Waterloo West Side Employment Lands, Waterloo ON

Functional Servicing Report

August 2018

Prepared for:

City of Waterloo
City Hall, 2nd Floor
100 Regina Street South
Waterloo ON N2J 4P9

Prepared by:

Stantec Consulting Ltd.
100-300 Hagey Boulevard
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161413446

Sign-off Sheet

This document entitled Waterloo West Side Employment Lands Functional Servicing Report was prepared by Stantec Consulting Ltd. ("Stantec") for the account of the City of Waterloo (the "Client") to support the permitting process for the Client's applications for a Zoning By-law, Official Plan Amendment and Draft Plan of Subdivision (the "Application") for the West Side Employment Lands Project (the "Project"). In connection thereto, this document may be reviewed and used by the provincial and municipal government agencies participating in the permitting process in the normal course of their duties. Except as set forth in the previous sentence, any reliance on this document by any third party for any other purpose is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

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Project Manager

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Joe Harris, BES
Project Manager

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1.0 INTRODUCTION

Stantec Consulting Ltd. was retained by the City of Waterloo to complete a Functional Servicing Report (FSR) to support the Official Plan Amendment, Rezoning and Draft Plan of Subdivision applications, for the development of employment lands, herein referred to as the "Waterloo West Side Employment Lands" or "WSEL", located at the northeast corner of Erb Street West and Wilmot Line (further referred to as 'the Site').

The Subject Site encompasses an area of approximately 43.6 hectares and is located on the north side of Erb Street West at the western limit of the City of Waterloo and adjacent to the Township of Wilmot. The site is bound by a Hydro One Networks Inc. (HONI) corridor to the east, Erb Street West and West Waterloo Commercial Centre (930 Erb Street West) to the south, Wilmot Line and rural residential properties to the west and Columbia Street West and the Vista Hills community to the north. Please refer to Figure 1 which identifies the location of the subject lands.

The Site is currently zoned Agriculture (A) in the City of Waterloo Zoning By-Law 1418 and currently consists of an inactive golf course (formerly operated by the Waterloo Golf Academy - north part of the site), active agricultural and fallow fields, a former cider mill and a temporary stormwater management (SWM) pond. This report is in support of a Draft Plan of Subdivision. The Site is proposed to be developed for commercial and business employment purposes. The subject Site is located entirely within the Laurel Creek Watershed.

The golf course portion of the property contains 3 ponds. The club house has been removed from the site and 2 maintenance sheds and other remaining structures are to be removed by the City of Waterloo following approval for demolition.

The purpose of this report is to document the opportunities and constraints for the subject property with respect to servicing, grading and stormwater management in support of the development applications. The following studies have been completed and were reviewed and coordinated with the Functional Servicing Report:

- Preliminary Stormwater Management Report prepared by Stantec, dated August 2018
- Geotechnical Investigation prepared by Stantec, dated August 16, 2018
- Hydrogeological Investigation prepared by Stantec, dated August 2018
- Phase I Environmental Site Assessment prepared by Stantec, dated July 20, 2018
- Transportation Impact Study prepared by Stantec, dated August, 2018

The above referenced studies are provided independently of the FSR and have been submitted in support of the development applications.



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March 2018
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Site Limits

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Figure No.

FIGURE 1

Title

LOCATION PLAN

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2.0 EXISTING CONDITIONS

2.1 BACKGROUND STUDIES

Stantec Consulting completed a Due Diligence Study in 2014 for the Subject Lands, on behalf of the City of Waterloo which included a grading and servicing strategy for the Site. Furthermore, several studies including a Stormwater Management (SWM) Report and Geotechnical Investigation were completed by Stantec for the West Waterloo Commercial Centre located at 930 Erb Street West. The SWM strategy for the Site and surrounding lands is described in this report. A *Preliminary Stormwater Management Report* (Stantec, August 2018) for the Subject Site is also submitted concurrently to the City of Waterloo and can be found under separate cover.

2.2 EXISTING TOPOGRAPHY

In reference to Figure 2, the site is significantly undulating with a topographic high at the central west part of the site of 406.0 MASL to low elevations of 394.0 MASL adjacent to part of the Wilmot Line and an elevation of 381.0 MASL at a location of an area adjacent the hydro corridor.

In total topographic relief is approximately 25 m. A north-south drainage divide exists adjacent to Wilmot Line and as such all of the site drains to Clair Creek. There is a wetland on the subject property at the northwest corner of the site and there is also a wetland located on a private property owned by others (50 Wilmot Line) which straddles the property limits and onto the subject Site. The regulation limit of the wetland further extends beyond the limits of the wetlands.

There is an existing temporary SWM pond north of Copper Street adjacent the Hydro Corridor that services the Costco site. This pond will be decommissioned and filled in with material that was stockpiled when the pond was constructed.

2.3 GEOTECHNICAL CONDITIONS

Numerous geotechnical and/or hydrogeological investigations have been completed for the surrounding lands and the subject site. The most recent and relevant of these studies is the Preliminary Geotechnical Investigation for the Waterloo West Side Employment Lands (Stantec, 2018) of which has been submitted under separate cover in support of the Draft Plan of Subdivision.

Additional, relevant geotechnical investigations include;

- 2004 Geotechnical Investigation by CH2M Hill
- 2010 Geotechnical Investigation by CH2M Hill
- 2013 Geotechnical Investigation by Stantec

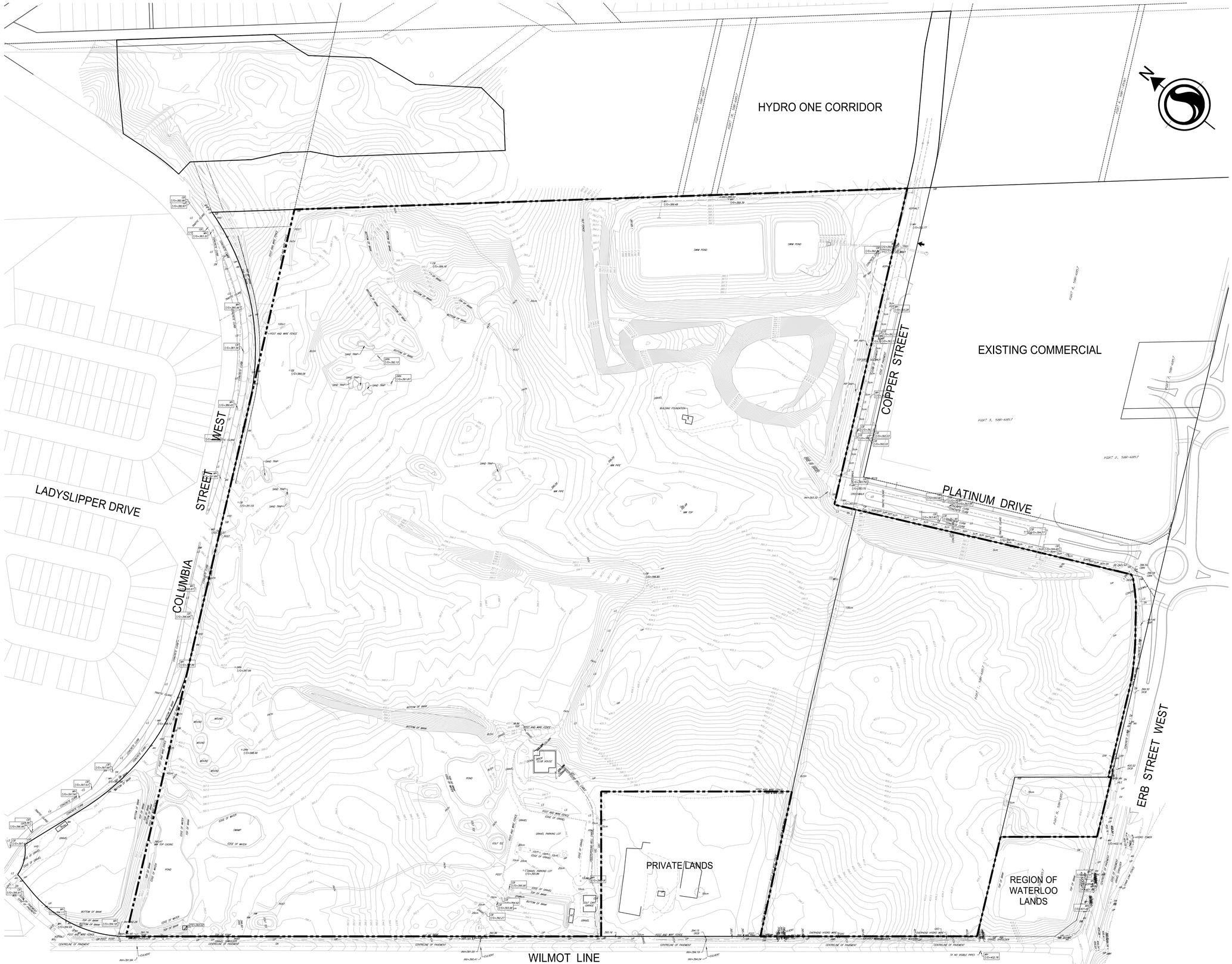
The subsurface conditions of the project Site can be summarized as follows;

- The site is underlain primarily of glacial till; comprised of clay till, silty sand till and sand layers;
- Groundwater is generally perched within seams of the glacial till and/or above the glacial till;
- The native clayey soils may be challenging for grading efforts, especially in wet or cold weather; and
- Bedrock was not encountered.

As a result of the existing soil conditions, the geotechnical considerations for the project Site include;

- An erosion and sediment control plan shall be prepared at detailed design to direct runoff away from areas of construction and to protect adjacent properties from sediment deposition;
- Scheduling of grading/earthworks should be carefully addressed to avoid adverse conditions i.e. late fall to late spring. If grading must take place within this timeframe, additional construction practices may be required;
- Temporary excavations during grading and/or site servicing may encounter seepage; therefore, pumping may be required, and/or additional construction measures implemented to ensure stability of slopes, etc.; and,
- Existing fill material, found in localized areas throughout the site, is not suitable for reuse as engineered fill, trench backfill, or subbase material;

For further explanation of detailed geotechnical findings, please refer to the *Geotechnical Investigation – Waterloo West Side Employment Lands* (Stantec, 2018).



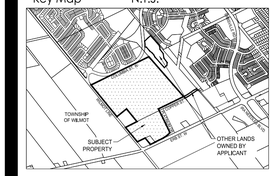
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Key Map N.T.S.



Legend

	PROPOSED	EXISTING
PROPERTY LINE		
STANDARD IRON BAR		□SIB
IRON BAR		■IB
CATCHBASIN		▣CB
MANHOLE		◯MH
HYDRANT SET		HYD ⊖ HV
SIAMESE CONNECTION		
OBSERVATION WELL		WELL
STORM SEWER		
SANITARY SEWER		
WATERMAIN		
FENCE		
SLOPE		
ELEVATION		+524.311
CONTOUR		349.0
BOLLARD		BLRD
POST		POST
BELL PEDESTAL		BPED
HYDRO POLE		HP
GUY WIRE		
SIGN		TS
TREES		
SHRUB		SHRUB

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City of Waterloo, Ontario

Title

EXISTING CONDITIONS PLAN (FIGURE 2)

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3.0 CONCEPT DRAFT PLAN OF SUBDIVISION

Figure 3 illustrates the Concept Draft Plan of Subdivision prepared by Stantec as the basis for undertaking a complete preliminary review of the proposed grading and servicing for the subject lands. The concept plan includes the following components:

- 13 development blocks varying from 7.9 ha to 0.7 ha in size;
- A block dedicated for a park located northwest of the existing Copper Street cul-de-sac;
- A Servicing Corridor (Block 18) located close to the northeast corner of the Site;
- Walkway blocks extending east to west from the Wilmot Line to Street 'B', 'C' and Platinum Drive;
- Platinum Drive extension connecting Erb Street West to Columbia Street West. The first leg of Platinum Drive was constructed as part of the development of the West Waterloo Commercial Centre. The proposed width of the Platinum Drive right-of-way is 30 m;
- Two (2) local streets (Street 'B' and Street 'C') with a proposed width of 20 m;
- Three (3) roundabouts connecting Streets 'B' and 'C' to Platinum Drive; one (1) proposed roundabout at Platinum Drive and Copper Street and Street 'C'; one (1) proposed roundabout at Platinum Drive and Street 'B' and Street 'C'; and, one (1) proposed roundabout at the intersection of Columbia Street West and the Platinum Drive extension; and
- A proposed Stormwater Management Facility located in the existing HONI corridor.

It should be noted that the following properties are not part of the Draft Plan Subdivision:

- Lands owned by the Region of Waterloo for their pumping station/reservoir located on the north corner of Erb Street West and Wilmot line adjacent to the site;
- Private property of approximately 2.0 hectares located along the western edge of the subject lands (50 Wilmot Line); and
- Two (2) trianglular private parcels of land adjacent to Columbia Street West know as Block 45 (Draft Plan 30T-050402) and Block 46 (Draft Plan 30T-05402).

For purposes of this report, the concept engineering grading, servicing and stormwater management designs include the 2.0 ha private parcel at 50 Wilmot Line; and, the two (2) private triangular parcels along Columbia Street West currently owned by Activa Holdings Inc.



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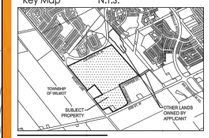
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Key Map N.T.S.



Legal Description

Part of Lot 41,
German Company Tract ,
City of Waterloo,
Regional Municipality of Waterloo

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 Listed Below
e) - As Shown
f) - As Shown
g) - As Shown
h) - Municipal Water Supply
i) - Glacial Till
j) - Municipal Sanitary and Storm Sewers
k) - None
l) - As Shown

Surveyor's Certificate

I hereby certify the boundaries of the subject land to be subdivided on this plan and their relationship to the adjoining lands have been accurately and correctly shown.

Signed _____
- O.L.S
Company

Date _____

Owner's Certificate

I hereby authorize Stantec Consulting Ltd. to submit this Draft Plan of Subdivision on my behalf.

Signed _____
Owner's Name
Company

Date _____

Land Use Schedule

Lots/Blocks	Land Use	Area (ha)	Potential # of Units
BLOCKS 1-11	EMPLOYMENT	35.672	
BLOCKS 12-13	EMPLOYMENT/COMMERCIAL	1.763	
BLOCK 14	PARK	0.890	
BLOCKS 15-17	6.0m WALKWAY	0.295	
BLOCK 18	15.0m WALKWAY/SERVICING	0.219	
BLOCKS 19-24	0.3m RESERVE	0.034	
ROADS		4.737	
TOTAL		43.610	

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APPROVED: _____ DATE: _____
I hereby certify that the plan was prepared under the supervision of a registered professional planner, within the meaning of the Ontario Professional Planners Institute Act, 1994.

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WATERLOO WEST SIDE EMPLOYMENT LANDS
WATERLOO, ON

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DRAFT PLAN OF SUBDIVISION

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WEST SIDE EMPLOYMENT LANDS

Project No.
161413446

Title
CONCEPT
DRAFT PLAN
OF SUBDIVISION

Revision	Date
	2018.07.20
Reference Sheet	Figure No.
	FIGURE 3

4.0 PROPOSED GRADING AND ROAD PROFILES

Utilizing the Concept Draft Plan of Subdivision shown in Figure 3, the alignment and design of road profiles and overall grading plan were completed with the following constraints:

- Match existing grades at the site property limits as much as possible to minimize overall cut and fill quantities;
- Match existing grades along the previously constructed sections of Platinum Drive and Copper Street;
- Match ultimate property line grades along Erb Street West, The Wilmot Line and Columbia Street West;
- Satisfy the City of Waterloo requirements for minimum and maximum road and site plan grades;
- Provide major overland flow route for flows in excess of the storm sewer capacity;
- Maintain sufficient cover over storm/sanitary sewers and watermain; and
- Maintain existing topography where possible and provide a cut/fill volume balance as close as possible.
- Provide for moderate grades on the employment blocks where possible that are conducive to the built form of anticipated development.

4.1 ROAD PROFILES

In reference to Figures 4 and 5, the road profile for Platinum Drive has been designed to match existing grades as much as practical, to convey overland flows from the site to the SWM facility via Street B through Block 18. The road profile for Platinum Drive conveys overland flows to the north with a high point near Erb Street to limit the area of overland flow conveyed to Erb Street.

