



Listowel Subdivision Walton Ave North

Functional Servicing Report

Project Location:

Walton Ave North
Listowel, ON

Prepared for:

Riverview Properties Creekside Ltd.
520 Riverview Drive
Listowel, ON N4W 3R6

Prepared by:

MTE Consultants Inc.
365 Home Street
Stratford, ON N5A 2A5

March 3, 2025

MTE File No.: 60410_001





CONTENTS

1.0	Introduction	1
2.0	Municipal Servicing.....	3
2.1	Sanitary Servicing	3
2.2	Water Distribution	3
2.3	Storm Sewer Servicing.....	6
3.0	Stormwater Management	8
3.1	Allowable/Pre-development Conditions.....	8
3.2	Post-development Conditions	8
3.3	Water Quality Control.....	8
4.0	Preliminary Grading Design.....	9
4.1	Lot Grading Design	9
4.2	Preliminary Cut-Fill Analysis.....	11
5.0	Utility Servicing.....	13
6.0	Summary.....	13

Figures

Figure 1.0	– Location of Site	2
Figure 2.0	– Preliminary Sanitary Servicing Plan.....	4
Figure 3.0	– Preliminary Water Distribution Plan	5
Figure 4.0	– Preliminary Storm Servicing Plan	7
Figure 5.0	– Preliminary Road and Lot Drainage Plan.....	10
Figure 6.0	– Preliminary Cut-Fill Plan.....	12

Tables

Table 4.1:	Preliminary Pavement Structure	9
Table 4.2:	Summary of Preliminary Cut-fill Analysis	11

Appendices

Appendix A	Draft Plan of Subdivision
Appendix B	Preliminary Drainage Area Plans

1.0 INTRODUCTION

MTE Consultants Inc. (MTE) was retained by Riverview Properties Creekside Ltd. to complete a Functional Servicing Report (FSR) for the lands known as part of Lots 22 and 23 of Concession 1 located in the Geographical Township of Wallace, formerly in the town of Listowel and now in the Municipality of North Perth. The subject lands consist of approximately 13.29ha generally bounded by existing residential subdivisions to the southwest, Walton Ave North to the west, active agricultural lands to the north, and the Middle Maitland River to the south and east as shown on Figure 1.0.

The Middle Maitland River runs through the southeastern corner of the site flowing from the northeast to the southwest. The Maitland Valley Conservation Authority (MVCA) has completed floodplain modeling for the site and the floodplain limits and associated 15.0m development setbacks are included on the Figures.

It is proposed to develop the property for 7 Residential Blocks and 2 Multiple Residential Blocks consisting of approximately 208 units, a stormwater management (SMW) Block, and municipal rights-of-way. A draft plan of subdivision (refer to Appendix A) has been prepared by MHBC Planning Ltd., which forms the basis for the preliminary servicing designs. Some assumptions were made regarding the final number of lots and units within the Subdivision Blocks. It is noted that the proposed number of lots is preliminary and subject to change depending on how the Blocks are developed.

The purpose of this FSR is to develop a comprehensive servicing strategy for the proposed subdivision which outlines how the subdivision can be developed on full municipal services, including sanitary sewage collection, domestic water supply, storm drainage, pavement structure, and utilities.

TOWN OF LISTOWEL



SITE



Engineers, Scientists, Surveyors

PROJECT
**WALTON AVENUE
SUBDIVISION DESIGN**

TITLE
SITE LOCATION

Drawn	TNH	Scale	NTS	Figure 1.0
Checked	JMD	Project No.	60410_001	
Date	2025-03-03	Rev No.	0	

2.0 MUNICIPAL SERVICING

2.1 Sanitary Servicing

The sanitary sewage from the proposed development will all be directed to the existing 200mm diameter sewers within Walton Ave North, which will convey flows to the south. Connections to the existing sewage system will be made in Perkins Crescent and Pleasant View Drive, and the existing Walton Ave sewers will be extended to the north. The existing sewers are located at depths ranging from 2.3m to 3.6m below the existing centerline road grades.

The preliminary sanitary servicing plan for the proposed development can be seen on Figure 2.0. The sanitary sewers are proposed to be constructed at depths that will allow for the Residential Blocks (Blocks 1 thru 7) portion of the development to be serviced via gravity sewers. The sanitary sewer network for the proposed medium density blocks (Blocks 8 and 9) will require a lift station that pumps sewage into one of the adjacent gravity sewers in order to avoid excessive fill requirements. The sanitary sewer design sheet and its associated drainage areas can be found in Appendix B.

Sanitary sewers will be constructed through the proposed development within the existing and proposed road allowances at depths ranging from 2.2m (minimum) to 3.6m (maximum).

Sufficient capacity within the sanitary sewers in Walton Ave North downstream of Pleasant View Drive and at the wastewater treatment system will need to be confirmed with the Municipality of North Perth.

2.2 Water Distribution

Water supply for the proposed development will be provided by three connection points to the municipal water distribution system.

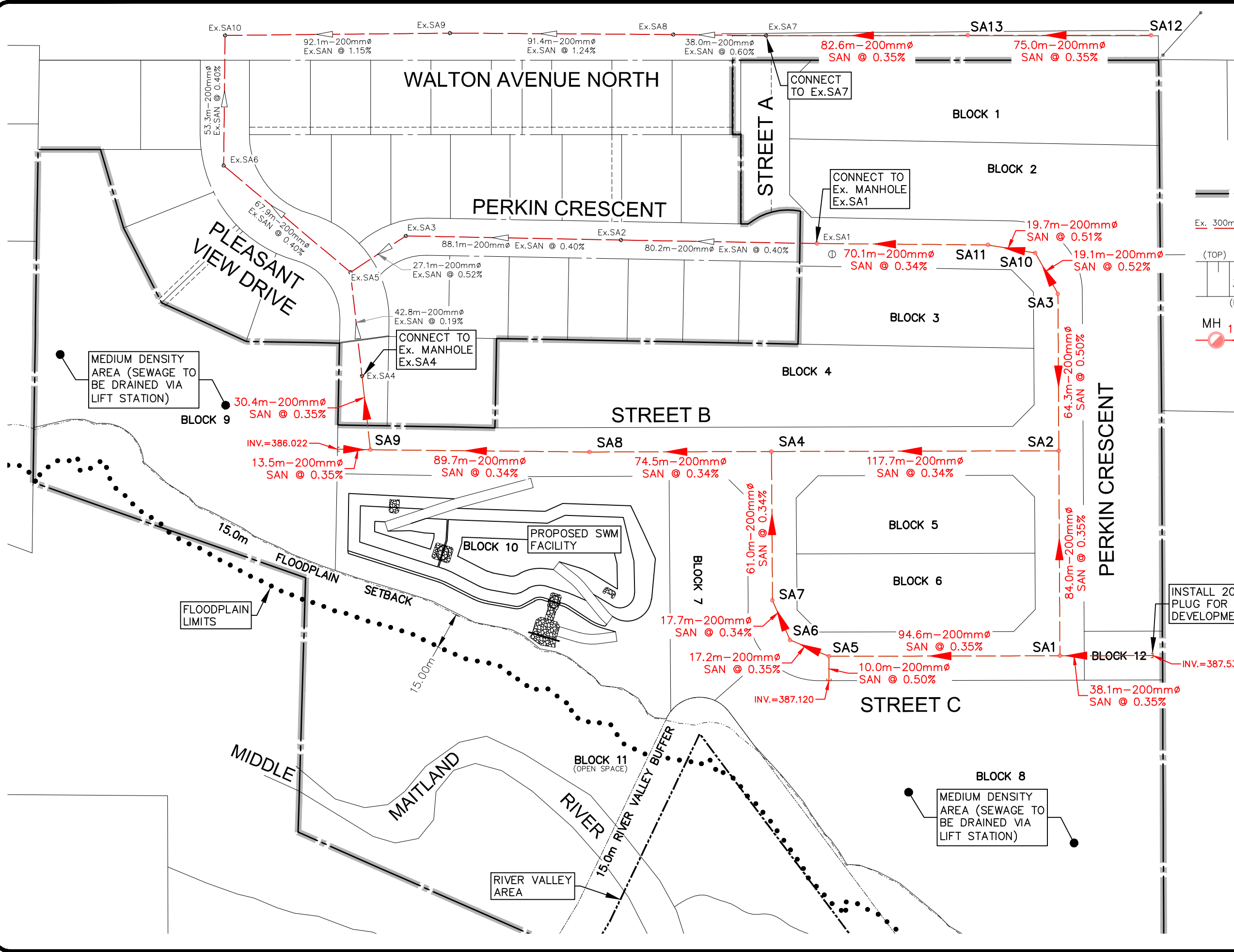
- Walton Ave North: connection to the existing 150mm diameter watermain
- Pleasant View Drive: connection to the existing 150mm diameter watermain
- Perkin Crescent: connection to the existing 150mm diameter watermain

The proposed network will consist of a 150mm diameter looped network located within the proposed road allowances. Each medium density block is proposed to have a 150mm service connection. Further details within each block will be determined during the detailed design for site plan approval.

