0.50	0.00	0.00	1.61							
CEDAR CREEK DRIVE	**Findlay Creek Stage 3**	*Outlet to Wood Acres Grove*		MH365A	MH362A	0.28		8																												
CEDAR CREEK DRIVE	**Findlay Creek Stage 3**	*Outlet to Wood Acres Grove*		MH342A	MH362A	0.30		10																												
WOOD ACRES GROVE	**Findlay Creek Stage 3**	362	361	MH362A	MH361A	**1.11**		**34**				81.6	247.20	2.87	1.64	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.11	2.76	0.83	0.00	0.00	2.47							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	361		MH361A	MH360A	0.41		13				31.2	278.40	2.86	1.84	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.41	3.17	0.95	0.00	0.00	2.79							
WOOD ACRES GROVE	Findlay Creek Stage 3			MH360A	MH356A	0.71		25				60.0	338.40	2.83	2.22	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.71	3.88	1.16	0.00	0.00	3.38							
WOOD ACRES GROVE	**Findlay Creek Stage 3**		355	MH356A	MH355A	0.19		4				9.6	348.00	2.83	2.28	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.19	4.07	1.22	0.00	0.00	3.50							
WOOD ACRES GROVE	**Findlay Creek Stage 3**	355	353	MH355A	MH353A	0.55		16				38.4	386.40	2.82	2.52	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.55	4.62	1.39	0.00	0.00	3.91							
ALASKEN DRIVE	Findlay Creek Stage 3			MH360A	MH352A	0.56		16				38.4	38.40	3.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.56	0.56	0.17	0.00	0.00	0.43							
ALASKEN DRIVE	***Findlay Creek Stage 3***			*MH352A*	*MH351A*	*0.19*		*3*																												
ALASKEN DRIVE	**Findlay Creek Stage 3**		350	MH351A	MH350	**0.88**		**27**				64.8	103.20	2.94	0.70	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.88	1.44	0.43	0.00	0.00	1.14							
ALASKEN DRIVE	**Findlay Creek Stage 3**	350	353	MH350A	MH353A	0.06		2				4.8	108.00	2.94	0.74	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.06	1.50	0.45	0.00	0.00	1.19							
ALASKEN DRIVE	**Findlay Creek Stage 3**	353	333	MH353A	MH333A	**0.43**		**8**				19.2	513.60	2.78	3.31	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.43	6.55	1.97	0.00	0.00	5.27							
FINDLAY CREEK DRIVE	**Findlay Creek Phase 4**	333	330-11	MH333A	MH11A	1.19	8	12				54.4	9012.20	2.20	45.89	0.00	2.55	0.00	5.54	0.00	0.00	1.00	1.59	1.19	140.52	42.16	0.00	0.00	89.64	118.54	*188.70*	375	*0.42*	1.040	28.90	24.38%
												9012.2	TRUE			2.6	TRUE	5.5	TRUE	0.0	TRUE			140.5	TRUE											
S5 LANDS TO COWANS	**COWANS GROVE**	S5E	COWANS	S5E	COWANS	10.99						861.0	861.00	2.70	5.39	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	10.99	10.99	3.63	0.00	0.00	9.02							

Design Parameters:

Residential			ICI Areas			
SF	3.2	p/p/u				
TH/SD	2.4	p/p/u	INST	17,000	L/Ha/day	
1 Bed	1.4	p/p/u	COM	17,000	L/Ha/day	
2 Bed	2.1	p/p/u	IND	17,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha			L/Ha/day	

Notes:

1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 200 L/day 280 L/day (S4 & S5)
3. Infiltration allowance: 0.30 L/s/Ha 0.33 L/s/Ha (S4 & S5)
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.6
   where K = 0.6 Correction Factor (existing areas only)
5. Commercial and Institutional Peak Factors based on total area,
1.5 if greater than 20%, otherwise 1.0

Designed: AS/RM

Checked: RM/DY

Dwg. Reference: 145172-100

No.	Revision	Date
1.	Existing Conditions Report Submission No. 2 2025-03-25	
2.	Existing Conditions Report Submission No. 3 2025-05-29	
3.	Serviceability Report Submission No. 1 2025-08-08	

File Reference:	Date:	Sheet No:
145172-6.04.03	2025-08-08	1 of 1

Note: For this exercise the current (revised) criteria for normal operating conditions was applied to existing areas
Harmon - correction factor is now 0.6
ICI peak factor is always 1.0
INST, COM, IND release rates changed as noted
Demand = 200 per capita L/day
Infiltration allowance = 0.3 L/s/Ha

<angela.soward@arcadis.com>; Moffatt, Jim <jim.moffatt@arcadis.com>; Adam Fobert <AFobert@dsel.ca>; Marc Pichette <MPichette@dsel.ca>
Subject: RE: S-4 / S-5 Lands - WW and STM model updates

Arcadis Warning: Exercise caution with email messages from external sources such as this message. Always verify the sender and avoid clicking on links or scanning QR codes unless certain of their authenticity.

Hi Ryan,

As discussed below, we received Caivan's new plan. They would like to move forward with the modeling using the following flows:
To Sora = **8.39 L/s**
To Shuttleworth = **12.76 L/s**

Please let me know if you have any questions or concerns.

Thanks,

Jeremy Chouinard, P.Eng.,
Project Manager

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

Cell: 613-668-2585
e-mail: jchouinard@DSEL.ca
This email, including any attachments, is for the sole use of the intended recipient(s) and may contain private, confidential, and privileged information. Any unauthorized review, use, disclosure, or distribution is prohibited. If you are not the intended recipient or if this information has been inappropriately forwarded to you, please contact the sender by reply email and destroy all copies of the original.

From: Jeremy Chouinard
Sent: January 14, 2025 10:20 AM
To: 'Magladry, Ryan' <ryan.magladry@arcadis.com>
Cc: Spal, Peter <peter.spal@arcadis.com>; Ghasri, Mahsa <mahsa.ghasri@arcadis.com>; Soward, Angela <angela.soward@arcadis.com>; Moffatt, Jim <jim.moffatt@arcadis.com>; Adam Fobert <AFobert@dsel.ca>; Marc Pichette <MPichette@dsel.ca>
Subject: RE: S-4 / S-5 Lands - WW and STM model updates

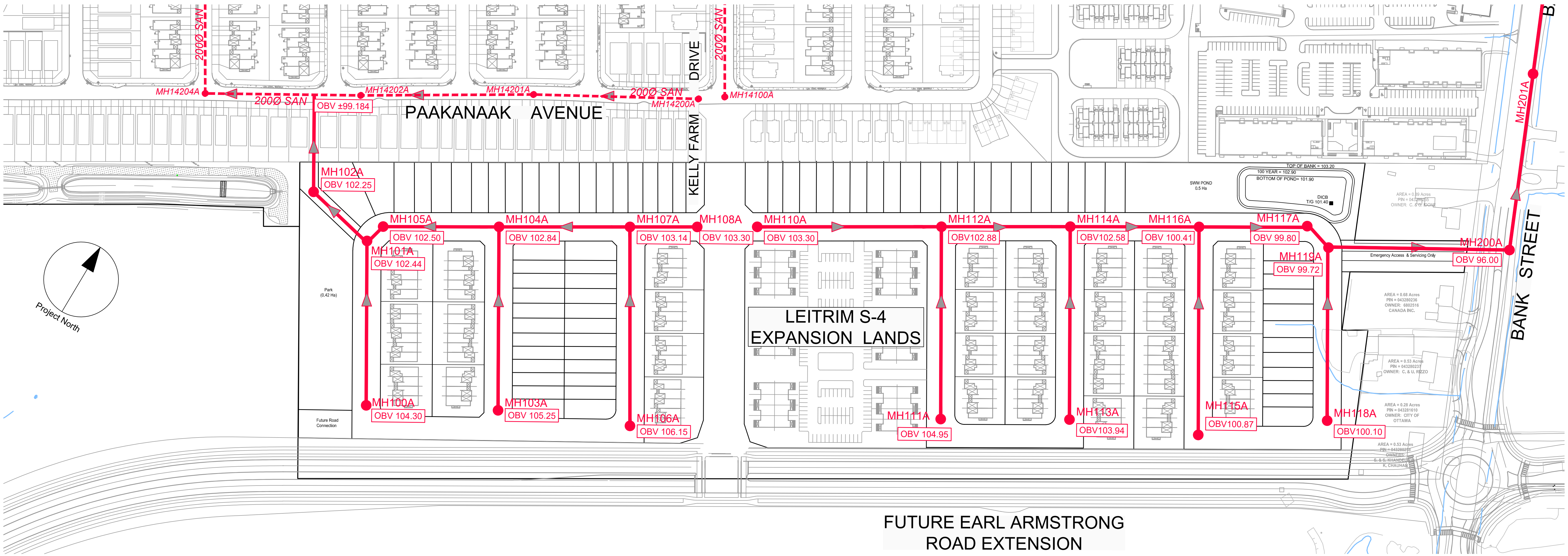
Hi Ryan,

We received the storm model, thank you.

We discussed Arcadis' proposed modeling efforts with Caivan, and they are in agreement to proceed subject to the following:

- Caivan will be providing updated proposed flows from their lands to optimize their plan.

J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Preferred Wastewater.dwg Last Saved By: milnem4626 Last Saved At: Oct. 20, 25



LEGEND:

▬	PROPOSED WASTEWATER SEWER
200Ø SAN - - -	EXISTING WASTEWATER SEWER c/w DIAMETER
MH100A	MANHOLE ID
● OBV 104.30	OBVERT ELEVATION

Project Title

SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

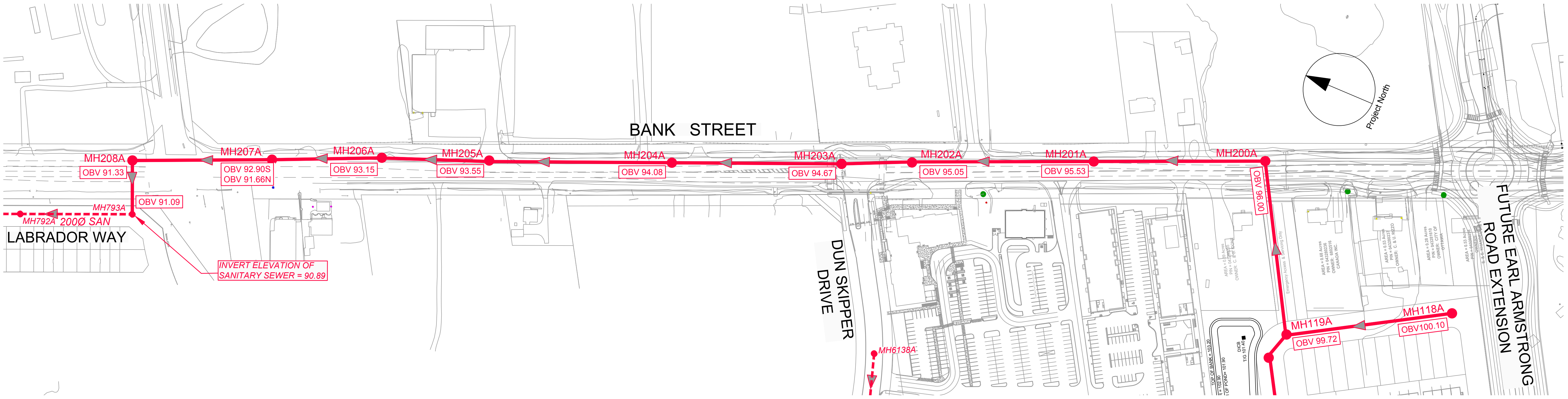
Drawing Title

PREFERRED WASTEWATER COLLECTION SYSTEM
AND OUTLET TO PAAKANAK AVENUE

Sheet No.

FIGURE 6-2

J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Preferred Wastewater_2.dwg Last Saved By: milnem4626 Last Saved At: Oct. 20, 25



LEGEND:

—	PROPOSED WASTEWATER SEWER
- - - 200Ø SAN	EXISTING WASTEWATER SEWER c/w DIAMETER
MH100A	MANHOLE ID
● OBV 104.30	OBVERT ELEVATION

ARCADIS

Project Title

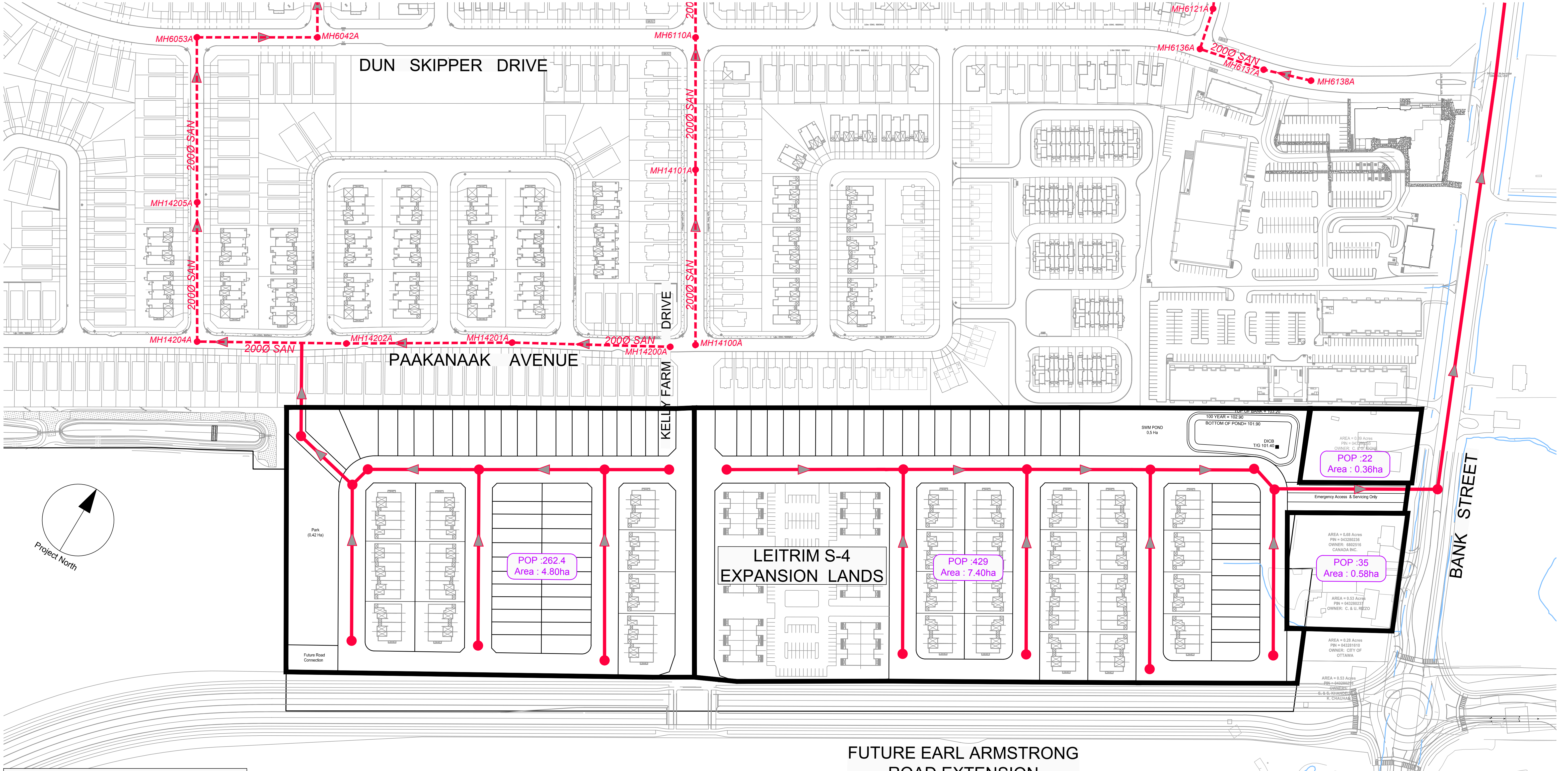
SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

Drawing Title

PREFERRED WASTEWATER OUTLET
TO LABRADOR CRESCENT

Sheet No.

FIGURE 6-3



LEGEND:

▬	PROPOSED WASTEWATER SEWER
200Ø SAN - - - -	EXISTING WASTEWATER SEWER c/w DIAMETER
▬	SANITARY DRAINAGE AREAS
POP : 075 Area : 8.09ha	POPULATION AREA IN HECTARES

J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Preferred Wastewater DAP.dwg Last Saved By: milnem4626 Last Saved At: Oct. 20, 25

ARCADIS

Project Title

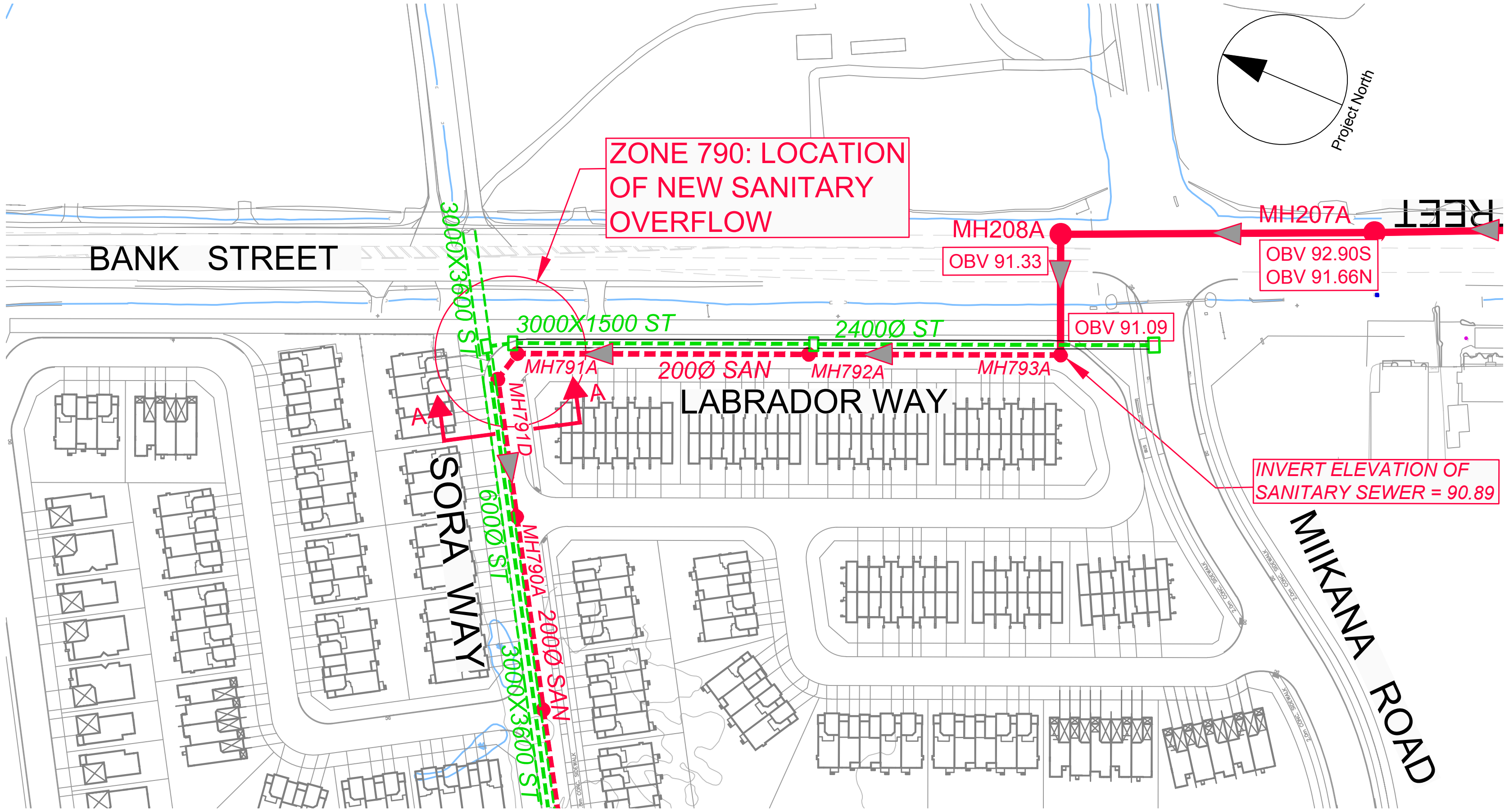
SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

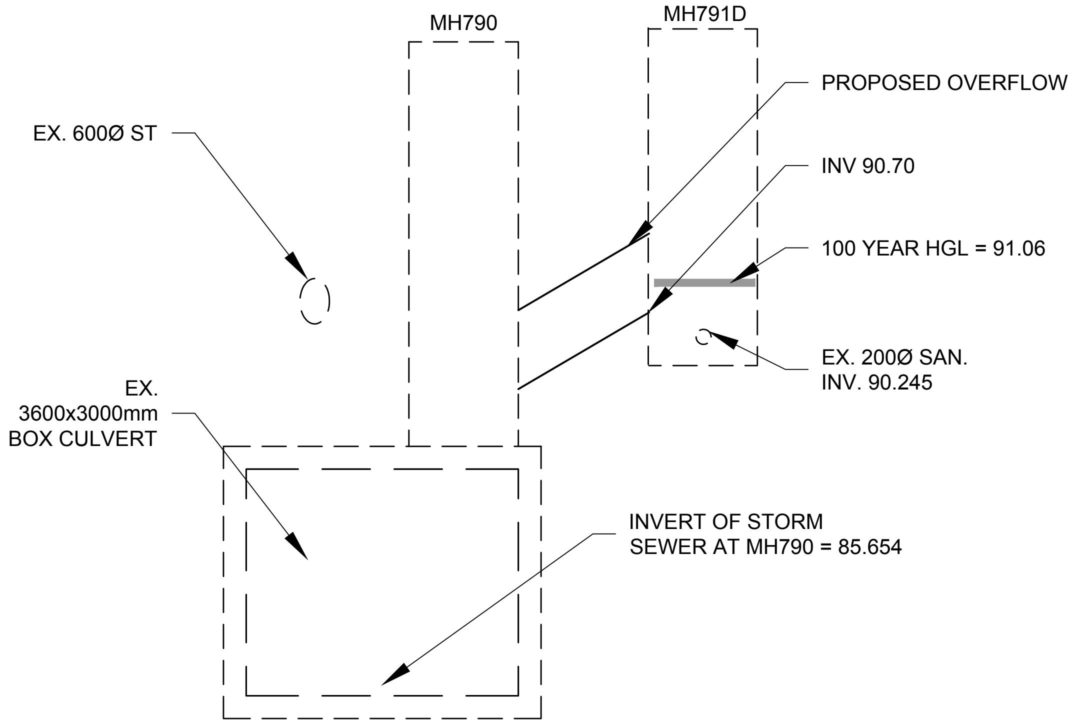
Drawing Title

PREFERRED WASTEWATER DRAINAGE AREA PLAN

Sheet No.

FIGURE 6-4





SECTION A-A

NOTES:

1. FINAL OVERFLOW PIPE SIZE TO BE CONFIRMED AT DETAILED DESIGN.
2. THE LOCATION SHOWN SHOULD BE CONSIDERED CONCEPTUAL LEVEL FOR DEMONSTRATION PURPOSES AND THAT FINAL LAYOUT AND CONFIGURATION IS LIKELY TO DIFFER FROM THE CONCEPT SHOWN.
3. INTEGRATION OF MONITORING EQUIPMENT TO BE IMPLEMENTED THROUGH DETAILED DESIGN.

LEGEND:

━━━	PROPOSED WASTEWATER SEWER
200Ø SAN - - -	EXISTING WASTEWATER SEWER c/w DIAMETER
MH100A	MANHOLE ID
● OBV 104.30	OBVERT ELEVATION

ARCADIS

Project Title

SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

Drawing Title

CONCEPTUAL PLAN OF OVERFLOW AT
SORA WAY AND LABRADOR CRESCENT

Sheet No.

