COUNTERPOINT LAND DEVELOPMENT BY | DILLON CONSULTING

J. RAUTI DEVELOPMENTS INC. AND 2601817 ONTARIO LIMITED

FUNCTIONAL SERVICING REPORT

3694 – 3738 Howard Avenue

JANUARY 2026 – 24-8813

TABLE OF CONTENTS

TABLES

APPENDICES

1.0 INTRODUCTION

This Functional Servicing Report ('FSR') has been prepared to support a Zoning Bylaw Amendment ('ZBA') application for the site municipally known as 3694-3738 Howard Avenue in Windsor, Ontario (referred to as 'the site'). This report has been prepared on behalf of the applicant, J. Rauti Developments Inc. and 2601817 Ontario Limited (or 'client') to outline the servicing strategy, including supporting studies and related information for the transportation, sanitary, stormwater management, and watermain servicing for the site.

The site is approximately 0.74 ha in area and shown in **Figure 1** below. When fully developed, the site will include one 6-storey apartment building with a total of 90 units.

Figure 1: Site Location

1.1 REFERENCE DOCUMENTS

The following documents and drawings were referenced when completing this study:

- City of Windsor Development Manual (City of Windsor, 2015);
- City of Windsor Sewer Atlas (City of Windsor);
- MappMyCity Sewer Mapping (City of Windsor);
- Design Criteria for Environmental Compliance Approval (MECP, 2023); and
- Windsor/Essex Region Stormwater Management Standards Manual (WERSMSM, 2018).

2.0 TRANSPORTATION SERVICING

2.1 EXISTING CONDITIONS

Currently there are five driveway accesses to the four existing residential dwellings at 3694, 3702, 3726 and 3738 Howard Avenue. These existing driveway accesses will be removed to accommodate the proposed development.

The site is bounded on the north by Holburn Street, the west by Howard Avenue, the south by existing residential and the east by an existing stormwater management pond, also known as the 'Orchards Pond'.

2.2 PROPOSED ROADWAYS

The proposed development will have one access point located off of Holburn Street. The internal road network is proposed to be a parking lot with 7.1m and 6.1m wide drive isles and a total of 106 parking spaces. The parking lot layout is shown in **Figure 1.0** (in **Appendix A**). The pavement structure will be consistent with geotechnical recommendations and will be finalized during detailed design.

3.0 SANITARY SERVICING

3.1 EXISTING CONDITIONS

Currently, there are three 150mm diameter sanitary services to the existing residential dwellings at 3694 and 3714 Howard Avenue which will be capped and abandoned to accommodate the proposed development. There is an existing 250mm diameter sanitary sewer main which runs along Howard Avenue. There is also a 250mm diameter sanitary sewer main along Holburn Street which ties into the sewer on Howard at the intersection and ultimately drains north towards the Lou Romano Water Reclamation Plant (LRWRP).

3.2 DESIGN CRITERIA

The following sanitary sewer design criteria for this property are outlined in **Table 1** below. The design criteria were established by the City of Windsor Development Manual (2015).

Table 1: Sanitary Design Criteria

CRITERIA	CITY OF WINDSOR DEVELOPMENT MANUAL
Hydraulic Sewer Sizing	Manning's Equation
Population Densities For:	
Single-Detached / Townhome	3 people per unit
Multi-Unit Residential	2 people per unit
Residential Density Per Area	50 people per hectare
Commercial Density Per Area	74 people per hectare
Average Daily Sewage	0.0042 litres per second per capita
Peaking Factor	6 (population under 1,000)
Extraneous Flow	0.156 litres per hectare per second
Sewer Surcharging	Maximum Hydraulic Grade Line

3.3 SANITARY CAPACITY ASSESSMENT

A sanitary capacity assessment was completed along Howard Avenue fronting the site to determine the impact of the proposed development on the existing sewer system. The limits of the assessment were from the most upstream sanitary MH 8S3184 and downstream to MH 8S3506 where the existing sewer size changes from 250mm diameter to 525mm diameter.

A summary of the existing and proposed densities along Howard Avenue within the limits described is shown in **Table 2** below. The corresponding drainage areas are provided in **Figure 4.0** (in **Appendix A**).

Table 2: Howard Avenue Population Summary

FROM MH	TO MH	EXISTING DEVELOPMENT			PROPOSED CONDITIONS		
		LAND USE / UNIT TYPE	TOTAL POP.	AREA (ha)	LAND USE / UNIT TYPE	TOTAL POP.	AREA (ha)
8S3184	8S3508	10 single-detached 46 multi-unit 0.05 ha commercial	126	4.73	7 single-detached 46 multi-unit 0.05 ha commercial Astoria = 178 multi-unit	473	4.73
8S3508	8S3507	Lily Mac = 44 townhomes 8 single-detached	156	6.96	Lily Mac = 44 townhomes Lily Mac Ph2 = 65 multi-unit 6 single-detached Howard = 90 multi-unit	460	7.26
8S3507	8S5630	5 single-detached	15	1.71	3 single-detached	9	1.41
8S5630	8S3506	92 single-detached	276	10.75	92 single-detached	276	10.75

The sanitary sewer design sheet analysis of the existing conditions and future development conditions as outlined above is provided in **Appendix B**. The existing conditions currently produce a peak design flow of 18.20 L/s and the capacity of the existing sewer system is 36.22 L/s. The sanitary sewer peak design flow under future conditions is proposed to be 34. L/s which is within the capacity of the existing sanitary sewer.

3.4 PROPOSED SANITARY SERVICING

Refer to the attached **Figure 2.0** (in **Appendix A**) which illustrates the proposed servicing plan. The sanitary servicing for the proposed development is as follows:

- All sanitary flows from within the development will be conveyed via a proposed 200mm diameter sanitary service connecting to the existing 250mm sanitary sewer on Howard Avenue at maintenance hole 8S3507.

The sanitary sewer functional design sheets are provided in **Appendix B**. Criteria used in flow calculations are listed in **Table 1**.

The connection to the existing manhole on Howard Avenue allows for adequate cover of the proposed sanitary service. In the event that the bottom of the footings is below the sewer and the hydraulic grade line is less than 300mm below the basement floor elevation, the building shall be equipped with a sewage ejector pump.

The future detailed design of the sanitary sewers and services are to be consistent with the requirements of the Ontario Building Code.

4.0 STORMWATER SERVICING

4.1 EXISTING CONDITIONS

Currently, there are no records of storm services to the existing residential dwellings at 3694, 3702, 3726 and 3738 Howard Avenue.

The Orchards Pond is an existing dry pond located to the east of the proposed development. There is currently one inlet located in the south-east corner which services the Orchards subdivision. The Orchards Pond outlets into a pump station located to the north-east of the proposed development, ultimately draining west to Howard Avenue through a forcemain and 450mm diameter storm sewer respectively. The 450mm diameter storm sewer then ties into an existing the 600mm diameter storm sewer that runs along Howard Avenue and drains north.

4.2 DESIGN CRITERIA

The following storm sewer design criteria for this property are outlined in **Table 2** below. The design criteria were established by the City of Windsor Development Manual (2015).