The existing and proposed water distribution networks are illustrated on Figure 3.0 and includes preliminary pipe sizes.

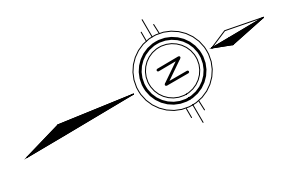
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Plot Date: March 3, 2025 - 9:59 AM

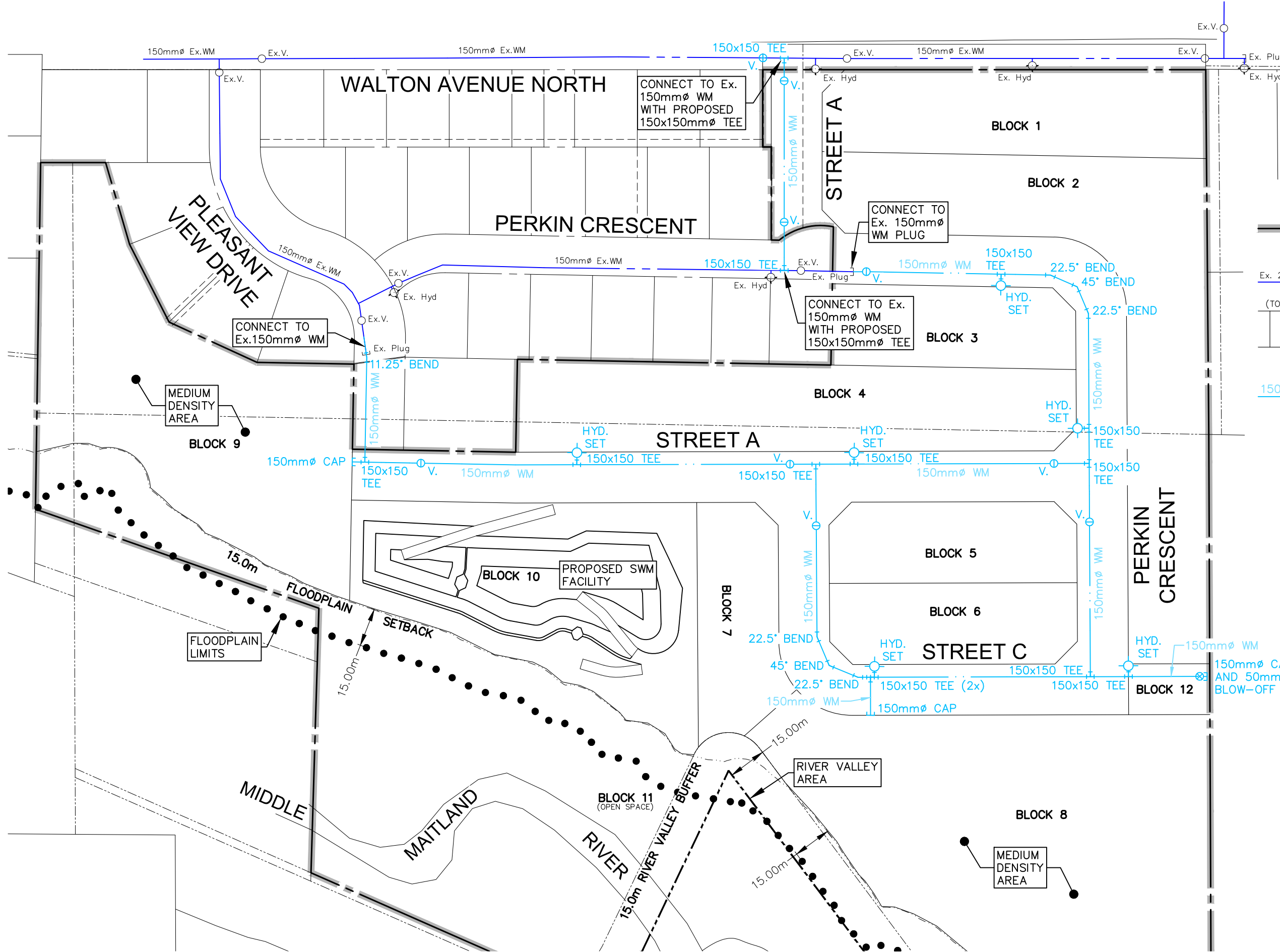


LEGEND

- SITE BOUNDARY
- Ex. 300mm ϕ SAN. Ex. MH
- EXISTING SANITARY SEWER
- (TOP) EMBANKMENT (BOTTOM)
- MH 14.6m-200mm ϕ SAN
- SANITARY SEWER

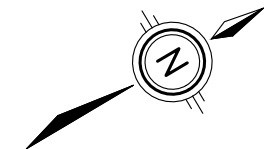



 Engineers, Scientists, Surveyors		
PROJECT WALTON AVENUE SUBDIVISION DESIGN		
TITLE PRELIMINARY SANITARY SERVICING PLAN		
Drawn TNH	Scale 1:1,500	Figure 2.0
Checked JMD	Project No. 60410_001	
Date 2025-03-03	Rev No. 0	



LEGEND

- SITE BOUNDARY
- Ex. WATERMAIN
- PROPOSED EMBANKMENT
- WATERMAIN



 Engineers, Scientists, Surveyors		
PROJECT WALTON AVENUE SUBDIVISION DESIGN		
TITLE PRELIMINARY WATER DISTRIBUTION PLAN		
Drawn TNH	Scale 1:1,500	Figure 3.0
Checked JMD	Project No. 60410_001	
Date 2025-03-03	Rev No. 0	

2.3 Storm Sewer Servicing

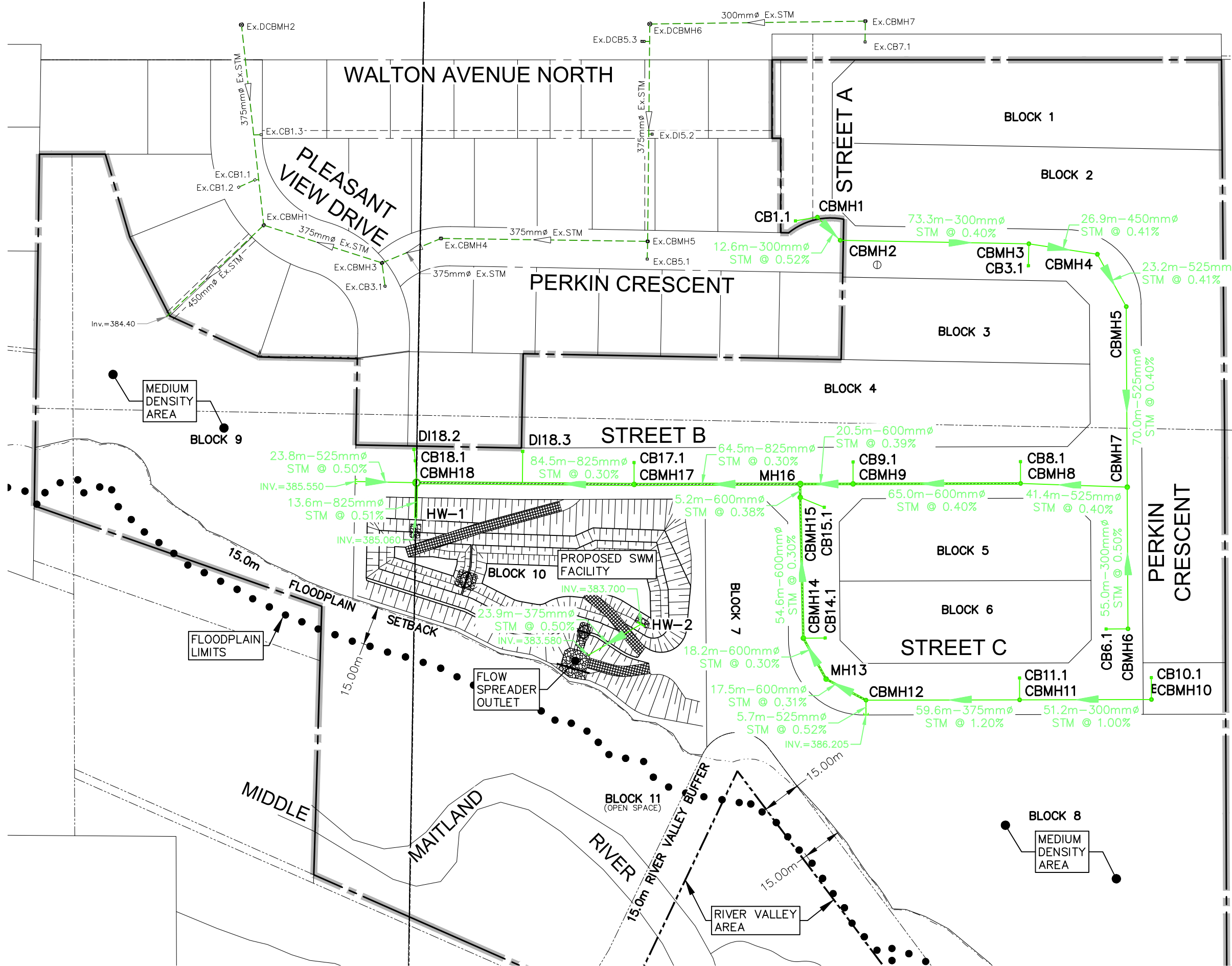
Stormwater runoff from the proposed development will be provided by a combination of minor (sewers) and major (overland flows) drainage systems. Stormwater will be generally directed to the proposed Stormwater Management Facility (SWMF). This facility will discharge the treated storm flows directly to the Middle Maitland River, which runs through the subject property. No connection to any existing storm services is proposed for the development.