FIGURE 6-5

Appendix E

- Figure 7-1 Existing Storm Sewer Layout
- Excerpt Eastern Outlet Release Rate
- Figure 7-2 Preferred Storm Sewer Plan
- Figure 7-3 Preferred Storm Outlet to Bank Street
- Figure 7-4 Preferred Storm Outlet to Existing Constructed Channel
- Figure 7-5 Preferred Storm Drainage Area Plan
- Figure 7-6 Preferred Stormwater Management Concept Plan
- WSWMF-1 Conceptual Western SWM Facility Design
- WSWMF-2 Conceptual Western SWMF – Cell 1 Plan View and Profile
- WSWMF-3 Conceptual Western SWMF – Cell 2 Plan View and Profile
- WSWMF-4 Conceptual Western SWMF – Cross Sections
- Pathways at Findlay Creek (Remer Lands) Constructed Channel General Plan
- Excerpt Constructed Channel Design Brief Section 3
- Excerpt Constructed Channel Design Brief Figure 1
- Constructed Channel 5-year Monitoring Report
- Meeting Minutes and Observation Comments from July 25th Site Meeting with SNCA, City of Ottawa, Regional Group and Arcadis
- Water Quality Calculations

J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Storm Sewer figure.dwg Last Saved By: milnem4626 Last Saved At: Oct. 20, 25

LEGEND:

1350Ø STM	EXISTING STORM SEWER c/w DIAMETER

ARCADIS

Project Title

SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

Drawing Title

EXISTING STORM SEWER LAYOUT

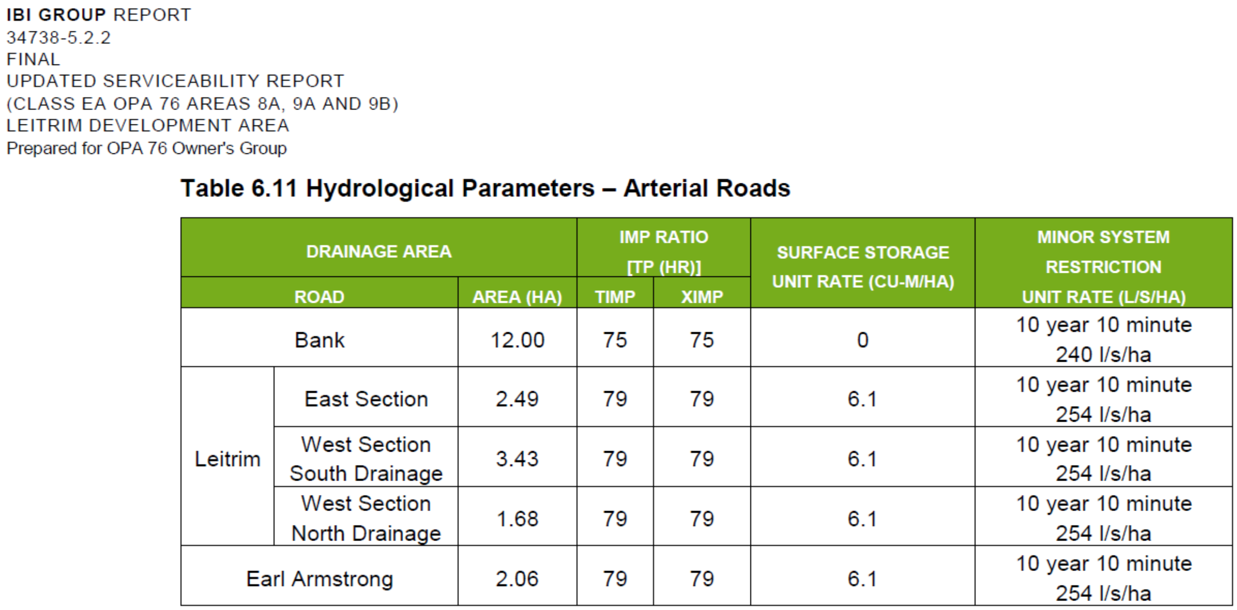
Sheet No.

FIGURE 7-1

Storm release rate for the eastern portion of the site

Storm capacity corresponding to 523 l/s has been identified for the eastern portion of the subject site. This is based on the following:

The 2016 'Final Updated Serviceability Report (Class EA OPA 76 Areas 8a, 9a and 9b) Leitrim Development Area' prepared by IBI Group identified a 523 l/s allocation for a 2.06 ha portion of future Earl Armstrong (2.06 ha x 254 l/s/ha = 523 l/s). Refer to below image of Table 6.11 from that report.

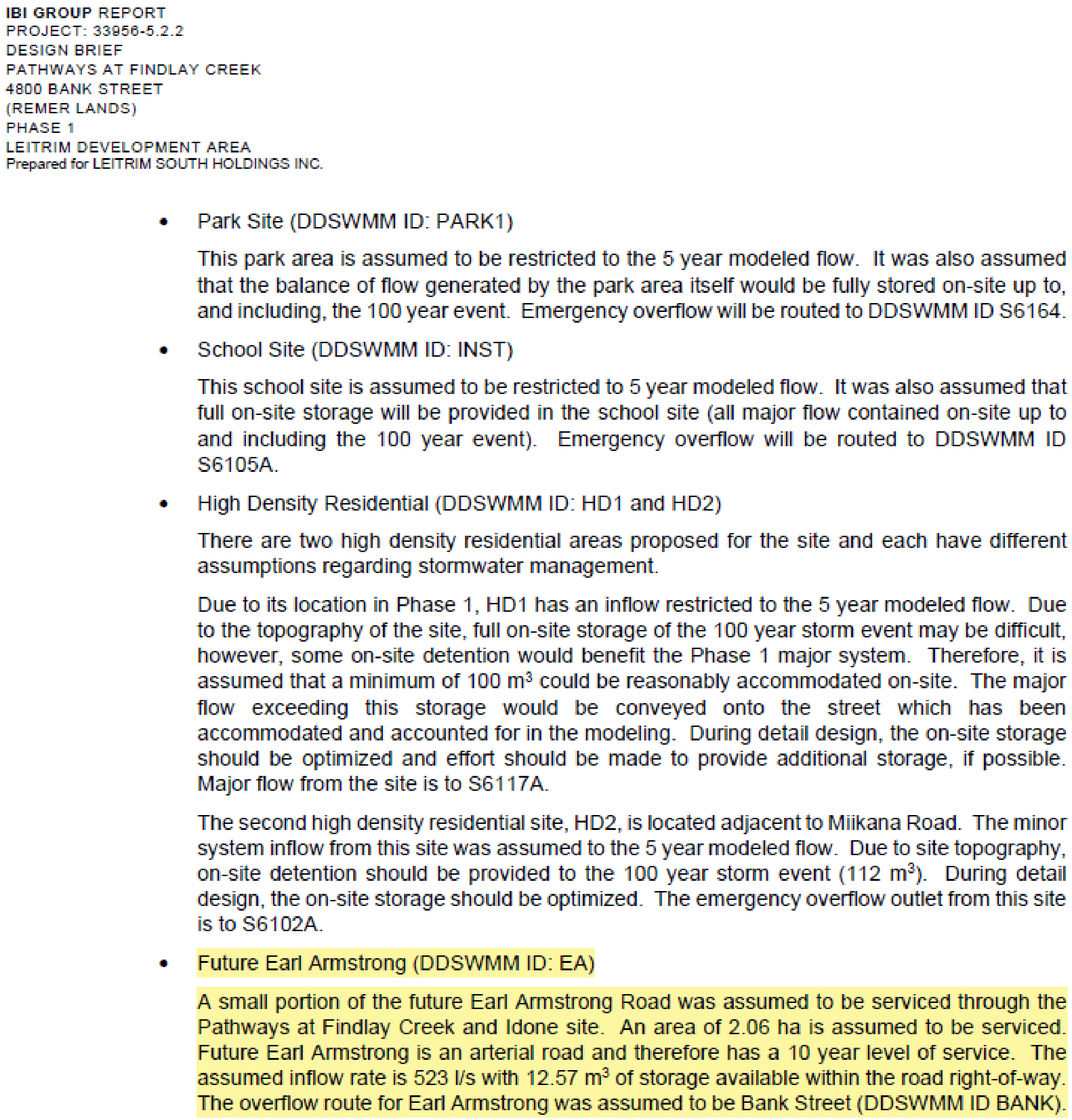


IBI GROUP REPORT
34738-5.2.2
FINAL
UPDATED SERVICEABILITY REPORT
(CLASS EA OPA 76 AREAS 8A, 9A AND 9B)
LEITRIM DEVELOPMENT AREA
Prepared for OPA 76 Owner's Group

Table 6.11 Hydrological Parameters – Arterial Roads

DRAINAGE AREA			IMP RATIO [TP (HR)]		SURFACE STORAGE UNIT RATE (CU-M/HA)	MINOR SYSTEM RESTRICTION UNIT RATE (L/S/HA)
ROAD		AREA (HA)	TIMP	XIMP		
Bank		12.00	75	75	0	10 year 10 minute 240 l/s/ha
Leitrim	East Section	2.49	79	79	6.1	10 year 10 minute 254 l/s/ha
	West Section South Drainage	3.43	79	79	6.1	10 year 10 minute 254 l/s/ha
	West Section North Drainage	1.68	79	79	6.1	10 year 10 minute 254 l/s/ha
Earl Armstrong		2.06	79	79	6.1	10 year 10 minute 254 l/s/ha

This servicing approach was carried forward to the Pathways Phase 1 design brief, entitled 'Design Brief Pathways at Findlay Creek, 4800 Bank Street (Remer Lands) Phase 1, Leitrim Development Area' prepared by IBI Group August 2017. Refer to highlighted text in the below image excerpted from report Section 4.9.1 Land Use (subsection 'Future Lands').



- Park Site (DDSWMM ID: PARK1)

  This park area is assumed to be restricted to the 5 year modeled flow. It was also assumed that the balance of flow generated by the park area itself would be fully stored on-site up to, and including, the 100 year event. Emergency overflow will be routed to DDSWMM ID S6164.

- School Site (DDSWMM ID: INST)

  This school site is assumed to be restricted to 5 year modeled flow. It was also assumed that full on-site storage will be provided in the school site (all major flow contained on-site up to and including the 100 year event). Emergency overflow will be routed to DDSWMM ID S6105A.

- High Density Residential (DDSWMM ID: HD1 and HD2)

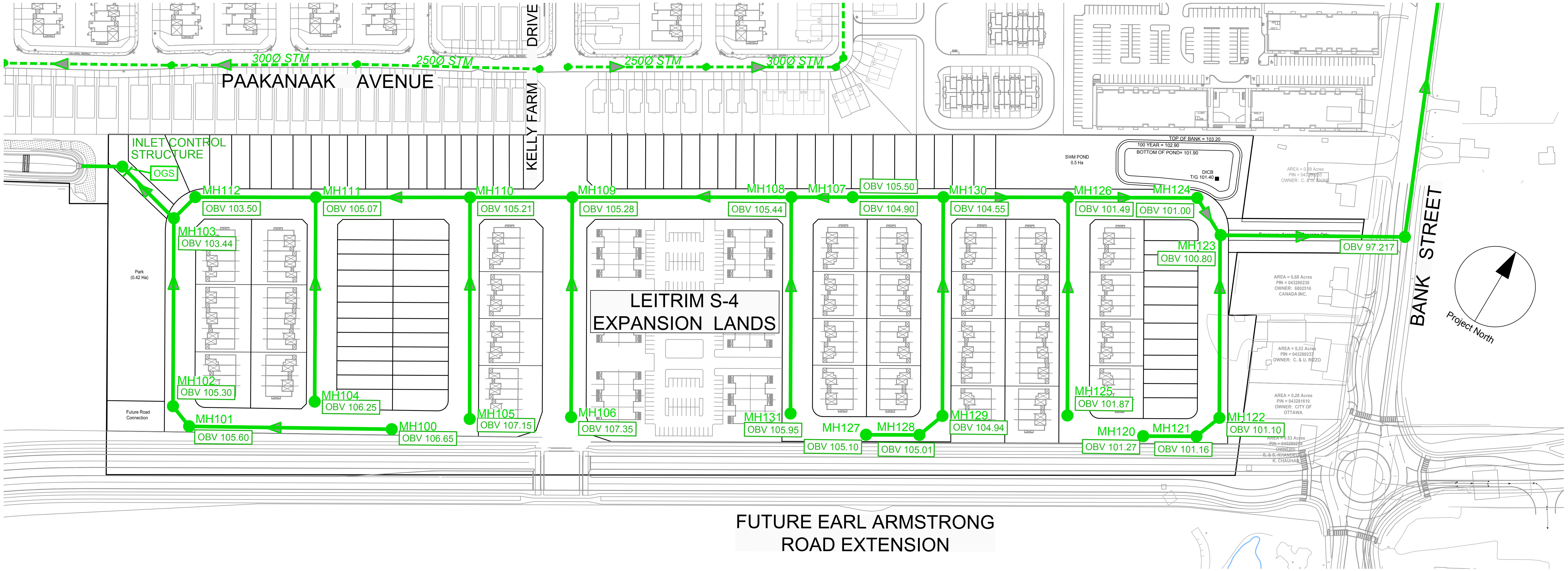
  There are two high density residential areas proposed for the site and each have different assumptions regarding stormwater management.

  Due to its location in Phase 1, HD1 has an inflow restricted to the 5 year modeled flow. Due to the topography of the site, full on-site storage of the 100 year storm event may be difficult, however, some on-site detention would benefit the Phase 1 major system. Therefore, it is assumed that a minimum of 100 m^3 could be reasonably accommodated on-site. The major flow exceeding this storage would be conveyed onto the street which has been accommodated and accounted for in the modeling. During detail design, the on-site storage should be optimized and effort should be made to provide additional storage, if possible. Major flow from the site is to S6117A.

  The second high density residential site, HD2, is located adjacent to Miikana Road. The minor system inflow from this site was assumed to the 5 year modeled flow. Due to site topography, on-site detention should be provided to the 100 year storm event (112 m^3). During detail design, the on-site storage should be optimized. The emergency overflow outlet from this site is to S6102A.

- Future Earl Armstrong (DDSWMM ID: EA)

  A small portion of the future Earl Armstrong Road was assumed to be serviced through the Pathways at Findlay Creek and Idone site. An area of 2.06 ha is assumed to be serviced. Future Earl Armstrong is an arterial road and therefore has a 10 year level of service. The assumed inflow rate is 523 l/s with 12.57 m^3 of storage available within the road right-of-way. The overflow route for Earl Armstrong was assumed to be Bank Street (DDSWMM ID BANK).



LEGEND:

▬	PROPOSED STORM SEWER
250Ø STM ‐ ‐ ‐	EXISTING STORM SEWER c/w DIAMETER
MH105 ●	MANHOLE ID
OBV 107.15	OBVERT ELEVATION

ARCADIS

Project Title

SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

Drawing Title

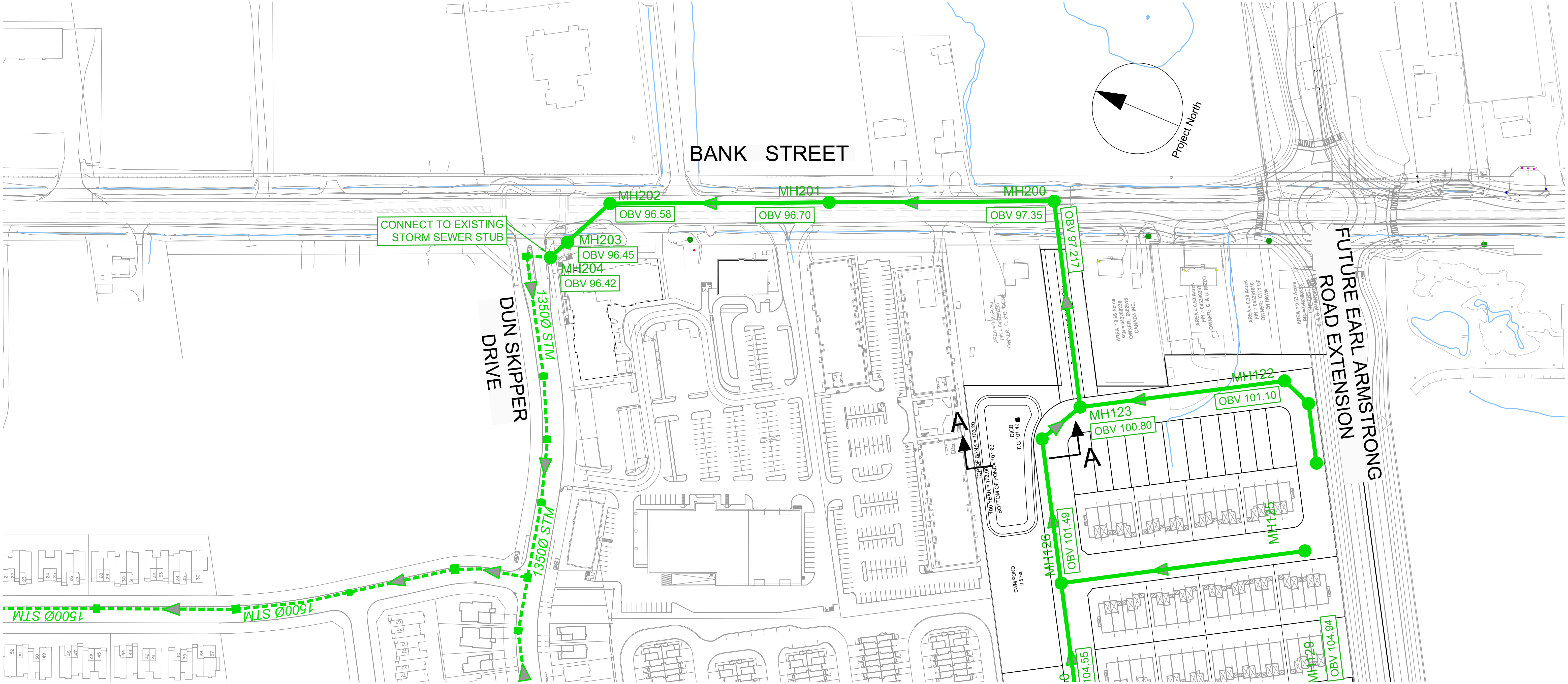
PREFERRED STORM SEWER PLAN

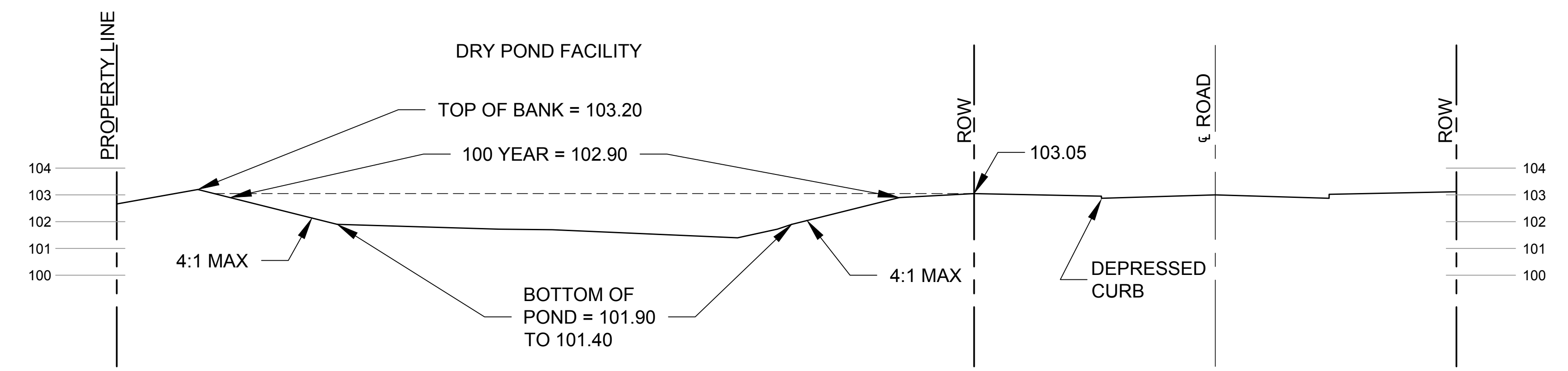
Sheet No.

FIGURE 7-2

J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Preferred Storm_2.dwg Last Saved By: milnem4626 Last Saved At: Apr. 9, 26

J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Preferred Storm_3.dwg Last Saved By: milnem4626 Last Saved At: Oct. 20, 25





SECTION A-A

N.T.S.

LEGEND:

🟩	PROPOSED STORM SEWER
250Ø STM	EXISTING STORM SEWER c/w DIAMETER
● MH105	MANHOLE ID
OBV 107.15	OBVERT ELEVATION

ARCADIS

Project Title

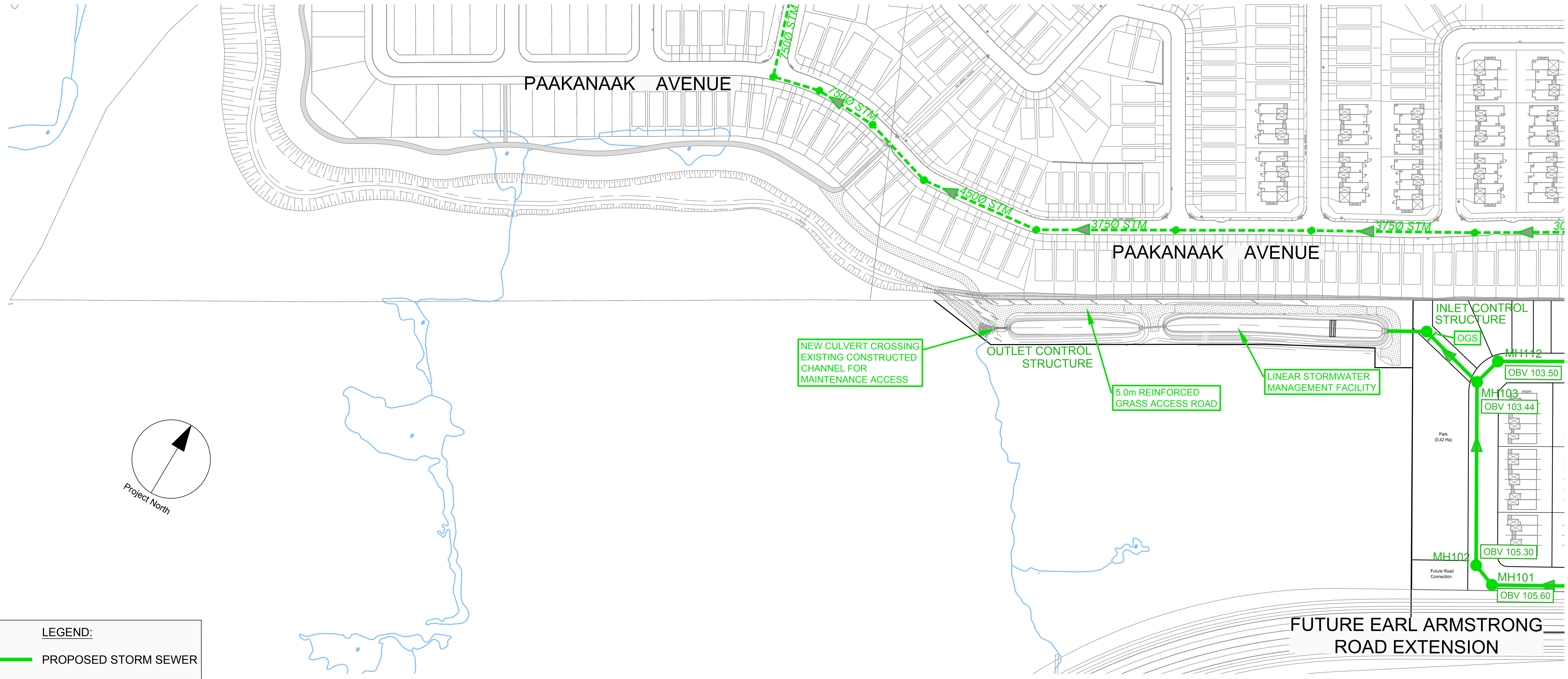
SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

Drawing Title

PREFERRED STORM OUTLET
TO BANK STREET

Sheet No.