Table 2: Storm Sewer Design Criteria

CRITERIA	CITY OF WINDSOR DEVELOPMENT MANUAL
Design Method	Rational Method
Standard Return Period	1 in 5 years Storm Event
Rainfall Intensity	i = a / (t+b)^c a = 1259.0, b = 8.80, c = 0.838
Minimum Cover Depth (m)	1.00
Manning's Roughness Coefficient 'n'	0.013
Full Flow Velocity: Minimum Maximum	 0.76 metres per second 3.00 metres per second
Runoff Coefficients: High Density Residential	 0.80
Inlet Time	15 minutes
Minimum Manhole Size	1200mm

4.3 PROPOSED STORM SERVICING

Refer to the attached **Figure 2.0** (in **Appendix A**) which illustrates the proposed servicing plan. The stormwater servicing for the proposed development is as follows:

- The proposed building and parking lot will be serviced through a new storm sewer network constructed within the proposed development.
- The proposed storm sewers have been sized to accommodate a 1:5-year storm event. Refer to the functional storm sewer design sheet provided in **Appendix B**.
- The proposed storm sewer network will outlet into the existing Orchards Pond located to the east of the property via a new outlet.
- Overland flow will be provided through parking lot grading towards the existing Orchards Pond. Refer to **Figure 3.0** (in **Appendix A**) for the proposed site grading and overland flow route.
- There will be temporary ponding of runoff in the parking lot for storms greater than 1 in 5 year until it can be captured by the catch basins and conveyed to the ponds. The parking lot ponding will not exceed 300mm.
- A curb cut, shallow swale and erosion blanket down the banks of the pond will be provided for the overland flow outlet.
- Stormwater quantity control will be provided in the Orchards Pond and quality control will be provided through an Oil and Grit Separator (OGS) unit. Details are provided in the stormwater management report in **Appendix C**.

5.0 WATERMAIN SERVICING

5.1 EXISTING CONDITIONS

The site currently has six existing watermain services to the existing residential dwellings at 3694, 3702, 3726 and 3738 Howard Avenue which will be disconnected to accommodate the proposed development. There is an existing 200mm diameter watermain located north of the proposed development on the north side of the right-of-way of Holburn Street. There is also an existing 150mm diameter watermain located to the west of the proposed development within the east side of the right-of-way of Howard Avenue.

5.2 PROPOSED WATERMAIN SERVICING

Refer to the attached **Figure 2.0** (in **Appendix A**) which illustrates the proposed servicing plan. The watermain servicing for the proposed development is as follows:

- The existing 200mm diameter watermain within the right-of-way of Holburn Street will be used to service the proposed multi-unit residential building.
- A 200mm diameter watermain will extend into the site and provide servicing to the proposed building as well as a fire hydrant located within 40m of the main entrance.
- A 50mm diameter service for potable water and 150mm diameter service for a fire protection will be provided to the proposed building.

No pressure/flow testing has been completed for this development. During detailed design, pressure testing of the existing watermain on Holburn Street may be required.

The detailed design of the watermain is to be consistent with the requirements of Windsor Utility Commissions (W.U.C.) and the Ontario Building Code (OBC). The detailed design process will be coordinated with W.U.C.

6.0 UTILITIES

6.1 GAS

There is a 4” steel coated gas main at 420 kPa that runs along the east side of Howard Avenue. There is also a 2” plastic gas main at 420 kPa that runs along the south side of Holburn Street. Future coordination with Enbridge will be required during detailed design.

6.2 BELL

Existing Bell service is available along Howard Avenue. Future coordination with Bell will be required during detailed design.

6.3 COGECO

Cogeco plant is aerial along the east side of Howard. There is both coax and fibre available. Future coordination with Cogeco will be required during detailed design.

6.4 MNSI

MNSi has aerial plant on Enwin poles along the east side of Howard Avenue. Future coordination with MNSi will be required during detailed design.

6.5 ENWIN

Enwin has three-phase hydro located along Howard Avenue and single-phase hydro located along Holburn Street. Future coordination with Enwin will be required during detailed design.

7.0 CONCLUSIONS

This FSR presents a site servicing strategy for the proposed development that addresses the requirements of the applicable regulatory agencies and provides the basis for detailed servicing design.

We trust this report sufficiently addresses the site servicing requirements and allows for approval of the Zoning Bylaw Amendment ('ZBA') application. Should there be any questions or comments, please feel free to contact the undersigned.

Sincerely,

Counterpoint Land Development by Dillon Consulting Limited

Kailee Dickson, P.Eng
Project Engineer
Email: kdickson@dillon.ca

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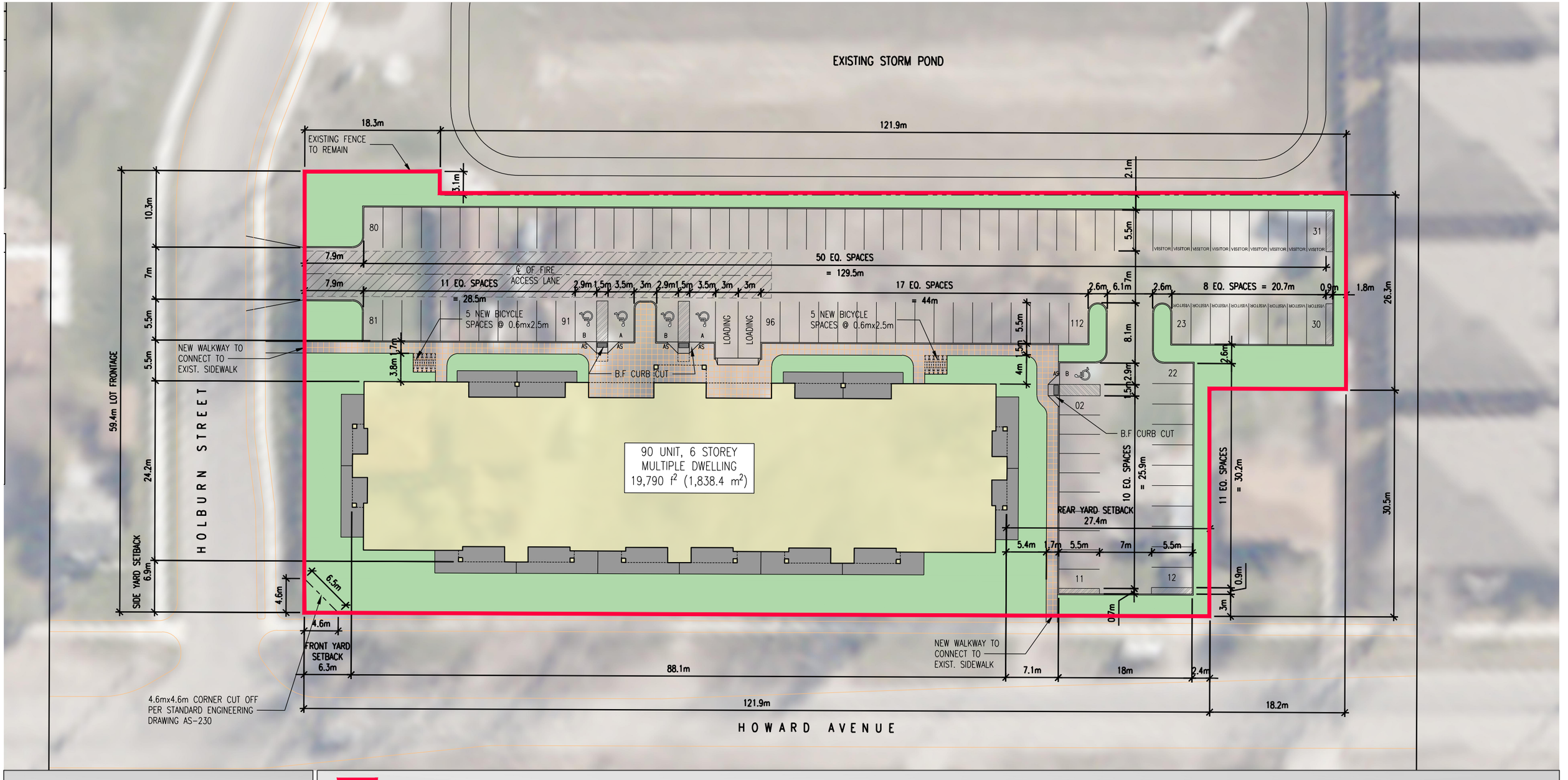
APPENDIX A