The proposed storm sewers will be designed for the 5-year storm event using the City of Stratford I.D.F information with overland flow routes generally following the proposed road allowances. The proposed sewer network has been designed to operate by gravity and is proposed to be constructed at depths of 1.5m to 2.8m below the finished grade elevations.

Flows will generally be directed southeast from Walton Ave North to the proposed Street 'A' road allowance. From there, they will be conveyed southwest to the location of the proposed Stormwater Management Facility (SWMF). The anticipated sizes for the proposed storm sewers range from 300mm to 825mm in diameter. The preliminary storm servicing plan for the proposed development is shown in Figure 4.0 below, and the storm sewer design sheet and drainage areas are detailed in Appendix B.

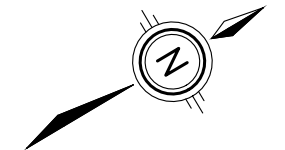
Since no concept plan has been created for the medium density blocks, only limited preliminary servicing details could be prepared for this report. However, each block has been provided with a storm service connection. These connections were sized based on the area and an average runoff coefficient of 0.75. Given the conceptual invert of the proposed stormwater management facility and the existing grades within the medium density blocks, it is assumed that these areas can be serviced by gravity sewers.

Uncontrolled flows from the existing development along Pleasant View Drive and Perkin Crescent are directed to an existing 450mm diameter storm sewer. This existing sewer discharges to a shallow swale that conveys flows overland through the middle of Block 9 to the Middle Maitland River. The concept plan for the medium-density block (Block 9) will be designed to ensure that these flows can continue to be conveyed to the Middle Maitland River without control.



LEGEND

- SITE BOUNDARY
- Ex. 375mm ϕ STM, Ex. MH EXISTING STORM SEWER
- (TOP) 3:1 (BOTTOM) PROPOSED EMBANKMENT
- MH 21.3m-300mm ϕ STM STORM SEWER



PROJECT
**WALTON AVENUE
SUBDIVISION DESIGN**

TITLE
**PRELIMINARY STORM
SERVICING PLAN**

Drawn	TNH	Scale	1:1,500	Figure 4.0
Checked	JMD	Project No.	60410_001	
Date	2025-03-03	Rev No.	0	

3.0 STORMWATER MANAGEMENT

3.1 Allowable/Pre-development Conditions

The existing land use for the subject property is a combination of active agricultural lands, and riverbank and floodplain lands for the Middle Maitland River. The subject lands generally slope from Walton Ave North to the east towards the banks of the Middle Maitland River at overland slopes ranging from 1.0% to 8.0%. The resulting flows will generally be sheet flows, but several existing shallow flow paths to the top of bank have been created over time. After entering the Middle Maitland River, flows continue downstream to the southwest towards the center of the Town of Listowel. At the location of the development lands, the Middle Maitland River has a total of 66.16ha of upstream drainage area.

As stated earlier, a portion of the subject property is located within floodplain hazard lands. The limits of the floodplain and it's associated setback have been provided by the MVCA and are shown on the figures.

It is also assumed that no development will be allowed within 15.0m of the floodplain limits. The conceptual plan has limited all development to this boundary.

3.2 Post-development Conditions

It is assumed that the stormwater runoff for the development will be controlled to each storm event's corresponding pre-development flow rate.

In order to achieve this stormwater management objective, the runoff generated by the proposed development will be directed to the proposed SWMF located above the bank of the Middle Maitland River. It is anticipated that a large portion of the development (both the single-family lots and the medium density block) will be able to convey flows to the facility, as the facility is proposed to be placed at an existing low point in the existing drainage pattern. This Facility will be controlled by an orifice and weir combination. Refer to the Stormwater Management Report prepared by MTE Consultants Inc. and submitted under a separate cover.

3.3 Water Quality Control

It is anticipated that the MVCA will also require stormwater quality controls to obtain a minimum of an Enhanced Level of quality control as defined by the Ministry of the Environment, Conservation, and Parks (MECP). An Enhanced Level of quality control is defined by the MECP as removing 80% of the total suspended solids within the stormwater discharge. This could be achieved through the installation of an oil-grit separator (OGS) unit, or the installation of a wet pond facility designed in accordance with the MECP design manuals. Low-impact development (LID) practices such as enhanced swales could also provide a portion of the required quality control. Refer to the Stormwater Management Report prepared by MTE Consultants Inc. and submitted under a separate cover for more details.

4.0 PRELIMINARY GRADING DESIGN

4.1 Lot Grading Design

Access to the proposed development will be provided by extending Pleasant View Drive and Perkin Crescent, and by connecting to Walton Ave North.

Preliminary centerline road grades for the proposed roadways will most likely range from 0.50% (minimum) to 2.00% (maximum) while private road grades within the medium density blocks will most likely range from 0.50% to 3.00%. These grades will generally slope towards the southwest or southeast towards the proposed SWM Facility. Some lands will direct flows to the existing river valley as uncontrolled flows. Refer to Figure 5.0 below for an illustration of the conceptual site grading design.

The proposed roadways (Pleasant View Drive, Perkin Crescent, Street 'A', and Street 'B') will be constructed to a full urban cross-section including asphalt pavement, concrete curb and gutters, concrete sidewalks, roadway illumination and boulevard landscaping all in accordance with the standards of the Municipality of North Perth wherever feasible. Proposed pavement structures are summarized in Table 4.1 below.

Table 4.1: Preliminary Pavement Structure

Pavement Structure Component	Component Design Depth (mm)	
	Municipal ROWs	Private Roadways
Surface Asphalt (HL-3)	40*	40*
Base Asphalt (HL-8)	50*	50*
Granular 'A' Base	150*	150*
Granular 'B' Sub-base	450*	450*

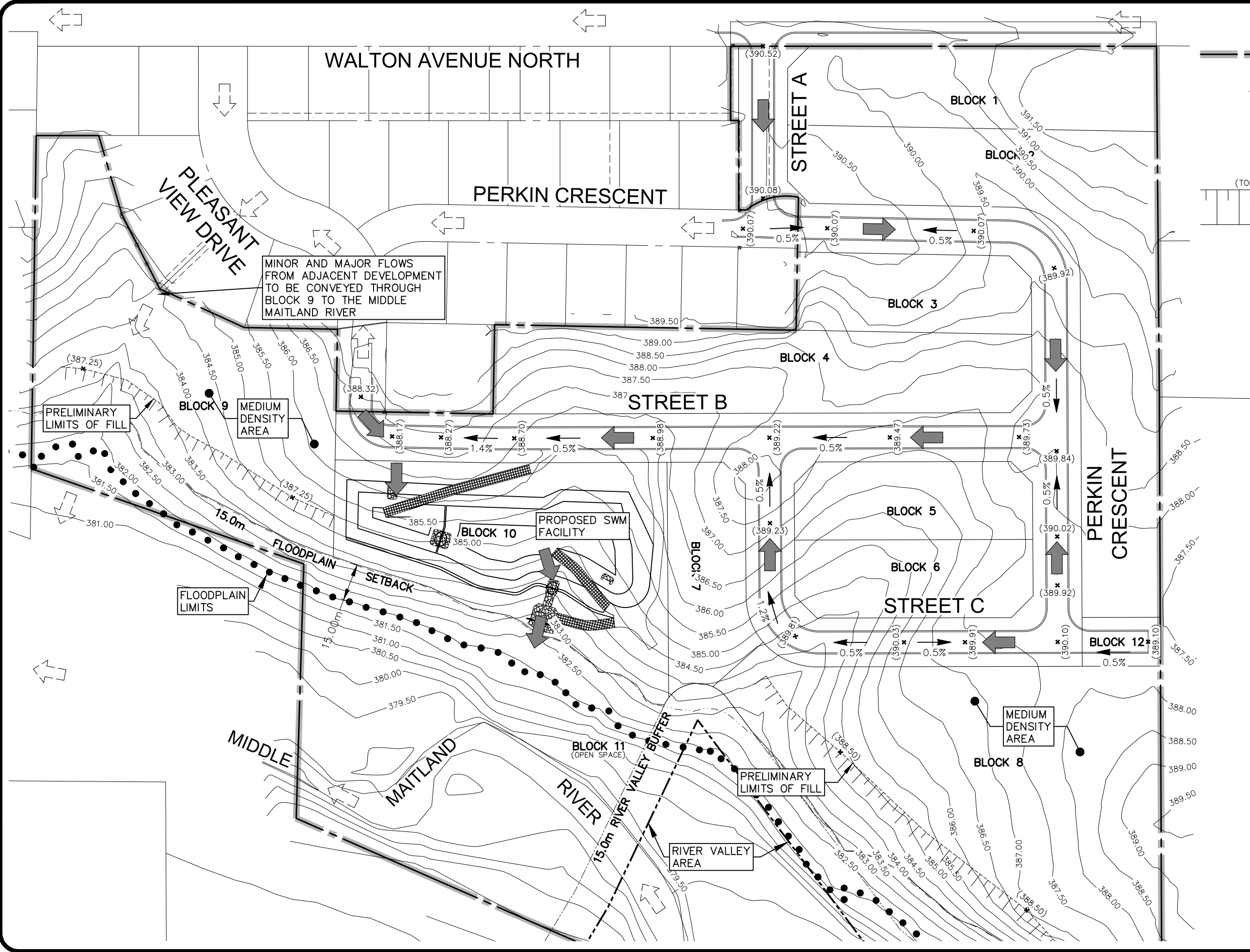
*A geotechnical investigation is required to provide the pavement structure design based on site characteristics