FIGURE 7-3



LEGEND:

▬	PROPOSED STORM SEWER
250Ø STM	EXISTING STORM SEWER c/w DIAMETER
● MH105	MANHOLE ID
OBV 107.15	OBVERT ELEVATION

J:\145172_Cattizone_Po\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Preferred Storm.dwg Last Saved By: milnem4626 Last Saved At: Oct. 20, 25

ARCADIS

Project Title

SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

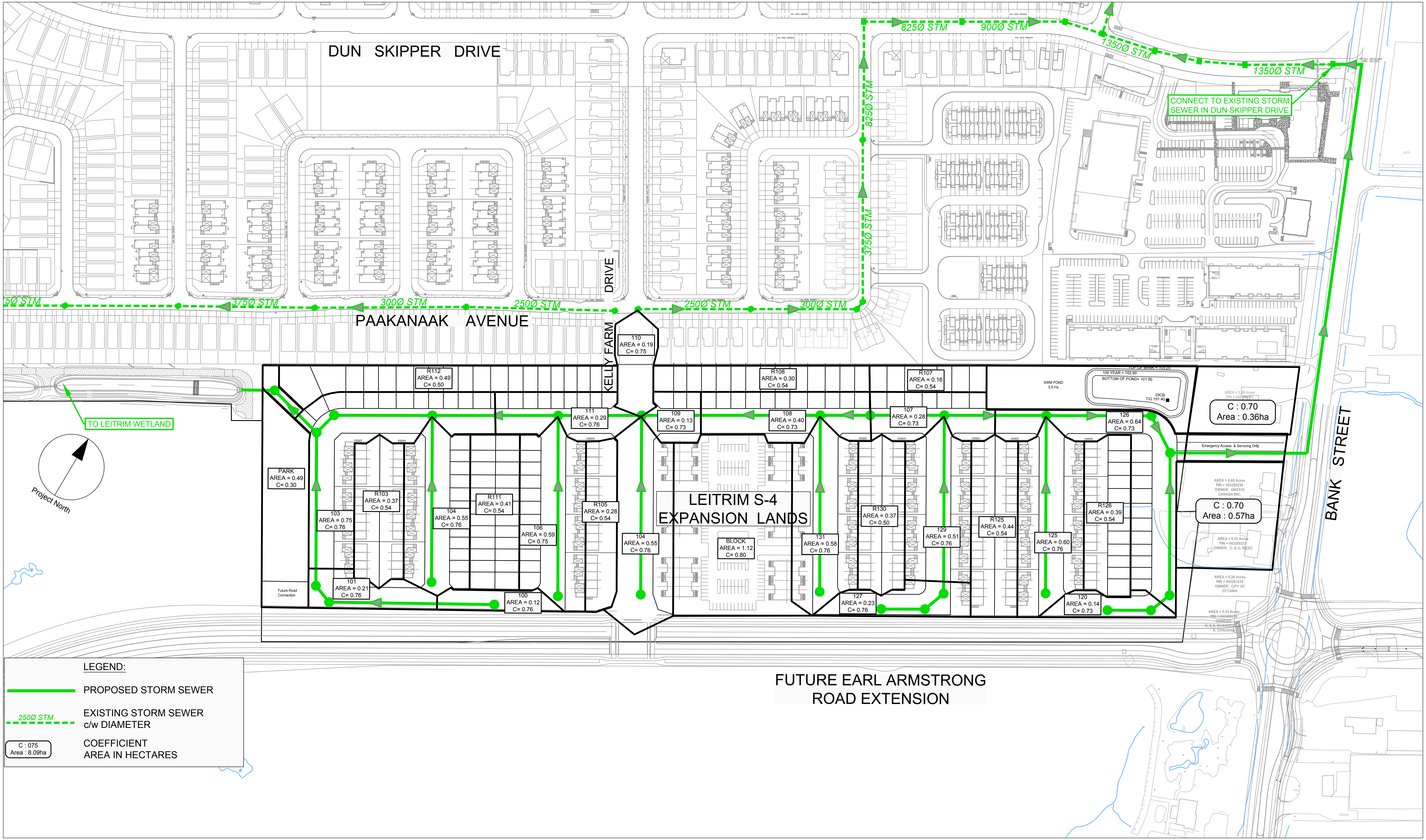
Drawing Title

PREFERRED STORM SEWER OUTLET
TO EXISTING CONVEYANCE CHANNEL

Sheet No.

FIGURE 7-4

J:\145172_Cattizone_Po\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Preferred Storm Trib DAP.dwg Last Saved By: milnem4626 Last Saved At: Oct. 20, 25



Project Title

SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

Drawing Title

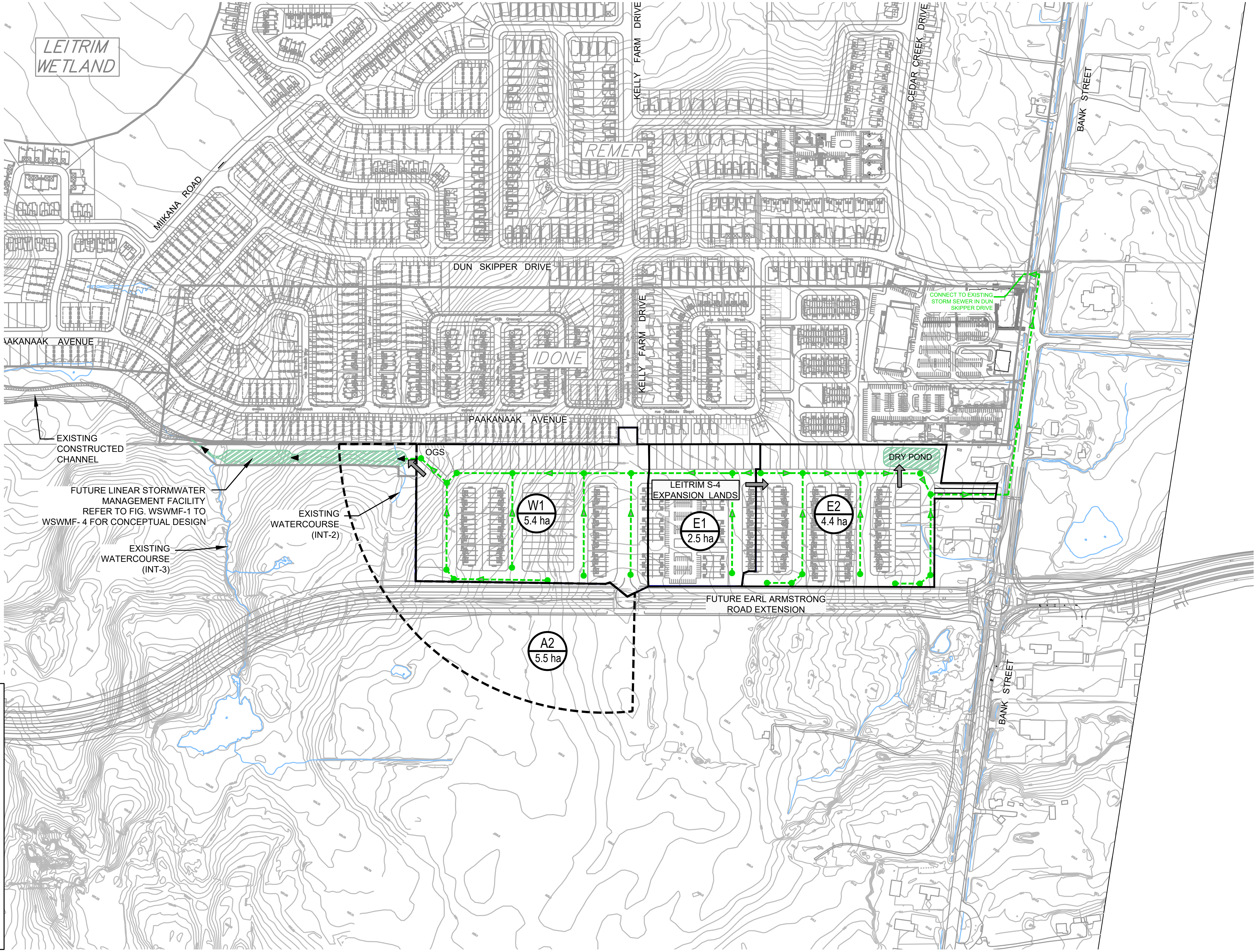
PREFERRED STORM DRAINAGE AREA PLAN

Sheet No.

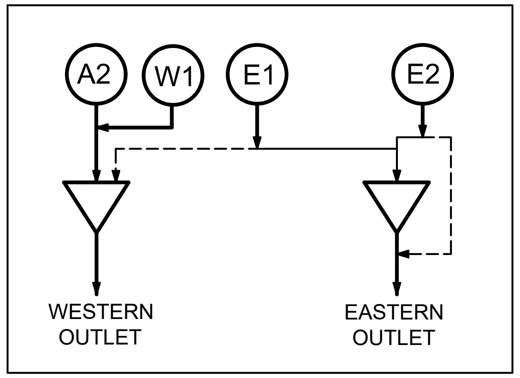
FIGURE 7-5

ARCADIS

J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\20_Drainage\Sheets\Figures\Figure 7-6 Preferred Stormwater Servicing Concept Plan.dwg Last Saved By: vukics5258 Last Saved At: Oct. 17, 25



STORMWATER SERVICING CONCEPT SCHEMATIC



LEGEND:

- ──→ TOTAL FLOW
- - - → MINOR FLOW
- ─→ MAJOR FLOW
- E1 DRAINAGE AREA ID
- ▽ STORMWATER MANAGEMENT FACILITY

LEGEND:

- EXISTING DRAINAGE AREA
- PROPOSED DRAINAGE AREA
- ▨ FUTURE LINEAR STORMWATER MANAGEMENT FACILITY
- PROPOSED STORM SEWER
- W1 5.4 ha DRAINAGE AREA ID AREA (ha)
- ⇨ MAJOR FLOW
- WATERCOURSE

ARCADIS

Project Title

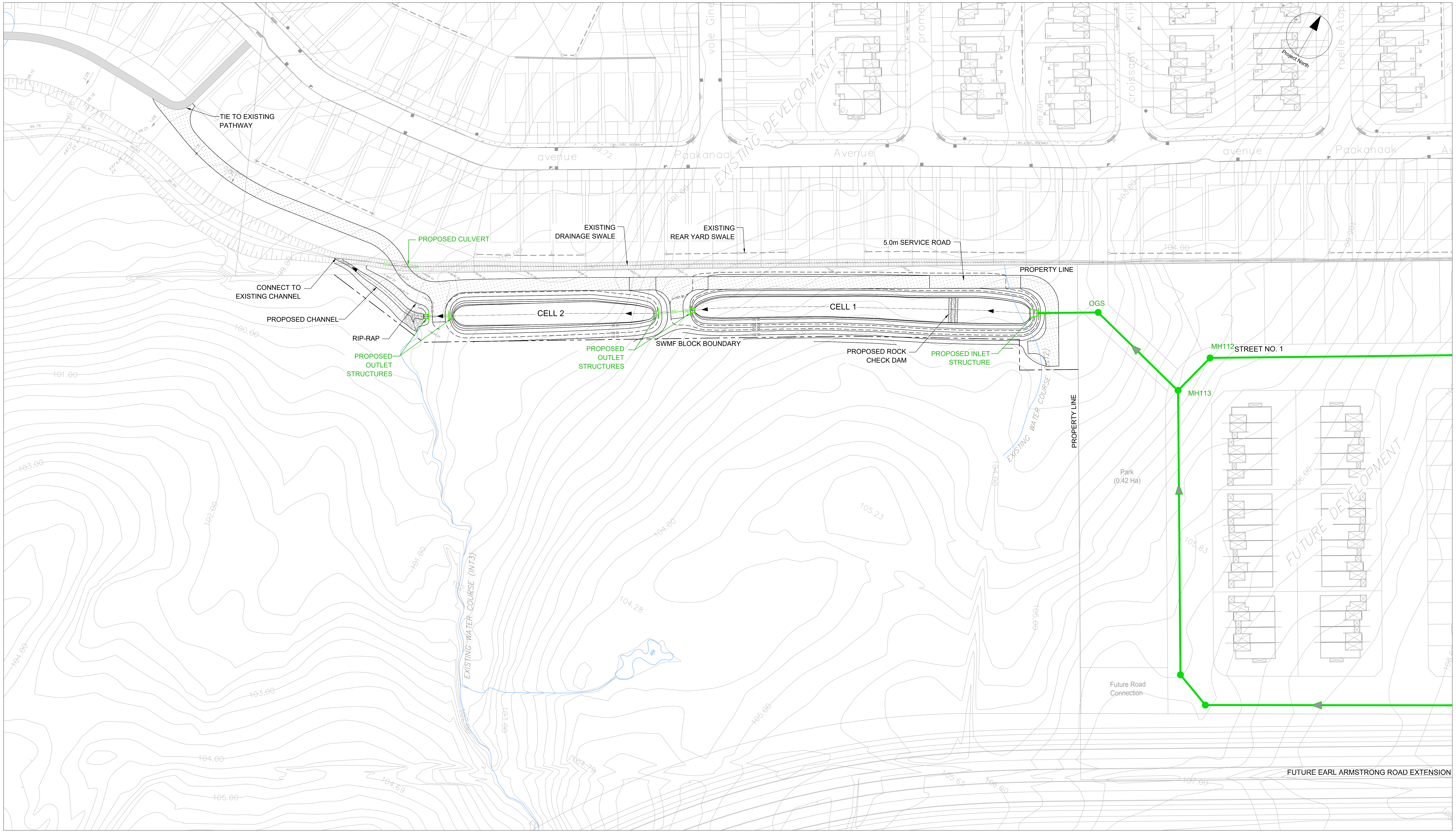
SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

Drawing Title

PREFERRED STORMWATER
SERVICING CONCEPT PLAN

Sheet No.

FIGURE 7-6



PLAN VIEW

SCALE 1:750

COPYRIGHT

This drawing has been prepared solely for the intended use, thus any reproduction or distribution for any purpose other than authorized by Arcadis is forbidden. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job, and Arcadis shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to Arcadis for general conformance before proceeding with fabrication.

ISSUES

No.	DESCRIPTION	DATE
1	S-4 LEITRIM UEA SERVICEABILITY REPORT SUBMISSION 2	2025-10-17
2	S-4 LEITRIM UEA SERVICEABILITY REPORT SUBMISSION 3	2026-04-15

NOT FOR CONSTRUCTION

SEAL

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT

SERVICEABILITY STUDY
LEITRIM S-4
EXPANSION LANDS

PROJECT NO:
145172

DRAWN BY: S.V.	CHECKED BY: R.M.
PROJECT MGR: R.M.	APPROVED BY: P.S.

SHEET TITLE

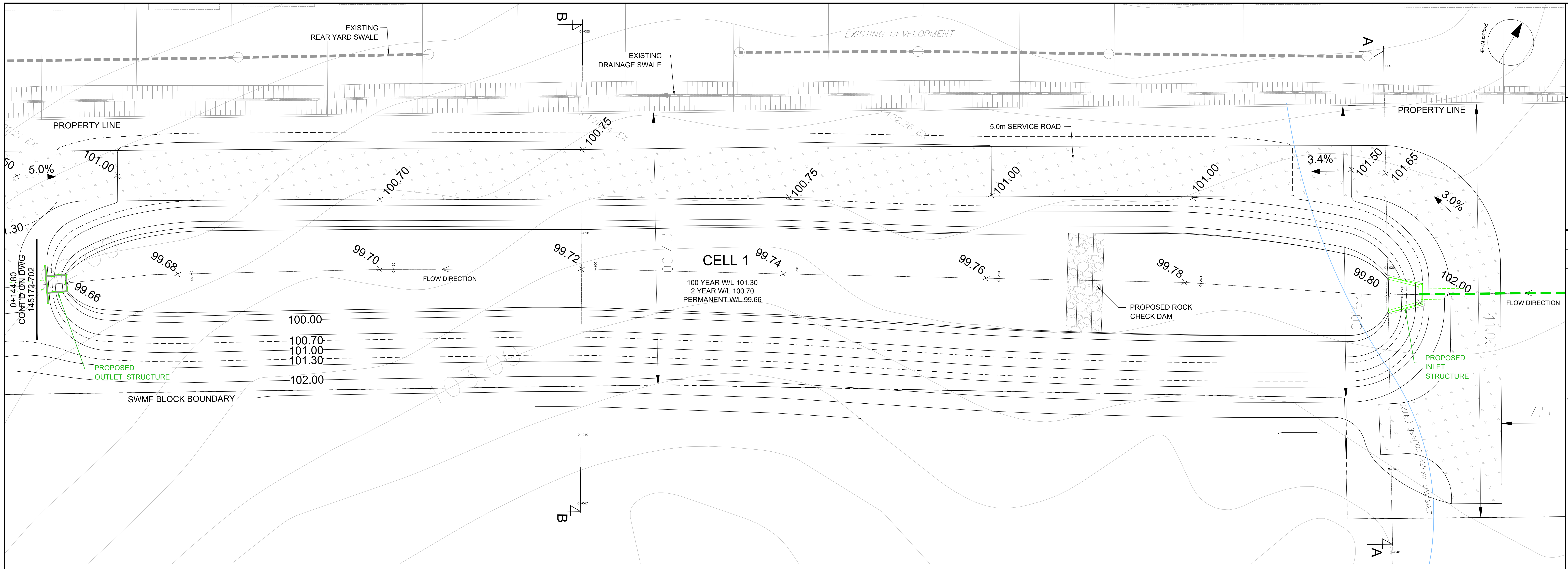
CONCEPTUAL WESTERN
SWM FACILITY
DESIGN

SHEET NUMBER
WSWMF-1

ISSUE
2

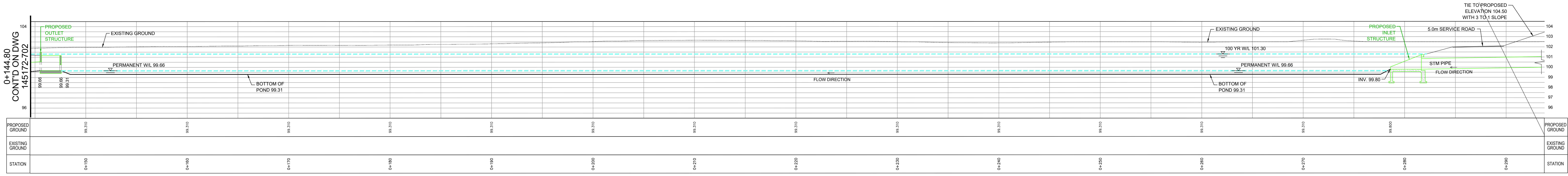
File Location: J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\20_Drainage\Sheets\145172-WSWMF-1.dwg Last Saved: October 17, 2025, by vukics5258 Plotted: April 15, 2026 4:47:18 PM by Vukic, Slavica

SCALE CHECK 1 in 10mm



PLAN VIEW

SCALE 1:200



CELL 1- PROFILE

SCALE 1:200

NOT FOR CONSTRUCTION

COPYRIGHT
This drawing has been prepared solely for the intended use, thus any reproduction or distribution for any purpose other than authorized by Arcadis is forbidden. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job, and Arcadis shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to Arcadis for general conformance before proceeding with fabrication.

ISSUES

No.	DESCRIPTION	DATE
1	S-4 LEITRIM UEA SERVICEABILITY REPORT SUBMISSION 2	2025-10-17
2	S-4 LEITRIM UEA SERVICEABILITY REPORT SUBMISSION 3	2026-04-15

SEAL

PRIME CONSULTANT

ARCADIS
333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT
SERVICEABILITY STUDY
LEITRIM S-4
EXPANSION LANDS

PROJECT NO:
145172

DRAWN BY: S.V.	CHECKED BY: R.M.
PROJECT MGR: R.M.	APPROVED BY: P.S.

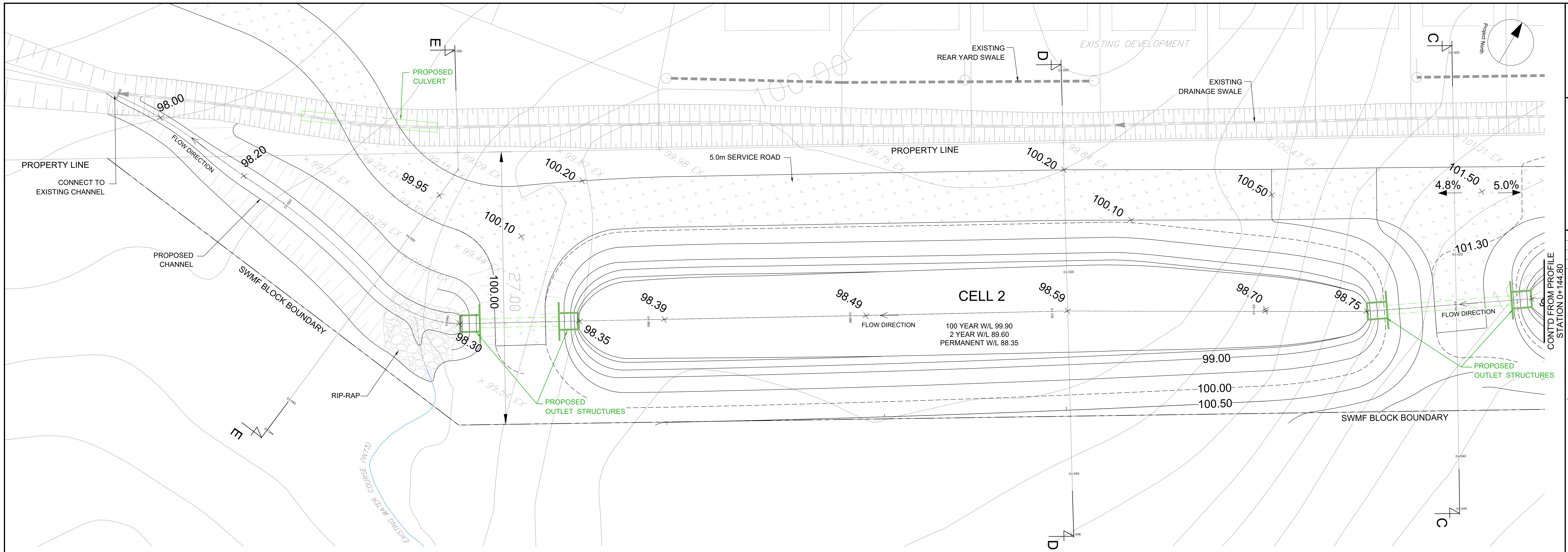
SHEET TITLE
CONCEPTUAL WESTERN
SWMF - CELL 1
PLAN VIEW AND PROFILE

SHEET NUMBER
WSWMF-2

ISSUE
2

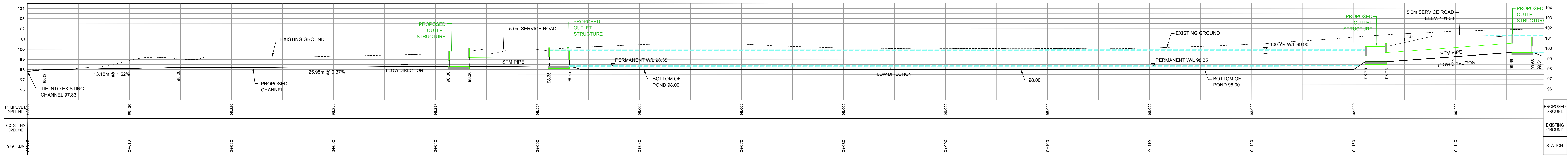
SCALE CHECK 1 in 10mm

File Location: J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\20_Drainage\Sheets\145172-WSWMF-2.dwg Last Saved: October 17, 2025, by vukics5258 Plotted: April 15, 2026 5:09:34 PM by Vukic, Slavica



PLAN VIEW

SCALE 1:200



CELL 2 AND CHANNEL - PROFILE

SCALE 1:200

NOT FOR CONSTRUCTION

COPYRIGHT

This drawing has been prepared solely for the intended use, thus any reproduction or distribution for any purpose other than authorized by Arcadis is forbidden. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job, and Arcadis shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to Arcadis for general conformance before proceeding with fabrication.

ISSUES

No.	DESCRIPTION	DATE
1	S-4 LEITRIM UEA SERVICEABILITY REPORT SUBMISSION 2	2025-10-17
2	S-4 LEITRIM UEA SERVICEABILITY REPORT SUBMISSION 3	2026-04-15

SEAL

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT

SERVICEABILITY STUDY
LEITRIM S-4
EXPANSION LANDS

PROJECT NO:
145172

DRAWN BY: S.V.	CHECKED BY: R.M.
PROJECT MGR: R.M.	APPROVED BY: P.S.