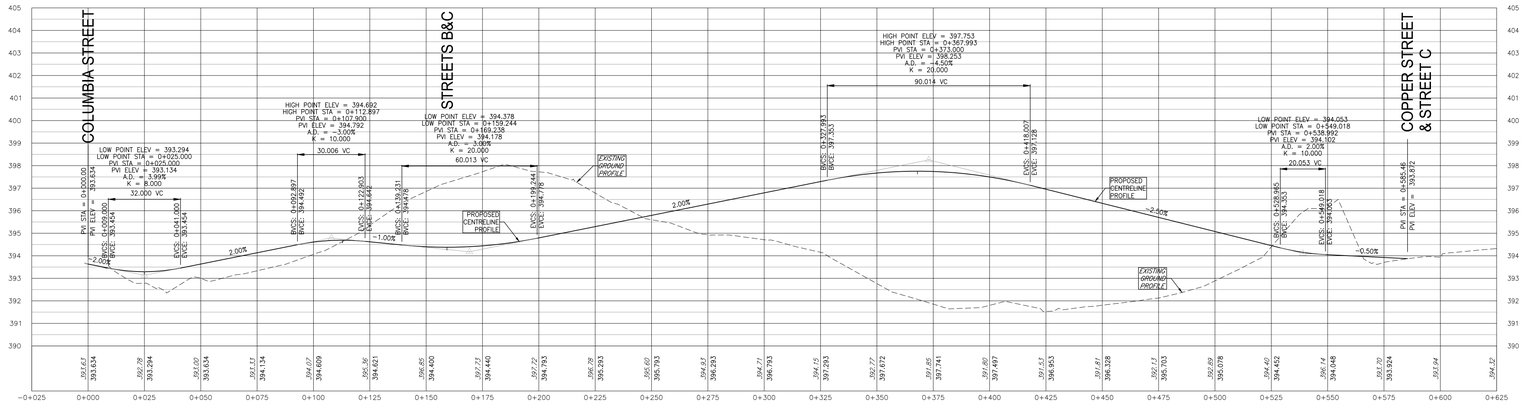
Preliminary road profiles were established for streets shown on the Concept Plan. Road grades ranged from a minimum of 0.5% to a maximum of 3.0% on Platinum Drive and a minimum of 0.5% to a maximum of 5.0% on the internal Streets ‘B’ and ‘C’.

4.2 PROPOSED GRADING AND EARTHWORKS

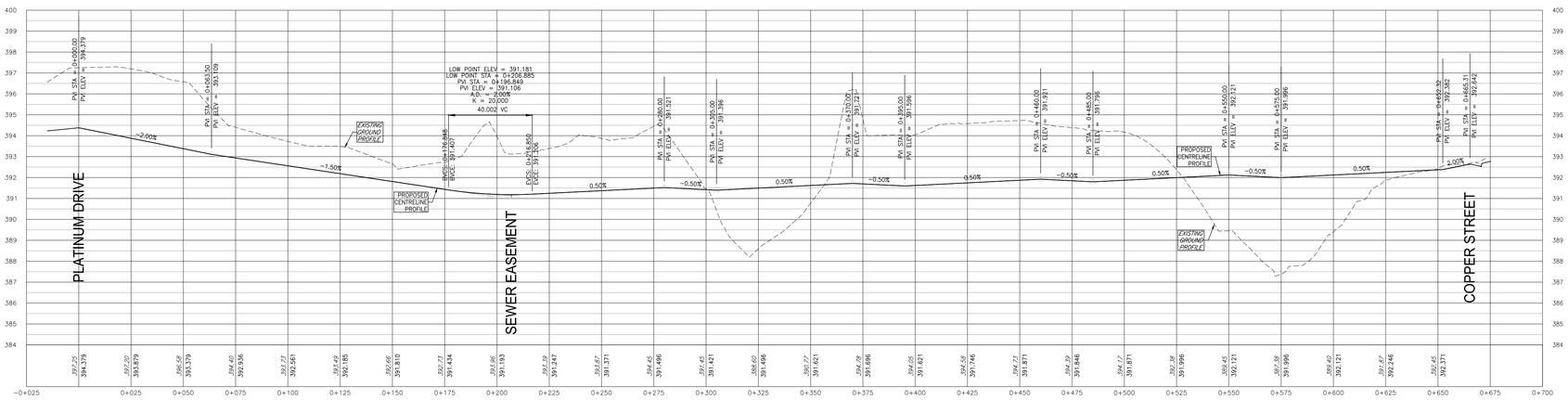
A Preliminary Grading Plan (Figure 6) was prepared in an effort to understand the earthworks required to develop the Site. Proposed grading of the future employment development blocks was generally designed to have grades between 1.0% to 2.5%, with some localized areas up to 3.6%

The following engineering pre-grades were utilized in calculating the earth volumes for the study area :

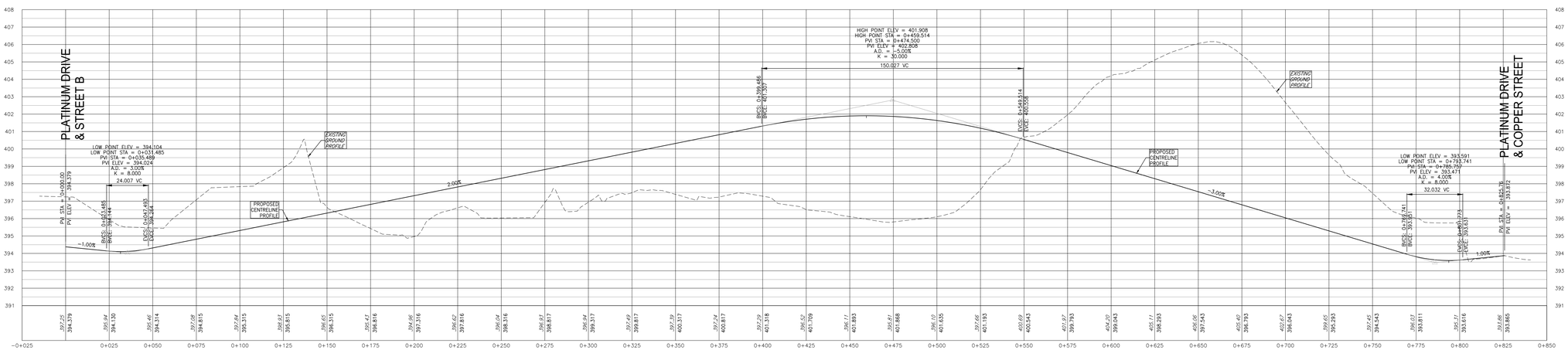
- 0.5 m pregrade on the Employment Blocks
- 0.7 m pregrade on the Platinum Drive right-of-way
- 0.6 m pregrade on the right-of-way of Streets ‘B’ and ‘C’
- 0.3 m of topsoil depth assumed to be stripped throughout the site



PLATINUM DRIVE



STREET 'B'



STREET 'C'

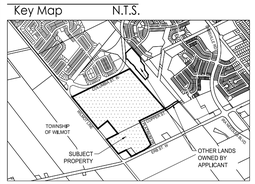
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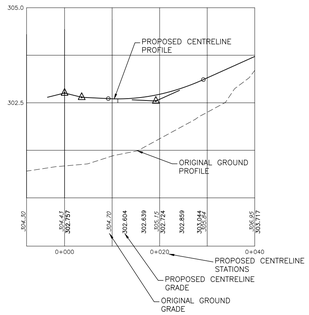
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WEST SIDE EMPLOYMENT LANDS

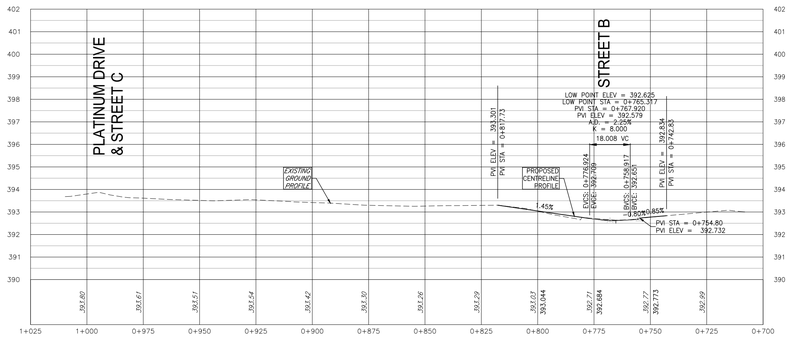
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Title
PRELIMINARY ROAD PROFILES
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(FIGURE 4)

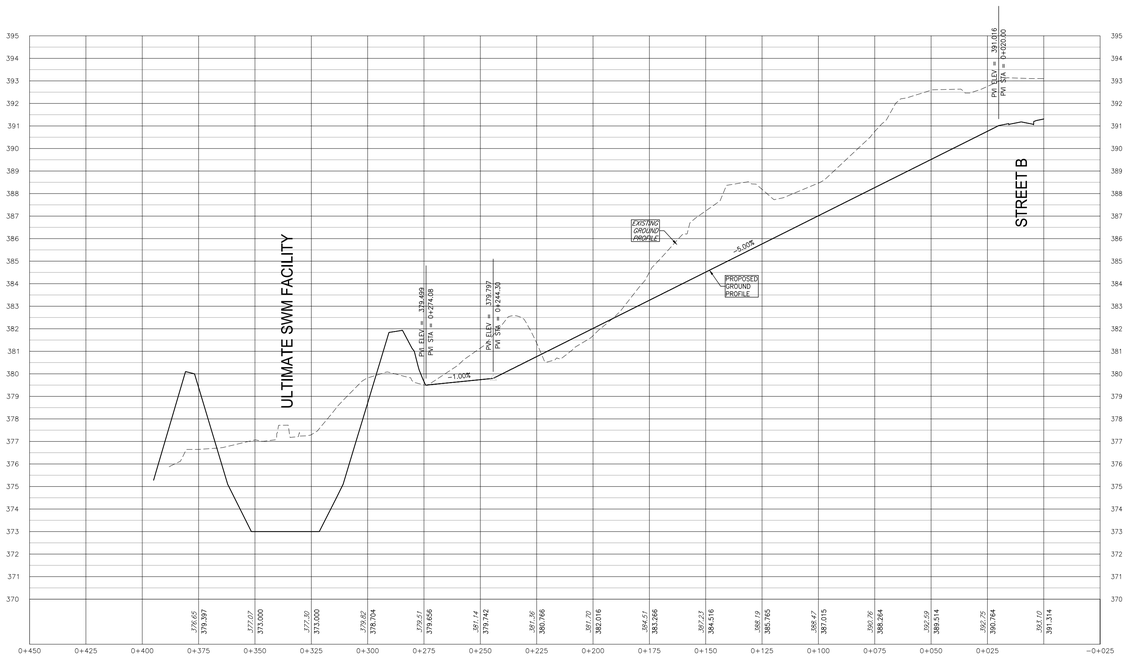
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COPPER STREET



SEWER EASEMENT

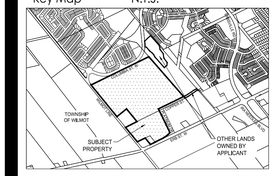
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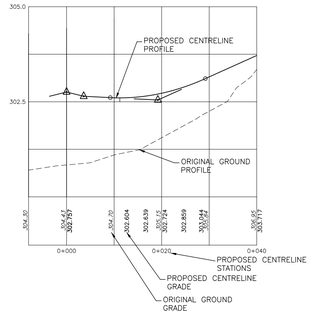
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WEST SIDE EMPLOYMENT LANDS

City of Waterloo, Ontario

Title
PRELIMINARY ROAD PROFILES
SHEET 2 OF 2
(FIGURE 5)

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2018/07/23 4:04 PM By: Ross, Martin

ORIGINAL SHEET - ARCH D

SWM FACILITY

HYDRO ONE CORRIDOR

BLOCK 1

BLOCK 2

BLOCK 14

STREET B

BLOCK 3

BLOCK 5

BLOCK 4

COPPER STREET

EXISTING COMMERCIAL

WEST STREET

BLOCK 12

LADYSLIPPER DRIVE

PLATINUM DRIVE

COLUMBIA STREET

BLOCK 13

BLOCK 6

BLOCK 7

BLOCK 10

BLOCK 8

STREET C

ERB STREET WEST

BLOCK 11

BLOCK 9

PRIVATE LANDS

REGION OF WATERLOO LANDS

WILMOT LINE

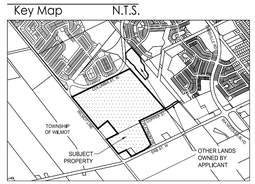
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Key Map N.T.S.



Legend

- STAGE LIMIT / PHASE LIMIT
- 352.82 EXISTING ELEVATION
- 352.92 PROPOSED ELEVATION
- 2.0% FLOW DIRECTION
- PROPOSED DRAINAGE SWALE
- 349.00 EXISTING CONTOUR
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED SANITARY MANHOLE
- PROPOSED VALVE & BOX
- PROPOSED HYDRANT
- PROPOSED SLOPE (3:1 UNLESS NOTED OTHERWISE)
- OVERLAND FLOW DIRECTION
- BH BORE HOLE
- TP TEST PIT

Revision	By	Appd.	YY.MM.DD
File Name: 161413446_C-GP.dwg	Dwn.	Chkd.	18.07.23
		Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
CITY OF WATERLOO

WEST SIDE EMPLOYMENT LANDS

City of Waterloo, Ontario

Title
PRELIMINARY GRADING PLAN (FIGURE 6)

Project No. 161413446

Scale 1:1500 (0, 15, 45, 75m)

Drawing No. C-400 of Revision 0

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2018/07/23 4:06 PM By: Rose, Martin

ORIGINAL SHEET - ARCH D

Due to the topographic relief on the subject lands, earth cut/fill up to approximately 9.0 m is expected to occur within the site to provide positive drainage, and overland flow. Earthwork calculations have been performed to provide a balance of cut/fill volumes with assumptions made for topsoil depths as well as the use of fill that would be required for the private lands.

In order to achieve a cut/fill balance, site grading includes 3:1 slopes around parts of the site perimeter and within the development blocks. Upon completing a final design with a refined development plan, it is expected that these slopes can be minimized and if this is not possible, the slope could potentially be steepened and/or combined with retaining walls.

It is noted that there are uncertainties with respect to area grading within the golf course and whether there is buried topsoil, vegetation or other debris and therefore some sorting of material may be required during area grading. An additional contingency allowance as it relates to earth volumes and preliminary construction cost estimates should be included in this regard.

Based on the preceding we expect that a cut/fill balance can be achieved on the Site.



5.0 SANITARY SERVICING

5.1 EXISTING SANITARY SERVICING

There are two (2) sanitary sewer outlets for the Site located west of the HONI corridor. The first outlet is located at the southeast corner of the Site where there is an existing 200 mm diameter sanitary sewer. The 200 mm sanitary sewer was extended from the Paris Boulevard right-of-way (ROW) to Copper Street located north of the existing commercial centre (930 Erb Street West) and to the Platinum Drive ROW.

The second outlet is located at the northeast corner of the Site in the Columbia Street West ROW. There is a 300 mm diameter sanitary sewer on Columbia Street West which flows to the east.

5.2 PROPOSED SANITARY SERVICING

In reference to Figures 7 and 8, it is proposed that the majority of the Site will outlet through a servicing corridor in the northeast part of the site, to the existing 300 mm diameter sanitary sewer below Columbia Street West. The remaining portion of the southern area of the Site (primarily along Blocks 6 and 10) will outlet to the existing 200 mm diameter sanitary sewer within Copper Street and the HONI corridor. The proposed sanitary servicing of the site is illustrated on the Preliminary Servicing Plan (Figure 7). All sewers are expected to be at normal depths of between 3 to 5 meters.

To determine the anticipated sanitary flows for the proposed development, a sanitary flow design sheet has been prepared and can be found in Appendix B. These sanitary flows are based on 1.5 L/s/ha. Approximately 80% of these flows will be conveyed to the 300 mm diameter sewer within Columbia Street West and 20% will outlet to the 200 mm diameter sewer within the Copper Street and Paris Boulevard ROW's. We have corresponded with the City of Waterloo and have confirmed that adequate capacity exists in the downstream sewers to convey flows from the site (Columbia Street West and Copper Street to the Paris Boulevard ROW).

SWM FACILITY

HYDRO ONE CORRIDOR

EXISTING COMMERCIAL

BLOCK 1

BLOCK 2

BLOCK 3

BLOCK 4

BLOCK 5

BLOCK 6

BLOCK 7

BLOCK 8

BLOCK 9

BLOCK 10

BLOCK 11

BLOCK 12

BLOCK 13

BLOCK 14

PRIVATE LANDS

REGION OF WATERLOO LANDS

STREET B

STREET C

WEST STREET

COPPER STREET

PLATINUM DRIVE

LADYSLIPPER DRIVE

COLUMBIA STREET

ERB STREET WEST

GEHMAN

WILMOT LINE

PROP.	ELEV.
STORM	378.30

EXISTING	ELEV.
SANITARY	380.70

HP	ELEV.
ROAD	393.10

	ELEV.	COVER
ROAD	392.05	
STORM	388.80	3.25
SANITARY	389.20	2.85

LP	ELEV.	COVER
ROAD	392.65	
STORM	389.35	3.30
SANITARY	--	--

	ELEV.	COVER
ROAD	391.60	
STORM	387.15	4.45
SANITARY	388.00	3.60

LP	ELEV.	COVER
ROAD	391.18	
STORM	385.18	6.00
SANITARY	386.90	4.28

HP	ELEV.	COVER
ROAD	397.75	
STORM	395.95	1.80
SANITARY	390.15	7.60

LP	ELEV.	COVER
ROAD	393.85	
STORM	391.50	2.35
SANITARY	390.20	3.65

LP	ELEV.	COVER
ROAD	393.30	
STORM	391.85	1.45
SANITARY	--	--

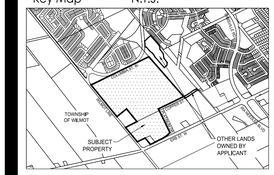
HP	ELEV.
ROAD	393.65

HP	ELEV.
ROAD	394.70

LP	ELEV.	COVER
ROAD	394.0	
STORM	391.05	3.35
SANITARY	389.10	5.30

	ELEV.	COVER
ROAD	397.10	
STORM	395.10	2.00
SANITARY	393.70	3.40

HP	ELEV.	COVER
ROAD	401.90	
STORM	400.10	1.80
SANITARY	398.95	2.95



Key Map N.T.S.