Preliminary lot grades will range from 2.0% (minimum) to approximately 3.0% with a combination of back-to-front type drainage lots, split drainage lots, and walkout type split drainage lots. Figure 5.0 illustrates the preliminary road and lot grading design. Together with the centerline road grades, the development's lot grading will be designed to generally meet the following criteria:

- Match existing road grades at the subdivision access;
- Match existing grades around the perimeter of the development;
- Ensure adequate cover is provided over municipal services;
- Ensure 'major' overland flow routes are directed to the proposed SWM facility and the downstream outlets as shown in Figure 5.0; and
- Comply with the current municipal standards for minimum and maximum road grades and for various other lot grading specifications including minimum and maximum grades and rear-yard swale widths, depths, and slopes.

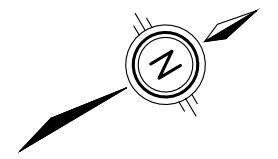
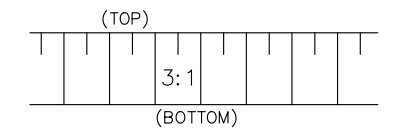
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Plot Date: March 3, 2025 - 10:02 AM



LEGEND

- SITE BOUNDARY
- Ex. CONTOURS
- Ex. OVERLAND FLOW ROUTE (MAJOR STORM)
- OVERLAND FLOW ROUTE (MAJOR STORM)
- PROPOSED EMBANKMENT



PROJECT			5.0
WALTON AVENUE SUBDIVISION DESIGN			
TITLE			5.0
PRELIMINARY ROAD DRAINAGE PLAN			
Drawn	Scale	Figure	
TNH	1:1,500		
Checked	Project No.		
JMD	60410_001		
Date	Rev No.		
2025-03-03	0		

4.2 Preliminary Cut-Fill Analysis

In conjunction with the preliminary lot grading design, a cut-fill analysis has been completed for the Residential Block portion of the development. Grading for the medium density blocks was assumed to be relatively flat at elevations that will provide a minimum amount of cover over the proposed storm sewer services. Some other assumptions are included in the following list.

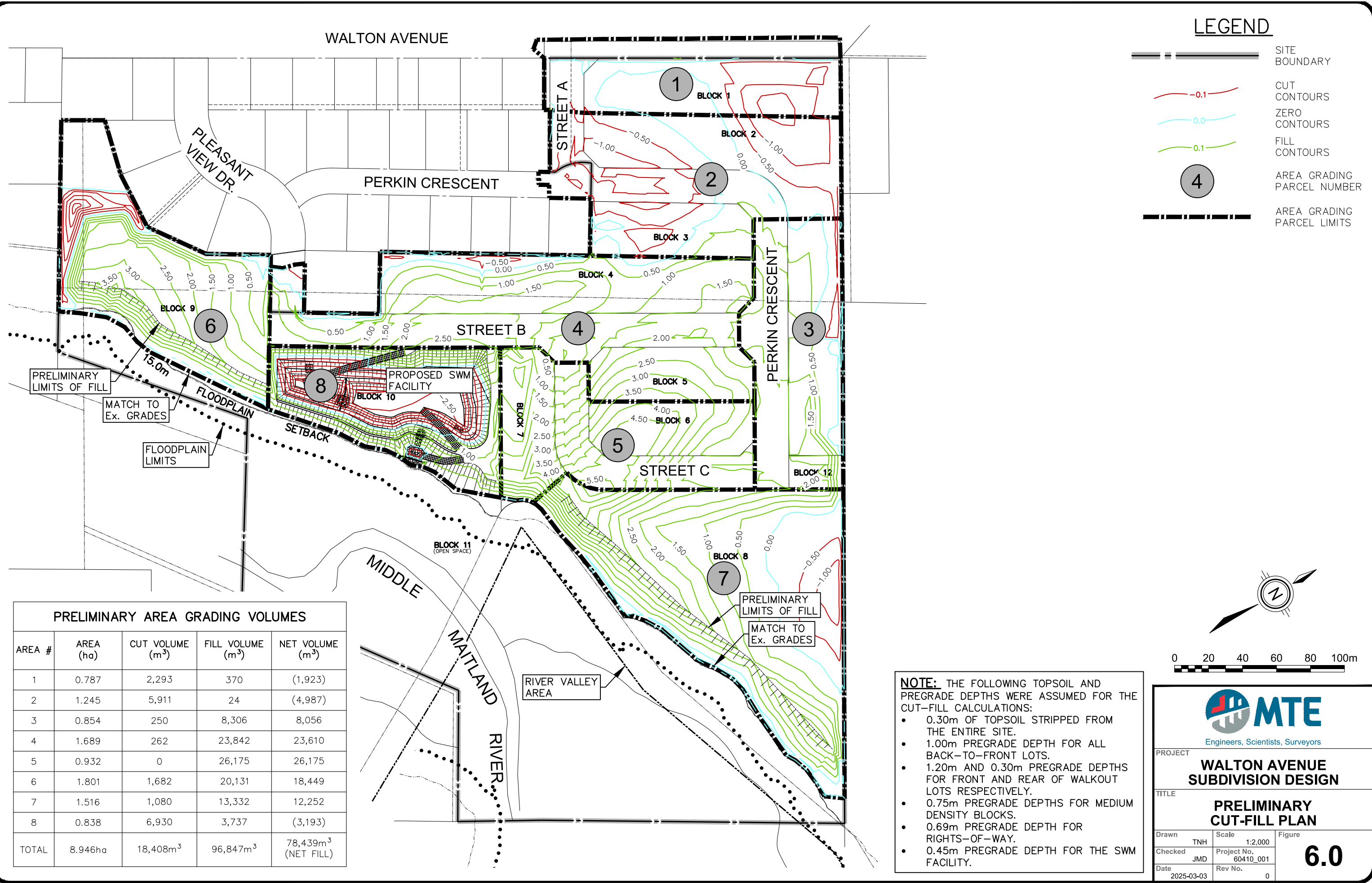
- The existing soils include 0.30m of topsoil that will be stripped prior to area grading.
- The proposed Residential Blocks have pre-grade depths of 1.0m for the back-to-front and split drainage type lots, and depths of 1.25m and 0.30m for the front and back of the walkout lots, respectively.
- The proposed medium density blocks have pre-grade depths of 0.8m.
- The proposed rights-of-ways have a pre-grade depth of 0.69m including sewer spoils.

The results of the calculations and above assumptions are summarized in Table 4.2 below. It is noted that there may be additional fill material available generated from the construction of the proposed SWM facility. However, this depends on the location of the existing ground water conditions.