CONCEPT, UTILITY AND GRADING PLANS



J. RAUTI DEVELOPMENTS INC. & 2601817 ONTARIO LIMITED
3694-3738 Howard Avenue
WINDSOR ONTARIO

CONCEPT PLAN
FIGURE 1.0

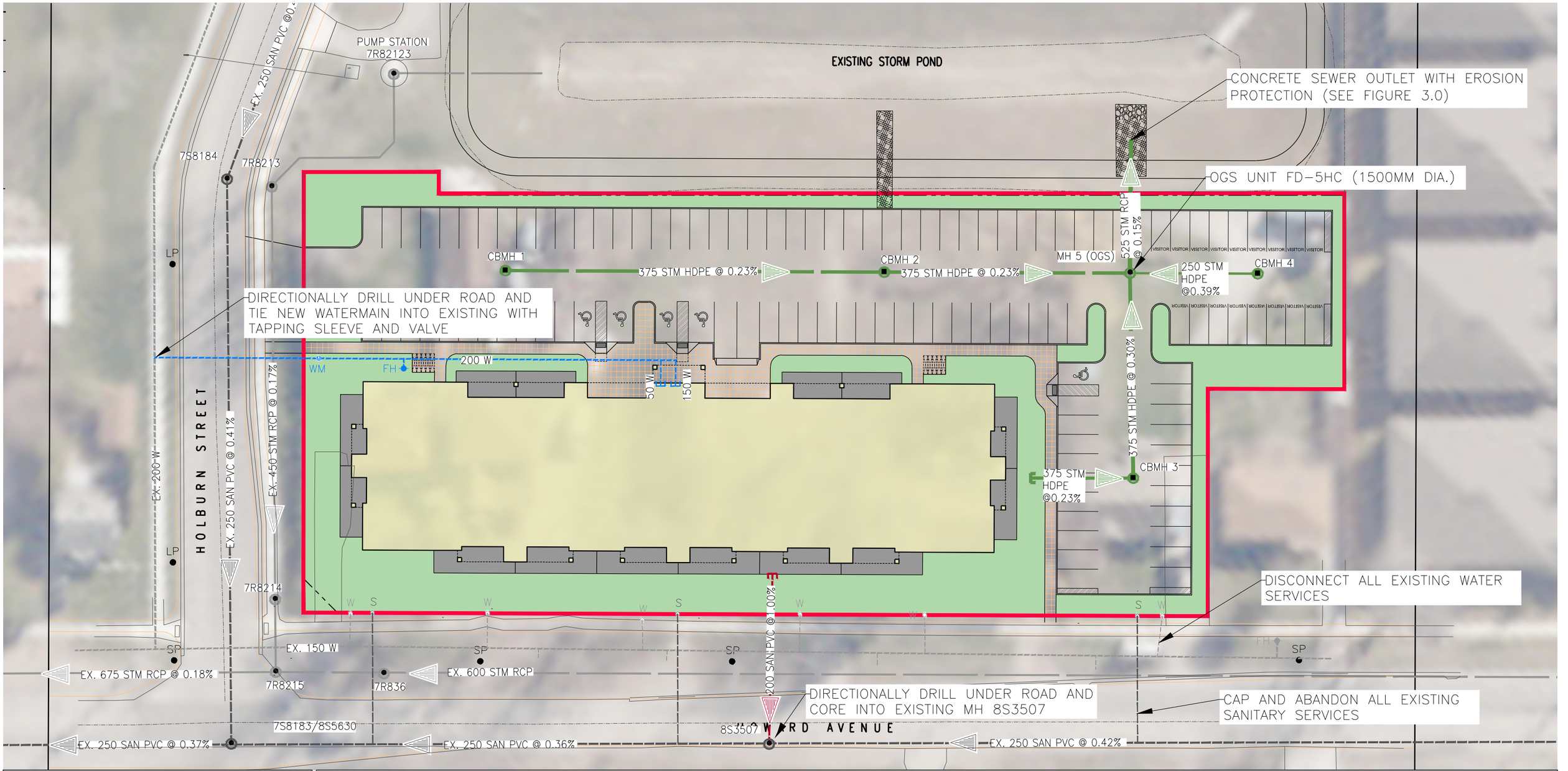
SUBJECT AREA
(±0.74ha / 1.83ac)

SOURCE: COUNTY OF ESSEX AERIAL PHOTOGRAPHY (2023)

MAP/DRAWING INFORMATION
THIS DRAWING IS FOR INFORMATION PURPOSE ONLY. ALL DIMENSIONS AND BOUNDARY INFORMATION SHOULD BE VERIFIED BY AN O.L.S PRIOR TO CONSTRUCTION.
CREATED BY: KYD
CHECKED BY: KNE
DESIGNED BY: KYD

SCALE: 1:500m

PROJECT: 24-8813
STATUS: DRAFT
DATE: 10/10/2025



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3694-3738 Howard Avenue
WINDSOR ONTARIO

UTILITY PLAN
FIGURE 2.0

SUBJECT AREA (±0.74ha / 1.83ac)

LP EXISTING LIGHT POLE

SP EXISTING SERVICE POLE

EX. 600 STM EXISTING STORM SEWER AND MANHOLE

EX. 250 SAN EXISTING SANITARY SEWER AND MANHOLE

W EX. 150 W EXISTING WATERMAIN AND VALVE

375 STM PROPOSED STORM SEWER

200 SAN PROPOSED SANITARY SEWER

WV 150 W PROPOSED WATERMAIN AND VALVE

PROPOSED STORM MANHOLE

PROPOSED STORM CATCHBASIN MANHOLE

FH PROPOSED FIRE HYDRANT

SOURCE: COUNTY OF ESSEX AERIAL PHOTOGRAPHY (2023)

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CREATED BY: KYD
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DESIGNED BY: KYD

SCALE: 1:500m

PROJECT: 24-8813
STATUS: DRAFT
DATE: 10/10/2025

INSTALL STANDARD CONCRETE DRIVEWAY APPROACH AND CURB CUT AS PER C.O.W. AS-204

EXISTING STORM POND

INSTALL EROSION CONTROL BLANKET ALONG BANKS OF THE POND AND RIP-RAP AT THE BOTTOM OF THE OUTLET PIPE.