Legend

- PROPERTY BOUNDARY
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED SANITARY MANHOLE
- PROPOSED VALVE & BOX
- PROPOSED HYDRANT
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN

LP	ELEV.	COVER	
ROAD	393.9		ROAD SURFACE ELEVATION
STORM	391.6	2.3	STORM SEWER OBVERT ELEVATION
SANITARY	390.2	3.7	SANITARY SEWER OBVERT ELEVATION

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File Name: 161413446_C-UG.dwg	Dwn.	Chkd.	Dsgn. 18.07.24 YY.MM.DD

Permit-Seal

Client/Project
CITY OF WATERLOO

WEST SIDE EMPLOYMENT LANDS

City of Waterloo, Ontario

Title
PRELIMINARY SERVICING PLAN (FIGURE 7)

Project No.	Scale	
161413446	1:1500	0 15 45 75m
Drawing No.	Sheet	Revision
C-100	of	0

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2018/07/24 7:59 AM By: Rose, Martin

ORIGINAL SHEET - ARCH D

SWM FACILITY

HYDRO ONE CORRIDOR

BLOCK 1

BLOCK 2

BLOCK 14

BLOCK 3

BLOCK 4

BLOCK 5

BLOCK 6

BLOCK 7

BLOCK 8

BLOCK 9

BLOCK 10

BLOCK 11

BLOCK 12

BLOCK 13

EXISTING COMMERCIAL

PRIVATE LANDS

REGION OF WATERLOO LANDS

STREET B

STREET C

WEST STREET

COPPER STREET

PLATINUM DRIVE

LADYSLIPPER DRIVE

COLUMBIA STREET

ERB STREET WEST

WILMOT LINE

1
A=15.73
1.500 L/sec/Ha

2
A=8.93
1.500 L/sec/Ha

3
A=3.49
1.500 L/sec/Ha

4
A=8.28
1.500 L/sec/Ha

5
A=0.31
1.500 L/sec/Ha

6
A=2.99
1.500 L/sec/Ha

7
A=6.79
1.500 L/sec/Ha

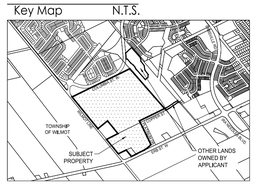
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Key Map N.T.S.



Legend

8 / A=3.58 / 1.500 L/sec/Ha	AREA ID NUMBER, AREA, FLOW RATE
	AREA BOUNDARY
	EXISTING SANITARY SEWER
	PROPOSED SANITARY SEWER
	FLOW DIRECTION

Revision	By	Appd.	YY.MM.DD
File Name: 161413446_C-SS.dwg	Dwn.	Chkd.	18.07.19
		Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
CITY OF WATERLOO

WEST SIDE EMPLOYMENT LANDS

City of Waterloo, Ontario

Title
PRELIMINARY
SANITARY DRAINAGE AREA PLAN
(FIGURE 8)

Project No. 161413446

Scale 1:1500 (0, 15, 45, 75m)

Drawing No. C-120

Sheet of

Revision 0

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2018/07/23 4:12 PM By: Rose, Martin

ORIGINAL SHEET - ARCH D

6.0 WATER DISTRIBUTION ANALYSIS

6.1 OVERVIEW

A watermain distribution analysis has been carried out for the proposed Waterloo West Side Employment Lands based on the Draft Plan of Subdivision. The intent of the analysis is to determine the appropriate watermain sizes that will distribute domestic and fire flow water demand scenarios within Ministry of the Environment and Climate Change (MOECC), Region of Waterloo, and City of Waterloo pressure and distribution guidelines.

6.2 METHODOLOGY

6.2.1 Model Development and Design Criteria

The water distribution system analysis was performed using the Haestad Methods Hydraulic Modeling WaterCAD Software (v.8i). The distribution network was created by assigning physical parameters to each node and pipe. The model was run under various demand scenarios and each was checked against the relevant guidelines for operating and residual pressures and fire flow availability. The parameters and criteria are outlined in the following sections.

The subject land will consist primarily of an employment business park with a proposed park block and walking trails. Water supply is provided to the subject site and adjoining properties by a pumping station located northeast of the intersection of Erb Street West and Wilmot Line. The proposed development is currently located at the westerly edge of Waterloo Pressure Zone 7 – the hydro corridor located along the northwest limit of the subject site forms the boundary between Pressure Zone 6 and 7. The existing HGL for Pressure Zone 7 is approximately 446 m.

The Region of Waterloo has provided data pertaining to nodes JCT_19739 and JCT_19855 which are located at the intersection of Erb Street West with Platinum Drive and on Columbia Street West with the proposed Platinum Drive intersection, respectively. For the purpose of this analysis, Node JCT_19739 was used because it is located at a higher elevation than node JCT_19855, providing more conservative results.

Results from the node JCT_19739 under various demand scenarios were provided to establish the hydraulic grade lines (HGL). A summary of the nodal HGL data obtained from the Region is provided in **Appendix D**.

Watermain connections to the proposed development will be via two 300 mm diameter connections; the first connection will be to the existing 300 mm diameter watermain stub located at the intersection of Platinum Drive with Copper Street and the second connection will be to the 300 mm diameter watermain located on Columbia Street West at the proposed Platinum Drive intersection.



6.2.2 Region of Waterloo Design Guidelines

The Region of Waterloo document entitled, *Region of Waterloo and Area Municipal Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS),* intended to provide a common Regional and area-wide standardization for municipal water distribution and wastewater designs and installation was used. The general guidelines have been published to provide direction for water distribution system analysis and design, including:

- Pressure, demand, and velocity criteria
- Hydraulic modeling parameters (i.e. friction factors)
- Hydrant spacing and location
- Minimum watermain sizing criteria

The recommendations of these guidelines have been followed in completing this analysis.

6.2.3 Boundary Conditions

Hydraulic grade line information for the subdivision was based on modeling results provided by the Region of Waterloo on April 25, 2018. The HGL's were obtained for the average day and maximum day as well as data pertaining to a range of fire flow scenarios. A reservoir was assigned the hydraulic grade line determined from the Region's model for each demand scenario.

Appendix D contains correspondence from the Region of Waterloo and the data they have provided. **Table 1** summarizes the hydraulic grade line information received from the Region of Waterloo at JCT_19739.

Table 1 Hydraulic Grade Lines (Node JCT_19739)

Demand Scenario	Hydraulic Grade Line (m)
Average Day	441.60
Maximum Day	444.56
Minimum Hour	442.46
Peak Hour	440.23

For fire flow scenarios, the Region of Waterloo provided a table with the available flow and the respective residual pressure. This data was used in the WaterCAD model to provide the respective pressure at a given flow. The Region of Waterloo fire flow analysis table can be found in **Appendix D**.



6.2.4 Peaking Factors

The peaking factors used in the model are based on the *Region of Waterloo DGSSMS* document and Table 3-1 of the 2008 MOECC Guidelines for Drinking Water Systems. **Table 2**, below, outlines the peaking factors that were used based on the population range of 3,001 to 10,000 people.

Table 2 Peaking Factors

Demand Scenario	Factor
Average Day	1.00
Maximum Day	2.00
Peak Hour	3.00
Minimum Hour	0.50

6.2.5 System Demands

The site demands are calculated based on the Draft Plan of Subdivision prepared by Stantec Consulting Ltd. and the Tri-City Water Distribution Master Plan Final Report 2009. Using the Draft Plan and population estimates, demand allocation was completed by assigning the demand from contributory areas to each applicable node.

The usage rates and detailed demand calculations for each node are provided in **Appendix E**.

6.2.6 Pressure Requirements

The Region of Waterloo Pressure Guidelines are to be maintained for all demand scenarios and are consistent with the MOECC requirements. The guidelines are shown in **Table 3** below.

Table 3 Region of Waterloo Pressure Requirements

Demand Scenario	Pressure Guidelines (kPa)	
	Min.	Max.
Average Day	350	550
Maximum Day	350	550
Peak Hour	275	700
Minimum Hour	275	700
Max. Day + Fire	140	700

The Region of Waterloo requires the use of individual pressure-reducing valves (PRV) on each water service where pressures exceed 550 kPa (80 psi) under any demand scenario. Where PRV's are installed, the Region allows a maximum pressure in the watermain system up to 700 kPa (100 psi).

6.2.7 Fire Flow Requirements

The fire demand for the proposed employment business area was determined using the *Water Supply for Public Fire Protection, A Guide to Recommended Practice (1999), Fire Underwriter's Survey (FUS)*. Based on the FUS manual, the required fire flows are as follows:

- Typical Industrial – 9,000 to 12,000 L/min (150 - 200 L/s)

6.2.8 Velocity Requirements

The Region of Waterloo and the MOE recommends that velocities throughout the distribution system not exceed a maximum of 5 m/s for non-regional watermains and 1.5 m/s for regional watermains during any demand scenario. Areas of concern are typically at long cul-de-sacs or dead-end stubs of smaller diameter (150 mm diameter). Large fire flow loads may cause the velocity in these mains to exceed 5 m/s.

6.2.9 Friction Factors

The following Hazen-Williams C-Factors are commonly used to estimate frictional losses through the distribution system based on material type, as outlined in **Table 4**.

Table 4 Hazen-Williams C-Factors

Pipe Material	C
PVC	150
Ductile Iron (D.I.)	130
Concrete Pressure Pipe (CPP)	130
High-Density Polyethylene (HDPE)	140

All pipes were assumed to be PVC and a C value of 150 was applied.

6.2.10 Minor Losses

Appurtenances and fittings along the length of pipe cause minor losses in the system. Standard K-values of 1.33 were assigned to every pipe, representing two valves, a bend, and a tee connection along each length of pipe in the network.



6.3 RESULTS

The model was run to optimize pipe sizes for the proposed West Side Employment Lands according to the aforementioned design criteria. The proposed watermain network has been designed with a 300 mm diameter watermain on Platinum Drive extending from it's current terminus at Copper Street, north-westerly to Columbia Street. Local watermains on Streets B and C have been modelled as a 200 mm diameter watermain. **Appendix F** provides the final network and a series of tables summarizing the output results of the software analysis. **Tables 5 and 6** present the modeling results.

Table 5 Domestic Modeling Results – Pressures

Node	Node Elevation (m)	Pressure (kPa)			
		Average Day	Maximum Day	Peak Hour	Minimum Hour
J-1	393.82	468	497	454	476
J-2	397.75	429	458	416	438
J-3	394.38	462	491	449	471
J-4	393.63	469	498	456	478
J-5	401.91	388	417	375	397
J-6	392.38	482	511	468	490
J-7	391.17	494	522	480	502

As shown on **Table 5** above, under the current pressure zone operating conditions, the domestic pressures in the development are within the recommended operating range of the MOECC guidelines. Pressure reducing valves (PRV's) are not required for the proposed development as pressures are less than the 550 kPa maximum recommendation.

Table 6 Residual Pressure Modeling Results During Fire Flow

Node	Node Elevation (m)	Available Fire Flow (L/s)	Residual Pressure at Fire Node (kPa)	Residual System Pressure (kPa)
J-1	393.82	>205	231	152
J-2	397.75	>207	177	148
J-3	394.38	>207	215	145
J-4	393.63	>205	233	152
J-5	401.91	171	140	295
J-6	392.38	199	140	172
J-7	391.17	203	140	160



Table 6 demonstrates that adequate fire flow can be achieved for the proposed development. Based on the proposed land usage (business park) it is anticipated that buildings will be on sprinkler systems. As such, fire flow demands can be achieved for the proposed land usage and configuration. It is recommended that fire flow demands be confirmed through the Site Plan process for each site to ensure the fire flow capacity to each building is available prior to construction.

The City of Waterloo and Region of Waterloo recommend maintaining the velocity in watermains below 5 m/s where possible, to prevent transient pressures from damaging the pipe system. The watermain configuration for the site can deliver the required fire flow to the onsite hydrants while maintaining the velocities of less than 5 m/s.

Detailed modeling results are provided in **Appendix F** for reference.

6.4 CONCLUSIONS AND RECOMMENDATIONS

From the above analysis, the following conclusions can be drawn:

The proposed development can be serviced by extending a proposed 300 mm diameter watermain on Platinum Drive from the existing stub located at the Platinum Drive intersection with Copper Street, north-westerly to Columbia Street. Streets B and C can be serviced with a proposed 200 mm diameter watermain loop connection to Platinum Drive.

Watermain velocities within the proposed site are below 5 m/s

Adequate fire flows can be met for the proposed business park. It is recommended that a fire flow demands be confirmed through the Site Plan process.

The FUS recommends fire flows can be provided by onsite hydrants while adhering to the minimum Region of Waterloo and MOECC recommended residual pressure of 140 kPa (20 psi)

Pressure reducing valves are not required for the proposed development as pressures are within the allowable range.



7.0 STORM DRAINAGE

7.1 EXISTING STORM DRAINAGE

As mentioned previously, the site generally drains from the southwest (high point) of the Site to the northeast and is part of the Laurel Creek Watershed, specifically Subwatershed #314. There is an existing temporary SWM facility located north of the West Waterloo Commercial Centre and west of the Hydro One Corridor on City of Waterloo land.

7.2 PROPOSED STORM DRAINAGE

It is planned that once the Employment Lands develop, the temporary SWM facility located at the southeast corner of the Site will be decommissioned and all storm flows will be redirected to a new ultimate SWM facility to be constructed in the Hydro One Corridor. This ultimate SWM facility will be located adjacent to the northeast corner of the Site. It is also understood that the existing SWM facility north of Columbia Street and west of the Hydro One Corridor (part of the Waterloo Westside Development Lands) will be abandoned and the runoff from this area will be redirected to the ultimate SWM Facility. As such, the ultimate SWM facility will account for flows coming from the Site, the existing West Waterloo Commercial Centre lands and the Waterloo Westside Development Lands north of Columbia Street West (approximately 77 ha).

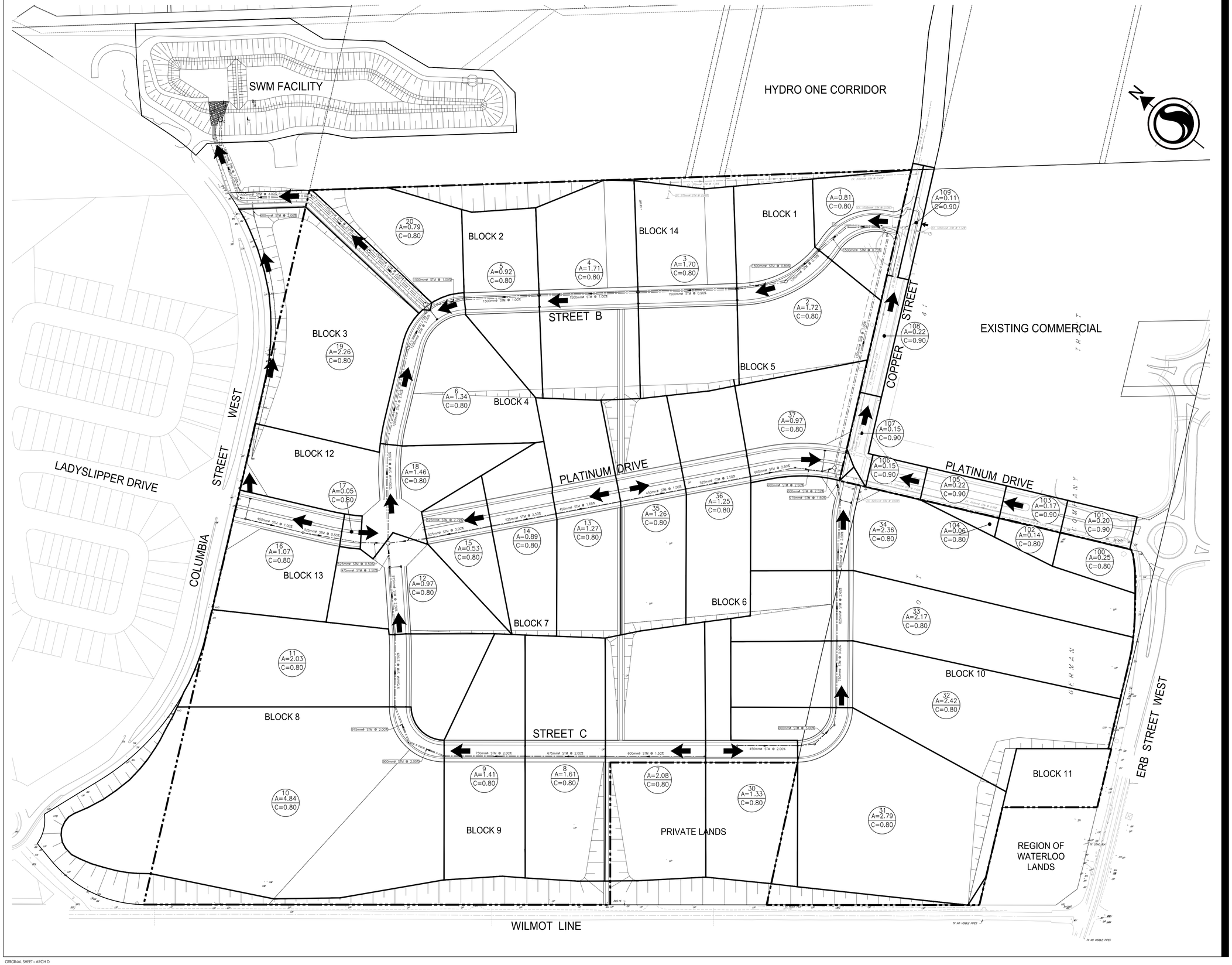
The City of Waterloo and Hydro One have approved the location of the ultimate SWM facility and the requisite detailed designs and SWM report were undertaken by Stantec in 2014[1]. In addition, the City of Waterloo has purchased the lands from Hydro One associated with the future SWM block. Furthermore, the City has obtained easements from Hydro One for the proposed inlet and outlet sewers.