Table 4.2: Summary of Preliminary Cut-fill Analysis

Area #	Area Description	Area (ha)	Cut (m ³)	Fill (m ³)	Net (m ³)
1	Lots fronting Walton Ave N	0.787	2,293	370	(1,923)
2	North portion of Lots fronting Perkin Crescent	1.245	5,911	924	(4,987)
3	South portion of Lots fronting Perkin Crescent	0.854	250	8,306	8,056
4	Lots fronting Street B	1.689	262	23,872	23,610
5	Lots fronting Street C	0.932	0	26,175	26,175
6	Medium Density Block 8	1.801	1,682	20,131	18,449
7	Medium Density Block 9	1.516	1,080	13,332	12,252
8	Stormwater Management Block 10	0.838	6,930	3,737	(3,193)
TOTAL		8.946	18,408	96,847	78,439 (Net Fill)

Volumes in brackets (100m³) illustrate a net removal of material (Cut)

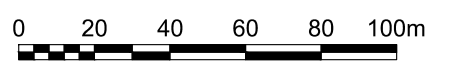
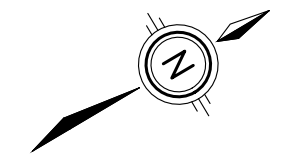


PRELIMINARY AREA GRADING VOLUMES

AREA #	AREA (ha)	CUT VOLUME (m ³)	FILL VOLUME (m ³)	NET VOLUME (m ³)
1	0.787	2,293	370	(1,923)
2	1.245	5,911	24	(4,987)
3	0.854	250	8,306	8,056
4	1.689	262	23,842	23,610
5	0.932	0	26,175	26,175
6	1.801	1,682	20,131	18,449
7	1.516	1,080	13,332	12,252
8	0.838	6,930	3,737	(3,193)
TOTAL	8.946ha	18,408m ³	96,847m ³	78,439m ³ (NET FILL)

NOTE: THE FOLLOWING TOPSOIL AND PREGRADE DEPTHS WERE ASSUMED FOR THE CUT-FILL CALCULATIONS:

- 0.30m OF TOPSOIL STRIPPED FROM THE ENTIRE SITE.
- 1.00m PREGRADE DEPTH FOR ALL BACK-TO-FRONT LOTS.
- 1.20m AND 0.30m PREGRADE DEPTHS FOR FRONT AND REAR OF WALKOUT LOTS RESPECTIVELY.
- 0.75m PREGRADE DEPTHS FOR MEDIUM DENSITY BLOCKS.
- 0.69m PREGRADE DEPTH FOR RIGHTS-OF-WAY.
- 0.45m PREGRADE DEPTH FOR THE SWM FACILITY.



PROJECT		WALTON AVENUE SUBDIVISION DESIGN	
TITLE		PRELIMINARY CUT-FILL PLAN	
Drawn	TNH	Scale	1:2,000
Checked	JMD	Project No.	60410_001
Date	2025-03-03	Rev No.	0
			6.0

5.0 UTILITY SERVICING

Utility servicing of the proposed development will be completed through the connection to and the extension of existing services along Walton Ave North, Pleasant View Drive, and Perkin Crescent. An application will be made to Hydro One during the detailed design stage for hydro servicing. Wightman Telecom (telephone and internet services), Bell Canada (telephone and internet services), and Enbridge Gas (natural gas) servicing will also be coordinated during the detailed design phase.

6.0 SUMMARY

Based on the foregoing analysis, the main findings of the functional servicing report for the proposed development are:

- The proposed development can be adequately serviced for storm and water through the extension of municipal watermains and the installation of storm sewers.
- Residential Blocks 1 through 7 can be adequately serviced for sanitary through the extension of gravity sewers.
- The sanitary sewage generated from the development will be conveyed to the existing 200mm sewers within Walton Ave North. Downstream sewers will need to be verified for adequate capacity for the proposed development.
- Two sanitary lift stations will need to be constructed, one to service Block 8 and the other for Block 9.
- Water supply for the proposed development will be provided by connections to the existing distribution system within Walton Ave North, Pleasant View Drive, and Perkin Crescent.
- The stormwater management quantity control requirements for the proposed development can be accommodated by a proposed dry pond.
- The stormwater quality control requirements for the proposed development can be achieved by the construction of a wet pond.
- Overall site grading will provide for 'major' overland flow conveyances along the proposed rights-of-way and will provide adequate cover over municipal servicing. Site grading will generally match existing road and boundary grades with appropriate slopes.

All of which is respectfully submitted,

MTE Consultants Inc.



Travis Hanko, E.I.T.

Designer

519-271-7952 ext. 2348

thanko@mte85.com



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Manager, Civil Engineering

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jdick@mte85.com

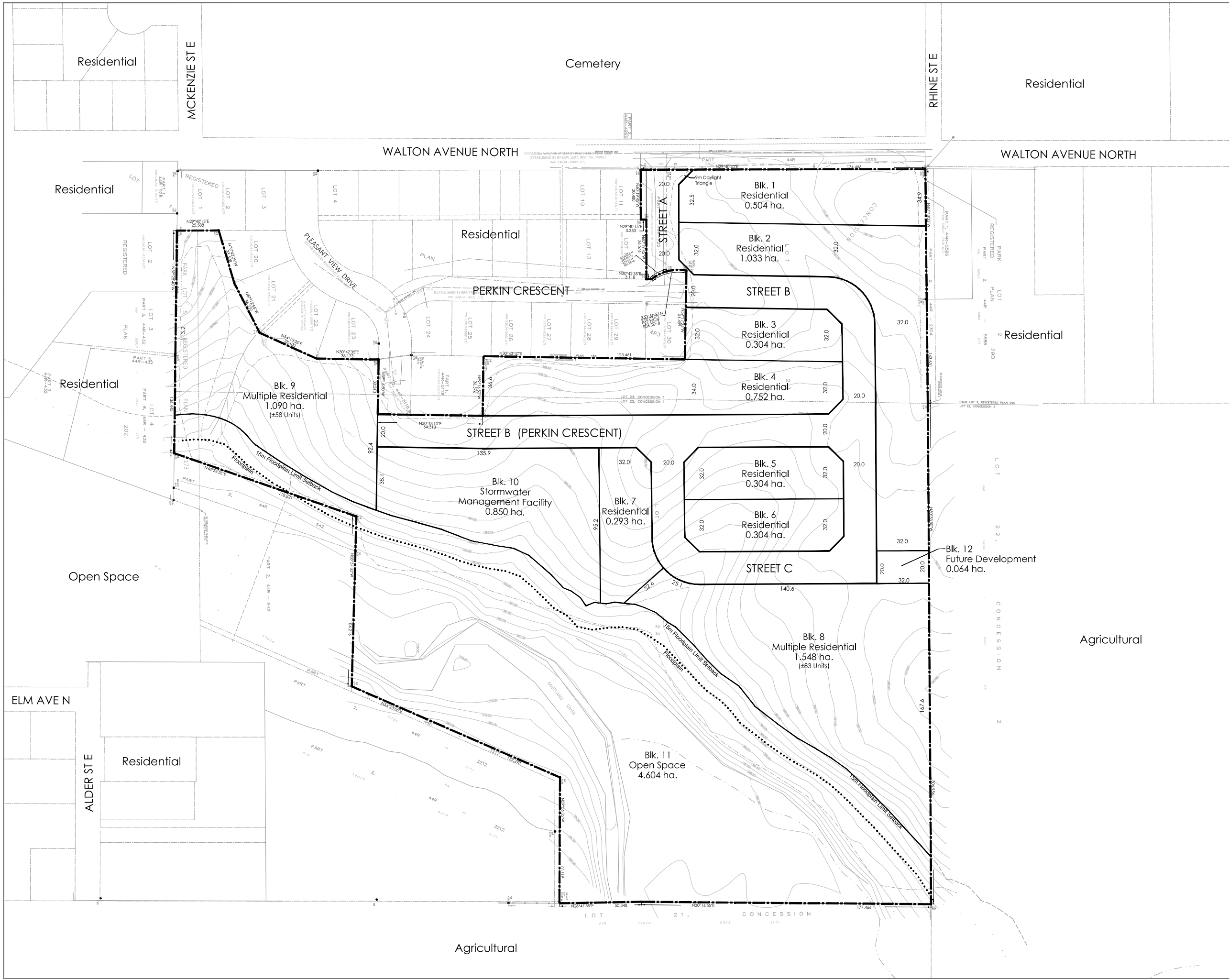
TNH:cmb

Cc: Emily Elliott - MHBC Planning, Urban Design & Landscape Architecture

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Appendix A

Draft Plan of Subdivision (Reduced)



DRAFT PLAN OF SUBDIVISION

Legal Description
 PART OF LOTS 22 & 23, CONCESSION 1
 AND PART OF PARK LOT 5, REGISTERED PLAN 173
 TOWNSHIP OF WALLACE, NOW IN THE TOWN OF LISTOWEL
 COUNTY OF PERTH

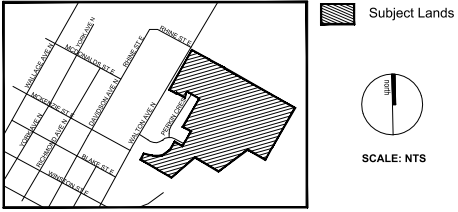
Owner's Certificate
 I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED
 TO SUBMIT THIS PLAN FOR APPROVAL.