CURB CUT WITH A SHALLOW SWALE TO POND. INSTALL EROSION CONTROL BLANKET FROM CURB CUT AND ALONG BANKS OF THE POND

187.95

187.67

187.93

187.66

187.60

187.95

187.70

187.98

R

RC

FFE = 188.40m
(188.30m MIN.)

187.67

188.05

HOLBURN STREET

HOWARD AVENUE

RC R

RC R

REMOVE EXISTING CONCRETE DRIVEWAY APPROACHES. REPLACE CURB CUT WITH STANDARD CURB AS PER C.O.W. AS-208A

J. RAUTI DEVELOPMENTS INC. & 2601817 ONTARIO LIMITED
3694-3738 Howard Avenue
WINDSOR ONTARIO

GRADING & REMOVALS PLAN
FIGURE 3.0

SUBJECT AREA (±0.74ha / 1.83ac)

188.05 PROPOSED ELEVATION (LOW POINT)

188.05 PROPOSED ELEVATION (HIGH POINT)

OVERLAND FLOW ROUTE

RC REMOVE CURB

R REMOVE SIDEWALK

R REMOVE DRIVEWAY

SOURCE: COUNTY OF ESSEX AERIAL PHOTOGRAPHY (2023)

MAP/DRAWING INFORMATION
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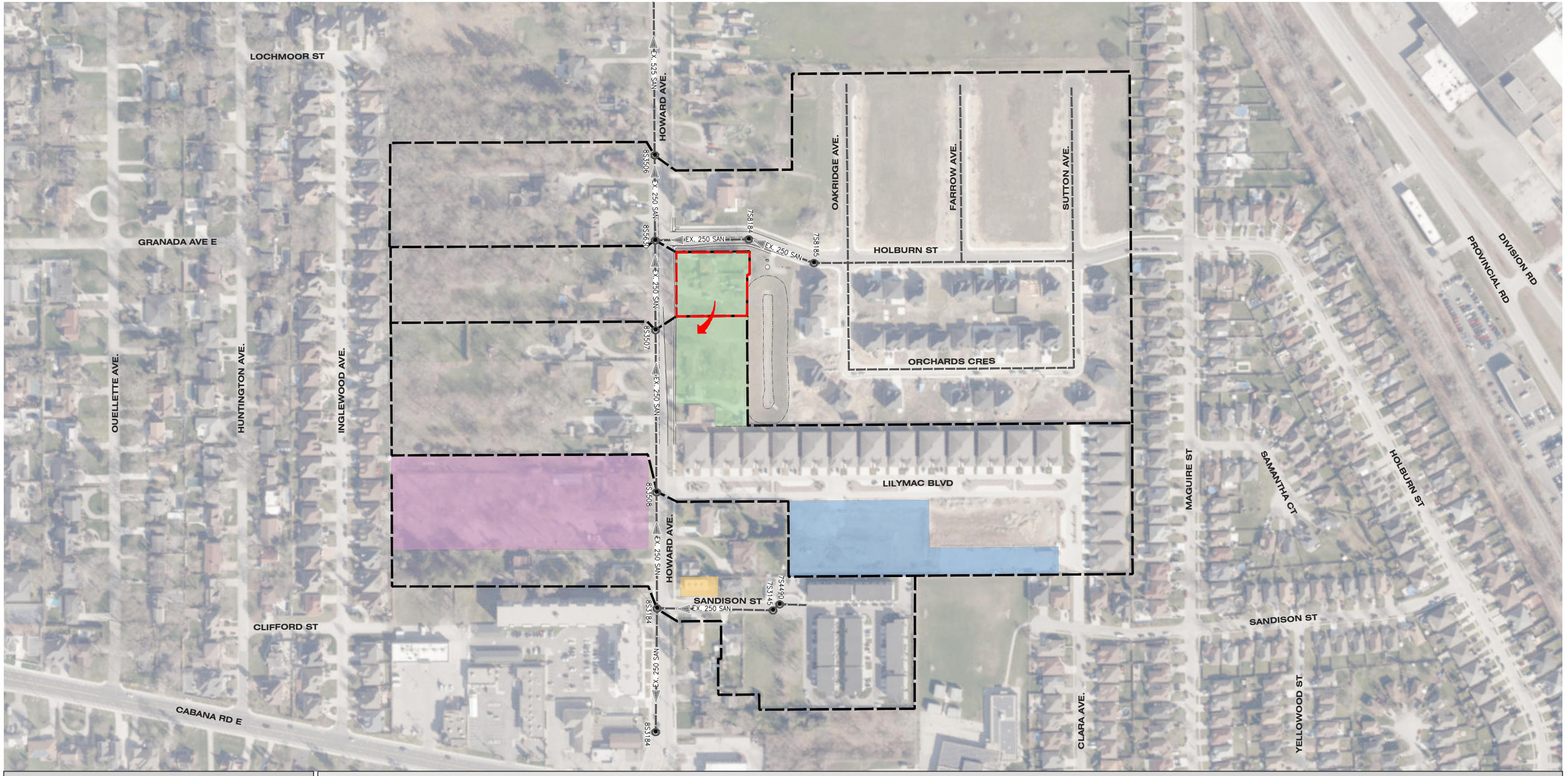
CREATED BY: KYD
CHECKED BY: KNE
DESIGNED BY: KYD

SCALE: 1:500m

PROJECT: 24-8813
STATUS: DRAFT
DATE: 10/10/2025



J. RAUTI DEVELOPMENTS INC. & 2601817 ONTARIO LIMITED
3694-3738 Howard Avenue
WINDSOR ONTARIO

SANITARY ASSESSMENT DRAINAGE AREAS
FIGURE 4.0

- EXISTING SANITARY DRAINAGE AREA
- FUTURE SANITARY DRAINAGE AREA ADJUSTMENT
- EXISTING COMMERCIAL AREA (0.05 ha)
- FUTURE 3694 HOWARD DEVELOPMENT (0.74 ha)
- FUTURE LILY MAC DEVELOPMENT (0.92 ha)
- FUTURE ASTORIA DEVELOPMENT (1.57 ha)
- EX. 250 SAN — EXISTING SANITARY SEWER AND MANHOLE

SOURCE: COUNTY OF ESSEX AERIAL PHOTOGRAPHY (2024)

MAP/DRAWING INFORMATION
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CREATED BY: JS
CHECKED BY: KYD
DESIGNED BY: KYD