As shown on the Preliminary Servicing Plan (attached Figure 7), once the temporary SWM facility in the southeast corner of the Site is abandoned, the storm sewers and major overland flow from Copper Street will be redirected to Street ‘B’. Major overland flow from both the Site and the West Waterloo Commercial Centre are directed down Copper Street onto Street B. The design of the minor system storm sewer on Copper Street did not account for developed flows from the Site and does not have capacity for any developed flow rates above those from the West Waterloo Commercial Centre. As such, a second storm sewer system on the north side of Copper Street has been designed to convey the minor flows from approximately 14.5 ha of the Site within Block 5 next to the Copper Street right-of-way.

All major flow directions are shown on the Preliminary Servicing Plan and storm sewer flows will be conveyed in a similar direction to a low point on Street ‘B’. All flows collected on Street ‘B’, Street ‘C’, and the majority of Platinum Drive will be conveyed through a servicing corridor (Block 18) to the lands immediately adjacent Columbia Street West and to the inlet of the ultimate SWM Facility.

Figure 9 illustrates the Storm Drainage Area Plan and the Storm Design Sheet for the storm sewers can be found in Appendix C.

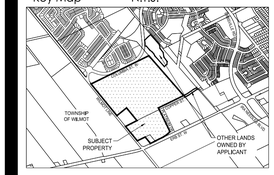
[1] West Waterloo Commercial Centre, Waterloo ON, Final Stormwater Management Report, Stantec, February 26, 2014



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Key Map N.T.S.



Legend

- AREA ID NUMBER
- AREA (Ha)
- RUN-OFF COEFFICIENT
- AREA BOUNDARY
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- STORM MANHOLE
- STORM CATCHBASIN MANHOLE
- CATCHBASIN
- FLOW DIRECTION

Revision	By	Appd.	YY.MM.DD
File Name: 161413446_C-SD.dwg			18.07.23
	Dwn.	Chkd.	Dsgn. YY.MM.DD

Permit-Seal

Client/Project
CITY OF WATERLOO

WEST SIDE EMPLOYMENT LANDS

City of Waterloo, Ontario

Title
PRELIMINARY
STORM DRAINAGE AREA PLAN
(FIGURE 9)

Project No.	Scale	Sheet	Revision
161413446	1:1500 0 15 45 75m		
Drawing No.			
C-110		of	0

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2018/07/23 4:15 PM By: Rose, Marvin

ORIGINAL SHEET - ARCH D

8.0 PRELIMINARY STORMWATER MANAGEMENT DESIGN

The Study Area for the Preliminary Stormwater Management Report (SWM Report) dated August 2018, by Stantec, includes lands north of Erb Street to approximately Columbia Street West and westerly from the Hydro One corridor to Wilmot Line. The report outlines a stormwater management (SWM) strategy that conforms to the Laurel Creek Watershed Study (LCWS). The report objective was to ensure that the proposed development includes controls necessary to protect the hydrology of the receiving surface systems in accordance with guiding documents.

The SWM Report for the Subject Site has been submitted concurrently to the City of Waterloo under separate cover and is summarized in the following section.

In 2014, Stantec undertook a SWM review for the West Waterloo Commercial Centre which included the subject site. The resulting Final Stormwater Management Report (Stantec, 2014) included the design of a future ultimate SWM facility located in the Hydro One Corridor. The ultimate SWM facility (SWMF) was designed to control stormwater runoff for the entire development within the Study Area (i.e. north to Columbia Street and West to the Wilmot Line, approximately 77 ha).

8.1 STORMWATER MANAGEMENT CRITERIA

SWM criteria for the subject lands were established through the completion of the Subwatershed 314 Management Plan and were predominantly based on the characteristics of the Clair Creek receiving system and the requirements of the LCWS. The Subwatershed (SW) #314 Management Plan is a guide for the sustainable development of land within the subwatershed area, of which the Site is a part. The plan identifies features and functions and identifies primary and supporting corridors and linkages as well as provides actions to ensure the health of the subwatershed. A small portion of the site currently drains to SW #307; however, as no subwatershed study has been completed for this area, SWM criteria from SW #314 were assumed to be sufficient for the purposes of this analysis.

8.1.1 Water Quantity

Water quantity controls required for new development within SW #314 include the following:

- Post-development peak flows exiting the site, as generated using GAWSER, are to be controlled to the target rates established by previous studies;
- In addition to matching target flows under post-development conditions, the timing of the hydrograph peaks are to be within 75% of existing conditions;
- Maintain pre-development Regional storm discharge rates from the southwest while maintaining or exceeding existing storage levels onsite; and
- Runoff volumes to be matched to existing levels, exclusive of extended detention volumes.

Furthermore, it should also be shown that the target flow and hydrograph timing criteria established above can be achieved at the downstream limits of SW #314 (Columbia Street).



8.1.2 Water Quality

Water quality storage requirements for the subject lands were established using the MOE Water Quality Sizing Criteria from the Stormwater Management Planning and Design Manual (MOE, 2003). A Normal (70% TSS removal) level of water quality control was used as consistent with other developments within the downstream reach of Clair Creek.

It was anticipated that the number of facilities implemented throughout the watershed should be minimized to the extent feasible in recognition that the Municipality will ultimately own and maintain the system and fewer facilities generally corresponds with lower long-term operating costs.

8.1.3 Infiltration and Water Balance

The original strategy as outlined in the 2014 Stormwater Management Report prepared for the West Waterloo Commercial Centre identified that the native soils were not conducive to infiltration but recommended that infiltration practices (and water balance) be explored for the West Side Employment Lands when the subject lands were ready for development. As such, preliminary existing and proposed conditions water balance analyses have been completed as part of the Preliminary Stormwater Management Report (Stantec, August 2018) to determine the groundwater recharge deficit and establish infiltration/retention targets for each block to maintain a recharge balance. Specific infiltration designs will be required for each site plan as individual applications are submitted and must meet the targets provided to ensure a balance is maintained

8.2 WATER QUANTITY CONTROL

The ultimate SWMF is proposed to be located within the Hydro One corridor, south of Columbia Street West and west of the Clair Hills District Subdivision. The SWMF services a total drainage area of 76.7 ha. The SWMF provides water quantity control for all storms up to and including the Regional Storm event (Hurricane Hazel), provided impervious coverage of the site is 80% or less, consistent with the assumptions in the hydrologic model.

8.3 WATER QUALITY CONTROL

'Normal' water quality control is provided by the ultimate SWM facility by removing the long term annual average of 70% of suspended solids. Adequate permanent pool and extended detention volumes are provided and meet the water quality design criteria outlined by the MOECC.

8.4 WATER BALANCE AND INFILTRATION ASSESSMENT

As per the findings of the *Hydrogeological Investigation* (Stantec, 2018), the existing annual groundwater recharge and surface runoff from the subject lands are 45,640 m^3/year (104 mm/year) and 95,420 m^3/year (218 mm/year), respectively. Accordingly, site level infiltration/retention will be required for each tenant/user on each parcel of developed land within the West Side Employment Lands. The analysis assumes 25% (minimum) building coverage with 'clean' rooftop runoff that can be directed to an infiltration/retention system for all rainfall events equal to or less than the 10 mm rainfall event.

Based on these assumptions, a groundwater recharge water balance is expected, with a recharge surplus of moderately less than 10,000 m^3/year (22 mm/year) and runoff surplus of just under 200,000 m^3/year (464 mm/year).



8.5 EROSION AND SEDIMENT CONTROL

The erosion and sedimentation control strategy will follow the Greater Golden Horseshoe Conservation Authorities' Erosion and Sediment Control Guideline (GGHCA ESC) for Urban Construction (2006) which determines the erosion potential of the site based on slope gradient, slope length and soil texture, which is then used to determine appropriate erosion control measures.

In order to minimize the effects of erosion during the grading of the site, sediment control fencing will be installed around the perimeter of the site and around any stockpiles and catchbasins during construction. Any sediment that is tracked onto the road ways during the course of the construction will be cleaned by the contractor. To help minimize the amount of mud being tracked onto the road way, a mud mat should be installed at the primary construction entrance. In addition, temporary sediment traps/basins will be considered, when appropriate, to help dissipate flow and encourage sediment deposition. These measures will be shown on the detailed engineering design drawings.

Following future development proposals on the City lands, it is recommended that erosion and sediment control strategies be developed for individual sites in order to minimize the potential for offsite discharge of sediment, the potential for sediment to discharge to the downstream SWMF, and the resultant negative environmental impacts.



9.0 UTILITIES

9.1 WATERLOO NORTH HYDRO AND HYDRO ONE

At present, there is an existing overhead pole line along the north side of Erb Street West. This pole line currently contains three (3) energized circuits of 27.6 kV each. In addition, an underground conductor carrying a 27.6 kV circuit crosses Erb Street West from Hydro Pole 7 to the landfill site. An overland pole line was also installed on the west side of Platinum Drive and services the West Waterloo Commerical Centre and Costco. This pole line terminates at the intersection of Platinum Drive and Copper Street.

In addition to the local Waterloo North Hydro (WNH) infrastructure, Hydro One owns and operates a series of overhead transmission lines that run north/south along their corridor, east of the subject lands. Hydro One has reviewed and approved all relevant reports relating to the proposed SWM facility in the corridor, as noted in previous sections. The City of Waterloo has also purchased the block of land required for the SWM facility and secured all required easements for storm sewers.

Electrical servicing for the subject lands will be provided via extension of the distribution network from Waterloo North Hydro on Platinum Drive. They have advised that one service can be accommodated per owner/site. WNH advises that more detailed information outlining electrical demands of the subject site and staging of development will be required in order to develop a proposed distribution plan. Further consultation with WNH will be undertaken during detailed design to confirm servicing and transformer locations throughout the subdivision. In addition, the City of Waterloo will need to determine if they prefer to install the hydro distribution network underground or aboveground. Should it be decided that underground hydro is feasible, the existing overhead power line currently installed along the west side of the first leg of Platinum Drive from Erb Street West to Copper Street, may need to be removed and installed underground as well. This line currently services the Costco building In considering whether to proceed underground or overhead with the hydro distribution, it should be noted that underground is often three (3) times more costly than overhead poles and cables.

Upon construction of the remainder of Platinum Drive, installations of the electrical distribution system would be placed within the right-of-way to compliment the servicing of the subject lands and future development.

9.2 BELL CANADA

Bell Canada advises that they have facilities on Erb Street West and Platinum Drive that will likely feed the properties within the employment business park. Bell Canada also has facilities on the Wilmot Line and have recently placed cables on Columbia Street West for future servicing of the area.

Upon construction of Platinum Drive, Bell Canada advises that installations of their distribution network would be placed within the right-of-way to compliment servicing this area.

9.3 UNION GAS

Union Gas advises they have a high pressure distribution main (1900kpa) on the Erb Street West right-of-way. Also, there is a high-pressure gas valve located in the property known as 980 Erb Street West that is (and must remain) in service.Union Gas also has a 100 mm, 420 kpa main on Platinum Drive. It is expected that this main will be sufficient to service the development, however, capacity within this network is not yet 'reserved' for the subject lands. Therefore, upgrades to the distribution main (1900 kpa) are required before service can be provided to general service customers within the West Side Employment Lands. Capacity upgrades by Union Gas began in 2016 and are continuing in 2018/2019.

Union Gas advises that more detailed information outlining potential gas consumption (loads) and staging of development would be required to develop a servicing plan and identify any potential upgrades to existing facilities that may be required. This shall be discussed and coordinated with Union Gas prior to commencement of detailed design.

9.4 ROGERS

As the subject lands are proposed employment, a business case would have to be approved by Rogers to provide service to the site. Rogers facilities are readily available on Columbia Street West. Rogers also advises that Columbia Street West contains the closest fibre cable presence and providing service from Erb Street West would be more expensive and difficult to build a business case for provision of service to the subject site. As such, further consultation with Rogers is warranted to confirm details of service to the subject lands.



10.0 CONCLUSIONS AND RECOMMENDATIONS

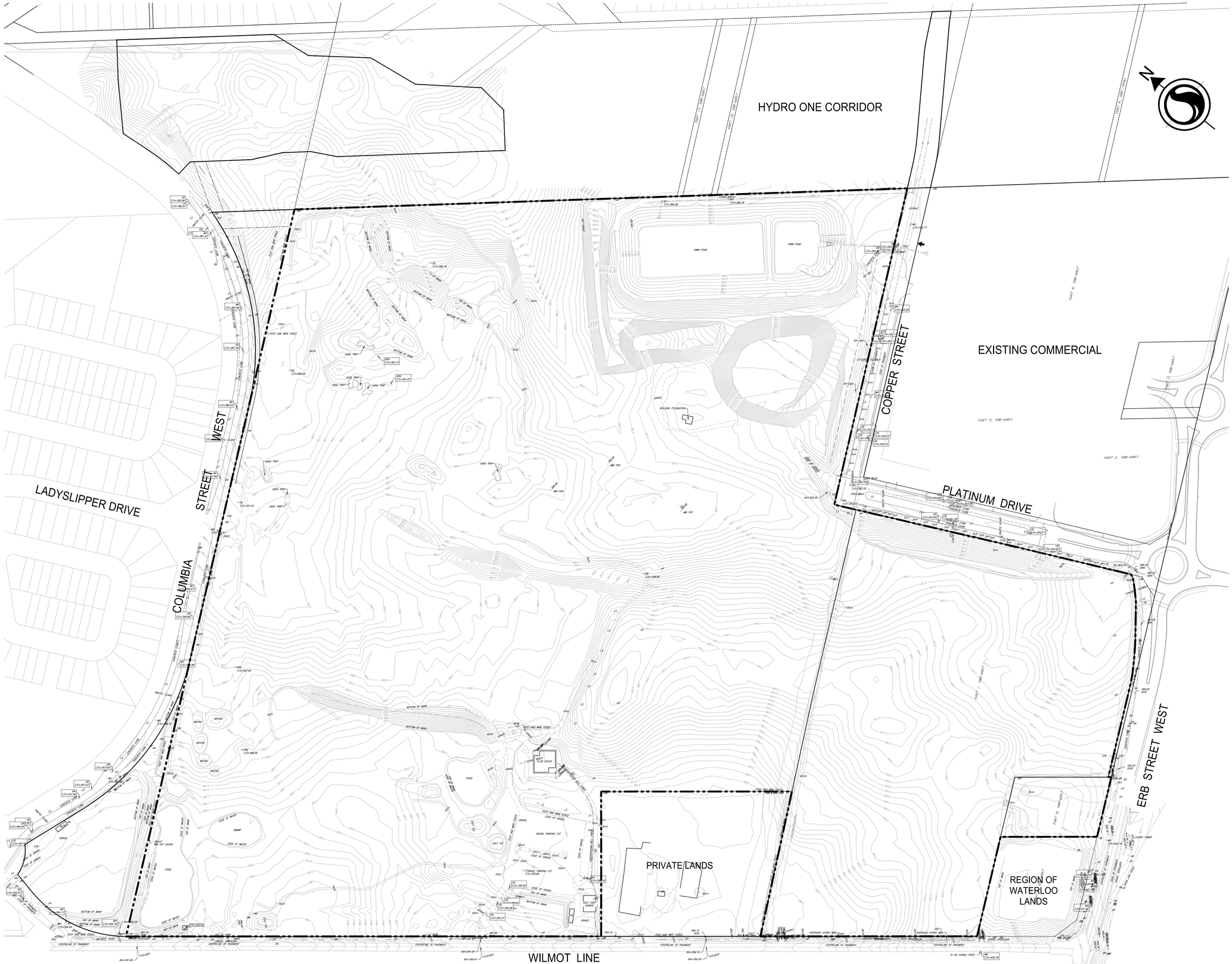
Based on the foregoing analysis, it is concluded that:

1. The proposed employment lands can be adequately serviced through the connection and extension of existing infrastructure in the area (water, sanitary and storm);
2. Storm drainage and stormwater management can be accommodated via the proposed stormwater management facility in the hydro corridor and related storm sewer outlets;
3. Overall site grading will provide for “major” overland surface water flow conveyance from the subject lands to the stormwater management facility; and
4. The proposed development can be adequately serviced through extension of existing utilities including hydro, gas, telephone and (based on the results of a business analysis) Rogers Cable TV; however, it is recommended that discussions with each of the utility providers and Hydro One continue through detailed design to confirm servicing demands and existing overhead line relocation considerations.