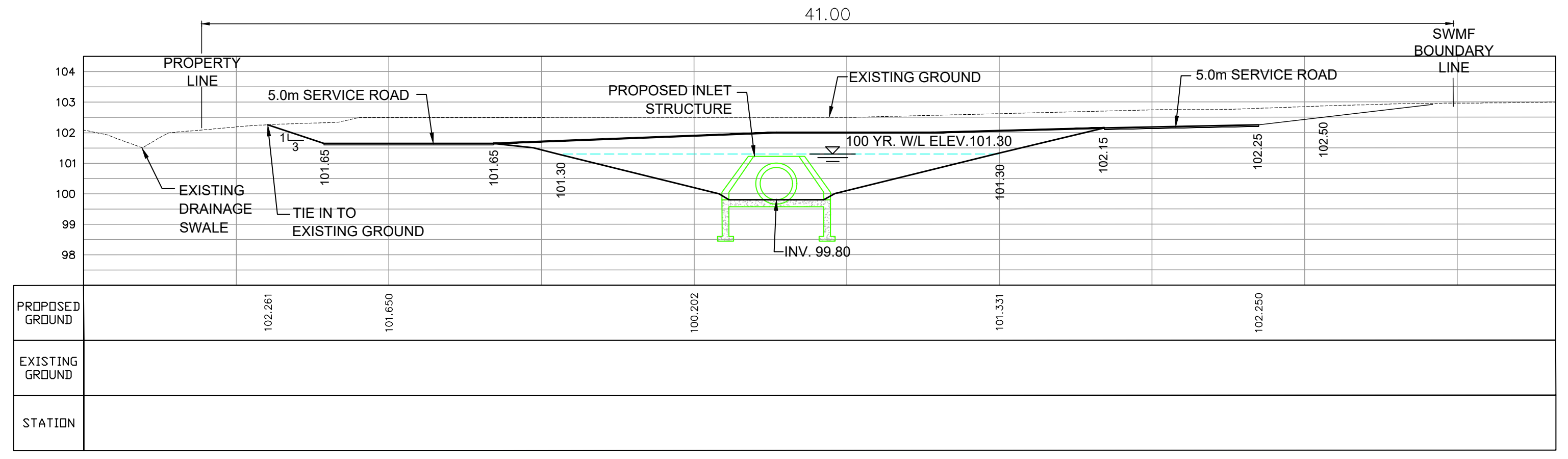
SHEET TITLE

CONCEPTUAL WESTERN
SWMF - CELL 2
PLAN VIEW AND PROFILE

SHEET NUMBER: WSWMF-3
ISSUE: 2

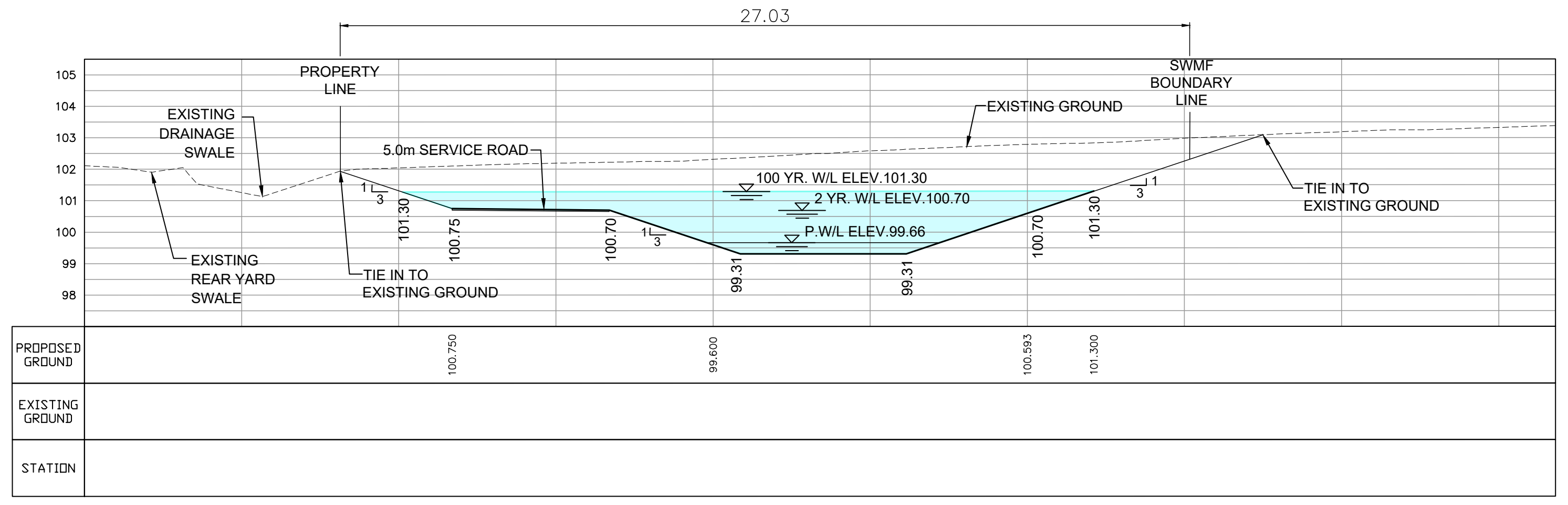
File Location: J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\20_Drainage\Sheets\145172-WSWMF-3.dwg Last Saved: October 17, 2025, by vukics5258 Plotted: April 15, 2026 5:07:12 PM by Vukic, Slavica

SCALE CHECK
1 in
10mm



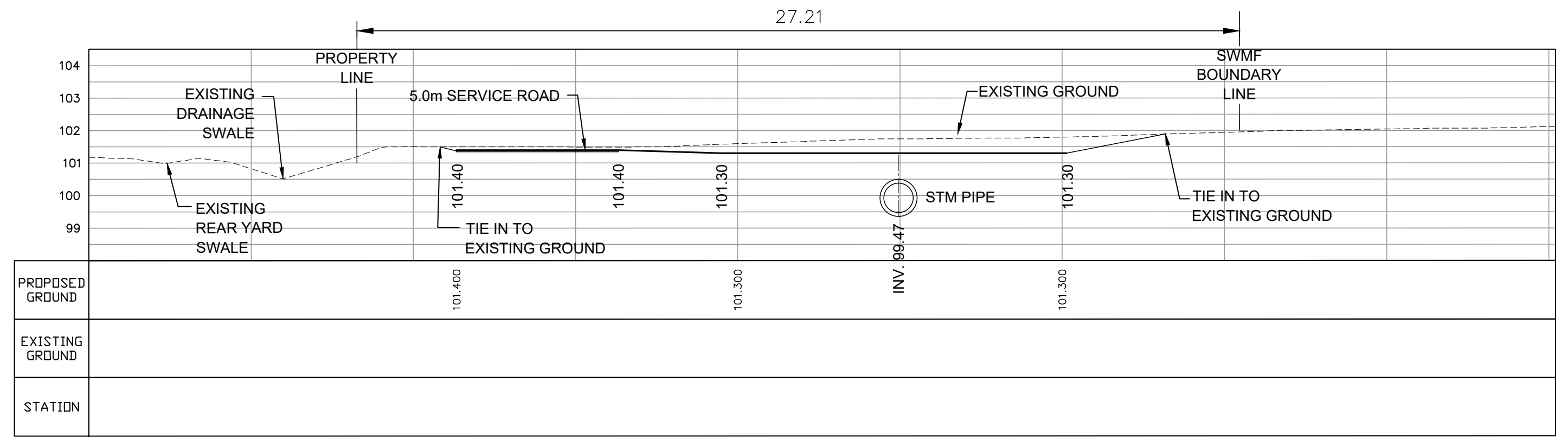
CROSS SECTION A-A

SCALE 1:200



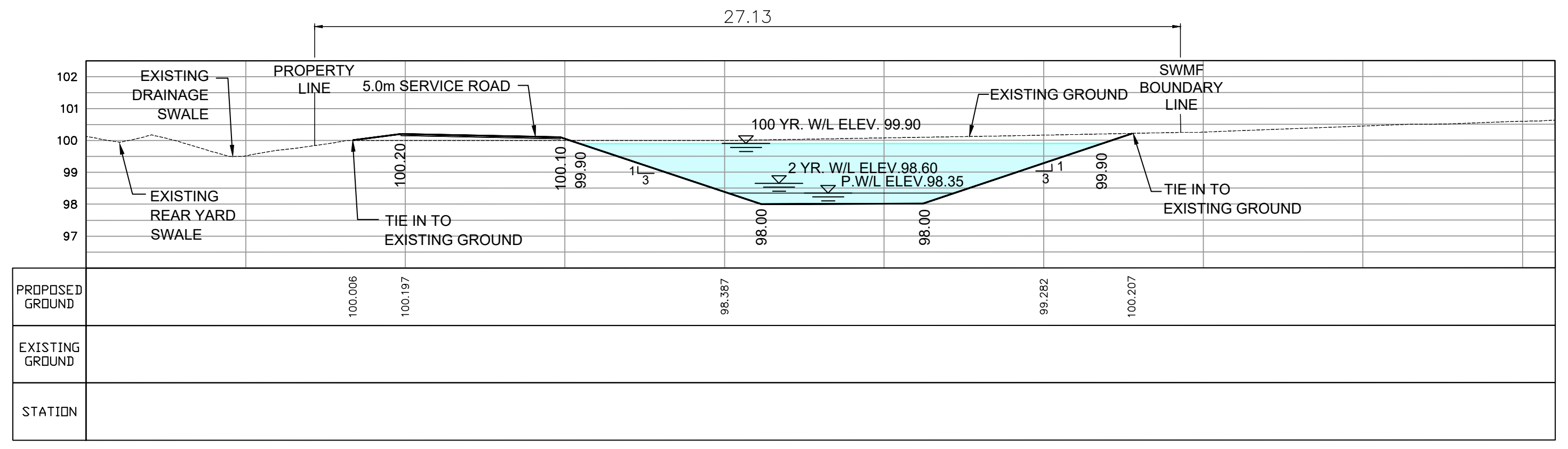
CROSS SECTION B-B

SCALE 1:200



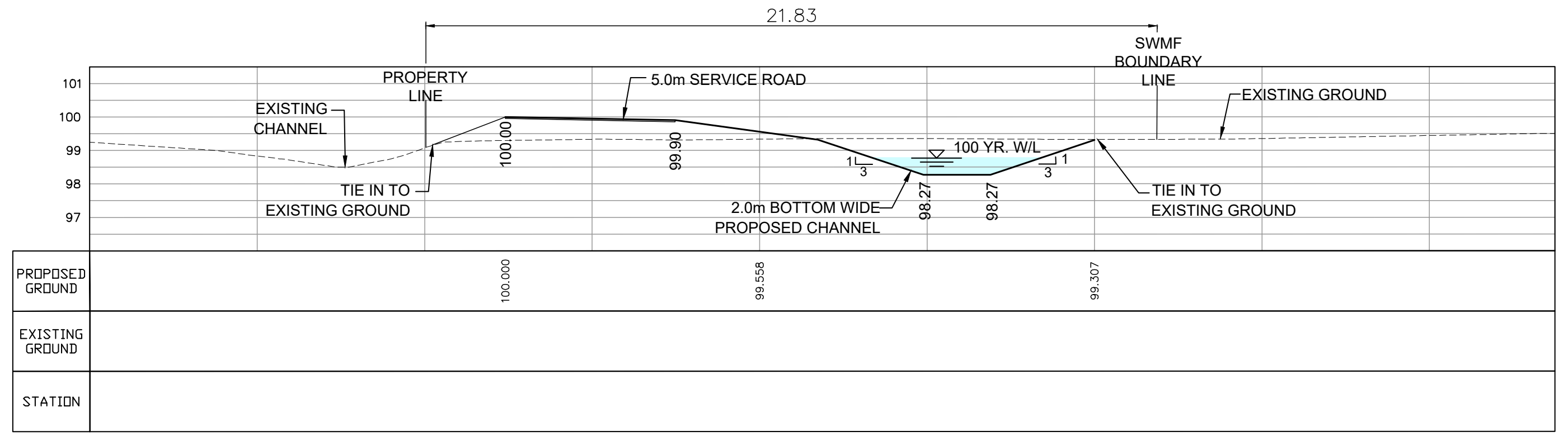
CROSS SECTION C-C

SCALE 1:200



CROSS SECTION D-D

SCALE 1:200



CROSS SECTION E-E

SCALE 1:200

COPYRIGHT

This drawing has been prepared solely for the intended use, thus any reproduction or distribution for any purpose other than authorized by Arcadis is forbidden. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job, and Arcadis shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to Arcadis for general conformance before proceeding with fabrication.

ISSUES

No.	DESCRIPTION	DATE
1	S-4 LEITRIM UEA SERVICEABILITY REPORT SUBMISSION 2	2025-10-17
2	S-4 LEITRIM UEA SERVICEABILITY REPORT SUBMISSION 3	2026-04-15

NOT FOR CONSTRUCTION

SEAL

PRIME CONSULTANT

ARCADIS
333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT

SERVICEABILITY STUDY
LEITRIM S-4
EXPANSION LANDS

PROJECT NO:
145172

DRAWN BY: **S.V.**	CHECKED BY: **R.M.**
PROJECT MGR: **R.M.**	APPROVED BY: **P.S.**

SHEET TITLE

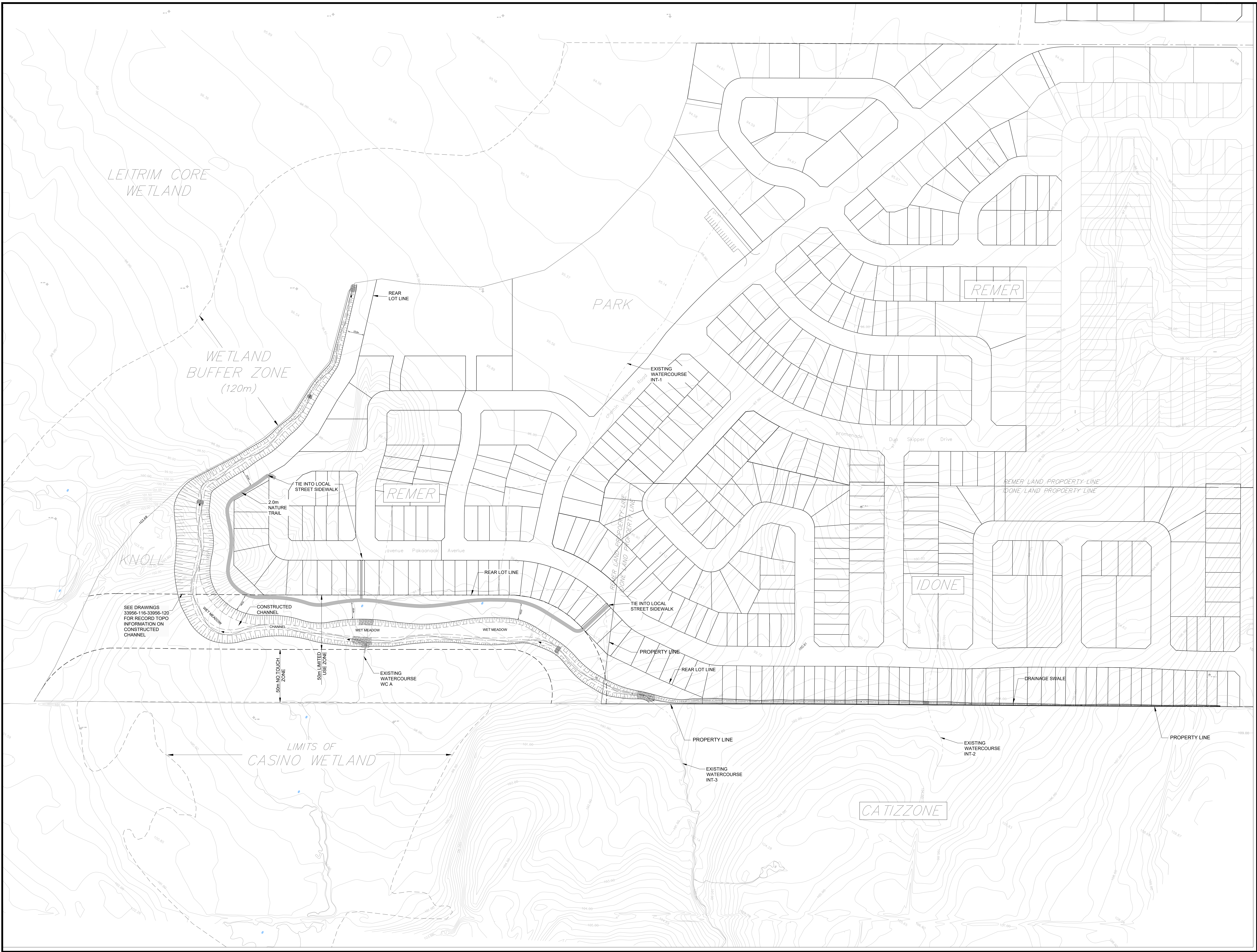
CONCEPTUAL WESTERN
SWMF - CROSS SECTIONS

SHEET NUMBER
WSWMF-4

ISSUE
2

File Location: J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\20_Drainage\Sheets\145172-WSWMF-4.dwg Last Saved: October 17, 2025, by vukics5258 Plotted: April 15, 2026 5:04:25 PM by Vukic, Slavica

SCALE CHECK
1 in
10mm



J:\33956–RemerLands\5.9 Drawings\59civil\swm\LAYOUT\33956–116.dwg Layout Name: 116 Plot Style: AIA STANDARD COLOR–HALF.CTB Plot Scale: 1:25.4 Plotted At: 11/4/2020 3:10 PM Last Saved By: mmilne Last Saved At: Nov. 4, 20

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed ____________________

Date ____________________ 2019

Plan Number ____________________

NOTE:

1. ALL MATERIALS AND CONSTRUCTION IS TO BE IN ACCORDANCE WITH THE CURRENT CITY OF OTTAWA STANDARD DRAWINGS & SPECIFICATIONS OR OPSD/OPSS IF CITY DRAWINGS AND SPECIFICATIONS DO NOT APPLY.
2. THE CONTRACTOR IS RESPONCIBLE FOR DETERMINING THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING SERVICES AND UTILITIES PRIOR TO CONSTRUCTION AND SHALL PROTECT AND ASSUME RESPONSIBILITY FOR ALL UTILITIES WHETHER OR NOT SHOW ON THESE DRAWINGS.
3. FOR GEOTECHNICAL INFORMATION REFER TO GEOTECHNICAL INVESTIGATION PROPOSED RESIDENTAL DEVELOPMENT REMER AND IDONE LANDS OTTAWA, ONTARIO REPORT # 13-1121-0083 (1042/2042) PREPARED BY GOLDER ASSOCIATES.
4. FOR GEODETIC BENCHMARK AND GEOMETRIC LAYOUT OF STREET AND LOTS, REFER TO TOPOGRAPHICAL SURVEY AND PLAN OF SUBDIVISION PREPARED BY ANNIS O'SULLIVAN VOLLEBEKK LTD BENCHMARK BASED ON CAN-NET VIRTUAL REFERENCE SYSTEM NETWORK.
5. SILT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
6. STRAW BALE SEDIMENT TRAPS TO BE PLACED AND MAINTAINED IN EXISTING AND CONSTRUCTED ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED (IF APPLICABLE).
7. THESE DRAWINGS ARE NOT TO BE SCALED OR USED FOR LAYOUT PURPOSES.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10	RECORD TOPO INFORMATION NOTE ADDED	J.I.M.	2020:10:20
9	UPDATED LOTTING AND LOT NUMBERS	J.I.M.	2019:05:24
8	GENERAL DITCH REVISIONS	J.I.M.	2019:02:08
7	ISSUED FOR CONSTRUCTION	J.I.M.	2019:01:25
6	ISSUED FOR TENDER	J.I.M.	2018:09:24
5	ISSUED FOR MOECP APPROVAL	J.I.M.	2018:08:17
4	SUBMISSION No.4 FOR CITY AND SNC REVIEW	J.I.M.	2018:05:07
3	SUBMISSION No.3 FOR CITY AND SNC REVIEW	J.I.M.	2017:11:17
2	SUBMISSION No.2 FOR CITY AND SNC REVIEW	J.I.M.	2017:03.01
1	SUBMISSION No.1 FOR CITY DISCUSSION	J.I.M.	2016:12.02

LEITRIM SOUTH
HOLDINGS INC.

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title
PATHWAYS AT FINDLAY CREEK
(REMER LANDS)
CONSTRUCTED CHANNEL

Jd Moffatt
J. I. MOFFATT
2020/10/20

Drawing Title
GENERAL PLAN

Scale
1:1500

Design	Date
R.B.	NOV. 2016
Drawn	Checked
S.V.	J.I.M.
Project No.	Drawing No.
33956	116

D07-16-11-007

#XXXXX

3 CONSTRUCTED CHANNEL

3.1 Hydrology

The development of the Remer and the Idone lands will impact the existing runoff patterns from the external lands located south of the site. External drainage presently flows northward through the site and eventually outlets to the Leitrim Core Wetland Buffer.

The external rural drainage areas are identified as A1, A2, A, RCR and B (see **Figure 1.1**). The peak flow evaluation was conducted using SWMHYMO, which provides single storm event flow generation and routing. Parameters of the rural drainage areas are summarized in the following **Table 3.1**. Further information on parameter determination and a model schematic are presented in **Appendix A**.

Table 3.1 Hydrological Parameters for Rural Areas South of Remer and Idone Lands

DRAINAGE AREA		TIME TO PEAK (HR)	CN VALUE	HORTONS*
ID	AREA (HA)			
A1	1.08	0.15	66	n/a
A2	9.36	0.42	66	n/a
A	88.22	0.95	66	n/a
RCR (Rideau Carleton Raceway)	11.00	85% TIMP	70	Fo=76.2 mm/hr Fc=13.2 mm/hr DCAY=4.14 /hr
B	108.30	1.14	66	n/a
Total Area	217.96			

** Horton's parameters are used for the RCR area only during the 100 year 3 hour Chicago + 20% storm event.*

The following storm events were used to evaluate the runoff from the rural lands:

- 25 mm 4 hour Chicago;
- 2 year 24 hour SCS Type II (48 mm);
- 5 year 24 hour SCS Type II (62.4 mm);
- 100 year 24 hour SCS Type II (103.2 mm);
- July 1, 1979 historical storm;
- 100 year 3 hour Chicago (71.7 mm) + 20%, and;
- 100 year 24 hour SCS Type II (103.2 mm) + 20%

The following **Table 3.2** presents the resulting peak flows for each drainage area for the above noted storm events.

Table 3.2 Resulting Peak Flows from the Rural Areas South of the Remer and Idone Lands

DRAINAGE AREA		PEAK FLOW (CMS)						
ID	AREA (HA)	25 MM 4 HOUR CHICAGO	2 YEAR SCS	5 YEAR SCS	100 YEAR SCS	JULY 1, 1979 HISTORICAL	100 YEAR CHICAGO + 20%	100 YEAR SCS + 20%
A1	1.08	0.01	0.03	0.05	0.13	0.12	0.14	0.17
A2	9.36	0.05	0.15	0.24	0.60	0.72	0.64	0.81
A1 + A2*	10.44	0.06	0.16	0.27	0.66	0.79	0.70	0.89
A	88.22	0.27	0.76	1.27	3.11	3.97	3.36	4.21
A1 +A2 + A*	98.66	0.30	0.85	1.41	3.46	4.43	3.73	4.68
RCR	11.00	0.17	0.17	0.17	0.17	2.36	2.71	1.47
B	108.30	0.30	0.81	1.35	3.32	4.19	3.59	4.49
RCR + B	119.30	0.47	0.98	1.52	3.49	4.36	3.82	4.72
A1 +A2 + A + RCR + B*	217.96	0.76	1.80	2.89	6.84	8.63	7.46	9.31

** The total peak flow for those areas added (A1+A2, A1+A2+A, RCR+B, A1+A2+A+RCR+B) are added in SWMHYMO (output files RCHN-CN or RCHN-H.out) and not necessarily additive.*

The SWMHYMO output file, background information regarding parameter determination for Areas A1, A2, A, RCR and B and model schematic presented in **Appendix A**.

3.2 Flow Associated with Drainage Swale

Areas A1 and A1+A2 convey runoff toward the drainage swale (see **Figure 1.1**). The flow associated with these areas is presented in the above **Table 3.2**. Further discussion regarding depth of water within the drainage swale is presented in **Section 3.4**.

3.3 Channel Hydraulics

As noted in **Section 3.1**, the constructed channel has been designed to capture and convey external runoff from south of the Remer property and convey that surface water towards the Leitrim Core Wetland Buffer located west and north of the subject lands. As discussed in the EMP document, the Remer subdivision is to include a 50 m wide “No Touch” zone along its southwest boundary respecting the presence of the Casino Wetland. The constructed channel is proposed to be located wholly within the 50 m “Limited Use” zone, which is located between the “No Touch” zone and the future rear yard property line. The channel will also be located to provide a minimum 15 m setback from the limit of development or the proposed nature trail, whichever governs.

The channel has been sized to convey the estimated 100 year storm event. **Section 3.1** identified external sub-drainage areas from which runoff is directed to the subject site via three watercourses, INT-2, INT-3 and WC A. The corresponding predicted 100 year peak flows from these watercourses are 0.66 cms, 3.11 cms and 3.49 cms, respectively (see **Table 3.2**). The constructed channel is proposed to start at the INT-3 ditch as shown on the design drawings. Between Stations 1+180 and 1+497, the channel has been designed to carry and convey 3.46 cms of flow (see flow from A1+A2+A in **Table 3.2**). At Station 1+497 the channel will intercept the WC A watercourse and from that point onward the channel is sized to convey 6.84 cms, which is the total flow from both INT-3 and WC A (see flow from A1+A2+A+RCR+B in **Table 3.2**).