DATE: _____ OWNER: _____

Surveyor's Certificate
 I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND
 THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE: _____ ONTARIO LAND SURVEYOR: _____

Key Plan



**Additional Information Required Under Section 51(17) of the Planning Act
 R.S.O. 1990, c.P.13 as Amended**

A. AS SHOWN	B. AS SHOWN	C. AS SHOWN
D. AS SHOWN	E. AS SHOWN	F. NONE
G. AS SHOWN	H. MUNICIPAL WATER SUPPLY	I. SILT/LOAM
J. AS SHOWN	K. ALL SERVICES AS REQUIRED	L. AS SHOWN

Area Schedule

Description	Block	Area (ha)	Units
Residential	1-7	3,494	±67
Multiple Residential	8, 9	2,638	±141
Stormwater Management Facility	10	0,850	
Open Space	11	4,604	
Future Development	12	0,064	
Roads		1,640	
TOTAL	12	13,290	±208

No.	Date	Issued / Revision	By
1.	Jan. 22, 2025	Preliminary Draft Plan	SP

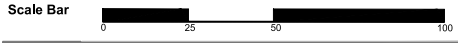
Notes
 1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
 2. PROPERTY BOUNDARY PREPARED BY MTE CONSULTANTS INC.
 3. TOPOGRAPHIC SURVEY PREPARED BY VAN HARTEN, DEC. 12, 2024.
 4. PARCEL FABRIC ARE APPROXIMATE/ FOR INFORMATION PURPOSES ONLY.
 5. DAYLIGHT TRIANGLE 9.0 METRE.



Approval Stamp	Date	January 22, 2025
	File No.	15188M
	Plan Scale	1:1,000 (Arch D)
	Drawn By	SP
	Checked By	XX

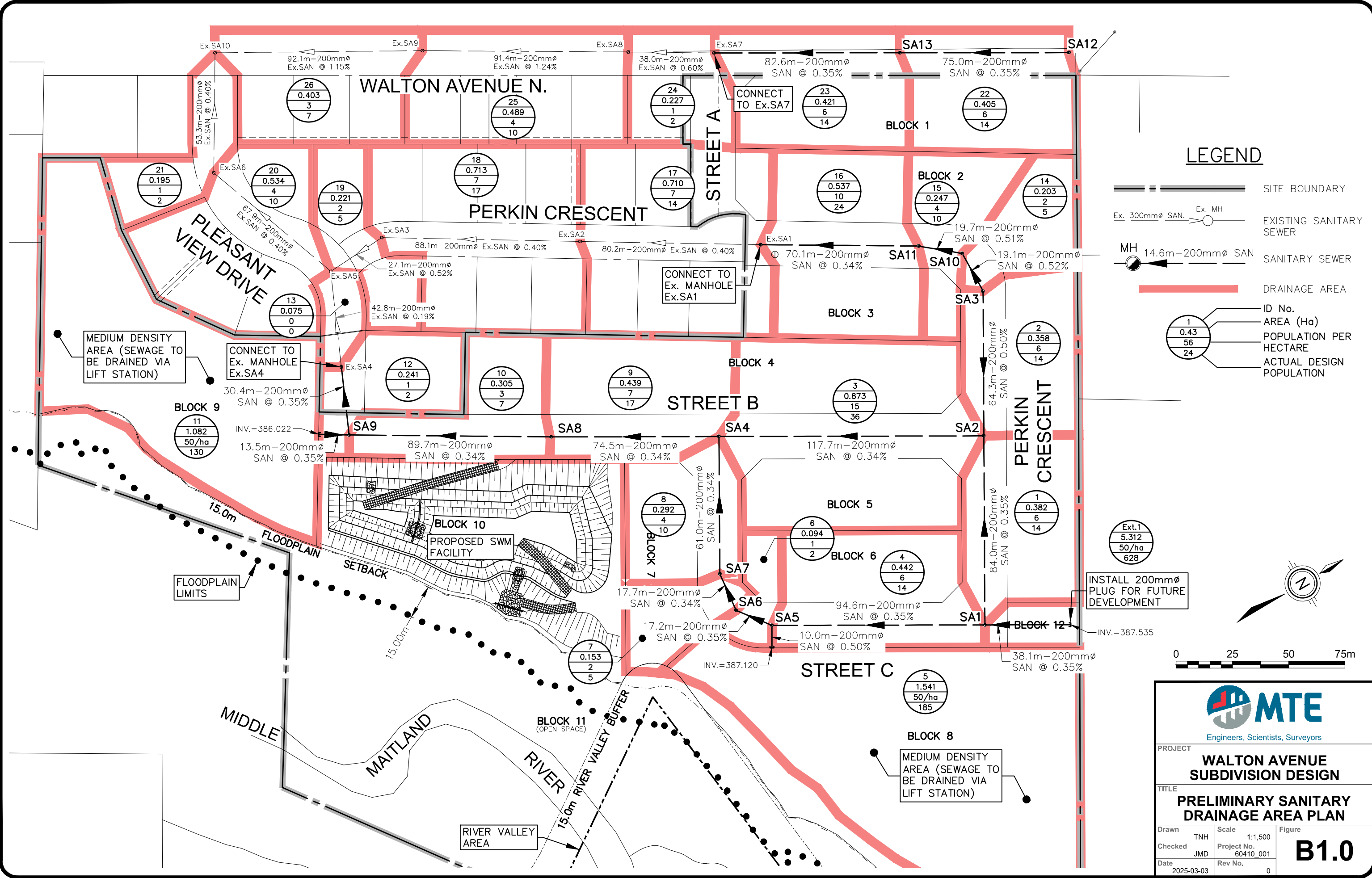
Project
 Walton Ave North
 Town of Listowel
 Municipality of North Perth

File Name: **Draft Plan of Subdivision** Dwg No. 1 of 1



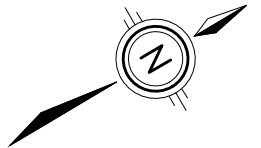
Appendix B


Preliminary Drainage Area Plans



LEGEND

- SITE BOUNDARY
- Ex. 300mmø SAN. Ex. MH
- EXISTING SANITARY SEWER
- MH 14.6m-200mmø SAN
- SANITARY SEWER
- DRAINAGE AREA
- ID No.
AREA (Ha)
POPULATION PER HECTARE
ACTUAL DESIGN POPULATION





MTE
Engineers, Scientists, Surveyors

PROJECT		
WALTON AVENUE SUBDIVISION DESIGN		
TITLE		
PRELIMINARY SANITARY DRAINAGE AREA PLAN		
Drawn	Scale	Figure
TNH	1:1,500	B1.0
Checked	Project No.	
JMD	60410_001	
Date	Rev No.	
2025-03-03	0	

MEDIUM DENSITY AREA (SEWAGE TO BE DRAINED VIA LIFT STATION)

CONNECT TO Ex. MANHOLE Ex.SA4

CONNECT TO Ex. MANHOLE Ex.SA1

INSTALL 200mmø PLUG FOR FUTURE DEVELOPMENT

PROPOSED SWM FACILITY

MEDIUM DENSITY AREA (SEWAGE TO BE DRAINED VIA LIFT STATION)