It is further recommended that:

1. This report be circulated as required in support of the requested Official Plan Amendment (OPA), Zoning By-Law Amendment (ZBA) and Draft Plan of Subdivision (DP); and
2. Additional grading, servicing, and stormwater management details be provided following OPA, ZBA and DP approval during detailed engineering design.

APPENDIX A
Preliminary Engineering Drawings



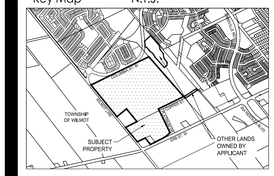
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Key Map N.T.S.



Legend

	PROPOSED	EXISTING
PROPERTY LINE		
STANDARD IRON BAR		□SIB
IRON BAR		■IB
CATCHBASIN		▣CB
MANHOLE		◯MH
HYDRANT SET		HYD ⊖ HV
SIAMESE CONNECTION		
OBSERVATION WELL		WELL
STORM SEWER		
SANITARY SEWER		
WATERMAIN		
FENCE		
SLOPE		
ELEVATION		+524.311
CONTOUR		349.0
BOLLARD		BLRD
POST		POST
BELL PEDESTAL		BPED
HYDRO POLE		HP
GUY WIRE		
SIGN		TS
TREES		
SHRUB		SHRUB

Revision	By	Appd.	YY.MM.DD
File Name: 161413446_C-DP.dwg	Dwn.	Chkd.	18.07.23
		Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

CITY OF WATERLOO

WEST SIDE EMPLOYMENT LANDS

City of Waterloo, Ontario

Title

EXISTING CONDITIONS PLAN (FIGURE 2)

Project No.	Scale	Sheet	Revision
161413446	1:1500 (0, 15, 45, 75m)		
Drawing No.			
C-050		of	0

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2018/07/23 4:02 PM By: Rose, Mollin

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20/07/2018 9:57 AM By: zaboda, Jeff

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7/20/2018 2:16:12 PM By: Rose, Martin

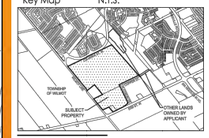
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Key Map N.T.S.



Legal Description

Part of Lot 41,
German Company Tract ,
City of Waterloo,
Regional Municipality of Waterloo

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 Listed Below
e) - As Shown
f) - As Shown
g) - As Shown
h) - Municipal Water Supply
i) - Glacial Till
j) - Municipal Sanitary and Storm Sewers
k) - None
l) - As Shown

Surveyor's Certificate

I hereby certify the boundaries of the subject land to be subdivided on this plan and their relationship to the adjoining lands have been accurately and correctly shown.

Signed _____
- O.L.S
Company

Date _____

Owner's Certificate

I hereby authorize Stantec Consulting Ltd. to submit this Draft Plan of Subdivision on my behalf.

Signed _____
Owner's Name
Company

Date _____

Land Use Schedule

Lots/Blocks	Land Use	Area (ha)	Potential # of Units
BLOCKS 1-11	EMPLOYMENT	35.672	
BLOCKS 12-13	EMPLOYMENT/COMMERCIAL	1.763	
BLOCK 14	PARK	0.890	
BLOCKS 15-17	6.0m WALKWAY	0.295	
BLOCK 18	15.0m WALKWAY/SERVICING	0.219	
BLOCKS 19-24	0.3m RESERVE	0.034	
ROADS		4.737	
TOTAL		43.610	

Revision	By	Appd.	YY.MM.DD
File Name: 161413446_B-DP.dwg	JJ	KW	JJ 18.07.19
	Dwn.	Chkd.	Dsgn. YY.MM.DD

Permit-Seal

APPROVED: _____ DATE: _____
I hereby certify that the plan was prepared under the supervision of a registered professional planner, within the meaning of the Ontario Professional Planners Institute Act, 1994.

Client/Project
CITY OF WATERLOO

WATERLOO WEST SIDE EMPLOYMENT LANDS
WATERLOO, ON

Title
DRAFT PLAN OF SUBDIVISION

Project No.	Scale	Revision
161413446	1:1500 (0, 15, 45, 75m)	
Drawing No.	Sheet	
DP-100	1 of 1	0

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Tel: (519) 579-4410
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Notes

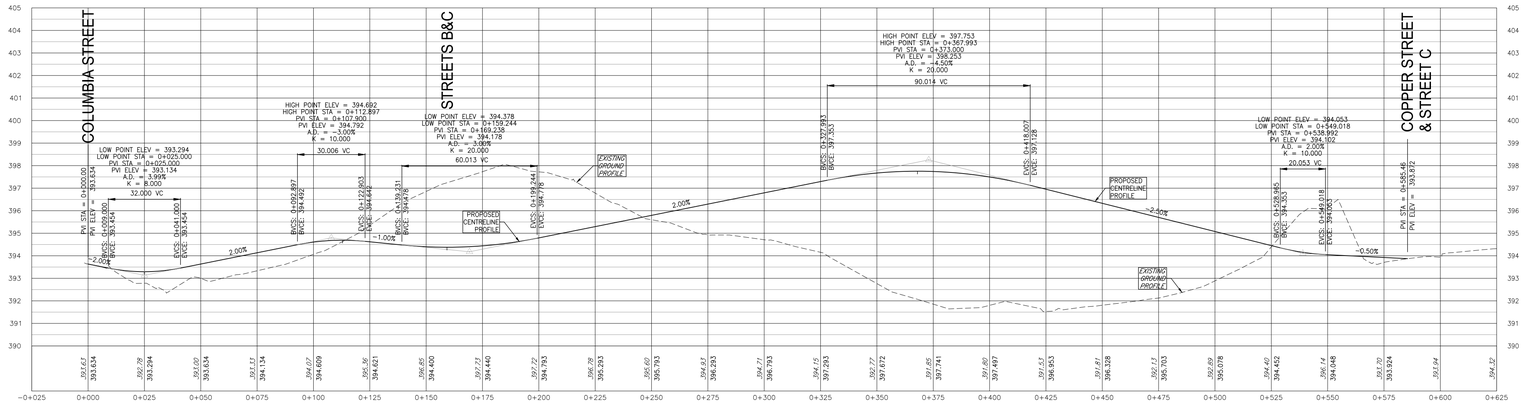
Client/Project
CITY OF WATERLOO

WEST SIDE EMPLOYMENT LANDS

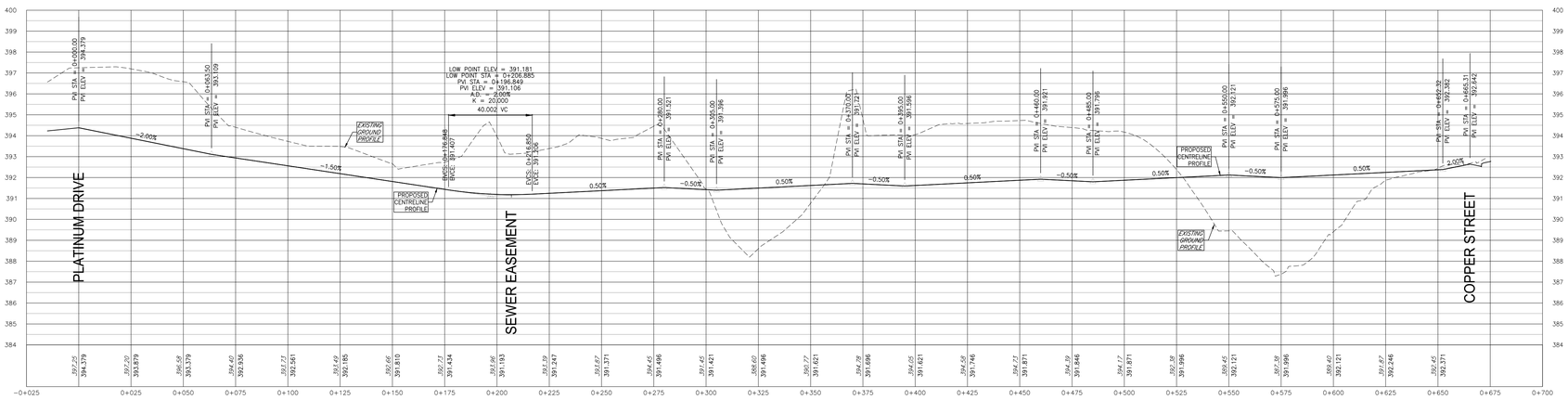
Project No.
161413446

Title
CONCEPT
DRAFT PLAN
OF SUBDIVISION

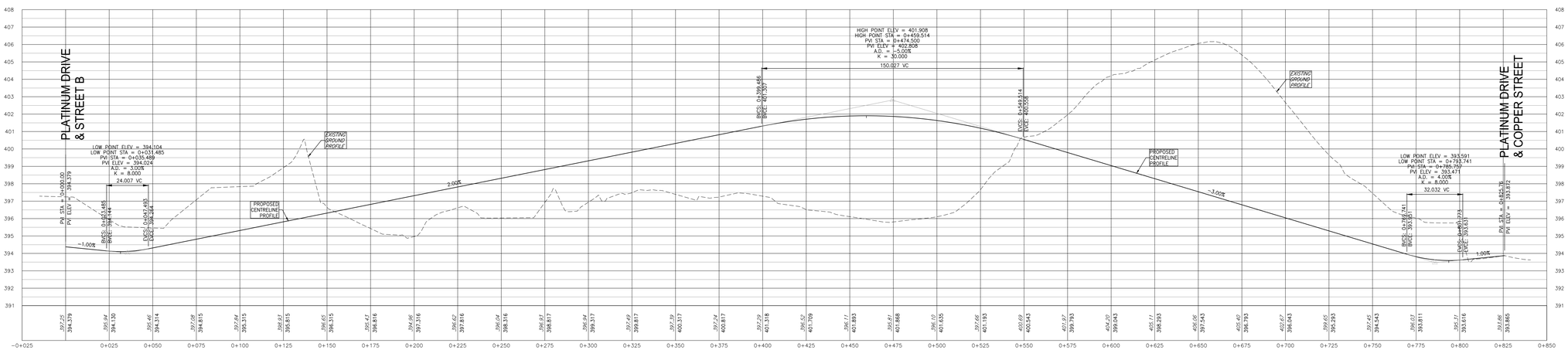
Revision	Date
	2018.07.20
Reference Sheet	Figure No.
	FIGURE 3



PLATINUM DRIVE



STREET 'B'



STREET 'C'

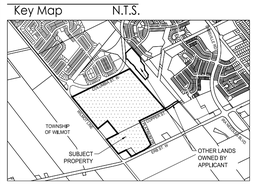
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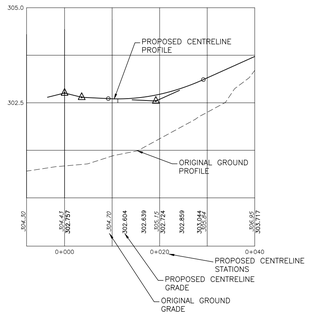
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Key Map N.T.S.



Legend



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File Name: 161413446_C-Profiles.dwg	Dwn.	Chkd.	Dsgn. 18.07.23 YY.MM.DD

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Client/Project
CITY OF WATERLOO

WEST SIDE EMPLOYMENT LANDS

City of Waterloo, Ontario

Title
PRELIMINARY ROAD PROFILES
SHEET 1 OF 2
(FIGURE 4)

Project No.	Scale	
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Drawing No.	Sheet	Revision
C-200	of	0

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2018/07/23 4:53 PM By: Rosie, Martin

ORIGINAL SHEET - ARCH D

SWM FACILITY

HYDRO ONE CORRIDOR

BLOCK 1

BLOCK 2

BLOCK 14

STREET B

BLOCK 3

BLOCK 5

BLOCK 4

COPPER STREET

EXISTING COMMERCIAL

WEST STREET

BLOCK 12

LADYSLIPPER DRIVE

PLATINUM DRIVE

COLUMBIA STREET

BLOCK 13

BLOCK 6

BLOCK 7

BLOCK 10

BLOCK 8

STREET C

ERB STREET WEST

BLOCK 11

BLOCK 9

PRIVATE LANDS

REGION OF WATERLOO LANDS

WILMOT LINE

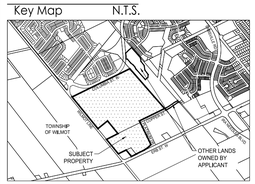
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Key Map N.T.S.



Legend

- STAGE LIMIT / PHASE LIMIT
- 352.82 EXISTING ELEVATION
- 352.92 PROPOSED ELEVATION
- 2.0% FLOW DIRECTION
- PROPOSED DRAINAGE SWALE
- 349.00 EXISTING CONTOUR
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED SANITARY MANHOLE
- PROPOSED VALVE & BOX
- PROPOSED HYDRANT
- PROPOSED SLOPE (3:1 UNLESS NOTED OTHERWISE)
- OVERLAND FLOW DIRECTION
- BH BORE HOLE
- TP TEST PIT

Revision	By	Appd.	YY.MM.DD
File Name: 161413446_C-GP.dwg	Dwn.	Chkd.	18.07.23
		Dsgn.	YY.MM.DD

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Client/Project
CITY OF WATERLOO

WEST SIDE EMPLOYMENT LANDS

City of Waterloo, Ontario

Title
PRELIMINARY GRADING PLAN (FIGURE 6)

Project No. 161413446

Scale 1:1500 (0, 15, 45, 75m)

Drawing No. C-400 of Revision 0

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2018/07/23 4:06 PM By: Rose, Martin

ORIGINAL SHEET - ARCH D

SWM FACILITY

HYDRO ONE CORRIDOR

EXISTING COMMERCIAL

BLOCK 1

BLOCK 2

BLOCK 3

BLOCK 4

BLOCK 5

BLOCK 6

BLOCK 7

BLOCK 8

BLOCK 9

BLOCK 10

BLOCK 11

BLOCK 12

BLOCK 13

BLOCK 14

PRIVATE LANDS

REGION OF WATERLOO LANDS

STREET B

STREET C

WEST STREET

COPPER STREET

PLATINUM DRIVE

LADYSLIPPER DRIVE

COLUMBIA STREET

ERB STREET WEST

GEHMAN

WILMOT LINE

PROP.	ELEV.
STORM	378.30

EXISTING	ELEV.
SANITARY	380.70

HP	ELEV.
ROAD	393.10

	ELEV.	COVER
ROAD	392.05	
STORM	388.80	3.25
SANITARY	389.20	2.85

LP	ELEV.	COVER
ROAD	392.65	
STORM	389.35	3.30
SANITARY	--	--

	ELEV.	COVER
ROAD	391.60	
STORM	387.15	4.45
SANITARY	388.00	3.60

LP	ELEV.	COVER
ROAD	391.18	
STORM	385.18	6.00
SANITARY	386.90	4.28

HP	ELEV.	COVER
ROAD	397.75	
STORM	395.95	1.80
SANITARY	390.15	7.60

LP	ELEV.	COVER
ROAD	393.85	
STORM	391.50	2.35
SANITARY	390.20	3.65

LP	ELEV.	COVER
ROAD	393.30	
STORM	391.85	1.45
SANITARY	--	--

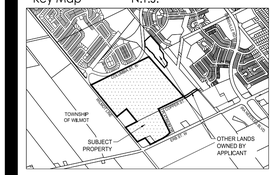
HP	ELEV.
ROAD	393.65

HP	ELEV.
ROAD	394.70

LP	ELEV.	COVER
ROAD	394.0	
STORM	391.05	3.35
SANITARY	389.10	5.30

	ELEV.	COVER
ROAD	397.10	
STORM	395.10	2.00
SANITARY	393.70	3.40

HP	ELEV.	COVER
ROAD	401.90	
STORM	400.10	1.80
SANITARY	398.95	2.95



Key Map N.T.S.