SCALE: 1:3000

PROJECT: 24-8813
STATUS: DRAFT
DATE: 10/10/2025

APPENDIX B

SANITARY SEWER AND STORM SEWER DESIGN SHEETS

3694 HOWARD AVENUE
SANITARY SEWER DESIGN SHEET
CAPACITY ASSESSMENT - EXISTING CONDITIONS

Project Name: 3694 Howard Avenue
Project No: 248813

City of Windsor

The Peaking Factor was derived:
Using Harmon Formula= N (Y or N)
From a Table= Y
Value from table= 6.000

Residential Average Daily Flow= 363 L/Cap.D
Peak Extraneous Flow= 0.156 L/Ha.S

Outlet Invert Elevation= 181.870
Mannings 'n'= 0.013
Total Area= 24.144

Location			Flow Characteristics								Sewer Design/Profile										Hydraulic Grade Line	
ROAD/STN	LOCATION FROM MH	LOCATION TO MH	INDIVIDUAL POP	INDIVIDUAL AREA (ha.)	CUMULATIVE POP	CUMULATIVE AREA (ha.)	PEAKING FACTOR M	POP FLOW Q(p) (L/s)	PEAK EXTR. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE DIA. (mm)	Wall Thickness (mm)	SLOPE (%)	UPPER INVERT (m)	LOWER INVERT (m)	FALL (m)	VELOCITY (m/s)	DROP IN LOWER MANHOLE (m)	HGL Elev at Upstream MH	HGL Elev vs. Obvert @ Up MH
Howard Ave	8S3184	8S3508	126	4.73	126	4.73	6.000	3.168	0.738	**3.91**	**42.68**	94.0	250	8	0.52	183.524	183.040	0.484	0.87	0.049	182.511	INTERSECTS OB\
Howard Ave	8S3508	8S3507	156	6.96	282	11.68	6.000	7.099	1.823	**8.92**	**38.36**	130.0	250	8	0.42	182.991	182.450	0.541	0.78	0.057	182.507	INTERSECTS OB\
Howard Ave	8S3507	8S5630	15	1.71	297	13.39	6.000	7.477	2.089	**9.57**	**35.88**	72.4	250	8	0.36	182.393	182.130	0.264	0.73	0.005	182.478	OKAY
Howard Ave	8S5630	8S3506	276	10.75	573	24.14	6.000	14.432	3.766	**18.20**	**36.22**	68.6	250	8	0.37	182.125	181.870	0.255	0.74		182.459	OKAY

3694 HOWARD AVENUE
SANITARY SEWER DESIGN SHEET
CAPACITY ASSESSMENT - FUTURE CONDITIONS

Project Name: 3694 Howard Avenue
Project No: 248813

City of Windsor

The Peaking Factor was derived:
Using Harmon Formula= N (Y or N)
From a Table= Y
Value from table= 6.000

Residential Average Daily Flow= 363 L/Cap.D
Peak Extraneous Flow= 0.156 L/Ha.S

Outlet Invert Elevation= 181.870
Mannings 'n'= 0.013
Total Area= 24.144

Location			Flow Characteristics								Sewer Design/Profile										Hydraulic Grade Line	
ROAD/STN	LOCATION FROM MH	LOCATION TO MH	INDIVIDUAL POP	INDIVIDUAL AREA (ha.)	CUMULATIVE POP	CUMULATIVE AREA (ha.)	PEAKING FACTOR M	POP FLOW Q(p) (L/s)	PEAK EXTR. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE DIA. (mm)	Wall Thickness (mm)	SLOPE (%)	UPPER INVERT (m)	LOWER INVERT (m)	FALL (m)	VELOCITY (m/s)	DROP IN LOWER MANHOLE (m)	HGL Elev at Upstream MH	HGL Elev vs. Obvert @ Up MH
Howard Ave	8S3184	8S3508	473	4.73	473	4.73	6.000	11.912	0.738	**12.65**	**42.68**	94.0	250	8	0.52	183.524	183.040	0.484	0.87	0.049	183.041	INTERSECTS OB\
Howard Ave	8S3508	8S3507	460	7.26	933	11.99	6.000	23.504	1.870	**25.37**	**38.36**	130.0	250	8	0.42	182.991	182.450	0.541	0.78	0.057	182.998	OKAY
Howard Ave	8S3507	8S5630	9	1.41	942	13.39	6.000	23.731	2.089	**25.82**	**35.88**	72.4	250	8	0.36	182.393	182.130	0.264	0.73	0.005	182.762	OKAY
Howard Ave	8S5630	8S3506	276	10.75	1218	24.14	6.000	30.686	3.766	**34.45**	**36.22**	68.6	250	8	0.37	182.125	181.870	0.255	0.74		182.625	OKAY

3694 HOWARD AVENUE
SANITARY SEWER DESIGN SHEET
PROPOSED DEVELOPMENT FLOWS

Project Name: 3694 Howard Avenue
Project No: 248813

City of Windsor

The Peaking Factor was derived:
Using Harmon Formula= N (Y or N)
From a Table= Y
Value from table= 6.000

Residential Average Daily Flow= 363 L/Cap.D
Peak Extraneous Flow= 0.156 L/Ha.S

Outlet Invert Elevation= 182.548
Mannings 'n'= 0.013
Total Area= 0.740

Basement Floor Elevation =
or
Hydraulic Grade Line Cover =

Ground Elevation at Outlet = 187.710
HGL at Outlet = 182.798

Location			Flow Characteristics								Sewer Design/Profile										Cover			Hydraulic Grade Line		
ROAD/STN	LOCATION		INDIVIDUAL		CUMULATIVE		PEAKING	POP FLOW	PEAK EXTR.	PEAK DESIGN	CAPACITY	LENGTH	PIPE DIA.	Wall	SLOPE	UPPER	LOWER	FALL	VELOCITY	DROP IN LOWER	Ground Elevation	Cover @ Up MH	Cover @ Low MH	HGL Elev	HGL Elev vs.	HGL Elev vs.
	FROM MH	TO MH	POP	AREA (ha.)	POP	AREA (ha.)	FACTOR M	Q(p) (L/s)	FLOW Q(i) (L/s)	FLOW Q(d) (L/s)	(L/s)	(m)	(mm)	Thickness (mm)	(%)	INVERT (m)	INVERT (m)	(m)	(m/s)	MANHOLE (m)	Upper MH	(m)	(m)	at Upstream MH	Grnd Elev @ Up MH	Obvert @ Up MH
	BLDG	8S3507	180	0.74	180	0.74	6.000	4.536	0.115	**4.65**	**32.80**	22.8	200	6	1.00	183.276	183.048	0.228	1.04	0.500	188.400	4.918	4.511	182.803		INTERSECTS OB

3694 HOWARD AVENUE
STORM SEWER DESIGN SHEET

Project Name: 3694 Howard Avenue
Project Number: 248813

Based on 1:5 Year Storm Event
Windsor, Ontario

Intensity Option # 1

1) Intensity (i) = a/(t+b)^c
a= 1259.000
b= 8.800
c= 0.838

2) Intensity (i) = a*t^b
a=
b=

3) Insert Intensity
i=

Manning's n = 0.013

Total Area (ha)= 0.74 Outlet Invert Elevation= 184.900 Ground Elevation @ Outlet = 187.43 High Water Level at Outlet=