It is expected that most of the time there will be limited flow in the new channel. This situation would eventually create a natural low flow channel. It is therefore proposed to construct a narrow low flow channel in a meandering pattern in the channel bottom to initiate and guide the subsequent natural development of the low flow channel. Besides assisting in establishing aquatic habitat in the “wettest” location, the low flow channel will also help dewater the channel during construction.

The constructed channel design was evaluated using SWMHYMO (Route Channel routine) and verified with Manning’s calculations. The cross sections used and rating curves generated for the channel evaluation are presented in **Appendix A**. It should be noted that the channel evaluation does not account for or in any way rely upon the low flow channel or any wet meadow areas.

In accordance with the geotechnical recommendations, the channel has been designed and will be constructed with 3H:1V side slopes to maintain slope stability. Most of the channel will be trapezoidal in shape with a five (5) m wide bottom. Upstream of the confluence with WC A, the expected 100 year water depth is 1.1 m (excluding backwater effect) and downstream of WC A the water depth is expected to increase to 1.5 m. Because of the backwater effect from the WC A flow, the channel upstream of WC A is proposed to be designed at a minimum depth of 1.5 m. It should be noted that during the stress test storm events, the water level upstream of the confluence with WC-A is 1.5 m (excluding backwater effect) and downstream of WC-A the water depth is 1.7 m (see **Appendix A** for corresponding calculations).

Based on site surveys, the channel bottom will be constructed at a slope of 0.13% from Station 1+180 to Station 1+497 and 0.135% from the confluence of WC A to the channel outlet. Because of relatively flat and low lying topography upstream of the WC A location, the channel’s southern slope will be less than the predicted flow depth of 1 m. In these areas during flood conditions, the upstream lands will overflow and flood, thus replicating similar existing situations.

Along the entire length of the new channel, the slope along the subdivision side has been designed to include at least a 0.3 m freeboard within the channel. The design drawings include the proposed grading between the top of embankment and the future rear yards. From the top of embankment, the “set back” limit is proposed to be graded with fairly flat slopes, between 2% and 5%, up to the proposed rear yard property limits. On the “non-subdivision” side, the slopes are designed to match existing ground.

Four cross sections of the proposed channel are included on the design drawings. Section A-A’, near Station 1+440, shows a channel section near its upper end. This section demonstrates the flooded situation over the south embankment. In this location, existing ground is only about 0.8 m above the proposed channel bottom. Section B-B’, near Station 1+650, shows a portion of the channel at a wet meadow location. Section C-C’, near Station 1+750, shows the proposed channel in the deepest cut at the natural topographic “knoll”. Section D-D’, near Station 1+933 at the downstream portion of the channel, indicates the location where the predicted 100 year water levels start to overtop the western slope and spill into the Leitrim Core Wetland Buffer. This channel feature will help disperse the flow into the Wetland Buffer for larger rain events. Downstream of this point, the channel bottom can gradually decrease in width to less than 5 m. The constructed channel will eventually transition into the existing Buffer grade at approximately elevation 95.90 m.

3.4 Drainage Swale

As stated earlier, the development of the adjacent Idone Lands will impede existing surface flow patterns. Surface drainage from south of that property will be interrupted and prevented from reaching the Leitrim Core Wetland Buffer, where it currently discharges.

As noted in **Section 1.1**, rural areas A1 and A2 contribute rural runoff which is conveyed toward the Idone property where the drainage swale is proposed to be constructed. Area A1 is located east of INT-2 whereas Area A2 includes the drainage area contributing to INT-2 (see **Figure 1.1**). As noted previously, INT-2 conveys flows intermittently, either during spring freshet or during a storm event. By generating cross section rating curves using SWMHYMO (Route Channel routine), the runoff conveyed along the drainage swale was evaluated during various storm events to assess the approximate resulting water depth in the drainage swale. **Drawings 33956-117 and 33956-118** include cross sections complete with estimated water depths during the 100 year storm event. The following **Table 3.3** summarizes the cross section information and resultant water level.

Table 3.3 Approximate Depth of Water within Drainage Swale during Various Storm Events

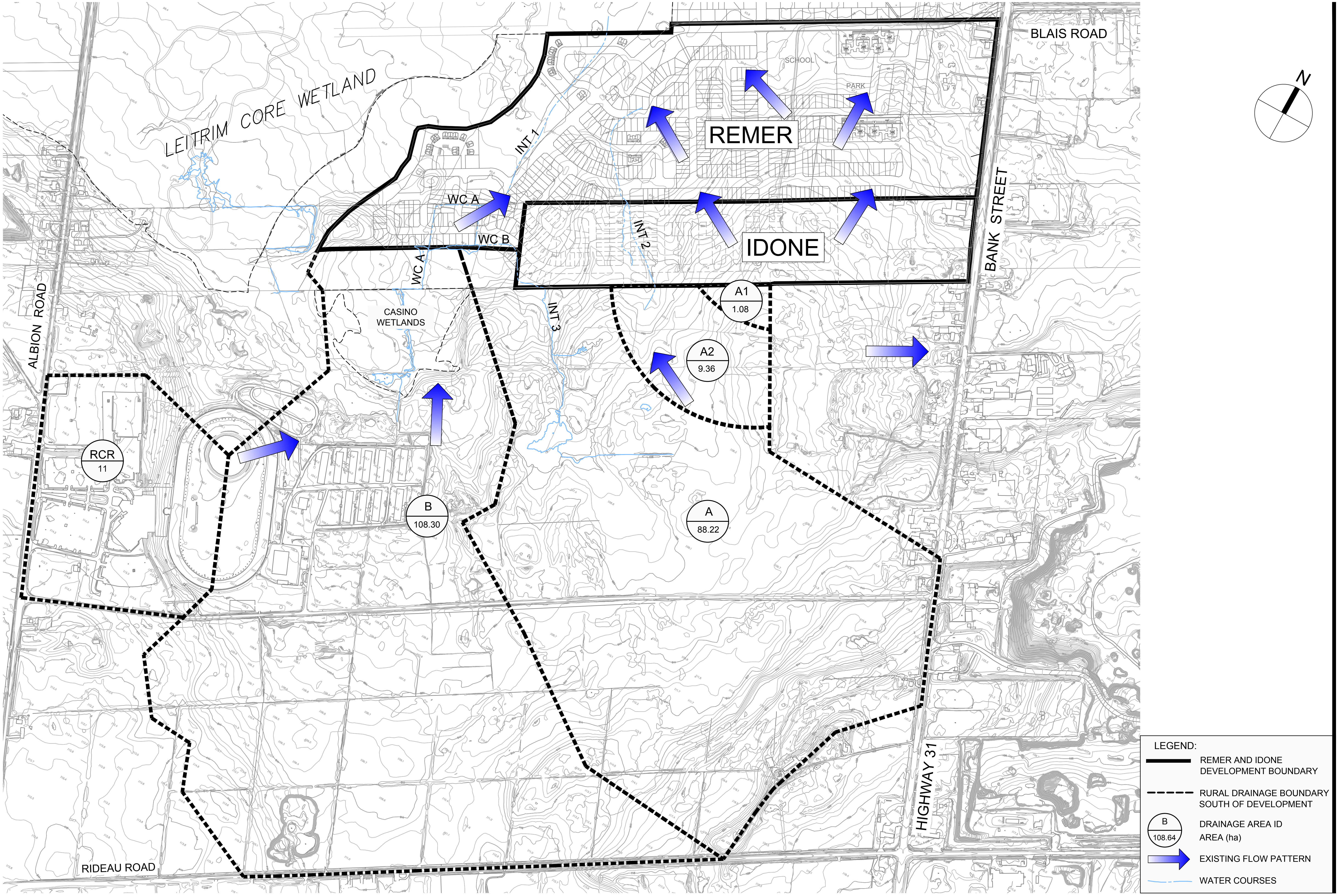
AREA ID	CROSS SECTION STA	STORM EVENT	PEAK FLOW (CMS)	WATER DEPTH (M)	FREEBOARD (M)†
A1	0+826	25 mm 4 hour Chicago	0.01	0.10	0.24
		2 Year SCS	0.03	0.16	0.18
		5 Year SCS	0.05	0.19	0.15
		100 Year SCS	0.13	0.27	0.07
		July 1, 1979 Historical	0.12	0.26	0.08
		100 Year Chicago + 20%	0.14	0.27	0.07
		100 Year SCS + 20%	0.17	0.30	0.04
A1 + A2*	1+030	25 mm 4 hour Chicago	0.06	0.31	0.65
		2 Year SCS	0.16	0.46	0.50
		5 Year SCS	0.27	0.56	0.40
		100 Year SCS	0.66	0.78	0.18
		July 1, 1979 Historical	0.79	0.84	0.12
		100 Year Chicago + 20%	0.70	0.80	0.16
		100 Year SCS + 20%	0.89	0.88	0.08

** The total peak flow for those areas added (A1+A2) are added in SWMHYMO (output files RCHN-CN.out and RCHN-H.out) and not necessarily additive.*

† Freeboard is the difference between the depth of the drainage swale and the resulting water depth in the swale.

The cross sections used and rating curves generated to obtain the depths presented in the above table are presented in **Appendix A**. A static design of the complete swale is also included in **Appendix A**.

The drainage swale is proposed to be located within a series of blocks wholly within the Idone property along its southern edge. With the development of the site, the drainage swale will be tied into the final grading of the residential units. The series of blocks which will contain the swale will be sold as part of the adjacent lots and the purchase will cover the swale since it effectively becomes part of a lot. With the purchase of the property, the homeowner agreement will include a clause requiring the owner to maintain the swale. This is similar in principle to other urban residences that have open storm ditches on their property. The City of Ottawa has also agreed to maintain the deeper western portion of the drainage swale.



Scale
N.T.S.

Project Title
PATHWAYS AT FINDLAY CREEK
(REMER LANDS)
CONSTRUCTED CHANNEL

Drawing Title
EXISTING SURFACE
WATER PATTERNS

Sheet No.
FIGURE 1.1

J:\33956-RemerLands\5.9 Drawings\59civil\current\Figures\Constructed Channel figure\33956 Figure 1.1.dwg Layout Name: 1.1 Plot Style: ---- Plot Scale: 1:2.5849 Plotted At: 11/14/2017 12:46 PM Last Saved By: Josee.Forget Last Saved At: Nov. 14, 17

Pathways at Findlay Creek – Constructed Channel Monitoring (Year 5)

October 30, 2024

Prepared for:
Leitrim South Holdings Inc.
c/o The Regional Group
1737 Woodward Dr. 2nd Floor
Ottawa, ON K2C 0P9

Cambium Reference: 20031-001

CAMBIUM INC.

866.217.7900

cambium-inc.com

Table of Contents

1.0 Introduction ... 1
1.1 Channel Design ... 1
2.0 Methods ... 3
2.1 Landscape Plan Monitoring ... 3
2.2 In-Stream Monitoring and Photo-Points ... 4
2.3 Plant Community Photo-Monitoring ... 4
2.4 Plant Community Plots ... 4
2.5 Amphibian Breeding Monitoring ... 5
3.0 Results ... 6
3.1 Landscape Plan Monitoring ... 6
3.2 In-Stream Monitoring and in-Stream Photo-Points ... 6
3.3 Plant Community Monitoring ... 13
3.3.1 Plant Community Photo-Monitoring ... 13
3.3.2 Plant Community Plots ... 13
3.4 Amphibian Breeding Monitoring ... 14
3.4.1 April Visit ... 14
3.4.2 May Visit ... 14
3.4.3 June Visit ... 15
3.4.4 Comparison of Results from All Years ... 15
4.0 Discussion ... 17
4.1 In-Stream Monitoring ... 17
4.2 Plant Community Monitoring ... 17
4.3 Amphibian Breeding Monitoring ... 18
5.0 Review of Remedial Actions Taken ... 19
6.0 Summary and Recommendations ... 20

7.0 Closing 22

8.0 References 23

List of Embedded Tables

Table 1 Year 5 (2024) Monitoring Events 6
Table 2 Reaches of the Constructed Channel 7
Table 3 In-Stream Monitoring Photo-Point Habitat Parameters 2024 9
Table 4 Summary of Amphibian Breeding Results (All Years) 16

List of Appended Figures

Figure 1 Constructed Channel Features and Monitoring Stations

List of Appendices

Appendix A Landscape Plan Monitoring and Recommendations (Novatech, 2024)
Appendix B In-Stream Photographic Monitoring
Appendix C Plant Community Monitoring

1.0 Introduction

Cambium Inc. (Cambium) was retained by Leitrim South Holdings Inc. to undertake the final year of annual natural environment monitoring of the constructed channel at the Pathways at Findlay Creek development (the Site; Figure 1), as outlined in the Design Brief prepared for the constructed channel (IBI Group et al., 2018).

The annual monitoring of the constructed channel was conducted from 2020 through 2022 [Years 1, 2 and 3 of the five-year program; (Golder, 2021) (Golder, 2022) (WSP Canada Inc., 2023a)] and results from 2022 indicated that the channel was functioning as intended and showed excellent establishment of vegetation and wildlife habitats. Based on these observations, and through discussions with the City of Ottawa in April 2023, it was agreed that it would be reasonable to skip Year 4 (2023) of the full monitoring program and complete only Year 5 (2024; the final year) of the monitoring program. Monitoring activities completed in Year 4 were limited to a one-day site visit to determine if there were any deficiencies in the channel (form or function) that required remedial actions. No remedial actions were deemed necessary (WSP Canada Inc., 2023b).

This report represents Year 5 of the five-year monitoring program. This annual report will describe noted deficiencies in the landscaping plan or channel form and function, if any, and document the establishment of the plant and amphibian community over time. This report will also identify remedial actions to be undertaken, if necessary. Where remedial actions have been undertaken, this report will assess their effectiveness.

1.1 Channel Design

The 2016 Environmental Management Plan (EMP; (Golder, 2016)) for the Site identified the need for a constructed channel, to be located in the southwest portion of the Site, to replace existing surface water features. Development of the Site involved the filling of the existing watercourses that previously conveyed external runoff from south of the Site, through the Site and emptied into the Leitrim Core Wetland buffer. Besides providing a conveyance function, these watercourses also supported fish and amphibian communities. Therefore, the new constructed channel was proposed to both maintain and improve the surface water conveyance function of surface drainage from southern off-site rural lands by providing more permanent flow, and also provide habitat features for wildlife, including fish and amphibians.

The detailed design of the constructed channel was presented in the Design Brief (IBI Group et al., 2018) and included the following natural environment elements:

- A landscaping plan for riparian areas adjacent to the constructed channel;
- Three seasonally wet meadows within the constructed channel; and,
- Aquatic habitat features (e.g., root wads and rock piles) within the constructed channel.

The constructed channel was built in accordance with the Design Brief (IBI Group et al., 2018) in 2019, and the above elements are the focus of this monitoring program (Figure 1).

2.0 Methods

In accordance with the Design Brief (IBI Group et al., 2018), natural environment monitoring of the constructed channel was to commence following its construction, after flow diversion had occurred and the channel was on-line and continue for a period of five years. The constructed channel was put on-line in July 2019, with the first year of natural environment monitoring occurring in 2020 (Year 1). The monitoring program is intended to observe the establishment of the plant community, as well as monitor the effectiveness of the design of the channel and associated habitat features. The program includes a fixed-point photo-monitoring program, plant community plots, in-stream monitoring and assessment, and amphibian monitoring. In addition, the structural and functional effectiveness of the channel as a whole will be assessed. Monitoring occurs twice annually: once during spring to assess flow conveyance in the channel and water retention in the wet meadows; and once during the peak growing season (July/August) to monitor all aspects. Additionally, three evening events (April, May and June) monitor for amphibian breeding.

2.1 Landscape Plan Monitoring

The as-constructed corridor was reviewed at the end of summer 2020 following completion of the constructed channel for conformance with the landscape design drawings, and to identify any major modifications to features or plantings. During this process, the success of the plantings was noted. If any of the caliper trees, 25% of the whips or 10% of the seeded areas were found to be in poor condition, remedial actions were to be identified. Determination of the exact nature of the actions depend on the specific problem identified, but may include replacement plantings, species substitution or overseeding localized areas. This as-constructed record provided the baseline for comparison during the post-construction monitoring program.

Over the course of the five-year monitoring program, remedial actions were to be considered if there was greater than 10% decline in the number of species or if any given species could no longer be observed. This was intended to confirm that sufficient diversity was establishing within the corridor.

2.2 In-Stream Monitoring and Photo-Points

Monitoring of the in-stream area occurred twice (spring and mid-summer). Representative reaches of the in-stream portion of the channel were visually assessed and photo-points were established (Figure 1) to ensure that photos are taken at the same locations and vantage points during each year of monitoring. Information on in-stream habitat features, in-stream vegetation, basic stream morphology and aquatic habitat (including fish habitat, if applicable) were collected. Recommendations for maintenance or repair, if required, were identified.

2.3 Plant Community Photo-Monitoring

Photo-monitoring of plant communities occurred once in mid-summer. The photo-monitoring program consisted of ten photo-point locations (plots) within representative portions of the riparian zone of the channel (including slope, tablelands, and the channel discharge area adjacent to the Leitrim Core Wetland buffer) and wet meadows (Figure 1). This number corresponds to approximately 1 plot per 100 m of riparian length, plus 2 additional plots targeting the wet meadows.

Plots were comprised of a reference post (T-bar) against which the density board (2.0 m vertical board with black and white bands to illustrate successive measurements) was placed, and a photo-point post (T-bar) on which the surveyor’s camera was placed so that photographs are taken from the same vantage point during each monitoring year. The posts at each plot are placed 10 m apart.

Estimates of vegetation height and percent cover were made by quantifying height and percent cover of plants within the photo relative to the density board using quantitative photo-monitoring techniques, as described by Van Horn & Van Horn (Van Horn & Van Horn, 1996). This data is presented in tabular and graph form to allow for comparison of data from year to year to identify any notable changes or the need for remedial actions.

2.4 Plant Community Plots

Plant community plot monitoring occurred once during mid-summer. Ten 5x5 m plant community plots were established (Figure 1) to monitor the growth, cover, and over-all health of the vegetation within each plot. The plant community plots were located at the same location as the reference posts in the photo-monitoring program. The permanent marker used for photo-monitoring was used to establish the corner of the 5x5 m plot. The remaining three corners were located and marked with permanent markers. All woody plants within the 5x5 m plot were identified to genus or species where possible. Additional data collected included: height of each stem or group of stems, number of stems, estimated absolute cover, and general notes on the health of the plants. For all non-woody vascular plants, a species list estimated absolute cover per species, genus, and/or plant form, as well as general notes on plant health and habitat features, were also collected. Other applicable habitat data, such as presence of standing water, woody debris, bryophytes and bare substrate were noted. This data is presented in tabular form, showing any changes that may occur from year to year.

Any notable changes (such as anthropogenic impacts including, but not limited to: trash, encroachment, off-trail use, ad-hoc trails, invasive species) were also noted, and recommendation for maintenance or repair were identified, if required.

2.5 Amphibian Breeding Monitoring

Monitoring of the success of amphibian breeding within the three wet meadows was undertaken according to standard methodologies (Bird Studies Canada, 2003), and consisted of three visits (April, May and June). Locations of the amphibian breeding monitoring stations are presented on Figure 1. In addition to the call-count data, information on water depth, temperature, and area of inundation was also recorded.

3.0 Results

The Year 5 monitoring program was undertaken in 2024 on the dates presented in Table 1.

Table 1 Year 5 (2024) Monitoring Events

Date	Purpose
April 20	Instream Monitoring, Amphibian Breeding Monitoring
May 23	Amphibian Breeding Monitoring
June 28	Amphibian Breeding Monitoring
August 15	Instream Monitoring, Plant Community Monitoring

3.1 Landscape Plan Monitoring

A review of the landscape plantings was performed by Novatech Engineering Consultants (Novatech) in summer 2024. The plantings were reviewed against the planting plan to identify any major modifications to the planned features or plantings. The success of the plantings was assessed, and the need for remedial actions was determined. The results of the review are provided in Appendix A (Novatech, 2024).

3.2 In-Stream Monitoring and in-Stream Photo-Points

The constructed channel essentially consists of three distinct reaches; for a general description of each reach, and the corresponding photo-point stations, refer to Table 2.

Table 2 Reaches of the Constructed Channel

Reach Name	Corresponding In-Stream Photo-Point Stations	General Description
Reach 1	Photo-point 1	• Upstream-most portion of the constructed channel that starts immediately downstream of the existing INT-2 watercourse and the drainage swale. • A short and narrow section of stream with substrate comprised of cobble and boulder rip-rap at the top of the reach, becoming silt and clay. • In-stream vegetation has remained well established in 2024.
Reach 2	Photo-points 2-5	• Starts at the end of Reach 1 and continues until the constructed channel turns ~90 degrees to the north. • The widest portion of the constructed channel, swale-like, and where the three wet meadows occur. • Receives input mid-reach from the small watercourse WC-3 to the south. • In-stream vegetation has remained well established in 2024.
Reach 3	Photo-points 6-7	• Starts at the end of Reach 2 at the corner and continues to the downstream end of the constructed channel where it dissipates into the adjacent Leitrim Core Wetland buffer. • A relatively straight, wide stream, which includes the deepest portions of the constructed channel. • Substrate is primarily silt, clay and organics, with several cobble check dams. The check dams have a small breach to allow water to flow around them, creating small pools in periods of high water. • In-stream vegetation has remained well established in 2024.

In-stream monitoring, including representative photographs, occurred at seven photo-point stations along the constructed channel in April and August 2024, with additional information noted, if relevant, in between each station (Appendix B, Figure 1). Additional supplementary information was collected during the amphibian surveys in May and a June 2024. Habitat parameters observed at each station in 2024 are presented in Table 3 and a summary of the conditions observed during each visit in 2024 is presented below.

Table 3 In-Stream Monitoring Photo-Point Habitat Parameters 2024

Plot #	Survey Date (2024)	Habitat Type(s)	Flow Condition	Dominant Substrate Type(s)	Average Depth (cm)	Air Temperature (ºC)	Water Temperature (ºC)	In-Stream Vegetation
Plot 1	April 20	Run	Fast	Cobbles, Boulders	5-7	5	9.8	Dormant
	August 15	Run	Low to Moderate	Cobbles, Boulders	3-4	25	19.1	Moderate terrestrial and wetland grasses and forbs, Carex spp.
Plot 2	April 20	Flat, Run	Moderate	Silt, Sand	8-9	5	10.5	Dormant
	August 15	Flat, Run	Low to Moderate	Silt, Clay	5-6	25	20.2	Dense grasses, forbs, Carex spp., Typha sp. Salix still spreading rapidly
Plot 3	April 20	Flat	Moderate	Silt, Organic	15-19	5	11.9	Dormant
	August 15	Flat	Low	Silt, Clay, Organic	10	26	21.0	Dense Typha sp., grasses, forbs, Salix sp. still increasing
Plot 4	April 20	Flat, Pool	Moderate	Silt, Clay, Organic (Sand)	20-24	5	12.4	Dormant

Plot #	Survey Date (2024)	Habitat Type(s)	Flow Condition	Dominant Substrate Type(s)	Average Depth (cm)	Air Temperature (ºC)	Water Temperature (ºC)	In-Stream Vegetation
	August 15	Flat, Pool	Low	Silt, Clay, Organic	8-15	26	20.5	Moderate to Dense Carex spp., Typha sp., grasses, forbs etc.
Plot 5	April 20	Run, Pool	Moderate	Silt, Organic, (Sand)	20-25	6	12.4	Dormant
	August 15	Run, Pool	Low	Silt, (Sand)	14	28	19.9	Dense *Typha latifolia*, algae, grasses and forbs
Plot 6	April 20	Run, Flat	Moderate to Fast	Silt	16-21	6	12.0	Dormant
	August 15	Run, Flat	Low to Moderate	Silt, Clay	17	28	21.2	Dense Typha sp., Carex spp., Algae.
Plot 7	April 20	Run, Flat, Pool	Moderate	Silt, Cobble	20-25	6	12.2	Dormant
	August 15	Run, Flat, Pool	Low to Moderate	Silt, Cobble	14	28	20.3	Dense Typha sp., Carex sp., scattered forbs

Early Spring (April) Monitoring

Refer to Appendix B for photographic log of in-stream monitoring in 2024 and previous years. During the 2024 surveys, water in the constructed channel was at the highest levels seen during this study, as noted in Table 1. Water flowed into Reach 1 from the drainage swale and the existing watercourse INT-2 with moderate to fast flow, before slowing to a slower but steady flow through Reaches 2 and 3 before dissipating into the adjacent Leitrim Core Wetland buffer at the north end of the constructed channel. There still appeared to be several areas of seepage from adjacent wetlands that were also contributing to the flow, in particular where WC-3 enters the constructed channel at Reach 2, although these areas were heavily vegetated in 2024, and difficult to observe during the summer visit. Except for the top of Reach 1, which was primarily cobble and boulders, the substrate throughout was dominated by fines, such as silt, clay and organics. There were occasional small areas of sand and gravel throughout, especially where sediment sorting had occurred. In Reach 2, a few naturally occurring channels were observed in the fine substrates of the wet meadows during the spring visit. This was very similar to conditions observed in past years with the exception that water was slightly higher, and flow had slightly increased [Appendix B, (Golder, 2022)].