Legend

- PROPERTY BOUNDARY
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED SANITARY MANHOLE
- PROPOSED VALVE & BOX
- PROPOSED HYDRANT
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN

LP	ELEV.	COVER	
ROAD	393.9		ROAD SURFACE ELEVATION
STORM	391.6	2.3	STORM SEWER OBVERT ELEVATION
SANITARY	390.2	3.7	SANITARY SEWER OBVERT ELEVATION

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Client/Project
CITY OF WATERLOO

WEST SIDE EMPLOYMENT LANDS

City of Waterloo, Ontario

Title
PRELIMINARY SERVICING PLAN (FIGURE 7)

Project No.	Scale	
161413446	1:1500	0 15 45 75m
Drawing No.	Sheet	Revision
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2018/07/24 7:59 AM By: Rose, Martin

ORIGINAL SHEET - ARCH D

APPENDIX B
Sanitary Design Sheet

Stantec

City of Waterloo
West Side Employment Lands

DATE: July 25, 2018
DESIGNED BY: MAR
CHECKED BY: JLG

SANITARY SEWER DESIGN SHEET

FILE NUMBER: N/A
PROJECT NUMBER: 161413446

Design Parameters

Mininum Velocity=	0.800 m/s	Residential:	305 L/day/Person
			0.0035 L/s/Person
n=	0.013	Comercial:	1.500 L/s/Ha
Max Peak Factor=	4.500	Industrial:	1.500 L/s/Ha
Min Peak Factor=	1.500	Institutional:	0.100 L/s/Ha
		Infiltration:	0.150 L/s/Ha

LOCATION			RESIDENTIAL AREA AND POPULATION								COMMERCIAL			INDUSTRIAL			INSTITUTIONAL				INFILTRATION				PIPE SELECTION						
Street	U/S	D/S	Area ID	Residential Area (ha)	Population Density (P/ha)	Population (P)	Cummulative Area (ha)	Cumulative Population (min)	Peak Factor	Peak Flow L/s	Area ID	Area (ha)	Accumulated Area (ha)	Area ID	Area (ha)	Accumulated Area (ha)	Area ID	Area (ha)	Accumulated Area (ha)	Total C+I+I Flow (L/s)	Total Area (ha)	Accumulated Area (ha)	Flow (L/s)	Total Flow (L/s)	Length Design (m)	Design Size (mm)	Slope Design (%)	Full Capacity (L/s)	Full Velocity (m/s)	Actual Velocity (m/s)	Q_A/Q_C (%)
Street C	114	106					0.00	0	4.50	0.00			0.00	1.00	15.73	15.73			0.00	23.60	15.73	15.73	2.360	25.95	90.0	200	1.00	32.80	1.04	1.16	79.1%
Platinum Drive	118	106					0.00	0	4.50	0.00			0.00	2.00	8.93	8.93			0.00	13.40	8.93	8.93	1.340	14.73	90.0	200	0.50	23.19	0.74	0.78	63.5%
Street B	106	119					0.00	0	4.50	0.00			0.00	3.00	3.49	28.15			0.00	42.23	3.49	28.15	4.223	46.45	90.0	200	1.00	59.47	1.21	1.19	78.1%
Street B	131	119					0.00	0	4.50	0.00			0.00	4.00	8.28	8.28			0.00	12.42	8.28	8.28	1.242	13.66	90.0	200	0.50	23.19	0.74	0.77	58.9%
Sewer Easement	119	CBA-29					0.00	0	4.50	0.00			0.00	5.00	0.31	36.74			0.00	55.11	0.31	36.74	5.511	60.62	90.0	250	1.50	72.83	1.48	1.67	83.2%
Platinum Drive	plug	55					0.00	0	4.50	0.00			0.00	6.00	2.99	2.99			0.00	4.49	2.99	2.99	0.449	4.93	27.2	200	1.01	32.96	1.05	0.72	15.0%
	55	54		0.26			0.26	0	4.50	0.00			0.00			2.99			0.00	4.49	0.26	3.25	0.488	4.97	90.2	200	1.04	33.45	1.06	0.73	14.9%
	54	19		0.25			0.51	0	4.50	0.00			0.00			2.99			0.00	4.49	0.25	3.50	0.525	5.01	90.0	200	0.57	24.76	0.79	0.60	20.2%
Street C	114	19					0.00	0	4.50	0.00			0.00	7.00	6.79	6.79			0.00	10.19	6.79	6.79	1.019	11.20	90.0	200	1.00	32.80	1.04	0.94	34.2%
Copper Street	19	18		0.15			0.66	0	4.50	0.00			0.00			9.78			0.00	14.67	0.15	10.44	1.566	16.24	80.9	200	0.95	31.97	1.02	1.02	50.8%
	18	17		0.17			0.83	0	4.50	0.00			0.00			9.78			0.00	14.67	0.17	10.61	1.592	16.26	79.5	200	0.96	32.14	1.02	1.02	50.6%
	17	16		0.16			0.99	0	4.50	0.00			0.00			9.78			0.00	14.67	0.16	10.77	1.616	16.29	78.9	200	1.05	33.61	1.07	1.06	48.5%
930 Erb Street	136	16					0.00	0	4.50	0.00		7.77	7.77			0.00			0.00	11.66	7.77	7.77	1.166	12.82	90.0	200	1.00	32.80	1.04	0.97	39.1%
Copper Street	16	3		0.17			1.16	0	4.50	0.00			7.77			9.78			0.00	26.33	0.17	18.71	2.807	29.13	74.7	200	0.93	31.63	1.01	1.16	92.1%
	3	13		0.18			1.34	0	4.50	0.00			7.77			9.78			0.00	26.33	0.18	18.89	2.834	29.16	80.3	200	4.18	67.06	2.13	2.03	43.5%
	13	K36-2		0.06			1.40	0	4.50	0.00			7.77			9.78			0.00	26.33	0.06	18.95	2.843	29.17	43.8	200	5.32	75.65	2.41	2.23	38.6%

APPENDIX C
Storm Design Sheet

Stantec

City of Waterloo
West Side Employment Lands

STORM SEWER DESIGN SHEET

DATE: July 25, 2018
DESIGNED BY: MAR
CHECKED BY: JLG

FILE NUMBER: 30T- N/A
PROJECT NUMBER: 161413446

DESIGN PARAMETERS

DESIGN STORM 1 IN 5 Years

I = a / ((tc + b) ^c)

a=	1593.00	MANNING'S n =	0.013	
b=	11.00	MINIMUM COVER:	1.500	m
c=	0.8789	TIME OF ENTRY	10	min

LOCATION			DRAINAGE AREA								PIPE SELECTION							
Street	U/S	D/S	Area ID	5-Year Area Design (ha)	Runoff Coeff. Design	A x R	Accum. A x R	U/S T_C (min)	Rainfall Intensity (mm/hr)	Total Flow (m^3/s)	Length Design (m)	Design Size (mm)	Slope Design (%)	Full Capacity (m^3/s)	Full Velocity (m/s)	Actual Velocity (m/s)	Time of Flow (min)	5-Year Q_A/Q_C (%)
Platinum Drive			101	0.20	0.90	0.18												
(Existing)			100	0.25	0.80	0.20												
	29	120		0.45	0.84	0.38	0.38	10.00	109.68	0.116	57.30	375	1.01	0.176	1.60	1.71	0.56	65.7%
			102	0.14	0.80	0.11												
			103	0.17	0.90	0.15												
	120	25		0.31	0.85	0.27	0.65	10.56	107.17	0.192	54.98	450	0.56	0.213	1.34	1.53	0.60	90.0%
								11.16										
			104	0.06	0.80	0.05												
			105	0.22	0.90	0.20												
	25	24		0.28	0.88	0.25	0.89	11.16	104.62	0.259	69.74	525	0.60	0.333	1.54	1.71	0.68	77.7%
								11.84										
	24	23	106	0.15	0.90	0.14	1.03	11.84	101.88	0.290	19.46	525	0.50	0.304	1.40	1.62	0.20	95.5%
	23					0.00	1.03	12.04										
Copper Street	23	22	-	0.00	0.65	0.00	1.03	12.04	101.10	0.288	61.36	525	0.69	0.357	1.65	1.85	0.55	80.7%
(Existing)	22	21	107	0.15	0.90	0.14	1.16	12.59	99.01	0.319	89.48	525	1.01	0.432	2.00	2.20	0.68	73.9%
	21	20	108	0.22	0.90	0.20	1.36	13.27	96.57	0.365	80.86	525	0.92	0.413	1.91	2.17	0.62	88.4%
	20					0.00	1.36	13.89										
930 Erb Street	151	20	-	7.70	0.90	6.93	6.93	7.36	123.42	2.376	25.01	1050	1.12	2.890	3.34	3.75	0.11	82.2%
Copper Street	200	20	109	0.11	0.90	0.10	0.10	10.00	109.68	0.030	12.86	300	2.00	0.137	1.93	1.51	0.14	22.1%
	20					0.00	0.10	10.14										
STREET B	20	157	-	0.00	0.65	0.00	8.39	13.89	94.45	2.201	20.00	1050	0.79	2.427	2.80	3.21	0.10	90.7%

Stantec

City of Waterloo
West Side Employment Lands

STORM SEWER DESIGN SHEET

DATE: July 25, 2018
DESIGNED BY: MAR
CHECKED BY: JLG

FILE NUMBER: 30T- N/A
PROJECT NUMBER: 161413446

DESIGN PARAMETERS

DESIGN STORM 1 IN 5 Years

I = a / ((tc + b) ^c)

a=	1593.00	MANNING'S n =	0.013	
b=	11.00	MINIMUM COVER:	1.500	m
c=	0.8789	TIME OF ENTRY	10	min

LOCATION			DRAINAGE AREA								PIPE SELECTION							
Street	U/S	D/S	Area ID	5-Year Area Design (ha)	Runoff Coeff. Design	A x R	Accum. A x R	U/S T_C (min)	Rainfall Intensity (mm/hr)	Total Flow (m^3/s)	Length Design (m)	Design Size (mm)	Slope Design (%)	Full Capacity (m^3/s)	Full Velocity (m/s)	Actual Velocity (m/s)	Time of Flow (min)	5-Year Q_A/Q_C (%)
STREET C	198	197	30	1.33	0.80	1.06	1.06	10.00	109.68	0.324	54.99	450	2.00	0.403	2.54	2.84	0.32	80.4%
	197	196	31	2.79	0.80	2.23	3.30	10.32	108.22	0.991	15.47	600	3.00	1.063	3.76	4.33	0.06	93.2%
	196	195	-	0.00	0.65	0.00	3.30	10.38	107.95	0.988	24.92	600	3.00	1.063	3.76	4.33	0.10	92.9%
	195	199	-	0.00	0.65	0.00	3.30	10.48	107.53	0.984	16.04	600	3.00	1.063	3.76	4.33	0.06	92.6%
	199	194	32	2.42	0.80	1.94	5.23	10.54	107.26	1.559	60.62	750	3.00	1.928	4.36	4.89	0.21	80.8%
	194	193	33	2.17	0.80	1.74	6.97	10.75	106.36	2.059	64.00	825	2.65	2.337	4.37	4.98	0.21	88.1%
	193	192	34	2.36	0.80	1.89	8.86	10.96	105.45	2.594	64.00	900	2.50	2.862	4.50	5.15	0.21	90.6%
	192	204	-	0.00	0.65	0.00	8.86	11.17	104.58	2.573	29.78	975	1.50	2.745	3.68	4.23	0.12	93.7%
	204					0.00	8.86	11.29										
Platinum Drive	187	191	35	1.26	0.80	1.01	1.01	10.00	109.68	0.307	60.05	450	1.50	0.349	2.20	2.49	0.40	87.9%
	191	190	36	1.25	0.80	1.00	2.01	10.40	107.87	0.602	59.95	525	2.50	0.680	3.14	3.58	0.28	88.5%
	190	189	37	0.97	0.80	0.78	2.78	10.68	106.65	0.825	41.35	600	2.50	0.971	3.43	3.88	0.18	84.9%
	189	188	-	0.00	0.65	0.00	2.78	10.86	105.88	0.819	24.98	600	2.50	0.971	3.43	3.88	0.11	84.3%
	188	204	-	0.00	0.65	0.00	2.78	10.97	105.43	0.815	11.54	600	2.52	0.975	3.45	3.88	0.05	83.6%
	204					0.00	2.78	11.02										
Storm Easement	204	203	-	0.00	0.65	0.00	11.64	11.29	104.10	3.366	214.54	1200	1.00	3.899	3.45	3.91	0.91	86.3%
	203	202	-	0.00	0.65	0.00	11.64	12.20	100.48	3.249	5.63	1200	1.00	3.899	3.45	3.88	0.02	83.3%
	202	157	-	0.00	0.65	0.00	11.64	12.22	100.39	3.246	6.58	1200	1.00	3.899	3.45	3.88	0.03	83.3%
								12.25										
Street B	157	201	-	0.00	0.65	0.00	20.03	14.00	94.11	5.236	31.85	1500	0.70	5.914	3.35	3.82	0.16	88.5%
	201	143	-	0.00	0.65	0.00	20.03	14.15	93.59	5.207	32.65	1500	0.70	5.914	3.35	3.82	0.16	88.0%
	143	142	1	0.81	0.80	0.65	20.68	14.32	93.06	5.345	41.52	1500	0.70	5.914	3.35	3.83	0.18	90.4%
	142	141	2	1.72	0.80	1.38	22.05	14.50	92.48	5.665	45.13	1500	0.80	6.323	3.58	4.08	0.18	89.6%
	141	140	3	1.70	0.80	1.36	23.41	14.68	91.90	5.976	90.02	1500	0.90	6.706	3.79	4.33	0.35	89.1%
	140	139	4	1.71	0.80	1.37	24.78	15.03	90.82	6.251	90.01	1500	1.00	7.069	4.00	4.56	0.33	88.4%
	139	138	5	0.92	0.80	0.74	25.52	15.36	89.82	6.366	67.99	1500	1.00	7.069	4.00	4.58	0.25	90.1%
	138	136	-	0.00	0.65	0.00	25.52	15.61	89.09	6.314	20.31	1500	1.00	7.069	4.00	4.56	0.07	89.3%
	136	135	-	0.00	0.65	0.00	25.52	15.68	88.87	6.299	15.80	1500	1.00	7.069	4.00	4.56	0.06	89.1%
	135					0.00	25.52	15.74										

Stantec

City of Waterloo
West Side Employment Lands

STORM SEWER DESIGN SHEET

DATE: July 25, 2018
DESIGNED BY: MAR
CHECKED BY: JLG

FILE NUMBER: 30T- N/A
PROJECT NUMBER: 161413446

DESIGN PARAMETERS

DESIGN STORM 1 IN 5 Years

I = a / ((tc + b) ^c)

a=	1593.00	MANNING'S n =	0.013	
b=	11.00	MINIMUM COVER:	1.500	m
c=	0.8789	TIME OF ENTRY	10	min

LOCATION			DRAINAGE AREA								PIPE SELECTION							
Street	U/S	D/S	Area ID	5-Year Area Design (ha)	Runoff Coeff. Design	A x R	Accum. A x R	U/S T_C (min)	Rainfall Intensity (mm/hr)	Total Flow (m^3/s)	Length Design (m)	Design Size (mm)	Slope Design (%)	Full Capacity (m^3/s)	Full Velocity (m/s)	Actual Velocity (m/s)	Time of Flow (min)	5-Year Q_A/Q_C (%)
STREET C	172	171	7	2.08	0.80	1.66	1.66	10.00	109.68	0.507	89.99	600	1.50	0.752	2.66	2.86	0.52	67.4%
	171	170	8	1.61	0.80	1.29	2.95	10.52	107.32	0.880	73.00	675	2.00	1.189	3.32	3.67	0.33	74.0%
	170	169	9	1.41	0.80	1.13	4.08	10.86	105.89	1.200	73.73	750	2.00	1.574	3.56	3.96	0.31	76.2%
	169	168	10	4.84	0.80	3.87	7.95	11.17	104.59	2.310	34.45	900	2.00	2.560	4.02	4.61	0.12	90.2%
	168	167	11	2.03	0.80	1.62	9.58	11.29	104.07	2.768	34.48	975	2.00	3.169	4.24	4.82	0.12	87.3%
	167	166	12	0.97	0.80	0.78	10.35	11.41	103.59	2.979	65.79	975	2.50	3.543	4.75	5.36	0.20	84.1%
	166	165	13	1.27	0.80	1.02	11.37	11.61	102.76	3.245	61.27	975	2.50	3.543	4.75	5.43	0.19	91.6%
	165	164	-	0.00	0.65	0.00	11.37	11.80	102.02	3.222	22.00	975	2.50	3.543	4.75	5.43	0.07	90.9%
	164		-	0.00	0.65	0.00	11.37	11.87										
Platinum Drive	174	173	16	1.07	0.80	0.86	0.86	10.00	109.68	0.261	53.66	450	1.00	0.285	1.79	2.05	0.44	91.5%
	173	176	-	0.00	0.65	0.00	0.86	10.44	107.72	0.256	53.34	525	0.50	0.304	1.40	1.59	0.56	84.2%
	176	164	-	0.00	0.65	0.00	0.86	11.00	105.30	0.250	24.97	525	0.50	0.304	1.40	1.58	0.26	82.3%
	164					0.00	0.86	11.26										
Platinum Drive	187	180	13	1.27	0.80	1.02	1.02	10.00	109.68	0.310	59.99	450	1.65	0.366	2.30	2.60	0.38	84.5%
	180	179	14	0.89	0.80	0.71	1.73	10.38	107.94	0.518	60.00	525	2.50	0.680	3.14	3.49	0.29	76.2%
	179	178	15	0.53	0.80	0.42	2.15	10.67	106.69	0.638	59.99	525	3.00	0.745	3.44	3.89	0.26	85.6%
	178	164	-	0.00	0.65	0.00	2.15	10.93	105.59	0.631	35.27	525	2.79	0.718	3.32	3.77	0.16	87.9%
	164					0.00	2.15	11.08										
STREET B	164	163	18	1.46	0.80	1.17	15.54	11.87	101.75	4.394	89.94	1200	2.50	6.164	5.45	5.94	0.25	71.3%
	163	335	6	1.34	0.80	1.07	16.62	12.12	100.78	4.651	89.98	1200	2.50	6.164	5.45	6.02	0.25	75.5%
	335	162	-	0.00	0.65	0.00	16.62	12.37	99.83	4.608	33.84	1200	2.00	5.514	4.88	5.48	0.10	83.6%
	162	135	-	0.00	0.65	0.00	16.62	12.47	99.45	4.590	9.71	1200	2.00	5.514	4.88	5.48	0.03	83.3%
	135					0.00	16.62	12.50										