Location			Sewer Design / Profile																	Cover			Hydraulic Grade Line	
Road /Stations	From MH	To MH	Area (ha)	Run. Coef.	2.78AC	Accum. 2.78AC	T of In (min)	T of F (min)	T of Conc. (min)	Intensity (mm/hr)	Exp. Flow (L/s)	Capacity (L/s)	Velocity (m/s)	Wall Thickness (mm)	Length (m)	Pipe Dia. (mm)	Slope (%)	Invert Up MH	Invert Low MH	Fall (m)	Drop Across Low MH (m)	Ground Elev Up MH	Cover @ Up MH (m)	Cover @ Low MH (m)	HGL Elevation at Upstream MH	HGL Elev vs. Grnd Elev @ Up MH
	CBMH 1	CBMH 2	0.21	0.80	0.47	0.47	15.0	1.12	15.00	88.40	**41.78**	**84.09**	0.76	76	51.0	375	0.23	185.295	185.178	0.12	0.025	187.670	1.92	1.97	185.67	Okay
	CBMH 2	MH 5	0.07	0.80	0.17	0.64		0.72	16.12	85.07	**54.36**	**84.09**	0.76	76	33.1	375	0.23	185.153	185.077	0.08	0.150	187.600	2.00	2.42	185.53	Okay
	BLDG	CBMH 3	0.28	0.80	0.63	0.63	15.0	0.31	15.00	88.40	**55.62**	**84.09**	0.76	76	14.1	375	0.23	185.217	185.185	0.03	0.025	188.400	2.73	2.03	185.59	Okay
	CBMH 3	MH 5	0.11	0.80	0.24	0.87		0.53	15.31	87.45	**75.77**	**96.03**	0.87	64	27.5	375	0.30	185.160	185.077	0.08	0.150	187.670	2.07	2.43	185.53	Okay
	CBMH 4	MH 5	0.07	0.80	0.15	0.15	15.0	0.38	15.00	88.40	**13.07**	**37.14**	0.76	34	17.2	250	0.39	185.269	185.202	0.07	0.275	187.700	2.15	2.46	185.52	Okay
	MH 5 (OGS)	POND	0.00	0.80	0.00	1.65		0.39	16.84	83.05	**137.31**	**166.56**	0.77	89	18.0	525	0.15	184.927	184.900	0.03		187.950	2.41	1.92	185.45	Okay

APPENDIX C

STORMWATER MANAGEMENT REPORT

COUNTERPOINT LAND DEVELOPMENT BY | DILLON CONSULTING

J. RAUTI DEVELOPMENTS INC. AND 2601817 ONTARIO LIMITED

STORMWATER MANAGEMENT TECHNICAL DESIGN BRIEF

3694 – 3738 Howard Avenue

October 2025 – 24-8813

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

Dillon Consulting Limited (Dillon) was retained by J. Rauti Developments Inc. and 2601817 Ontario Limited to develop a stormwater management (SWM) strategy for the proposed 0.74 ha future development site at 3694-3738 Howard Avenue, Windsor, Ontario (the Site). The proposed Site development is to consist of a six storey Apartment building, parking lot and landscape area and sits within City of Windsor (the City) Howard Future Development Land area. The current site plan is provided in **Figure 1**.

The Site is currently occupied by a number of single detached dwellings and is bounded by the existing Orchards Subdivision Dry Pond to the east, Howards Avenue to the west, Holburn Street to the north and the Lily Mac Residential Development to the south.

This technical design brief has been developed to support the Zoning By-Law Amendment application for the Site.

1.1 BACKGROUND REVIEW

The following background documents and relevant design and servicing information were reviewed to support this assessment:

1. **Howard Avenue Future Development Area Storm and Sanitary Servicing Feasibility Study (Dillon Consulting Ltd, 2020)**
    - Review of the approved storm allowable release rate for the Howard Future Development Lands between Cabana Road and South Cameron Boulevard.
2. **Orchards Subdivision Stormwater Management Report (R.C. Spencer, June 2021):**
    - Review of the final SWM servicing strategy, Dry Pond and Pump Station design for the Orchards Subdivision.

1.2 STORMWATER MANAGEMENT DESIGN CRITERIA

The SWM Design criteria for the Site is to be based on the following reference documents:

- Stormwater Management Planning and Design Manual (Ministry of the Environment, 2003).
- Windsor/Essex Region Stormwater Management Manual (ERCA, June 2024) [WERSM].

1.2.1 Design Storms

The following design storm events, as recommended in the WERSM, are to be used for the purposes of the SWM analysis:

- 2-Year, 4-hour design storm using Chicago distribution with a 15-minute time interval and a total rainfall depth of 32 mm.
- 5-year, 4-hour design storm using the Chicago distribution with a 15-minute time interval and a total rainfall depth of 49.5 mm.

- 100-year, 4-hour design storm using the Chicago distribution with a 15-minute time interval with a total rainfall depth of 81.6 mm.
- 100-year, 24-hour design storm using the SCS Type-II distribution with a 2-hour time interval and a total rainfall depth of 108 mm.
- Urban Stress Test (UST) storm using the Chicago distribution with a 15-minute time interval with a uniform distribution of an additional 42 mm for a total rainfall depth of 150 mm.

1.2.2 Quantity Control

Based on approved Howard Avenue Future Development Area Storm and Sanitary Servicing Feasibility Study (Dillon, 2020) completed by the City, the Site sits within the East Development Land area. Post-development peak flows are to be restricted to a maximum release rate of 35 L/s/ha into the existing Howard Avenue storm sewer system.

Surface ponding within parking lots and roadways are to be maintained below 0.30 m during all storms, up to and including the governing 100-year event. During the UST event, ponding depths within parking lots are to be maintained below proposed building entrances and fully maintained on the Site.

It is proposed that the Site utilizes the existing Orchards Subdivision Dry Pond for water quantity control.

1.2.3 Quality Control

Post-development runoff is required to be treated to a “Normal” protection level, which is defined as the removal of 70% of total suspended solids (TSS) on an average annual basis. Water quality control design is to meet requirements set out within the WERSM for particle size distribution and rainfall intensity/rainfall volume relationships shown in Table 3.4.1.4 and Table 3.4.1.5 respectively.

On-site water quality controls are proposed for the Site to treat runoff prior to entering the existing Orchards Dry Pond.

1.2.4 Minor System Conveyance:

Storm sewers are to be designed to a 5-year level of service where the 5-year Hydraulic Grade Line (HGL) in the sewer system is to be 0.30 m below the lowest road elevation.

1.2.5 Major System Conveyance:

Major system overland flow depths are to be maintained below 0.30 m in depth during all storms, up to and including, the governing 100-year event. During the UST event, flow depths must be maintained below proposed building entrances and fully maintained on the Site.

2.0 ORCHARDS DEVELOPMENT SWM DESIGN

The adjacent Orchards Subdivision currently sites along the eastern boundary of the Site encompasses approximately 8.46 ha of land, and includes 86 family dwellings, associated roads, and Dry Pond. The SWM design was approved by the City of Windsor (City) and considered an additional 1.82 ha of development from the future Bragianis lands area to the north, for a total drainage area of 10.28 ha.