More details on in-stream vegetation are discussed in the section below based on results of the summer (August) monitoring.

Wildlife observations within the constructed channel during this visit included tracks of wading birds and songbirds, white-tailed deer (*Odocoileus virginanus*), mink (*Neovision vision*), muskrat (*Ondatra zibethicus*), and raccoon (*Procyon lotor*), as well as actual observations of muskrat (*Ondatra zibethicus*), great blue heron (*Ardea Herodias*), American bittern (*Botaurus lentiginosus*), Wilson’s snipe (*Gallinago delicata*), and several species of songbird such as song sparrow (*Melospiza melodia*). Several leopard frogs (*Lithobates pipiens*) were observed throughout. Large numbers off small-bodied fish, primarily cyprinids, were observed throughout the deeper portions of all reaches.

Summer (August) Monitoring

Refer to Appendix B for a photographic log of in-stream monitoring in 2024 and previous years. During the August 2024 surveys, all reaches had a low to moderate flow. This was different than conditions observed during past surveys when much of the channel had dried up by July or August [Appendix B; (Golder, 2022)].

Results of the 2024 monitoring have shown that, since 2020, vegetation has become well established in all portions of the constructed channel. Reach 1 had a moderate amount of wetland and upland plants interspersed amongst the boulders and cobbles. Most of Reach 2, including the three wet meadows, has become a well-established marsh/thicket swamp, with the upper portion being meadow marsh-like and dominated by a mixture of species such as sedges (*Carex* spp.) and cattails (*Typha* spp.). Willows (*Salix* spp.) continue to spread rapidly and it is possible a notable portion of this reach will become a thicket swamp. The bottom of Reach 2, near the end of wet meadow 3, has fully established as a dense stand of cattail marsh. In some portions of Reach 3, particularly near the bottom end, very dense patches of cattails and sedges and grasses occur. The breached check dams were barely visible, being fully vegetated, creating habitat such as runs, pools, and shading. Small-bodied fish were observed throughout all reaches in August 2024, especially in and around habitat features where pools occur.

Wildlife observations within the constructed channel during this visit included various tracks of birds, as well as tracks of muskrat, mink, raccoon, coyote (*Canis latrans*), and white-tailed deer. Two great blue herons, and a single green heron (*Butorides virescens*) were also seen feeding. There were many songbirds such as swamp sparrow (*Melospiza georgiana*) and red-winged blackbird (*Agelaius phoeniceus*) in the riparian zone, and constructed channel itself. Several green frogs (*Lithobates clamitans*), wood frogs (*Lithobates sylvaticus*), and leopard frogs and were observed basking on the shore and/or swimming in the water of all reaches. Two painted turtles (*Chrysemys picta*) were observed swimming in Reach 3.

3.3 Plant Community Monitoring

Plant community monitoring included 10 photo-monitoring plots within representative portions of the constructed channel, and the adjacent riparian/upland zone (Figure 1). The same 10 locations were used for the plant community plots. Photographs and results of the monitoring are presented in Appendix C.

3.3.1 Plant Community Photo-Monitoring

Comparison of Results from All Years

In past years the bands on the density board (0-250 cm) had various levels of coverage, depending upon the location of the plot. In 2024, almost all bands at all stations were 100% cover with the exception of the upper bands at Plot 7, 9, and 10. It is expected that cover will fluctuate from year to year and at each plot, as the plant community changes over time; however, it appears that the meadow community reached a relatively mature state in 2024.

3.3.2 Plant Community Plots

Comparison of Results from All Years

During 2024 surveys it was apparent that most of the planted trees and shrubs within the plots were still healthy and in good condition. The majority of the individuals noted during 2020 monitoring have survived into 2024, and all have increased in height. A few additional trees appear to have been planted since 2020 monitoring, in particular near Plot 8, and they are thriving. In addition, several early successional shrub and trees species [e.g., poplars (*Populus* spp.)] and willows are becoming well established and spreading naturally as is apparent in Plots 2, 3, 7 and 8. Willows, in particular, continue to spread rapidly and have become dominant in some areas of the channel; which contributes to habitat diversity.

Herbaceous ground cover was a mix of seeded species (both native and alien) and naturally occurring species. The presence, abundance, and coverage of native species has increased significantly since 2020, and they are dominant in many areas. It is expected that, over time, native herbaceous plants will continue to increase in dominance. The plant community in 2024 is well established and in good condition, with most species showing vigour and dense growth. Overall, vegetation is the densest and tallest it has been since the start of the monitoring program, with little room for increased growth, other than the trees. At the stations in the wet meadows, there was little to no standing water at the time of the summer survey in either 2020, 2021 or 2022; however, in 2024 water was present throughout. The plant community continues to thrive and continues to increase in diversity. Overall, in 2024, compared to 2020 and other years, the plant community is diverse, healthy, and well established.

3.4 Amphibian Breeding Monitoring

Amphibian breeding monitoring was focused on the three wet meadows (Reach 2), with an additional station located at the downstream end of Reach 3, associated with the adjacent Leitrim Core Wetland buffer. A summary of the results is provided in Table 4.

3.4.1 April Visit

Three anuran species were heard calling in the wet meadows in the constructed channel during the April visit, including a full chorus of spring peepers (*Pseudacris crucifer*) and moderate numbers of northern leopard frog and American toad (*Anaxyrus americanus*). Full choruses of spring peepers and American toads, as well as smaller numbers of northern leopard frogs, were heard calling within the Leitrim Core Wetland buffer and Casino Wetland, adjacent to the Site. Wood frog was not heard in 2024 either inside or outside the constructed channel, in spite of it having been present in past years. For details on water inundation and other habitat parameters, refer to Section 3.2 and Table 3 above.

3.4.2 May Visit

During the May visit, a full chorus of spring peepers and lower numbers of American toads were heard calling throughout the channel (just downstream of wet meadow 3). A full chorus of spring peepers and American toads were heard calling within the Leitrim Core Wetland buffer and Casino Wetland, adjacent to the Site. At the time of the May visit, water depths had only slightly decreased compared to the April visit in 2024. The area of inundation was similar to April, and larger than in past years of monitoring.

3.4.3 June Visit

More than 10 green frogs were heard calling in the constructed channel during the June visit, with similar levels of calling by this species heard in the adjacent wetland off-Site. Water depths in the wet meadows had decreased since the previous visit, but the majority of the constructed channel still held water, contrary to June conditions in past years of monitoring.

3.4.4 Comparison of Results from All Years

Below is a summary of the species and abundance of amphibians observed breeding in the constructed channel during the current and previous years' monitoring. The codes presented in Table 4 follow the codes in the Marsh Monitoring Program (Bird Studies Canada, 2003):

- Code 1 – Individuals can be counted; calls not simultaneous
- Code 2 – Calls indistinguishable, some simultaneous calling
- Code 3 – Full chorus; calls continuous and overlapping

Table 4 Summary of Amphibian Breeding Results (All Years)

Year	April	May	June
2020	None	AMTO – Code 1	GRFR – Code 1
2021	SPPE – Code 3 WOFR – Code 1 NLFR – Code 1 AMTO – Code 2	GRFR – Code 1 SPPE – Code 2	GRFR – Code 1
2022	SPPE – Code 3 WOFR – Code 1 NLFR – Code 1 AMTO – Code 2	SPPE – Code 3 AMTO – Code 2	GRFR – Code 2
2024	SPPE – Code 3 NLFR – Code 2 AMTO – Code 1	SPPE – Code 3 AMTO – Code 2	GRFR – Code 2

Notes: *AMTO – American toad; GRFR – Green frog; SPPE – Spring peeper; WOFR – Wood frog; NLFR – Northern leopard frog*

4.0 Discussion

4.1 In-Stream Monitoring

Throughout the monitoring in 2020-2022 and 2024, the constructed channel was seen to be receiving inputs from the drainage swale (which runs along the southern edge of the property, collecting flows from lands to the south), and the connections with the intermittent streams identified as INT-3 and WC-A (Figure 1). Additional inputs of surface and groundwater from the adjacent wetland areas were also observed. The channel was seen to convey this water north where it eventually outlets at very low velocities into the Leitrim Core Wetland buffer. This indicates that the channel is continuing to function as intended with respect to water conveyance. These inputs appear to be part of the natural south-to-north flow of water in the Leitrim Wetland system that existed prior to construction of the channel. These inputs flow through the constructed channel and are outlet back into the Leitrim Core Wetland buffer at the north end of the channel. This flow mimics the original conditions on the Site. Based on the detailed studies conducted by Golder (Golder, 2020), the area within the no-touch zone between the northern fringe of the Casino Wetland and the constructed channel has experienced a permanent drawdown due to the construction of the channel, with maximum permanent water drawdown of 0.1 m to 0.5 m due to the construction of the channel near the north limit of the Casino Wetland. However, any permanent drawdown is being mitigated by precipitation events and recharge from off-Site locations to the south. The Leitrim Core Wetland has experienced no permanent drawdown due to the construction of the channel.

Water levels in the wet meadows and the channel in were higher throughout the 2024 monitoring period when compared to past years of monitoring, which is likely a result of a wetter than usual spring and summer in 2024. Water and flow remained in the constructed channel well into summer.

4.2 Plant Community Monitoring

No issues were identified during the in-stream and plant community monitoring in 2024. Although some of the ground cover plants are still alien pioneer species, there was a notable increase in density, cover and diversity of native species in 2024 compared to previous years, with native species being dominant overall. It is expected that native herbaceous plants will continue to colonize over time. Willows continue to become increasingly dominant in the wet meadows, with many thousands of stems present, and portions of it may become thicket swamp in future years. This may help to dissuade the colonization of invasive species such as glossy buckthorn (*Rhamnus frangula*), which is abundant in the adjacent Leitrim Wetland.

4.3 Amphibian Breeding Monitoring

The observed amphibian breeding activity within the wet meadows in 2024 has increased compared to that seen in 2024, with the exception of wood frog being absent from the nocturnal call count surveys. Wood frog is an early breeding species, and given the early spring in 2024, it is possible it bred earlier and was missed during the surveys. Several wood frogs were seen during daytime surveys, later in the summer. The habitat in 2024 appears to have established as high quality breeding habitat for amphibians, which benefited from higher-than-normal spring and summer precipitation. Overall, there appears to be a thriving amphibian community within the constructed channel.

5.0 Review of Remedial Actions Taken

The erosion issues observed in 2020 along the banks at the bend in the constructed channel were remediated in 2021 through the placement of additional geotextile and rip-rap in the area of erosion. During the 2024 monitoring, the remediation works still appeared to be performing as intended and no additional notable erosion was observed. All areas were heavily vegetated by 2024, and the erosion prone areas have fully stabilized. No areas requiring remedial action have been identified since that time, including during the current monitoring.

6.0 Summary and Recommendations

Below is a summary of Cambium's observations in Year 5:

- The constructed channel is functioning as designed.
- No remedial actions with respect to the landscaping plan are recommended (Novatech, 2024); Appendix A).
- Over-all, the plant community appears to be fully established, healthy, maturing, and dominated by native species. No remedial actions are required or recommended.
- Following the Design Brief (IBI Group et al., 2018), the upland meadow was to be reviewed in Year 5 to determine if mowing should be undertaken to control the presence of woody species. No such mowing is deemed necessary, based on observations made during the Year 5 monitoring. Future caretakers of the channel are recommended to conduct their own reviews of the upland meadow to ensure the woody species do not spread into the area and mowing takes place at appropriate intervals, if meadow habitat is to be maintained.
- Water levels were higher in 2024 than in previous years, with water and flow persisting well into summer. This is likely due to the above normal precipitation in spring and summer of 2024. The mature vegetation provided adequate structure and cover to entice amphibians to breed in the wet meadows. The current results indicate that amphibians are successfully breeding in the wet meadows and, as such, no recommendations for alterations are proposed.
- The habitat created by the constructed channel and associated plant community has become habitat for several species of wildlife. No remedial actions are required or recommended.
- Remedial actions taken to address slope erosion in 2020 were reviewed each year since installation and appear to be functioning successfully. No further remediation is required.
- Based on the observed success of the various components of the constructed channel over the course of the five-year monitoring program, it is Cambium's opinion that the channel

has successfully established, and the Owner has completed their obligations under the Subdivision Agreement. We recommend that the management and control of the entirety of the constructed channel be turned over to the City of Ottawa.

7.0 Closing

We trust this report meets your current needs. If you require anything further, please contact the undersigned.

Cambium Inc.

DocuSigned by:
Fergus Nicoll
AC17126AFF204FA...

DocuSigned by:
G. Weeks.
B52DA9433CDD43E...

Fergus Nicoll, Dip. T.
Senior Ecological Specialist

Gwendolyn Weeks, H.B.Sc.Env.
Senior Ecologist / Senior Project Manager

\\cambiumincstorage.file.core.windows.net\projects\20000 to 20099\20031-001 Leitrim S Holdings -EIS- 1737 Woodward Dr\Deliverables\Final\2024-10-30 RPT Pathways Channel Monitoring Report_Year 5_20031-001_FINAL.docx

8.0 References

Bird Studies Canada. (2003). *Marsh Monitoring Program: Training Kit and Instructions for Surveying Marsh Birds, Amphibians and their Habitats.*

Golder. (2016). *Environmental Management Plan for the Remer and Idone Lands, Ottawa, Ontario. Project No. 13-1121-0083.* Golder Associates Ltd.

Golder. (2020). *Assessment of Potential Wetland Impacts Due to the Constructed Channel - Pathways Residential Development, Ottawa, Ontario. Project No. 20142688.* Golder Associates Ltd.

Golder. (2021). *Pathways at Findlay Creek, 4800 Bank Street, Ottawa, ON - Constructed Channel Monitoring (Year 1). Project No. 20142688.* Golder Associates Ltd.

Golder. (2022). *Pathways at Findlay Creek, 4800 Bank Street, Ottawa, ON - Constructed Channel Monitoring (Year 2). Project No. 20142688.* Golder Associates Ltd.

IBI Group et al. (2018). *Design Brief - Pathways at Findlay Creek (Remer Lands): 4800 Bank Street. Constructed Channel - Leitrim Development Area. Project No. 33956-5.2.2.* IBI Group, Golder Associates Ltd., Novatech Consulting Engineers.

Novatech. (2024). *Technical Memorandum: Pathways - Constructed Channel Monitoring Requirements.* Novatech Consulting Engineers.

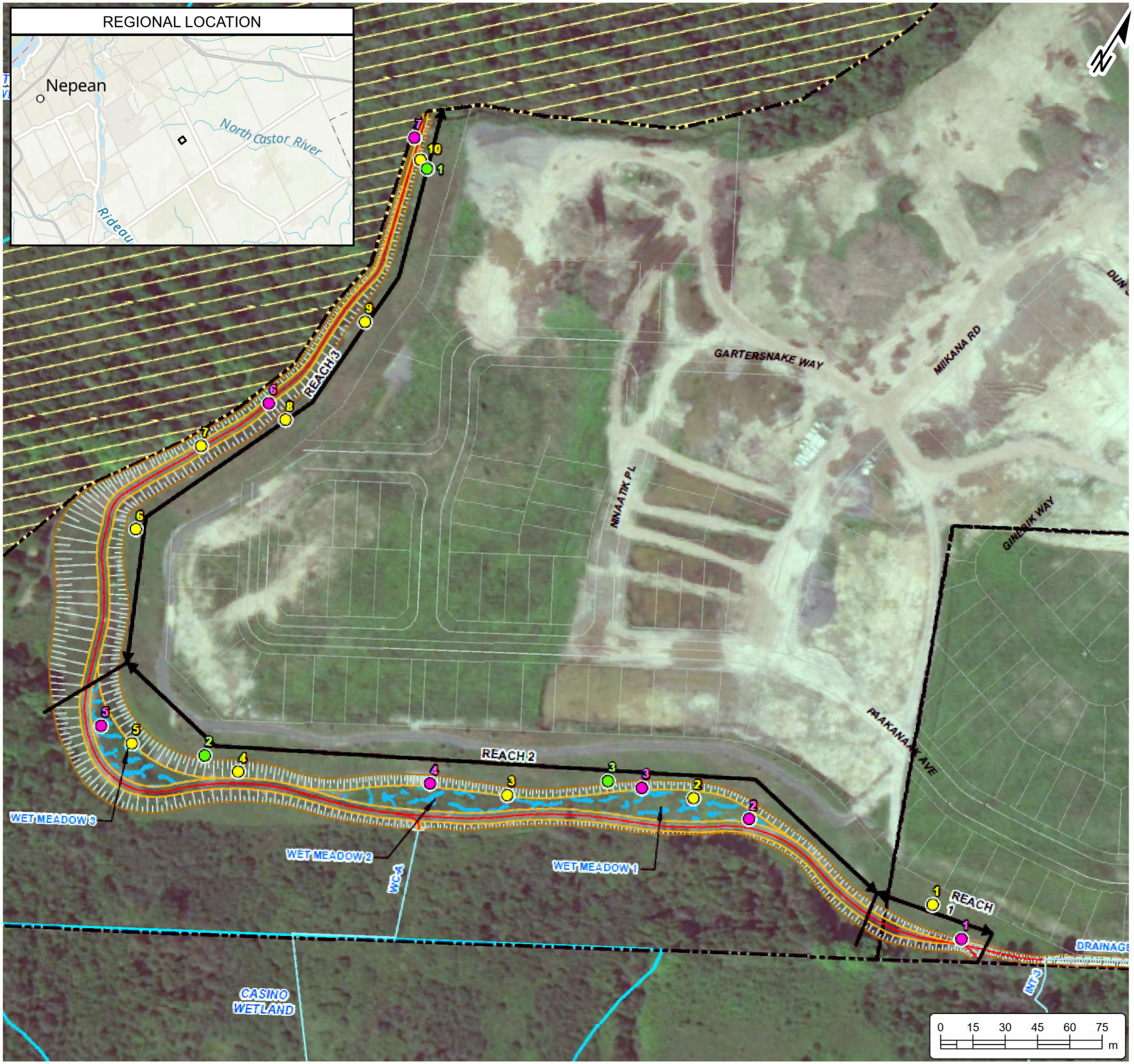
Ontario Nature. (2019). *Ontario Reptile and Amphibian Atlas.* Retrieved from Ontario Nature: https://ontarionature.org/oraa/maps/

Van Horn, M., & Van Horn, K. (1996). Quantitative Photomonitoring for Restoration Projects. *Restoration and Management Notes*, 14: 30-34.

WSP Canada Inc. (2023a). *Pathways at Findlay Creek - Constructed Channel Monitoring (Year 3). 4800 Bank Street, Ottawa, ON. Project No. 20142688.*

WSP Canada Inc. (2023b). *Pathways at Findlay Creek Subdivision - Constructed Channel Year 4 Monitoring. 4800 Bank Street, Ottawa, ON.*

Appended Figures



PATHWAYS CONSTRUCTED CHANNEL MONITORING

LEITRIM SOUTH HOLDINGS INC.
4800 Bank Street
Ottawa, Ontario

LEGEND

- 🟢 NOCTURNAL AMPHIBIAN STATION
- 🟣 INSTREAM MONITORING STATION
- 🟡 PLANT COMMUNITY STATION
- — SLOPE
- — BOTTOM OF BANK
- — TOP OF BANK
- — CENTRELINE
- ▭ PROVINCIALLY SIGNIFICANT WETLAND
- ▨ LEITRIM CORE WETLAND BUFFER

Notes:
- Figure created on March 15, 2021 by WSP.
- This document contains information licensed under the Open Government License - Ontario.
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
- Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

CAMBIUM
194 Sophia Street
Peterborough, Ontario, K9H 1E5
Tel: (705) 742.7900 Fax: (705) 742.7907
www.cambium-inc.com

CONSTRUCTED CHANNEL FEATURES AND MONITORING STATIONS

Project No.:	20031-001	Date:	June 2024
		Rev.:	
Scale:	1:2,500	Projection:	NAD 1983 UTM Zone 18N
Created by: DBB	Checked by: GW	Figure:	1

O:\GIS\MXDs\20000-20099\20031-001 Leitrim S Holdings -EIS- 1737 Woodward Dr\01_Standard_EIS.aprx

Appendix A

Landscape Plan Monitoring and Recommendations

(Novatech, 2024)

NOVATECH
Engineers, Planners & Landscape Architects

M E M O R A N D U M

DATE: JULY 2024

TO: GWENDOLYN WEEKS, CAMBIUM INC.

FROM: RYAN JAMES, NOVATECH

RE: 116023-17
PATHWAYS AT FINDLAY CREEK – CHANNEL CORRIDOR
RIPARIAN ECOSYSTEM MONITORING, YEAR 5

CC: EVAN GARFINKEL, REGIONAL

The channel corridor within Pathways at Findlay Creek supports a variety of plant communities which consist of groups of species selected to respond to varying site conditions. To ensure a minimum standard for the long-term success of the channel corridor planting, a monitoring protocol was implemented over a 5-year period. This is the 5th year, and final observations are to be found below.

Year 5 (2024)

Minimum Standard of Success

When the corridor was commissioned in 2019, the field review for the F1 Certificate (City of Ottawa standard) confirmed it was in general compliance with the approved landscape design drawings. There were no substantial modifications to features or plantings.

During the monitoring process, the success of the plantings was noted. If any of the caliper trees, 25% of the whips, or 10% of the seeded areas were found to be in poor condition, remedial actions were to be taken. Determination of the exact nature of the actions was dependent on the specific problem identified, but included replacement plantings, species substitution or over-seeding localized areas. This as-constructed record has provided the baseline for comparison during the post-construction monitoring program.

Plant Observations

The final assessment of all trees, shrubs and whips was conducted in the summer of 2024 by Novatech staff.

Trees and shrubs continue to display good signs of success and vigor. The Maples, Oaks, Sumacs have done exceptionally well and are putting on vigorous growth. There are volunteer Poplars and Willows appearing throughout the naturalized area. The coniferous grove on the north end of naturalized channel has excellent coverage, with near perfect success with the Tamarack, Larch and Fir specimens.

Groundcover Observations (Seeded Areas)

The final assessment of all seeded areas was conducted in the summer of 2024 by Novatech staff. Note that the seed has grown to shoulder-height in some areas, with a density that makes it very difficult to move through at the height of the growing season. Fortunately, the stone dust path that runs along the corridor is available to facilitate observations.

Overall, the creek groundcover is performing strongly and has maintained a dense mat of naturalization with many native wildflowers, grasses and volunteer species establishing along with the applied seed. Some of the typical vegetation recently observed includes but is not limited to Canada thistle, Crown Vetch, Fleabane, Goldenrod, Queen Anne’s Lace, prickly lettuce, crab grass and Rudbeckia. Due to prevalence of these species in the adjacent wetland area, the establishment of these species is to be expected.

Remedial Action

No remedial action is recommended. Over the 5-year monitoring period, the corridor has, and continues to perform strongly. The trees, whips, shrubs, and groundcover are robust and well-established and have consistently met the minimum standards of success.