Walton Avenue Subdivision
SANITARY SEWER DESIGN SHEET
 Listowel, ON



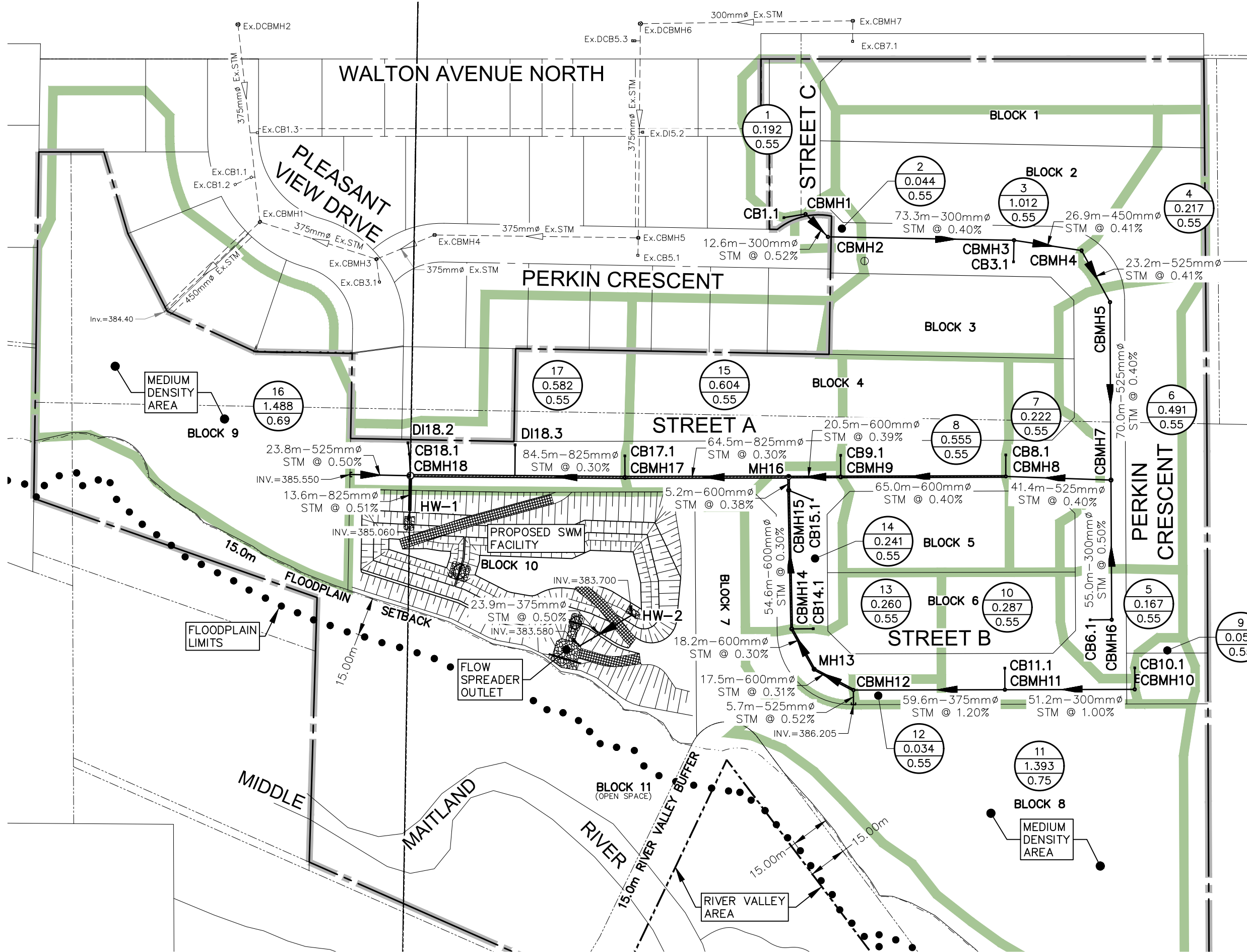
AVERAGE RESIDENTIAL RATE = **0.004** l/s/cap (345.6 l/d/cap)
 INDUSTRIAL RATE = **0.50** l/s/ha
 COMMERCIAL RATE = **1.15** l/s/ha
 INSTITUTIONAL RATE = **1.00** l/s/ha
 AVERAGE INFILTRATION RATE = **0.10** l/s/ha
 AVERAGE PEOPLE PER UNIT = **2.40** people/unit

DESIGN PARAMETERS
 RESIDENTIAL HARMON PEAKING FACTOR (PF)
 n = 0.013
 Vmax = **3.0** m/sec (peak flow)
 Vmin = **0.6** m/sec (peak flow)
 INFILTRATION RATE = **0.10** l/s/ha

Harmon Peaking Formula
 $PF = 1 + \frac{14}{4 + (P)^{0.50}}$
 P = (Population)/1000

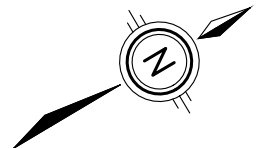
SHEET NO. 1 of 1
 JOB No.: 60410_001
 CALCULATED BY: TNH
 CHECKED BY: JMD
 DATE: February 14, 2025
 REVISED: n/a
 FILE: Q:\60410_001\Sanitary\60410_001_Sanitary Design Sheet_Rev-00.xlsx


LOCATION				RESIDENTIAL FLOWS (0.004 L/s/person)						INFILTRATION (0.26 L/s/ha)			SEWER DESIGN											
Street	Area No.	From MH	To MH	POPULATION DENSITY						Area	Accum. Area	Infiltration Flow	Total Flow	Length	Slope	Size	Capacity	Full Flow Velocity	Actual Velocity	Fall in Sewer	Drop in MH	U.S. Invert	D.S. Invert	
				Area	# Of Units (by count)	# of Units (Units/ha)	Pop.	Accum. Pop.	Peaking Factor "PF"															Peak Residential Flow
Street 'C'	Ext.1	Plug	SA1	5.312		5.233	628	628	3.92	9.85	5.312	5.312	0.53	10.38	38.1	0.35	200	19.51	0.62	0.63	0.14	--	387.535	387.400
				<i>*Population set from downstream maximum pipe capacity of 95% (Walton Avenue N.)</i>																				
Perkin Crescent	1	SA1	SA2	0.382	6		14	642	3.92	10.06	0.382	5.695	0.57	10.63	84.0	0.35	200	19.27	0.61	0.62	0.29	0.060	387.340	387.050
Perkin Crescent	2	SA3	SA2	0.358	6		14	14	4.40	0.25	0.358	0.358	0.04	0.28	64.3	0.50	200	23.13	0.74	0.25	0.32	--	387.370	387.050
Street 'A'	3	SA2	SA4	0.873	15		36	692	3.90	10.79	0.873	6.925	0.69	11.48	117.7	0.34	200	19.11	0.61	0.63	0.40	0.060	386.990	386.590
Street 'C'	4	SA1	SA5	0.442	6		14	14	4.40	0.25	0.442	0.442	0.04	0.29	94.6	0.35	200	19.36	0.62	0.22	0.33	--	387.370	387.040
Medium Density Block	5	Plug	SA5	1.541		1.541	185	185	4.16	3.08	1.541	1.541	0.15	3.23	10.0	0.50	200	23.18	0.74	0.52	0.05	--	387.120	387.070
Street 'C'	6	SA5	SA6	0.094	1		2	201	4.15	3.33	0.094	2.078	0.21	3.54	17.2	0.35	200	19.36	0.62	0.47	0.06	0.030	387.010	386.950
Street 'C'	7	SA6	SA7	0.153	2		5	206	4.14	3.41	0.153	2.231	0.22	3.64	17.7	0.34	200	19.06	0.61	0.47	0.06	0.030	386.920	386.860
Street 'C'	8	SA7	SA4	0.292	4		10	216	4.14	3.57	0.292	2.524	0.25	3.83	61.0	0.34	200	19.23	0.61	0.48	0.21	0.030	386.830	386.620
Street 'A'	9	SA4	SA8	0.439	7		17	925	3.82	14.14	0.439	9.888	0.99	15.13	74.5	0.34	200	18.99	0.60	0.67	0.25	0.030	386.560	386.310
Street 'A'	10	SA8	SA9	0.305	3		7	932	3.82	14.24	0.305	10.193	1.02	15.26	89.7	0.34	200	19.11	0.61	0.68	0.30	0.030	386.280	385.975
Medium Density Block	11	Plug	SA9	1.082		1.082	130	130	4.21	2.19	1.082	1.082	0.11	2.30	13.5	0.50	200	23.29	0.74	0.47	0.07	--	386.043	385.975
Pleasant View Drive	12	SA9	Ex.SA4	0.241	1		2	1064	3.78	16.10	0.241	11.516	1.15	17.25	30.4	0.35	200	19.27	0.61	0.69	0.11	0.060	385.915	385.810
Pleasant View Drive	13	Ex.SA4	Ex.SA5	0.075	0		0	1064	3.78	16.10	0.075	11.591	1.16	17.26	42.8	0.38	200	20.23	0.64	0.72	0.08	0.030	385.780	385.700
Perkin Crescent	14	SA3	SA10	0.203	2		5	5	4.44	0.09	0.203	0.203	0.02	0.11	19.1	0.52	200	23.70	0.75	0.19	0.10	--	386.940	386.840
Perkin Crescent	15	SA10	SA11	0.247	4		10	15	4.40	0.26	0.247	0.450	0.04	0.31	19.7	0.51	200	23.37	0.74	0.26	0.10	0.000	386.840	386.740
Perkin Crescent	16	SA11	Ex.SA1	0.537	10		24	39	4.34	0.68	0.537	0.987	0.10	0.78	70.1	0.35	200	19.37	0.62	0.30	0.24	0.030	386.710	386.470
Perkin Crescent	17	Ex.SA1	Ex.SA2	0.710	7		17	56	4.30	0.96	0.710	1.697	0.17	1.13	80.2	0.40	200	20.70	0.66	0.35	0.32	0.060	386.410	386.090
Perkin Crescent	18	Ex.SA2	Ex.SA3	0.713	7		17	73	4.28	1.25	0.713	2.410	0.24	1.49	88.1	0.40	200	20.66	0.66	0.38	0.35	0.030	386.060	385.710
Perkin Crescent	19	Ex.SA3	Ex.SA5	0.221	2		5	78	4.27	1.33	0.221	2.631	0.26	1.60	27.1	0.52	200	23.56	0.75	0.43	0.14	0.010	385.700	385.560
Pleasant View Drive	20	Ex.SA5	Ex.SA6	0.534	4		10	1152	3.76	17.32	0.534	14.756	1.48	18.80	67.9	0.40	200	20.67	0.66	0.75	0.27	0.240	385.460	385.190
Pleasant View Drive	21	Ex.SA6	Ex.SA10	0.195	1		2	1154	3.76	17.35	0.195	14.951	1.50	18.85	53.3	0.40	200	20.82	0.66	0.75	0.22	0.030	385.160	384.945
Walton Avenue N.	22	SA12	SA13	0.405	6		14	14	4.40	0.25	0.405	0.405	0.04	0.29	75.0	0.35	200	19.30	0.61	0.22	0.26	--	388.180	387.920
Walton Avenue N.	23	SA13	Ex.SA7	0.421	6		14	28	4.36	0.49	0.421	0.826	0.08	0.57	82.2	0.35	200	19.47	0.62	0.27	0.29	0.030	387.890	387.600
Walton Avenue N.	24	Ex.SA7	Ex.SA8	0.227	1		2	30	4.35	0.52	0.227	1.053	0.11	0.63	38.5	0.60	200	25.35	0.81	0.34	0.23	0.040	387.560	387.330
Walton Avenue N.	25	Ex.SA8	Ex.SA9	0.489	4		10	40	4.33	0.69	0.489	1.542	0.15	0.85	91.4	1.24	200	36.45	1.16	0.48	1.13	0.020	387.310	386.180
Walton Avenue N.	26	Ex.SA9	Ex.SA10	0.403	3		7	47	4.32	0.81	0.403	1.945	0.19	1.01	92.1	1.15	200	35.22	1.12	0.49	1.06	0.030	386.150	385.087
Walton Avenue N.	--	Ex.SA10	Downstream	0.000	0		0	1201	3.75	18.00	0.000	16.896	1.69	19.69	69.5	0.40	200	20.73	0.66	0.75	0.00			