As noted in Section 1.2.2, the 3694-3738 Howard Development Site is proposing to utilize the existing Orchards Dry Pond for water quantity control.

As requested, A detailed existing conditions investigation analysis was completed for the Orchards Subdivision. A dual drainage existing condition PCSWMM model has been developed, and quasi calibration was completed to replicate the approved SWM design.

2.1 Original Dry Pond Design

Based on a review of the Howard Avenue Future Development Area Storm and Sanitary Servicing Feasibility Study (Dillon Consulting Ltd., 2020), the maximum allowable release rate for the East Howard Development lands is 35 L/s/ha. Review of the ultimate buildout area for the Orchards Dry Pond (Orchards Subdivision + Bragianis Lands) identifies a maximum allowable release rate of 360 L/s.

The existing Orchards Dry Pond is designed to provide water quantity control at a restricted pump out rate of 91 L/s into the existing Howard Avenue storm sewer, well below the allowable release rate of 360 L/s allocated for the 10.28 ha area. The approved Orchards Subdivision Dry Pond design, showing key design water surface elevations (WSEL), is provided in **Table 1**.

Table 1: Orchards Subdivision SWM Pond Summary - Approved Design

STORAGE EVENT	POND ELEVATION (M)	POND DEPTH (M)	STORAGE VOLUME (M^3)
Bottom of Pond	184.60	0.00	0
5-Year[1] WSEL	186.33	1.73	2,461
100-Year[2] WSEL	187.25	2.65	4,921
100-Year (Pump Failure) WSEL	187.51	2.91	5,768
Urban Stress Test[3] WSEL	187.61	3.01	6,111
Top of Pond	187.80	3.20	6,792

[1] 5-Year Design Storm (Chicago 4-Hour, 49.5mm Depth, 5 min. Time Step)
[2] 100-Year Design Storm (Chicago 4-Hour, 81.6mm Depth, 5 min. Time Step)
[3] Urban Stress Test (Chicago 100 -Year 24-Hours,150mm Depth, 15min. Time Step)

The approved hydraulic assessment for the Orchards Subdivision consisted of a dual drainage model to consider the proposed storm sewer system and roadway overland flow routing. Based on the review of the approved SWM report, during both the 100-year and Urban Stress Test (UST) events, a combination of surface and underground pipe storage was utilized. While the report did not provide specific details on the on-site surface and pipe storage volumes, it noted that storm sewers between MH-7 and MH-9, MH-4 and MH-6, and MH-1 and MH-3 were oversized to 1050 mm in diameter to accommodate future flows from the Bragianis lands.

Water quality control for the Orchards development is provided through an Oil and Grit Separator to achieve a normal level (70% TSS) of treatment.

The approved Orchards Subdivision SWM report is provided in **Appendix A**.

2.2 Orchards Subdivision SWM Model Development and Analysis

Dillon completed a detailed dual drainage model analysis for the existing Orchards Subdivision to replicate the original design conditions of the Orchards Dry Pond. To complete the quasi calibration, a dual drainage PCSWMM model was developed as follows:

- Sixteen (16) sub-catchment (Total area 8.46 ha) representing the existing Orchards Subdivision and Bragianis lands at the designed impervious value of 60%;
- Three (3) sub-catchment (Total area 1.82 ha) representing the future Bragianis lands at the designed impervious value of 60%;
- The storm sewer network (minor system) was developed based on as-constructed drawing provided in **Appendix A**;
- The roadway overland flow (major system) was developed using road grades and catchbasin locations based on as-constructed drawings. The following features were included in the model:
    - Roadway high points (HPs) to represent spillover grades from roadway low points.
    - Roadway low points to represent catchbasins (CBs) set at gutter grades and represented as either TCICB OR CICB's.
    - CICB leads were represented as 200 mm diameter orifices, and the TCICBs were represented as 250 mm diameter orifices.
    - 150 mm orifices added to the major system to replicate the rearyard CB leads originally built in the approved RC Spencer model.
- One (1) 56 m long, 2 m wide and 0.5 m deep trapezoidal swale with side slopes of 6:1 (H: V) representing the overland flow conveyance to the Dry Pond with a spillover elevation at 187.75 m.
- One (1) storage node representing the Orchards Dry Pond based on the stage-storage information provided in **Table 1**;
- One (1) hydraulic pump station Dry Pond outlet with a constant pumping rate of 91 L/sec; and
- One (1) outfall representing the Dry Pond pump outlet into the downstream 675mm diameter Howard Avenue storm sewer.

For the purposes of assessing existing conditions, only the existing Orchards Subdivision and Bragianis Lands have been considered. The model schematic for the for existing conditions is shown in **Appendix B.**

To replicate the approved design conditions of the Orchards Dry Pond, Dillon completed a quasi-calibration for the Orchards Subdivision and Bragianis Lands by adjusting various hydrologic modelling parameters to replicate the design WSELs in the Dry Pond for the 100-year and UST events. This included adjusting flowpath lengths, as well as pervious depression depths to consider rearyard storage originally simulated in the RC Spencer model.

A summary the existing condition model parameters considered are shown in **Table 2**.

Table 2: Existing Conditions Model Parameters

SITE	TOTAL DRAINAGE AREA (HA)	IMPERVIOUS VALUE (%)	SUB-CATCHMENT PARAMETERS
Existing Orchards Subdivision	8.46	60%	Flow Length = varies Slope = 0.5 % Impervious Depression Storage = 2.5 mm Pervious Depression Storage* = 7.5 – 22 mm Manning's N Impervious = 0.013 Manning's N Pervious = 0.24 <u>Green-Ampt Infiltration Parameters (Type D Soils):</u> Suction Head = 180 mm Conductivity = 0.50 mm/hr Initial Deficit (normal) = 0.10
Future Bragianis Lands	1.82	60%	Flow Length = varies Slope = 0.5 % Impervious Depression Storage = 2.5 mm Pervious Depression Storage = 7.5 mm Manning's N Impervious = 0.013 Manning's N Pervious = 0.24 <u>Green-Ampt Infiltration Parameters (Type D Soils):</u> Suction Head = 180 mm Conductivity = 0.50 mm/hr Initial Deficit (normal) =

** Quasi calibrated to represent rear yard storage as approved in the original design for Orchards Subdivision*

Based on Dillon's PCSWMM Dual drainage modelling analysis for the Orchards Subdivision, the following tables summarize the Approved Orchards SWM design with Dillon's model results.

Table 3: Orchards Subdivision Existing SWM Pond Summary – Approved Design vs 2025 Dillon Model

STORM EVENT	Approved Dry Pond Design WSEL (m)	2025 Dillon Model WSEL (m)	Approved Dry Pond Design Volume (m^3)	2025 Dillon Model Storage Volume (m^3)
Chicago 100-Year, 4-hour	187.25	187.25	4,921	4,908
UST	187.61	187.70	6,111	6,434

As shown, the UST WSEL and volumes are slightly above the approved design. However, the 2025 Dillon model shows that the WSEL during this event is still maintained in the Dry Pond.