Yours truly,

NOVATECH

Ryan James, OALA, CSLA
Senior Project Manager | Landscape Architecture

Appendix B

In-Stream Photographic Monitoring

Photo 1: Instream Station 1, Upstream, April 2020

Photo 2: Instream Station 1, Upstream, April 2021

Photo 3: Instream Station 1, Upstream, April 2022

Photo 4: Instream Station 1, Upstream, April 2024

Photo 5: Instream Station 1, Upstream, July 2020

Photo 6: Instream Station 1, Upstream, July 2021

Photo 7: Instream Station 1, Upstream, August 2022

Photo 8: Instream Station 1, Upstream, August 2024

Photo 9: Instream Station 1, Downstream, April 2020

Photo 10: Instream Station 1, Downstream, April 2021

Photo 11: Instream Station 1, Downstream, April 2022

Photo 12: Instream Station 1, Downstream, April 2024

Photo 13: Instream Station 1, Downstream, July 2020

Photo 14: Instream Station 1, Downstream, July 2021

Photo 15: Instream Station 1, Downstream, August 2022

Photo 16: Instream Station 1, Downstream, August 2024

Photo 17: Instream Station 2, Upstream, April 2020

Photo 18: Instream Station 2, Upstream, April 2021

Photo 19: Instream Station 2, Upstream, April 2022

Photo 20: Instream Station 2, Upstream, April 2024

Photo 21: Instream Station 2, Upstream, July 2020

Photo 22: Instream Station 2, Upstream, July 2021

Photo 23: Instream Station 2, Upstream, August 2022

Photo 24: Instream Station 2, Upstream, August 2024

Photo 25: Instream Station 2, Downstream, April 2020

Photo 26: Instream Station 2, Downstream, April 2021

Photo 27: Instream Station 2, Downstream, April 2022

Photo 28: Instream Station 2, Downstream, April 2024

Photo 29: Instream Station 2, Downstream, July 2020

Photo 30: Instream Station 2, Downstream, July 2021

Photo 31: Instream Station 2, Downstream, August 2022

Photo 32: Instream Station 2, Downstream, August 2024

Photo 33: Instream Station 3, Upstream, April 2020

Photo 34: Instream Station 3, Upstream, April 2021

Photo 35: Instream Station 3, Upstream, April 2022

Photo 36: Instream Station 3, Upstream, April 2024

Photo 37: Instream Station 3, Upstream, July 2020

Photo 38: Instream Station 3, Upstream, July 2021

Photo 39: Instream Station 3, Upstream, August 2022

Photo 40: Instream Station 3, Upstream, August 2024

Photo 41: Instream Station 3, Downstream, April 2020

Photo 42: Instream Station 3, Downstream, April 2021

Photo 43:Instream Station 3, Downstream, April 2022

Photo 44:Instream Station 3, Downstream, April 2024

Photo 45: Instream Station 3, Downstream, July 2020

Photo 46: Instream Station 3, Downstream, July 2021

Photo 47: Instream Station 3, Downstream, August 2022

Photo 48: Instream Station 3, Downstream, August 2024

Photo 49: Instream Station 4, Upstream, April 2020

Photo 50: Instream Station 4, Upstream, April 2021

Photo 51: Instream Station 4, Upstream, April 2022

Photo 52: Instream Station 4, Upstream, April 2024

Photo 53: Instream Station 4, Upstream, July 2020

Photo 54: Instream Station 4, Upstream, July 2021

Photo 55: Instream Station 4, Upstream, August 2022

Photo 56: Instream Station 4, Upstream, August 2024

Photo 57: Instream Station 4, Downstream, April 2020

Photo 58: Instream Station 4, Downstream, April 2021

Photo 59: Instream Station 4, Downstream, April 2022

Photo 60: Instream Station 4, Downstream, April 2024

Photo 61: Instream Station 4, Downstream, July 2020

Photo 62: Instream Station 4, Downstream, July 2021

PHOTO MISSING

Photo 63: Instream Station 4, Downstream, August 2022

Photo 64: Instream Station 4, Downstream, August 2024

Photo 65: Instream Station 5, Upstream, April 2020

Photo 66: Instream Station 5, Upstream, April 2021

Photo 67: Instream Station 5, Upstream, April 2022

Photo 68: Instream Station 5, Upstream, April 2024

Photo 69: Instream Station 5, Upstream, July 2020

Photo 70: Instream Station 5, Upstream, July 2021

Photo 71: Instream Station 5, Upstream, August 2022

Photo 72: Instream Station 5, Upstream, August 2022

Photo 73: Instream Station 5, Downstream, April 2020

Photo 74: Instream Station 5, Downstream, April 2021

Photo 75: Instream Station 5, Downstream, April 2022

Photo 76: Instream Station 5, Downstream, April 2024

Photo 77: Instream Station 5, Downstream, July 2020

Photo 78: Instream Station 5, Downstream, July 2021

PHOTO MISSING

Photo 79: Instream Station 5, Downstream, August 2022

Photo 80: Instream Station 5, Downstream, August 2024

Photo 81: Instream Station 6, Upstream, April 2020

Photo 82: Instream Station 6, Upstream, April 2021

Photo 83: Instream Station 6, Upstream, April 2022

Photo 84: Instream Station 6, Upstream, April 2024

Photo 85: Instream Station 6, Upstream, July 2020

Photo 86: Instream Station 6, Upstream, July 2021

Photo 87: Instream Station 6, Upstream, August 2022

Photo 88: Instream Station 6, Upstream, August 2024

Photo 89: Instream Station 6, Downstream, April 2020

Photo 90: Instream Station 6, Downstream, April 2021

Photo 91: Instream Station 6, Downstream, April 2022

Photo 92: Instream Station 6, Downstream, April 2024

Photo 93: Instream Station 6, Downstream, July 2020

Photo 94: Instream Station 6, Downstream, July 2021

Photo 95: Instream Station 6, Downstream, August 2022

Photo 96: Instream Station 6, Downstream, August 2024

Photo 97: Instream Station 7, Upstream, April 2020

Photo 98: Instream Station 7, Upstream, April 2021

Photo 99: Instream Station 7, Upstream, April 2022

Photo 100: Instream Station 7, Upstream, April 2024

Photo 101: Instream Station 7, Upstream, July 2020

Photo 102: Instream Station 7, Upstream, July 2021

Photo 103: Instream Station 7, Upstream, August 2022

Photo 104: Instream Station 7, Upstream, August 2024

Photo 105: Instream Station 7, Downstream, April 2020

Photo 106: Instream Station 7, Downstream, April 2021

Photo 107: Instream Station 7, Downstream, April 2022

Photo 108: Instream Station 7, Downstream, April 2024

Photo 109: Instream Station 7, Downstream, July 2020

Photo 110: Instream Station 7, Downstream, July 2021

Photo 111: Instream Station 7, Downstream, August 2022

Photo 112: Instream Station 7, Downstream, August 2024

Appendix C

Plant Community Monitoring

Photo 1: 2020 Plant Community Plot 1

Photo 2: 2021 Plant Community Plot 1

Photo 3: 2022 Plant Community Plot 1

Photo 4: 2024 Plant Community Plot 1

Photo 5: 2020 Plant Community Plot 2

Photo 6: 2021 Plant Community Plot 2

Photo 7: 2022 Plant Community Plot 2

Photo 8: 2024 Plant Community Plot 2

Photo 9: 2020 Plant Community Plot 3

Photo 10: 2021 Plant Community Plot 3

Photo 11: 2022 Plant Community Plot 3

Photo 12: 2024 Plant Community Plot 3

Photo 13: 2020 Plant Community Plot 4

Photo 14: 2021 Plant Community Plot 4

PHOTO MISSING

Photo 15: 2022 Plant Community Plot 4

Photo 16: 2024 Plant Community Plot 4

Photo 17: 2020 Plant Community Plot 5

Photo 18: 2021 Plant Community Plot 5

Photo 19: 2022 Plant Community Plot 5

Photo 20: 2024 Plant Community Plot 5

Photo 21: 2020 Plant Community Plot 6

Photo 22: 2021 Plant Community Plot 6

Photo 23: 2022 Plant Community Plot 6

Photo 24: 2024 Plant Community Plot 6

Photo 25: 2020 Plant Community Plot 7

Photo 26: 2021 Plant Community Plot 7

Photo 27: 2022 Plant Community Plot 7

Photo 28: 2024 Plant Community Plot 7

Photo 29: 2020 Plant Community Plot 8

Photo 30: 2021 Plant Community Plot 8

Photo 31: 2022 Plant Community Plot 8

Photo 32: 2024 Plant Community Plot 8

Photo 33: 2020 Plant Community Plot 9

Photo 34: 2021 Plant Community Plot 9

Photo 35: 2022 Plant Community Plot 9

Photo 36: 2024 Plant Community Plot 9

Photo 37: 2020 Plant Community Plot 10

Photo 38: 2021 Plant Community Plot 10

Photo 39: 2022 Plant Community Plot 10

Photo 40: 2024 Plant Community Plot 10

Appendix C-1 Photomonitoring Results 2020-2024

Section of Density Board (cm)	% Covered by Vegetation	% Covered by Vegetation	% Covered by Vegetation	% Covered by Vegetation	Section of Density Board (cm)	% Covered by Vegetation	% Covered by Vegetation	% Covered by Vegetation	% Covered by Vegetation
	July 2020	July 2021	July 2022	July 2024		July 2020	July 2021	July 2022	July 2024
Plot 1					**Plot 6**				
0-50	70	50	100	100	0-50	65	95	100	100
51-100	10	5	60	100	51-100	20	80	100	100
101 - 150	50	60	50	100	101 - 150	0	10	80	100
151 - 200	0	0	5	100	151 - 200	0	0	10	100
201 - 250	0	0	0	95	201 - 250	0	0	0	100
Plot 2					**Plot 7**				
0-50	95	95	100	100	0-50	60	50	95	95
51-100	15	15	55	100	51-100	15	10	55	60
101 - 150	5	0	5	100	101 - 150	5	0	10	30
151 - 200	0	0	5	100	151 - 200	0	0	0	5
201 - 250	0	0	0	100	201 - 250	0	0	0	5
Plot 3					**Plot 8**				
0-50	85	65	100	100	0-50	15	100	100	100
51-100	10	0	60	100	51-100	0	90	95	100
101 - 150	0	0	10	100	101 - 150	0	70	45	100
151 - 200	0	0	0	100	151 - 200	0	0	5	100
201 - 250	0	0	0	100	201 - 250	0	0	0	100
Plot 4					**Plot 9**				
0-50	65	100	100	100	0-50	35	90	100	100
51-100	20	100	100	100	51-100	0	15	55	100
people pp	0	60	90	100	101 - 150	0	5	5	75
151 - 200	0	0	0	100	151 - 200pp	0	0	0	5
201 - 250	0	0	0	100	201 - 250	0	0	0	0
Plot 5					**Plot 10**				
0-50	95	100	100	100	0-50	10	60	65	100
51-100	40	90	100	100	51-100	0	5	5	70
101 - 150	10	20	90	100	101 - 150	0	0	0	10
151 - 200	0	5	70	100	151 - 200	0	0	0	0
201 - 250	0	0	30	100	201 - 250	0	0	0	0

Table C2 - Plant Community Monitoring Data

Plot	Species	Talley				Height Range (m)				Absolute Cover (%)				Notes			
		2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024
1 (Upland)	*Acer saccharum*	3	3	3	3	0.9 to 1.2	0.9 to 1.4	1 to 1.5	1.2 to 1.8	<5	<5	<5	10	good condition	good condition	good condition	good condition
	Celtis occidentalis	3	3	3	3	1 to 1.4	1.1 to 1.5	1.1 to 1.8	1.5 to 2.2	<5	5	5	5	good condition	good condition	good condition	good condition
	Quercus macrocarpa	1	1	1	1	3.1	3.4	3.5	3.8	<5	<5	<5	5	good condition	small amount of dieback	fair condition	good condition
	Rhus typhina	1	1	1	2	0.6	1.2	1.2	0.5 to 2.1	<5	<5	<5	10	original stem died, healthy new shoot	good condition	good condition	good condition, new shoot
	Agalinis tenuifolia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	0				
	Chenopodium album	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15	0	0	0				
	Cirsium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	5	5	<5				
	Grasses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40	10	30	30				
	Erigeron spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	10	15	0				
	Lythrum salicaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	<5				
	Matricaria chamomilla	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	0	0	0				
	Melilotus spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	60	35	<5				
	Monarda fistulosa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	10				
	Oenothera biennis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	<5				
	Papaver sp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	<5	0				
	Persicaria maculosa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Rudbeckia hirta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	20	25	20				
	Solidago canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	10	15				
	Sonchus arvensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	5				
	Symphyotrichum spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	5	20				
	Trifolium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	<5				
	Vicia cracca	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	5				
	BARE SOIL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15	0	0	0				
	OPEN WATER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0				
2 (Wet Meadow)	*Populus deltoides*	0	7	11	12	N/A	0.2 to 0.5	0.1 to 0.8	0.2 to 2.1	0	<5	<5	10		good condition	good condition	
	Salix spp.	0	40+	100+	100+	N/A	0.2-0.6	0.1 to 1	0.1 to 2.4	0	15	35	70		many seedlings/shoots	many seedlings/shoots/ saplings	many seedlings/shoots/ saplings
	Alisma triviale	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	<5	<5				
	Carex spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	20	15	20				
	Cirsium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Daucus carota	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	<5				
	Eupatorium perfoliatum	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5	10	10				
	Glyceria grandis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40	25	20	15				
	Grasses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	20	15	10				

Plot	Species	Talley				Height Range (m)				Absolute Cover (%)				Notes			
		2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024
2 (Wet Meadow)	*Juncus spp.*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	5	5				
	Leersia oryzoides	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15	5	10	20				
	Lythrum salicaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	10	10	5				
	Melilotus spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Oenothera biennis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	5	<5	<5				
	Persicaria maculosa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	5	<5				
	Phalaris arundinacea	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	10	15				
	Plantago major	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Scirpus atrovirens	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	5	10				
	Solidago canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	5	10				
	Typha spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	25	20	20				
	BARE SOIL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25	15	5	0				
	OPEN WATER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	10				
3 (Wet Meadow/Slope)	*Populus deltoides*	0	6	7	7	N/A	0.3 to 0.4	0.4 to 0.8	0.9 to 2.6	0	<5	<5	10		good condition	good condition	good condition
	Populus tremuloides	0	1	2	3	N/A	1.3	1.8	0.2 to 1.9	0	<5	<5	<5		good condition	good condition	good condition
	Salix spp.	0	0	30+	100+	N/A	N/A	0.1 to 0.8	0.1 to 2.5	0	0	15	35			many seedlings/shoots	many seedlings/shoots
	Achillea millefolium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	<5				
	Alisma triviale	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	5	5	<5				
	Daucus carota	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	5	<5				
	Echinacea purpurea	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	<5				
	Elymus canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	5				
	Equisetum arvense	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	5	5				
	Glyceria grandis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	0	<5	5				
	Juncus spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	5				
	Leersia oryzoides	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	10				
	Lycopus americana	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	10	5				
	Lythum salicaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	5	10	5				
	Melilotus spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	10	10	<5				
	Rudbeckia hirta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	5	5				
	Phalaris arundinacea	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	10	15				
	Scirpus atrovirens	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	5	15				
	Solidago canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	5	10				
	Symphyotrichum spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	5	20				
	Trifolium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5	<5	<5				
	Typha spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	20	20	25				
	Unknown grasses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	15	20	20				
	BARE SOIL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60	20	10	0				
	OPEN WATER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	5				

Plot	Species	Talley				Height Range (m)				Absolute Cover (%)				Notes			
		2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024
4 (Slope)	*Acer rubrum*	2	2	2	2	1.1 to 1.3	1.1 to 1.4	1.2 to 1.9	1.4 to 2.2	<5	<5	<5	5	good condition	good condition	good condition	good condition
	Acer saccharinum	1	1	1	1	1.3	1.4	1.4	1.6	<5	5	5	5	good condition	good condition	good condition	good condition
	Betula papyrifera	1	1	1	1	2.1	2.2	2.5	3.1	<5	<5	<5	10	good condition	good condition	good condition	good condition
	Populus deltoides	1	1	1	2	0.6	1.1	1.7	2.6	<5	<5	<5	5	original stem died, healthy new shoot	recovered	good condition	good condition
	Populus grandidentata	1	1	1	3	2	2.2	2.5	0.1 to 3.2	<5	<5	<5	10	good condition	good condition	good condition	good condition, new shoots
	Quercus macrocarpa	1	1	1	1	1.1	1	1.3	1.5	<5	<5	<5	5	Top dieback, but since recovered	poor condition	fair condition	good condition
	Tilia americana	3	0	0	0	1.4 to 1.5	N/A	N/A	N/A	<5	0	0	0	2 good condition, 1 partial dieback	dead		
	Chenopodium album	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Cirsium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	5				
	Daucus carota	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	10	20				
	Grasses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	55	20	40	45				
	Matricaria chamomilla	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	5	<5	0				
	Melilotus spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	40	25	<5				
	Monarda fistulosa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	5	15				
	Oenothera biennis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	5	<5				
	Oxalis stricta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	0				
	Rudbeckia hirta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	10	15				
	Rumex crispus	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	<5	<5	0				
	Solidago canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	10	20				
	Sonchus arvensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	<5				
	Symphyotrichum spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	10	20				
	Taraxacum officinale	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	<5	<5	0				
	Trifolium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	10	10	<5				
	Tussilago farfara	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	0	0	0				
	Typha spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	<%				
	Vicia cracca	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	5	10	5				
	BARE SOIL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	<5	<5	<5				
	OPEN WATER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0				
5 (Wet Meadow)	*Salix* spp.	N/A	N/A	N/A	7	N/A	N/A	N/A	0.1 to 0.3	0	0	0	<5				New seedlings
	Alisma triviale	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	<5				
	Carex spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	5	10				
	Eutrochium maculatum	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	0				
	Galium palustre	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	<5				
	Glyceria grandis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	5				
	Lycopus uniflorus	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	<5				
	Lythrum salicaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	5	5	<5				

Plot	Species	Talley				Height Range (m)				Absolute Cover (%)				Notes			
		2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024
5 (Wet Meadow)	*Melilotus* spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	0				
	Phalaris arundinacea	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	5	10				
	Sagittaria latifolia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	5				
	Solidago canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	5	20				
	Trifolium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	10	<5	0				
	Typha spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	80	85	90	90				
	BARE SOIL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0				
	OPEN WATER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	100	80	80	100				
6 (Upland)	*Alnus incana*	1	1	0	0	2.7	1.8	N/A	N/A	<5	<5	0	0	good condition	top dieback occurred, potentially recovering.	dead	
	Betula papyrifera	1	1	1	1	1.7	1.8	2	2.2	<5	<5	5	5	good condition	good condition	good condition	good condition
	Juniperus virginiana	1	1	1	1	0.8	0.8	1	2.3	<5	<5	<5	5	good condition	good condition	good condition	good condition
	Picea glauca	2	2	2	2	0.6 to 0.9	0.7 to 0.9	1 to 1.1	1.6 to 2.0	<5	5	5	10	good condition	good condition	good condition	good condition
	Pinus strobus	1	1	1	1	0.5	0.7	1.2	3.1	<5	<5	5	15	good condition	good condition	good condition	good condition
	Chenopodium album	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	0	0	0				
	Cirsium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	35	15	5				
	Conyza canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	<5	0				
	Daucus carota	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5	10	10				
	Grasses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35	<5	30	35				
	Erigeron spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5	5	5				
	Matricaria chamomilla	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	0	0	0				
	Medicago lupulina	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	15	10	<5				
	Monarda fistulosa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	15				
	Oenothera biennis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	5	<%				
	Pastinaca sativa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	0				
	Plantago major	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Potentilla norvegica	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Rumex crispus	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	<5				
	Rudbeckia hirta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	5				
	Solidago canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	5	20				
	Setaria pumila	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	0	0	0				
	Sonchus arvensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	<5				
	Symphyotrichum spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	15				
	Taraxacum officinale	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	0	0	0				
	Trifolium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	5	0				
	Tussilago farfara	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	BARE SOIL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	5	<5	0				
	OPEN WATER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0				

Plot	Species	Talley				Height Range (m)				Absolute Cover (%)				Notes			
		2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024
7 (Riparian Slope)	Salix spp.	N/A	4	9	17	N/A	0.2 to 1.0	0.1 to 1.0	0.1 to 1.4	0	<5	<5	<5	good condition	good condition	good condition	good condition, new shoots
	Alisma triviale	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	<5				
	Bidens cernua	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	0	0				
	Carex spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	5	10	20				
	Cicuta bulbifera	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	<5				
	Daucus carota	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	15				
	Echinochloa crusgalli	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Euthamia graminifolia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	<5				
	Fragaria virginiana	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	5	<5				
	Juncus spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	5				
	Grasses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	70	0	20	15				
	Lythrum salicaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	<5				
	Medicago lupulina	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Monarda fistulosa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	5				
	Oxalis stricta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	0	0				
	Persicaria maculosa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	0				
	Rudbeckia hirta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	30	35	30				
	Setaria pumila	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Solidago canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	5	15				
	Sonchus arvensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Symphyotrichum spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	5	10				
	Taraxacum officinale	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	<5	<5	0				
	Trifolium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	15	<5	<5				
	Typha spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	5	15	30				
	Vicia cracca	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	5	<5				
	BARE SOIL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	0				
	OPEN WATER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	35	25	40				
8 (Upland)	*Alnus incana*	0	2	2	2	0	1.5 to 1.8	1.7 to 2	1.8 to 2.3	0	5	5	10		Planted since 2020 monitoring?	good condition	good condition
	Betula papyrifera	1	1	1	1	1.7	1.7	2.1	2.6	<5	<5	<5	10	good condition	good condition	good condition	good condition
	Juniperus virginiana	0	1	1	1	0	1.1	1.4	2.3	0	<5	5	10		Planted since 2020 monitoring?	good condition	good condition
	Picea glauca	0	1	1	1	0	1.2	1.3	1.8	0	<5	<5	5		Planted since 2020 monitoring?	good condition	good condition
	Pinus strobus	1	1	1	1	0.4	1.3	2	2.5	<5	<5	5	15	Dead	Planted since 2020 monitoring?	good condition	good condition
	Ambrosia artemisiifolia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	10	5	0				
	Cirsium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	15	10	10				
	Daucus carota	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	10	15	10				

Plot	Species	Talley				Height Range (m)				Absolute Cover (%)				Notes			
		2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024
8 (Upland)	*Doellingeria umbellata*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	<5				
	Grasses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15	15	30	30				
	Melilotus spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	<5	<5	0				
	Oenothera biennis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	5				
	Oxalis stricta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	0	0	0				
	Pastinaca sativa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	5				
	Persicaria maculosa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Plantago major	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Rudbeckia hirta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	5	10	15				
	Setaria pumila	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30	0	0	0				
	Solidago canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	15				
	Symphyotrichum spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	10	20				
	Taraxacum officinale	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	0				
	Trifolium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	10	<5	<5				
	Vicia cracca	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	<5				
	BARE SOIL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	5	<5	0				
	OPEN WATER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0				
9 (Upland)	Populus tremuloides	N/A	N/A	N/A	2	N/A	N/A	N/A	0.2 to 0.3	0	0	0	<5				New seedlings
	Ambrosia artemisiifolia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	10	5	0				
	Chenopodium album	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Cirsium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	5	5	<5				
	Echinacea purpurea	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	15				
	Grasses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	70	10	25	30				
	Matricaria chamomilla	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	0				
	Medicago lupulina	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Melilotus spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	10	10	<5				
	Monarda fistulosa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	10	25				
	Pastinaca sativa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	<%				
	Rudbeckia hirta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	40	35	35				
	Setaria pumila	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Solidago canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	10				
	Symphyotrichum spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	5	10				
	Trifolium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	10	5	<5				
	BARE SOIL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	5	5	<5				
	OPEN WATER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0				
10 (Slope)	*Salix spp.*	N/A	N/A	N/A	7	N/A	N/A	N/A	0.1 to 0.2	0	0	0	<5				New seedlings
	Asclepius syriaca	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	5				
	Carex spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	5				
	Equisetum arvense	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	10	10	5				

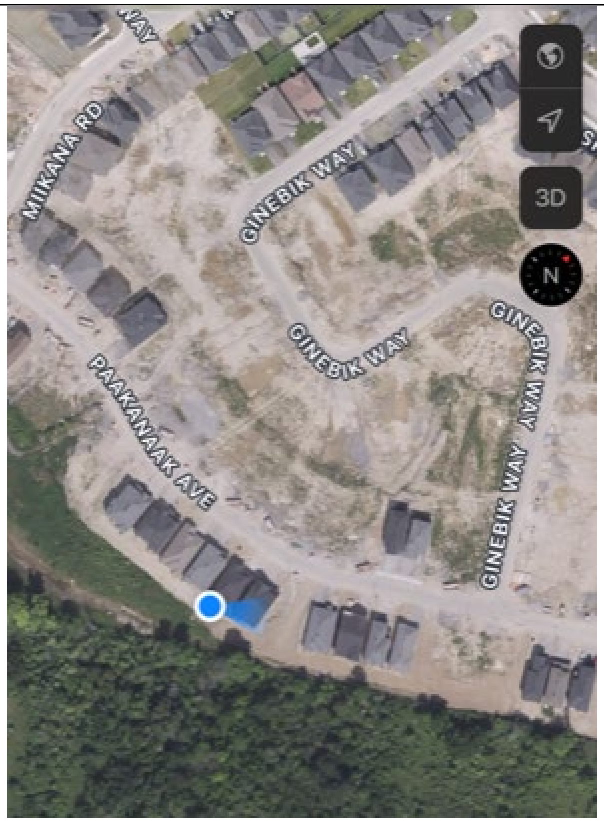
Plot	Species	Talley				Height Range (m)				Absolute Cover (%)				Notes			
		2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024	2020	2021	2022	2024
10 (Slope)	*Erigeron spp.*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	5				
	Echinacea purpurea	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	<5	10				
	Galium palustre	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	<5				
	Grasses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40	5	20	25				
	Juncus spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5	<5	5				
	Leersia oryzoides	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	<5	5				
	Lythrum salicaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	10	5	<5				
	Monarda fistulosa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	<5	10	15				
	Rudbeckia hirta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	25	25	25				
	Setaria pumila	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	0	0	0				
	Solidago canadensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	5	15				
	Sonchus arvensis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	0	0	0				
	Symphyotrichum spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	5	10				
	Trifolium spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	5	5	<5				
	Typha spp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	30	35	45				
	Vicia cracca	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	<5				
	OPEN WATER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5	<5	<5	<5				