LEGEND

- SITE BOUNDARY
- Ex. 375mm ϕ STM. Ex. MH
- (TOP) PROPOSED EMBANKMENT
- (BOTTOM)
- MH 21.3m-300mm ϕ STM
- DRAINAGE AREA
- ID No.
- AREA (Ha)
- RUNOFF COEFFICIENT





MTE
Engineers, Scientists, Surveyors

PROJECT		
WALTON AVENUE SUBDIVISION DESIGN		
TITLE		
PRELIMINARY STORM DRAINAGE AREA PLAN		
Drawn	Scale	Figure
TNH	1:1,500	B2.0
Checked	Project No.	
JMD	60410_001	
Date	Rev No.	
2025-03-03	0	

WALTON AVE. SUBDIVISION
Listowel, ON
Storm Sewer Design Sheet

Project No.: 60410_100
Design By: TNH
Check'd by: JMD
Date: February 14, 2025
Revised : --N/A--

MUNICIPALITY OF NORTH PERTH
ENGINEERING & PUBLIC WORKS
STORM SEWER DESIGN SHEET

5 Year Storm
Intensity = $a/(Tc+b)^c$
 $Q=2.78CIA/1000$
a = **875.105**
b = **7.641**
c = **0.762**

Manning's "n" : **0.013**
Initial Entry time: **15 min**
Velocities
0.6 m/sec minimum
6.0 m/sec maximum



Q:\60410_001\Storm\60410_100_Storm Design Sheet_Rev-00.xlsx

STREET	AREA ID	FROM MH	TO MH	AREA A (ha.)	CUMUL. AREA (ha.)	RUNOFF COEFF "C"	A x C	ACCUM. A X C	CONCENTRATION TIME (Tc)		RAIN INTENSITY (mm/hr)	FLOW Q (m³/sec)	PIPE SIZE (mm)	LENGTH (m)	SLOPE (%)	CAPACITY (m³/sec)	FULL FLOW VELOCITY (m/sec)	ACTUAL VELOCITY (m/sec)	REMARKS	FALL IN SEWER	DROP IN MANHOLE	INV. U.S	INV. D.S
									IN PIPE (min.)	TOTAL (min.)													
Street 'B'	1	CBMH1	CBMH2	0.192	0.192	0.55	0.11	0.11		15.00	81.21	0.024	300	12.61	0.52	0.069	0.982	0.891		0.065	--	388.645	388.580
Perkin Crescent	2	CBMH2	CBMH3	0.044	0.237	0.55	0.02	0.13	0.21	15.21	80.63	0.029	300	73.26	0.30	0.053	0.751	0.769		0.221	0.000	388.580	388.290
Perkin Crescent	3	CBMH3	CBMH4	1.012	1.249	0.55	0.56	0.69	1.63	16.84	76.52	0.146	450	26.91	0.33	0.163	1.026	1.160		0.088	0.150	388.140	388.030
Perkin Crescent	4	CBMH4	CBMH5	0.217	1.466	0.55	0.12	0.81	0.44	17.28	75.50	0.169	525	23.20	0.32	0.245	1.131	1.220		0.075	0.075	387.955	387.860
Perkin Crescent	--	CBMH5	CBMH7	0.000	1.466	0.20	0.00	0.81	0.34	17.62	74.72	0.167	525	70.05	0.40	0.272	1.255	1.320		0.279	0.000	387.860	387.580
									0.93	18.55													
Perkin Crescent	5	CBMH6	CBMH7	0.167	0.167	0.55	0.09	0.09		15.00	81.21	0.021	300	55.00	0.40	0.061	0.865	0.782		0.220	--	388.080	387.805
									1.06	16.06													
Street 'A'	6	CBMH7	CBMH8	0.491	2.124	0.55	0.27	1.17		18.55	72.68	0.236	525	41.43	0.40	0.271	1.254	1.412		0.165	0.000	387.580	387.415
Street 'A'	7	CBMH8	CBMH9	0.222	2.346	0.55	0.12	1.29	0.55	19.10	71.54	0.257	600	65.00	0.40	0.388	1.373	1.467		0.260	0.075	387.340	387.080
Street 'A'	8	CBMH9	MH16	0.555	2.901	0.55	0.31	1.60	0.79	19.89	69.97	0.310	600	20.54	0.39	0.383	1.355	1.509		0.080	0.000	387.080	387.000
									0.25	20.14													
Street 'C'	9	CBMH10	CBMH11	0.054	0.054	0.55	0.03	0.03		15.00	81.21	0.007	300	51.17	0.50	0.068	0.966	0.615		0.255	--	388.200	387.945
Street 'C'	10	CBMH11	CBMH12	0.287	0.341	0.55	0.16	0.19	0.88	15.88	78.88	0.041	300	59.64	0.50	0.069	0.970	1.014		0.300	--	387.870	387.570
									1.02	16.91													
Medium Density Block XX	11	Plug-XX	CBMH12	1.393	1.393	0.75	1.04	1.04		15.00	81.21	0.236	525	5.75	0.52	0.311	1.435	1.579	Block XX	0.030	--	386.205	386.175
									0.07	15.07													
Street 'C'	12	CBMH12	MH13	0.034	1.769	0.55	0.02	1.25		15.07	81.03	0.282	600	17.52	0.31	0.344	1.217	1.357		0.055	1.470	386.100	386.045
Street 'C'	--	MH13	CBMH14	0.000	1.769	0.20	0.00	1.25	0.24	15.31	80.38	0.280	600	18.16	0.30	0.338	1.195	1.335		0.055	0.030	386.015	385.960
Street 'C'	13	CBMH14	CBMH15	0.260	2.029	0.55	0.14	1.39	0.25	15.56	79.72	0.309	600	54.60	0.30	0.338	1.194	1.354		0.165	0.000	385.960	385.795
Street 'C'	14	CBMH15	MH16	0.241	2.270	0.55	0.13	1.53	0.76	16.32	77.78	0.330	600	5.22	0.38	0.380	1.345	1.514		0.020	0.000	385.795	385.775
									0.76	16.32													
Street 'A'	--	MH16	CBMH17	0.000	5.171	0.20	0.00	3.12		20.14	69.49	0.603	825	64.46	0.30	0.789	1.477	1.627		0.195	0.200	385.575	385.380
Street 'A'	15	CBMH17	CBMH18	0.604	5.775	0.55	0.33	3.46	0.73	20.87	68.13	0.654	825	84.49	0.30	0.781	1.461	1.636		0.250	0.000	385.380	385.130
									0.96	21.83													
Medium Density Block XY	16	Plug-XY	CBMH18	1.488	1.488	0.69	1.03	1.03		15.00	81.21	0.233	525	23.80	0.50	0.305	1.411	1.553	Block XY	0.120	--	385.550	385.430
									0.28	15.28													
SWM Facility Inlet	17	CBMH18	HW-1	0.582	7.845	0.55	0.32	4.81		21.83	66.43	0.888	825	13.63	0.51	1.029	1.924	2.164	OGS Unit	0.070	0.000	385.130	385.060
									0.12	21.95													
SWM Facility Outlet	--	HW-2	Outfall	0.000	0.000	0.20	0.00	0.00		21.95	66.23	0.120	375	23.93	0.50	0.124	1.124	1.280	Outlet	0.120	--	383.700	383.580
									0.35	22.31													

*Flow rate taken from the Stormwater Management calculation results for the 5-year storm event.