Stantec

City of Waterloo
West Side Employment Lands

STORM SEWER DESIGN SHEET

DATE: July 25, 2018
DESIGNED BY: MAR
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FILE NUMBER: 30T- N/A
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LOCATION			DRAINAGE AREA								PIPE SELECTION							
Street	U/S	D/S	Area ID	5-Year Area Design (ha)	Runoff Coeff. Design	A x R	Accum. A x R	U/S T_C (min)	Rainfall Intensity (mm/hr)	Total Flow (m^3/s)	Length Design (m)	Design Size (mm)	Slope Design (%)	Full Capacity (m^3/s)	Full Velocity (m/s)	Actual Velocity (m/s)	Time of Flow (min)	5-Year Q_A/Q_C (%)
Easement	135	134	-	0.00	0.65	0.00	42.13	15.74	88.70	10.381	70.37	1500	2.63	11.464	6.49	7.43	0.16	90.6%
	134	133	20	0.79	0.80	0.63	42.76	15.89	88.24	10.482	73.75	1500	3.00	12.244	6.93	7.83	0.16	85.6%
	133	132	-	0.00	0.65	0.00	42.76	16.05	87.79	10.429	64.21	1500	3.00	12.244	6.93	7.83	0.14	85.2%
	132	131	19	2.26	0.80	1.81	44.57	16.19	87.40	10.822	49.28	1800	1.00	11.495	4.52	5.22	0.16	94.1%
	131	130	-	0.00	0.65	0.00	44.57	16.35	86.96	10.767	23.26	1800	1.00	11.495	4.52	5.19	0.07	93.7%
Headwall	130					0.00	44.57	16.42										

APPENDIX D
Region of Waterloo Correspondence

Region of Waterloo

TRANSPORTATION AND
ENVIRONMENTAL SERVICES
Water Services

150 Frederick Street
Kitchener ON Canada N2G 4J3
Telephone: (519) 575-4426
Fax: (519) 575-4452
www.region.waterloo.on.ca

Date: April 25, 2018
File #: E18-10/WA

Sergio Zaga, M. Eng.
Stantec
100-300 Hagey Blvd
Waterloo, ON N2L 0A4
t. 519.585.7417
e. Sergio.Zaga@stantec.com

Dear: Sergio

Re: Waterloo West Employment Lands, Waterloo

Please find the results of the modeling simulations for boundary conditions requested on March 16 2018.

The results included a figure showing the locations of the node from the Region's model. Attached are a series of spreadsheets containing results for Average Day, Maximum Day demands and available fire flows for the two entrance points to the employment lands. This represents existing conditions.

Node	Location	Elevation (m)
JCT_19739	Erb St W @ Platinum Dr	396.0
JCT_19855	Columbia St W @ proposed Platinum Dr	392.0

The diurnal 24 hour demand distribution accounts for the minimum hour and peak hour peaking factors. The minimum hourly demand on the average day represents the minimum hour, and the maximum hourly demand on the maximum day represents the peak hour.

Demands as applied to nodes:

Node	Employment Demand (L/s)		Fire Flow Results	
	Average Day	Maximum Day	Design Flow (L/s)	Design Pressure (m)
JCT_19739	3.27	6.54	245.6	16.5
JCT_19855	3.27	6.54	268.2	26.9

A fire flow analysis shows the maximum flow available at a node with an associated design pressure during the maximum day scenario while maintaining the minimum design pressure of 14 m (140 kPa) at all nodes within the pressure zone.

If you have any questions, please contact me.

jsh for



Kevin Dolishny P.Eng.
Senior Project Engineer, Servicing and Development Planning
t. 519.575.4757 x 3862
e-mail: kdolishny@regionofwaterloo.ca

cc John Holowackyj, RMOW

Available Flow (L/s)	Residual Pressure (m)
0.0	54.0
10.0	54.0
20.0	53.9
30.0	53.7
40.0	53.5
50.0	53.3
60.0	53.0
70.0	52.6
80.0	52.3
90.0	51.9
100.0	51.4
110.0	50.9
120.0	50.4
130.0	49.8
140.0	48.3
150.0	42.6
160.0	35.7
170.0	34.0
180.0	33.7
190.0	33.3
200.0	32.8
210.0	32.1
220.0	31.4
230.0	30.6
240.0	29.8
250.0	28.8
260.0	27.8
268.2	26.9

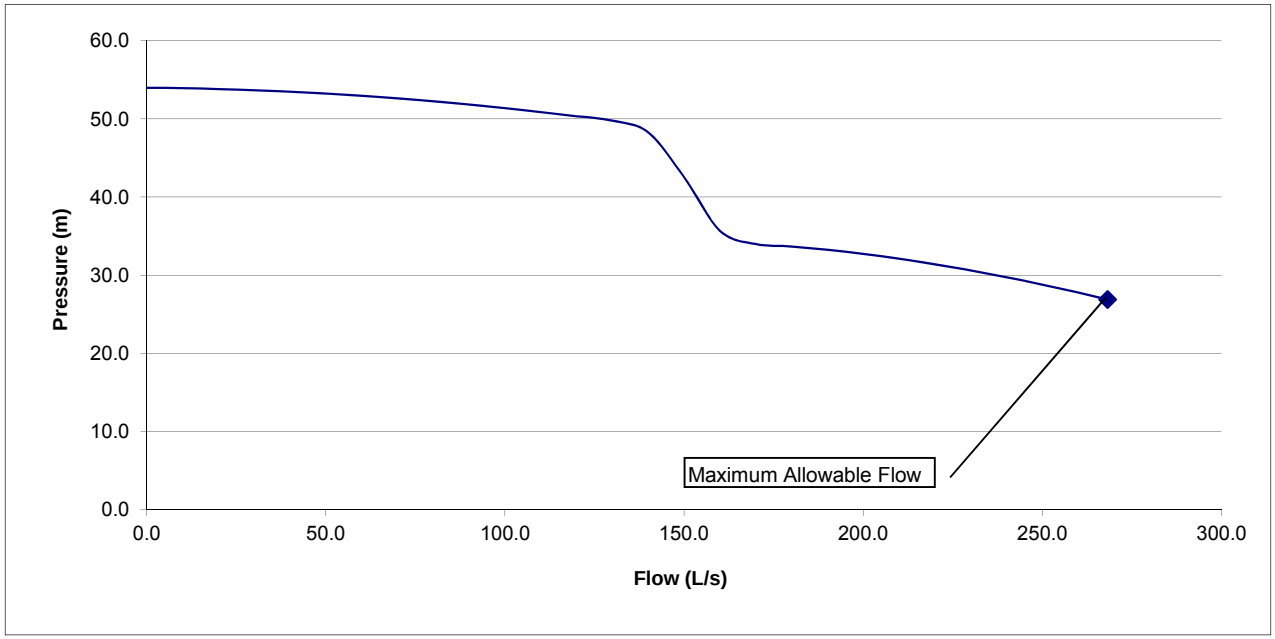
Fire Flow Analysis

Fire Flow Node:	JCT_19855
Design Flow (L/s):	268.2
	26.9

The final adjusted flow at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.

The lowest allowable pressure at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.

The constraining node within the pressure zone that drops to the minimum design pressure of (14m (140 kPa)) during the design flow.



Available Flow (L/s)	Residual Pressure (m)
0.0	50.0
10.0	50.0
20.0	49.9
30.0	49.8
40.0	49.7
50.0	49.5
60.0	49.3
70.0	49.0
80.0	48.8
90.0	48.5
100.0	48.2
110.0	47.8
120.0	47.4
130.0	47.0
140.0	46.6
150.0	40.4
160.0	33.8
170.0	26.8
180.0	25.0
190.0	24.2
200.0	23.1
210.0	21.9
220.0	20.6
230.0	19.1
240.0	17.5
245.6	16.5

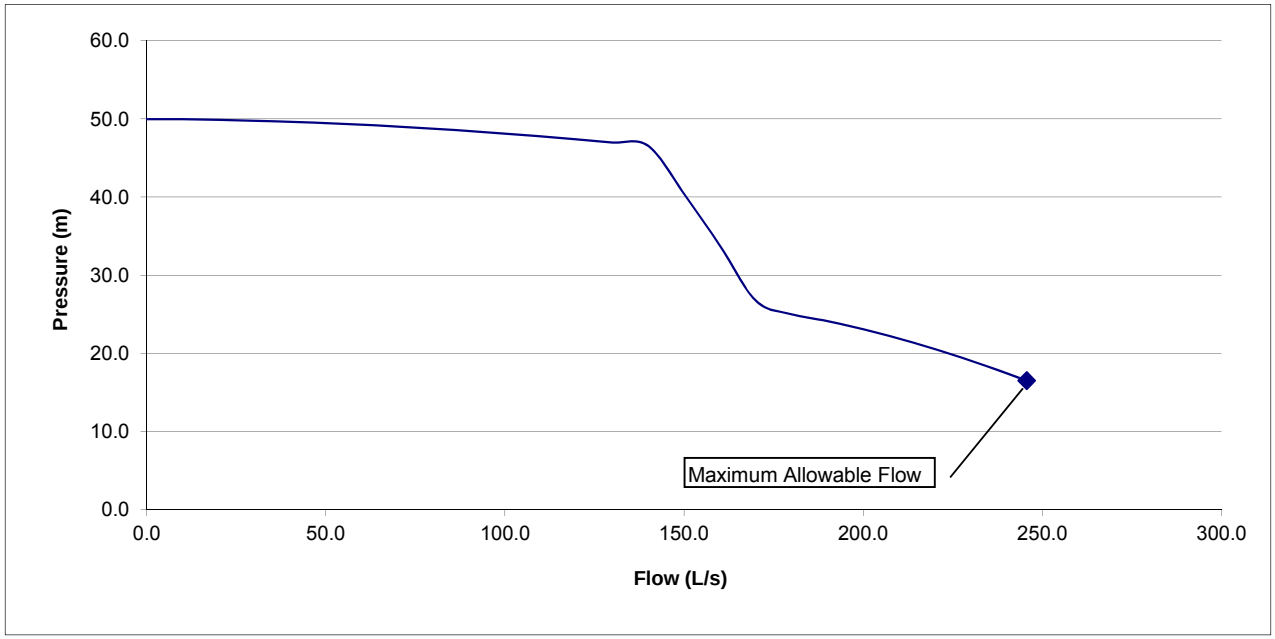
Fire Flow Analysis

Fire Flow Node:	JCT_19739
Design Flow (L/s):	245.6
	16.5

The final adjusted flow at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.

The lowest allowable pressure at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.

The constraining node within the pressure zone that drops to the minimum design pressure of (14m (140 kPa)) during the design flow.



Wat 7 Infowater Columbia St W @ proposed Platinum Dr

JCT_19855 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	3.04	442.25	50.25
01:00 hrs	2.88	442.31	50.31
02:00 hrs	2.29	442.38	50.38
03:00 hrs	2.03	442.42	50.42
04:00 hrs	1.96	442.45	50.45
05:00 hrs	2.19	442.46	50.46
06:00 hrs	2.42	442.42	50.42
07:00 hrs	1.96	442.35	50.35
08:00 hrs	2.49	441.87	49.87
09:00 hrs	4.12	440.84	48.84
10:00 hrs	4.28	440.71	48.71
11:00 hrs	4.77	440.29	48.29
12:00 hrs	4.90	440.21	48.21
13:00 hrs	4.77	440.48	48.48
14:00 hrs	4.74	440.60	48.60
15:00 hrs	4.55	440.85	48.85
16:00 hrs	4.28	440.99	48.99
17:00 hrs	4.05	441.11	49.11
18:00 hrs	3.53	441.33	49.33
19:00 hrs	3.07	441.57	49.57
20:00 hrs	2.62	441.93	49.93
21:00 hrs	2.45	442.13	50.13
22:00 hrs	2.55	442.15	50.15
23:00 hrs	2.62	442.18	50.18

Average Day HGL: 441.60
Minimum Hour: 442.46

JCT_19855 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	6.28	445.97	53.97
01:00 hrs	6.02	445.98	53.98
02:00 hrs	4.25	441.61	49.61
03:00 hrs	4.12	441.63	49.63
04:00 hrs	4.58	441.31	49.31
05:00 hrs	4.90	441.18	49.18
06:00 hrs	7.72	445.96	53.96
07:00 hrs	7.91	445.95	53.95
08:00 hrs	7.85	445.95	53.95
09:00 hrs	11.44	445.92	53.92
10:00 hrs	11.84	445.93	53.93
11:00 hrs	11.97	445.93	53.93
12:00 hrs	12.69	445.92	53.92
13:00 hrs	9.48	445.95	53.95
14:00 hrs	4.58	445.98	53.98
15:00 hrs	6.93	445.96	53.96
16:00 hrs	3.92	445.98	53.98
17:00 hrs	3.01	440.98	48.98
18:00 hrs	2.62	440.89	48.89
19:00 hrs	3.20	440.22	48.22
20:00 hrs	3.86	445.97	53.97
21:00 hrs	4.32	445.97	53.97
22:00 hrs	6.47	445.97	53.97
23:00 hrs	7.00	445.97	53.97

Maximum Day HGL: 444.54
Peak Hour: 440.22

Wat 7 Infowater Erb St W @ Platinum Dr

JCT_19739 Average Day 24 Hour Simulation

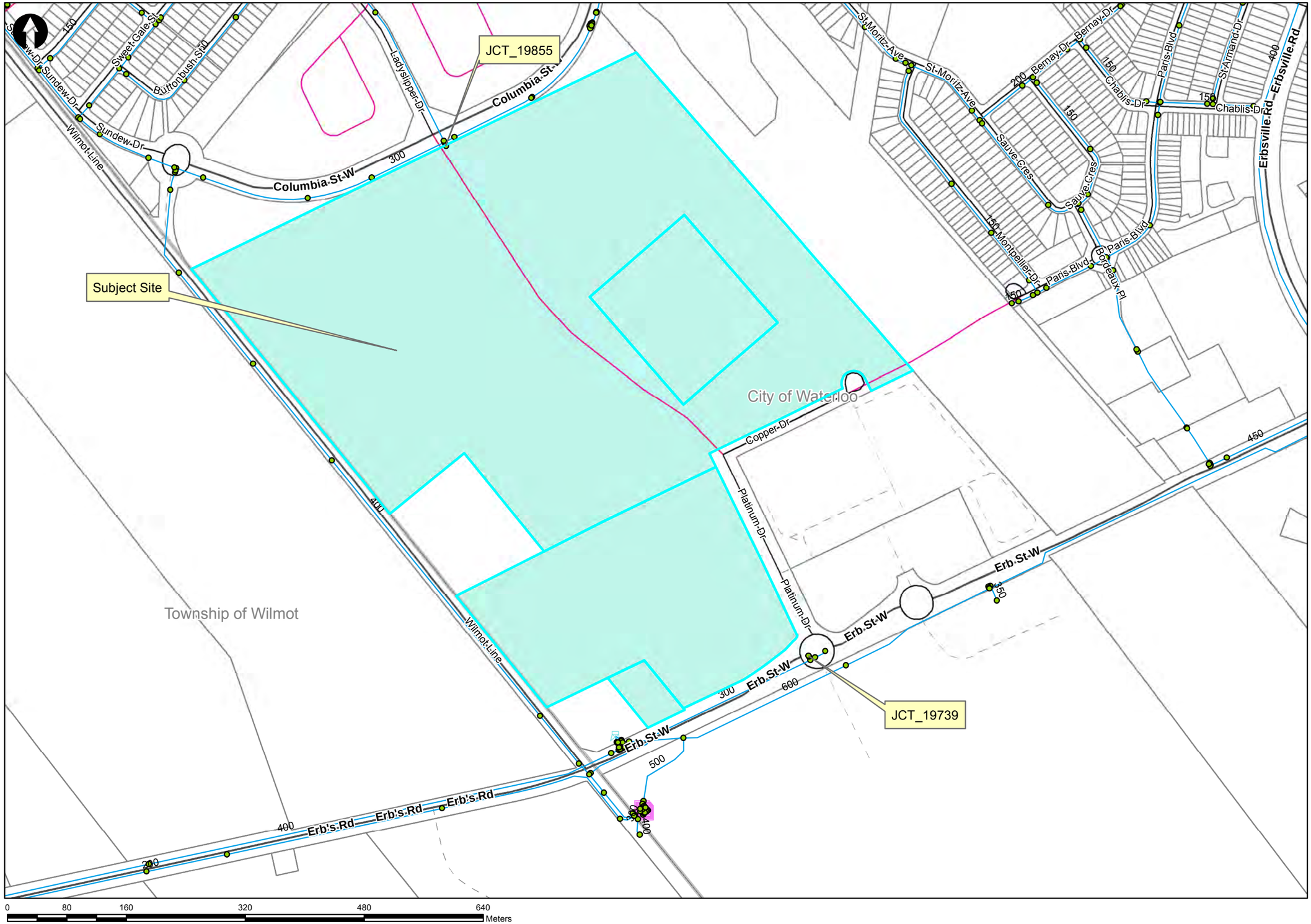
Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	3.42	442.25	46.25
01:00 hrs	3.23	442.31	46.31
02:00 hrs	2.57	442.38	46.38
03:00 hrs	2.28	442.42	46.42
04:00 hrs	2.20	442.45	46.45
05:00 hrs	2.46	442.46	46.46
06:00 hrs	2.72	442.42	46.42
07:00 hrs	2.20	442.36	46.36
08:00 hrs	2.79	441.88	45.88
09:00 hrs	4.63	440.84	44.84
10:00 hrs	4.81	440.72	44.72
11:00 hrs	5.36	440.30	44.30
12:00 hrs	5.51	440.22	44.22
13:00 hrs	5.36	440.49	44.49
14:00 hrs	5.33	440.61	44.61
15:00 hrs	5.11	440.86	44.86
16:00 hrs	4.81	441.00	45.00
17:00 hrs	4.56	441.12	45.12
18:00 hrs	3.97	441.34	45.34
19:00 hrs	3.45	441.58	45.58
20:00 hrs	2.94	441.94	45.94
21:00 hrs	2.76	442.14	46.14
22:00 hrs	2.87	442.15	46.15
23:00 hrs	2.94	442.19	46.19