Leitrim Development Area – Area S4 Future Neighbourhood (Regional Group)

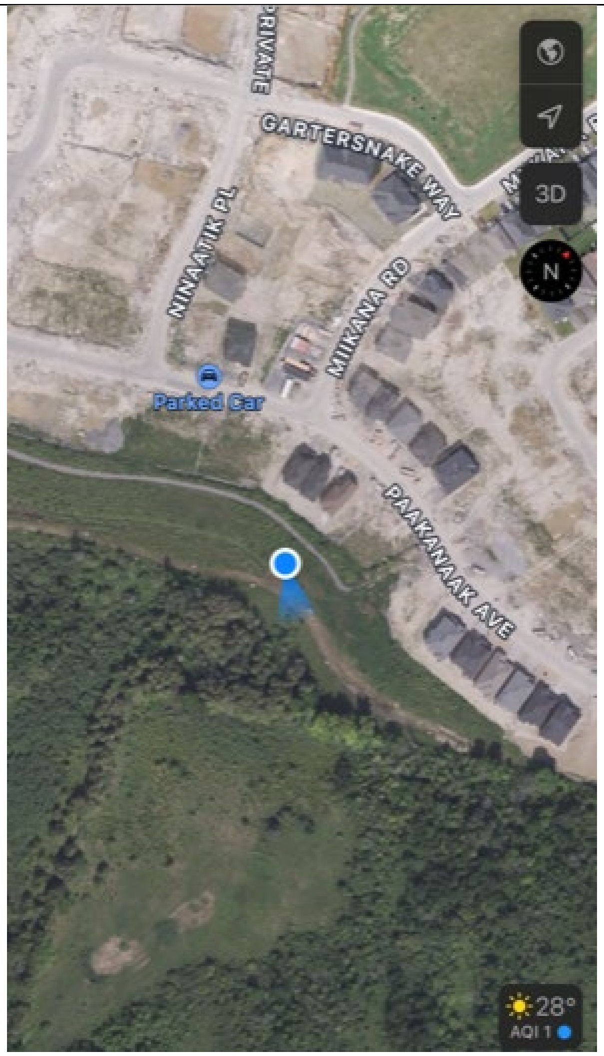
Site visit conducted Friday, July 25, 2025 – Field Notes and Observations by South Nation Conservation

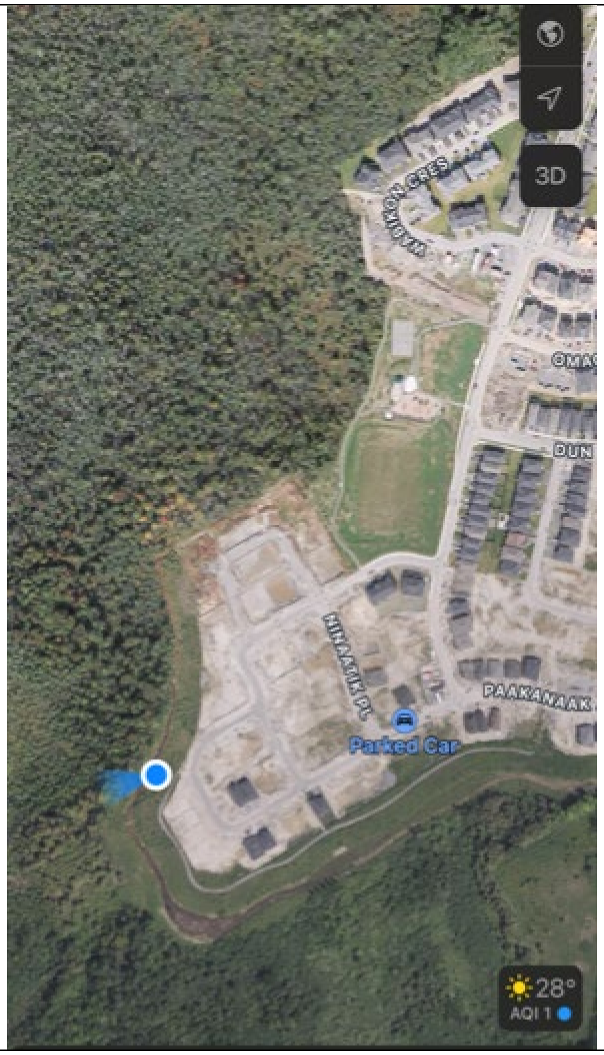
Attendance:

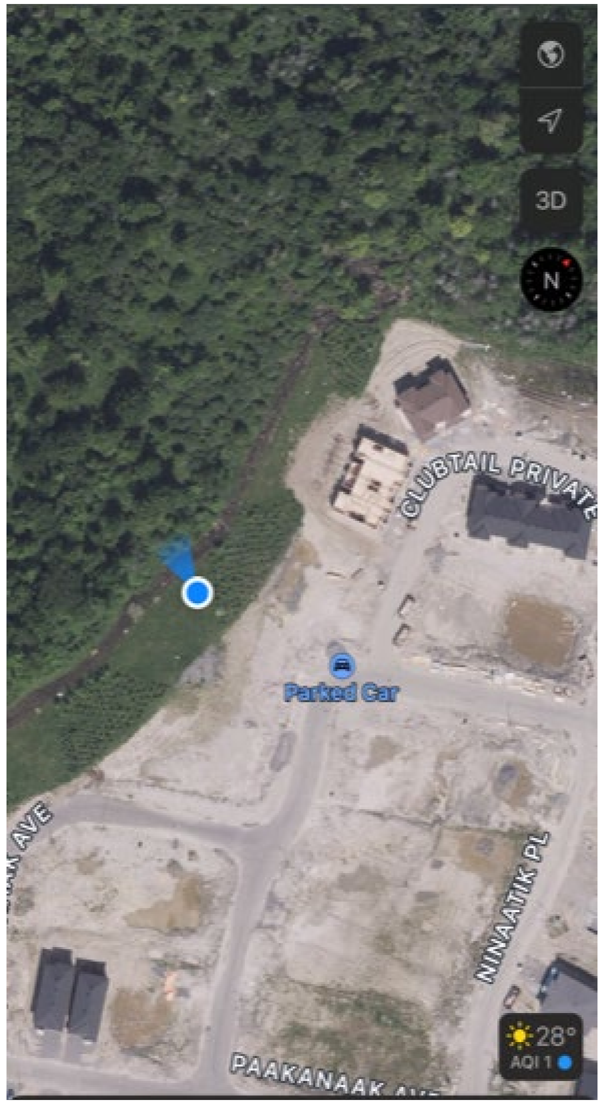
City of Ottawa-	Amy McPherson, Mark Elliot
Arcadis -	Peter Spal, Angela Soward, Brittany Semmier
SNC -	Jen Boyer, James Holland
Regional Group -	Matthew Van Bakel
Regrets:	Evan Garfinkel (Regional); Alex Zeller + Casey Little, Ryan Magladry (Arcadis)

Constructed Channel Plan Fig. 6-2 EMP Reference Location	Notes/Observations	Aerial Photo Location	Corresponding Site Photos	
LOCATION A **INT-3** Watercourse and Watercourse outlet and start of Conveyance Channel and end of Scratch Ditch/rear yard swale on adjacent development	**Observations** - not apparent where the INT-3 HDFA watercourse enters into the channel, outlet now obstructed with rock weir and not functioning – needs maintenance/removal - Rear Yard double swale/ Scratch Ditch entirely on private properties – As Built location of Scratch Ditch different than Remer Site Serviceability Plan - double swale design to service subdivision and catch overland flows - erosion where scratch ditch enters constructed channel -conveyance area was moist after rain but essentially with no vegetation in this area - Tire tracks of a vehicle in dry mud **INT-3** Intermittent watercourse 3 (INT-3) enters the southwest part of the Site from the southeast. INT-3			

	appears to convey surface flow from the upstream rural lands to the south of the Site into WC-B. INT-3 conveys major flows during spring freshet and high water events, however north of the Idone property boundary the channel is more defined. **Action:** S4 Servicability Update for the Leitrim Development Area, corresponding to the As-Built for the Scratch Ditch/rear yard swale contained within the adjacent development in property owner's backyards. Discuss if this feature will be redundant and if a permanent swale will be placed to the south of the S4 lands to intercept surface sheet flow south to northwest.			

LOCATION B Wetland Conveyance Channel Input	Conveyance Channel input from Rear Yard Double Swale observed to be very dry with limited vegetation in spots. Looked like vehicle had been in area in recent past during construction of subdivision. Some minor flow damp ground from recent storm. This area could be enhanced in future. **Action:** Leitrim Development Area Servicability Update (2016) illustrated the rear yard scratch ditch on the south property with a different elevation. Carry forward the as-built condition to the new report. Arcadis stated that this area will be the location of the new West SWM Outlet feature to convey clean flows from development at a 1:100 year function, as stated in the Leitrim Remer-Idone EMP and MSS. Also to include sump drainage and LID drainage.			

LOCATION C Mid-section conveyance channel	Observed wetland vegetation with some small pools of standing surface water. Well established buffer zones with mature plantings. Area functioning as per design. From LDA Remer-Idone EMP: The constructed conveyance channnel requires that a linkage be maintained between the Casino Wetland and the Leitrim Core Wetland through maintenance of a natural area within the proposed development area.		

LOCATION D UPPER REACH CHANNEL	**Conveyance Channel – upper reach** It was determined that the conveyance channel is operating as intended. The S4 Lands will meet pre-development flows and if requested, we will increase flows during Detailed Design. Should additional flows be requested, SNCA is to provide Stormwater criteria above the pre-development condition during Detailed Design. Water in channel from channel mid point to outlet into wetland, two species of frog observed (green, leopard). Mature species of field meadow flowers, wetland vegetation and planted trees well established.		 	 

SUMMARY OF TOTAL AREA AND WEIGHTED IMPERVIOUS FOR FINDLAY CREEK VILLAGE STORMWATER FACILITY

	Area ID	Area (ha)	Weighted TIMP (%)	Weighted IMP - Water Quality Calculations
9A9B	91	1.98	39	77.2
	92	3.12	0	0.0
	93	8.316	61.33	510.1
	94	4.81	80.00	384.8
	95	5.38	34.25	184.3
	102	3.42	37.54	128.4
	96	7.79	39.00	303.8
	101	2.79	39.00	108.8
	104	1.3	39.00	50.7
	97	8.68	70.31	610.3
	98	2.62	37.00	96.9
	99	5.37	38.39	206.1
	103	4.48	34.50	154.5
	100	5.94	39.00	231.7
	Area 1 west	7.92	0.00	0.0
	Area 1 east	4.15	0.00	0.0
LD_UP	Z4	17.45	58.54	1021.523
	Z1	28.53	55.70	1589.121
	Z2	15.06	58.96	887.9376
	Z3 U/S	17.34	52.83	916.0722
	Z3 D/S	5.94	64.47	382.9518
	BANK	12	75.00	900
	Pond	18.27	100.00	1827
	Remer Phase 1 East	28.51	71.09	2026.7759
	Remer Phase 1 West	19.96	68.18	1360.89276
	Remer SWMHYMO	28.32	54.90	1554.85
Zone 5	3a and 3b	25.16	38.43	966.93
	3C and 3D	15.52	58.66	910.36
Zone 7	KFD	12.73	53.34	678.97
	SORA	20.17	61.71	1244.614054
	Zone 3-3	5.38	53.25	286.47
Zone 10	Phase 1	30.347	40.50	1229.052
	Phase 2	25.96	53.12	1379.03
Cattizone	PARK	0.49	14.29	6.9
	S-001	0.57	25.00	14.3
	S-002	0.36	25.00	9.1
	S100_2	0.29	80.00	23.5
	S100_3	0.12	80.00	9.8
	S100_4	0.04	80.00	3.6
	S100_5	0.75	80.00	60.1
	S100_6	0.21	80.00	16.5
	S103	0.37	48.57	17.8
	S104	0.55	80.00	43.6
	S105	0.59	80.00	46.9
	S106	0.59	78.57	46.2
	S107_1	0.30	48.57	14.4
	S107_2	0.16	48.57	7.9
	S108	1.12	85.71	95.7
	S109	0.13	75.71	10.0
	S110	0.19	78.57	15.2
	S110A	0.28	48.57	13.5
	S111	0.41	48.57	19.7
	S112	0.49	42.86	21.1
	S120_1	0.40	75.71	30.0
	S120_3	0.28	75.71	21.5

S120_4	0.15	75.71	11.0
S120_5	0.14	75.71	10.9
S120_6	0.64	75.71	48.6
S123	0.51	14.29	7.3
S124	0.39	48.57	18.8
S125	0.60	80.00	47.7
S126	0.44	48.57	21.2
S127_1	0.51	80.00	41.0
S127_2	0.23	80.00	18.1
S130	0.37	42.86	16.0
S131	0.58	75.71	44.3
	417.95		23042.3

Weighted Impervious %

55.1

Water Quality Calculations

Total Drainage Area to the Findlay Creek Village Stormwater Facility for Water Quality Treatment: 418

Total weighted TIMP for Drainage Areas to Findlay Creek Village Stormwater Facility for Water Quality Treatment: 55

Enhanced Level of Treatment (80% TSS removal)

Permanent Storage required for Wet Pond (from MOE Manual p3-10 Table 3.2):

IMP (%)	Storage
35	140
55	190

For Expanded Findlay Creek Village Stormwater Facility: 190

Calculated storage volume minus 40 m^3/ha extended storage: 150 m^3/ha

Total Permanent Storage Required in Expanded Findlay Creek Village Stormwater Facility: 62830 m^3

Existing permanent storage in Findlay Creek Village Stormwater Facility at permanent water elevation of 87.10 m: 53887 m^3

Proposed permanent storage available in Expanded Cell at permanent water elevation of 87.10 m: 35002 m^3

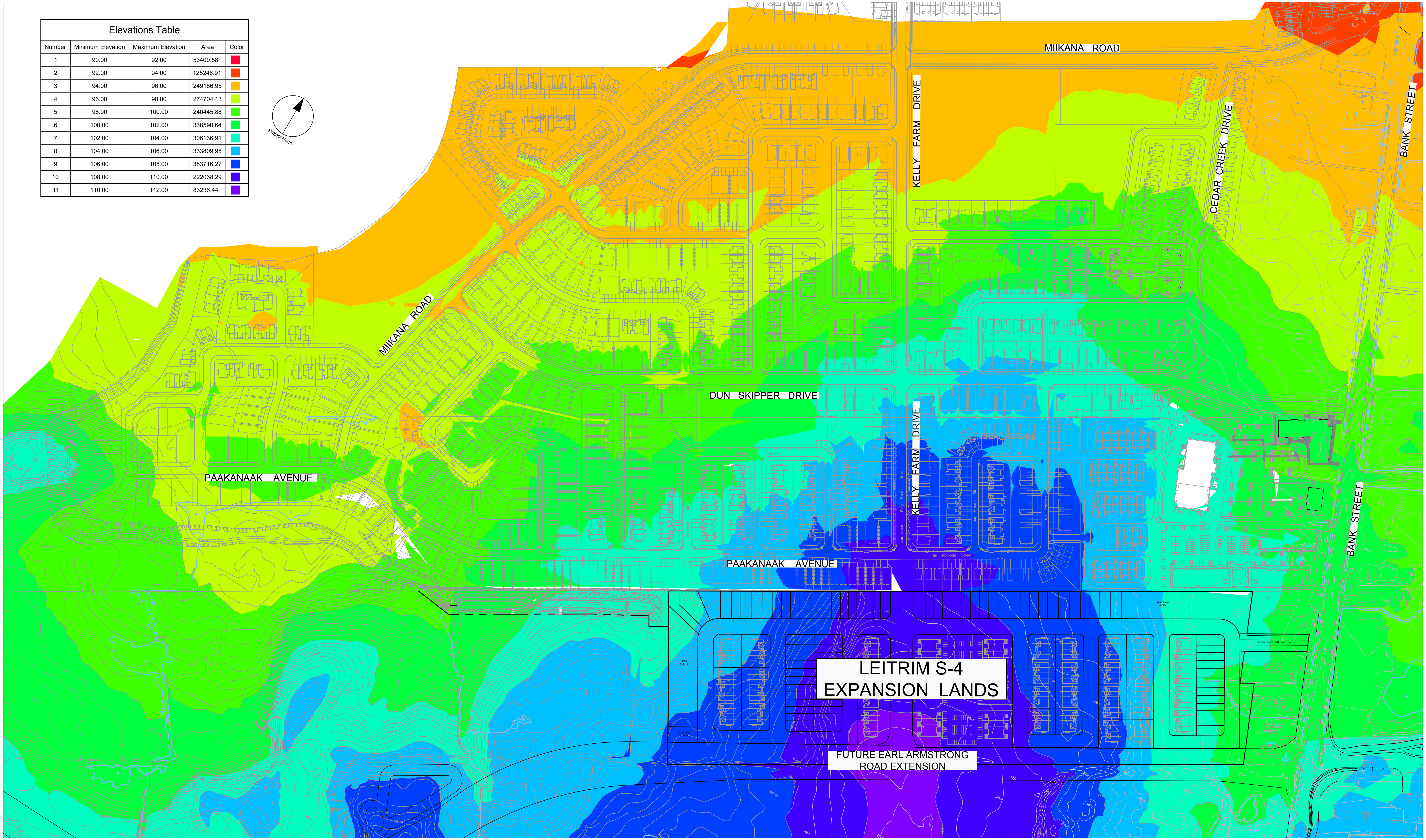
Total Available Permanent Storage: 88889 m^3

Extended Storage Required in Expanded Findlay Creek Village Storwmater Facility: 16718 m^3

Appendix F

- Figure 9-1 Existing Topography
- Figure 9-2 Preferred Macro Grading Plan

J:\145172_Cattizone_Pa\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Grading figure.dwg Last Saved By: milnem4626 Last Saved At: Oct. 20, 25



Elevations Table

Number	Minimum Elevation	Maximum Elevation	Area	Color
1	90.00	92.00	53400.58	🟥
2	92.00	94.00	125246.91	🟧
3	94.00	96.00	249186.95	🟧
4	96.00	98.00	274704.13	🟨
5	98.00	100.00	240445.88	🟩
6	100.00	102.00	338590.64	🟩
7	102.00	104.00	306136.91	🟩
8	104.00	106.00	333809.95	🟦
9	106.00	108.00	383716.27	🟦
10	108.00	110.00	222038.29	🟪
11	110.00	112.00	83236.44	🟪

ARCADIS

Project Title

SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

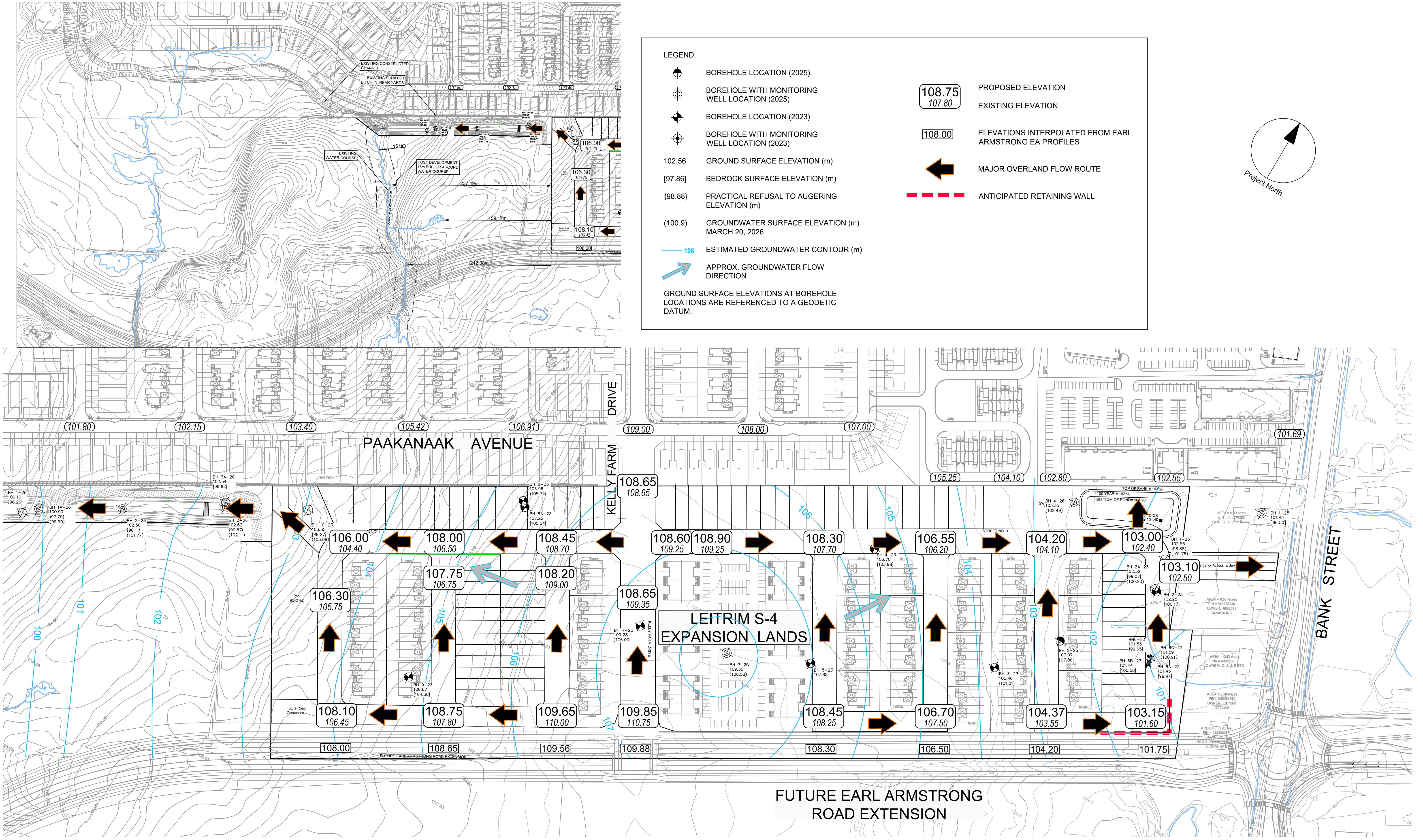
Drawing Title

EXISTING TOPOGRAPHY

Sheet No.

FIGURE 9-1

J:\145172_Cattizone_Po\7.0_Production\7.03_Design\04_Civil_Land\Serviceability Report\Preferred Grading.dwg Last Saved By: milnem4626 Last Saved At: Apr. 15, 26



LEGEND:

BOREHOLE LOCATION (2025)

BOREHOLE WITH MONITORING WELL LOCATION (2025)

BOREHOLE LOCATION (2023)

BOREHOLE WITH MONITORING WELL LOCATION (2023)

102.56 GROUND SURFACE ELEVATION (m)

[97.86] BEDROCK SURFACE ELEVATION (m)

{98.88} PRACTICAL REFUSAL TO AUGERING ELEVATION (m)

(100.9) GROUNDWATER SURFACE ELEVATION (m) MARCH 20, 2026

106 ESTIMATED GROUNDWATER CONTOUR (m)

APPROX. GROUNDWATER FLOW DIRECTION

GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

108.75 PROPOSED ELEVATION

107.80 EXISTING ELEVATION

108.00 ELEVATIONS INTERPOLATED FROM EARL ARMSTRONG EA PROFILES

MAJOR OVERLAND FLOW ROUTE

ANTICIPATED RETAINING WALL

ARCADIS

Project Title

SERVICEABILITY STUDY
LEITRIM S-4 EXPANSION LANDS

Drawing Title

PREFERRED MACRO GRADING PLAN

Sheet No.

FIGURE 9-2

Arcadis Professional Services (Canada) Inc.
333 Preston Street, Suite 500
Ottawa, Ontario K1S 5N4
Canada
Phone: 613 225 1311
Fax:
www.arcadis.com

Arcadis. Improving quality of life.