Table 4: Orchards Subdivision Existing 100-Year Roadway Ponding Results

STREET	2025 Dillon Model 100-Year Max. Roadway Ponding Depth (m)
Oakridge Avenue	0.06
Farrow Avenue	0.22
Sutton Avenue	0.21
Holburn Street	0.19
Orchards Crescent	0.20

Based on the re-created dual drainage model of the Orchards Subdivision, the 100-year roadway ponding depths along each roadway are maintained to be at, or slightly above 0.21m. This is consistent with the approved SWM design.

3.0 PROPOSED DEVELOPMENT CONDITIONS

The Site is proposed to utilize the existing Orchards SWM Dry Pond for the purposes of water quantity control. To assess the feasibility of this SWM strategy, the Site was incorporated into the PCSWMM model originally developed to assess the approved design conditions of the Orchards Dry Pond. The proposed condition PCSWMM model schematic is provided in **Appendix B**.

Modelling parameters for the site under a developed condition are shown below.

Table 5: 3694-3738 Howard Development - Proposed Conditions Model Parameters

SITE	DRAINAGE AREA (HA)	IMPERVIOUS VALUE (%)	SUB-CATCHMENT PARAMETERS
3694-3738 Howard Avenue	0.74	80%	Flow Length = 120 m Slope = 1 % Impervious Depression Storage = 2.5 mm Pervious Depression Storage = 7.5 mm Manning's N Impervious = 0.013 *Manning's N Pervious = 0.15 <u>Green-Ampt Infiltration Parameters (Type D Soils):</u> Suction Head = 180 mm Conductivity = 0.50 mm/hr Initial Deficit (normal) = 0.10

** Manning's Roughness for pervious area reflective of well manicured urban lawn*

3.1 Stormwater Management Analysis Results

Provided below is a comparison of existing verses proposed WSEL's and storage volumes for the Orchards Dry Pond based on a pump out rate of 91 L/s.

Table 6: Orchards Subdivision SWM Pond Summary – Existing Design vs. Proposed Design

STORM EVENT	2025 Dillon Model Dry Pond WSEL (m)	Proposed Condition Dillon Model WSEL (m)	2025 Dillon Model Dry Pond Storage Volume (m^3)	Proposed 2025 Dillon Model Storage Volume (m^3)
Chicago 100-Year, 4-hour	187.25	187.42	4,908	5,450
Chicago 100-Year, 4-hour (Pump Failure)	187.60	187.71	5,768	6,454
UST	187.70	187.78	6,434	6,740

Based on the above, the increased WSEL's in the Dry Pond under proposed development conditions are maintained within the original design top of bank. Despite the increase in runoff from the proposed Site, the Dry Pond maintains a freeboard of 0.38 m, confirming that it can handle the additional volume without

overtopping. The UST WSEL is shown to be maintained below the Orchard Subdivision minimum lowest building opening of 188.30 m as shown in the approved Orchards Subdivision Grading Plan. The Dry Pond pump outlet of 91 L/s is still considered adequate under proposed design conditions and is well below the allowable release rate of 35 L/s/ha. The Dry Pond continues to maintain the design for a zero release condition under a pump failure scenario.

The Dry Pond under proposed conditions is therefore shown to still meet the requirements laid out in the WERSM and Approved design completed as part of the Orchards Subdivision.

Provided below are the updated maximum roadway depths due to the incorporation of the Site development. As shown, roadway ponding depths through the Orchards Subdivision are maintained below the permissible 0.30m during the 100-year event. This demonstrates that the proposed development has a minimal impact on roadway ponding, aligning with the approved design ponding depths for the Orchards Subdivision.

Table 7: Orchards Subdivision 100-Year Roading Ponding Impacts

STREET	2025 Dillon Model 100-Year Max. Roadway Ponding Depth (m)
Oakridge Avenue	0.06
Farrow Avenue	0.23
Sutton Avenue	0.21
Holburn Street	0.20
Orchards Crescent	0.20

3.1.1 Water Quality Control

As discussed in **Section 1.2.3**, to meet the water quality requirements of the site at a 'Normal' protection level water quality treatment (70% TSS removal) and requirements set out within he WERSM, on oil and grit separator (OGS) unit is proposed. The FD-5HC model supplied by ADS, or approved equivalent is recommended for this site which provides a TSS removal efficiency of 73.0%.

The details of this OGS sizing are provided in **Appendix B.**

3.1.2 Conveyance

The Site is proposed to convey flow into the existing Orchards Dry Pond through a combination of storm sewers and overland flow routes. A storm sewer outlet is proposed to convey flows during frequent storm events into the Dry Pond. During larger storm events up to and including the UST, curb cuts are proposed along the eastern edge of the Site development area to convey major system flow to the Dry Pond. Please refer to the Site servicing and grading plan prepared for this design submission. Storm Servicing and preliminary grading for the site is provided in **Figure 2** and **Figure 3**.

Further design of storm sewers design and overland flow routing for the Site is to be completed during detail design for Site Plan Control.

4.0 DEVELOPMENT FLOODPROOFING

According to the WERSMSM design requirements, the minimum building opening elevation should be the higher of the following:

- 0.30 m above the regulatory flood level for a neighboring watercourse.
- 0.30 m above the 100-Year water surface elevation (WSEL) on-site; or
- Climate Change stress test WSEL on-site.

Hence, for the subject's site, a minimum building opening elevation of 187.78m (UST Dry Pond WSEL of 187.78m) will be provided.

5.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures are to be implemented during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987) and "Construction Specification for Temporary Erosion and Sediment Control Measures" (OPSS 805)

6.0 CONCLUSIONS AND RECOMENDATIONS

The SWM design proposed for 3694-3738 Howard Avenue Development meets all regional and provincial requirements to satisfy the Zoning Bylaw application requirements at this time.

The proposed SWM design for the Site includes the following:

- Quantity Control to be provided through the use of the existing Orchards Subdivision Dry Pond;
- Dry Pond is shown to have sufficient capacity to accommodate quantity control for the Site for all storms, up to and including the 100-year and UST events, including during the zero release design condition during the 100-year event;
- Incorporation of the Site into the existing Dry Pond does not adversely impact existing roadway ponding through the Orchards Subdivision;
- Dry Pond pump station capacity of 91 L/s is to be maintained;
- Water quality control will be achieved on the Site using the OGS Unit FD-5HC sized to achieve a Normal (70% TSS) Level of Treatment.
- A minimum building opening elevation of 187.78m is to be considered during detailed design.

This report is respectfully submitted for review and approval. Should you have any questions, we would be pleased to discuss the results of our evaluation in further detail.

DILLON CONSULTING LIMITED

Ryan Langlois, P.Eng.
Water Resources Engineer

FIGURES

REFER TO SWM TECHNICAL DESIGN BRIEF FOR FIGURES & APPENDICES

APPENDIX A

BACKGROUND INFORMATION

REFER TO SWM TECHNICAL DESIGN BRIEF FOR FIGURES & APPENDICES

APPENDIX B

MODELLING ANALYSIS AND SWM DESIGN

REFER TO SWM TECHNICAL DESIGN BRIEF FOR FIGURES & APPENDICES