Average Day HGL:	441.60
Minimum Hour:	442.46

JCT_19739 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	6.77	445.98	49.98
01:00 hrs	6.49	445.98	49.98
02:00 hrs	4.58	441.62	45.62
03:00 hrs	4.44	441.64	45.64
04:00 hrs	4.94	441.32	45.32
05:00 hrs	5.29	441.18	45.18
06:00 hrs	8.32	445.97	49.97
07:00 hrs	8.53	445.97	49.97
08:00 hrs	8.46	445.97	49.97
09:00 hrs	12.34	445.95	49.95
10:00 hrs	12.76	445.95	49.95
11:00 hrs	12.90	445.95	49.95
12:00 hrs	13.68	445.94	49.94
13:00 hrs	10.22	445.96	49.96
14:00 hrs	4.94	445.99	49.99
15:00 hrs	7.47	445.98	49.98
16:00 hrs	4.23	445.99	49.99
17:00 hrs	3.24	440.99	44.99
18:00 hrs	2.82	440.90	44.90
19:00 hrs	3.46	440.23	44.23
20:00 hrs	4.16	445.99	49.99
21:00 hrs	4.65	445.99	49.99
22:00 hrs	6.98	445.98	49.98
23:00 hrs	7.55	445.98	49.98

Maximum Day HGL:	444.56
Peak Hour:	440.23



Time: 2:42:59 PM Date: 4/25/2018 Author: hsjohn Document Path: I:\InfoWater\Modeling Requests\2018\Stantec\Waterloo West Employment Lands\Waterloo_West_Emp_All_Pipes_20180410.mxd

Region of Waterloo

TRANSPORTATION AND ENVIRONMENTAL SERVICES

Water Services

150 Frederick Street
Kitchener ON Canada N2G 4J3
Telephone: (519) 575-4426
Fax: (519) 575-4452
www.regionofwaterloo.ca

Legend

TYPE
- Active
- Domain

TYPE
- Active
- Domain

TYPE
- Active
- Domain

TYPE
- Active
- Domain

TYPE
- Active
- Domain

TYPE
- Active
- Domain
- Highway
- Arterial/Collector
- Local
- Private
- Proposed Roads
- Regional Municipal Boundaries
- Assessment Parcels (MPAC)
- Subject Site

Waterloo West Employment Lands

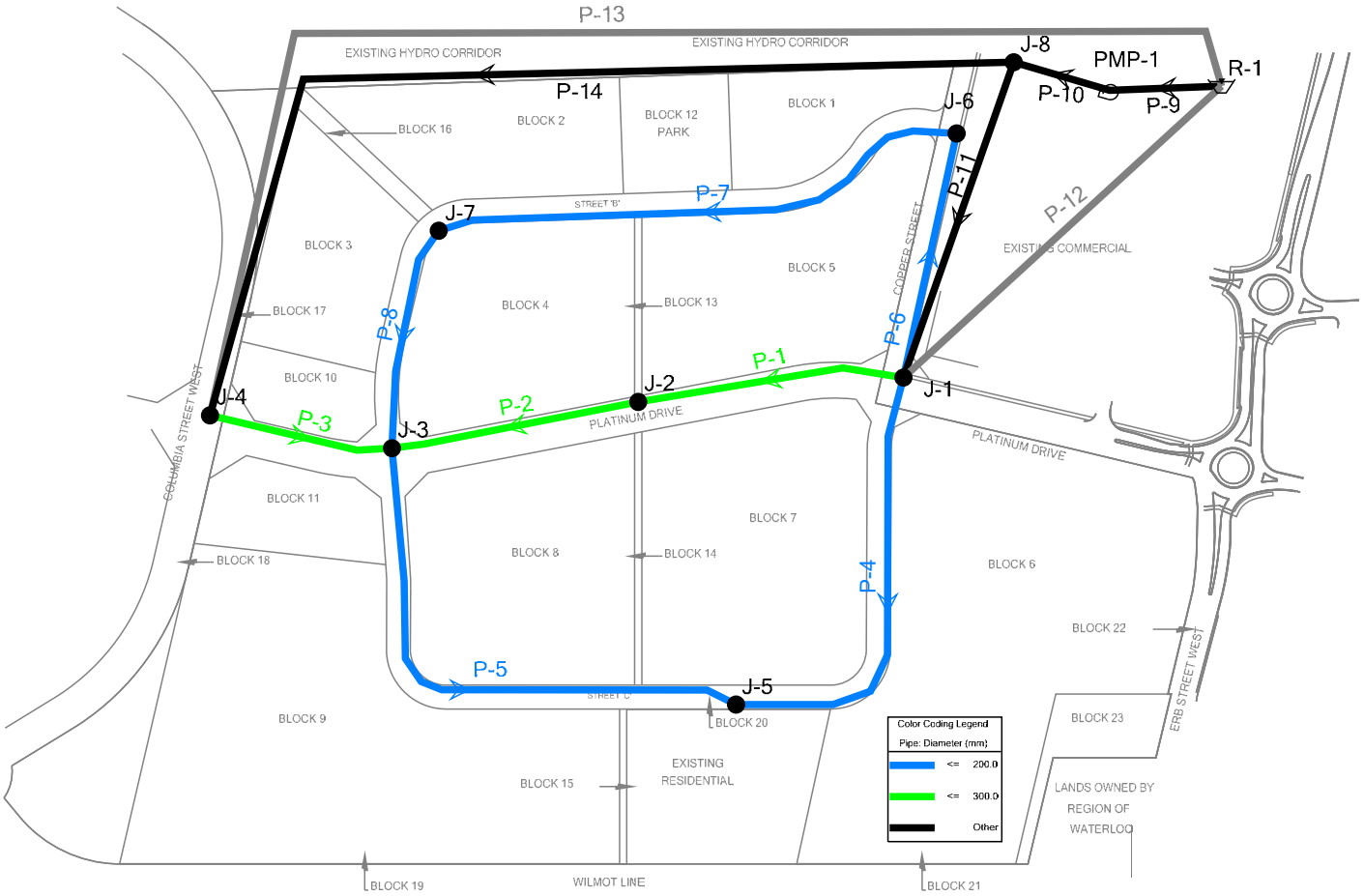
APPENDIX E
Demand Calculations

1614-13446 - West Side Employment Lands								
Nodal Data Input								
Description	Node No.	Employment/Business Park		Total Demand	Min. Hour Demand	Max Day Demand	Peak Hour Demand	Fire Flow Demand
		Area (ha)	Demand (L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)
Part Block 4		1.534	0.23	0.23	0.12	0.46	0.69	
Part Block 5		1.660	0.25	0.25	0.12	0.50	0.75	
Part Block 7		2.147	0.32	0.32	0.16	0.64	0.97	
Part Block 8		1.805	0.27	0.27	0.14	0.54	0.81	
Part Block 13		0.045	0.01	0.01	0.00	0.01	0.02	
Part Block 14		0.064	0.01	0.01	0.00	0.02	0.03	
Roads		0.880	0.13	0.13	0.07	0.26	0.40	
Total J2	J2	8.135	1.22	1.22	0.61	2.44	3.66	100
Block 10		0.708	0.11	0.11	0.05	0.21	0.32	
Block 11		1.055	0.16	0.16	0.08	0.32	0.47	
Part Block 9		3.795	0.57	0.57	0.28	1.14	1.71	
Roads		1.270	0.19	0.19	0.10	0.38	0.57	
Total J3	J3	6.828	1.02	1.02	0.51	2.05	3.07	100
Block 6		7.858	1.18	1.18	0.59	2.36	3.54	
Part Block 7		2.147	0.32	0.32	0.16	0.64	0.97	
Part Block 8		1.805	0.27	0.27	0.14	0.54	0.81	
Part Block 9		3.795	0.57	0.57	0.28	1.14	1.71	
Part Block 14		0.064	0.01	0.01	0.00	0.02	0.03	
Block 15		0.078	0.01	0.01	0.01	0.02	0.04	
Roads		1.300	0.20	0.20	0.10	0.39	0.59	
Total J5	J5	17.047	2.56	2.56	1.28	5.11	7.67	100
Block 1		1.257	0.19	0.19	0.09	0.38	0.57	
Part Block 5		1.660	0.25	0.25	0.12	0.50	0.75	
Block 12		0.890	0.13	0.13	0.07	0.27	0.40	
Part Block 13		0.045	0.01	0.01	0.00	0.01	0.02	
Roads		0.540	0.08	0.08	0.04	0.16	0.24	
Total J6	J6	4.392	0.66	0.66	0.33	1.32	1.98	100
Block 2		2.136	0.32	0.32	0.16	0.64	0.96	
Block 3		1.938	0.29	0.29	0.15	0.58	0.87	
Part Block 4		1.534	0.23	0.23	0.12	0.46	0.69	
Block 16		0.219	0.03	0.03	0.02	0.07	0.10	
Roads		0.777	0.12	0.12	0.06	0.23	0.35	
Total J7	J7	6.604	0.99	0.99	0.50	1.98	2.97	100
TOTALS		43.005	12.9	12.90	6.45	25.80	38.70	

1614-13446 - West Side Employment Lands								
Nodal Data Input								
Specific Usage Rates								
Land Use	Average Day		Source					
Employment/Business Park	0.150	L/s/ha	Tri-City Water Distribution Master Plan Final Report 2009					
Peaking Factors:								
Residental	min	0.50						
	avg	1.00	MOECC Design Guidelines for Drinking Water Systems					
	max	2.00						
	pk	3.00	(3,001 to 10,000 people)					

APPENDIX F
Modelling Results

West Side Employment Lands



West Side Employment Lands
FlexTable: Junction Table
Active Scenario: Average Day

Label	Demand (L/s)	Elevation (m)	Pressure Head (m)	Hydraulic Grade (m)	Pressure (kPa)
J-1	0.00	393.82	47.78	441.60	468
J-2	1.22	397.75	43.85	441.60	429
J-3	1.02	394.38	47.22	441.60	462
J-4	0.00	393.63	47.97	441.60	469
J-5	2.56	401.91	39.68	441.59	388
J-6	0.66	392.38	49.22	441.60	482
J-7	0.99	391.17	50.43	441.60	494

West Side Employment Lands
FlexTable: Junction Table
Active Scenario: Max Day

Label	Demand (L/s)	Elevation (m)	Pressure Head (m)	Hydraulic Grade (m)	Pressure (kPa)
J-1	0.00	393.82	50.74	444.56	497
J-2	2.44	397.75	46.81	444.56	458
J-3	2.05	394.38	50.18	444.56	491
J-4	0.00	393.63	50.93	444.56	498
J-5	5.11	401.91	42.63	444.54	417
J-6	1.32	392.38	52.18	444.56	511
J-7	1.98	391.17	53.38	444.55	522

West Side Employment Lands
FlexTable: Junction Table
Active Scenario: Min Hour

Label	Demand (L/s)	Elevation (m)	Pressure Head (m)	Hydraulic Grade (m)	Pressure (kPa)
J-1	0.00	393.82	48.64	442.46	476
J-2	0.61	397.75	44.71	442.46	438
J-3	0.51	394.38	48.08	442.46	471
J-4	0.00	393.63	48.83	442.46	478
J-5	1.28	401.91	40.55	442.46	397
J-6	1.33	392.38	50.08	442.46	490
J-7	0.50	391.17	51.29	442.46	502

West Side Employment Lands
FlexTable: Junction Table
Active Scenario: Peak Hour

Label	Demand (L/s)	Elevation (m)	Pressure Head (m)	Hydraulic Grade (m)	Pressure (kPa)
J-1	0.00	393.82	46.41	440.23	454
J-2	3.66	397.75	42.47	440.22	416
J-3	3.07	394.38	45.84	440.22	449
J-4	0.00	393.63	46.60	440.23	456
J-5	7.67	401.91	38.28	440.19	375
J-6	1.98	392.38	47.84	440.22	468
J-7	2.97	391.17	49.05	440.22	480

West Side Employment Lands
Fire Flow Node FlexTable: Fire Flow Report
Active Scenario: Max Day + 100 L/s Fire

Label	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated System Lower Limit) (kPa)	Junction w/ Minimum Pressure (System)
J-1	100	105	447	368	J-5
J-2	102	107	404	367	J-5
J-3	102	107	438	366	J-5
J-4	100	105	449	368	J-5
J-5	105	110	317	408	J-2
J-6	101	106	421	367	J-5
J-7	102	107	434	366	J-5

West Side Employment Lands
Fire Flow Node FlexTable: Fire Flow Report
Active Scenario: Max Day + 150 L/s Fire

Label	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated System Lower Limit) (kPa)	Junction w/ Minimum Pressure (System)
J-1	150	155	358	278	J-5
J-2	152	157	310	276	J-5
J-3	152	157	345	274	J-5
J-4	150	155	359	278	J-5
J-5	155	160	176	318	J-2
J-6	151	156	290	277	J-5
J-7	152	157	304	276	J-5

West Side Employment Lands
Fire Flow Node FlexTable: Fire Flow Report
Active Scenario: Max Day + 200 L/s Fire

Label	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated System Lower Limit) (kPa)	Junction w/ Minimum Pressure (System)
J-1	200	205	231	152	J-5
J-2	202	207	177	148	J-5
J-3	202	207	215	145	J-5
J-4	200	205	233	152	J-5
J-5	205	171	140	295	J-2
J-6	201	199	140	172	J-5
J-7	202	203	140	160	J-5

West Side Employment Lands

FlexTable: Pipe Table

Active Scenario: Max Day + 200 L/s Fire @ J5

Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (L/s)	Velocity (m/s)
P-1	J-1	J-2	300.0	PVC	150.0	1.330	36	0.51
P-2	J-2	J-3	300.0	PVC	150.0	1.330	33	0.47
P-3	J-3	J-4	300.0	PVC	150.0	1.330	-59	0.83
P-4	J-1	J-5	200.0	PVC	150.0	1.330	108	3.45
P-5	J-5	J-3	200.0	PVC	150.0	1.330	-97	3.08
P-6	J-1	J-6	200.0	PVC	150.0	1.330	10	0.31
P-7	J-6	J-7	200.0	PVC	150.0	1.330	9	0.27
P-8	J-7	J-3	200.0	PVC	150.0	1.330	7	0.21

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Stantec Consulting Ltd.
Waterloo, ON

West Side Employment Lands

FlexTable: Pipe Table

Active Scenario: Max Day + 200 L/s Fire @ J7

Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (L/s)	Velocity (m/s)
P-1	J-1	J-2	300.0	PVC	150.0	1.330	48	0.68
P-2	J-2	J-3	300.0	PVC	150.0	1.330	46	0.64
P-3	J-3	J-4	300.0	PVC	150.0	1.330	-79	1.12
P-4	J-1	J-5	200.0	PVC	150.0	1.330	14	0.45
P-5	J-5	J-3	200.0	PVC	150.0	1.330	9	0.29
P-6	J-1	J-6	200.0	PVC	150.0	1.330	71	2.27
P-7	J-6	J-7	200.0	PVC	150.0	1.330	70	2.23
P-8	J-7	J-3	200.0	PVC	150.0	1.330	-132	4.20